Williams Syndrome, Specific Language Impairment and Modularity

Vesna Stojanovik

Thesis submitted in fulfilment of the regulation for the degree of Doctor of Philosophy

Department of Human Communication Sciences
University of Sheffield

December, 2002

Acknowledgments

First of all, I would like to thank my main supervisor Dr Mick Perkins, for his guidance, patience, thought provoking discussions and for encouraging my creativity and independence during the PhD process. I would also like to thank my second supervisor, Dr Sara Howard, for her support throughout the course of the thesis, and especially in the earlier stages, when the knowledge and experience from a speech and language therapist was more than needed and much appreciated. I am indebted to Dr Marcin Szczerbinski for helping me so generously with the statistical analysis of the data and for his challenging questions on various issues related to the thesis.

Special thanks must go to Dariel Merrils for being exceptionally kind and helpful in the process of recruiting participants for the study; and also to Caroline Pickstone for putting me in touch with relevant speech and language therapists. I would like to express my utmost gratitude to the children and staff from Alderwasley Hall School, for their wonderful cooperation; to the children and staff of Hunters Bar School; and to the staff and members of the Williams Syndrome Foundation.

My warmest thanks to my dear friends who shared in my excitements but also in moments of crisis. Special thanks to Sarah James for reading and commenting on drafts of the thesis, helping with the inter-rater reliability, putting me up and for being a wonderful colleague and friend; to Ela Nutu for cooking those wonderful lunches and dinners and for always having a sympathetic ear; to Michelle Pascoe, for being such a great officemate, for her patience and warm heartedness, and for her help with the conversational analysis; and many thanks to Janet Bailey, Olga Popovic, Blagoj Temov, Bashkim Hajrulau, Peggy and Graham Reid, Chris Salmon, Rennie Sverdloff, Ghada Khattab, Diane Nelson and Hella Reese, for their constant encouragement and moral support.

Last but not least, I would like to thank my dear parents for their endless patience in listening to my moans and concerns, and for always being able to find words of comfort and support; and to my beloved sister for keeping my spirits high and boosting my positive energy with her sense of humour. And many special thanks to my great aunt for her generous financial support during my PhD time.

For my parents

Summary

Williams Syndrome, Specific Language Impairment and Modularity

It has been widely claimed that the language abilities in individuals with Williams Syndrome (WS) provide evidence for dissociations between verbal and non-verbal cognitive processes, thereby supporting the modularity hypothesis. Although previous research has delineated a variety of skills and weaknesses in the WS profile, the reported results have been conflicting and inconsistent. It has also been claimed that WS is the 'opposite' of Specific Language Impairment (SLI), that is, that, in contrast to SLI, individuals with WS have relatively well preserved linguistic abilities in the face of cognitive deficits. However there have not been any studies that have directly compared the two populations on verbal and non-verbal tasks.

The aims of the present thesis are: to investigate whether individuals with WS show superior verbal abilities in comparison to their non-verbal cognitive functioning; to investigate whether the individuals with WS show the 'opposite' profile to that of individuals with SLI; and to address the question of whether WS offers support for modular views of language.

Case study series of five participants with WS and five participants with SLI were carried out. The study not only gathered information from a range of standardised verbal and non-verbal tests but, most importantly, combined these results with analysis of conversational interaction and narrative discourse, which has not been done previously. The results suggest there is a wide variability among individuals with WS (and those with SLI), and that the linguistic abilities of individuals with WS can often be severely impaired, sometimes being even inferior to those of children with SLI. Furthermore, there seems to be no statistically significant difference between the WS and the SLI profile with regard to their linguistic abilities, although the two profiles are clearly distinct regarding their non-verbal abilities.

The results are discussed in light of the relevant literature and the current theoretical debates on modularity.

Table of contents

List of abbreviations

BD – Block Design

BPVS – British Picture Vocabulary Scale

CELF – E – Clinical Evaluation of Language Fundamentals (Expressive Language)

DS – Down Syndrome

FIQ – Full Scale Intelligence Quotient

FS – Formulated Sentences

IQ – Intelligence Quotient

MA – Mental Age

OA – Object Assembly

PA – Picture Arrangement

PC – Picture Completion

RCM – Ravens Coloured Matrices

RS – Recalling Sentences

SA – Sentence Assembly

SD – Standard Deviation

SLI – Specific Language Impairment

TROG – Test for the Reception of Grammar

VIQ – Verbal Intelligence Quotient

WS* - Word Structure

WS – Williams Syndrome

Conversational analysis procedure

<A> - Adult Interrupt

CN – Continuation

ESS – Expressive Syntax/Semantics

F – Follow Up

FCC – Failure to Use Context in Conversation

FILIM – Failure to Interpret Literal/Inferential Meaning

F/IS – Follow-Up Initiation

<G>- Gap

<I> - Inadvertent Overlap

II- Ignoring an Initiation while Remaining on the Topic

IN – non – soliciting information

IS – Soliciting information

O – Other

RE – Extended Response

RIO – Open Request for Information

R-IS – Response Initiation

RM – Minimal Response

RMn – Minimal Non-Verbal Response

RMv – Minimal Verbal Response

RQCL – Request for Clarification

RQCN – Request for Confirmation

TLI – Too Little Information

TMI – Too Much Information

U – Unanalysed Utterance

USICS – Socially Inappropriate Content or Style

<V> - Violating Overlap

WISC – Weschler Intelligence Scale for Children

WISC –P – Weschler Intelligence Scale for Children - Performance

Narrative discourse analysis

addit – Additive tie

adver – Adversative tie

ANT – Antonymy

contin – Continuative tie

CL - Clause

CU – Communication Unit

MLCU (CL) – Mean Length of a Communication Unit in Clauses

PW – Part-Whole Relationship

RPT – Repetition

SS – Subordinate - Superordinate Relationship

Sub – Subordinate Clauses

SYN – Synonymy

tempor – Temporal tie

CHAPTER 1.

Introduction and outline of the present research study

> *"One reason for studying language – for me personally the most compelling reason – is that it is tempting to regard language, in the traditional phrase, as "a mirror of mind".*
>
> (Chomsky, 1975:4).

1.1 The phenomenon of language acquisition

Acquiring language is one of the most important accomplishments in early child development. By the time they are three or four years of age, children from all over the world have mastered the major components of their native languages, regardless of how complex the grammar and the sound system of a particular language may be. At around school age, children already know how to manipulate their language according to the social and communicative demands of the particular situation; they know the meaning and the pronunciation of

thousands of words, and they correctly use a wide variety of grammatical forms. And language development does not cease when the individual reaches school age, adolescence or maturity – the developmental process continues throughout the life cycle.

This universal human achievement, the ability to acquire language, poses some of the most challenging theoretical and practical questions of our times (Berko-Gleason, 2001:1):

> *"How and why do young children acquire complex grammar? Are there theories or models that can adequately account for language development? Is language a separate capacity, or is it simply one facet of our general cognitive ability? What is it that individuals must know in order to have full adult competence in language, and to what extent is the development of those skills representative of universal processes? What happens when language develops in atypical conditions (serious economic or social deprivation) or as a result of brain damage? Where are the loci of language in the human brain?"*

Scholars from Plato to Wittgenstein have investigated the complex processes involved in child language acquisition as a way of exploring broader questions about the capacities and functions of the human mind and there is a lively research scene within present day science devoted to child language acquisition. Yet despite years of research the answers to the above questions are still hotly debated and far from definitive. There have been several theoretical perspectives offered, which will be briefly presented in the following section.

1.2 Theoretical perspectives - The Modularity debate

> *"It is an established opinion amongst some men that there are in the understanding certain innate principles: some primary notions, characters, as it were stamped upon the mind of men: which the soul receives in its very first being, and brings into the world with it. It would be sufficient to convince unprejudiced readers of the falseness of this supposition, if I should only show...how men...may attain to all the knowledge they have, without the help of any innate impressions; and may arrive at certainty, without any such original notions or principles..."*

Even though it has been over three hundred years since the British philosopher John Locke wrote these words in his *Essay Concerning Human Understanding*, (quoted in Bishop, 1999:2283), there is still a vehement debate about how much "innate" linguistic knowledge an infant is born with, i.e. how much specific

information, if any, is innate (Karmiloff-Smith, 1998; Paterson, et al., 1999; Bishop, 1999). The fact that language is part of the biological endowment of all human beings rather than an arbitrary learned skill has been widely accepted. What is at the heart of a heated debate is the content of this endowment.

Broadly speaking, those working within the domain of language acquisition and seeking theoretical explanations for this complex phenomenon have been divided into two opposing 'camps': the Nativist and the Cognitivist.

During the 1960s there was a cognitive revolution, which had as its aim to attack the claims of the dominating Behaviourism at the time. This in turn meant the emergence of a new branch of psychology, called *Cognitive Psychology*, but also a new line in the development of linguistics, Chomsky's *Theory of Universal Grammar* (Chomsky, 1957, 1965). The most important proposal which weakened and eventually defeated Behaviourism was the idea that language is a *mental* process rather than a stimulus-response relationship (Chomsky, 1957, 1965).

Even though both cognitive psychology and Chomskyan linguistics were based on the same starting assumption, i.e. they were both concerned with understanding the way language is represented in the human mind, they differ a great deal in their research practice. Whereas for the adherents of the Chomskyan tradition language is assumed to be part of our innate mental ability, embodied in a specialised brain module and developing independently of our general cognitive abilities, the Cognitivists (who largely relied on Jean Piaget's theory of language acquisition) argued that some cognitive prerequisites are necessary for the acquisition of language to occur, which means that language is largely inseparable from general cognitive processes.

The publication of Fodor's (1983) *Modularity of Mind* had a profound impact on the study of language, with its claim that many of the processes involved in language comprehension were undertaken by special brain systems termed *modules*[1] which are domain specific in that they have no impact from the central processes. This domain specificity of language has become a fundamental feature that differentiates competing theories and accounts of language acquisition (Bates et al., 1988; Bates et al., 1995; Fodor, 1983, 1985; Levy, 1994;

[1] Note that the term module was first used by Chomsky, 1965.

Roeper and Seymour, 1994). On one end of the debate are those who believe that human cognition is a modular system consisting of independently functioning modules which are present from birth, are responsible for specific domains and can process only certain types of information. Thus they can be differentially spared or impaired (Pinker, 1991, 1999; Fodor, 1983, 2000). At the other end of the debate are those who believe that there is no need to presuppose any initial domain specific structures and that modules are a product of development (Karmiloff-Smith, 1992, 1998; Elman et al., 1996; Paterson et al., 1999). More details about the differing theoretical assumptions will be provided in Chapter 2. What is important to be mentioned in this introductory section is the contribution of atypical populations to the ongoing debate.

1.3 Why study atypical populations

David Crystal (1987) observed that we come to appreciate the unique complexity and function of language 'only' when a language breakdown occurs. From a historical point of view, aphasia studies were extremely important for the discovery of the major loci of language functions in the human brain. Thus for example pioneering work by Mark Dax in the first half of the 19th century which was later followed by Paul Broca and Karl Wernicke has been extremely informative as to the main locus of language functions in the human brain, which identified the left hemisphere as the main locus for processing language.

More recently and over the past two decades in particular, the field of developmental psycholinguistics has experienced a rich tradition of relying on evidence from atypical populations to inform theories of language acquisition (e.g. Curtiss, 1977; Lenneberg, 1967; Yamada, 1990). There are a number of studies on adult aphasia which describe and explain selective impairment and sparing of particular linguistic and cognitive competencies (Bates & Thal, 1991; Caramazza & Berndt, 1978; Grodzinsky, 1986). A substantial body of evidence in support of or against theories of modularity has been accumulating from reports of individuals who appear to disobey the expected linear relationship between cognitive development and linguistic competence such as children with

Specific Language Impairment (SLI) and children with Williams Syndrome (WS).

SLI is a language disorder which involves a primary deficit in morpho-syntax while general cognitive development seems to be unimpaired. WS on the other hand, which results from a genetic anomaly in chromosome 7, typically presents with an uneven neurocognitive profile, in that the linguistic abilities seem to be much more advanced than non-verbal abilities. However whether the picture is as clear cut has been a subject of much debate. In fact, the current Nativist Vs Cognitivist debate has been reflected in the research of atypical development.

A large body of literature has been devoted to the way WS can support claims for modularity (Bellugi et al., 1988, 1989, 1994, 2000; Clahsen and Almazan, 1998; 2001). On the other hand, there are a number of reports which claim that the neurolinguistic profile of individuals with WS does not support modularity in a Fodorian sense, but may support modularity in a developmental sense (Karmiloff-Smith., 1992; 1998). There have been those who argue that WS and SLI are the opposite of each other and show *double dissociations*, i.e. that WS presents with relatively good linguistic skills and poor non-verbal skills and the opposite is the case with SLI, which presents with relatively good non-verbal skills but poor linguistic skills, thus offering support for the modular structure of human mind (Pinker, 1994, 1999; Smith and Tsimpli, 1995; Smith, 1999; Van der Lely, 1997a,b; Clahsen and Almazan, 1998; Clahsen and Almazan, 2001).

The reports on WS found in the relevant literature are controversial and far from conclusive as to whether WS presents with a superior verbal profile in the face of impaired non-verbal abilities. The research so far further suggests quite a vast variability across subjects, which includes the possibility of a rather heterogeneous linguistic profile. Even though previous research has delineated a variety of skills for individuals with WS, the profile of strengths and weaknesses has not been consistent among studies and more research is needed in order for us to get a clearer picture of the WS cognitive and linguistic profile. Furthermore those who argue that WS is the opposite of SLI, either rely on other studies which had independently considered WS or SLI (for example Pinker 1999 cites Bellugi's studies on WS and van der Lely's studies on SLI) or had done independent research on one group only, either only WS (Clahsen and Almazan

1998; 2001) or only SLI (van der Lely, 1997a) and then rely on other studies in order to argue that the two clinical groups show contrasting profiles. Therefore the question of whether WS is the opposite of SLI remains open and so does the question of whether WS really presents a case in support of modularity. Furthermore, most of the studies on WS have not yet considered detailed profiling of the linguistic abilities in WS, which would not only rely on standardised tests but would also gather data from spontaneous speech and narrative discourse. These are the issues that the present piece of research sets out to address and which will be explored and discussed in more detail throughout this thesis.

1.4 Aims and outline of the thesis

This thesis is organised in 7 chapters. Chapter 2 presents a background to the modularity debate by providing a brief summary of the history of innate ideas, starting from classical Greece, through the 17th and 18th century debate between the empirisists and nativists and up to the present day, and discusses the theoretical importance of studying atypical populations, particularly WS and SLI. A review of the literature with respect to the current debate as to how SLI and WS are relevant for and can inform theories of modularity is also presented. Chapter 3 provides details of the methodology employed for the current research study. Chapter 4 presents the profiles of five children with WS incorporating information about their verbal and non-verbal abilities on standardised language tests, in spontaneous conversation and in narrative discourse. Chapter 5 presents the individual profiles of five children with SLI along the same parameters of verbal and non - verbal functioning as for the participants with WS. Chapter 6 provides a statistical analysis of the results within the WS and the SLI profiles and also between the two groups. Finally, a discussion of the findings resulting from the statistical analysis in relation to the existing literature and the current modularity debate is presented in Chapter 7.

CHAPTER 2.

Williams Syndrome, Specific Language Impairment and the Modularity Debate

2.1. Introduction

In this chapter, I will lay out the background for studying Williams Syndrome (WS) and Specific Language Impairment (SLI) by positioning it in relation to the controversy surrounding the currently two most opposed 'camps' with regard to theories of language acquisition: the Nativist and the Cognitivist, and the controversy surrounding the Modularity debate. For this purpose a general overview of modularity and some key issues related to it, as well as non-modularist views will be presented first, which will be followed by a review of the representative literature regarding the relevance of studying atypical development such as WS and SLI to issues of modularity. I will end the chapter with a discussion of why some previous work in this area may have yielded contradictory findings. I will conclude the chapter by outlining the research questions.

2.2. Theoretical approaches to language acquisition

As already mentioned in the introduction, in broad terms, there are two major theoretical viewpoints as to whether language acquisition can be explained in terms of an ability to learn and use symbolic rules, related to the Nativist tradition, or whether it can be explained solely through associative capacities, related to the Cognitivist tradition. For the Nativists, language is autonomous from other cognitive processes, a separate language module, instinct or perhaps 'organ' is assumed, which develops in isolation from general social, cognitive and perceptual abilities. According to those who on the other hand argue in favour of the Cognitivist Approach, the human ability to learn language is a result of more general social, cognitive and perceptual abilities.

A brief look at the history of philosophy reveals that the debate is not that recent. There seems to be a continuity of a Nativist tradition spanning almost three thousand years and present day proponents of Nativist ideas (primarily Noam Chomsky and Jerry Fodor) exemplify one component of that tradition. There is also a continuity of the Cognitivist tradition spanning at least over three hundred years. What follows next is a brief overview of the history of innate ideas and the historical debate which gives some background to the contemporary controversy.

2.2.1. The origins of the Nativist tradition

Ideas about the possibility of the human mental structure being internally rather than environmentally determined dates back several centuries BC, at the time when the Greek philosopher Plato launched his doctrine of *anamnesis*. According to this doctrine, so-called learning is a matter of 'recollecting' knowledge that was in fact acquired before birth, as our souls "communed in incorporeal congress with the Forms" (Cowie, 1999:13). The doctrine of *anamnesis* was developed primarily as a solution to the psychological 'acquisition problem', which is "How does what is in our minds come to be there?" Plato argues that much of what is in our minds must be innate, as the

information provided through our sensory experience is insufficient to account for our acquisition of certain concepts and beliefs.

2.2.2. Cambridge Platonists and Rationalist Philosophers of the 17th and 18th centuries

Ideas about the innate properties of the human mind were revived again by early 17th century Cambridge Platonists and rationalist philosophers such as Descartes and Leibniz in the 17th and 18th centuries. Their Nativist ideas were very different from the contemporary ones. The claims and motivations of the early 17th century Cambridge Platonists stemmed from the fear of some that traditional Christianity was being threatened by the rise of modern scientific materialism (Cowie, 1999). Thus in order to preserve Christian dogma and values against the contemporary scepticism, the Cambridge Platonists sought to defend their favoured moral and religious beliefs by establishing that they are innate.

Leibniz and Descartes however held the view that all our beliefs and concepts are innate and that they are not influenced in any way by the environment. According to Leibniz the soul does not have windows and, therefore nothing that comes from the outside, i.e. the environment could provide the soul with ideas or beliefs. Even though Leibniz admits that "the outer senses can be said to be, in a certain sense, partial causes of our thoughts" (1981:74) the real truth according to Leibniz is that "all the thoughts and actions of our soul come to it from its own depth and could not be given to it by the senses" (1981:74). Along similar lines to Leibniz, Descartes also argues that experience cannot give rise to ideas, and that all our ideas are innate.

The rationalists of the 17th and 18th centuries were challenged by the Empirisists such as Locke, Berkeley and Hume, according to whom all beliefs are either direct consequences of sensory stimulation or have been acquired from other beliefs via induction or deduction. Thus the argument proposed by the Empirisists is that there is an inborn ability to 'acquire' primitive ideas directly from sensory experience (Cowie, 1999) but that there are no innate ideas.

From what has been said above, it seems that while both sides of the argument would agree that humans are born with the capacity to register, interpret and store information obtained from experience, they disagree about the

character of that capacity. Whereas for the Empiricists our learning mechanisms are based on generality (i.e. there are general-purpose mechanisms and acquisition phenomena can be explained in fundamentally the same way), for the Nativists certain learning tasks require task specific or special purpose, learning mechanisms in addition to those that Empiricists allow. Thus according to the Nativists, inborn intellectual abilities are domain specific. While the Empiricists try to solve the acquisition problem by positing a causal explanatory model, i.e. the action of experience on our minds, the Nativists try to solve the problem by positing a hypothesis of universal innateness which emphasises the fact that acquisition phenomena have an enigmatic character and they are impenetrable to our sensory experience.

In the 17th and 18th century, and in a good deal of European and American philosophy since then, one of the main points at issue has been the relationship between the mind and our perception of the external world (Lyons, 1970). The Empiricist doctrine has been very influential in the development of modern psychology, whereas Rationalist ideas have been very influential for the development of current linguistic theory.

Despite the fact that all contemporary scientists involved in the study of language acquisition would agree that development involves contributions from both genes and environment, there is still a strong disagreement as to how genes and environment are claimed to contribute to developmental outcomes. The debate seems to be unresolved as yet. As already mentioned a number of times, in very broad terms, researchers divide into two opposing factions, the Nativist VS the Cognitivist 'camp', which will be considered in more detail in what follows next.

2.3. The Contemporary Nativist Approach

The first half of the 20th century was dominated by a behaviourist view of language acquisition according to which acquiring human language was seen as a stimulus-response phenomenon and the idea that linguistic abilities get established in childhood as a result of training provided by the members of the child's immediate linguistic environment. According to the main proponent of

Behaviourism, Skinner (1957), language is just another behaviour which can be acquired through explicit teaching and reinforcement.

In his attempt to attack and destroy behaviourist explanations of language acquisition, Noam Chomsky in the late 1950s launched what has become known as a Nativist revolution. According to Chomsky, linguistics can make an important contribution to the study of the human mind and it can provide evidence in favour of one position rather than the other in the long-standing philosophical dispute between the rationalists and the Empiricists (Lyons, 1970).

The adherents of the Nativist tradition argue against the simplistic and rather mechanical behaviourist way of explaining language acquisition and propose that the adult linguistic system as described by generative grammar is to be taken as a starting point for explaining language acquisition. A generative grammar is a set of rules or procedures which allow one to generate all and only the grammatical sentences in a language. It will characterise all the sentences which already exist in the corpus and also predict the existence and properties of new sentences (Chomsky, 1965).

In their first years of life children will hear only a limited number of sentences; yet by the age of 5, they will be able to freely generate an infinite number of sentences, sentences that they had never heard before. This is what Chomsky often refers to as *Plato's problem of knowledge acquisition*, but in this case the problem of knowledge is almost exclusively approached in relation to language. Thus in order to be able to learn language, the child must be 'equipped' with a method for devising an appropriate grammar, given primary linguistic data. The precondition is that the child possesses a linguistic theory which specifies the form of grammar of a possible human language and a strategy for selecting a grammar of the appropriate form which will be compatible with the primary linguistic data. Chomsky (1965) refers to the term Universal Grammar (UG) to denote the preformed 'linguistic theory', i.e. that initial pre-specification of the form of possible human grammars. Such an explanation in its turn requires the postulation of specifically linguistic innate constraints. What is meant by linguistic constraints is the fact that during the language acquisition process, the learner does not consider the data in a certain light, even though it may seem logically possible to do so. Thus a linguistic constraint is some sort of formal means which prevents the language learner from

formulating a system that might seem possible on various interpretations of the input data, but that will produce incorrect output (Maratsos,1992). For the purpose of illustrating the term constraint, an example will be taken from the Government and Binding Theory (Chomsky, 1981). The theory postulates an 'innate principle' which states that every sentence must have a grammatical subject at some level of analysis, even if none seems to appear in the sentence (e.g., an imperative like "drink your milk"). Thus the constraint rules out any hypothesis that a sentence in any possible human language might lack an underlying subject. As mentioned in the introduction, another very important aspect of the nativist theories of language acquisition is the assumption that the human mind is 'modular' and that language is a separate and independent module, which will be discussed in more detail in the following section.

2.3.1. How did the idea for brain modules emerge?

The Chomskyan position is that humans have an innate brain system that constraints knowledge, that is extremely abstract and independent of our perceptual abilities, is not tied to any modality, and is highly specialised for language learning. Language is assumed to be part of our innate mental ability, embodied in a specialised brain module. In his *Aspects of the Theory of Syntax* (1965), Chomsky proposed four main modules: a base component, a transformational component, a semantic interpretive component, and a phonological component.

The transformational component contained the deep and surface structures[1]. The deep structures themselves comprised the output of the base component module. The base component module consisted of two main parts: phrase structure rules that generated deep structures, and the lexicon which contained information about individual lexical items with regard to which

[1] For example 2 sentences: "The police arrested the murderer" and "The murderer was arrested by the police" have an intuitive relation between them despite the surface difference in the sequence of words and the details of verb and noun phrase marking. This relationship was captured by assuming that their deep structure had similar phrase structures. In both sentences, the noun phrase (NP) "the police" in the underlying subject of the main verb "arrest" and "the murderer" is the underlying NP object of "arrest". To produce the passive form a transformational rule of passivisation applies and interchanges the two NPs "the police" and the "murderer".

syntactic deep structures they could appear in. Thus for example, the information that "arrest" is a transitive verb that can take both a syntactic underlying subject and object is stored in the entry for the verb "arrest" in the lexicon.

The semantic interpretive component is the component responsible for reading of the meaning of the sentence using information from the deep structure and the lexicon whereas the phonological component is responsible for supplying the actual sound representations of the sentence, such as stress patterns (Maratsos, 1992). An important property of this system was the *autonomy* of the syntactic component (the base plus transformational rules). What this meant was that the elements referred to in the syntactic rules are hypothesised to be purely syntactic elements: they are not semantic, conceptual, or any kind of non-syntactic element. For example the fact that in a sentence: "*The police arrested the murderer*" the NP "the murderer" refers semantically to a conceptually animate, human individual plays no role whatsoever in the operation of the syntactic rules; it is the semantic interpretive component which is supposed to have access to this information. Thus whereas the interpretive components mix syntactic representations with other kinds of representations (for example the semantic interpretive component registers the fact that "the police" in the above example is a syntactic deep subject of the verb "arrest" in order to interpret "the police" as an agentive doer of the arresting action), the syntactic components are homogeneously composed of component-specific elements which are not mixed with any other kind of representations.

This early model of linguistic structure proposed by Chomsky (1965) was probably the first well-known modular model of higher cognition. It was also claimed to be 'innately specified' in that all human languages were supposed to have this kind of particular modular structure.

In Chomsky's later work, namely the Theory of Government and Binding (GB) (1981), also known as the Principles and Parameters Framework (PP), the earlier modular model was revised. Thus the distinction between the Base and the Transformational components of the grammar became blurred, as many of the structural constraints and the constraints on movement apply at both derivational levels, and there was no need for two separate 'modules'.

In his most recent proposal, Chomsky (1995) excluded the distinction between the base and the transformational component. In the 'Minimalist

Program' Chomsky (1995) includes only one syntactic component where the lexical properties of words and a variety of constraints on movement and tree structure interact and produce at interface level (called the 'Spell Out') two representations of the sentence. These two representations in turn serve as inputs to two levels: one related to sound called the morphophonological (PF) level and the other one related to meaning, called the semantic (LF) system.

With regard to language acquisition, Chomsky (1965) quite explicitly pointed out that children might require all kinds of environmental support to acquire language. Such environmental supports however do not affect the form of the language (i.e. Syntax). In other words, children develop grammatical competence spontaneously without any formal instruction or training. All they need is interaction with other people and exposure to normal language use. By being exposed to human language, children hear a number of grammatical sentences which allows them to form an internal representation of the rules that generate grammatical sentences. However the evidence available to the child does not determine the underlying rules (Chomsky, 1965). In his 1980 work, Chomsky suggests that:

"*what we loosely call "knowledge of language" involves in the first place knowledge of grammar ...and beyond that other cognitive systems that interact with grammar: conceptual systems with their specific properties and organising principles may be quite different in character from the "computational" language faculty; pragmatic competence might be a cognitive system distinct and differently structured from grammatical competence; these systems may furthermore be composed of distinct though interacting components* (Chomsky, 1980: 90).

From this it follows that, Chomsky's suggestion views knowledge of language as comprising rules, principles and representations, i.e. it views grammar as a separate faculty to pragmatics. Thus for Chomsky, language form is a separate system from the other cognitive processes and language use (pragmatics).

Chomsky is not the only one who viewed human cognition as being modular. Another very influential theory of modularity which has had a great influence in the field of linguistics, psychology and philosophy is that of Jerry Fodor, which will be discussed in what follows next.

2.3.2. Fodorian Modularity

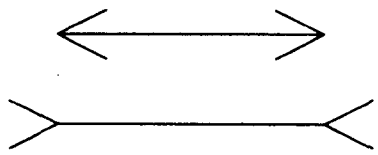
The publication of Fodor's (1983) *Modularity of Mind* had a profound impact on the study of language, with its claim that many of the processes involved in comprehension were undertaken by special brain systems termed modules. This domain specificity of language or *modularity* has become a fundamental feature that differentiates competing linguistic theories and accounts of language acquisition (Bates et al., 1988; Bates et al., 1995; Fodor, 1983, 1985; Levy, 1994; Roeper and Seymour, 1994).

Fodor (1983) argues for a distinction between a central system responsible for rational thought and the fixation of belief, and a number of modular input systems, one for each of the senses, which feed the central system. The argument which Fodor puts forward is that whereas cognitive tasks, such as for example long-term memory and problem solving, are carried out by non-modular, relatively slow central processes, other, primarily input systems, are modular. The language faculty is viewed as an input system on a par with the senses such as vision. Fodor's main examples of modules are language comprehension and visual perception. The modules are input driven and they operate in a bottom-up fashion.

There are various criteria required for a system to be counted as a module and these include the following:

- ***domain specificity***, which means that a module is constrained as to the range of information it can access, which in turn means that each module is specialised to perform operations using a limited range of components;

- ***information encapsulation***, which means that the processing only occurs in a bottom – up manner, hence information travels only one way: information from higher levels is not fed back to lower ones. In other words, modules have only very limited access to each other. A classic example of informational encapsulation provided by Fodor is what is known as the Muller-Lyer illusion.



According to Fodor (1983) if the systems were completely open to each other, one might expect that the perceptual system could be "persuaded" by the cognitive system that the lines are indeed still equal. But because the module of perception is encapsulated it only allows restricted access to information from other systems, in this case the cognitive system.

- ***mandatoriness***, which means that there is no voluntary control over the kind of input which gets processed nor whether relevant input gets processed;

- ***speed of operation***, which means that information processing occurs rapidly and repetitively;

- ***lack of access by other systems to intermediate levels of representations***, which means that the information which gets processed by the module is not available to conscious awareness;

- ***shallow output***, which means that a module is specialised to compute only a limited number of representations;

- ***neural localisation***, which means that there is a fixed neural architecture to every module, i.e. a specific brain region which is dedicated to the function of a module. They are 'hard wired', which means that they are given by evolution as part of the biology of the organism.

- ***characteristic pace and sequencing of development***, which means that the development of a modular function depends on the maturation of endogenous systems rather than any environmental influences;

- ***susceptibility to idiosyncratic pathological breakdown***, which implies that if there is a focal brain injury it will cause selective impairment while the non-affected areas of the brain will be functioning normally.

Fodor points out however that the "the key to modularity is informational encapsulation" (1983:98). All the other characteristics of modules may be present but they are not that crucial.

By examining the patterns of impairment after damage one can discover which modules are specialised for which operation. It is the neural specificity of the architecture of the modules that is claimed to be genetically determined i.e. innate. (Pinker, 1994, 1999; Fodor, 1983; Chomsky 1965, 1986).

Even though Fodor's work was very much under Chomsky's influence, their views on modularity differ. Chomsky does not share Fodor's view that the central system is inscrutable. Chomsky adheres very much to the claim that the central system should be fractionated into different domains, such as moral judgment, face recognition, theory of mind, etc (Smith, 1999). In order to account for such a picture, Smith and Tsimpli (1995) proposed a distinction between modules, corresponding roughly to Fodor's input systems, and "quasi-modules", relating to domains like face recognition and theory of mind. Like modules, quasi-modules are domain specific, they operate with a great speed and they are mandatory, subserved by particular neural architecture, which allows for the manifestation of *double dissociations*[2]. Thus for example autistic people, who are characterised by a defective theory of mind, may be of normal intelligence but be unable to perform successfully on false belief tasks; or individuals with Down's syndrome, who may have deficits in their general intelligence and delayed language, may be successful on theory of mind tasks.

Now that the main ideas of the Nativist approach have been presented and the notion of Modularity addressed, the other end of the theoretical debate, the Cognitivist approach, will be considered in more detail.

[2] This term will be discussed in further detail in 2.6.3.

2.4. The Cognitivist Approach

Deriving largely from Piagetian Theory (Piaget, 1962), a second 'camp' was formed largely in the 1970s. Even though it may seem that the Cognitivist 'camp' will be a kind of a continuation of the Empiricist thought of the 17th and 18th century this did not seem quite to be the case, as Piaget explicitly said:

> "*The critique of empiricism is not tantamount to negating the role of experimentation, but the "empirical" study of the genesis of knowledge shows from the onset the insufficiency of an "empiricist" interpretation of experience. In fact, no knowledge is based on perceptions alone, for these are always directed, and accompanied by schemes of action. Knowledge, therefore, proceeds from action, and all action that is repeated or generalised through application to new objects engenders by this very fact a "scheme", that is, a kind of practical concept*".
>
> (Piattelli-Palmarini, 1980:23/24)

This quote from the Piaget-Chomsky debate suggests that even though Piaget does not fully discard the role of experience in knowledge acquisition, he emphasises the necessity of the human subject having an important role in structuring activity. Thus knowledge is supposed to proceed from action, or what Piaget terms 'assimilation' of objects to the schemes of the subject. How is such a proposal relevant to language acquisition?

According to Piaget language is facilitated by the development of sensory-motor schemas that represent the joint outcomes of perception and action. The sensory-motor schemas undergo orderly changes which are nourished but not shaped by continuing experience in acting on the world. This means that in due course the child will be able to separate thought from action in his schemas, and his concepts of objects and events in the world will become independent of the actions to be performed on them. Thus in order for the language acquiring infant to be able to make the linguistic distinctions such as Object and Action (i.e. NP and VP) they need to acquire the concept that Object is independent of Action.

For Piaget, language is a manifestation of intelligence and hence not dissociable from it. It is also argued that certain cognitive prerequisites are necessary for the acquisition of language. The idea is that the normal development of language is parasitic on the prior mental development of such abilities as "seriation" and "conservation". In order to acquire such linguistic

structures as correct word order or the passive, children were supposed to have reached a level of cognitive development at which they could carry out tasks such as putting items in ascending order of size (seriation), or judging that the amount of liquid poured from a tall thin glass into a short one remained the same (conservation).

The adherents of this approach postulate that it is semantics which provides an entry wedge into the grammatical system. This means that it is unnecessary to postulate any innate knowledge. In the early stages of the development of the semantic approach to language acquisition, cognitive development was seen in relation to semantic development, i.e. it was postulated that syntactic categories could be reduced to semantic concepts, which in turn were built up from developing knowledge about the world (e.g. Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979). Children interpret the world in terms of such relations as agent, location, and patient, and learn how these are expressed by linguistic means: word order, function words, and inflections. Thus the children's early linguistic system, which is semantic in nature, allows them to eventually break into the grammar of their native language (Schlesinger, 1994).

This idea was later extended to include social interaction and pragmatics (e.g. Bates, 1976; Bruner, 1975). Hence the social-interactionist view of language acquisition emerged, according to which syntactic categories and rules are discovered through nonverbal interaction between the infant and the caretaker. Bruner (1975) emphasises the fact that in order for us to understand the child's transition from a pre-speech communication system to fully developed language, we need to take into account the uses of communication as speech acts. Language acquisition according to Bruner (1975) is an 'action dialogue' in which joint action is being undertaken by both the infant and the adult. As Bruner put it:

"It is this joint enterprise which sets the deictic limits that govern joint reference, determines the need for a referential taxonomy, establishes the need for signalling intent, and provides a context for the development of explicit predication".

(Bruner, 1975: 284)

This quotation summarises Bruner's view on language acquisition that it is only through interaction with the caregiver that the child will start learning the meaning of new words, which will eventually lead to the need for

communication to develop, which again in turn will lead to the child developing sentence structure.

More recently, a usage-based model based on the earlier assumptions of the cognitive semantic approach has been proposed according to which children's early utterances are organised around concrete and particular words and phrases, not around any system-wide syntactic categories or schemas. Abstract and adult-like syntactic categories and schemas are observed only to emerge gradually and in piecemeal fashion during the preschool years (Tomasello, 2001). It is proposed that at first children learn by imitating concrete linguistic expressions and then slowly and gradually - by using their general cognitive and social-cognitive skills – they categorise, schematise, and creatively combine these individually learned expressions and structures to reach adult linguistic competence. Thus, for example, children begin to form an abstract category of "concrete noun" quite early, and this allows them to use any symbol categorised in this way productively in a wide range of linguistic contexts (Tomasello, 2001). Having item-based constructions to start off with, children will then progress and try to find patterns in the language they are hearing, and thereby form some kinds of abstract categories or schemas.

It has been pointed out that cognitive and social-interactionist theories of language acquisition are reductionist theories, assuming that syntactic categories and rules derive from cognitive or social constructs (Tager-Flusberg, 1994). There is ample evidence that syntax is considerably more abstract and irreducible, and that children acquire structure-dependent rules based on syntactic categories at even the earliest stages of acquisition (Bloom, 1990; Levy, 1988, Valian, 1986). Nevertheless, both the cognitive and social-interactionist perspectives continue to provide important interpretations for the acquisition of semantic and pragmatic knowledge respectively.

2.4.1. Connectionist approaches to language acquisition

More recently, the view that language is a product of cognition and therefore dependent on it has also been adopted by those who are mainly concerned with artificial systems that stimulate real-time comprehension. This approach has been termed "connectionism", "neural networks" or "parallel distributed processing"

or PDP. For the connectionists, limitations in attentional capacity, memory and motor programming are regarded as fundamental constraints that shape the form that languages take.

Connectionist models attempt to explain grammar in terms of natural constraints on language processing, rather than to regard grammar as something entirely independent or autonomous, whose characteristics can only be accounted for by appealing to innateness. According to the connectionist view of language, all the complexities of human thought and language can emerge from interactions among a set of processing units which can take on different activation values (Elman, et al., 1996). Thus what is called a connectionist network will consist of a set of nodes that collect input from a variety of sources (both inside and outside the system), and transmit inputs to other nodes, thereby activating them in turn. "Learning" is viewed as a result of training a network which had been exposed to vast numbers of examples of the pattern which is to be acquired. This approach presupposes no need for any kind of initial domain-specific structure to the network. This means that any form of genetically determined modularity is not needed and is therefore superfluous. The complex structure of the modular mind is a property which emerges as a result of the received input, especially the number of times that a particular stimulus features in that input. This implies that the connectionist view would not discard the idea that the mind is modular, however, it would argue that modularity results from the received input.

It has been admitted (Bishop, 1997) that connectionist approaches to explaining language acquisition still have a long way to go if they are going to develop a plausible simulation of language learning. However by confronting the Nativist approaches to language acquisition, they have highlighted the fact that some of the assumptions that had been made about language learning need to be seriously questioned. Thus for example the PDP model has been tested in a computerised simulation of the acquisition of past tense forms by Rummelhart and McClelland (1986). They presented a PDP simulation with over 400 different verbs and their past tense forms, with a frequency matched to what a child might be exposed to, i.e. irregular verbs were presented more frequently and they preceded the presentation of regular verbs. The interesting finding was that although the simulation did not learn any rules, the pattern of learning was

similar to what Pinker (1991) found in children and that is that the system initially used every verb correctly, then went through an overregularisation "stage" and finally regularising only the regular forms and correctly producing the irregular ones. What is also very important is that if the PDP net is damaged after acquiring aspects of language, it performs similarly to brain-damaged human patients (Marchman, 1993; Plaut, 1995). Thus this connectionist framework is challenging linguistic theory in its proposal that there are two separate systems (computational system for grammar and the associative system for lexical acquisition) in the human mind and that they represent independent modules.

2.5. 'Other' approaches to modularity

Since 1983, when Fodor launched his Modularity Hypothesis, the literature on modularity has been growing rapidly. This includes a lot of challenges to the details of Fodor's modularity from both philosophers and psychologists. Thus for instance, Putnam (1984), Churchland (1988) and Jackendoff (2000) have challenged the detail of the encapsulation of modules and the nature of their shallow output. Marshall (1984) has challenged the impenetrability of the internal processing of modules, whereas Karmiloff-Smith (1994) has challenged the innateness of modules. This does not by any means imply that those who have challenged the concept of modularity as presented by Fodor (1983) are against modularity. Jackendoff (2000) for example, agrees with Fodor's proposal overall; however he suggests that the "locus of modularity is not large-scale faculties such as language perception but at the scale of individual integrative, interface, and inferential processors" (Jackendoff 2000: 13).

I shall expand on Karmiloff-Smith's neuroconstructivist approach to modularity since it has been applied to atypical development, and is therefore particularly pertinent to Williams Syndrome.

2.5.1. The neuroconstructivist approach to modularity (Karmiloff –Smith, 1992, 1998)

This is a view on modularity, which as already mentioned in the introductory chapter, does not preclude the existence of modularity in the adult brain but proposes that rather than being an innate phenomenon present from the earliest stages of development, modularity is a process which results as a product of development (Annette Karmiloff – Smith 1992, 1998). This approach fully recognises the existence of innate biological constraints but it considers these constraints to be not so detailed and less domain-specific as far as higher-level cognitive functions are concerned. Development itself is seen as playing a crucial role in shaping phenotypical outcomes. The protracted period of post-natal growth is seen as essential in influencing the resulting domain specificity of the developing neocortex. (Karmiloff-Smith, 1998). This means that the child's way of processing environmental stimuli is likely to change repeatedly as a function of development, which in turn results in the formation of domain-specific representations. It is assumed that the domain specificity observed in the adult brain is the result of a progressive ontogenetic change rather than being present from birth. The relevance of this view for the study of cases such as Williams Syndrome will be discussed in section 2.6.

2.5.2. Summary

The previous discussion has outlined the two major theoretical directions for approaching language acquisition: the Nativist and the Cognitivist tradition. The debate has existed for over three hundred years having its roots in the long standing philosophical dispute between the rationalists and the empiricists, though the idea of innate knowledge is much older, dating back to the time of the Greek philosophers Plato and Aristotle. The main proponent of the Nativist tradition over the past few decades has been Noam Chomsky. Such an approach is in favour of treating the language faculty as a special 'brain module' independent of general intelligence and other cognitive processes; the opposite one is the Cognitivist tradition, deriving largely from Piagetian ideas, according to which language acquisition is just another part of human cognition, thus being

inseparable from it. The publication of Fodor's (1983) *Modularity of Mind* has had a profound impact on the recent debate and even though highly controversial, it has been one of the most productive proposals with respect to the organisation of the human mind. It stirred wide response in the field of psychology, neuroscience and linguistics and specific challenges to the details of Fodor's modularity hypothesis started to appear. Of special interest to the field of psycholinguistics and developmental disorders has been Karmiloff-Smith's neuroconstructivist approach which challenges the innateness of modules and proposes that modules emerge from a developmental process of modularisation. Therefore the "Modularity Debate" does not only revolve around the issues as to whether the human mind is modularised or not, but also whether modularity is innate or develops through the received input and whether the modules have the characteristics as specified by Fodor. Language breakdown and atypical development have often been invoked as support for the modularity of mind hypothesis, which will be discussed in more detail in the following section.

2.6. What is the role of atypical development in the Modularity Debate?

Over the past 20 years or so, atypical linguistic and cognitive development have started to play a very important role in the ongoing debate on modularity. The idea is that if there exist domain-specific mechanisms within innately specified modules, the absence of such domain-specific mechanisms in a developmental disorder will be informative regarding their specific function in normal development. Language breakdown observed in people who have suffered brain damage due to some physical event, individuals in whom language deficits are congenital as well as individuals who show relatively good linguistic abilities but have severe cognitive deficits, could offer empirical confirmations of specific theoretical predictions which concern normal cognition (Levy & Kave, 1999). Both acquired and developmental disorders have played a role in issues of modularity and they will both be discussed in turn.

2.6.1. Acquired language disorders and modularity

There has been quite an extensive literature on adult aphasia where the relevance of acquired language disorders for theories of language acquisition and modularity have been addressed. Only a few studies will be mentioned in order to show how acquired language disorders have been used with reference to the modularity hypothesis and current linguistic theory.

Grodzinsky, (1986, 1990, 1995, 2000) has argued that syntax, though less localised than previously thought, is distinct from other intellectual capacities. Other studies on adult aphasia have used aphasic data in order to show how language breakdown can provide support for the psychological reality of some aspects of current linguistic theory i.e. the Principles and Parameters Framework (Ouhalla, 1993). Thus Ouhalla shows how agrammatism offers some evidence for the theoretically based and empirically viable distinction between impaired (closed-class or functional) categories and spared (content or substantive) categories. Hence a hypothesis has been put forward that functional categories constitute an autonomous component (module) of UG, and that they are represented separately from substantives in the human cognitive system. Research on propositional reasoning (involving 'theory of mind') on adult patients with aphasia (Siegal, Varley and Want 2001, Varley and Siegal, 2000), shows that prepositional reasoning can proceed in the absence of explicit grammatical knowledge, which suggests that grammar may be separate from cognition. However one should be careful when invoking acquired language disorders for theories of modularity as people with aphasia had had normal competency in language prior to brain injury. Therefore even though from the above mentioned studies there seems to be some evidence that the adult brain may be modularised, it is uncertain to what extent grammar might have been a prerequisite for configuring reasoning in early development. Therefore in order to consider theories of modularity in relation to language breakdown, it is more logical to look at a 'developing brain' rather than the 'end-state' brain.

What follows next will be a more detailed review of how congenital developmental disorders have contributed to the modularity debate and to current theories of language acquisition.

2.6.2. Congenital disorders and Modularity

Within the field of developmental psycholinguistics there has been a rich tradition of relying on evidence from atypical populations to inform our theories of language acquisition (e.g. Curtiss, 1977; Lenneberg, 1967; Yamada, 1990) and more recently on language modularity (Smith and Tsimpli, 1995; Van der Lely, 1997 a, b; Van der Lely et al., 1998; Van der Lely and Stollwerck, 1996; Bellugi et al., 2000). A substantial body of evidence in support of modularity has been accumulating from reports of individuals who appear to disobey the expected linear relationship between cognitive development and linguistic competence.

A very famous case quoted widely in the literature is that of Laura (Yamada, 1990) who suffered severe retardation of unknown origin. She showed a striking discrepancy between her performance IQ and her verbal scores. She failed most of the Piagetian conservation tasks and all of the seriation and classification tasks. She had impaired spatial abilities, and she performed very poorly on various neuropsychological tests involving visuo-spatial memory, auditory memory, face recognition and memory for designs. Yet, Laura's linguistic abilities were quite impressive. She could produce correctly full and agentless passives, coordination, conjunctions, subordination of all kinds such as wh-relative clauses, subject and object relatives, double coreferentials and elliptical constructions.

Another recent case reported in the literature is that of Christopher, a polyglot savant (Smith & Tsimpli, 1995) who had a performance IQ ranging between 42 and 67, could not tie his shoe laces and live independently, yet had an amazing talent for languages. His command of English was indeed perfect, and he could freely converse in some other 15 different languages. His mastery of syntax of these other languages though was less perfect and did not approach the level of command he had in vocabulary and morphology in these languages, which casts doubt on whether the case of Christopher truly shows such superior verbal abilities.

Apart from linguistic isolates such as the case of Laura or the case of Christopher, congenital pathologies such as Williams Syndrome (WS) or Specific Language Impairment (SLI) have often been brought forward as support for language modularity (Pinker, 1991, 1994, 1999; Smith 1999; Smith and

Tsimpli, 1995). A substantial body of literature has been accumulating which has addressed issues of modularity in relation to SLI and WS (Clahsen and Almazan, 1998; Smith, 1999; Levy, 1996; Levy and Kave, 1999; Bellugi et al., 2000; Van der Lely et al., 1998; to mention but a few). And it has been claimed that each of these conditions manifests with *dissociation* and that the two conditions if considered together present with a case of *double dissociations*.

Some have pointed out (Levy, 1996; Levy and Kave, 1999) that atypical development does not actually support 'big' modularity, i.e. the inseparability of the language faculty from other cognitive systems, however that atypical development does support 'small' or internal modularity, i.e. the modularity between the different language levels within the language faculty. However this issue will be discussed in more detail in 2.11.

2.6.3. What are associations, dissociations, and double dissociations?

In the field of cognitive neuropsychology, it is very important to distinguish between three different kinds of data that individuals with brain abnormalities may yield: associations of deficits, dissociations of deficits, and double dissociations of deficits. These three kinds of data are especially relevant if we have a particular modular theory of how for example human cognition is organised, and we hypothesise that language is represented in isolation of other non- verbal cognitive processes. If it is observed that a patient is impaired on tasks X and Y, where task X is related to processing language and task Y is a non verbal task, then the impairments are said to be associated. If a patient is impaired on task X but not impaired on task Y then the two impairments are dissociated (Coltheart, 2000). If such a dissociation between performance on task X and task Y can be observed from early development then it is said that *developmental dissociations* occur. Furthermore, if a patient A is impaired on task X, but can do task Y, and there is a patient B for whom the opposite holds, i.e. he is impaired on task Y, but is not impaired on task X, there is a case of what is called a *double dissociation.*

Double dissociations have been proposed to hold between WS and SLI (Clahsen and Almazan, 1998; 2001; Pinker, 1994, 1999; Smith and Tsimpli, 1995; Smith 1999) and the argument has been put forward that WS and SLI

therefore support the modularity view. The evidence is not straightforward though. In the next two sections an overview of the etiology and the relevant literature in relation to WS and SLI will be presented and discussed.

2.7. The Nature of Williams Syndrome

2.7.1. What is Williams Syndrome?

Williams Syndrome (WS) is a rare genetic condition, first identified in 1961 by Williams and his colleagues in New Zealand (Williams, Barratt-Boyes and Lowe, 1961). It occurs in one of 25.000-50.000 live births. They labelled the syndrome following a clinical study of four patients with mental retardation and a peculiar facial appearance. WS appears due to a micro-deletion of one copy of about 20 contiguous genes in chromosome 7, affecting one of the alleles of the elastin gene (Korenberg et al., 2000; Frangistakis et al., 1996). It is characterised by a range of moderate to severe physical abnormalities, including elevated blood calcium levels, sensitive hearing and high blood pressure, failure to thrive in infancy, abnormal sensitivity to certain classes of sounds (hyperacusis). Molecular genetic testing (fluorescence *in situ* hybridisation, or FISH) can now be used to confirm the deletion of one copy of the elastin gene and other surrounding genes in a small region of chromosome 7 at 7q11.23, characteristic of nearly all individuals with clinically diagnosed WS.

A further characteristic of the condition, often taken into account at diagnosis is a typical facial profile – the so-called "elfin face" – which includes a broadening of the lips, medial eyebrow flare, and irregular dentition (Jones & Smith, 1975).

On the level of brain organisation, WS typically presents with no evidence of focal lesions. WS cerebrum is small, but the frontal cortex acquires a near normal volume relationship to the posterior cortex (Wang, et al., 1992). Some work, however, points to cytoarchitectonic anomalies in the form of exaggerated horizontal organisation of neurones within layers, increased cell packing density throughout brain regions, decreased myelination, and abnormally clustered and oriented neurones, particularly in the visual cortex (Galaburda,

Wang, Bellugi et al., 1994). This all suggests that there are some brain abnormalities.

Despite these abnormalities, WS is of particular interest to cognitive neuroscientists, psychologists and linguists because of the resulting uneven cognitive-linguistic profile which is associated with moderate to severe learning difficulties, profound impairments in planning, problem solving and spatial cognition and relative strengths in social cognition, linguistic abilities, face processing and auditory rote memory (Mervis et al, 1999). Despite the fact that their Performance IQ is around 50, the general view held so far is that individuals with WS tend to show superior linguistic abilities, i.e. that there are major dissociations in their cognitive functioning (Reilly et al., 1990; Clahsen and Almazan, 1998, 2001; Bellugi et al., 2000; Jarrold, et al., 2001). That may not be the whole story though, and the 'picture' of the WS phenotype is more complex as the following literature review on the cognitive-linguistic profile of WS will suggest.

2.7.2. The cognitive and linguistic profile of WS – a review of the literature

Although it is a fairly recent area of investigation, there is nevertheless quite an extensive body of literature devoted to studying the cognitive and linguistic profile in WS. A detailed review of the results obtained in previous studies on the linguistic and cognitive profile of WS reveals a rather incomplete picture. In particular, the question of whether morphosyntactic abilities are relatively spared in WS has received conflicting answers, with some researchers arguing for a selective sparing of grammar in WS, while others claim to have identified genuine deficiencies in the linguistic abilities of WS. The available evidence for dissociation between verbal and non-verbal abilities[3] in WS is equivocal.

[3] The literature on WS has not been very specific as to the use of the terms 'verbal' and 'linguistic' and 'non -verbal' and 'cognitive'. In order to avoid confusion, the term verbal and

2.7.2.1. Early research on WS

Earlier studies on WS were rather limited as they were undertaken as part of multi-dimensional studies which would normally incorporate behavioural, medical, physiological, cognitive and linguistic aspects of the WS profile providing a rather broad picture that describes the WS phenotype.

However, these early studies point to possible dissociations in the WS profile noting challenging facts about the language domain in this population. Thus von Arnim and Engel (1964) reported four subjects, aged 5 to 15 years, whose IQs ranged from 43 to 56 and who had physical growth retardation, poor motor coordination, outgoing personalities, recurrent signs of unreasonable anxiety, and an unusual command of language. '*Their loquacity combined with friendliness and a great ability to make interpersonal contacts makes them appear brighter and more intelligent than in fact they are*' (p.375). It was also observed that children of about equal intelligence (IQ) to children with WS but belonging to various other well-defined groups can show different attitudes to language and they use speech in different ways.

A decade later, Jones and Smith (1975) presented evaluation data on 14 individuals with WS between the ages of 3 months to 23 years. The participants were found to be functioning in a range of Full Scale (F) IQ = 41 to 80 with a mean FIQ of 56. The names of the IQ tests though were not reported. Again a note was made regarding WS linguistic abilities, but it was not elaborated upon. The personality of individuals with WS was described as "*friendly, loquacious, and cocktail party manner*" (p.719).

It was not until 1978 that the first attempt was made to systematically quantify data on individuals with WS. Bennett, La Veck, and Sells (1978) studied 7 children with WS, ages 4:06-8:05 years of age. The children were administered the McCarthy Scales of Children's Abilities, and they scored between 30-81 with a mean IQ of 53.9 (mild to moderate learning difficulties). All 7 children performed better on measures of verbal ability than on fine motor and gross motor measures. The authors concluded that verbal abilities in WS

---

linguistic will be used interchangeably, whereas the term non-verbal will be used in order to refer to all the other abilities which involve skills other than verbal.

were superior in the face of impaired motor skills and cognitive deficits. Thus a debate was begun which remains unresolved as yet.

2.7.2.2. Research on WS in the 1980s and early 1990s

A number of studies investigating linguistic abilities in WS followed throughout the 1980s. Thus Kataria, Goldstein and Kushnik (1984) evaluated language development quotients for 7 children with WS (age range 18 – 71 months, mean 48 months), using the Receptive-Expressive Emergent Language (REEL) Scale (Bzoch & League, 1978 quoted in Kataria et al, 1984) for the youngest five, and Peabody Picture Vocabulary Test (PPVT) (Dunn, 1959, quoted in Kataria et al., 1984) for the oldest two children. They concluded that the pattern of superior verbal abilities over motor abilities was not supported nor there was any evidence of an "unusual command of language" (considered previously a marker of the syndrome). Most researchers in the field would agree though that language in WS is rather delayed in the early years (Capirci et al. 1996; Thomas et al, 2001). Therefore it is rather premature to come to any conclusions about the language skills of children whose language milestones have not been achieved yet.

Many studies, especially in the 1980s and early 1990s, relied on IQ tests when investigating the verbal and non-verbal abilities in WS. The results obtained in different studies are controversial and will be discussed in the following section.

2.7.2.2.1. WS and the IQ tests controversy

Arnold et al, (1985) studied 23 individuals with WS (age range 7:02 – 13:01). They found no differences in performance on the verbal and non-verbal subtests of the Wechsler's Intelligence Scale for Children – Revised (WISC) (1976) amongst their subjects with WS. Furthermore, on the Reynell Developmental Language Scales - revised (1977) the language skills of only three children exceeded the seven-year ceiling of the test while those of the remainder ranged from three to seven years. Most children though were able to produce and respond to simple sentences.

Pagon et al. (1987) also gave the WISC to a group of 13 individuals with WS (ages 10;02 – 20;08). Seven of the group scored above the floor of the verbal scale, and had verbal IQs of between 47 and 85. Five of these individuals also scored above the floor on the performance scale and their performance IQs were between 45 and 69. These differences were non-significant. Pagon et al., provide details of individual verbal scores, which for these five individuals are: 49, 54, 58, 62 and 85, and the difference in IQ in each case is 4, -15, 7, 1, and 16 respectively. It seems that only the individual with a high verbal IQ shows a verbal advantage, which suggests that the verbal advantage may not be so prevalent within the WS phenotype in general.

Similarly, Crisco, Dobbs and Mulhern (1988) found no significant verbal advantage on the Stanford-Binet Intelligence Scale for a group of children with WS when matched on mental age with another group of children (mean subject ages 84.8 months for the WS group and 85.1 months for the controls). However they did observe significantly poorer performance for the WS group in comparison to the control group on visual reception, visual closure and visual memory.

Significant differences between verbal and performance IQ were reported in a series of papers by Udwin and colleagues (Udwin & Yule, 1990, 1991; Udwin et al., 1986, 1987). These four papers give details from a single, large group of 44 individuals with Infantile Hypercalcaemia (IHC)[4] aged between 6;0 and 15;09 who received the WISC. A number of the participants scored below the floor of the verbal and performance scales, but verbal IQs for the remaining participants ranged between 45 and 109 (mean=62.4), and performance IQs ranged between 45 and 73 (mean =55.9) which suggests a verbal advantage for the majority of the participants.

Contrary to the findings by Udwin & Yule (1990, 1991) and Udwin et al., (1986, 1987), Dall'Oglio and Milani (1995) also gave the Wechsler Scales to 16 children with WS, aged between 4;10 and 15;04 and reported that full scale IQs ranged between 36 and 82, though the majority of the individuals scored between 40 and 49 points, and that differences between verbal and performance IQs were non-significant. These findings were consistent with Greer et al., (1997), who

[4] This is how the syndrome used to be referred to in the UK originally.

using the Stanford-Binet Intelligence Scale, reported that participants with WS (age range 4–18 years) showed a more evenly developed intellectual profile, with verbal and non-verbal skills being commensurate.

In summary, the majority of the studies which have used IQ measures with the WS population found no significant differences between their verbal and non-verbal profiles, apart from the Udwin and Yule (1990, 1991) and Udwin et al, 1986, 1987) who reported a marginal verbal advantage. The problem with using IQ measures for the purposes of investigating verbal and non-verbal skills is that the verbal part of both the Wechsler and the Stanford - Binet does not only test for verbal abilities in a Chomskyian/Fodorian sense, but it also requires the subject to use metalinguistic skills and knowledge of social situations. Both scales examine knowledge of vocabulary by asking the participant to provide a definition, which is a metalinguistic skill as opposed to for example only asking the participant to name a word from a picture presented to them. Also both scales have a comprehension subpart which require practical problem solving and social information and it has been widely documented across studies that individuals with WS have difficulties with problem solving tasks (Bellugi, et al., 1988, 1989, 1994) and that they may also have difficulties with social and interpersonal situations (Jones, et al., 2001). Therefore, the term 'verbal' here does not necessarily refer only to morpho-syntactic abilities, but skills which involve the spoken modality. This may be problematic if we are considering arguments for what language is in the Chomskyan and Fodorian tradition, where metalinguistic skills and use of language would not be considered to be part of what is referred to as 'linguistic competence'. Therefore it is possible that IQ tests do not reveal 'true' linguistic abilities in the WS population. The second reason for having conflicting results may be due to the fact that most of these studies are group studies, and it is possible that the results are biased because a few members of the group perform very differently to the majority of the participants.

An alternative way of investigating modularity issues is by comparing two different atypical populations matched on mental age or level of cognitive functioning. There have been a number of studies which have compared individuals with WS to those with Down Syndrome (DS) or with individuals matched on mental age or general IQ. These studies will be reviewed in the subsequent section.

2.7.2.2.2. WS and other atypical populations

It had already been noted (von Arnim and Engel, 1964) that individuals with WS show a facility for language rarely observed in other populations with the same degree of cognitive deficits. Studies which have compared WS with other atypical populations report controversial results. It seems that when individuals with WS are compared to individuals with cognitive deficits other than Down Syndrome (DS) there is not much difference in the profiles. In contrast, studies which have compared individuals with WS with individuals with DS found 'clear' dissociations.

One such study was reported by Crisco, Dobbs and Mulhern (1988) which compared a group of children with WS with another group of children matched on sex and as closely as possible on chronological age and global IQ (using the Stanford-Binet Intelligence Scale). They administered the Illinois Test of Psycholinguistic Abilities and found that the subjects with WS were significantly poorer than the matched controls only on visual reception, visual closure and visual memory whereas the children's understanding of and ability to employ rules governing the correct use of grammar (e.g. verb tense, plurals, irregular forms of verbs) were similar in both groups (subject ages 84.8 months for the WS group and 85.1 months for the controls).

Gosch, et al., 1994 reported findings similar to Crisco, Dobbs and Mulhern (1988). The children with WS (ages 4-10) were administered the Heidelberg Language Development Test and a picture story. The linguistic variables included: comprehension at the level of the word/sentence, grammatical competence at the level of the word/sentence, the interactive competence, the mean length of sentences, or the number of meaningfully applied words. Children with WS were compared to children with a comparable nonverbal reasoning ability, i.e. children with non-specific developmental disabilities. No differences were found between the two groups apart from the fact that the children with WS performed better (statistically) on the singular-plural formation.

On the other hand, when individuals with WS were compared to those with DS the results were very different. Thus Bellugi et al., (1988) showed distinct dissociations between the verbal and the non-verbal domains in WS.

When WS individuals were compared to individuals with DS they performed much higher on language measures (above their mental age) than the individuals with DS.

Later studies by Bellugi et al., (1989, 1994) yield similar findings. The individuals with WS were shown to perform almost at ceiling level on comprehension tests of passive sentences, negation and conditionals. Analysis of spontaneous speech revealed use of well-formed, grammatically correct sentences, including complex forms, and very good narrative and discourse abilities. In their narrations of the Frog Story subjects with WS showed phonologically and syntactically sophisticated language, establishing a clear orientation, introducing time, characters, and their states and behaviours. The same subjects though displayed a marked spatial cognitive deficit on the subtest of the WISC-R test known as 'Block Design' where the subjects have to reproduce the correct global configuration of a group of blocks.

Another study by Bellugi, et al., (1990) also reports that individuals with WS show relatively preserved syntax in comparison to subjects with DS. However when the results are looked at more closely it seems that again caution should be taken: the individuals with WS performed almost at ceiling levels on only some subtests, i.e. on passives and conditionals (content). Their performance on negatives ranged between 20 to 100% correct, conditionals (grammar) between 50-100% correct, on sentence completion and on sentence correction between 50 and 100% correct. It is true that some of the WS individuals performed better than the DS ones, however their performance was far below ceiling levels, which puts in question any claims about sparing of syntax in WS.

Dissociations between the verbal and non-verbal domains were also reported in Reilly, Klima and Bellugi's (1990) study. Thus dissociations between use of affective devices (pitch changes, vocalic lengthening and modifications in volume) in story telling and use of linguistic narrative enrichment devices (affective states and mental verbs, emphatics and intensifiers, negative markers, causal connectors, and character speech, as well as onomatopoetic devices and audience hookers) on the one hand and impaired picture arrangement abilities on the other have been reported. Subjects with WS performed significantly better than subjects with DS and mental aged (MA) controls on the use of affective

devices and linguistic enrichment devices, however on the picture arrangement task both groups (WS and DS) failed. The study involved only four subjects, which makes it difficult to generalise to the entire WS population.

In summary, the review of the studies which have compared individuals with WS to whose who have similar mental ages, suggests the following pattern: when compared to individuals matched on mental age other than DS, the participants with WS do not appear to be more advanced with their verbal performance. However, when compared to individuals with DS, the WS individuals perform much better with regard to their verbal skills, be it vocabulary, morpho-syntax, or use of affective devices in story telling.

There might also be a potential problem when comparing individuals with WS to those with DS. Comparing individuals with WS with those with DS does not reveal any significant strengths in WS since it has been pointed out in the literature that language in individuals with DS has been reported as a weakness (Fowler, 1990; Miller, 1987, 1988; Vicari, Volterra and Fabretti, 1996). As Temple et al., (2002) point out:

"*to report relative advantage in language for children with WS, over those with DS, is comparable to the idea of reporting relative reading advantage for a new syndrome, in relation to a dyslexic control group*" (p.464).

Therefore, caution should be exercised when discussing 'preserved' language abilities in WS in comparison to individuals who show impaired language skills such as those with DS as the fact that individuals with WS may show superior language abilities to a group of individuals who have delayed language does not necessarily mean that the individuals with WS show superior language skills. All it suggests is that individuals with WS may have better language functioning in comparison to a another atypical population which has the same mental age but delayed language. Thus the studies which compare WS with DS must not be taken for granted regarding the issue of superior language abilities in WS.

2.7.3. More recent studies on WS (from 1998 onwards)

The past few years have been especially prolific for research in WS. IQ tests are no longer used in order to measure the verbal and non-verbal profiles and current

research is considering different aspects of the WS phenotype, both within verbal and non-verbal performance.

2.7.3.1. Do task demands make a difference in performance?

It has been suggested that task demands may be the reason for the rather conflicting reports on WS. Karmiloff-Smith et al. (1998) evaluated WS receptive syntax using two types of task: an on-line word monitoring task and an off-line picture-pointing task. The subjects with WS performed worse than the control subjects on the off-line task than on the on-line task. The performance of the individuals with WS on the on-line task also identified a specific area of difficulty, i.e. that the individuals with WS were insensitive to violations of subcategory constraints, but they were sensitive to violations of auxiliary markers and phrase structure rules, which means that even when the task demands are decreased, the individuals with WS show syntactic problems.

2.7.3.2. Dissociations within the linguistic system

Dissociations within the linguistic system evident in WS have also been reported. Clahsen and Almazan (1998) argue for dissociations between the computational and the lexical components of the linguistic system (what Levy, 1996 would refer to as *internal modularity*). They investigated the performance of subjects with WS on story telling, passives, binding principles and the past tense inflection using off-line tasks (picture-pointing, grammaticality judgement tasks and elicitation tasks where the child repeats a sentence which involves a change of tense) and found that on complex morpho-syntactic phenomena such as reversible passives, reflexive anaphors, and regular past tense inflection the children with WS performed at ceiling levels. However the same subjects performed worse when they had to inflect a root verb (requiring irregular inflection) as opposed to its denominal counterpart (requiring regular inflection). Therefore in line with Chomsky's (1995) proposal, the authors argue that WS presents with a spared *computational system* for language and a rather impaired lexical system, called the *associative memory system*.

The results of this study however were challenged by Thomas et al., (2001) who replicated the tasks in a much larger sample of 21 participants with WS and 46 normal controls and demonstrated that much of the apparent deficit in irregular past tense formation is in fact a consequence of delayed language development (when verbal mental age is controlled for the selective deficits disappear).

A more recent study by Clahsen and Almazan (2001) in line with Clahsen and Almazan (1998) argues further for a dissociation between lexical and grammatical phenomena in WS by investigating noun plurals and plural formation inside compounds. The results of the study showed that the participants with WS always inflected correctly nouns taking regular plurals, whereas they performed much worse on nouns which require irregular plurals. What was more interesting was the fact that the participants with WS used the plural –s as non-head elements inside compounds, which was not the case with the normal controls. It is argued therefore that this excessive use of the regular –s plural in WS results from an impairment of the lexical system whereas the rule based computation system for language is spared.

2.7.3.3. WS and conversational abilities?

With regard to research into conversational abilities in WS, there have been only a couple of studies: A study by Udwin and Yule (1990) examined the speech of 20 individuals with WS on the total number of utterances and words, percentages of child utterances containing idioms and clichés, irrelevant personal experiences and social phrases and fillers and percentages of dysfluencies. The speech samples were then further classified according to the communicative function intended by each utterance, using Dore's (1977) scheme for coding conversational acts. They were grouped in 6 categories: 1) Requests, which solicit information, actions, and acknowledgements. 2) Responses, which directly complement preceding utterances. 3) Descriptions, which represent observable or verifiable aspects of context, and past or present facts. 4) Statements, which express analytical and institutional facts, beliefs, attitudes, emotions, and reasons. 5) Conversational devices, which regulate contact and conversations. 6) Performatives, which accomplish acts by being said. Finally a scheme of

language functions devised by Tough (1976) was used to calculate the percentages of utterances used for a range of complex purposes, such as comparisons, recall of past events, future plans, linking two events in time, reasons, explanations etc. The subjects with WS were divided into a "cocktail party speech" group (those who produced significantly more speech, more complex utterances, more social phrases and clichés, and more complex communicative functions, when compared to the rest of the WS group) and a "non-cocktail party speech group". They also differed on the use of complex language functions, with statistical significance on recall of past events, linking two events in time, giving reasons, explanations, making generalisations and definitions, reasoning and inference. However, it has not been specified where the differences between these potentially two distinct WS groups might lie, i.e. in their use of reference-specifying mechanisms, in topic-maintenance, conversational breakdowns, quantity of speech and conversational inadequacy.

Another study by Jones et al., (2000) concluded that individuals with WS are hypersocial, which is evident in their story telling, where they use more evaluative devices in comparison to individuals with DS, in a biographical interview task, where they manifested a desire for continued social interaction, by not only replying to the interview's questions but also seeking information from the interviewer; by showing an excessive interest in others, and a lack of inhibition toward approaching other individuals.

Both of these studies are very informative with regard to how one should expect an individual with WS to behave in social interactions. What has not been specified is whether their conversational behaviour is adequate and if it is not, how could the inadequacy be better specified.

2.7.3.4. Lexical skills in WS

Performance on receptive vocabulary tests, such as the BPVS (Dunn et al. 1982) or the PPVT (the American counterpart of the BPVS) seems to be a particular strength is WS (Bellugi et al., 1988, 1994, 2000). In learning new words children with WS show some peculiarities (Stevens and Karmiloff-Smith, 1997). They had no problems with the **novel name-nameless category principle** (Berko-Gleason, 2001), according to which if a child already knows the name of an

object the child presumes that a new word would refer to a different object that is present. What children with WS had difficulties with was that they did not observe the principle that words refer to whole objects rather than a component part of it; and they also failed to observe the **taxonomic principle**, according to which when extending a word, the same word can be applied to referents which belong to the same taxonomic category, and not simply to those with the same colour, texture or shape. These results are compatible with the recent study by Temple et al., (2002). It is argued that tests of receptive vocabulary are not very adequate for testing lexical semantics because they only require superficial semantic knowledge. Impairments in receptive vocabulary in WS became more apparent when the participants were asked to select from multiple, semantically-related distracters. Also the individuals with WS tended to make atypical selections, showing preference for items of low frequency. The older children in the study also had some naming difficulties, and all the participants made atypical naming errors. This may all result from a slightly different developmental pathway for learning the meaning of words. However, when naming was accurate it was faster than that of mental age controls. The authors conclude that the children with WS have a lexical system where access is too fast and with insufficient editing of responses, which also suggests that irregular forms may be processed with greater difficulty, a deficit which had already been identified in Clahsen and Almazan (1998).

2.7.3.5. Verbal Memory and WS

A number of studies have reported that phonological short-term memory in WS is a relative strength in this population. Wang and Bellugi (1994) compared the memory abilities of individuals with WS and those with DS, matched on CA and IQ and found that the individuals with WS had significantly longer forward and backward digit span than the individuals with DS. The findings were confirmed by Jarrold, Baddeley and Hewes, (1998); Klein and Mervis, (1999), Mervis et al., (1999). Grant et al., (1996) also found that individuals with WS do not simply parrot the auditory input they are exposed to, but that they gradually develop knowledge of the phonological system of their native language. However, Barisnikov, Van der Linden & Poncelet., (1996) on the basis of a case study of a

20-year-old woman with Williams Syndrome demonstrate a quasi-normal functioning of the phonological short-term memory. Their subject performed normally on a paired-associate word-non-word learning task, while being dramatically impaired in the memorisation of word-word pairs.

2.7.3.6. Is the WS profile more variable than we think?

The contradictory evidence on WS research so far suggests two possibilities: it is either the case that the conflicting research findings result from the various methods employed in the different studies (the choice of tests and tasks, the ages of the participants, or the comparison groups used); or it may be the case that the WS profile is more heterogeneous than it has been assumed so far. Only recently has this second possibility emerged with the study by Jarrold, Baddeley and Hewes (1998) who in two separate studies examined the verbal and non-verbal abilities in 16 individuals showing the WS phenotype. When considered as a whole, the group did have significantly superior verbal abilities, but this difference was the effect of a large discrepancy in abilities in only a small number of individuals. In both studies there was a clear, linear relationship between the individuals' verbal ability, and the magnitude of their verbal-nonverbal discrepancy. Jarrold et al., (1998) suggested the possibility of an inconsistent WS profile.

This possibility of having a non-homogeneous WS profile was further explored by Pezzini et al., (1999). Both in the visuospatial and in the linguistic domain there was considerable variability between the 18 participants (ages 4:10 – 15:03), which prompted the authors to conclude that children with WS show an uneven profile of sparing and impairment in both the visuospatial and the linguistic domain. The same authors investigated more closely the neurocognitive profiles of their participants and their difficulties on the Block Design test emerged as being universal in all the cases. However, each of these children showed different patterns of sparing and impairment on the linguistic and visuospatial tasks. The need for more longitudinal case studies was reiterated, in order to confirm or refute the existence of a single neuropsychological profile in WS.

Jarrold, Baddeley, Huwes and Phillips (2001) in a longitudinal study of 15 individuals with WS done over a 40 month period showed that mental age scores for vocabulary increase more rapidly than scores for the pattern construction test, which is suggestive of a definite verbal advantage over non-verbal abilities.

2.7.3.7. Williams Syndrome in other languages

Studies from other languages report impaired linguistic abilities in WS. Volterra et al. (1996) found that Italian subjects with WS differed from normal controls in their grammatical comprehension and morpho-syntactic aspects of production. Six out of nine WS subjects performed below their mental age in a sentence repetition task, a finding that shows little evidence for syntax being spared. They noticed that although the language of WS subjects is fluent, and they appear to be good conversationalists, the content of their speech is often odd or out of place in a particular social context.

However dissociations between the components of the linguistic systems in WS have also been reported. Vicari, Brizzolara, Carlesimo et al., (1996) argue for preserved phonological processes and slightly impaired lexical-semantic and grammar abilities in WS, on the basis of the results from a study in which they investigated the contribution of phonological and semantic processing of words to the verbal memory span in children with WS and normal controls. Although there were phonological similarity and length effects in both groups, the children with WS showed a reduced frequency effect (i.e. they did not repeat the high-frequency words better than the low-frequency ones).

Karmiloff-Smith et al. (1997) on the basis of the results of an expressive language task involving assignment of grammatical gender in French-speaking WS patients argue that morphosyntactic abilities are actually impaired in WS.

Volterra et al. (1999) presented a single case study of an Italian boy with WS who did not support the 'typically assumed' WS profile where linguistic abilities are better preserved than visuo-spatial abilities. The boy showed an interesting pattern of peaks and valleys, with his visuo-perceptual abilities (i.e. face recognition) being better preserved than his visuo-motor abilities whereas in

the linguistic domain, his phonological abilities were better preserved than his semantic and morpho-syntactic abilities.

Volterra et al. (2001) confirm the findings from the previous two studies and argue for an asymmetric fragmentation within the linguistic abilities of individuals with WS: a profile of strengths in phonological abilities but serious deficits in semantic and morpho-syntactic aspects of language.

Pezzini et al. (1999) as already mentioned above, argue for the possibility of having a heterogeneous WS phenotype as different individuals in the study showed different patters of spared and impaired abilities.

It seems that research on WS in other languages is quite similar in its findings to the research carried out with English speaking WS individuals. It suggests that the question of whether individuals with WS have superior language abilities and to what extent there are dissociations within the same domain (either verbal or non-verbal) remains open to further research.

2.7.4. Summary of the literature review on WS

It is clear from the reports on WS over the past two decades that the view of WS as being characterised by spared verbal and impaired nonverbal abilities is oversimplistic. In the first instance, a number of studies have shown that verbal abilities are not wholly spared or even *relatively* spared (Karmiloff-Smith et al., 1997, 1998; Pezzini et al., 1999; Voltera et al., 1996, to name but a few), however there are those who report the opposite, i.e. the idea that that verbal and non-verbal abilities in WS truly dissociate (Bellugi, et al., 1988, 1989, 1994, 2000; Udwin et al., 1986; 1987; Udwin and Yule,1990, 1991).

As previously mentioned, the conflicting reports may result from differences in subject selection (age and number of the individuals with WS that took part in the particular study), who the participants with WS are compared with, the standardised tests used, and sometimes the theoretical background of the researcher.

There have also been investigations in the lexical skills of WS and some abnormalities have been reported. Similarly, research into the conversational abilities in WS shows that the interaction skills in WS may not be typical, and there have not been any studies which have investigated narrative abilities in WS

from the point of view of story organisation. The study by Klima, Reilly & Bellugi (1990) focused on the use of affect in the WS population and compared them to DS individuals, whereas Clahsen & Almazan (1998) used narratives for the purposes of grammatical error analysis (micro-structure).

If we exclude the above, there is a second possibility, which had already been suggested, and that is that the WS population is more heterogeneous than other syndromes involving mental retardation, and this possibility needs to be further explored, which is going to be one of the main aims of the present research study.

The second point that needs to be made is that none of the studies dealing with linguistic abilities in WS provide a systematic evaluation of the profile of strengths or deficits across the different domains of language, leaving much unknown about the language impairments that may be present in the majority of children with WS. Furthermore, few studies include a full-scale error analysis. There is an attempt in Clahsen and Almazan's study (1998) to analyse expressive language errors made by children with WS and to claim that the linguistic profiles of WS and SLI are different; however the study does not directly compare children with WS and children with SLI; rather it relies on the literature for describing the linguistic behaviour of children with SLI. There are no studies which have considered the WS linguistic profile by combining standardised tests with conversational data. If we are to achieve a fuller picture as to what the linguistic skills of individuals with WS are there is a need for more detailed profiling, which the present research is going to address.

Before the aims of the present study are laid out, a further comment needs to be made regarding the relation between WS and SLI.

2.8. WS versus Specific Language Impairment (SLI)?

As already discussed, there has been a tradition of referring to populations with atypical language and cognitive development to support the modularity of mind hypothesis. In order to strengthen the argument for dissociations researchers often compare different atypical populations. In addition to extensive comparison with DS, in the attempt to argue in favour of a modularity view on cognition,

individuals with WS have been compared to individuals with SLI. Pinker (1991) suggested that SLI and WS together provide a developmental *double dissociation* between two sorts of mechanism; the computational, syntactic, rule-based mechanism responsible for learning the abstract rules of grammar, and the associative memory system responsible for learning information about individual words i.e. what Levy (1996) refers to as 'internal' modularity. Support for what Levy (1996) labels 'big' modularity (the separability of the language modules from the rest of the cognitive processes) comes from certain researchers working primarily on SLI and modularity, who often refer to the fact that individuals with WS show the opposite phenotype of strengths and weaknesses to individuals with SLI (Van der Lely, 1997a).

The developmental profiles of children with SLI suggest skill discrepancies among the domains of language (Gopnik and Crago, 1991; Rice, et al., 1995; Clahsen and Almazan, 1998) and between language and cognition (Van der Lely, 1997a, b; Van der Lely & Stollwerck, 1996; Smith and Tsimpli, 1995; Smith 1999) however typically individuals with SLI would show superior non-verbal and impaired verbal abilities. Such findings point to a degree of independence both within the system of linguistic abilities and between linguistic abilities and cognitive competencies. Since there have been claims that the 'opposite' seems to be the case in WS, i.e. deficits in the non-verbal domain and strengths in the verbal domain, and also selective sparing or impairment of certain linguistic abilities, it has been suggested and even strongly argued that WS and SLI show the opposite profiles and support modularity views of human cognition.

Whether WS is truly the opposite of SLI may be a complex issue and it will be another aim of the present study to address it. However before an evaluation of such claims is provided (SLI Vs WS), a description of the nature of SLI and a literature review of SLI will be presented first.

2.9. What is SLI?

Language disorders may result from peripheral impairments such as deafness, malformation of the vocal apparatus, or paralysis of the speech musculature (to

name but a few causes). Furthermore, language may fail to develop normally as a consequence of general mental retardation, severe emotional disorder, autism, or acquired childhood aphasia, where there is known postnatal brain injury to areas which subserve language. However, if we exclude all the above causes for language disorders, there still remains a group of children who have various degrees of difficulty in learning language. These children have been referred to as "developmentally aphasic" or "specifically language impaired" - SLI (Benton, 1964).

Children with SLI are characterised as having problems in the development of language comprehension and/or production but not showing any impairment in their non-linguistic cognitive or motor development, hearing or emotional-social behaviour. In addition there is a genetic component to this disorder (Bishop, North and Donlan, 1995). Recently, Fisher, Vargha-Khadem, Watkins, Monaco and Pembrey (1998) have identified a region on chromosome 7 which co-segregates with the speech and language disorder confirming autosomal dominant inheritance.

Several subgroups of children with have been identified (Conti-Ramsden and Botting, 1999): 1) children with a lexical-syntactic deficit, 2) children with verbal dyspraxia, 3) children with phonologic programming deficit syndrome, 4) children with phonological-syntactic deficit syndrome, and 5) children with semantic-pragmatic deficit syndrome. Van der Lely and colleagues (Van der Lely, 1994, 1997 a, b; Van der Lely & Stollwerck, 1996; Van der Lely, Rosen and McClelland, 1998) have argued that there exists a subset of children who have severe difficulties with the computational syntactic system, referred to as Grammatical SLI children (G-SLI). It is this subgroup of children that are referred to in discussions of modularity related issues.

The most prominent characteristic of Grammatical SLI children is an impairment in inflexional morphology and complex syntax. These children have been reported to have difficulties with the following:

- omissions of 3rd pers. sing, *-s* and noun plural *-s* (Rice and Oetting, 1993);
- errors with regular and irregular past tense (Gopnik & Crago, 1991, Ullman & Gopnik, 1999);

- overgeneralisation errors at age 9-12, when such errors are not expected. Overregularisation of past for instance has been documented by Eyer & Leonard (1994, 1995), Leonard, Bortolini, Caselli, McGregor, and Sabbadini (1992).
- when asked for grammatical judgements in comprehension tasks, they accept forms like ***falled*** or ***walk*** with past reference as correct (Van der Lely and Ullman, 1996).

Problems with syntax when no semantic/pragmatic cues are available as the following studies have shown:

- reversible passives '*The dog is bitten by the girl*'. When asked to assign the role of agent and patient, they tend to assign *the dog* the role of an agent, simply because that is semantically more plausible, ignoring the sentence's underlying syntax (Bishop, 1982; Van der Lely, 1994);
- intrasentential assignment of reference to anaphors and pronouns as characterised by the Binding Theory (part of the Government and Binding Framework, Chomsky, 1981) was investigated by Van der Lely and Stollwerck, (1997). For example, in a sentence like the following: "Baloo Bear says Mowgli is tickling him", "him" refers to Baloo Bear; however, in "Baloo Bear says Mowgli is tickling himself", the reflexive "himself" refers to Mowgli. These pronominal forms occupy exactly the same sentence position, which means that their interpretation depends on something other than word order. Within the Theory of Government and Binding (Chomsky, 1981), it is the Binding Principles which specify that a reflexive must be coreferential with a "local" antecedent (broadly speaking, this means it will refer to a noun phrase within the same clause). Thus the antecedent must have a particular syntactic relationship with the reflexive. In contrast, a personal pronoun cannot refer to a noun phrase in a local syntactic relationship.

2.10. What are the underlying deficits in SLI?

SLI has recently attracted considerable attention as a source of evidence about the biological and genetic bases of grammar. Some researchers working within the Principles & Parameters (P & P) Framework have taken SLI as evidence that specific components of this innate grammatical capacity can be damaged. Pinker (1989:324), for example, has suggested that "the syndrome shows that there must be some pattern of genetically guided events in the development of the brain, that is specialised for the wiring of linguistic computation". Joanisse and Seidenberg (1998) on the other hand, suggest that the main question regarding grammatical SLI should be whether the deficit is in fact limited to grammar. An alternative view is that these impairments are sequelae of information processing deficits that broadly interfere with language learning.

There are 3 major accounts as to what may be the underlying causes of SLI (Leonard, 1998):

i) deficits in linguistic knowledge;
ii) limitations in general processing capacities;
iii) processing deficits in specific mechanisms.

I will discuss each of these accounts in turn. It should be pointed out though that in general terms there are actually 2 types of account of SLI: accounts that argue for a predominantly linguistic deficit in SLI and accounts that assume that the underlying linguistic processing in SLI is intact but the deficits arrise because of processing limitations elsewhere. These, broadly speaking, run parallel to the two opposed traditions in the field of language acquisition: the Nativist and the Cognitivist.

2.10.1. Deficits in linguistic knowledge as an underlying cause of SLI

Since one of the most conspicuous problems experienced by children with SLI is problems with morphosyntax, it is not surprising that many accounts turn to grammar as a possible explanation for the disorder. The main assumption is that

children with SLI experience comprehension and production problems of grammar due to their incomplete knowledge of particular rules, principles and constraints. One of the frameworks used to account for the underlying linguistic deficits in SLI is the Principles and Parameters Framework (P&P) as described in Chomsky (1981, 1986). The primary goal of the P& P framework is to explain how language is learnt. It differs from earlier approaches in that it is based on the assumption that what the child learns must be constrained in such a way that only those variations in natural languages are considered. There are also many accounts in the literature on language disorders, which are based on the P & P Framework, not necessarily relating to SLI.

Some researchers working within the Principles and Parameters Framework have taken SLI as evidence that specific components of this innate grammatical capacity can be damaged. These linguistic deficits can be of various types as will be seen from what follows.

2.10.1.1. Functional Categories Deficits

Some investigators have proposed that individuals with SLI have problems with the acquisition of functional categories (the IP[5], CP & DP) (Eyer & Leonard, 1995; 1991; Leonard, 1995). Some of these proposals focus exclusively on the I-system (Loeb & Leonard, 1991). The properties of grammar associated with I and IP are sometimes referred to collectively as the 'I-system' (I-simply standing for inflection). Specifically, it is assumed that there is no IP in these children's underlying grammatical knowledge, and therefore no movement of the subject. Furthermore, the verb receives no tense and agreement features, because I would be absent (in the absence of IP).

2.10.1.2.The Extended Optional Infinitive Account

This proposal stems from the work of Wexler (1994) who argued that young normally developing children go through a stage during which they fail to obligatorily mark tense in main clauses. According to Rice, Wexler & Cleave,

(1995), Rice, (1999), Rice, Wexler & Redmond, (1999), SLI children never really fully leave the stage of Optional Infinitives. According to this account, the problem is again one of underlying linguistic knowledge: these children do not know that tense is obligatory in main clauses. However, such an account only focuses on a single problem and can not explain other problems that these children may have (structure dependent relationships like passives or binding problems). Also, Italian and Hebrew speaking children do not seem to go through this stage (Bortolini & Leonard, 1996; Dromi, Leonard & Steiman, 1993).

2.10.1.3. Implicit Grammatical Rule Deficit

Gopnik and her colleagues (e.g., Gopnik, 1990a, 1990b; Gopnik and Crago, 1991) argue that the main problem in SLI children is a serious and possibly permanent inability to acquire implicit rules to mark tense, number and person. Without access to implicit rules, individuals compensate in one of two ways. They either memorise inflected forms as unanalysed lexical items or employ explicit rules that have been taught to them, such as "add-*s* for more than one" or "add *-ed* to describe past events" (Gopnik, 1994).

Ullman & Gopnik (1999) after further investigations argue for a three level explanation: a grammatical deficit of rules or morphological paradigms, which may be caused by a dysfunction of a frontal/basal ganglia "procedural memory" responsible for implicit learning and use of motor and cognitive skills (the rule-based grammatical system is part of the procedural memory system). Second, in contexts requiring inflexion in the normal adult grammar, the affected individuals appear to retrieve word forms as a function of their accessibility and conceptual appropriateness, which may rely on a "declarative memory" system previously implicated in the explicit learning and use of facts and events (the lexicon forms part of it). And thirdly, the affected individuals use a compensatory strategy whereby they add suffix-like endings to forms retrieved by conceptual selection. Ullman, Corkin, Copola, Hickock, Growdon, Koroshetz & Pinker (1997) present evidence from posterior aphasia, Alzheimer's, Parkinson's and Huntington's Disease that the lexicon is part of a temporal-

[5] In the Government and Binding Tradition , IP stands for Inflectional Phrase, CP –

parietal/medial-temporal "declarative memory" system and that grammatical rules are processed by a frontal/basal-ganglia "procedural system".

2.10.1.4. Representational Deficits for Dependent Relationships

- **Binding Principles**

Van der Lely & Stollwerck (1996) investigated the intrasentential assignment of reference to pronouns (*him, her*) and anaphors (*himself, herself*) as characterised by Binding Theory (Chomsky, 1981, 1986).

The study used two experiments in which picture-sentence pair judgement tasks were used in order to shed light on the children's knowledge of the lexical properties versus syntactic knowledge in the assignment of reference to reflexives and pronouns.

(1) *Binding Principle A: a reflexive must be bound in its governing category, where "bound" means c-commanded by and coindexed with an antecedent.* [C-command: in a phrase marker, node A c-commands node B if and only if A and B do not dominate each other, and the first branching node that dominates A also dominates B][6]

(2) *Binding Principle B: a pronoun must be free in its governing category. [Free-not bound]*[7].

Complementiser Phrase, and DP for a Determiner Phrase.

[6] *King Hasan*i *says [that King Arthur*j *shaved himself**i/j*]*

Thus the reflexive *himself* is bound by the noun *King Arthur*, because what 'local' means is that its antecedent must be in the same clause and *King Arthur* within the same clause boundary but not *King Hasan*.

[7] What this means is that within a sentence, such as the one below, the pronoun may only refer to a non-local antecedent. That is *him* can only refer to *King Hasan* but not to *King Arthur*.
[*King Hasan*i *says that King Arthur*j *shaved him*i /*j]

The results indicated that the SLI children and the language ability (LA) controls may use a combination of conceptual-lexical and pragmatic knowledge (i.e., semantic gender, reflexive marking of the predicate, and assignment of theta roles) to help assign reference to anaphors and pronouns. While the LA controls also showed appropriate use of syntactic knowledge, the children with SLI seemed to lack such knowledge, i.e. they performed at chance levels when syntactic information was crucially required to rule out inappropriate coreference. The results showed that these children were poor at working out pronoun reference on the basis of syntactic information. The results were interpreted as a failure of maturation of innate syntactic principles. The data were consistent with an impairment of the (innate) syntactic knowledge characterised by the Binding Theory which underlies reference assignment to anaphors and pronouns. The authors therefore proposed a *Representational Deficit for Dependent Relationships* (RDDR), i.e. that grammatical SLI children have a modular language deficit with syntactic dependent structural relationships.

In another paper, Van der Lely (1997a) proposed that SLI may be caused by a single dominant gene. She presented a case study of a 10 year old boy with grammatical SLI whose nonverbal IQ was in the range between 119 and 131, whereas his abilities to understand sentences whose meaning depends on their syntax was at the level of a 5 year old child. His vocabulary was below average but not as dramatically so as his grammatical abilities, and his pragmatics was unimpaired. Van der Lely (1997a) argued that cases such as this one offer evidence for modularity of language and its innate basis because this is a case where only the morpho-syntactic abilities seem to be impaired in the face of otherwise typical cognitive development suggesting a dissociation between morpho-syntactic and general cognitive abilities.

In summary, there are currently four major theoretical accounts of SLI within the linguistic deficits category: the functional categories deficit, the implicit rule learning deficit, the extended optional infinitive stage and a representational deficit with dependent relationships. They all attempt to explain SLI in terms of lack of knowledge of grammatical rules and representations or part of what is supposed to be 'underlying knowledge of language' in Chomksyan terms. However, as previously mentioned, there is a different line of

argument which attempts to explain SLI as a deficit in processing. This other alternative will be discussed next.

2.10.2. SLI as a general processing deficit

Following a slightly different tradition, more akin to the Cognitivist theories of language acquisition and not in favour of the idea of modularity of the language faculty, there have emerged a number of proposals which try to find an explanation for the underlying causes of SLI by associating the observed language deficits with processing deficits. In the cognitive processing literature, the notion of limited processing capacity is discussed in three different ways: in terms of space, energy or time (Leonard, 1998). When it comes to space, we are talking about a restriction on the size of the computational region of memory; there is insufficient workspace. Limitations of energy refer to inadequate fuel to complete a cognitive task. Here, a mental task is begun but all of the energy available is exhausted before the task is completed. Finally, time restrictions refer to limitations dictated by the rate at which information can be processed. If the information is not processed quickly enough, it will be vulnerable to decay or interference from additional incoming information (Leonard, 1998). Accordingly, the language deficits observed in individuals with SLI are explained by invoking memory deficits, other cognitive deficits or slower response times.

Part of the general processing deficits account of SLI is the *Generalised Slowing Hypothesis* based on the idea that SLI children show slower response times. Several accounts share the assumption that the language deficits in children with SLI result from an interaction between a general processing capacity and the characteristics of the language which is being acquired. Thus for example, the *Surface Hypothesis* states that surface elements, such as stress, frequency, obligatoriness and syllabic structure predict which morphological elements will be most frequently omitted in SLI. It predicts that there will be cross-linguistic differences in the way SLI manifests cross linguistically, depending on the perceptual salience of grammatical morphemes (Leonard et al. 1987).

In order to accommodate data from other languages, a revised version of the Surface hypothesis, the *Sparse Morphology Hypothesis* was proposed. It argues that those elements which are less frequent in a language, perceptually less salient and non redundant are acquired late by typical children. Children with SLI will acquire such elements later or maybe not at all. This is because SLI affects general processing mechanisms and thus elements in which breakdown is likely to be seen in normals under degraded conditions will also result in a breakdown in the case of SLI. The account hinges on the fact that English nouns, verbs and adjectives frequently appear as bare stems. Therefore the hypothesis proposes that because English is not a highly inflectional language, English-speaking children with SLI due to general processing deficits will not pay much attention to such morphemes but will devote their limited processing resources to those aspects of English which provide crucial information such as word order (Leonard, 1992; Rom & Leonard, 1990).

In summary, the various proposals within the general processing deficits account of SLI assume some sort of processing deficits because of which a breakdown in language competence occurs, however it is not specified which mechanisms are responsible for the slowing down of the system.

2.10.3. SLI as a Processing Deficit in Specific Mechanisms

According to this account of SLI, the deficits in processing which are supposed to cause language breakdown are more localised. The specific mechanism affected varies across these accounts; however, in each account, the consequences of the deficit are assumed to be widespread. There have been two such accounts proposed in the literature: deficits in phonological processing and deficits in temporal processing. Each of these will be discussed in turn.

2.10.3.1. SLI as a deficit in phonological memory

Gathercole and Baddeley (1990) proposed the idea that the underlying problem of SLI is deficits in phonological memory. Evidence for phonological deficits is provided by: Kamhi and Catts (1986), Kamhi et al. (1988), Montgomery (1995a, 1995b), Gillam, Cowan, and Day (1995). Studies of lexical learning in children

with SLI also lend support to the Gathercole and Baddeley (1990, 1993) view. They base their view on the fact that children with SLI tend to be poorer at repeating single nonwords and recalling word lists than even the younger children matched for verbal abilities. This finding was supported by Montgomery (1995a, b) who examined the influence of phonological working memory on sentence comprehension in children with SLI and found a positive correlation between the participants' performance on nonsense word repetition and sentence comprehension tasks. Results were interpreted to suggest that children with SLI have diminished phonological working memory capacity and that this capacity deficit compromises their sentence comprehension effects.

More recently, Joanisse & Seidenberg (1998) suggested in similar lines that the link between the deficits in speech processing and the kinds of grammatical impairment observed in SLI children is provided by phonology. Their argument is based on the fact that in English many morphological rules have important phonological components. Thus for instance, there are three allomorphs of the English past tense morpheme and which form is appropriate for a given verb is entirely determined by the identity of the final phoneme. In order to learn and use the rule, children must be able to analyse phonologically the alternation and the conditions under which particular forms occur. Performing this analysis would clearly be more difficult in the face of perceptual impairments typical of SLI subjects, because of the relatively weak perceptual salience of the morpheme and because ill-formed phonological representations developed as a result of such deficit would possibly weaken the ability to analyse and learn how subtle aspects of phonology such as the abstract notions of alveolar and continuant fricatives govern the realisation of the past tense inflection. Some studies within the connectionist framework are consistent with this account.

Hoeffner and McClelland (1993) examined the effects of phonological impairment using a connectionist model of past tense learning. The model learned to map from the semantics of a verb to its phonological form. It was trained with either a normal phonological representation or one that was systematically degraded. Like children with SLI, the impaired network had difficulty applying the past tense rule to verbs, even though it was able to repeat accurately words presented to it.

2.10.3.2. SLI as a temporal processing deficit

On the other hand, Tallal (1980,1984) shows that there is not enough evidence for a phonological memory deficit and proposed a *Time Processing Deficit Hypothesis,* originally to explain the underlying mechanisms of dyslexia, and later extended the account to children with language impairments. The basis of this account is that stimulus duration and rate of presentation influence the time within which processing must take place. Tallal et al., (1985) showed that children with language impairment were significantly impaired in their ability both to perceive and produce temporal cues nonverbally as well as within speech.

Arguments in support of a temporal processing deficit come from the connectionist literature where models have been proposed for both speech perception (Wickelgren, 1979) and reading (Seidenberg & McCleland, 1989) According to these accounts what is perceived is not a series of individual phonemes or letters, but sets consisting of a phoneme or letter in the context of the phonemes or letters surrounding it. Each set activates a particular pattern of excitation in the brain, and temporal order is determined by the particular activation of transitional, context-dependent patterns. The strength of the excitatory patterns is influenced by the frequency with which similar patterns have been perceived in the past. In turn, if the activation is stronger, the speed with which future patterns will be correctly identified will also increase. This parallel processing of sets of context-dependent stimuli enables the cognitive system to process rapidly incoming phonemic stimuli such as speech, or orthographic stimuli such as letters. Although it may seem that such a system would mean a huge increase in the number of possible activational patterns over those required for individual phonemes or letters, the constraints of our phonemic and orthographic systems limit the number of possible combinations. Even though the number of possible combinations is limited, there are still a number of patterns that must be activated by learning. These patterns must be learned if understanding of speech and later, production (of speech) and fluent reading are to be attained. For such learning to proceed, the organism should be able to discriminate among the various stimuli perceived. In order for patterns of stimuli

to be discriminated, it is necessary that the individual units can easily and automatically be recognised.

According to the temporal processing deficit account of the nature of underlying mechanisms of SLI, the argument is that individuals with SLI are impaired in processing *any* rapidly presented auditory stimuli. Perception of spoken language just happens to be particularly vulnerable to such a deficit, because speech is made up of component sounds, some of which (for example, the stop consonants /b/, /p/, /d/, /t/, /k/, /g/) involve rapid spectral changes over a time period of just tens of milliseconds. Tallal, Stark and Mellits (1985) propose that this rapid temporal/sequential processing deficit results in an inability to discriminate many speech sounds, which in turn may result in some patterns not being activated and problems with speech perception will follow.

2.10.4. Summary of the literature review on SLI

The literature review on SLI suggests that the views as to what are the underlying causes of SLI are divided, mainly in terms of whether SLI is addressed within the theoretical linguistic tradition, which offers structural characterisation of the deficit and is based on Nativist ideas; or whether it is addressed from a more Cognitivist tradition which aims at explaining SLI as a processing deficit. Sometimes language impairment is explained in terms of general processing mechanisms, but often it is explained in terms of specific processing deficits, such as phonological or temporal processing deficits. Further discussion of which of these two general 'trends' (mainly linguistic or mainly processing) is more plausible in the case of SLI would be superfluous for the purposes of the present research study. The most important fact to be noted is that SLI has been contributing to the current Modularity debate and it has often been contrasted with WS by those who adopt a theoretical linguistic point of view and regard the linguistic deficits in SLI as lack of grammatical knowledge. But is WS really the opposite of SLI?

2.11. WS and SLI – a *double dissociation* of innate mechanisms?

Referring to evidence from Gopnik and Crago (1991), Pinker (1999) proposed that in individuals with SLI, the syntactic, rule-based system is impaired, but their ability to memorise words is intact. Citing further evidence from Bellugi et al., (1988, 1989), and from other studies such as Clahsen and Almazan (1998) he also proposed that the opposite is found in WS, where there is a "*selective sparing of syntax, and grammatical abilities are close to normal in controlled testing*" (p. 479), but that there is an impairment in the associative memory mechanism such that individuals "*retrieve words in a deviant fashion*" (ibid). Pinker (1999:262) thus claims double dissociation in the case of SLI and WS:

"*...the genetic double dissociation is striking, suggesting that language is both a specialisation of the brain and that it depends on generative rules that are visible in the ability to compute regular forms. The genes of one group of children impair their grammar while sparing their intelligence; the genes of another group of children impair their intelligence while sparing their grammar...*"

WS has often been referred in the literature as providing evidence in support of modularity. Thus for example, Smith and Tsimpli (1995:190) in order to argue for the independence of language from cognition refer to WS at the end of their book:

"*It is no longer plausible to talk of 'cognitive prerequisites' to language. This has been apparent on the basis of many studies, especially of Williams Syndrome. Christopher's case confirms it*"

The existence of a language savant like Christopher is offered as one half of the argument for modularity, the other half consisting of the existence of syndromes (including adult aphasia and specific language impairment) in which there seems to be a discrepancy between language and nonverbal cognition.

In contrast to such views, Bates (1997) argues that adults with WS have been found to function in relevant ways at the level of 5 – to 7- year olds, which means that they have a sufficient substrate of cognitive abilities to allow them to develop complex syntax, and accordingly, WS does not represent an example of dissociations between language and general cognitive functions.

Furthermore, the literature review on WS presented earlier in this chapter suggests that there is a lot of debate whether linguistic abilities and more precisely, whether morpho-syntactic abilities, are superior in WS.

Levy (1994, 1996) and Levy and Kave (1999) distinguish between what they call 'big' modularity, which refers to dissociations between the language faculty and the general cognitive processes (the modularity of the language faculty); and 'small' or 'internal modularity, which supposes that language is not a unitary phenomenon but a multi-level entity where different levels (phonology, morphology, lexicon, syntax, pragmatics) operate as stages in a processing chain that are largely independent of one another. Based on evidence presented in the current literature, namely the fact that the language savant Christopher, Laura, or individuals with WS, can often have rather sophisticated expressive language, it is argued that if we follow Fodor's original view (1983), where language is in no contact with central processes, it would not be possible for an individual to be able to talk about certain topics in a sensible way given their severe deficits with general cognitive abilities. Laura (Yamada, 1990) was able to talk about bars, roommates, films. Similar findings have been reported in the WS literature, where individuals with WS are able to produce sensible comments about various issues that surround them and definitions of various concepts (Bellugi et al., 1988). This requires access to a rich conceptual system. Well-formed and appropriate language would often necessitate top-down influences, i.e. the involvement of central processes. Hence the argument is that individuals with uneven cognitive profiles do not only offer support 'big' modularity, and their sophisticated linguistic performance is described in terms of *uniquely preserved accessing privileges for language* (Levy 1996) which enable them to reach levels of performance that they cannot reach through other modalities. However such studies may offer support for 'internal' modularity or modularity within the linguistic system because there is evidence that vocabulary is more advanced than grammar in WS (Bellugi et al., 1994; Jarrold et al, 1998; 2001), and in the case of Laura, sentence production was well ahead of sentence comprehension Levy, 1996).

In a recent paper by Bellugi et al., (2000) the syntactic abilities of a group of individuals with WS was compared to a group of children with focal brain lesions and the findings suggested that the participants with WS were not

different to the participants with focal brain lesions. However, the results were not commented upon in light of modularity issues, even though they do question (in an indirect way) the position of those who claim that WS is the opposite of SLI.

2.12. Summary and research questions

The literature on WS is inconclusive as to whether WS presents with a superior verbal profile in the face of impaired non-verbal abilities. It further suggests quite a considerable variability across subjects, which includes the possibility of a rather heterogeneous linguistic profile. Even though previous research has delineated a variety of skills for individuals with WS, the profile of strengths and weaknesses has not been consistent among studies. The question of whether WS is the opposite of SLI remains open and further research is needed in order to determine whether there are grounds for positing a case of double dissociations for WS and SLI. Most of the research on language abilities in WS has focused on their morpho-syntactic skills, often relying on standardised tests or IQ tests where language abilities and cognitive skills can often be confounded. There have been very few studies which have investigated the linguistic abilities of individuals with WS in conversational settings and there have not been any studies which have combined a variety of procedures with the same subjects (standardised tests, conversational abilities and discourse abilities). Furthermore, apart from Bellugi et al., 2000 there have not been any studies which have directly compared individuals with SLI and those with WS and if we are going to make any claims as to whether WS and SLI show the opposite profiles and are a case of double dissociations we need to investigate it in more detail.

Hence **the aims** of the present study are the following:

a) **to explore and attempt to determine whether individuals with WS show superior linguistic abilities, i.e. what is the profile of language abilities across measures of vocabulary, morphology, syntax and pragmatics;**

b) **to further investigate whether individuals with WS are the 'opposite' of individuals with SLI;**

c) **to explore whether there are grounds for the claims that WS offers support for language modularity.**

This chapter has outlined the relevance of studying WS and SLI for the current modularity debate and it has offered a critical review of the relevant literature. The aims of the present research stemming from the inconsistency of the literature were specified. The methodology for the present research will be discussed in the following chapter.

CHAPTER 3.

Methodology – setting the scene

A child does not 'adopt the hypothesis' and 'seek to formulate the exceptions': a child is not a pocket edition of a linguist!

(Kaper, 1976:441)

3.1. Introduction

In this chapter the methodological approach adopted for the present research study will be discussed. This will include a section on the research design, with a special emphasis on the case study approach which was the one selected for the present research; a section on the selection of participants and a section on the materials used. The section on materials will provide a description of the verbal and non-verbal standardised tests selected for the present study, a rational for the

conversational analysis procedure, and the principles for the narrative discourse analysis procedure.

3.2. Research design – the 'case study' approach

Methodology plays a crucial role in scientific research. And although methodology is not an end in itself, methods can often account for seemingly divergent results across studies. Hence results must be interpreted in light of the methodological approach taken in a particular study. The method used in the present study is a combination of both a qualitative and a quantitative approach. The qualitative side is the fact that it contains a small number of data driven case studies whereas the quantitative contribution is the fact that a number of statistical quantitative analyses are used in order to calculate the results.

The literature review on WS (see Chapter 2) suggested that the WS phenotype may be more heterogeneous than it has been perceived in the past. This in turn may be one of the reasons why many studies, when attempting to replicate findings, come up with controversial results. The implications of the above are that a group study approach may not be the most appropriate at this stage of our knowledge and understanding of WS. Therefore the present study is going to adopt the case study approach. The advantages of adopting the case study method in the present study are outlined below.

3.2.1. Why a case study approach?

There are several reasons as to why a case-study approach may be appropriate for the present research study which will be discussed below.

a) More in-depth analysis

Primarily, the case study method allows in-depth analysis (Silverman, 2000) and therefore can provide a comprehensive and a detailed account of the children's linguistic and cognitive abilities. Since compiling a detailed case study can be a very labour-intensive and time- consuming process, the present study is limited to investigating a case series of five cases of each population of children, i.e. WS and SLI. Furthermore the case-study approach also allows one to focus on particular issues where a body of literature has already accumulated and there is a demand for more specific description. Thus for example, the literature on WS so far has suggested that morpho-syntactic abilities in WS may be impaired; what has not been specified or is still an issue of a large debate is which areas of morpho-syntax may be particularly troublesome for this population and whether these problems are in any way similar to those experienced by children with SLI.

b) Emphasising divergences in a population

Secondly, the case study approach was adopted in order to avoid the situation where the average performance of a group may characterise none of the individual subjects' performance, or in the best case scenario "may reflect a majority of cases, but hide the existence of divergences from the average in a significant number of cases" (Martin, 1995:495). One of the disadvantages of a group study approach is that it is theoretically unjustifiable to average the performance of individuals who, although may all be grouped under the same clinical 'label', (in this case WS) may well have different linguistic and cognitive deficits. What very often happens in group studies is that when a statistically significant difference is obtained between the disordered group's performance and that of the control group, it is often inferred that the difference characterises most, if not all, of the individuals of the disordered group (Martin, 1995).

c) The nature of the linguistic approach

Thirdly, the present study is mainly a clinical linguistic investigation, which requires

a predominantly linguistic approach. The nature of the linguistic approach is such that individual differences are important for linguistic theory and deserve close investigation. Therefore case studies are encouraged and are relevant for linguistic theory. The field of linguistics is guided by a philosophy according to which a phenomenon is considered genuine if it is theoretically interesting and coherent and it is very often the case that a phenomenon is evaluated by how well it can be accounted for within a particular theory (McDaniel, McKee and Smith-Cairns, 1996). This approach differs fundamentally from that of experimental psychology whereby a phenomenon must occur more often than it would be anticipated by chance before being considered psychologically "real". Therefore sophisticated quantitative tools are designed to distinguish such genuine phenomena from ambient variability ("noise") (McDaniel, McKee and Smith Cairns, 1996). For the purposes of the present study, it would be very useful to search for, and discuss those elements in the data which contradict or seem to contradict the emerging explanation of the phenomena under study. The analysis of 'deviant' cases or those which are part of the 'noise' helps refine the analysis until it can explain all or the vast majority of the cases under scrutiny (Mays and Pope, 2000).

d) The importance of clinical implications of the study

Another reason for adopting the case-study method is due to the fact that the study involves clinical populations and will inevitably have clinical implications. The literature review in Chapter 2 indicated the fact that individuals with WS cannot be assumed to be linguistically homogeneous; individual differences must therefore be identified, which would allow for the right clinical approaches to be designed and implemented that would meet the needs for a range of variations within a condition.

e) Implications for future research

The last but not least reason for selecting the case study approach is for the benefits of future research. Namely, the individual cases should help to identify behaviours

which it would be worth focusing on in larger scale studies. If a certain pattern is observed in all case studies it may be hypothesised that the pattern will be present in the rest of the population in question, which could eventually lead to expanding the sample and finally perhaps using a control group to test the observed hypotheses on a broader scale. Although for the present study there is a preference for the inductive, hypothesis-generating approach rather than hypothesis–testing, hypotheses must at some point be tested, otherwise the study runs the risk of being limited to mere speculation. Hence the present case study series should generate hypotheses to be tested in future research.

3.2.2. Drawbacks of a case-study approach

The case study method certainly has its drawbacks. Thus for instance the ability to generalise from the case study to the wider population is strictly limited (Pope and Mays 2000; Robson, 1993). However, as pointed out in Silverman (2000), the problem of generalisability can be tackled if information is obtained about relevant aspects of the population of cases against which our cases will be compared. Hammersley (1992) argues that comparisons with a larger sample may allow us to establish some sense of representativeness of a single case. Perakula (1997:214) supports this view: "*The comparative approach directly tackles the question of generalisibility by demonstrating the similarities and differences across a number of settings*". Thus by investigating the extent to which the case studies in the present research are similar or different to what has been reported so far in the literature about the populations under scrutiny we are getting an insight as to how what is already know about a population may need to be revisited and reconsidered.

There may be some practical difficulties as well, such as access difficulties; a detailed case study requires a number of sessions with the same participant over a longer period of time and there is an increased risk of a subject moving away or withdrawing from the study. Also, there are multiple methods of data collection (in the present study, a combination of standardised tests and conversational data) which means that there are more potential errors and difficulties in coherent presentation. However, the fact that each research method has its drawbacks should not prevent us

from doing research. The potential drawbacks of the various methodologies should not constitute an insurmountable obstacle to thoroughgoing research, providing they are taken into account and considered in an adequate way. Thus in the present study the need for more detailed case studies on individuals with WS is stronger than the drawbacks of the case-study approach. As already pointed out in Chapter 2, our present state of knowledge of WS is not very clear and there are strong implications for the WS phenotype being a spectrum where strengths and weaknesses vary to different degrees rather than being a single profile.

3.3. Participants

The five participants with WS were recruited through the Williams Syndrome Foundation and through local speech and language therapists. The ages of the WS subjects were between the ages of 7;06 to 12;00, mean age 9;02 at the time of the first session and such a broad range was allowed due to the rarity of the syndrome. Three of the participants were female and two were male. They had all had a positive FISH (fluorescent in situ hybridisation) test, which confirms the individual has WS. Three of the children were attending a mainstream school at the time of recruitment whereas the other two were attending special schools.

In the literature review it was mentioned that some recent findings on WS indicated towards the possibility of having a heterogeneous WS population. However at the time when the participants for the present study were to be recruited the information on heterogeneity in WS was not available.

The participants with SLI were recruited on the judgements of speech and language therapists working either in special schools or providing services within mainstream schools. The chronological ages of the children with SLI were between the ages of 9;00 and 11;00, mean age 10;00 at the time of the first session. Four of the participants were recruited from a special school for children with speech and language impairments and one participant was recruited from a mainstream school. There were four boys and one girl.

The literature review on SLI pointed to the fact that this population may be

rather heterogeneous and in order to avoid the possibility of having participants with different profiles, the children were selected on the basis of the following exclusion criteria:

- score of at least 1SD below the mean on minimum one standardised test involving grammatical comprehension or production;
- no recognised pragmatic problems;
- no hearing loss of a severity which necessitates regular visits to an audiologist; no history of recurrent otitis media;
- no autistic spectrum tendencies;
- no history of clinically significant behavioural, emotional, or neurological problems;
- non-verbal IQ - not lower than 85;
- no oral motor or sensory defects.

Thus efforts were made to recruit participants with SLI whose main problems were within the area of morphology and syntax.

3.4. Materials

The research design comprises standardised verbal and non - verbal measures, conversation analysis and discourse analysis i.e. narrative discourse. Each of these will be discussed in more detail below.

3.4.1. Standardised verbal measures

A battery of standardised measures for language comprehension and production was carried out. In order to obtain information about the level of language comprehension the following tests were used:

- British Picture Vocabulary Scale (BPVS) (Dunn et al., 1982), a test of comprehension of single words, which assesses the level of receptive vocabulary (vocabulary is an important measure of child development). It consists of line drawings which are presented one at a time and the child is required to point to

the picture which corresponds to the word said by the researcher. It has been chosen because it does not require the subjects to read or write and it does not require extensive verbal interaction between the examiner and the child, which makes it less threatening than many other individual tests.

- Test for the Reception of Grammar (TROG) (Bishop, 1982) is similar in format to the BPVS. The child is presented again with four pictures at a time and needs to select the one which corresponds to the adult's spoken stimulus sentences. The TROG assesses whether or not the child's comprehension of grammar is as expected for their chronological age and also to identify whether the child has a specific difficulty with grammar or a more generalised comprehension problem.

In order to obtain a measure of the children's grammatical production, the following tests were carried out:

- Clinical Evaluation of Language Fundamentals – E (revised version)(CELF-R) (only the Expressive Language Subpart) (Semenl, et al., 1987). It consists of three subtests: *Formulated Sentences* – which taps the child's ability to formulate complex and compound sentences; *Recalling Sentences* – which evaluates the ability to recall and reproduce sentence surface structure of varying length and syntactic complexity; and *Sentence Assembly*, which assesses the ability to assemble structures into grammatically and semantically acceptable sentences.
- In addition to the aforementioned standardised language measures, the BUS STORY (Renfrew, 1991) was also used because it has the advantage of assessing the child's ability to give a coherent description of a continuous series of events and the child's use of grammar in context.

NB: due to the fact that the children with SLI recruited from special schools were receiving intensive speech and language therapy at the time of the data collection, and were under constant observation by a specialist team, it was often the case that a speech and language therapist had administered the same language assessment as the research design for the present study very shortly before the same test was going to be administered by the researcher. In such cases, if the same test was administered within the previous 6 months, it was decided that the same language assessment was not going to be administered again, but the results that the child scored when tested

by their speech and language therapist will be used for the case study.

It should also be noted that one of the participants with SLI (MS) had moved to a secondary school while the data collection was under way, and therefore there is no data for this participant's performance on the Bus Story.

3.4.2. Standardised non-verbal tests

Very few studies have paid equal attention to both verbal and non-verbal abilities in the same group of children with WS. In order to assess a range of non-verbal cognitive abilities, the following were selected:

The Coloured Progressive Matrices (CPM)

- The Coloured Progressive Matrices (CPM) (Raven, 1984) tests general intellectual ability. It consists of three sets: set A taps the ability for pattern matching (forming gestalts) and visuo-perceptual skills; set B taps reasoning by analogy, and set Ab is an intermediate set testing both previously mentioned abilities. CPM indicates whether a person is, or is not, capable of forming comparisons and reasoning by analogy; and if not, to what extent, relative to other people, he or she is capable of organising spatial perceptions into systematically related wholes. It should be noted that CPM is not an IQ measure.
- Picture Completion (PC)- (subpart of the WISC-R battery) (Wechsler, 1992) at its most basic level tests visual recognition and thus is somewhat vulnerable to reduced visual acuity (Lezak, 1995). The participant is required to discover which part of an object is missing. The kind of visual organisation and reasoning abilities needed to perform PC differs from that required by other WISC Performance scale tests as the subject must supply the missing part from long-term memory but does not have to manipulate the parts (Lezak, 1995).
- Picture Arrangement (PA) (subpart of the WISC battery) (Wechsler, 1992) –

is a test with a humorous content which not only enhances its sensitivity to socially appropriate thinking, but also provides an opportunity for a particular kind of social response and interplay within the test setting (Lezak, 1995). The participant is required to put a set of pictures in the correct order. It taps sequential thinking- including the ability to see relationships between events, establish priorities and order activities chronologically. A low picture arrangement score in itself is likely to be associated with right temporal lobe damage (Dodril & Wilkus, 1976).

- Block Design (BD) (subpart of the WISC-R battery) (Wechsler, 1992) – is a test which is generally recognised as the best measure of visuo-spatial organisation in the Weschler Scales. It requires from the participant to produce a pattern using purpose-made cubes. Benton (1984) notes that in addition to measuring visuoconstructive abilities, the test correlates highly with general mental abilities.
- Object Assembly (OA) – (subpart of the WISC battery) (Wechsler, 1992) – has the lowest association with general mental ability of all the WISC Performance test battery (i.e. is does not test general mental ability). The participant is required to put cut-off pieces together in order to make an object (a girl, a horse, a face). In normal individuals, the OA performance level tends to vary relatively independently of other WISC test scores. Like BD it is a pure measure of the visuo-spatial organisation ability for which little abstract thinking is required. It taps the ability to form visual concepts quickly and translate them into rapid hand responses. Thus OA is as much a test of speed of visual organisation and motor response as it is of the capacity for visual organisation itself (Lezak, 1995).

3.5. Spontaneous speech

Formal tests and assessments are often very successful in identifying the specific skills and deficits which they are designed to test however this also implies that they can be quite limited (Howard et al., 1995). Thus for example if an individual test is deigned to investigate the ability to use past tense it will only detect skills and

deficits in this area of language functioning. Hence standardised tests can only provide limited information about a narrow range of linguistic abilities and overreliance on test scores and results for the purposes of diagnosis, management and research, may often prove inadequate or even misleading (Howard et al, 1995). In order to perform a more detailed and more accurate analysis of the language abilities of children with WS, spontaneous speech data was also collected.

Very few studies on WS consider language abilities across several domains. Clahsen and Almazan, (1998) is the only one which investigated both morpho-syntactic abilities and narrative discourse abilities in a group of 4 children with WS. There are no studies which have included both morpho-syntactic measures and conversational abilities in their investigation of the linguistic abilities of children with WS and certainly no studies have investigated standardised test performance, conversational abilities and discourse abilities in the same participants. Thus there is a need in the field of WS for more detailed profiling, which will include not only performance on standardised tests or performance only in conversational situations without any information regarding standardised language scores, but profiles which will include a combination of standardised tests, conversational, and discourse abilities.

There are some disadvantages when getting spontaneous speech data and that is if a particular grammatical construction does not occur in the sessions sampled, it is difficult to determine why it is absent. Furthermore, if a specific construction or grammatical item is present in spontaneous production data, it may be difficult to determine whether its occurrence is "productive" i.e. whether it is produced as a lexicalised rather than a productive form (McDaniel, McKee and Smith-Cairns). There is also the danger of the subject talking incessantly around their favourite topics, and considering the fact that this study deals with impaired populations, it would be difficult to judge what the level of conversational functioning is in reality with particular subjects.

In order to avoid some of the above-mentioned disadvantages of spontaneous speech data, semi-structured situations were created where a conversation is developed around a set of photographs thought to represent everyday scenes of which the participants might have had some personal experience ('The sick boy', 'The broken Vase', A birthday party'...).150 conversational turns were selected and

analysed in terms of exchange structure, turn taking and information transfer. Initially, the conversational samples of two children with WS were analysed and coded by making a note of every inappropriate utterance. Many of the categories that started to emerge from the two conversational samples resembled the framework by Bishop and Adams (1989) and Adams and Bishop (1989), which was to quantify and qualify the conversational behaviour of children with semantic-pragmatic disorders (SPD). The framework was also used, in an adapted version, by Taylor (1999). Since most of the data from the conversational behaviour of the children with WS could be fitted into the categories devised by these authors, it was decided to adopt this framework as a basic guideline and alter it as necessary, by either omitting categories for which there was no corresponding data or by including additional categories.

Consequently, in order to accommodate the data obtained from the conversations with the children with WS, the framework needed to be altered in the following manner: Although all the main headings in the framework were retained, the conversational behaviour of the children with WS necessitated the inclusion of a few additional subcategories within some of the main headings and also the omission of some of the subcategories from the main headings i.e. those that NEVER occurred in the conversations with the children with WS. However an additional category, i.e. **Inappropriate behaviour** was added, in order to mark those situations where a child laughed when that was not expected and was inappropriate in the particular conversational situation.

A couple of extra categories were included under the heading of **Too Little Information.** These were: **Minimal verbal response when a more elaborate response was expected,** to mark those utterances in which the child responded with yes/no whereas a more detailed response was required; and **Too vague**, to mark those utterances of the child when she has provided an answer which was too vague a response for the question asked (examples for these categories are provided in the relevant section below). Also, under the heading **Other**, the category **Repetition** was included, in order to mark those responses where the child simply repeated the adult's previous utterance, which was not a case of echolalia, but a mere repetition of the adult's previous utterance when the child did not know what to say next yet did not want to miss their turn. The remaining categories were adopted in their original form, i.e. as defined by Bishop and Adams (1989) and Adams and Bishop (1989).

In what follows, every category will be further explained using examples from the conversations with the children with WS. The exchange structure between the adult and the child was coded in the first pass through the transcript. Any inadequate responses were marked and then further considered in a second pass through the conversational data. Turn taking and information transfer were coded in a third pass through the data.

1. Exchange structure

- Initiation (I)

An initiation was coded for an item that begins anew, however it may not always solicit a response. It could be a question (which, unless a rhetorical question, would always require a response, which in turn needs to provide some new information) or a command (which may not always require a verbal response, it may only require a certain action). When the initiation was a question or a command requiring some kind of a response, it was coded as soliciting initiation (IS)

Examples are:

A ***what is he writing***?/ IS
C *party invitations/*

b) Command

C ***let's play the game/*** IS
A *which one?/*

An initiation may not necessarily be a question or a command. It may well be a statement, which itself provides some information, however it does not always require a response. These were coded as non-soliciting initiations (IN).

Example of a non-soliciting statement (demands maybe a weak response from the interlocutor) is:

C *I got a new teddy for X-mas/* IN

- **Reinitiation (R/IS)** - these were coded when the adult felt it was necessary to reinitiate an utterance, either because the child did not respond to the original initiation or because the child had not answered the adult's question as required and the adult felt it would be worth asking the same question again. Sometimes the reinitiations occurred on the part of the child, because the child did not get a satisfactory answer from the adult. For example:

A *and where is the frog?/*
C *no/*
A ***where is it?/*** R-IS
C (3.00)
don't know/

- **Response**

  - *Minimal, non-verbal* (RMn) or *Minimal, verbal* (RMv)

These codes are used for responses such as 'yes', 'no' or 'don't know' or the assumed non-verbal equivalents of nodding, shaking the head or shrugging, which provide no new information other than confirmation, denial or indication of inability to respond.

  - *Extended Response (RE)*

Any response that provides more information than simply a minimal yes/no/don't know reply was coded as an extended response, even though it may consist of only one word.

A *who is he writing his invitations to?/* IS
C ***Anna/*** RE

The responses could be adequate or inadequate. The inadequate ones were coded using a separate system, as it will be indicated below.

*Adequate/Inadequate (IR-inadequate response).

- **Follow-up (F)**

This is an optional element of exchange structure, which neither elicits nor provides information. It is used to acknowledge a response or to simply echo or reinforce information that has already been given. For example:

A	*what is he writing?/*	IS
C	*party invitations/*	RE
A	***exactly, party invitations/***	F

- **Follow-up initiation (F/IS)**

These were coded when the adult in addition to acknowledging the child's utterance, also initiated additional response from the child as a reinforcement of what the child had already said.

A	*so did you get that game for your birthday?*	
C	*yeah/*	
A	***did you?/***	F/IS
C	*yeah/*	

Sometimes the adult may have asked for some additional information within the same follow-up utterance, and these instances were also coded as follow-up initiations. For example:

C	*where does, where is he going now?/*	
A	*where is he going?/*	
	where do we want him to go?/	F/IS
C	*cause he's going in the puzzle, so I think the puzzle would be there/*	

- **Continuation (CN)**

A Continuation was coded when an utterance adds some new information either within a turn or lasting beyond one turn. For example:

A	*what are they doing on that picture?/*	IS
C	*waving/*	RE
A	*they are waving/*	F
C	***because he's got some balloons/***	CN

- **Unclassified (U)** - these were coded when an utterance was uncodable because of the unintelligibility of one or several words within it or when it was incomplete.

***Classification of inadequate responses**

- ***Problems with expressive syntax or semantics*** ESS

This code was used for utterances where the inappropriacy seemed to result from unusual morphology or syntax. The child may have selected the wrong tense, aspect, preposition, pronoun, adverbial; the child may have failed to include the auxiliary in a complex tense or other grammatical constructions, or has failed to mark morphologically the presence of an inflectional suffix (3 person singular, plural 's, possessive 's, past 'ed', present participle 'ing' , past participle, inadequate use of a pronoun etc). Unusual semantics refers to inappropriate use of discourse devices normally used to establish and link discourse topics ['by the way', 'actually', 'well', 'in fact', 'anyway', 'of course'], formulaic strings of words, or inappropriate selection of lexical items.

C	***oh, where she phoning/***	IR – ESS (auxiliary omitted)
A	*who's she phoning?/*	

C *I don't know/*

A *who do you think?/*

C ***he's phoning daddy/*** IR – ESS (use of masc. instead of fem).

- ***Failure to interpret literal/inferential meaning*** (FILIM)

This category was coded when the child provided an answer, which was not appropriate to the question asked by the adult, but to a related question. The child may have either misinterpreted the adult's initiation (usually a question) or has not grasped the meanings of particular lexical items or function words in a question.

V *did you just come from football?/*
you just played football?/

B *no I go to another another place/*

V *oh to another place/*

B *yeah/*

V *which place was that?/*

B *YMCA/*

V *oh YMCA/*

B *yes just next to my (.) next to my house/*

V *so what did you do there?/*

B ***I played football/*** FILIM

- ***Pragmatic problems I: Ignoring an initiation while remaining on the topic (II)***

These were coded when the child responded to the adult's initiation though not always with the most appropriate response, i.e. the child's response is vaguely related to the adult's question or on the same topic but not necessarily a response to the actual question. For example:

A *what's your favourite toy?/*

C *a hoover/*

A *a hoover?/*

so what do you do with it?/

C *just play with it/*

A *play with it/*

does your mum let you play with it?/

C ***and Ashley's got a hoover too/*** II

- ***Pragmatic Problems II: Failure to use context in comprehension*** **(FCC)**

Sometimes the child may have understood the literal meaning of an utterance but missed the adult's intended meaning because of failure to account for the linguistic, environmental or social context. Thus the child has actually missed the illocutionary force of an utterance and has interpreted too literally the adult's utterance.

A *what do you do when you are ill?/*

C *oh I go to hospital or something/*

or to the doctor's it depends/

A *if you are at home are you bored?/*

C ***no I am going to clinic/*** FCC

- ***Pragmatic Problems III: Too little information*** (TLI)

These were coded when the child failed to observe what Grice (1975) would refer to as the 'maxim of quantity' by giving their interlocutors too little information so that the meaning remains unclear. Several subcategories were coded under this heading.

a) Unestablished referent

These were coded when the child introduces a term which had not been sufficiently

well established for the listener.

C *you have to go outside to the pond/*
A *yeah/*
C ***and then you go round/*** TLI
A ***you*** *go round?/*
C *no the boat goes round and then it turns/*

b) Logical step omitted

These were coded where a logical step of the argument or a critical step in the sequence which the child is producing is omitted, the effect is bizarre, and the natural flow of the conversation is interrupted as it creates some confusion for the hearer who needs to 'recover' the missing elements. The omission may either occur within a single utterance or within a conversational turn.

For example:

A *what else did you do?/*
C *mmm (2.00) I do I do I did my spelling/*
A *excellent/*
were you good at it?/
C **yeah my alphabet/** TLI

The child probably wanted to say 'I did my alphabet' but omitted a crucial element, i.e. the verb which made the utterance sound slightly bizarre and not very clear.

c) Minimal Verbal Response when more elaborated response was expected

A *and did he just stay there on the floor?/*
C ***no/*** TLI
A *what happened to him?/*
C *he got home/*

The child had replied with a minimal verbal response although the conversational situation required a more elaborate response, which the child gave after further prompting from the adult.

d) Too vague

These were coded when a child provided a response which is too vague in its content for the question asked.

A	*what's her name?/*	
C	*Elisabeth/*	
A	*oh right/*	
	is she nice?/	
C	*yeah/*	
A	*what does she look like?/*	
C	***all right/***	TLI
A	*can you describe her to me?/*	
	I can't imagine what (.)	
C	no no/	
A	*no?/*	
	does she have long hair, short hair?/	
C	*blond hair/*	
A	*blond hair?/*	
	is it long?/	
C	*yeah, no not long/*	
	it's like Hot Spice's hair/	

The child started a conversation about a girl from his class that he likes. When the adult asked: 'What does she look like', in a typical conversation, one would expect a more elaborate answer, usually involving a description of some sort and use of adjectives. The child however only provided a vague response ('all right'). With

further prompting, the child gave more relevant and more detailed information. The reason why such instances are marked as inadequate is because there is a strong pressure on the conversational partner to keep asking questions in order to obtain the relevant information and to keep the conversation going.

- ***Pragmatic problems IV: Too much information*** **(TMI)**

The maxim of quantity may also be violated by the child providing unnecessary information to the listener, information which is often superfluous or irrelevant. Several subcategories were identified under this heading:

a) Excessive elaboration (EE)

These were coded when the child tended to over elaborate on a topic, saying more in response to a question than it was necessary.

A *who takes the dog for walks?/*

C *my granddad on a Saturday/*

A *that's nice/*

C ***he takes him one hour long, when we got a friend, and you take her while I'll play her, then walk back/***
I am tired after a minute, when I go home I'd go on the settee then I just flop on the settee and my dog just licks my face/ TMI

b) Unnecessary reiteration (UR)

These were coded when a child unnecessarily attempted to reiterate or to confirm a piece of information that has already been established.

C *and I can learn French sometimes on my computer/*

A *oh you can learn French/*

C ***on my computer/*** TMI

- ***Unusual or socially inappropriate content or style*** (USICS) – these were coded when the child provides an utterance which has something unusual in its message, i.e. the content of the message (though very often well formulated grammatically) seems inappropriate or even a bizarre thing to say in the context of the conversation taking place.

a) Topic drift (TD) - drifting away into talk about something which is in some way *connected* to the original subject, but not really relevant to the discussion.

C *he's going to brush his hair/*

A *yes so that he can be nice and tidy when his friends come/*

clean like you/

C ***you can come/*** USICS

b) Unmarked topic shift - when the child suddenly changes the topic non-related

to the topic in hand.

C *what's in there?/*

A *let's see what is in there?/*

there is a book there/

C *huh?/*

A *uh-huh, there is a book/*

C *a book of (.) of (.) of (.)*

have you got other things there?/

A *other things?*

no/

D *no?/*

V *no/*

D ***there's Ashley Ward in our school/*** USICS

c) Stereotyped 'learned' language used inappropriately– these were marked when the child produced utterances that had a stereotyped quality, which gave the impression that the child was simply repeating learnt information or a learnt construction inappropriately. The following was included in this category: fillers (well, you know, mind you...) but only if they occurred more than 10 times within a sample of 150 utterances as fillers are not unusual in typical conversations; and social phrases, such as *How are you*, *See you later*...etc. when they were used inappropriately or excessively.

C *how are you today?*

A *I am very well, thank you/*
how are you?/

C *I am very well/*
how are you today? USICS

d) Socially inappropriate behaviour– these were coded when the child showed socially inappropriate non-verbal behaviour.

A *can you tell me what is going on on this picture?/*

C (laughs)

The child laughs and there was nothing funny on the picture. The adult was only trying to elicit a conversation around a picture.

f) Inappropriate questioning

These were coded when the child asked a question that the adult could not possibly know the answer to, which was not the type of question typically asked about this topic, or to which the child already knew the answer. Sometimes it was felt the children used a questioning mode as a strategy to avoid being asked questions which they can not cope with or to divert the adult's attention from the task that the child may not have felt comfortable doing.

A	*what's happening there?/*	
C	*the bus left the bus driver/*	
	and he got another one to meet at the (.)/	
	where is your house?/	USICS
A	*my house is down in Broomhill/*	
	it's a part of the city called Broomhill/	
	that's where I live/	
	it's far from here/	
C	***have you got some kids?/***	USICS
A	*no I haven't/*	
	I am not married/	
C	*aren't you?/*	
A	*no/*	
C	*are you on yourself?/*	
A	*yes I am/*	
C	(starts singing a tune)/	
A	*will you tell me the story about the bus?/*	
C	(laughs)	

- ***Other problems*** (O) – these were coded when the child produced an utterance which could not have been classified into any of the above categories, but it was felt that it still should be coded as inadequate.

a) **Immature/lack of experience or world knowledge** (O) - some children give responses that seem simply to reflect the fact that they do not know enough to be able to provide an adequate response. This appears to be a problem with general

knowledge rather than with language.

A *have you been on an aeroplane before?/*

C *no no/*

A *are you afraid?/*

C *yes/*

A *you are/*

what are you afraid of?/

C *of of of of of of of flying/*

A *you are afraid of flying?/*

C *yeah/*

A *are you? /*

why?/

C ***I don't know/*** IR - O

(4.00)

I don't know/

b) Repetitions (R) – these were coded when the child not knowing what to say simply repeated the adult's utterances either in a form of a question or in the from of an answer.

A *did you have a nice day?/*

C *yeah/ did you?/*

A *yes I did/*

I worked most of the time but I am fine/

what did you do?/

C ***I worked most of the time/*** IR-O

2. Turn-taking

Turn-taking was coded in a second pass through the transcript. Normal fluent conversation requires both partners to synchronise the timing of their utterances precisely, predicting when the other will stop talking. This is a skill that develops, as children grow older.

- Gap <G> was coded when there was a noticeable interval between the completion of the adult's utterances and start of the child's utterance. Only when the interval was longer than 2.00 seconds it was coded as a gap.

A *what did you do*?/

C (2.00) <G>

A *what did you do*?/

- Inadvertent overlap <I> was coded when the child's utterance occurred at a 'transition relevance place' i.e. when the child had a legitimate reason to predict on either syntactic or prosodic grounds that the adult completed their turn. For example:

A *so who drives, is it your mum or your dad*?/

C *my dad*/

A *he drives*/

[**do you have*(.)

C **can I have*] *a blue mini there next to that car*?/ < I >

- Violating overlap <V> was coded when the child would cut across in the middle of the adult's utterance; i.e. the child had made a wrong prediction about the point at which the adult had finished speaking.

A *do you laugh at* [**somebody who is sad*?/

C **no*] <V>

- Adult interrupt <A> was coded when the adult interrupted the child, due to the adult's impression of the child having poor control of synchronisation and the need for the child to clarify their utterance.

A *do you have a birthday party yourself for your birthday*?/

C *erm I (.) my friend (.) Louis and Donathan 's friend ain 't coming round because,*

A **no but have you ever had a birthday party*?/ <A>

C *yeah at home and Donathan 's friend is coming round/*

3. Information transfer

This category does not feature in the original framework by Bishop and Adams (1989) and Adams and Bishop (1989) as the above authors had used the category **Repair** which considers the child's ability to request clarification from the adult and to respond to requests for clarification made by the adult. Taylor (1999) argued that considering only the issue of being able to seek clarification or respond to requests of clarification, without considering the issue of how the child is dealing with requests for information in general, is limiting because it does not take into account the fact that if a child has a specific problem in dealing with requests for clarification, the theoretical and clinical implications will be different than if a child had a general problem in dealing with requests for information. Therefore, the following subcategories were coded:

- Open Requests for Information (RIO)

These were coded when the child was required to provide a response other than confirmation or clarification. Wh-questions and yes/no questions were included in this category.

For example:

A *where did you go on holiday?/* RIO

C *to France/*

A *do you ever have your friends round?/* RIO

C *yes/*

- Requests for Clarification (RQCL)

These were coded when the child's previous utterance was not clear enough for the correct interpretation of their intended message. These included utterances on the part of the adult which sought clarification to what has already been asserted on the part of the child and also those instances when the child provided insufficient information and the adult needed to ask a further question in order to clarify that the child's intended message is properly understood.

For example:

C *and then you go round/*

A ***you** go round?/* RQCL

C *no the boat goes round/*

- Requests for Confirmation (RQCN)

These were coded when the adult simply wanted to confirm the message that the child intended to convey.

C and we had a minibus crash/

A a minibus crash?/ (RQCN)

C yes/

3.5.1. Inter-rater reliability

There were a total of 10 conversational samples, each of which contained 150 utterances. Two independent raters coded 3 conversational samples, in order to ensure that the codes assigned to the conversational samples were not subjective. The levels of inter-rater agreement obtained for the conversational analysis procedure are detailed below.

Exchange structure: The agreement for the allocation of exchange structure codes was on average 84%. It varied between 84% and 86% between the raters. The level of agreement for each individual exchange structure code varied between 50% and 100%.

Turn-taking: The level of agreement for the allocation of turn taking and the subcategories associated with it was 100%.

Information transfer: There was 95% agreement between the rates on the allocation of information transfer codes. The level of agreement varied between 90% and 98%.

Conversational inadequacy: The average agreement between rates as to which categories were conversationally inadequate was 87%, with a range of 85% to 88%. Since there were several major inadequacy subcategories, they are presented in Table 3.1. below, giving the average agreement per categories and the range of agreement.

Category	Overall agreement	Range
Expressive syntax/semantics	87%	81-92%
Ignoring initiation while remaining on the topic	88%	75-100%
Failure to use context in comprehension	86%	71-100%
Failure to interpret literal or inferential meaning	63%	50-75%
Too little information	92%	83-100%
Too much information	57%	50-63%
Socially inappropriate content or style	93%	85-100%
Other	90%	80-100%
Unanalysed	100%	100%

Table 3.1 Inter-rater agreement for the allocation of inadequacy codes

As evident from table 3.1 the level of agreement fell to about 50% for the Failure to Interpret Literal and/or Inferential Meaning. It was thought that the reason for this may be the very low frequency of the code. The second category where the level of agreement sometimes fell to 50% was the category of *Too Much Information*. The level of agreement in this case could have been affected by the ambiguous nature of the conversations coded, whereby the participants had problems with several aspect at the same time (for example: problems with sentence structure coupled with socially inappropriate style and providing too much information). Since efforts were made so that only one code per utterance gets allocated, (depending on what the rater thought was the biggest problem with the utterance), there was the risk of having the same utterance coded differently because only one code was to be allocated. This issue was not predicted and should be taken aboard in future studies of a similar kind.

3.6. Narrative discourse abilities

When dealing with issues regarding the language -cognition interface the research on WS so far has focused mainly on standardised tests. In order to address the issue of the interface, we should look into more detail, paying special attention to the use of

language in narrative, where the interplay between language and cognition is most clearly seen.

The wordless picture book *Frog, where are you* (Mercer Mayer, 1969) was selected in order to elicit a narrative from the children. This particular story was chosen because the plot is amusing, the children find it entertaining and it has been used over the years in assessing both typical and atypical language functioning in both children and adults (Berman, 1988; Reilly et al., 1990; Berman and Slobin, 1994; Van der Lely, 1997). The child was shown the book and asked to tell a story from the pictures as they progress page by page. The adult could see the pictures. If the child stopped, the adult would encourage the child to continue (e.g. 'and then', 'and then what happened'). These were later coded as open contributions on the part of the adult. If the child after such encouragement still seemed unable to proceed, the adult resorted to more specific questions (e.g. 'and where is the dog' or 'and what is the boy doing').

3.6.1. Analysis of the narrative sample

The next question to consider was how to segment the narrative sample. Many recent studies or reviews of narrative language have used the minimal terminable unit (T-unit) (Gillam and Johnston, 1992; Paul and Smith, 1993) or the communication unit (CU) for segmenting samples (Crais and Lorch, 1994; cited in Hughes, McGillivray and Schmidek, 1997). The term T-unit was first used in Hunt's (1965), cited in Hughes, McGillivray and Schmidek, 1997, work and defined as:

- A minimal terminable unit – a T-unit – consists of one main clause and all the subordinate clauses attached to it (Hunt, 1965). It is used primarily to segment written narrative samples.

The term CU was used in the work of Loban (1976) and defined as the following:

- A communication unit – a CU- consists of each independent clause with its modifiers (Loban, 1976). It is used most often to segment oral narrative samples.

The T-unit analysis so far in narrative research has been applied for counting

independent clauses only, i.e. those consisting of at least a subject and a verb. However, some of the narrative samples in the present study contained a number of elliptical answers, particularly in cases when the child was struggling to tell the story and the adult needed to ask open-ended questions. Therefore, it was felt that the use of T-units was not appropriate in the present study of narrative discourse. In addition, T-units have been usually associated with written narratives whilst the present study deals exclusively with oral discourse. The use of the term CU is also slightly broader than T-units as it comprises several categories (Loban 1976, cited in Hughes, McGillivray and Schmidek, 1997:53):

1. **Each main clause, which contains a subject and a predicate, is a CU.**

Examples:

C *The boy is called Jack.* **CU**

2. Each answer to a question, provided that the answer lacks only the repetition of the question elements is a CU.

Example:

A and what are they doing there?/

C *sitting and having fun/* **CU**

3. Each elliptical 'yes' or 'no' answer is one CU.

Example:

C "have you seen my frog"?/

A and what does the mole say?/

C *"no"*/ **CU**

Rules for segmenting and counting CUs when quotes appear (Hughes, McGillivray & Schmidek, 1997):

1. Each main clause along with any subordinating clauses in the quote is attached to the introductory words as one CU.

Example:

The boy said: "*Go away you bees*". **CU**

2. If the quote contains additional main clauses, each becomes a new CU.

Example:

She yelled: "Stop!/I don't want you to go in there!" **(two CUs)**

Narrative samples can be analysed at two levels: (1) macrostructure level, or the sample's global, general properties; and (2) the microstructure level, or the sample's local, more specific properties. It is exactly this possibility of 'duality' of levels of functioning that makes narratives extremely important when dealing with issues on associations or dissociations of language and cognition. The macrostructure of a narrative considers the overall thematic organisation in terms of causal and temporal relationships for fictional stories. It is also referred to as 'story grammar' (Hughes, McGillivray and Schmidek, 1997). It relies to a great extent on general cognitive abilities.

Microstructure on the other hand involves "*the smaller units within the narrative, consisting of the underlying network of ideas put into sequences of sentences*" (Hughes, McGuillivray & Schmidek, 1997: 111). The linguistic forms chosen are those that play a central role in the construction of a narrative. They are the systematic parts of linguistic expressions that make it possible to situate narrative events in time and space, and in relation to one another. The term "form" is used as an umbrella term for a range of grammatical morphemes and construction types:

(1) bound inflectional and derivational morphemes, such as tense/aspect markers on verbs;

(2) free grammatical morphemes (closed class terms such as pronouns, determiners, prepositions, particles and conjunctions);

(3) syntactic constructions, such as relative clauses and complement clauses;

(4) systematic alternations of word order, such as left dislocations, passives ets;

Macro	Micro
⇓	⇓
General cognition	Linguistic abilities

3.6.2. Macrostructure analysis

There are several approaches that can be adopted when studying the macrostructure of a narrative, the episodic analysis being one that is most suitable for analysing fictional stories (Hughes, McGuillivray & Schmidek, 1997), as it can reveal how well a child can express and sequence the parts of a prototypical story. Several variations of story grammars have been developed (see Nelson, 1993 for review) but Stein and Glenn's approach (1979, 1982; Glenn and Stein, 1980; Stein 1988) seems to be used most commonly.

Table 3.1 shows eight common parts of a story grammar, giving alternative terms used by various writers. Optional parts are indicated by an asterisk, and short examples of a story are provided to illustrate each part.

Story grammar element	Description	Example
Setting (S)*	Reference to time and place, usually including introduction to one or more characters.	*Once upon a time there was a little boy called Jack, and a little dog called Bes, and a little frog called Harry and they were best friends.*
Initiating Event (IE) or Problem (P)	An event that sets the story in motion, including a problem that requires a solution; it function to make the protagonist want to achieve a goal or change of state.	*When the boy was asleep the frog got out of this thing. And the dog was asleep. He woke up and (.) the (.) Jack woke up and found the (.) the (.) the frog had gone.*
Internal response (IR)*	A statement of how a character feels in response to the initiating event; it usually contains an emotion word. It functions to motivate the protagonist to act.	*The boy was upset;*
Internal plan (IP)*	A statement of an idea that might fix the problem; sometimes this is considered to be part of the internal response.	*He was thinking what he should do and he decided to go and look for his frog...*
Attempt or Action (A)	Some action taken by the main character that is meant to solve the problem; there may be several attempt without a statement of consequence before the end of a story.	*He got himself dressed in his clothes and (.) and Bes got his head stuck in a jar. And Jack was shouting "Harry Harry where are you".*
Consequence (C)	The event(s) following the attempt and causally linked to it, whether successful or not; there are may be several consequences of an attempt.	*And all they saw was a beehive with bees coming out.*
Resolution or Reaction (R)	The final state or situation triggered by the initiating event; it does not cause or lead to other actions or states.	*They found a (.) they found a log and they got onto it. And then they met two frogs the dog and Jack. And they met some little other frogs too. "Yeee I found it I found it"!*
Ending (E)*	A sentence or phrase that clearly states that the story is over.	*The end by Jonathan Hope.*

Table 3.1: Adapted from Hughes, McGillivray and Schmidek, 1997:118-119. The examples are taken from the transcripts of the present study, apart from IR and IP for which there were no examples in the transcripts obtained by the participants, therefore they are invented for illustration purposes.

From Table 3.1 above it follows that having an initiating event, an action, and a direct consequence are the three essential parts that form what is referred to as a 'complete episode'. As children develop their narrative skills, they move from simple descriptive sequences or additive chains toward more elaborated and complex episode structures. Hedberg and Westby (1993), Hudson and Shapiro (1991), Kemper (1984), Peterson and McCabe (1983) have examined the development of narratives in typical populations and have proposed the following developmental milestones of narrative production used for macrostructure. The table below (3.2) also adopted from Hughes, McGillivray and Schmidek, 1997: 118-119) shows the story structure levels, the main features of each level, and the corresponding developmental age.

Story Structure Levels		
Story structure levels	**Developmental age**	**Description**
1. Descriptive sequence	Preschool	Describe(s) characters, surroundings, actions with no causal relations
2. Action Sequence	Preschool	Lists actions in a chronological order with no causal relations
3. Reactive sequence	Preschool	Series of actions, each of which automatically causes other actions, but with no planning involved; no clear goal-directed behaviour
4. Abbreviated episode	About 6 years	Provides aims or intentions of characters but no planning involved; planning must be inferred
5a. Incomplete episode	Around 7-8 years	States planning, but one or more of the three essential story grammar parts of a complete episode are missing: IE, A, or C.
5b. Complete episode	Around 7-8 years	Includes aims and plans of a character, may reflect evidence of planning in the attempts to reach a goal; has at minimum an IE, A and C; uses words like *decided to*
5c. Multiple episodes	Around 7-8 years	Is a chain of reactive sequences or abbreviated episodes, or a combination of complete and incomplete episodes
6. Complex episodes	Around 11 years	Includes elaboration of a complete episode by including multiple plans, attempts, or consequences within an episode; includes an obstacle to the attainment of a goal; may include a trick

Table 3.2 Story structure level. Adopted from Hughes, McGillivray and Schmidek, 1997: (118-119)

Global or macrostructure analysis of fictional stories can provide information on how well organised the child's narrative framework is.

3.6.3. Microstructure analysis

In the previous section, the macro level or the global level of analysis of the structure of narratives, which is going to be used for the analysis of the narrative samples in the present research, was described. Apart from a macro level analysis, it is also useful to examine the organisation of narratives at a micro level, investigating the ways a storyteller manipulates linguistic forms in order to transfer the fictional reality into a verbal encounter (Hughes, McGillivray and Schmidek, 1997).

When summarising and reporting narrative language performance, both quantitative and qualitative measures are important to consider. Certainly, there are some measures of oral narrative ability that are not easily quantified, such as ability to take listener's perspective and ability to engage an audience and entertain the listeners. However, there are other measures such as average length of CU – or T-unit and average number of clauses per unit, that are more easily determined.

When discussing micro-level analysis, the following aspects will be considered: cohesion analysis, grammatical units analysis, and morphological error analysis, and syntactic analysis.

a) cohesion analysis

Cohesion is extremely important when judging the effectiveness of a narrative in that it allows sentences to 'stick' together into a unit to form a whole. If a speaker does not include enough cohesive ties in a text, or uses cohesive markers that do not tie back to information elsewhere in the text, comprehension of discourse may suffer. In comparison to conversational discourse, narrative discourse has a particularly high density of connectives (McCabe and Peterson, 1991), and thus, narratives make a good choice for examining a speaker's knowledge and use of cohesion. Development of cohesive devices in children ages 2;0 to 3;6 years, which was studied longitudinally by Peterson and Dodsworth (1991) indicated that the number of cohesive ties increased with both age and mean length of utterance (MLU).

Research on cohesion in narratives has shown more errors in cohesion and more incomplete cohesive ties in narratives produced by children with language disorders than in those produced by children without language disorders. (Hedberg and Westby, 1993; Liles, 1985; Strong and Shaver, 1991). Therefore cohesion analysis will be part of the narrative discourse analysis in the present research, as there have not been any studies so far which have investigated the use of cohesive devices in the WS population.

NB: It should be noted that when analysing cohesion, the fact should be taken into account that both the child and the adult shared contextual information (as they both could see the pictures from Mercer Meyer's book the Frog Story).

Three types of linguistic cohesion will be considered: reference, conjunctive and lexical. Both inter and intra-sentential cohesion was considered. Each of the three categories of cohesion contained several subcategories:

a) ***reference cohesive ties*** (pronominal, demonstrative and comparative)

For example:

The boy went to the wood.

***He** wanted to find the frog.* (pronominal reference tie)

There was a boy and a frog.

***The** boy also had a dog.* (demonstrative reference tie)

The boy rode on a reindeer and fell into the water.

*And then he had **another** accident.* (comparative reference tie)

b) ***conjunctive cohesive ties*** (additive, adversative, temporal, causative, and continuative)

For example:

The boy had a dog and a frog.

***And** the frog lived in a jar.* (additive conjunctive tie)

He checked the tree.

***But** the frog wasn't there.* (adversative conjunctive tie)

*He was running away **because** all the bees were chasing him.* (causal conjunctive tie)

The boy said 'Good night' to the frog.

***Then** he went to bed.* (temporal conjunctive tie)

He saw that the jar was empty.

***So** he decided to look for the frog.* (continuative tie)

c) ***lexical cohesive markers*** (repetitions, synonyms, antonyms, part-whole relations, subordinate-superordinate. An example of each of these categories is given below.

For example:

*The boy had **a frog**.*

*One day, **the frog** ran away.* (repetition)

*Then he saw **a reindeer**.*

*And he was riding on **the deer**.* (synonymy)

*There were two frogs. **The big one** was probably the mother and **the small one** was the baby.* (antonymy)

He saw ***a reindeer*** *and he was riding on* ***his back.*** (part-whole)

Then they saw some ***animals****, and he took* ***a frog*** *away.* (superordinate-subordinate)

b) ***Grammatical error analysis***

Since the present study has as one of its main goals to investigate whether the morpho-syntactic abilities of children with WS bear any similarities to the morpho-syntactic abilities of children with SLI, a grammatical error analysis was carried out, whereby the number of correctly used, omitted and incorrectly used grammatical morphemes in the children's narratives was calculated. They were based on Brown's (1973) fourteen grammatical morphemes with some adaptations. Thus given that there has not been any indication in the literature on SLI that contracted forms of the auxiliary and the copula are easier or more difficult to produce for this population, and there has not been any indication in the WS literature either that participants with WS find contractible/uncontractible copula/auxiliary forms easier or more difficult to produce, no distinction between contractible and uncontractible forms was made in the present study. However given that children with WS sometimes have problems with the perception of size (what's bigger/smaller, taller/shorter etc.) (Bellugi et al., 1988; 1994) the comparative and superlative forms of adjectives were included. Thus the grammatical morphemes examined in the present study were: determiners, prepositions, plural 's', genitive 's, pronouns, 3rd person singular, -ed past tense, irregular past, -ing participle, -en participle and the comparison morphemes (-er, -est).

c) Syntactic analysis

In order to investigate whether the children with WS use complex syntactic structure spontaneously, as there have been many claims in the literature that they do (Bellugi et al., 1988; 1994; Klima, Reilly and Bellugi (1990), and furthermore, in order to investigate whether they can use complex syntactic structures correctly, and whether

there are any similarities or differences in comparison to the children with SLI, a syntactic analysis was carried out. It mainly included structures which were beyond the level of a simple declarative clause and which are most likely to be used in typical everyday situations. Therefore the analysis included counting the number of correctly and incorrectly produced coordinate structures, subordinate structures, question formation, conditionals and passives. Admittedly, passives are not found that frequently in everyday situations, however given the claims (Bellugi et al., 1994; 2000; Clahsen and Almazan, 1998) that individuals with WS do not have any problems with the production of passives, they were included in the count. If the child produced a different complex structure (coordinated noun phrases, or a noun phrase in which the head noun is postmodified by clause, or a complex verb phrase), they were discussed separately.

3.7. Statistical analysis of all the available data

The sample sizes used in the present study were relatively small, which means that the power of statistical analyses is low as well. However given that there was an extensive range of variables for each participant in terms of standardised test scores, categories of conversational functioning (exchange structure, turn taking, information transfer, and conversational inadequacy), and narrative discourse analyses, there was a need to quantify in some way the results obtained and to investigate whether there are any statistically significant differences amongst the different individuals with WS, and to what extent their performance is similar/different to that of individuals with SLI. It should be pointed out (as already mentioned above) that the small sample sizes reduce the possibility of generalising over the majority of the populations (in this case SLI and WS). However in order to support any theoretical views stemming from the present research, some quantitative evidence is needed in order to sustain the scientific value of the study.

3.8. Summary

This chapter presented the rationale for choosing the case-study approach as the preferred research method for the present research study. The procedure for recruiting the participants was reviewed and the selected standardised verbal and non-verbal measures were discussed. Finally the procedures for the analysis of conversational and narrative discourse abilities were described and exemplified, and the issue of statistical analysis was addressed. The following two chapters will present the individual case-studies for the participants with WS and SLI respectively.

CHAPTER 4.

Williams Syndrome individual profiles–case study series

In this chapter the case studies of five children with WS will be presented. The case-study for every child will provide the scores that these children achieved on standardised verbal and non-verbal tests, conversation analysis of randomly selected 150 utterances in terms of exchange structure, turn taking, information transfer and conversational inadequacy and narrative discourse analysis of their 'Frog Story' narrations (as described in Chapter 2). A discussion of the child's strengths and weaknesses will be provided at the end of each case study.

4.1. WS Case Study 1 - MW (chronological age 7;06)

4.1.1. Language abilities

MW's performance on standardised language tests is presented in Table 4.1. and her scores on the individual subtests of the CELF-E are shown in Table 4.2.

	Raw Score	Stand score	Z-score
BPVS	**13**	**91**	**-0.60**
TROG	**17**	**111**	**0.73**
CELF-E	**126**	**110**	**0.60**

Table 4.1. MW's scores on standardised language tests

CELF - E	Raw Score	Scaled Score	Z-score
Word Structure	**35**	**12**	**1.66**
Formulated Sentences	**32**	**6**	**-1.33**
Recalling Sentences	**59**	**17**	**2.33**

Table 4.2. MW's scores on the individual subparts of the CELF-E

4.1.2. Performance on standardised language tests

MW's performance on standardised language tests as shown in Table 4.1 and Table 4.2 was as expected for her chronological age. Her comprehension of grammar is unimpaired as revealed by the results on the TROG where she performed as expected for her chronological age. MW's receptive vocabulary, as the scores on the BPVS show, was within the normal range. The score on the BPVS however is much lower than her performance on receptive grammar. With regard to expressive morpho-syntactic abilities MW performed within the expected range for her chronological age.

4.1.3. MW's expressive language abilities

Because of her chronological age at the time of data collection, MW was administered the *Word Structure* (WS) subtest of the *CELF-E* instead of the *Sentence Assembly* task. MW's performance on the WS task was at ceiling levels. She revealed no difficulties when required to produce regular and irregular plurals, noun possessives, personal and possessive pronouns, third person singular 's', regular past tense, auxiliary+ing structures, derivation of nouns from verbs, derivation of adjectives from nouns and use of demonstratives. Table 4.3 shows some of MW's responses on the *Word Structure Test*:

Word Structure	
1. Here is one dog.	Here are two **dogs.**
2. Here is a tooth.	Here are some **teeth.**
3. Whose bike is this?	It is **Mark's.**
4. The girl has a new watch.	The watch belongs to **her.**
5. His father bought him a new coat.	The coat is his.
6. Here Mark types.	Here he **writes.**
7. Here is Mark jumping the fence.	This is the fence Mark has **jumped.**
8. Here is Mark writing a letter.	This is the letter Mark ***writed.**
9. Here Mark Mark is fishing.	Here Ann and Mark **are playing on the swings.**
10. The man paints.	He is called a **painter.**
11. Ann said, 'Mark, you have all the luck', She could have said, "You are very **lucky**".	
12. This man is strong, but this man is a bit **stronger** and this man is the **strongest**.	
13. Mark said, "I don't want these apples. I'll take some of **those**".	

Table 4.3 Sample responses on the Word Structure subtest

NB: The words which are underlined and in bold are the target words that MW produced. Words marked with * indicate errors.

Some problems with irregular past tense were revealed. Thus for instance when asked to produce the past tense of *write* MW produced **writed.* It should be noted however that many typically developing children still sometimes overregularise at this age (Berko-Gleason, 2001) as a common phase in English language acquisition.

MW's performance on the Formulated Sentences subpart of the CELF-E was 1.5SDs below the mean.

Formulated sentences	
1. car	The wheels of the **car** are not the same as each other.
2. gave	At nanny's house, Kate the girl is eating her egg. Nanny **gave** Kate some fruit.
3. before	**Before** that grown up he is waiting after her*.
4. when	The baker is giving the children some dinner **when** it is dinner time.
5. after	Number two has won **after** these boys.*
6. if	**If** he throws the ball, how far would it go?
7. and	The birds and the flowers are being so good.
8. because	That lady is stopping **because** she has got a sign which says 'STOP' children!
9. but	They are riding their bikes **but** he and she are looking at his bike.
10.or	*The nanny has the basket with much more apples in the basket.
11.although	He's got his bike **although** he's on his way*.
12. tall	He's **tall** and he's not giving the ball to the little one.
13. either	She is hungry **either** she is waiting.
14. neither	He's got one shoe on **neither** he's got two shoes on.

Table 4.4. Some of MW's responses on the Formulated Sentences subpart of the CELF-E.

*As it was not very clear whether M might have misheard *or* for *more*, this item has not been counted as either correct or incorrect.

MW was able to use correctly a number of complex and co-ordinated structures. She showed awareness of temporal relationships as she used correctly the temporal subordinator **when** (item 4) and the temporal subordinators **before** or **after** (items 3 and 5 respectively). It should be pointed out however that item 3 was semantically anomalous.

MW also showed some awareness of causal relationships. Thus she used successfully the causal subordinator **because** (item 8). Her use of **although** was slightly deviant in a semantic sense, i.e. the sentence was grammatically correct but semantically inadequate.

MW was able to produce conditional 'if' clauses. Thus when asked to make a sentence with the word *if* she produced: *If he throws the ball, where would it go?*

MW's use of some conjunctions although syntactically correct, showed semantic abnormalities (ex: 7). It is rather unimaginable in the world as it is how flowers 'can be good'. MW however correctly used the conjunction BUT (item 9).

MW was able to produce multiple embeddings as item 8 shows, whereby she used one main and two subordinate clauses. The sentence was not absolutely correct however due to her omission of an argument for the verb **stop**. This might suggest that MW's attempt to use a rather complex sentence structure had an adverse effect on another level of sentence processing, i.e. verb-argument structure.

MW scored slightly higher than 2SDs above the mean on the *Recalling Sentences* subpart of the CELF, repeating sentences of varying length and syntactic complexity very successfully.

4.1.4. Receptive language abilities

As MW's scores on the TROG suggest, MW showed no problems understanding passives, postmodified subjects, X but not Y structures, above/below, neither/nor structures. She had some difficulty with object relative clauses and embeddings however mastery of these structures is not expected for her chronological age.

MW's receptive vocabulary was age appropriate, though it should be noted that it was at the lower end of average and much lower than her scores on grammatical comprehension and production.

4.1.5. Use of grammar in context – Bus Story

Table 4.5 shows MW's scores on the Renfrew Bus Story.

	Raw score	Age equivalent
Information	**11**	**4;0**
Sentence length	**13**	**7;9**
Subordinate clauses	**3**	**6;3**

Table 4.5 Renfrew Bus Story

The formal scores in Table 4.5 indicate that on sentence length MW scored age appropriate. Her sentences, if taken in isolation, were well formed with appropriate use of morphology and syntax. There were no inflections missing, all the prepositions and verb particles were appropriately used, the verbs' argument structure was maintained, i.e. all the sub-categorised arguments and prepositions were present. MW's use of subordinate clauses was at almost age-appropriate level.

MW's Bus Story:

1. Once upon a time there was a stupid horrible bus/
2. he lived in a bus carriage with his driver/
3. and when the driver jumped out to put this thing on his head the bus didn't stop/
4. he went on/
5. but the driver raced after it/
6. now this is a funny bit/
7. he passed the train but the train went into a tunnel/
8. but a policeman blowed a whistle/
9. and then he was (.) decided he is not staying on the road/
10. he's going to the village/
11. so off he went into the field/
12. and then he saw the little cow who couldn't believe his eyes/
13. but he isn't scared of it/
14. he raced/
15. he raced down and into the pond/
16. and he was taking him but now he was good/

MW manifested some problems with reference specifying mechanisms. She encoded the changing aspects of the situation very successfully in line 1 and 2, however in line 3 she attempted a very complex sentence with a subordinate

and a co-ordinate structure in it and produced an ambiguous sentence. The listener does not know whether it was the bus driver's head that the driver is trying to put something on or whether it was the bus's head. She also uses the deictic form 'this' in line 3, which also adds to the ambiguity of the sentence.

She used a pronominal referring expression (line 7), *he*, however it is not very clear whether *he* refers to the driver or to the bus. In the same line (line 7) though MW successfully introduced the train. She seemed to over-rely on pronominalisation (she uses pronouns rather than full NPs in the whole of the bus story) apart from line 8 where she introduced a new character - the policeman. In line 17 for instance, three pronouns are being used the antecedents of which are not known, which makes the sentence rather confusing. The interpretation of pronouns is regulated by anaphora, which can hold within sentences, across sentences, and across turns at speaking in dialogue. It seems that MW has not really mastered anaphora, neither within nor across sentences, however this aspect of language is one of the last ones to be acquired and given MW's age it is not surprising that this language domain is still in the developing phase.

Despite her excellent command of morpho-syntax, MW did not provide enough information. The score on the information she provides is very low, much lower than what is expected for her chronological age and for the level of her linguistic development. Successful temporal sequencing of events, which MW seems to be capable of, on its own, is meaningless. It provides only the skeleton but not the flesh of an event; a meaningful narrative involves not only temporal organisation but also thematic content. It is the *thematic content* that seems to be rather anomalous.

MW also shows problems with linguistic cohesion:

- her use of connectors is not always appropriate, in this case co-ordinating connectors. Thus for example in line 8 the inappropriate use of the conjunction 'but' breaks the natural flow of the sequence because it provides an adversative cohesive tie which expresses a relationship contrary to expectation and as it is produced in the text above, there is no previous expectation (some relevant information has obviously been omitted) to which the adversative tie would be a contrast to.

- inappropriate use of additive ties as in line 15 where a verb phrase and a preposition are co-ordinated, instead of a verb phrase being co-ordinated with another verb phrase.

Cohesion, though heavily 'linguistic', actually taps more into the child's cognitive abilities because it reflects temporal chains and sequencing. Picture sequences impose on children a particular cognitive demand because they require the children to translate spatially static visual sequences into temporally dynamic verbal input (Berman & Slobin, 1994). MW does show an ability to a certain extent to relate two or three events to one another in a temporal chain, however due to her heavy use of pronouns the sequence becomes rather aberrant. There is more than one character in this story and although the temporal sequence is acceptable, the referential sequencing is slightly problematic.

11. *he's going to the village/*
12. *so off he went into the field/*
13. *and then he saw the little cow who couldn't believe* ***his*** *eyes/*

In summary, although short the Bus Story indicated areas of strengths and weaknesses across domains of language and cognition. Thus as already predicted from the scores on the standardised language tests, MW's strengths are within the domain of language structure. She scored age equivalent on sentence length and almost age equivalent on her use of subordinate clauses, however the score on information was much lower than expected for her language age and for her chronological age. The greatest difficulty seemed to be reference specifying mechanisms and cohesion. The problem seems to be integration of structure into discourse function. The connections between conversational functions and their linguistic formulation are the first level within the communication process that breaks down for this type of child.

4.1.6. Overview of MW's linguistic abilities

The results that MW obtained on the standardised language tests suggest that MW's development of morpho-syntax is unimpaired and follows a normal curve of development. Receptive and expressive grammar seem to be an obvious

strength in her linguistic profile, however her vocabulary development, as her scores on the BPVS showed, is also within the typical range. There seemed to only one area of expressive linguistic abilities, the Sentence Assembly subpart of the CELF-E, where MW performed below the average expected for her chronological age.

4.1.7. Non verbal abilities - standardised test scores

MW's non-verbal abilities in terms of non-verbal standardised test scores are shown in Table 4.6.

Test	Raw	Scaled score	Z-score
Picture completion	**6**	**5**	**-1.33**
Picture arrangement	**0**	**1**	**-3**
Block Design	**2**	**3**	**-2.66**
Object Assembly	**5**	**4**	**-2**

Table 4.6 MW's scores on four subtests of the WISC-P

MW's general intellectual abilities as measured by the Ravens Coloured Matrices are shown in Table 4.7.

Test	Raw	Centile
Ravens	**17**	**25**

Table 4.7 Raven's Coloured Matrices

As tables 4.6 and 4.7 show, MW's scores on standardised non-verbal tests were much lower than her scores on the verbal ones. Her score on the RCPM was the highest of all the non-verbal measures, at borderline for non-impaired performance. On this measure MW performed as would be expected from a typically developing 7-year-old child.

MW's performance on the four WISC-P subtests was about 2.5 SDs below the mean, giving her a Performance IQ score of around 50. MW's performance on the Picture Completion (PC) subtest on the WISC was 1SD

below the mean. The lowest of all scores, 3 SDs below the mean, was her performance on the Picture Arrangement (PA) test, a subtest of the WISC battery which taps into sequential thinking - which includes the ability to see relationships between events, to establish priorities and order activities chronologically, to think in a socially appropriate way.

MW performed 2 SDs below the mean on the Block Design (BD) and Object Assembly (OA) subtests of the WISC. These two tests measure visuo-spatial organisation and visuo-constructive abilities and given that it has been reported over and over again that WS individuals typically have problems in this domain, scores below average were expected on these two tests.

4.1.8. Summary of MW's performance on standardised verbal and non-verbal tests

MW's performance on non-verbal standardised tests varied from one test to another, her performance ranging between 1 and 3 SDs below the mean, which is indicative of a moderate to severe general cognitive impairment. The scores on the verbal standardised tests are all either within the expected range for her chronological age or above average. An interesting point worth noting is that although most of her expressive syntax is grammatically correct, it shows some semantic abnormalities, which may be worth exploring further. The standardised scores she obtained on the battery of verbal and non-verbal tests suggest that an obvious strength in MW's profile is her linguistic abilities, and that she manifests profound deficits in the non-verbal domain, in particular with sequential thinking - including the ability to see relationships between events, establish priorities and order activities chronologically (despite her correct use of temporal and causal subordinators in the verbal domain).

The scores on the standardised tests gave rise to a few questions:

1. whether the linguistic abilities that MW seemed to have as an obvious strength on formal language measures would emerge in her actual use of language, both in conversations and in narrations?

2. whether her strengths in the linguistic domain were going to 'conceal' her cognitive deficits in free conversations and in narrative discourse?

4.1.9. Conversational abilities

Conversational abilities were assessed in terms of exchange structure, turn taking and repairs. In a randomly selected sample of 150 turns, MW produced 154 utterances. Data from the analysis of exchange structure are shown in Table 4.8.

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
4	1	23	106	15	3	2

Table 4.8. Number and proportion of exchange structure codes

Data from the analysis of turn taking are summarised in Table 4.8. As they show, MW demonstrated very good abilities in managing turn taking with no gaps occurring and very rare overlaps with the interlocutor.

Gap	**Inadvertent overlap**	**Violating overlap**	**Adult interrupt**
0	0	2	0

Table 4.9 Turn taking

The analysis of information transfer in shown in Table 4.10.

Information (108)		**Clarification (15)**		**Confirmation (7)**	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
62	46	10	5	7	0

Table 4.10 Information transfer

Table 4.10 indicates that there was a total of 108 requests for open information put to the child, to which the child replied adequately 57% of the time and inadequately 43% of the time. There were also 15 requests for clarification put to

the child, to which MW responded adequately 66% of the time and she responded adequately to all the requests for confirmation.

In a conversational sample consisting of 150 conversational turns on the part of the child, MW produced 154 utterances. The conversationally inadequate utterances are shown in the Table 4.11.

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	11(7%)
Failure to comprehend literal/inferential meaning (FILIM)	1 (0.6%)
Ignoring initiation while remaining on the topic (II)	4 (2.6%)
Failure to use context in comprehension (FCC)	6 (4%)
Too little information (TLI)	26 (17%)
Too much information (TMI)	1 (0.6%)
Socially inappropriate content/style (SICS)	0 (0%)
Other (O)	4 (2.6%)
Unclassified (U)	2 (1.3%)
Total	**55 (37%)**

Table 4.11 Categories of conversational inadequacy

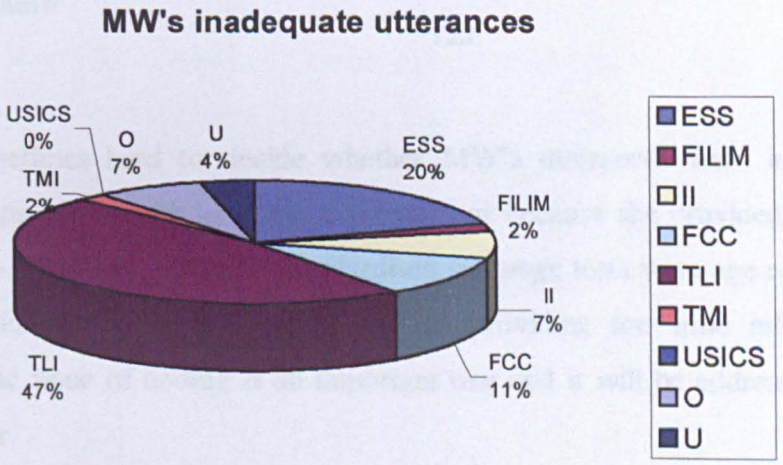


Figure 4.1 Categories of conversational inadequacy

As Table 4.11 and Figure 4.1 show, codes were not allocated to all the available categories. Thus codes were not allocated SICS. The greatest proportion (47%) of all available categories was allocated to the category of TLI. Within this category the code Too Vague was the most prevalent. MW had a strong tendency to say as little as possible to the adult's request for open information. The following excerpt from the transcript clearly indicates this tendency:

V	what's happening there?/	
M	**playing/**	**TLI**
V	they are playing/	
	do you know this game?/	
M	**go blind/**	**TLI**
V	yes/	
	so how do you think this game,/	
M	**girl/**	**TLI**
V	the girl/	
	what does she do?/	
	what is she having?/	
M	**it's (.) so she can't see/**	**TLI**
	she can't see/	
V	that's right/	
	so she's having that blind fold to close her eyes so she can't see the other children/	
	what do you think the girl has to do?/	
M	**to point/**	
V	to point to whom?/	
M	**that/**	
	Anna/	**ESS**
V	uh-huh/	
	and then when she touches Anna what happens?/	
M	**run round/**	**TLI**
V	and then?/	
M	**bye/**	**TLI**

It was sometimes hard to decide whether MW's utterances were inadequate because of problems with language expression or because she provided too little information. Since her scores on standardised language tests were age equivalent, it was decided to code such utterances as providing too little information. However the issue of coding is an important one and it will be addressed in the final chapter.

In addition, 20% of all the allocated codes fell within the category of ESS, even though MW scored extremely well on expressive morpho-syntax. Additional 11% of all the available codes allocated were from the category of FCC. MW sometimes had problems with using the available contextual information and provided some responses which were very much out of the

context of the conversation as the following example shows (taken from a conversational interaction while MW had a sequence of pictures in front of her and was asked to say what was happening on each one of them):

A and then what's the next one?/

M playing/ **FCC**

(this was a picture of the children playing but it was not the one MW was supposed to describe. It was a Birthday party and children have not arrived yet so that they could be playing already)

A they are not playing yet/

M coming in/

A who is coming in?/

M Anna/

7% of the codes were allocated to the categories of O and II respectively. A small proportion of codes were allocated from the categories of U, TMI and FILIM.

4.1.10. Narrative discourse abilities

Table 4.12 shows the number of Communication Units that MW used in order to retell the Frog Story, the number of clauses and words and the mean length of her communication units in terms of clauses and words as well as the number of subordinate clauses used in the narrative. It must be noted that MW was not able to tell the story without being prompted by the adult, which means that the relatively large number of CUs does not reflect her productivity in story telling.

	CU	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
MW	68	33	230	0.48	3.38	4

Table 4.12 Length information

4.1.10.1. Microstructure

MW's use of grammatical morphemes in her Frog Story narration is presented in Table 4.13. Table 4.14 presents MW's use of syntactic structures.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	34	3	0
Prepositions	6	0	1
Plural 's'	4	0	0
Genitive 's	0	0	0
Pronouns	10	0	1
3rd person sing.	4	0	0
Irregular past	15	0	0
-ed past	5	0	0
-ing participle	11	0	0
past participle	2	0	0
auxiliary	19	0	0
Total	**98**	**3**	**2**

Table 4.13 MW's use of grammatical morphemes

Table 4.13 shows that MW correctly used 98 grammatical morphemes, omitted only 3 (which all were determiners) and used incorrectly 2 (a preposition and a pronoun).

Syntax	Correct	Incorrect
Coordination	3	0
Subordination	4	0
Question formation	3	0
Passives	0	0
Conditionals	0	0
Total	**10**	**0**

Table 4.14 MW's use of syntax

4.1.10.2. Macrostructure

The fact that MW was not able to generate the story herself but was relying on prompts from the investigator suggests that MW does not have a well-developed

narrative framework (see Appendix 2, MW's story for a full transcript). When asked in the end to retell the story independently, MW provided a summary, which was at the level of a reactive sequence, with no planning involved and no clear goal-directed behaviour.

4.1.10.3. Summary of MW's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Word Structure		■	
Recalling Sentences		■	
Sentence Formulation	■		
Sentence length		■	
Subordinate clauses	■		
Information	■		
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			■
TROG			■
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion	■		
Picture arrangement	■		
Block design	■		
Object assembly	■		
RCM			■
Conversational abilities			
Exchange structure, turn taking and information transfer: MW had a tendency to use minimal verbal responses and had difficulty responding adequately to the adult's requests for open information and clarification. There were not any major problems with turn taking skills. **Conversational inadequacy**: MW's inadequacy score was 37% and the majority of MW's inadequate utterances fell in the category of too little information. She also had problems with expressive syntax/semantics, failure to use context in comprehension, world knowledge and ignoring the adult's initiations while still remaining on the topic.			
Narrative discourse			
Microstructure – Cohesion analysis is inappropriate because MW did not tell the story independently. However in terms of grammatical error analysis, MW had few problems and could generally manage sentence structure very successfully. **Macrostructure** – MW was unable to generate the story on her own, which means that MW has not yet developed a narrative framework, despite her excellent linguistic abilities. She had problems with establishing the causality of events though the Bus Story showed that MW was successful at ordering events temporally.			

Table 4.15 Summary of MW's profile

4.2. WS Case Study 2 - DW (chronological age 8;06)

DW's performance on standardised language measure are shown in Table 4.16 and 4.17.

4.2.1. Language abilities

Test	Raw score	Stand score	Z-score
BPVS	15	84	-1.07
TROG	10	75	-1.66
CELF-E	28	50	- 3.33

Table 4.16. Scores on standardised language tests

CELF-E	Raw Score	Scaled score	Z-score
Sentence Assembly	0	3	-2.33
Formulated Sentences	3	3	-2.33
Recalling Sentences	25	3	-2.33

Table 4.17. Scores on the individual subparts of the CELF-E

4.2.2. Performance on standardised language tests

As Table 4.16 above shows, DW performed below what was expected for her chronological age on all the three standardised tests i.e. BPVS, TROG and CELF-E. However her comprehension of Vocabulary seemed to be least impaired as DW scored the equivalent of what would be expected of a typically developing child whose chronological age was between 5;10 and 7;06. The scores on reception of grammar were lower and equivalent to what would be expected of an unimpaired child of an approximate age of 5;06. On the expressive subpart of the CELF, DW performed most poorly, much below what would be expected for her chronological age.

NB: Since it was virtually impossible for DW to do the *Sentence Assembly* subpart of CELF-E battery (for children 8 years and above) because the child could not read and could not understand what was expected from her on the task, the *Word Structure* subpart of the CELF-E was also administered. However in the final table when all the profiles of the children with WS were compared, her scores on the SA were included.

However as Table 4.18 shows, DW performed as poorly as she did on the SA task.

CELF-E	Raw Score	Scaled score	Z-score
Word Structure	16	3	-2.33

Table 4.18 DW's scores on the Word Structure subpart of the CELF-E

4.2.3. Expressive language abilities

In contrast to MW (see 4.1.1.) who did not have any problems with inflectional morphology, DW presented with serious difficulties in this area of linguistic performance. Thus for example, she omitted the plural marker 's' when asked to produce the plural form of *watch*, over-regularised the irregular plural and produced *foots* and *mens* as plural forms of foot and man respectively. She also showed problems with the regular past tense morpheme. These are some of her utterances when she was prompted to produce the past tense regular morpheme – **ed** :

Word Structure	
1. Here is Mark jumping the fence. This is the fence Mark has	**jumping on**.
2. Here is Ann climbing a ladder. Here is the ladder Ann has	**not on**.
3. Here is Ben painting a picture. This is the picture Ben has	**paint.**

NB: The child's responses are underlined and in bold.

DW's use of the irregular past tense however seemed to be unimpaired:

4. Here is Mark writing a letter. This is the letter Mark **wrote.**
5. Here is Ann getting a present. This is the present Ann **got**.
6. Here is Ben making an aeroplane. This is the aeroplane Ben **made**.

DW's use of pronouns was most consistent. She presented with no problems with possessive pronouns and personal pronouns. Furthermore, she used correctly the noun possessive marker 's'.

DW's performance on verb inflectional morphology was much more variable and rather inconsistent. Thus she used the 3rd person singular marker 's' correctly in one case and incorrectly in the other case:

7. Here Mark types. Here he * **drawing**.
8. Here Ann jumps. Here she **swims.**

The same applied for her use of auxiliary +ing which in one case was correct and it was incorrect in the other.

9. Here Mark is fishing. Here Ann and Mark **are playing on the swings**.
10. Here Ben ***running.**

Such inconsistency may be due to rather short attention span and lapse of attention as to what was required of her in some tasks.

DW was also experiencing difficulties with derivational morphology.

11. This man paints. He is called a * **dad.**
12. This girl jogs. She is called a * **Hannah**.
13. This woman teaches. She is called a * **lady**.
14. Mother said, 'You can't eat because your hands have dirt on them'. She could have said, "You can't eat because your hands are ***no response**
15. The teacher said: 'We won't go outside with this much noise in the room'. She could have said: "We won't go outside because it's too ***sleepy**.
16. Ann said, 'Mark, you have all the luck', She could have said, "You are very ***good**.

It is interesting to note that on item 15 DW supplied the correct derivational suffix however the stem noun was incorrect. This raises doubts as to whether the child had actually understood the task.

Since DW was not able to do the *Formulated Sentences* subpart of the CELF-E (she stopped after the first 2 items and could not do anymore), there was not much evidence regarding her competence on verb-argument structure. It seemed that this was not a very appropriate language measure for DW as very little data was obtained. There was no evidence of DW using any complex or coordinate structures and she scored rather low on the *Recalling Sentences* subpart of the CELF. She had problems repeating passive sentences, those that include noun modification, coordination, subordination, and relative clauses.

4.2.4. Receptive language abilities

DW scored quite low on the TROG, having problems with understanding passives, postmodified subjects, X but not Y structures, and also showing some problems with the comprehension of singular/plural noun inflections and prepositions. However, for the last two points DW failed on only one out of the four items in the particular blocks which may be due to a momentary lapse of concentration rather than grammar comprehension problems.

4.2.5. Use of grammar in context-Bus Story

Table 4.19 shows DW' s scores on the Renfrew Bus Story.

	Raw score	**Age equivalent**
Information	8	3.9
Sentence length	7	3.1
Subordinate clauses	0	3.11

Table 4.19 DW's Renfrew Bus Story

The Bus Story (second attempt)

1. D **the bus wouldn't work/**
2. V uh-huh/
3. D **one two three four** (unintelligible)
4. V OK, so the bus wouldn't work, /
5. what happened then?/
6. D **he ran away/**

7. V uh-huh/
8. where did he go?/
9. D to (2 syllables)
10. **to train track/**
11.V uh-huh/
12. and then where is the bus now?/
13.D **down the ??road/**
14.V yes/
15. who's that?/
16.D **the fireman from , /**
17.V the fireman?/
18.D **yeah/**
19.V OK what does he do?/
20.D **he** (1 syllable) (D whistles)
21.V uh/what's that?/
22.D **whistle/**
23.V whistle/ what does he say?/
24.D (3:00) **er he says stop/**
25.V that's it stop/
26. and then?/
27.D **then he ran away/**
28. **then he (.) then he had enough and say 'Ooh, he's had enough' said the cow/**
30.V that's right/
31. what did the cow say?/
32.V moo, I can't believe ****my eyes/***
33.D ***my eyes/***
34. **that's the end/**
35.V no it's not/
36. what happened?/
37. what happened here?/
38.D **he ran in the pool/**
39.V the bus went into the pool, /
40.D **and (.) and the bus driver gets a number one/**
41. **a number one/**
42. **he went in the pool and (.) and /**
43.V who took the bus out of the pond?/
44.D **I don't know/**
45.V a crane/
46.D **a crane/**
47.V yes/ and then what happened in the end?/
48.D **he he** (3.00) **he were a nice bus/**
49.V he was a nice bus again/

NB: DW's contributions are marked in bold

DW experienced severe problems when trying to retell the Bus Story, and with a lot of prompting from the adult she managed to construct a story at a second attempt. As the transcript shows, DW attempted only to answer the adult's questions rather than to construct a coherent story herself, even though she heard the story twice. The formal scores that DW obtained are much lower than what would be expected from her chronological age in all three aspects: information,

sentence length and number of subordinate clauses. She preformed at a level which corresponds to what would be expected from a 3 year old child.

Some information about her use of grammar in context is available. DW used irregular past tense forms with the verbs *go*, *run*, *to be*, *say*, she also correctly used 3rd person singular 's'. There is only one uninflected verb form (line 28), which according to the context in which it appears should be inflected for past tense. There was hardly any evidence of use of linguistic cohesion apart from line 28 when DW used one additive tie '*then*' but this was actually prompted in the previous line by the adult. Since the child produced very few complete sentences and their length was rather short (apart from line 28 which has 14 words, all the other have between 2 and 5 words) it is very difficult to judge what her real language level is as low as what the sparse output she produced suggests.

4.2.6. Overview of DW's linguistic abilities

DW's performance on standardised language tests suggests moderate receptive and severe expressive language deficits. Her linguistic functioning seems to be rather impoverished, resembling that of a 3-4 year old typically developing child.

4.2.7. Non verbal abilities - standardised test scores

DW's non-verbal abilities in terms of standardised test scores are shown in the Table 4.20 and Table 4.21.

Test	Raw	Scaled score	Z-score
Picture completion	**9**	**5**	**-1.66**
Picture arrangement	**4**	**2**	**-2.66**
Block Design	**0**	**3**	**-2.33**
Object Assembly	**7**	**4**	**-2**

Table 4.20 DW's performance of the four subtests of the WISC

On the non-verbal tests DW performed similarly to MW in that her scores all fell between 1 and 3 SDs below the mean. Her score on the PA subpart of the WISC was the lowest (z= -2.66) followed by Block Design (z= -2.33) followed by Object Assembly (-2) with the highest score on PA (-1.66).

Intellectual abilities – Ravens Coloured Matrices

Test	Raw	Centile
Ravens Coloured Matrices	**15**	**5-10**

Table 4.21 DW's performance on the RCM

4.2.4. Summary of DW's performance on standardised verbal and non-verbal tests

DW's performance on standardised non-verbal tests was rather variable, her performance being within the range of 1.5 and 2.5 SDs below the mean. Her verbal abilities lay within the same range, falling also between 1.5SD and 2.5SDs below the mean. This is indicative of a rather consistent linguistic-cognitive profile, which manifests with moderate to severe deficits both in the verbal and in the non-verbal domain.

4.2.6. DW's conversational abilities

In 150 conversational turns, DW produced 156 utterances. This shows that each conversational turn that DW undertook consisted of at least one utterance.

Conversational abilities were assessed in terms exchange structure, turn taking and information transfer.

Data from the analysis of exchange structure are shown in Table 4.22

Initiation		Response		Continuation	Follow-up	U
IS	IN	MV/N	EXT			
10	5	25	71	27	10	8

Table 4.22 DW's exchange structure analysis

The exchange structure analysis as shown in table 4.22 suggests that the majority of DW's responses were extended, however there was a rather small number of continuations. DW had a rather high number of initiations (15 in total) out of which 10 were soliciting information.

Data from the analysis of turn taking are shown in Table 4.23

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
0	0	0	0

Table 4.23 Turn taking

The analysis of Turn Taking as Table 4.23 indicates revels that DW was very good at turn talking skills, she never missed a turn, never interrupted the conversational partner and never said anything that warranted the adult's intervention.

Information (70)		Clarification (14)		Confirmation (11)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
38	32	10	4	10	1

Table 4.24. Information transfer

The analysis of Information Transfer as Table 4.24 revealed some severe difficulties with DW's responses to the adult's requests for open information. She replied inadequately to 45% of them. There were also a high number of adult's requests for clarification, where DW performed better providing adequate clarifications in 70% of the cases. There were not any major problems with DW's ability to provide adequate answers to the adult's requests for confirmation, where DW provided only one inadequate response out of 11 requests put forward on the part of the adult.

Conversational inadequacy (i.e. number of inadequate utterances out of 156 presented as raw numbers and percentages) is shown in Table 4.25.

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	25 (16%)
Failure to comprehend literal/inferential meaning (FILIM)	1 (0.6%)
Ignoring initiation while still remaining on the topic (II)	1 (0.6%)
Failure to use context in comprehension (FCC)	4 (2.6%)
Too little information (TLI)	18 (11.5%)
Too much information (TMI)	1 (0.6%)
Socially inappropriate content/style (SICS)	4 (2.6%)
Other (O)	7 (4.5%)
Unclassified (U)	8 (5%)
Total	**69 (44%)**

Table 4.25. Categories of inadequacy and number (percentage) of inappropriate utterances in a sample of 150 conversational turns and 156 utterances.

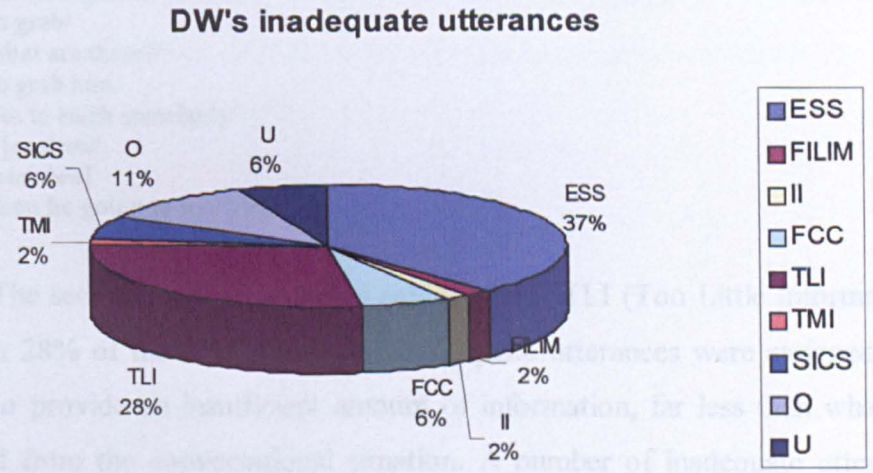


Figure 4.2. DW's inadequate utterances.

As Table 4.24 and Figure 4.2 show, codes were allocated from all available categories. 69 out of 156 or 44% of the total number of utterances that DW produced were coded as inadequate. The majority of her inadequate utterances (37% out of the total number of inadequate utterances) fell in the category of expressive syntax and semantics, which was not surprising given DW's poor scores on expressive language abilities as revealed by her performance on the

standardised verbal tests. In her spontaneous speech DW presented with severe sentence formulation difficulties and morpheme omissions, as the following excerpt from a transcript shows:

V what do they do?/
D the (.) the (.) they are playing/
V what's the girl (.)how do you think they are playing the game?/
D **cause (.) cause (.) he (.) cause she (.) she's a good him (.) him (.) him is (.) is (.) is he party tomorrow/ my (.) my brother's party/**
V yes/
D (6.00) mmm (.)he's closing his eyes/

(D gestures by putting her hands over her eyes)

V she's got closed eyes yes and what do you think she has to do here?/
D **she has to (.) to (.) to (1.00) to don't look/**
V to look/
D **don't look/**
V not to look/ she must not look/ she must not see through that/ is it a towel or something?/ and she has to/
D to grab/
V what are these?/
D to grab him/
V yes to catch somebody/
D *[*and and*
V *and then*]
D **then he going to bye - bye/**

The second most represented category was TLI (Too Little Information), to which 28% of the total number of inadequate utterances were assigned. DW tended to provide an insufficient amount of information, far less than what was expected from the conversational situation. A number of inadequate utterances (11%) were assigned to the category Other, and they were mainly within the subcategory of immature language or world knowledge. 2.6% of the inadequate utterances were assigned to the categories of SICS and FCC each, whereas a relatively small number of inadequate utterances, one in each category were assigned to TMI, FILIM and II.

4.2.7. Narrative discourse

DW's narrative discourse abilities were almost non-existent. She had great difficulties even replying to the adult's prompts and she tried to avoid telling the story on a couple of occasions. There were no attempts for independent story telling even though she was constantly encouraged by the adult. This is very similar to the findings of the previous case study presented (MW), as MW also struggled to produce an independent story.

The story structure level analysis is not included in this case study due to the fact that DW's story had none of the story structure that was used for narrative discourse analysis. However a grammatical error analysis of the utterances she produced as a response to the adult's initiations is presented below.

4.2.7.1. Grammatical error analysis

Table 4.25 below demonstrates the total number of grammatical morphemes that DW used correctly and also the total number of grammatical morphemes that DW used incorrectly or omitted.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	28	6	0
Prepositions	12	0	0
Plural 's'	6	0	0
Genitive 's	0	0	0
Pronouns	27	0	12
3rd person sing.	0	0	0
Irregular past	4	0	1
-ed past	0	0	0
-ing participle	12	1	0
past participle	3	2	0
auxiliary	21	3	0
Total	113	12	13

Table 4.25 DW's use of grammatical morphemes

Syntax	Correct	Incorrect
Coordination	**0**	**0**
Subordination	**1***	**0**
Question formation	**2**	**0**
Passives	**0**	**0**
Conditionals	**0**	**0**
Total	**3**	**0**

Table 4.26 DW's use of syntax

*It should be noted that the only example of DW's use of a subordinate clause in the sample was only partially connected to the story.

Table 4.25 shows that DW used a total of 138 grammatical morphemes, out of which 13 were used incorrectly and 12 were omitted. With regard to DW's use of syntactic structures, there were only three structures beyond the level of a simple sentence and they were all used correctly. There were not any examples of DW's use of coordinated sentences and there was only one instance when DW used a subordinate clause ('*He is in there cause I can see his rags pointing out*'). There were two instances of a correct question formation.

It should be noted that even though the numbers in Table 4.25 may suggest that DW was productive with her use of grammatical morphemes, that was not quite the case as the child tended to repeat the same sentences over and over again. Thus she repeated the structure '*he/it is looking for the frog'* four times, and the structure '*is trying to look for the frog*' twice.

4.2.8. Summary of DW's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence length			
Subordinate clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: DW produced a high rate of initiations and follow-ups, and a number of her utterances were unintelligible. Her turn taking abilities seemed to be unimpaired, however she had tremendous difficulties with replying adequately to the adult's requests for open information and she sometimes struggled to provide adequate responses to the adult's requests for clarification. **Conversational inadequacy**: DW's percentage inadequate score was 66%. This was due to serious difficulties with expressive syntax and semantics (especially sentence formulation problems and morphological errors) and also problems with providing too little information (mainly using minimal verbal responses when more elaborate responses were expected and being very vague), world knowledge, failure to use context and problems with intelligibility.			
Narrative discourse			
Microstructure –.grammatical error analysis revealed many problems with grammatical morphemes in that MW omitted or incorrectly used 22% of the total number of grammatical morphemes she produced. There were very few syntactic structures beyond the level of a simple sentence. **Macrostructure** – N/A, as DW was not able to generate a fictional narrative.			

Table 4.27 Summary of DW's profile

4.3. WS Case study 3 – BW (CA 11;04)

4.3.1. Language abilities

BW's performance on standardised language tests is presented in Table 4.28. The scores on the individual subparts of the CELF-E are presented in Table 4.28.

Test	Raw score	Stand score	Z-score
BPVS	22	97	-0.2
TROG	12	69	-2.06
CELF-E	73	64	-2.40

Table 4.27: Scores on standardised language tests

Test	Raw score	Scaled score	Z-score
Formulated sentences	23	3	-2.33
Recalling sentences	45	6	-1.33
Sentence assembly	5	5	-2.66

Table 4.28: Scores on the individual subparts of the CELF-E

4.3.2. Performance on standardised language tests

BW's performance on standardised language tests was rather variable, with performance ranging from age appropriate scores on the BPVS and 2 SDs below the mean on the TROG and on the CELF-E.

4.3.3. BW's expressive language abilities

Despite the very low scores on both the TROG and the CELF-E, BW did not reveal any problems with inflectional morphology. There was some evidence that BW used correctly sub-categorised arguments and verbs in his expressive language '*the girl* ***gave*** *(the bagel)(to the boy); If I* ***play*** *(football) (on my own).*

BW could also produce passive sentences '*Until the car is fixed*' which shows ability to assign thematic roles. He also produced short passives on the *Sentence Assembly* subpart of the CELF-E (*The man was chased by the dog*; *The dog was chased by the man*) when given the words *the man the dog chased by was*.

BW used coordination of noun phrases (and *the boy* ***and*** *the dog*); sentence coordination (*and the clowns are making a show* ***but*** *the audience don't like it*) on the *Formulated Sentences* subpart of the CELF-E, however on the Sentence Assembly subpart, when given the words *and is running is falling the girl the boy* BW failed to produce a coordinate structure.

BW showed some ability to use complex structures as well. Thus for example he produced two syntactically well formed complex structures, both of them having a main clause and a temporal subordinate clause (***Before the customer went to the counter*** *the counter was looking at the machine*-item 3); (***When at school today*** *I had dinner with my friends* – item 4); (***After the race*** *I won the race* – item 5); (***Until the car is fixed***, *you'd have to use your walking machine*). It is evident that although all four sentences are grammatically correct, sentence 3, sentence 5 and sentence 16 are semantically anomalous due to the choice of not the most appropriate words in the specific context, i.e. the use of the word *counter* in item 3; or the use of the word *walking machine* in item 16. The sentence labelled as item 5 was nonsensical altogether.

This linguistic behaviour is very similar to MW's (case 1), as MW would also produce perfectly correct sentences in terms of structure but whose semantics was sometimes deviant.

BW was not able to produce a conditional clause when given the word *if*, nor could he produce a causal clause given the item *because*.

BW scored highest on the *Recalling Sentences* subpart of the CELF-E. He was able to repeat sentences of various length and complexity. He had some difficulty when repeating sentences with relative clauses in them, however even when BW was not very sure of the exact words used in the model sentence when repeating it he would still retain the meaning of the sentence (item 15, 16, 18, 22, 25, 26 in the RS subpart of the CELF-E (see Appendix 1).

4.3.4. Receptive language abilities

BW's receptive language abilities were inconsistent as far as the scores on the TROG and on the BPVS suggest. BW's performance on the TROG was 2SDs below the mean, whereas his performance on the BPVS was within the normal range expected for his chronological age. Thus it seems that BW's receptive vocabulary is developing typically while he is experiencing serious problems with morpho-syntactic development. It was interesting to note that even though BW was able to produce passive sentences on the CELF-E, on the TROG he failed three out of the four items on the Reversible Passives Block. This suggests some discrepancies between BW's productive and receptive morpho-syntactic skills (even though this is not evident if we compare the z-scores for CELF-E and for the TROG, as they both fall within 2SDs below the mean). BW also failed the block testing the comprehension of subject relative clauses and object relative clauses, embedded sentences.

4.3.5. BW's use of grammar in context

BW's performance on the Renfrew Bus Story is shown in Table 4.29.

	Raw score	**Age equivalent**
Information	13	3;11
Sentence length	9	5;06
Subordinate clauses	2	4;08

Table 4.29 Renfrew Bus Story

BW's Bus Story

1. one day there was a naughty bus/
2. it was (.)/it was driving along the road/
3. it had a funny face on his back/
4. he runned over in front that policeman/
5. they had a argue that train and that the erm the train and that bus/
6. the train couldn't beat the bus/

7. the bus went (.)/the bus wanted to go into town/
8. the policeman blowed the whistle and the bus didn't know where to stopped/
9. it went at a town/
10. he said: 'I am tired of walking along the road'/
11. he jumped over and went into the field/
12. 'mmm I can't believe my eyes'/
13. it got stuck in the lake/
14. the crane(.) the bus had been pulled out by a crane/
15. and then it behaved itself/

BW scored very low regarding the inclusion of relevant information, the score being the equivalent of what would be expected from a typically developing child at about age 3:11. There was only one attempt to use a complex sentence with a subordinate clause (line 8) however the sentence is still syntactically deviant because of the inappropriate use of an inflected verb following a 'to' infinitive. The score on Sentence Length is the highest, still well below what would be expected from BW's chronological age.

Regarding the use of morphology, it becomes more evident that BW has difficulties in this area. He over regularises (line 4 & 8) certain verbs, has occasional problems with using prepositions (line 9), occasional problems with derivational morphology (line 5 – he fails to inflect 'argue' with the suffix 'ment' in order to derive a noun as needed, occasional problems with reference (line 12) when BW repeat verbatim a direct speech phrase without specifying who said it. Problems with verb-argument structure are also evident (line 11). The verb 'jump' can be used either as an intransitive or as a monotransitive verb. Since BW combined the verb 'jump' with the preposition 'over', the verb was used as a monotransitive verb and it consequently required a complement, which BW failed to provide.

In terms of syntax, BW used some coordinate structures (line 8 and 11). There is evidence of use of 2 subordinate structures as well (line 8 and line 10) however the subordinate structure in line 8 is syntactically deviant and the subordinate structure in line 10 is direct speech. There is also evidence of use of the passive in line 14.

BW also had problems with linguistic cohesion. Apart from line 14 when the appropriate temporal tie '*and then*' was provided and lines 2, 9 and 15 where

personal reference was used (*'it'*) DW used no other intersentential cohesive markers. Thus the story often sounds very fragmentary. For example in line 11, 12 and 13 the three events are not related to one another in a chain.

The Bus Story thus revealed serious problems with both cognitive and linguistic development, which was consistent with the child's performance on standardised tests. And although BW's linguistic development as measured by the Bus Story age-equivalent scores was slightly higher than the child's score on providing information which taps into the individual's cognitive development, it was still was much lower than what was expected from the child's chronological age.

4.3.6. Overview of BW's linguistic abilities

BW's performance on standardised language measures was varied with peaks and valleys in different domains. There seems to be a discrepancy between MW's development of vocabulary, which appears to be at age-equivalent levels and his development of morpho-syntax, which falls 2SDs below the mean. BW's problems with expressive language were also evident on his performance on the Bus Story, where he scored well below his chronological age both on sentence length and use of subordinate clauses.

4.3.7. Performance on standardised non-verbal tests

BW's performance on standardised non-verbal tests is shown in Tables 4.30 and 4.31.

Test	Raw	Scaled score	Z-score
PC	4	1	-3
PA	6	2	-2.66
BD	4	1	-3
OA	11	4	-2

Table 4.30: BW's performance on four subtests of the WISC-P

Test	Raw	Centile
Ravens	17	below 5th

Table 4.31: BW's performance on the Ravens Coloured Matrices

Table 4.30 shows that BW performed rather poorly on all the standardised non-verbal tests. There was not a large discrepancy between the scores on the WISC-P battery. BW scored the lowest on the Block Design and the Picture Completion tasks (3 SDs below the mean), he obtained a slightly higher score on the PA task (2.5 SDs below the mean) and his highest score was on the OA task (2 SDs below the mean).

His performance on the RCM (table 4.31) was below the 5th centile, which suggests rather impaired general intellectual functioning.

Thus the results which BW obtained on the five standardised non-verbal tests are indicative of a moderate to severe cognitive deficit, however they are not markedly different from the scores that BW obtained on the standardised verbal tests.

4.3.8. Summary of BW's performance on standardised verbal and non-verbal tests

BW's profile presents with prevalent deficits both in the verbal and in the non-verbal domain where he typically performed between 2 and 3 SDs below the mean. The exception was his performance on the BPVS where he obtained age-equivalent scores.

4.3.9. Conversational abilities

In 150 conversational turns, BW produced 151 utterances. This shows that each conversational turn that BW undertook consisted of one utterance.

Conversational abilities were assessed in terms exchange structure, turn taking and information transfer.

Data from the analysis of exchange structure are shown in Table 4.32.

Initiation		Response		Continuation	Follow-up	U
IS	IN	MV/N	EXT			
7	3	35	74	31	3	1

Table 4.32 Exchange structure analysis

The Exchange Structure Analysis in table 4.32 shows BW's conversational interaction in terms of exchange structure. There were 10 initiations in total, out of which 7 were soliciting, i.e. required a response on the part of the adult and 3 were non-soliciting. He provided a total of 90 responses, out of which 65 were extended and 35 were minimal verbal. BW also produced 31 continuations and 3 follow-ups. There was only one utterance which was left unanalysed.

Data from the analysis of turn taking are shown in Table 4.33

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
2 (1.3%)	0	0	0

Table 4.33 Turn taking

Table 4.33 shows BW's conversational abilities in terms of turn taking. There were only two instances when BW did not respond to the adult's initiations. There were no overlaps nor any instances when the adult needed to interfere.

Analysis of BW's conversational interaction in terms of information transfer is presented in Table 4.34 There were 68 open requests for information put forward by the adult, to which BW responded adequately 75% of the time. Out of the 10 requests for clarification put forward by the adult, BW responded adequately again 70% of the time and out of the 28 requests for confirmation put forward by the adult, BW responded adequately 82% of the time.

Information (68)		Clarification (10)		Confirmation (28)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
51 (75%)	17 (25%)	7 (70%)	3 (30%)	23 (82%)	5 (18%)

Table 4.34 Information transfer

Conversational inadequacy (i.e. number of inadequate utterances out of 154 presented as raw numbers and percentages) is shown in Table 4.35:

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	13 (8.6%)
Failure to comprehend literal/inferential meaning (FILIM)	2 (1.3%)
Ignoring initiation while still remaining on the topic (II)	2 (1.3%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	5 (3.3%)
Too much information (TMI)	0 (0%)
Socially inappropriate content/style (SICS)	1 (0.6%)
Other (O)	3 (2%)
Unclassified (U)	1 (0.6%)
Total	**27 (18%)**

Table 4.35. Categories of inadequacy and number (percentage) of inappropriate utterances in sample of 150 conversational turns and 151 utterances.

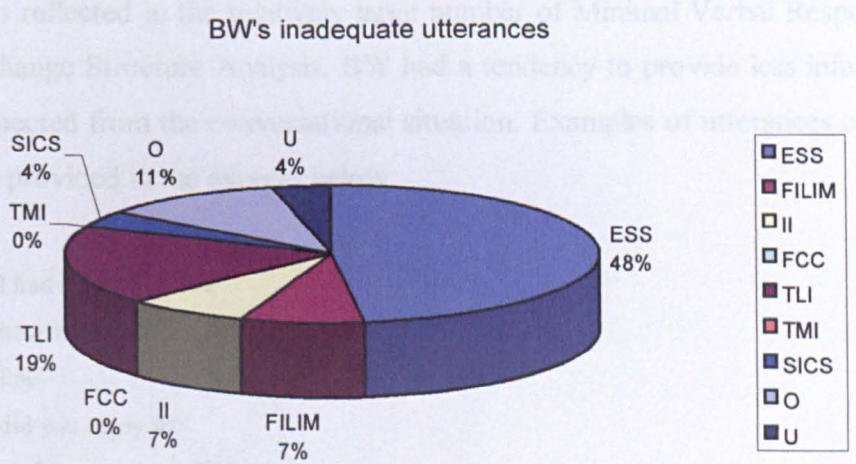


Figure 4.3. Categories of conversational inadequacy

As Table 4.35 and figure 4.3 indicate, codes were not allocated from every category. Thus no codes were allocated from the categories of FCC and TMI. Out of the 151 utterances that BW produced in a 150 conversational turns, 27 utterances (or 18%) were inadequate. The largest proportion of BW's inadequate utterances (almost 50%) fell within the category of Expressive Syntax and Semantics. This is in line with his scores on expressive and receptive language abilities, which indicated severe deficits in this domain. The following excerpt from a conversational sample illustrates BW's severe problems with sentence formulation in spontaneous speech:

V	do you remember?/	
B	it told me (.) it told us (.) my (.) my teacher says we had to learn this for our homework/	**ESS**
V	to learn the story for homework?/	
B	yeah yeah/	
V	so when is it for?/	
B	until tonight and tomorrow and then after that I have to take it back/	**ESS**
V	right and you have to learn it?/	
B	yes off my heart/	**ESS**

The second largest proportion of codes was allocated to the category of TLI. This was also reflected in the relatively large number of Minimal Verbal Responses in the Exchange Structure Analysis. BW had a tendency to provide less information than expected from the conversational situation. Examples of utterances coded as TLI are provided in the excerpt below.

B	I had a school disco/	
V	how was that?/	
B	fun/	**TLI**
V	did you enjoy it?/	
B	yeah/	**TLI**
V	what was the music like?/	
B	DJ/	**TLI**

There were three utterances in the selected sample which were coded as Other, mainly because BW's immature use of language, two were coded as FILIM and two as II and one utterance was coded as SICS and there was one which was not analysed.

4.3.10. Narrative discourse abilities

4.3.10.1. Length information

Table 4.36 below shows the number of Communication Units that BW used in order to generate the Frog Story, the number of clauses and words; and the mean length of his communication units in terms of clauses and words as well as the number of subordinate clauses used.

	CUs	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
BW	52	54	412	1	7.7	3

Table 4.36 Length information

Table 4.36 shows that in order to produce the Frog Story narrative BW used 53 communication units and 54 clauses, which means that his mean length of communication unit was one clause per unit. The mean length of his communication unit was 7.7 words per unit and there were 3 subordinate clauses.

4.3.10.2. Macrostructure

Macrostructure was assessed with regard to story structure level, which was at the level of an **abbreviated episode**. It provides aims and intentions of the characters, but it does not explicitly state the character's plans to achieve the aim; the planning needs to be inferred.

4.3.10.2.1. Story structure level

BW's story did not have a conventional setting such as *once upon a time*, however in CU1-9 BW did provide some kind of a setting though he did not introduce the characters.

4.3.10.3. Microstructure

4.3.10.3.1.Cohesion

Analysis of cohesion in terms of reference, conjunctive and lexical ties is presented in tables 4.37, 4.38 and 4.39 respectively.

Reference ties

Reference ties (complete)			**Reference ties (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
10	75	0	1	0	0

Table 4.37: Number of complete and incomplete/erroneous reference ties

BW used 88 reference ties out of which 10 were personal and 75 demonstrative. There was only one reference tie which was used incorrectly. There was a heavy reliance on demonstrative ties in BW's story. Each time he had to refer to one of the main characters, BW used a definite article (See Appendix 2, BW's story).

Conjunctive ties

Conjunctive ties (complete)					Conjunctive ties (incomplete/erroneous)				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
7	0	2	2	0	0	0	1	0	0

Table 4.38: Number of complete and incomplete/erroneous conjunctive ties
*addit=additive; adver=adversative; tempor=temporal; contin=continuative

BW did not use many conjunctive ties. There were only 12 conjunctive ties out of which 7 were additive, 2 were causal and 2 were temporal. Only one tie (a causal one) was used erroneously. The lack of conjunctive ties in BW's story has made his story sound very dry and there was not a very effective flow of information.

Lexical cohesive markers

Lexical ties (complete)					Lexical ties (incomplete/erroneous)				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
69	3	0	5	0	1	0	0	1	0

Table 4.39: Number of complete and incomplete/erroneous lexical ties
*RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate

BW used a total of 79 lexical ties, out of which 77 were complete and 2 were incomplete. The majority of the lexical ties used were repetitions of 13 different words, only 3 synonyms were used and there were 5 complete ties involving part-whole relations.

Lexical cohesive markers	***CU***
- use of repetition for "boy"	4, 5, 8, 14, 16, 19, 21, 25, 28, 29, 31, 32, 35, 39, 41, 43, 46, 48, 52
- use of repetition for "frog"	3, 5, 10, 16, 21, 40, 47
- use of repetition for "dog"	4, 5, 9, 11, 12, 13, 15, 17, 18, 20, 24, 26, 36, 37, 42, 43, 44, 45, 47, 51, 52
- use of repetition for "bed"	9
- use of repetition for "pot"	12, 13, 15, 17
- use of repetition for "bees"	24, 30, 36, 38 (2X)
- use of repetition for "beehive"	26, 27, 31
- use of repetition for "hole"	29, 30

- use of repetition for "tree" 33, 35, 39
- use of repetition for "owl" 33
- use of repetition for "deer" 43
- use of repetition for "pond" 43
- use of repetition for "kids" 51
- use of part-whole for "dog" 13, 15, 20
- use of part-whole for "deer" 43
- use of part-whole for "boy" 45
- use of synonym for "beehive" 31
- use of synonym for "wife" 51
- use of synonym for "kids" 51

4.3.10.3.2. Grammatical error analysis

Table 4.40 below demonstrates the total number of grammatical morphemes that BW used correctly and also the total number of syntactic structure beyond the level of a simple sentence.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	91	0	0
Prepositions	35	0	1
Plural 's'	11	0	0
Genitive 's	2	0	0
Pronouns	11	0	1
3rd person sing.	1	0	0
Irregular past	21	0	0
-ed past	16	0	1
-ing participle	18	0	0
past participle	3	0	0
auxiliary	13	1	0
Total	**223**	**1**	**3**

Table 4.40: BW's use of grammatical morphemes

BW was very productive with the use of grammatical morphemes. He used a total of 227 grammatical morphemes, determiners accounting for 40% of the total number of grammatical morphemes used. There were only 3 cases when

MW incorrectly used a grammatical morpheme and there was only 1 case when he omitted a grammatical morpheme.

Syntax	Correct	Incorrect
Coordination	1*	0
Subordination	3	0
Question formation	0	0
Passives	1	0
Conditionals	0	0
Total	5	0

Table 4.41 Syntactic error analysis

*NB: on syntactic grounds, the coordination was correct, however semantically it was rather odd, because the child coordinated 2 sentences which both begin with the same subject noun phrase. ('*The owl was getting out of the tree and the owl was flipping and flapping, getting untamed*').

4.3.10.3.3. Advanced syntactic structures that occur with low frequency

There were several occurrences of advanced syntactic structures. Thus BW used coordinated noun phrases (CU5, 42, 43, 51), and co-ordinated predicates (CU24, 52).

Coordinated noun phrases:

42. *the boy and the dog and the deer went down the grass/*
43. *the dog and the deer went*(.) *the dog and the boy went in the pond because the deer put the head (.) the antler down into the pond/*
51. *and the dog looked strangely at the kids and the frogs/*

Coordinated predicates:

24. *the bees went out of the beehive and tried to sting the dog/*
52. *then the boy and the dog looked* (.) *said good-bye to them, said good-bye to the frogs and went home* ***peacely*** *as (.) as calm/*

4.3.11. Summary of BW's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence Length			
Subordinate Clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: The majority of BW's responses were extended. He produced a high rate of initiations and continuations, though some of his continuations were conversationally inadequate. BW had very good turn taking abilities and managed reasonably well with information transfer, i.e. replied adequately to the majority of the adult's requests for open information and clarification. **Conversational inadequacy**: BW achieved an inadequacy score of 18%, which was mainly due to problems with expressive syntax and semantics and also some problems with proving too little information, failure to use context in comprehension and ignoring the adult's initiations while still remaining on the topic.			
Narrative discourse			
Microstructure – There was an over reliance on demonstrative reference and lexical ties, and a substantial lack of conjunctive ties. The grammatical error analysis did not reveal any major difficulties with particular grammatical morphemes or syntactic structures, though the use of syntactic structures beyond the level of a simple declarative sentence were rather rare. **Macrostructure** – BW was able to generate the narrative independently, his story scoring was at the level of an abbreviated episode.			

Table 4.42 Summary of BW's overall profile

4.4. WS Case Study 4 – CW (chronological age 12;01)

4.4.1. Language abilities

CW' s performance on standardised language tests is shown in Table 4.43 and Table 4.44.

Test	Raw score	Scaled score	Z-score
BPVS	18	72	-1.87
TROG	10	57	-2.86
CELF-E	90	70	-2

Table 4.43. Scores on standardised language tests

CELF-E	Raw score	Scaled score	Z-score
Formulated sentences	30	3	-2.33
Recalling sentences	54	8	-0.66
Sentence assembly	6	5	-1.66

Table 4.44. Scores on the individual subparts of the CELF-E

4.4.2. Performance on standardised language tests

CW's performance on standardised language tests varied between 1 and almost 3 standard deviations below the mean. The score on the BPVS was slightly higher (being one SD below the mean) than the scores on the TROG and the CELF-E, which were both 2SDs below the mean.

4.4.3. Expressive language abilities

As Table 4.44 shows, CW's performance on expressive language tests is variable. His performance on the Recalling Sentences subpart of the CELF –E was within the normal range, though at the lower end. CW had no major difficulties with repeating sentences of various length and complexity. He usually struggled with the longer, more complex sentences, however even when

he could not remember all the words in a sentence, he usually tried to retain the meaning of the sentence. There was only one example (out of 26) where CW completely changed the meaning of the sentence.

The target sentence was: *The boy who didn't turn up for practice wasn't allowed to play in the team until a week later.*
CW produced: *The boy who didn't turn up for practice played in the team.*

CW obtained a relatively lower score (between 1 and 2SDs below the mean) on the Sentence Assembly subpart of the CELF-E. The low score resulted from CW's inability to manipulate sentence structure, which is the main purpose of the task. He was able to produce declarative active sentences with coordination, with prepositional phrases (but only if the sentence was simple in structure and followed SV order) and with direct and indirect object (only when the verb had a simple form). He was also able to produce declarative passive sentences. However he was not able to produce sentence coordination, nor interrogative sentences with a complex verb phrase which contained an infinitive inside it.

CW's lowest score on the CELF-E was on the Formulated Sentences subpart where he scored 2SDs below the mean. CW could use correctly some co-ordinating conjunctions however although the sentences were grammatically well formed they were often semantically deviant. Thus even though CW used the coordinating conjunctions *and* and *but* at the correct point connecting two clauses together using ellipsis in the second clause, the sentence was still semantically not quite acceptable (*The bird went to the sun and back to the end*; *The boy fell down but he is hurt*;). Sometimes though he did not use coordinating conjunctions to connect two sentences but rather to start a sentence (*Or the people in the shop are looking for vegetables*; *And there are three clowns but they are playing tricks on the kids*).

CW had difficulty constructing complex sentences using temporal subordinators. He produced incomplete structures when given the subordinators *before* and *after* (*Before the woman went shopping...*; *After the girl went through the...*). However when given the subordinator *when* and asked to produce a sentence, CW constructed a perfectly grammatical sentence (*When the children*

went for the dinner *the dinner man gave them the dinner*) even though the sentence may sound slightly awkward because he repeated the word dinner three times. He also produced *before* using a sentence, which was both grammatically and semantically perfectly acceptable (*We need to get some breakfast before the plane goes*). NB: Unfortunately he did not score any points for this sentence as the task required the subject to use two subordinators (*if, before*).

Inconsistency with the use of subordinators was also apparent when CW was asked to use subordinating conjunctions in order to causally relate two events. He used correctly the subordinator *because* and produced: '*The mum and the son and the dog are crossing the road because the lollypop man's saying 'Stop' to the cars*'. However he struggled with the subordinator *although* and produced an incomplete structure: "*Although the boy is on the skateboard*".

CW showed no apparent problems with conditional clauses and when given the subordinator *if* produced a perfectly well formed sentence: "*If the children cross the road they might fall down*".

4.4.4. Receptive language abilities

CW's score on the TROG was very low, approaching 3SDs below the mean. CW had severe problems with the understanding of prepositions, comparatives, postmodified subjects, subject and object relative clauses which resulted in CW passing only 10 blocks out of 20 on the TROG. This is equivalent of what would be expected from a typically developing 5-year-old child. Interestingly, CW had no problems with understanding reversible passives neither with understanding **not only...but** structures.

CW was also poor at receptive vocabulary, where his score was approaching 2SDs below the mean, putting him in the 3rd percentile rank for his chronological age.

4.4.5. Use of grammar in context – Bus Story

CW's use of grammar in context as assessed by the Bus Story is shown in Table 4.45:

	Raw score	Age equivalent
Information	17	4;03
Sentence length	12	7;03
Subordinate clauses	1	4;01

Table 4.45. Bus Story

CW's scores on the Bus Story show that CW scored very poorly on the information he provided and the number of subordinate clauses he used, his scores being the equivalent of what would be expected from a typically developing 4 year old child. His score on sentence length was better, although far below what would be expected from his chronological age. Some of the sentences that CW used were grammatically ill formed, such as sentence number 3 and sentence number 4, where difficulties with sentence formulation are evident. In sentence number 3 it seems that a verb may be missing; furthermore it is not clear whether *on the road* is meant to be a qualifying prepositional phrase of the noun phrase *the bus* or whether there should be a verb connecting the noun phrase *the bus* with the prepositional phrase *on the road.* The use of the participial form of the verb *stopping* is also confusing as it is not clear whether CW meant to say that *the driver was trying to stop the bus* or whether it is only an auxiliary missing. In the same sentence, CW also over-regularised the past tense form of a regular verb *run*, and over-regularisations typically occur up to the age of 6 or 7. Sentence 4 was also syntactically deviant. It seems that CW was trying to connect two events in one sentence, however connecting words are missing which resulted in the sentence being ungrammatical. Apart from the ungrammaticality of these two sentences, CW had no other major problems. In comparison to the other children with WS who overpronominalised and had problems with cohesion, CW showed no difficulties, though he showed preference for lexical cohesive ties as opposed to reference and conjunctive cohesive markers.

CW's Bus Story

1. once upon a time there was a naughty bus/
2. the bus driver was driving it/

3. the bus on the road, the driver stopping it and he **runned** away/
4. the bus met a train pulling funny faces at each other/
5. the train went under the tunnel and the bus went on the road/
6. the bus went into the city/
7. a policeman was whistling his whistle 'stop it! stop'/
8. the bus went over the fence in the country and down the road/
9. and the cow said 'Moo I can't believe my eyes'/
10. the bus went rushing down the grass and it splashed into the water/
11. and (.) and (.) and the bus driver phones to get the bus out of water/

4.4.6. Overview of CW's linguistic abilities

In summary, CW presents with a profile of profound linguistic deficits in the domains of both expressive and productive language, having particular difficulties with more complex language structures, which involve subordination or coordination, but has no major difficulties repeating grammatical structures of various length and complexity.

4.4.7. CW's non-verbal abilities

CW's scores on the non-verbal part of the WISC and his general intellectual abilities as measured by the Ravens Coloured Matrices are presented in Table 4.46 and in Table 4.47 respectively.

Test	Raw	Scaled score	Z-score
PC	9	3	-2.33
PA	4	1	-3
BD	5	1	-3
OA	18	7	-1

Table 4.46 Scores on four subsets of the WISC-R

Test	Raw	Centile
Ravens	23	5

Table 4.47 Ravens Coloured Matrices

CW scored between one and three SDs below the mean on the four standardised non-verbal measures, his performance on the OA being the highest, even higher than any of the scores he obtained on the standardised verbal tests. He scored rather poorly on the PC task, i.e. 2SDs below the mean. CW obtained the poorest scores on the PA and BD subparts of the WISC (3SDs below the mean). It should be noted that his rather high score on the OA task may be due to the fact that it has the lowest association with general mental abilities (see **Chapter 2**) and also the fact that CW is almost obsessed with jigsaw puzzles and has had a lot of practice in the past (parents' report).

CW's score on the RCM which was indicative of severely impaired intellectual abilities was in line with his low scores on the non-verbal part of the WISC.

4.4.8. Summary of CW's performance on standardised verbal and non-verbal tests

CW's performance on standardised verbal and non-verbal tests was very similar. He showed profound impairments in his receptive and expressive grammatical abilities as well as severe impairments in the domain of non-verbal general intellectual abilities, visual recognition, sequential thinking and visuo-constructive abilities. 'Relative' strengths in the domain of visual recognition and the construction of concrete objects emerged (as the scores on the OA task showed), however these kind of abilities tend to vary independently of other WISC test scores and their association with general mental abilities (both verbal and non-verbal) is very low (Lezak, 1995).

4.4.9. Conversational abilities

In 150 conversational turns, CW produced 155 utterances. Conversational abilities were assessed in terms exchange structure, turn taking and information transfer. Data from the analysis of exchange structure are shown in Table 4.48.

Initiation		Response		Continuation	Follow-up	Unanalysed
IS	IN	MV/N	EXT			
1	4	47	76	18	7	2

Table 4.48. Exchange structure analysis

Table 4.48 shows that CW produced 5 initiations out of which only one was soliciting a response on the part of the adult and 4 were non- soliciting. CW provided 123 responses all together out of which 47 (or 38%) were minimal verbal and 76 or 62% were extended. CW also produced 18 continuations, 7 follow-ups and 2 utterances were unanalysed.

Data from the analysis of turn taking are shown in Table 4.49.

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
2	1	1	0

Table 4.49 Turn taking analysis

The analysis of CW's turn taking abilities as presented in Table 4.49 indicates that there were two instances when CW did not take his turn and there was one instance of CW inadvertently overlapping with the adult and one instance of a violating overlap.

Data from the analysis of CW's conversational abilities in terms of information transfer are shown in table 4.50.

Information (81)		Clarification (12)		Confirmation (32)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
64	17	4	8	31	1

Table 4.50 Information transfer

The analysis of information transfer presented in table 4.50 shows that out of the 81 requests for open information put forward on the part of the adult, CW replied adequately to 64 or 80% of the times. On the adults requests for clarification

though (12 altogether) CW replied adequately in only 33% of the cases. With regard to the adult's requests for confirmation, CW replied adequately most of the time, i.e. out of 32 requests for confirmation put forward on the part of the adult, CW replied adequately to 31 request, which means 97% of the time.

Conversational inadequacy (i.e. number of inadequate utterances out of 155 presented as raw numbers and percentages) is shown in Table 4.51:

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	5 (3%)
Failure to comprehend literal/inferential meaning (FILIM)	1 (0.6%)
Ignoring initiation while remaining on the topic (II)	5 (3%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	12 (7.6%)
Too much information (TMI)	0 (0%)
Socially inappropriate content/style (SICS)	0 (0%)
Other (O)	5 (3%)
Unclassified (U)	2 (1.3%)
Total	**33 (21%)**

Table 4.51. Categories of inadequacy and number (percentage) of inappropriate utterances in sample of 150 conversational turns and 157 utterances.

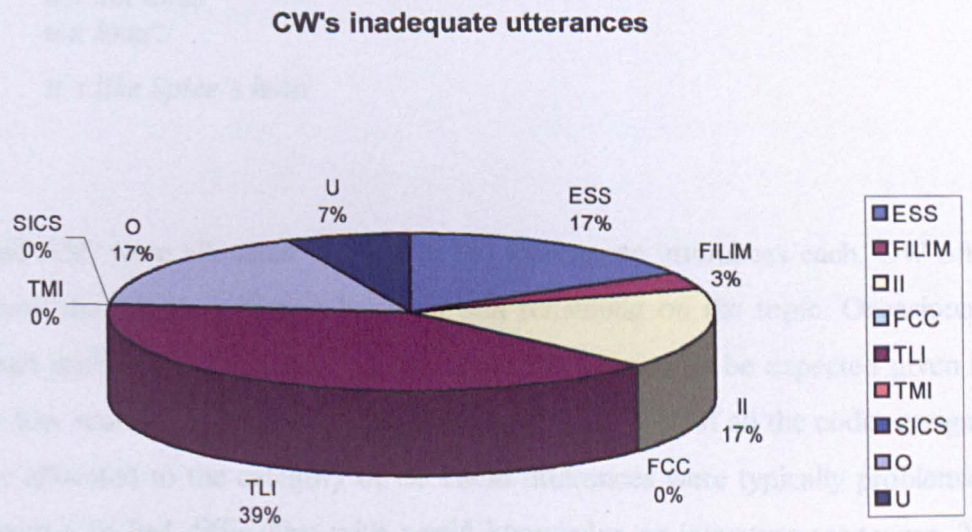


Figure 4.4: CW's inadequate utterances

Table 4.51 and figure 4.4 show that codes were not allocated from all the available categories. Thus there were no codes assigned from the category of FCC, TMI and SICS. Table 4.51 indicates that 33 out of 155 or 21% of CW's utterances were inadequate and the largest proportion of codes (which made 39% of all the inadequate utterances) was allocated to the category of TLI. CW tended to reply with minimal verbal responses and even when he replied with an extended response the information provided was often not enough, or too vague for the requirements of the conversational situation and the conversational partner had to keep on prompting CW in order for him to provide more information. The following excerpt clearly demonstrates this tendency:

A *what's her name?/*
C *Elisabeth/*
A *is she nice?/*
C *yeah/*
A *what does she look like?/*
C ***all right/*** **TLI**
A *can you describe her to me...I can't imagine what* (..)
C *no, no/* **TLI**
A *no?/*
does she have long hair, short hair?/
C *blond hair/*
A *is it long?/*
C *yeah/*
no, not long/
A *not long?/*
C *it's like Spice's hair/*

II and ESS were allocated to 17% of the inadequate utterances each. CW often ignored the adult's initiation however still remaining on the topic. Occasionally he had problems with sentence formulation, which was to be expected given his very low scores on the standardised language tests. 17% of all the codes assigned were allocated to the category of O. These utterances were typically problematic because CW had difficulties with world knowledge or immature responses. The following excerpt from a conversation with the researcher illustrates this point:

A *so where are you gonna ride the bike?/*

C *to school/*

A *you are gonna go to school by bike?/*

C ***I don't know/*** **O**

There was only one utterance which was inadequate as a result of problems with CW's understanding of literal meaning of what the adult said and two utterances in the sample were unclassified due to unintelligibility of one or more words contained in the utterance.

4.4.10. Narrative discourse abilities

4.4.10.1. Length information

Table 4.52 below shows the number of Communication Units that CW used in order to generate the Frog Story, the number of clauses and words; and the mean length of his communication units in terms of clauses and words as well as the number of subordinate clauses used.

	CUs	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
CW	41	42	258	1	6.3	2

Table 4.52 Length information

Table 4.52 shows that in order to generate the Frog Story CW used 41 communication units, 42 clauses and 258 words. The mean length of a communication unit in clauses was 1 clause per unit, whereas the mean length of a communication unit in words was approximately 6 words per unit. CW also used 2 subordinate clauses.

4.4.10.2. Macrostructure

4.4.10.2.1. Story structure level

CW's story was generated mainly independently, however there were several instances of the adult prompting the child in order to elicit more information,

using open-ended questions. CW's story structure was at the level of an **abbreviated episode**. There is some goal-oriented behaviour, particularly in the second part of the story, however the main characters' plans and intentions are not clearly stated.

CW started the story with a setting, however the initiating event that CW included was not the correct one in the story. The child failed to state without the prompt from the adult that the it was the disappearance of the frog which set the story into motion rather than the fact that the dog woke the boy the up and put his head in the frog's bowl. Since the child paused after CU6 it was not completely clear whether the CU5 and 6 were meant to be initiating events. That is why they were coded as IE with a question mark.

NB: See Appendix 2 (CW's story) for a full transcript and analysis.

4.4.10.3. Microstructure

4.4.10.3.1.Cohesion

Analysis of cohesion in terms of reference, conjunctive and lexical ties is presented in tables 4.53, 4.54 and 4.55 respectively.

Reference ties

Reference ties (complete)			**Reference ties (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
7	19	0	12	5	0

Table 4.53 Number of complete and incomplete/erroneous reference ties

As Table 4.53 shows, CW used a number of personal and demonstrative ties (45 altogether, 17 personal and 28 demonstrative). Quite a large proportion of the reference ties used, which was calculated to be 38%, were erroneous/incomplete.

Conjunctive ties

Conjunctive ties (complete)					Conjunctive ties (incomplete/erroneous)				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
11	0	0	0	0	0	0	0	0	0

Table 4.54 Number of complete and incomplete/erroneous conjunctive ties

*addit=additive; adver=adversative; tempor=temporal; contin=continuative

The analysis of CW's use of conjunctive ties as presented in table 4.54 shows that CW spontaneously[1] used a very small number of conjunctive ties (11 in total) which were all used correctly. The lack of other conjunctive markers had a negative impact on the flow of information in the story.

Lexical cohesive markers

Lexical ties (complete)					Lexical ties (incomplete/erroneous)				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
21	0	0	2	0	0	0	0	0	0

Table 4.55 Number of complete and incomplete/erroneous lexical ties

*RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate

Lexical cohesive markers	*CU*
- use of repetition for "boy"	8, 15, 21, 24, 30
- use of repetition for "frog"	25, 29, 30, 37, 40
- use of repetition for "dog"	5, 6, 23, 26, 27, 33, 34, 36
- use of repetition for "bees"	22, 26
- use of repetition for "tree"	24
- use of part-whole for "dog"	6
- use of part-whole for "boy"	10

[1] Any ties which resulted from the adult's prompts were not taken into account.

CW used a total of 22 lexical ties, each of which were repetitions of five different words and there were two which were part-whole relationships ('*the dog*' and '*his head*'; '*the boy*' and '*his hand*').

4.4.10.3.2. Grammatical error analysis

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	27	0	2
Prepositions	19	0	2
Plural 's'	5	0	0
Genitive 's	1	0	0
Pronouns	10	0	12
3rd person sing.	3	0	0
Irregular past	3	0	0
-ed past	2	0	0
-ing participle	14	0	0
past participle	4	0	0
auxiliary	4	0	0
Total	92	0	16

Table 4.56 Use of grammatical morphemes

As table 4.56 shows CW used 92 grammatical morphemes correctly, did not omit any but used incorrectly 16 grammatical morphemes. Out of the 16 incorrectly used grammatical morphemes, the 12 were pronouns, 2 were prepositions and 2 were determiners.

The number of missing determiners (i.e. the definite article) would have been higher if all the instances where the definite article was missing were counted. However omitting the definite article is a regional feature of the dialect that the child spoke, which was taken into consideration in the present analysis.

Syntax	Correct	Incorrect
Coordination	2	0
Subordination	2	0
Question formation	2	0
Passives	0	0
Conditionals	0	0
Total	6	0

Table 4.57 CW's use of syntax

There were only 6 structures beyond the level of a simple declarative clause, i.e. two coordinate clauses, two subordinate ones and two instances of question formation, and they were all used correctly.

4.4.11. CW's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence length			
Subordinate clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: CW did not produce many initiations, the majority of his responses were extended, a large proportion (almost 40% of the total number of responses) were minimal verbal. With regard to turn taking abilities, he sometimes failed to respond to the adult's initiations, but due to not knowing what to say rather than because he was not interested in responding. In terms of information transfer, CW had major difficulties with replying adequately to the adult's requests for clarification and also some difficulties with replying adequately to the adult's requests for open information. **Conversational inadequacy**: CW had a percentage inadequacy score of 21%. This was due to his tendency to provide too little information than what was expected from the conversational situation, closely followed by problems with expressive syntax/semantic, world knowledge and his tendency to ignore the adult's initiation while still remaining on the topic with his reply.			
Narrative discourse			
Microstructure – CW had problems with cohesion, especially with the use of referential ties and lack of conjunctive ties. The grammatical error analysis did not reveal any particular difficulties apart from some problems with his use of pronouns. **Macrostructure** – CW's story generation was at the level of abbreviated episode, all the story grammar part were present, however there were sometimes problems with coding the story grammar parts either because the adult had initiated the prompt or because CW's statement was neither an attempt nor clearly a consequence of an attempt. Even though the story that CW generated showed some goal directed behaviour there was no overt planning and often it was difficult for the listener to get a clear idea as to how the events connected with each other.			

Table 4.58 Summary of CW's profile

4.5. WS Case Study 5 – JW (chronological age 8;01)

4.5.1. Language abilities

JW's language performance on standardised language tests is presented in Tables 4.59 and 4.60 respectively.

	Raw score	Stand score	Z-score
BPVS	12	75	-1.66
TROG	14	87	- 0.86
CELF-E	83	70	-2

Table 4.59: Scores on standardised language tests

CELF - E	Raw Score	Scaled Score	Z-score
Formulated Sentences	28	3	-2.33
Recalling Sentences	47	5	-1.66
Sentence assembly	8	8	-0.66

Table 4.60. Scores on the individual subparts of the CELF-E

4.5.2. Performance on standardised language tests

As Tables 4.59 and 4.60 show, JW's performance on standardised language tests was variable, ranging from what is almost typical of her chronological age (on the TROG, where the z-score is only one percent below what would be expected from her chronological age) and what is clearly impaired performance, i.e. one and a half SD below the mean on the BPVS and two SDs below the mean on the CELF. JW's performance on the CELF-E subtests was similarly spread across the spectrum of what is typical performance on the Sentence Assembly task, one and a half SDs below the mean on the Recalling Sentences task and as low as two SDs below the mean on the Formulated Sentences task. Thus the scores she obtained suggest a profile of linguistic strengths and weaknesses.

4.5.3. Expressive language abilities

The scores on the three subtests of the CELF-E battery indicate that JW's expressive language profile is not clear-cut. She performed age-equivalent (though on the lower end of the typical performance range) on the Sentence Assembly task. Thus JW was able to produce declarative active and passive sentences, declarative sentences with prepositional phrases, interrogative passive (adjectival passive) and interrogative sentences with prepositional phrases and declarative active sentences with a relative clause.

JW performed less well on the Recalling Sentences task, scoring one a half SD below the mean. However even when she could not remember the exact wording of a sentence she would repeat it without distorting the meaning of the sentence.

JW performed most poorly on the Formulated Sentences subpart of the CELF-E, scoring 2SDs below the mean. Even though her score is very low, JW was able to produce certain complex language structures. Thus she used appropriately the temporal subordinators *when* and *after*, as the following examples show: '*The chef was cooking the dinner for the children when somebody says*: "*I would like a piece of cake*". (item 4); '*The boy ran after the girl*' (item 5). JW also used the causal subordinator *because* as in the following: '*Because the road is full of cars, they can't get out*' (item 8). JW was also able to produce perfectly well formed conditional sentences, as the following example shows: '*And if the girl says they can play, they can play*' (item 6). Sometimes JW produced syntactically well formed but semantically dubious structures. Thus when given the subordinator *although*, MW produced: '*Although the boy is on his scooter he has hurt his arm*'. This sentence is acceptable in terms of structure, however it is slightly odd semantically.

4.5.4. JW's receptive linguistic abilities

The scores that JW obtained on the receptive language measures were higher than her expressive language scores. She performed 1.5 SD below the mean on the BPVS, however her score on the TROG was on the borderline between average and below average performance. JW failed some of the blocks on the

TROG which deal with complex syntactic structures, such as the one involving passive sentences, subject relative clauses, embedding, however she passed the block testing object relative clauses and '*not only...but*' structures.

4.5.5. Use of grammar in context – Bus Story

Table 4.61 below shows JW's scores on the Renfrew Bus Story.

	Raw score	**Age equivalent**
Information	**12**	**3;10**
Sentence length	**22**	**8;0+**
Subordinate clauses	**2**	**4;8**

Table 4.61: JW's Bus Story

As the scores in Table 4.61 indicate, JW had most difficulties with the quality/quantity of information she provided. The score she obtained is far below what would be expected from her chronological age. JW used 2 subordinate clauses for which the score, even though still below her chronological age, was higher than her score on the quality/quantity of information. JW scored extremely well on mean sentence length, even higher than what would be expected from her chronological age. It should be pointed out though that her longest sentences were those where she used direct speech as sentences 1, 7 and 9 indicate (see the transcript below).

JW's Bus Story

1. Once upon a time there was a bus and the bus driver said (.) when he tried to mend him he said: "Come on bus, we've got a lot to do"/
2. Then the bus got away and said: "No way! I want to drive"!/
3. The train was on the journey/
4. And he said: "I'll race you, little bus"/
5. And the bus raced it/
6. And the man blew his whistle instead: "Go on bus! You can drive all over in the town"/

7. And the bus was still alive and he was about to jump over the fence when a cow came on and said: "Oh dear! I am not very happy about him"/
8. Then he said: "Oh dear I am going to fall into the pond"/
9. And then the driver said: "Go on. Oh dear, you poor little bus! I'll have to get a crane for you"/
10. Then in the end he was alive again/

JW produced a slightly different story from the one she heard from the adult by changing some of the information content, which resulted in a very low information score. All the sentences were well formed, there were no inflections omitted or used incorrectly, and cohesion seemed to be established rather well. JW over relied on direct speech thus avoiding subordination.

4.5.6. Overview of linguistic abilities

JW's linguistic abilities varied across domains. She showed an obvious strength in receptive grammar as her TROG scores suggest and her sentence length, as her performance on the Bus Story showed seems to be developed as is to be expected for her chronological age. However her performance on the BPVS suggests that her lexical development may be legging behind. Furthermore, despite the strengths in her sentence length, some of her scores on the expressive subpart of the CELF, namely her score on the FS and RS subparts

4.5.7. Non-verbal abilities

JW's performance on four subtests of the WISC-P battery is presented in Table 4.62. Her performance on the Ravens Coloured Matrices is shown in Table 4.63.

Test	Raw	Scaled score	Z-score
PC	7	5	-1.66
PA	0	1	-3
BD	2	1	-3
OA	6	4	-2

Table 4.62: Scores on the performance subparts of the WISC

Test	Raw	Centile
Ravens	15	10^{th}

Table 4.63: Ravens Coloured Matrices

As Table shows, JW's scores on the four subtests of the WISC-P battery fell between one and a half and two standard deviations below the mean. She performed most poorly on the Picture Arrangement and on the Block Design tasks, where her scores were 3SDs below the mean, which indicates severe deficits with sequential thinking and visuo-spatial abilities. JW performed slightly higher on the Object Assembly and on the Picture Completion tasks, though her scores still fell two and one and a half SDs below the mean respectively.

JW's performance on the Ravens Coloured Matrices fell around the 10^{th} centile, which is indicative of impairment in her general intellectual abilities.

4.5.8. Summary of JW's performance on standardised verbal and non-verbal tests

Whilst JW's performance on the verbal standardised tests was extremely varied, with peaks and valleys in different domains, her performance on the non-verbal tests was relatively constant, always falling between 1.5 and 3SDs below the mean, i.e. always being within the range of moderate to severe impairment. A rather varied linguistic but somewhat consistent cognitive profile was also evident in JW's performance on the Renfrew Bus Story.

4.5.9. JW's conversational abilities

In a conversational sample containing 150 conversational turns on the part of the child, JW produced 154 utterances.

Data from the analysis of exchange structure are shown in Table 4.64:

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
1	0	51	76	15	6	1

Table 4.64: Exchange structure analysis

The analysis of exchange structure shows that there was only one instance when JW initiated conversation and the initiation was soliciting. There were 127 responses, out of which a large proportion which is 51 or 40% were minimal verbal/non verbal responses and 76 or 60% were extended. JW produced 15 continuations and 6 follow-ups. There was only one utterance which was left unanalysed due to unintelligibility.

Data from the analysis of turn taking are shown in Table 4.65:

Gap	**Inadvertent overlap**	**Violating overlap**	**Adult interrupt**
3	0	0	0

Table 4.65: Turn taking

The analysis of turn taking as presented in Table 4.65 shows that there were 3 instances when JW failed to reply, however it should be noted that this was not a result of the child not being bothered to reply but due to word finding difficulties.

Data from the analysis of Information Transfer is shown in Table 4.66:

Information (98)		Clarification (14)		Confirmation (19)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
82	16	9	5	19	0

Table 4.66: Information transfer

The analysis of information transfer shows that the adult put forward 98 requests for open information to the child. JW provided adequate responses to 82 of those requests (which means 84 % of the time). JW replied adequately to 9 or 64% of the adult's requests for clarification and to all the adults' requests for confirmation.

Conversational inadequacy (i.e. number of inadequate utterances out of 154 presented as raw numbers and percentages) is shown in Table 4.67:

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	3 (2%)
Failure to comprehend literal/inferential meaning (FILIM)	5 (3%)
Ignoring initiation while still remaining on the topic (II)	5 (3%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	8 (5%)
Too much information (TMI)	0 (0%)
Socially inappropriate content/style (SICS)	0 (0%)
Other (O)	5 (3%)
Unclassified (U)	1 (0.6)
Total	**27 (17.5%)**

Table 4.67: Categories of inadequacy and number (percentage) of inappropriate utterances in sample of 150 conversational turns and 154 utterances.

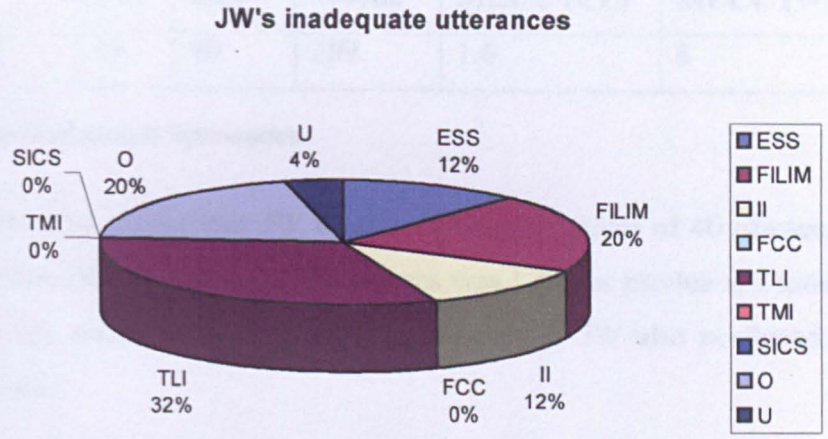


Figure 4.5 JW's inadequate utterances

Table 4.67 shows that 27 (or 17.5%) of the total of 154 utterances produced in a 150 turn conversational sample were coded as inadequate. Table 4.67 also shows that codes were not allocated from all the available categories. Thus codes were not allocated from the category of FCC, TMI and SICS. The largest number of codes (i.e. 32% of all the total number of codes assigned, as shown in Fig 4.5) was allocated from the category of TLI. JW often provided less information than what would be expected from the conversational situation, which was also evident from the exchange structure analysis where there was a strong tendency for minimal verbal/non verbal responses.

40% of the codes, or 20% each were allocated from the categories of FILIM and O. A small number of codes were allocated to the category of II and there was only one unanalysed utterance.

4.5.10. Narrative discourse abilities

4.5.10.1. Length information

Information about JW's story length in terms of communication units, clauses and words is shown in table 4.68.

	CUs	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
JW	25	40	209	1.6	8	3

Table 4.68 Length information

Table 4.68 shows that JW used 25 CUs and a total of 40 clauses, which means that her mean length of CU in clauses was 1.6. She produced a total of 209 words and her mean length of CU in words was 8. JW also produced 3 subordinate clauses.

4.5.10.2. Story structure

JW's story was coded as an action sequence as she listed many actions undertaken by the main characters chronologically, but failed to order them causally. There was no clear goal-directed behaviour, no planning, neither were the aims or intentions of the characters stated.

According to the analytical framework adopted for the study of narrative discourse (see Chapter 2), the action sequence provided by JW would be expected from a young preschool child (around the age of 4 or 5).

4.5.10.3. Microstructure

4.5.10.3.1.Cohesion

Analysis of cohesion in terms of reference, conjunctive and lexical ties is presented in tables 4.69, 4.70 and 4.71 respectively.

Reference ties

Reference ties (complete)			**Reference ties (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
4	17	0	4	4	0

Table 4.69 Number of complete and incomplete/erroneous reference ties

Table 4.69 shows that JW correctly produced 4 personal ties and 17 demonstrative ties. There were 4 personal and 4 demonstrative ties which were used erroneously. Thus for example *the boy* is correctly introduced with the indefinite article "a" in CU1 and is correctly referred to by *the boy* or *he* in CU 3, 4, 5, 7, 13, 14, 18, 19, 20, 22, 23.

Conjunctive ties

Conjunctive ties (complete)					**Conjunctive ties (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
4	0	0	16	0	0	0	0	0	0

Table 4.70: Number of complete and incomplete/erroneous conjunctive ties
*addit=additive; adver=adversative; tempor=temporal; contin=continuative

In terms of use of conjunctive ties, JW used 20 ties in total, out of which 4 were additive and 16 were temporal.

Lexical cohesive markers

Lexical ties (complete)					**Lexical ties (incomplete/erroneous)**				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
18	0	0	0	0	0	0	0	0	0

Table 4.71: Number of complete and incomplete/erroneous lexical ties
*RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate

Lexical cohesive markers	***CU***
- use of repetition for "boy"	3, 5, 7, 13, 14, 18, 19, 22, 23
- use of repetition for "frog"	2, 3, 19
- use of repetition for "dog"	6, 7, 12, 15
- use of repetition of "bowl"	4
- use of repetition of "reindeer"	16

JW used 18 lexical ties with 5 different lexical items and they were all repetitions.

4.5.10.3.2. Grammatical error analysis

Table 4.72 below demonstrates the total number of grammatical morphemes that JW used correctly and also the total number of grammatical morphemes that JW used incorrectly or omitted.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	**26**	**0**	**0**
Prepositions	**6**	**0**	**0**
Plural 's'	**1**	**0**	**0**
Genitive 's	**0**	**0**	**0**
Pronouns	**5**	**0**	**6**
3rd person sing.	**0**	**0**	**0**
Irregular past	**13**	**0**	**0**
-ed past	**8**	**0**	**0**
-ing participle	**0**	**0**	**0**
past participle	**1**	**0**	**0**
auxiliary	**1**	**0**	**0**
Total	**61**	**0**	**6**

Table 4.72: Use of grammatical morphemes

As table 4.72 shows, JW correctly used 61 grammatical morphemes, she did not omit any morphemes and she used incorrectly 6, which were all pronouns and the problem typically was that the pronouns were not bound to an antecedent.

The analysis of JW's use of syntax is presented in table 4.73.

Syntax	Correct	Incorrect
Coordination	**5**	**0**
Subordination	**3**	**0**
Question formation	**1**	**0**
Passives	**0**	**0**
Conditionals	**0**	**0**
Total	**9**	**0**

Table 4.73 Syntactic analysis

Table 4.73 shows that JW used coordination 5 times, sometimes intersententially and sometime intrasententially. There were 3 instances of JW's use of subordinate clauses and there was one example of a question formation. JW did not produce spontaneously any passive or conditional clauses.

4.5.11. JW's overall profile

A summary of JW's overall profile is presented in table 4.78 below.

Expressive Language	Weakness	Strength	Average
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence length			
Subordinate clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: JW produced a large number of minimal verbal/non verbal responses. However she showed relatively good turn taking skills and in terms of information transfer she did not prompt a very high rate of requests for clarification. JW also managed to respond adequately to about 70% of the adult's requests for open information, clarification and confirmation. **Conversational inadequacy**: 27% of JW's utterances were inadequate. The largest proportion of inadequate utterances was due to JW providing too little information. Together with some difficulties with interpreting adult's literal meaning and to provide immature or inconsistent responses.			
Narrative discourse			
Microstructure – JW's microstructure analysis did not reveal any problems with morpho-syntax. In terms of use of cohesive ties, JW did not use a great variety of ties, and she had some difficulties with reference and demonstrative ties. **Macrostructure** – JW's story structure level was an action sequence. There was no goal-oriented behaviour neither any overt planning on the part of the characters. JW was able to order events temporally but not causally.			

Table 4.78: Summary of JW's profile

4.6. Summary of the WS profiles

The analyses of performance on standardised tests, conversational abilities and narrative discourse abilities suggest quite a wide range of performance amongst the different participants with WS. With regard to their performance on verbal standardised tests, the participants with WS scored well below their chronological age, with the exception of one participant whose score was within the normal range, especially on the grammatical morpho-syntactic production and comprehension. The WS profile as a whole was more consistent in relation to the participants' performance on non-verbal standardised tests, on which they all performed in the impaired range, which was not at all unexpected given that

fact that the syndrome is characterised with impairments in the non-verbal domain. The results on the Progressive Coloured Matrices though were less unique in that the performance of one of the participants with WS (MW) fell almost within the average expected for her chronological age. This is an intriguing finding as the relatively good performance on the Progressive Coloured Matrices seems to coincide with a very good verbal performance (in particular syntactic comprehension and production). The following table gives a summary of all the participants' performance on standardised measures.

	MW (7;06)	DW (8;06)	BW (11;04)	CW (12;01)	JW (8;01)
	Z-score	Z-score	Z-score	Z-score	Z-score
BPVS	-.60 A	-1.07 W	-.20 A	-1.87 W	-1.66 W
TROG	.73 A	-1.66 W	- 2.06 W	-2.86 W	-.86 W
CELF	.60	-3.33	-2.40	-2 W	-2 W
FS	-1.33 W	WS*/FS -2.33 W	-2.33 W	-2.33 W	-2.33 W
RS	2.33 S	-2.33 W	-1.33 W	-0.66 A	-1.66 W
WS*/SA	1.66 S	-2.33 W	-2.66 W	-1.66 W	-.66 W
Bus Story	**Age equivalent**	**Age equivalent**	**Age equivalent**	**Age equivalent**	**Age equivalent**
Information	4;00 W	3;09 W	3;11 W	4;03	3;10
Length	7;09 S	3;01 W	5;06 W	7;03	8;0+
SubCl	6;03 W	3;11 W	4;08 W	4;01	4;08
WISC -P	**Z-score**	**Z-score**	**Z-score**	**Z-score**	**Z-score**
PC	-1.33 W	-1.66 W	-3 W	-2.33	-1.66
PA	-3 W	-2.66 W	-2.66 W	-3	-3
BD	-2.66 W	-2.33 W	-3 W	-3	-3
OA	-2 W	-2 W	-2 W	-1	-2
RCM	**Centile**	**Centile**	**Centile**	**Centile**	**Centile**
	25 A	5-10 A	5 W	5	10

Table 4.79: A summary of the scores of the participants with WS on standardised tests

*WS – Word Structure – this was administered instead of the SA subtest, which only has norms for age 8+. In the case of DW it was administered as a substitute for FS, which she was unable to do.
A-average performance; W-weakness; S-strength

The conversational analysis data showed preference for short, minimal verbal responses with most of the participants. All of the participants tended to produce less information than required by the conversational situation and their responses were often vague and with not much content. A similar tendency was observed in their narrative discourse abilities, where two out of the five participants were not able to generate the story independently, and the other three participants who managed to generate a story usually missed the key points, could not see the causal links between events, failed to relate events with what had gone on before, had problems with cohesion, and goal oriented behaviour was typically missing or if it could be recognised it was not explicitly stated. Thus instead of a structurally motivated hierarchy of events, the emphasis was on individual pictured scenes.

These observations are only impressionistic at this stage and a full statistical analysis will be carried out as appropriate[1] in Chapter 6 so that the findings and possible conclusions of the case study series are quantified and adequately supported.

[1] It would not be possible to quantify the different levels of story structure (as part of the macrostructure analysis of narratives) because of the qualitative nature of the analysis.

CHAPTER 5.

Specific Language Impairment individual profiles-case study series

In this chapter the case-studies of five children with SLI will be presented. The case-study for every child will provide the scores that the children obtained on standardised verbal and non-verbal tests, conversation analysis of randomly selected 150 utterances (in terms of exchange structure, turn taking and conversational inadequacy) and narrative discourse analysis of the 'Frog Story' (see Chapter 2 for details of the framework applied). A discussion will be provided at the end of each case study, which will contain an overall profile (verbal and non-verbal for every individual child).

5.1. SLI Case study 1 – BS (CA 9;01)

5.1.1. Language abilities

BS's performance on standardised language tests is presented in Table 5.1. The scores on the individual subparts of the CELF-E are presented in Table 5.2.

Test	Raw Score	Stand Score	Z-score
BPVS	15	77	-1.46
TROG	13	77	-1.46
CELF-E	91	72	-1.76

Table 5.1. Scores on standardised language tests

CELF-E	Raw Score	Scaled score	Z-score
Formulated sentences	26	3	-2.33
Recalling sentences	53	6	-1.33
Sentence Assembly	12	8	-0.66

Table 5.2. Scores on the individual subparts of the CELF-E

5.1.2. Performance on standardised language tests

The scores that BS obtained on standardised language tests, as Table 5.1. and Table 5.2. show, fall between 1 and 2 SDs below the mean. It seems that BS has less difficulty with language comprehension than with language production, as the scores on both comprehension of vocabulary and comprehension of grammar were slightly higher than his score on expressive grammar.

5.1.3. Expressive language abilities

Of the expressive tasks in the CELF-E battery, BS performed most poorly on the Formulated Sentences subtest, scoring 2 SDs below the mean. However, the sentences which he attempted to construct were perfectly well-formed. His low score resulted from the fact that he refused to attempt a number of sentences.

BS used appropriately the temporal subordinators 'before' and 'when' (*I gave the money first before I gave the receipt*; *When I gave the fish cake to the lady I gave the man some chips*); the causal subordinator 'because' (*I have to wait because I might run somebody over*); the conditional subordinator 'if' (*If I am late for school I have a drink*). These are all complex, well -formed sentences, each comprising a main and a subordinate clause. He also correctly formulated a co-ordinate structure using the co-ordinator 'but' (*I had a bike but it broke*).

However, BS refused to try and construct sentences using the temporal subordinator 'after', the concessive subordinator 'although' and the coordinators 'and' and 'or'. It is possible that BS lacked understanding of the meaning of some of the target words he was supposed to use rather than lacking core syntactic knowledge.

On the Recalling Sentences subpart of the CELF-E, BS scored 1SD below the mean. He had problems repeating some sentences, which had noun modifications in them and often omitted the modifier (items 15 & 21 in the task).

Target sentence: *The big, brown dog chased the red ball.*
BS's version: *The big, brown dog chased the ball.*

Target sentence: *The woman has read the twelve big, heavy, brown books.*
BS's version: *The woman has read the big brown books.*

BS also omitted postmodifiers in NPs: (item 26in the task)
Target sentence: *The man in the house next door promised to water our flowers during our holiday.*
BS's version: *The man promised to water our flowers.*

BS did not even attempt to repeat sentences containing a postmodifying relative clause in combination with a complex verb phrase and two adverbial clauses (The target item was: *The boy who didn't turn up for practice wasn't allowed to play in the team until a week later.* However he had no difficulty repeating sentence which contained a relative clause postmodifying the subject and a simple verb phrase and a subject complement (*The man who painted the railings was very kind*) nor did he have any difficulty repeating SVO structures where the Object NP was expended into a subordinate clause (*The girl did not like the boy who lived down the street*).

BS successfully repeated all the passive sentences, and he also successfully repeated one out of the two sentences containing clause coordination. He never omitted or substituted any inflectional affixes, never changed the tense of the sentence and never omitted any of the function words.

In contrast to the Formulated Sentences and Recalling Sentences subparts, BS performed within the normal range on the Sentence Assembly subpart of the CELF-E. He could put together passive sentences (both declarative and interrogative), declarative active sentences where the verb subcategories for two complements (direct and indirect object), interrogative sentences containing with coordinated noun phrases, declarative sentences containing relative clauses, sentences containing complex VPs with infinitival phrases. However, he seemed unable to compute sentences which contained two coordinated clauses or whose subject and object expanded into coordinated noun phrases, interrogative sentences with two complements (direct and indirect object) or declarative passive sentences whose object expands into a relative clause.

5.1.4. Receptive language abilities

BS's receptive language skills, judging by the scores he obtained on the standardised tests, were better than his expressive skills. He obtained the same z-score on both the test for comprehension of vocabulary and the test for the comprehension of grammar. On the TROG, he scored between 1 and 2 SDs below the mean, which is within the 5th percentile. BS had no problems understanding comparatives, reversible passives, plural morphemes, pronouns,

prepositions, 'not only...but' structures. However, he had difficulties understanding Object Relative Clauses, Embedded Clauses, coordinate phrases of the type '*the ...but not the ...*' but had no problems with coordinate phrases of the type '*the ....is ....but not ...*'. It could be that the former type of coordinate phrases require retaining more information to be computed about the subject of the sentence before processing the rest of the sentence.

5.1.5. Use of grammar in context – Bus Story

	Raw score	**Age equivalent**
Information	**22**	**4;11**
Sentence length	**13**	**7;9**
Subordinate clauses	**5**	**7;9**

Table 5.3. BS's scores on the Bus Story

From Table 5.3. it follows that BS scored very well on sentence length and his score on the use of subordinate clauses was only slightly below what would be expected for his chronological age. The use of inflectional morphemes was almost impeccable; there were no inflections missing or inflections used incorrectly, there were no deviant syntactic structures. BS scored most poorly on the Information subpart, because he often omitted essential pieces of information, added his own which were not always very relevant, made long pauses while telling the story thus waiting for the adult to prompt him, all of which made the story sound rather poor in thematic content.

5.1.6. Overview of BS's linguistic abilities

According to the results obtained on the standardised language tests, including the Bus Story, BS presented with deficits both in the domain of language comprehension and language production. Even though BS scored slightly below what would be expected from his chronological age, his deficits in language production appeared most prominently on the CELF-E, where BS tried to avoid to use certain complex syntactic structures.

5.1.7. Non-verbal abilities – standardised test scores

BS's performance on the four subtests of the WISC battery are presented in Table 5.4. and his performance on the Ravens Coloured Matrices are presented in Table 5.5.

Test	Raw	Scaled score	Z-score
Picture completion	**11**	**6**	**-1.33**
Picture arrangement	**30**	**13**	**1**
Block Design	**10**	**6**	**-1.33**
Object Assembly	**12**	**6**	**-1.33**

Table 5.4. Scores on four subsets of the WISC-R

Test	Raw	Centile
Ravens	21	25

Table 5.5. Performance on the Ravens Coloured Matrices

As Tables 5.4. and 5.5. show, BS's scores on standardised non-verbal tests are between -1SD below the mean (on the PC, BD and OA subparts of the WISC) and +1SD above the mean (on the PA subpart). This score reveals an obvious strength in socially appropriate thinking and ability to see relationships between events and order activities causally and temporally. On the other hands his low scores on the other three non-verbal subtests of WISC battery point to some deficits in visual recognition, visuo-spatial organisation and visuo-constructive abilities.

BS's score on the RCM was just below the 25 percentile, which again is about 1SD below the average.

5.1.8. Summary of BS's performance on standardised verbal and non-verbal tests

BS's performance on the verbal standardised tests did not vary immensely, although his expressive language skills seemed to be more impaired than his receptive language skills. His performance overall was impaired as it was the equivalent of a typically developing 6-7 year old child. BS never came up with semantically deviant sentences and did not produce any syntactically deviant structures. There were no obvious deficits within the domain of inflectional morphology whereas his syntactic competence was rather variable, as he was very selective as to which complex syntactic structures he was able/willing to produce.

BS's performance on the non-verbal standardised tests was more consistent. He scored on the low average range on most tests apart from the PA one, where he scored above average, which is indicative of rather superior sequential thinking abilities, i.e. ability to see relationships between events, establish priorities and order activities chronologically and in a socially acceptable way. BS also scored on the lower end of the normal range on the RCM, which means that his general intellectual abilities were not impaired.

5.1.9. Conversational abilities

In 150 conversational turns, BS produced 197 utterances. This shows that some of BS's conversational turns consisted of more than one utterance. Conversational abilities were assessed in terms exchange structure, turn taking and information transfer.

Data from the analysis of exchange structure are shown in Table 5.6.

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
3 (1.5%)	24 (12%)	6 (3%)	62 (31%)	60 (30%)	31 (16%)	11 (5%)

Table 5.6. Exchange structure analysis

Table 5.6. shows that about 14% of BS's utterances were initiations and the majority of the initiations were non-soliciting. Most of his responses were extended, i.e. out of a total of 68 responses, 62 were extended which is 90%. BS used a lot of continuations as well. A proportion of his responses were unanalysed because they did not fall neatly into any of the categories. They were usually gaps but not long enough to be coded as violations of exchange structure. In order to avoid the situation when the child may feel frustrated because they were not able to provide an answer to the adult's initiation, as soon as the child would be hesitating the adult would break the pause by either rephrasing the question or providing part of the answer.

Data from the analysis of turn taking are shown in Table 5.7.

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
1 (0.5%)	2 (1%)	0	0

Table 5.7 Turn taking

The data in Table 5.7 show that overlaps were very rare and if they did occur they were inadvertent. There was only case when the child paused for more than 8 seconds (which was the criterion for coding a gap).

The analysis of Information Transfer (see Table 5.8 below) shows that the adult put 71 requests to the child out of which 50 (or 70%) were requests that sought information, 4 (or 6%) were requests for clarification and 17 (or 24% sought confirmation). The rather low percentage of the adult's requests for clarification meant that the child was usually clear in what they were saying and the adult did not have much difficulty with interpreting the child. The majority (i.e. 3 out of 4) of the child's responses to the adult's requests for clarification were adequate and so were the child's responses to the adult's requests for confirmation (when the child provided adequate responses 77% of the time. However with regard to the adult's requests for open information, only 62% of the child's responses were adequate and the rest 38% were considered inadequate.

Information (54)		Clarification (5)		Confirmation (18)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
33	21	4	1	14	4

Table 5.8. Information transfer

Conversational inadequacy (i.e. number of inadequate utterances out of 197 presented as raw numbers and percentages) is shown in Table 5.9:

Categories of inadequacy	Number of utterances (percentage)
Expressive syntax and semantics (ESS)	3 (1.5%)
Failure to comprehend literal/inferential meaning (FILIM)	1 (0.5%)
Ignoring initiation while still remaining on the topic (II)	12 (6%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	1(0.5%)
Too much information (TMI)	8 (4%)
Socially inappropriate content/style (SICS)	1 (0.5%)
Other (O)	8 (4%)
Unclassified (U)	2 (1%)
Total	**36 (18%)**

Table 5.9. Categories of inadequacy and number (percentage) of inappropriate utterances in sample of 150 conversational turns and 197 utterances.

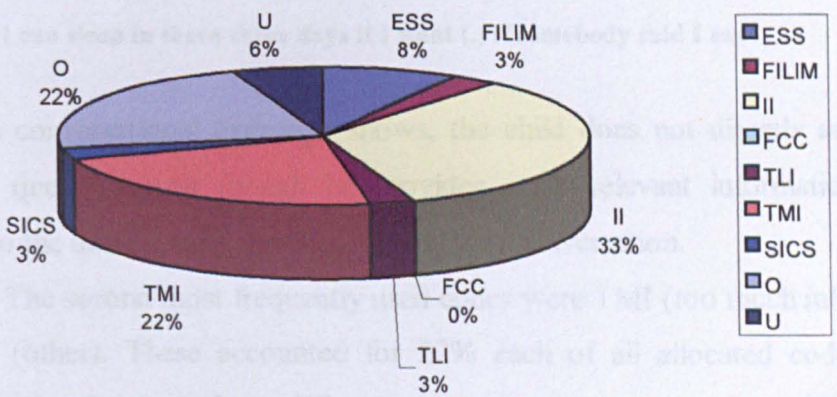


Figure 5.1 Categories of conversational inadequacy

As figure 5.1 demonstrates, codes were allocated from every category but the category FCC (failure to use context in comprehension). The largest proportion of codes (33% out of all the allocated codes) fell in the category of II (ignoring initiation while still remaining on the topic). The biggest problem in BS's conversational behaviour seemed to be his inability to always directly respond to the interlocutor's initiation. He tended to ignore the adult's initiation while still remaining within the general topic of conversation, thus obstructing the conversational flow. The following examples illustrate this tendency:

A she didn't have the bike there but has the bike here so?/
C well mind you it is the correct order because, because you see
the flowers are there and she's buying them/ **II**

In the example above the child and the adult are discussing a picture sequence of a market scene (semi-structured conversational setting). Another example from a free conversational setting is the following:

C I live at home but I won't be sleeping at home on Monday though/
A where will you,/
C I'll be going to Cedar (.) Cedar House/
it's up in Alderwasley/
A oh right/
is it only for one night or?/
C well/
A only for that evening?/
C **well the twenty ninth and the fifth and the thirteenth of December/**
I can sleep in there three days if I want (.) if somebody said I can/

As this conversational exchange shows, the child does not directly answer the adult's question even though he provides some relevant information, which refers to the question and is within the topic of conversation.

The second most frequently used codes were TMI (too much information) and O (other). These accounted for 22% each of all allocated codes. In his conversational interactions, BS sometimes seemed to be insensitive to the quantity of information he provided, which usually was more than what the

interlocutor was expecting, i.e. he tended to elaborate unnecessarily. For example:

A do you live at the school or do you live at home and travel to school?/

C **I live in (.) I live at home but I won't be sleeping at home on Monday though/**

As the above quote shows, the child, in his response to the adult's request for information, provided more information than required/expected by the interlocutor.

The category O was allocated to all those utterances that did not fall neatly into any other category. They were mainly instances of the child not providing an immediate response, thus leaving a short gap, or when the child responded to the adult's request for information or clarification or confirmation by initiating a new utterance, for which, because it was quite rare, a special code was not allocated.

It is interesting to note that there were only three codes out of 197 utterances (which makes only 1.5% of all the allocated codes) within the category of Expressive Syntax and Semantics (USS). Even though BS's scores for expressive language abilities approached 2SDs, in actual conversations BS showed minimal linguistic difficulties. Out of the three instances, which were coded as being linguistically inadequate, there was one utterance where BS had used an incorrect preposition, i.e. he used the preposition *by* instead of *from*:

C *she probably borrowed it **by** somebody/*

There was one utterance where BS had used again an incorrect preposition but had also used incorrectly a modal verb:

C *yes we **should**'ve been friends **in** about 1997/*

And the third utterance was when BS used two phrases (which normally form part of an idiomatic phrase) in a reversed order:

A *do you have a best friend in class?/*

C *yeah the one who (.) the one who used to live **to me next door** was/*

This one however could well have been a slip of the tongue as only two conversational turns before he used the same idiomatic expressions correctly:

C *one of my friends used to live next door to me/*

A very small proportion of codes was allocated to the category of TLI (too little information) and FILIM (failure to interpret literal or inferential meaning). Very few utterances were not analysed and the reason was mainly because they were incomplete not unintelligible. No codes were allocated to the category of FCC (failure to use context in comprehension), which means that the child did not have any problems with this category.

5.1.10. Narrative discourse abilities

5.1.10.1. Length information

Table 5.10 below shows the number of Communication Units that BS used in order to generate the Frog Story, the number of clauses and words; and the mean length of his communication units in terms of clauses and words as well as the number of subordinate clauses used.

	CUs	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
BS	34	47	313	1.4	9.2	2

Table 5.10 Length information

Table 5.10 shows that BS used 34 communication units and 47 clauses in order to generate the story. The mean length of his communication unit in terms of clauses was 1.4. Thus technically speaking, all of his communication units should consist of at least one clause. However that was not always the case as a few communication units consisted of elliptical sentences, which did not have the structure of a clause, and conversely, some communication units consisted of three or four clauses.

BS used a total of 313 words and his communication units had a mean length of 9.2 words. He used only two subordinate clauses.

5.1.10.2. Macrostructure

Macrostructure was assessed with regard to the story structure level and the story grammar parts present in the child's narration.

5.1.10.2.1. Story structure level

BS struggled to start the story and tried to divert the adults' attention onto a different topic (see appendix 3, BS's story). In order to help the child to start generating a story the adult started the story with a conventional setting (*once upon a time there was....*) Even though it seems that BS's story structure involves the main parts of what is required for a complete episode (IE, A, C), the story structure was at the level of an abbreviated episode. BS's story provided the aims and intentions of the main characters but did not explicitly state the characters' plan to achieve their aims and goal-oriented behaviour of the main characters was not made that obvious. The main characters eventually achieve an aim, i.e. they found a frog, however BS did not signal linguistically that this was the aim of the main characters. All the attempts of the boy and the dog to find the frog are presented as if they occur spontaneously without again any linguistics devices being employed which would suggest that this was their goal. BS also missed a few important turning points in the story: for example, BS said that a reindeer suddenly came, not realising that the boy was holding onto the reindeers' antlers by mistake in search of his frog.

5.1.10.3. Microstructure

Microstructure was addressed with regard to the following aspect: cohesive ties and grammatical error analysis.

5.1.10.3.1.Cohesion

Reference ties

Reference (complete)			**Reference (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
13	**43**	**0**	**1**	**1**	**0**

Table 5.11 Number of complete and incomplete/erroneous reference ties

Table 5.11 shows that BS does not have any major problems with reference ties. He used correctly 12 personal ties, both in intersentential and intrasentential contexts, as the following excerpts from the transcript show:

The boy and the dog are asleep and the frog jumps out of the bowl/ CU1

***They** wake up and **they** didn't see the frog/* CU2

The personal pronoun *they* used twice in CU2 correctly refers back to *the boy* and *the dog* in the previous CU (an example of intersentential reference).

A very good example of correct use of intrasentential reference is found in CU30, where *he* in the subordinate clause correctly refers to *the boy* in the matrix clause.

*And then **the boy** thought **he** could hear a noise and so did the dog/*

There was only one instance where BS used reference cohesion markers erroneously.

11. *and then they shout and then the boy shouted for (.) for the frog to come*
    'Frog where are you'!/
12. *and **he** was sniffing at the bees/*

This one was marked an erroneous reference cohesion tie because it is not clear who **he** refers to in CU12.

There were 43 demonstrative ties and all but one were complete. This was in CU 22 when BS did not realise that it was the same owl from the previous picture and incorrectly introduced the same lexical item with an indefinite article.

There were instances when BS would introduce a noun for the first time and use a definite article instead of indefinite. Such instances were not scored as incorrect because both the adult and the child shared information about the context.

BS did not use any comparative ties.

Conjunctive ties

Conjunctive ties (complete)					**Conjunctive ties (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
11	1	0	4	1	0	0	0	1	0

Table 5.12 Number of complete and incomplete/erroneous conjunctive ties

*addit=additive; adver=adversative; tempor=temporal; contin=continuative

BS used 11 additive ties, one adversative, one continuative (which was used intrasententially) and five temporal ties. He did not use any causal ties. There was one instance of a temporal tie being used instead of a causative tie, probably because the child did not recognise the causative nature of the two events.
BS failed to recognise the causal nature between CU23 and CU24 as exemplified below:

23. *the boy climbed on top of the rock and looked at the frog and shouted 'Frog where are you'/*
24. *then suddenly a rain deer (.) a deer came/*

It seems that BS did not realise that on the picture as the boy climbs on the rock, he wants to get hold of what he thinks are branches of a tree but it happened to be a raindeer. Thus the reindeer does not suddenly appear, it is there all the time and the boy by chance ends up on the reindeer's back.

Sometimes it was felt that there were ties missing though they were not put in any specific category as the context allowed for several options. For example CU 21 and CU22 are not well connected:

21. *he was trying to climb on top of the rock/*

22. *it's an owl/*

On the actual picture, the boy looks in a hole of a tree and as a result of which an owl comes out of the tree and pushes the boy down. On the following picture, the owl is flying above the boy's head while the boy is trying to climb a rock. Therefore, there is a feeling that some sort of either causal or adversative cohesive marker is needed in order to tie semantically the two CUs.

Lexical cohesive markers

Table 5.13 below shows the number of complete and incomplete lexical ties.

Lexical ties (complete)					**Lexical ties (incomplete/erroneous)**				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
33	1	0	3	0	0	0	0	0	0

Table 5.13 Number of complete and incomplete/erroneous lexical ties

*RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate

BS used a total of 37 lexical markers, out of which 10 were different words. Most of them were repetitions of words apart from one instance of a synonym and three instances of words which relate to each other in a part-whole relationship. Examples of all the lexical cohesive markers and the CUs in which they occur are listed below:

Lexical cohesive markers	***CU***
- use of repetition for "boy"	6, 10, 11, 13, 15, 18, 19, 23, 26, 30, 31
- use of repetition for "dog"	5, 7, 8, 14, 17, 25, 30
- use of repetition for "frog"	2, 11, 18, 23, 33
- use of repetition for "jar"	5, 7
- use of repetition for "bees"	17, 20

- use of repetition for "raindeer" 25, 26, 28
- use of repetition for "frogs" 34
- use of repetition for "tree" 19
- use of repetition for "rock" 23
- use of a synonym for "bowl" 3
- use of part-whole for "dog" 5, 7, 9

It should be mentioned that there was one example when BS used ellipsis within CU 30, when he substituted very successfully a whole clause with an auxiliary form.

30. *and then the boy thought he could hear a noise and* ***so did*** *the dog/*

5.1.10.3.2. Summary of BS's use of cohesive ties

The above analysis suggests that BS's use of cohesive markers is relatively good, given the very small number of erroneous/incomplete ties. However BS heavily relied on only certain types of cohesive ties. Thus he preferred demonstrative ties within the reference ties; with regard to his use of conjunctive ties, additive ties were predominant; and as to his use of lexical ties, he only used 10 different words and over relied on repetitions for signalling lexical cohesion..

5.1.10.3.3. Grammatical error analysis

Table 5.14 below demonstrates the total number of grammatical morphemes that BS used correctly and also the total number of grammatical morphemes that BS used incorrectly or omitted.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	54	0	1
Prepositions	19	0	0
Plural 's'	5	0	0
Genitive 's	0	0	0
Pronouns	21	0	1
3rd person sing.	2	0	0
Irregular past	15	0	0
-ed past	11	0	0
-ing participle	7	0	0
past participle	0	0	0
auxiliary	10	0	0
Total	**144**	**0**	**2**

Table 5.14. Use of grammatical morphemes

Table 5.14 shows that BS had almost no difficulties at all with using correctly grammatical morphemes. There was only one incorrect use of a pronoun and one incorrect use of a determiner. There were not any instances of morphemes being omitted.

The analysis of aspects of syntax (see Table 5.15), i.e. the use of syntactic structures which are beyond the level of a simple active declarative clause, shows that BS was able to produce spontaneously some coordinated and some subordinate structures, showing preference for coordination to subordination. There were not many complex syntactic structures present (thus there were not any spontaneous passive structures nor conditionals) but the all the complex structures that BS attempted were used correctly.

Syntax	Correct	Incorrect
Coordination	6	0
Subordination	2	0
Question formation	1	0
Passives	0	0
Conditionals	0	0
Total	**9**	**0**

Table 5.15 BS's use of syntax

5.2.10.3.4. Summary of BS's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence Length			
Subordinate Clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: BS had a large number of initiations, most of which were non-soliciting. The majority of his responses were extended and there was quite a large number of continuations and follow ups. BS's turn taking abilities were relatively good with only one gap and two inadvertent overlaps. BS had some difficulty with replying adequately to the adult's requests for information (38% of his replies were inadequate). **Conversational inadequacy**: 18% of BS's utterances were inadequate, the majority of utterances fell in the category of ignoring the adult's initiation while still remaining on the topic. BS also occasionally provided too much information and often instead of responding to the adult's request for information or clarification or confirmation, he would initiate a new utterance which was not a new topic but simply a way of allowing himself time and getting help from the adult in responding to the adult's initiation.			
Narrative discourse			
Microstructure: The grammatical error analysis did not reveal any problems with morpho - syntax, however there was not much evidence of use of more complex syntactic forms below the level of a simple sentence. In terms of cohesion, within the domain of conjunctive ties there was a prevalence of additive ties and a total absence of causative ties. There was a number of complete demonstrative and personal reference ties. With regard to lexical cohesion, all the ties were complete. There was a very small number of incomplete/erroneous ties. **Macrostructure:** BS's story structure analysis was at the level of an abbreviated episode. He provided the main story grammar parts (there was an initiating event, some action and some consequences and a resolution), with no setting, no internal plans or internal responses on the part of the main characters) and no ending. It provided some aims and intentions of the characters but their plans were not explicitly stated, i.e. the planning had to be inferred.			

Table 5.16 Summary of BS's profile

5.2.SLI Case study 2 – TS (CA 9;01)

5.2.1. Language abilities

TS's performance on standardised language tests is presented in Table 5.17. The scores on the individual subparts of the CELF-E are presented in Table 5.18.

Test	Raw Score	Scaled Score	Z-score
BPVS	17	87	-0.87
TROG	12	74	-1.73
CELF-E	83	64	-2.4

Table 5.17. Scores on standardised language tests

CELF-E	Raw Score	Scaled score	Z-score
Formulated sentences	30	3	-2.33
Recalling sentences	49	5	-1.66
Sentence assembly	4	6	-1.33

Table 5.18. Scores on the individual subparts of the CELF-E

5.2.2. Performance on standardised language tests

As Tables 5.17 and 5.18 above show, TS performs below what is expected for his chronological age on the TROG and on the CELF-E, however his performance on the BPVS falls almost within the expected range for his chronological age. Thus his problems seem to be mainly within the area of grammatical comprehension and production, which will be further investigated in what follows below.

5.2.3. Expressive language abilities

Table 5.18 shows the expressive language profile as measured by the three subtests of the CELF-E battery. TS's overall expressive language profile falls

2SDs below the mean, which is indicative of serious language problems. He scored most poorly on the Formulated Sentences subpart. He could not do items 16 to 20, when he needed to use two words in order to formulate a sentence. Thus for example in item 15 when he was given the words *and because* to use in a sentence he produced the following: '*There is a roadworks and the cars have to stop*'.

TS seemed to have fewer difficulties on the Recalling Sentences subpart, though he could not repeat items 20 to 26, namely those items which consist of many words, clauses with coordinated verb phrases, those including postmodified subjects, those including relative clauses or subordinate clauses. When repeating the target sentences, TS sometimes tried to transform a sentence, which contained subordination into one without subordination, while keeping the meaning. Thus for example in item16 shows TS's version of the target sentence:

Target sentence: *The man stopped to pick up some milk even though he was late for work.*

TS's version: *The man stopped and picked up some milk and he was late for work.*

TS scored best on the Sentence Assembly subpart of the CELF –E, even though he only managed to produce correctly two versions of the same sentence only four times.

5.2.4. Receptive language abilities

TS's receptive language abilities seemed slightly better compared to his expressive language abilities. His performance on the TROG was approaching almost 2SDs below the mean. He had difficulty understanding *not only...but* constructions and he completely failed that block. He also failed to understand subject and object relative clauses and *neither...nor* constructions. BS also failed the block on pronouns (block G and I) and the block dealing with understanding of plurality (J), however he only failed one item out of four on the above mentioned blocks, therefore it is not very clear whether the child had some

deficits in understanding plural morphemes and pronouns or whether it was a momentary lapse of attention or concentration on the part of the child.

With regard to receptive vocabulary as measured on the BPVS, BS scored within the average range, which put him within the 20th percentile.

5.2.5. TS's Use of grammar in context –Bus Story

	Raw score	Age equivalent
Information	**14**	**4;0**
Sentence length	**12**	**7;4**
Subordinate clauses	**3**	**6;3**

Table 5.19 TS's scores on the Bus Story

Table 5.19 shows TS's performance on the Renfrew Bus Story. TS scored the lowest on the Information subpart, his scores being the equivalent of a typically developing 4-year-old child. TS produced a story which was quite incoherent and which resembled only vaguely the story with which the child was presented. TS's score on the use of subordinate clauses was equivalent to what would be expected of a typically developing 6-year-old child. Even though the average length of his sentences was only slightly lower to what would be expected of a child with the same chronological age, many of the sentences he used were syntactically deviant. There were omissions of the auxiliary: *'The bus drew(.)driven on the road without a driver'*, *'The bus driven very very very very faster than the train'* (line 2 and 6 respectively). The use of pronouns was often confusing for the listener. Thus TS used the pronoun *they* without previously introducing the antecedents of it, as the following example shows:

1 there was a naughty very naughty bus/

2 and then the bus drew (.) driven on the road without a driver/

3 but it didn't know the brakes were broken/

4 they had a race but he didn't know who got to win/

In line 4, apart from the pronoun *they* being introduced without an antecedent, also the pronoun *he* does not have a clear antecedent as on the picture that both

the child and the adult can see, the bus is having a race with a train. Hence *he* could refer to any of these two entities.

In lines 8 to 12, TS used a series of direct speech utterances and only once (line 10) does TS mention a referent, i.e. identifies who it is that says the utterance.

7 The policeman tried to stop him 'Stop bus stop! You'll knock everybody flying'/
8 "I am tired of the road"/
9 "can I get off this road"?/
10 a bus thinks: "I'll probably jump over a hill"/
11 "well done, good idea, jump over the hill"/
12 "eee, I can't believe my eyes, moo"/
13 the bus just drove very fast/

In line 13, TS finally used the correct form of the verb (*drove*). It must be mentioned that TS spontaneously used a passive sentence correctly in line 16:

16 the bus had to be driven by a crane out of the water/

5.2.6. Overview of TS's linguistic profile

TS's linguistic profile is interesting in that even though his score on receptive vocabulary is almost at age equivalent level, his receptive and expressive grammatical abilities seem to be rather impaired. There also seems to be some consistency in his grammatical performance. Thus for example TS struggled both with the production of complex sentences (as the CELF-E scores show) and on the comprehension of complex sentences (as evident from his performance on the TROG). Similar problems were evident in hi production of the Bus Story, where he only used three subordinate clauses and where some of his utterances were ungrammatical. The TROG indicated some difficulties with pronouns, which also appeared in his retelling of the Bus Story, where he also had substantial problems with pronouns.

5.2.7. Non-verbal abilities

TS's scores on the four non-verbal tests of the WISC-P are presented in Table 5.20 and his score on the Ravens Coloured Matrices is shown in Table 5.21.

Test	Raw	Scaled score	Z-score
Picture completion	**22**	**15**	**1.66**
Picture arrangement	**28**	**12**	**0.66**
Block Design	**33**	**13**	**1**
Object Assembly	**19**	**10**	**0**

Table 5.20 TS's performance on four subtests of the WISC – R

Test	Raw	Centile
RCM	31	75%

Table 5.21 TS's scores on the Ravens Coloured Matrices

Table 5.20 shows that TS's non-verbal abilities as measured by four non-verbal tests which form part of the WISC-R battery range from average (Picture Arrangement and Object Assembly) to above average for his chronological age (Block Design and Picture Completion, where he scored one and one and a half standard deviations above the mean). Hence it seems that TS has no deficits in the non-verbal domain.

TS's scores on the Ravens Coloured Matrices are also above average, falling between the 75th and the 90th centile, which means that TS has above average general intellectual abilities.

5.2.8. Summary of TS's performance on standardised verbal and non-verbal tests

TS presents with a profile of evident deficits in the verbal domain, particularly in the domain of expressive and receptive grammar where he typically scored between one and a half and two and a half standard deviations below the mean, with the exception of receptive vocabulary, where he scored close to the average

range. On the other hand, his profile shows obvious strengths in the non- verbal domain, where he typically performed well within the average or one to two standard deviations above the average expected for his chronological age.

5.2.9. Conversational abilities

In 150 conversational turns, TS produced 176 utterances. Data from the analysis of exchange structure, turn taking and information transfer are shown in Tables 5.22, 5.23 and 5.24 respectively.

Initiation		Response		Continuation	Follow-up	Unanalysed
IS	IN	MV/N	EXT			
8	11	17	82	53	4	1

Table 5.22 Exchange structure analysis

Table 5.22 shows TS's conversational interaction in terms of exchange structure. TS produced 19 initiations altogether, out of which 11 were non-soliciting and 8 were soliciting. He provided 99 responses in total, out of which 82 were extended and 17 were minimal verbal. TS produced 53 continuations and only 4 follow-ups. There was only one utterance, which was left unanalysed because one word in was unintelligible.

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
0	4	1	0

Table 5.23: Turn taking

Table 5.23 shows that with regard to turn taking, TS had no gaps, however there were four instances when he overlapped with the adult but the overlaps were inadvertent. Only on one occasion did TS interrupt the adult at an inappropriate point of the conversational interaction.

TS's analysis of information transfer is presented in Table 5.24.

Information (65)		Clarification (16)		Confirmation (23)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
40	25	15	1	21	2

Table 5.24: TS's responses to adult's open requests for information, requests for clarification and requests for clarification-confirmation.

Table 5.24 shows that the adult put 65 open requests for information to the child. The child's responses were adequate 60% of the time whereas they were inadequate 40% of the time. The adult put 16 requests for clarification to the child and the child responded adequately to most of them. There was only one occasion when the child's response was inadequate. TS also responded adequately to all of the adult's requests for confirmation, except in two instances when he provided inadequate responses.

Table 5.25 shows the percentage of inadequate utterances within the selected conversational sample of 150 conversational turns, which contained 176 utterances on the part of the child. Thus 51 out of the 176 utterances that the child produced (29%) were inadequate. Codes were assigned within all existing category. The majority of the utterances were inadequate because of problems with expressive syntax or semantics, followed by the category 'Other', followed by the category of 'Too much information'. Very few utterances fell in the remaining categories.

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	17 (10%)
Failure to comprehend literal/inferential meaning (FILIM)	2 (1%)
Ignoring initiation while still remaining on the topic (II)	3 (1.7%)
Failure to use context in comprehension (FCC)	1 (0.5%)
Too little information (TLI)	4 (2.3%)
Too much information (TMI)	9 (5%)
Socially inappropriate content/style (SICS)	4 (2.3%)
Other (O)	10 (5.7%)
Unclassified (U)	1 (0.5%)
Total	**51 (29%)**

Table 5.25. Categories of inadequacy and number (percentage) of inappropriate utterances in a sample of 150 conversational turns and 176 utterances.

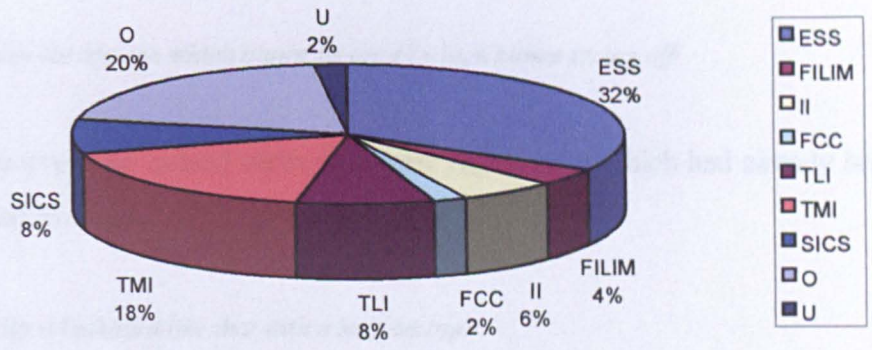


Figure 5.2 Categories of inadequacy – percentage of each category

Figure 5.2 shows that within the 51 inadequate utterances that the child produced, 32% fell within the category of inadequate expressive syntax and semantics. The errors that TS were mainly grammatical, for example, omission of inflectional affixes as in the following excerpt:

T *if I am in gear one wellp the car goes all along there and* ***hit*** *me very fast/*

In this example TS has omitted the 3rd person singular suffix. Sometimes he had problems with tense, which caused some confusion on the part of the listener, who needed clarification.

T *she's in hospital for a little bit but she's OK now/*

A *is she still in hospital?/*

T *no she is not in the hospital/.*

There were a couple of occasions where TS omitted the **–ing** present participle:

T *I'm* ***think*** *I can borrow crock/*

TS also omitted the auxiliary on a few occasions, as is the following conversational turn:

T *I seen the big one which **blown** its top (.) which **blown** its top off/*

He also over regularised verbs which are regular and which had already been inflected for tense.

T *wellp it lookeded like that with a hole on top/*

There was one utterance which was coded within this category, as it was semantically inadequate. Namely, TS used some neologisms as the following turn shows:

T *I will kill her by my army, very **shootable**, very **armiable**, very **carible**/*

In this utterance, apart from the incorrect preposition being used, the child also used adjectives which he derived from nouns by adding a legitimate adjectival suffix **–able** which is indicative of TS showing an interesting creativity with language. Even though the word *shootable* can have an adjective meaning 'something that can be shot at' the meaning that TS attributes to *shootable* is 'full of shooting', that is 'able to shoot', as he is talking about his army cars. Hence the meaning he intended for *armiable* and *carible* is similar, meaning 'full of army' and 'full of cars' respectively.

20% (or 10 out of 51) of all the inadequate utterances fell into the category Other. Out of those 10, five were inadequate because of TS's lack of world knowledge. This is one example of this type of inadequate utterances:

A *how old is she?/*
T *she's three weeks younger than me/*

TS does not seem to realise that a sister can not be three weeks younger than a brother, which is rather odd for a child of that chronological age.

Five utterances were inadequate because of TS being inconsistent in what he was saying, as the following example shows:

A *are you bored?/*
T *no I am not/*
A *you are not/*
OK/
T ***but I am a little/***
a little bit/

TS contradicts himself and is inconsistent with what he had said in the previous conversational turn.

Out of the 51 inadequate utterances that TS produced 9 fell within the category of TMI (too much information). TS occasionally provided the listener which much more information than the conversational situation needed.

A *do you play together?*

T *no, sometimes we fight because I want to have a go at something and she want to have a go at something and all I do is tell mum/*
or sometimes I just (.) when she's downstairs sometimes I just get on her, just strangle her and then we have a fight/

In his response to the adult's request for information as to whether TS plays with his sister, TS responds with two utterances which give far too much information than is required by the conversational situation.

A small percentage of codes was allocated to the category of socially inappropriate content or style, failure to use context in comprehension, ignoring the adult's initiation while still remaining on the topic, too little information and failure to interpret literal or inferential meaning.

5.2.10. Narrative discourse abilities

5.2.10.1. Length information

Table 5.26 below shows the number of communication units that TS used in order to generate the Frog Story, the number of clauses, words and subordinate clauses; and the mean length of his communication units in words and clauses.

	CUs	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
TS	18	25	183	1.4	10	2

Table 5.26 Length information

TS used 18 communication units, 25 clauses and 183 words in order to generate the Frog Story. The mean length of his communication units in terms of clauses was 1.4 clauses per communication unit and in terms of words, 10 words per communication unit. He only used two subordinate clauses.

5.2.10.2. Macrostructure

5.2.10.2.1. Story grammar parts

TS's Frog Story narration did not have a conventional setting (Appendix 3, TS's story). However there was a setting of a kind as TS tried to introduce the main characters. In terms of story grammar parts, TS's generated narrative, even though it had the three essential parts, i.e. initiating event, attempt and consequences, only included a series of actions, each of which automatically caused other actions, but he never explicitly stated the character's plan to achieve their aims; as in the case of BS's story, planning had to be inferred. The story was very short, many details were omitted, and many causal relations between events were overlooked. The resolution was unclear, as TS did not state explicitly how the boy and the dog found the frog. Thus TS's story structure was at the level of *Abbreviated Episode*, which is the level expected for typically developing children at approximately age 6.

5.2.10.3. Microstructure

Microstructure was analysed in terms of use of cohesive ties and use of grammatical morphemes and complex syntactic structures. TS's use of reference, conjunctive and lexical cohesive ties is presented in table 5.27, 5.28 and 5.29 respectively.

5.2.10.3.1.Cohesion

Reference ties

Reference ties (complete)			**Reference ties (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
4	23	0	4	0	0

Table 5.27 Number of complete and incomplete/erroneous reference ties

TS used a total of 31 reference ties out of which 8 were personal ties and 23 demonstrative. There were no examples of comparative ties being used. TS used all the demonstrative ties correctly, however half of the reference ties that he used were used erroneously. The major problem seemed to be that he would use a pronoun without having a clear antecedent for it, as the following example shows:

The dog tried the beehive and he climbed and he knocked the beehive down/ CU7
***He** looked in the tree/* CU8

The pronoun *he* in CU8 does not have an antecedent in the previous CU and even though the adult and the child shared contextual information, it was still not acceptable as it is true that it is the boy who actually looks in a tree on the picture. However on the same picture the dog is standing next to a tree as well.

However as Table 5.27 shows, TS used some reference ties correctly, both intersententially and intrasententially. For example in CU16, TS correctly used the pronoun *they* (intersentential reference) to refer to both the dog and the

boy, which are mentioned in the previous CU. In CU14, TS correctly used intrasentential reference, (or pronoun binding):

The antelope grabbed the hold of ***the boy*** *and then chucked* ***him*** *down the cliff into the water.*
CU14

Conjunctive ties

Conjunctive ties (complete)					**Conjunctive ties (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
7	0	0	3	1	0	0	0	0	0

Table 5.28 Number of complete and incomplete/erroneous conjunctive ties

***addit=additive; adver=adversative; tempor=temporal; contin=continuative**

Table 5.28 shows that TS used a total of 11 conjunctive ties, seven additive, three temporal and one continuative and they were all used correctly. However it was felt that TS's story lacked conjunctive ties as very often he would order actions without actually connecting them in any obvious way. There were no adversative nor causal ties used. It seems that even though TS showed strengths in the non-verbal domain on standardised tests, because of his language deficits, his full cognitive potential was not expressed. It is the complex interaction of cognitive, communicative and linguistic factors that makes for a successful narrative and deficits in one of these domains will inevitably influence the child's narrative output, which happens to be the case here.

Lexical cohesive markers

Table 5.29 below shows the number of complete and incomplete lexical ties.

Lexical ties (complete)					Lexical ties (incomplete/erroneous)				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
21	0	0	2	0	0	3	0	0	0

Table 5.29 Number of complete and incomplete/erroneous lexical ties

***RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate**

Table 5.29 shows that the child used 26 lexical ties. Most of his lexical ties were repetitions of words; there was only one attempt to use a synonym, however the attempt was rather unsuccessful in that the child used the word *bottle* twice and glass once to mean *a tub.* He used 7 different words in order to establish lexical cohesion.

Lexical cohesive markers	***CU***
- use of repetition for "boy"	11, 14, 15, 16
- use of repetition for "frog"	1, 2, 3, 6, 7, 13, 16, 18
- use of repetition for "dog"	4, 8, 10, 12, 13, 15
- use of repetition for "bees"	11, 12
- use of repetition for "beehive"	8
- use of synonym for "tub"	4 (2X), 5
- use of part/whole for "dog"	4 (2X)

5.2.10.3.2. Summary of TS's use of cohesive ties

Similarly to BS, TS also showed preference for using demonstrative ties within the reference ties category; additive ties as conjunctive cohesion markers and repetitions as lexical cohesion markers. TS also did not have many incorrect/incomplete ties, however the story seemed to have ties missing. Such an impression may have been created because of the absence of temporal and causal markers in particular, so that events did not seem to be connected in temporal and causal chains, but they were referred to most of the time as a list of happenings which somehow follow each other.

5.2.10.3.3. Grammatical error analysis

Table 5.31 below demonstrates the total number of grammatical morphemes that BS used correctly and also the total number of grammatical morphemes that BS used incorrectly or omitted.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	40	0	1
Prepositions	13	0	0
Plural 's'	2	0	0
Genitive 's	0	0	0
Pronouns	10	0	3
3rd person sing.	3	0	0
Irregular past	9	0	0
-ed past	12	0	1
-ing participle	1	0	0
past participle	3	0	0
auxiliary	5	0	0
Total	**98**	**0**	**5**

Table 5.31 Use of grammatical morphemes

Syntax	Correct	Incorrect
Coordination	3	0
Subordination	2	0
Question formation	1	0
Passives	1	0
Conditionals	0	0
Total	**7**	**0**

Table 5.32 Syntactic analysis

Table 5.31 shows some difficulties that TS had with the use of pronouns, i.e. there were three instances in the Frog Story when TS used pronouns incorrectly, mainly because there was no clear antecedent. He overregularised once (used the form *sticked* instead of *stuck*) and there was one instance when he used the indefinite article *a* incorrectly. There were no omission errors.

Table 5.32 provides information on the use of more complex syntactic structures. It indicates no problems with any of the structures listed, however

TS's spontaneous output does not seem to be rich in forms beyond the level of a simple sentence as there were only three instances of use o coordinated structures, two instances of use of subordinate structures, one question formation and one passive structure.

5.2.10.3.4. Other comments

Even though this was not marked as a specific category in the syntactic analysis table, TS had some difficulty with tense. He sometimes would try to coordinate two verb phrases, one of which would be in the past tense and the second one in the present tense (*'he was looking at the frog and the dog went inside the tub instead and looks at the frog'*). There was one occasion of an incorrect use of the adverb *even* (*'he looked for his frog and he can't even find it'*) and there was one instance when TS produced a sentence which was rather odd pragmatically. Namely, he said that the boy and the dog sink at the end of the story, and neither the pictures nor the context provide any ground for such a statement. All this indicates problems on several levels (syntactic, semantic and pragmatic) which is a very important issue when dissociations and modularity are discussed.

5.2.10.4. Summary of TS's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence Length			
Subordinate Clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture Completion			
Picture Arrangement			
Block Design			
Object Assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: TS produced quite a high rate of initiations, both soliciting and non-soliciting. The majority of his responses (more than 80%) were extended and there was also a high rate of continuations. With regard to his turn taking abilities there were quite a few overlaps most of which were inadvertent and there was one instance when the adult interrupted because the child was not clear as to what they were trying to say. In terms of information transfer, TS had some difficulty replying adequately to the adult's requests for open information, however most of his replies to the adult's requests for clarification and conformation were adequate. **Conversational inadequacy:** TS's percentage inadequate score was 29% and codes were allocated from all the available categories. The largest proportion of TS's inadequate utterances fell in the category of expressive syntax/semantics followed by the category of other and too much information.			
Narrative discourse			
Microstructure – TS had some problems with pronominal reference ties and there was a lack of causal and adversative ties. There were also some problems with lexical cohesive markers (use of synonymy in particular). The grammatical error analysis showed that TS never omitted a morpheme however there were several instances of incorrect use of grammatical morphemes. The syntactic analysis showed that there were not many complex syntactic structures beyond the level of a simple active declarative sentence. **Macrostructure** – TS's story structure was at the level of abbreviated episode. There was some goal directed behaviour however there was no evidence of planning. In terms of story grammar parts, he had an initiating event, attempt and consequence and an end. TS did not provide a resolution to the story spontaneously, he was prompted by the adult.			

Table 5.33 Summary of TS's overall profile

5.3. SLI Case study 3 – MS (CA 11;01)

5.3.1. Language abilities

MS's performance on standardised language tests is presented in Table 5.34. The scores on the individual subparts of the CELF-E are presented in Table 5.35.

Test	Raw Score	Stand Score	Z-score
BPVS	16	70	-2
TROG	15	81	-1.26
CELF-E	94	59	-2.73

Table 5.34. Scores on standardised language tests

CELF-E	Raw Score	Scaled score	Z-score
Formulated sentences	36	3	-2.33
Recalling sentences	46	3	-2.33
Sentence Assembly	12	6	-1.33

Table 5.35 Scores on the individual subtests of the CELF-E

5.3.2. Performance on standardised language tests

Table 5.34 shows that MS scores between 1 and 2 ½ SDs below the mean on both receptive and expressive language measures. His score on expressive grammatical abilities is the lowest (approaching 3SDs below the mean), which suggests that MS may present with having pervasive expressive language difficulties. However his understanding of vocabulary was rather low as well, which suggests the existence of receptive language problems as well.

5.3.3. Expressive language abilities

MS's expressive language abilities were quite pervasive. His test results indicate severe deficits especially when he needed to formulate sentences and repeat sentences of various lengths and complexity, his score falling slightly below two standard deviations below the mean.

In the Formulated Sentences subpart of the CELF-E, severe deficits with syntactic structure emerged. MS was able to use the temporal subordinating conjunction *when*. Thus he produced a grammatically correct though semantically slightly deviant sentence: '*When you finish your dinner you give it to the cook*'. What he meant to say is that you give the empty plate to the dinner person, as it is logically impossible to give the dinner to the cook after you had finished it. MS was also able to produce conditional sentences when given the conditional subordinator *if* : '*If the bus comes and open the door they go in*'. Even though there is a morphological error (omission of third person singular 's' on the verb *open*) the sentence is syntactically and semantically well formed.

With regard to use of other subordinating conjunctions in order to form complex sentences (after, before, because, although), MS had profound difficulties and sometimes produced sentences which were both syntactically and semantically ill formed: '*Before if she goes she goes first*', '*After she wins one of them to win*', or sentences which were syntactically well formed but semantically unacceptable such as: '*The lollypop lady was standing on the road because the car always goes through*' and when asked to produce a sentence using *although*, MS said that he did not know what the word meant.

As for the use of coordinating conjunctions, MS used *and* appropriately, producing: '*The girl is doing the gardening and the man is doing the leaf*'. Again there is a morphological problem in the sentence as MS used the noun *leaf* in the singular instead of plural. However, when asked to make a sentence using the coordinator *but*, MS used it as an additive rather then contrasting conjunction: '*But the dog was running away from the bicycle*'.

MS scored a whole standard deviation higher on the Sentence Assembly task, his scores still being 1SD below the mean but much higher than the scores on the previous two tasks.

5.3.4. Receptive language abilities

MS's receptive grammatical skills fall 1.5 SD below the mean, which is relatively higher than his expressive grammatical skills and his score on receptive vocabulary. MS had no difficulties understanding pronouns, singular Vs plural inflections, comparatives, reversible passives, object relative clauses, most of the prepositions, some types of coordinated noun phrases ('*the....but not the* ...'). He did have problems with some coordinated noun phrases ('*not only the ...but also the'* ...and '*neither the ....nor the* ...'). It might have been the case that MS did not actually understand the meaning of the words rather than the grammatical structures, as he did present with severe receptive vocabulary problems. MS also had some difficulties with embedding and subject relative clauses.

5.3.5. Overview of MS's linguistic abilities

The results that MS obtained on the standardised language tests are indicative of pervasive receptive and expressive language difficulties, with particular problems with formulating sentences and recalling sentences of various length and complexity and vocabulary problems. As already mentioned in Chapter 3, due to the fact that this participant had moved to a secondary school before the data collection was completed, there is no data for this participant's Bus Story.

5.3.6. Non verbal abilities – standardised test scores

MS's non-verbal abilities as measured by the four performance tests of the WISC-P are presented in Table 5.36.

Test	Raw	Scaled score	Z-score
Picture completion	**18**	**9**	**-0.33**
Picture arrangement	**27**	**10**	**0**
Block Design	**37**	**12**	**0.66**
Object Assembly	**22**	**10**	**0**

Table 5.36 Scores on the WISC-R

Intellectual abilities – Ravens Coloured Matrices

Test	Raw	Centile
Ravens	36	95

Table 5.37 Scores on the Raven's Coloured Matrices

As Tables 5.36 and 5.37 show, MS's non-verbal abilities are as expected for his chronological age. His scores on the four subtests of the WISC battery gave a total performance scaled score of 50, which is equal to a PIQ of 100. There was not much discrepancy between his scores on the four non-verbal tasks on the WISC-P battery.

MS showed extremely good intellectual abilities as measured on the Ravens Coloured Matrices, responding correctly on all the 36 items in the test, thus scoring more than 2SDs above mean. This shows intellectual abilities which are well above average including an excellent ability to reason by analogy and form gestalts.

5.3.7. Summary of MS's performance on standardised verbal and non-verbal tests

The results that MS obtained on the verbal and non-verbal standardised tests revealed a profile of marked dissociations, with definite strength in the non-verbal domain, where he performed at average or above average for his chronological age, and substantial deficits in the verbal domain, where his performance fell between 1.5 and 3SDs below the mean.

5.3.8. Conversational abilities

MS's conversational abilities were assessed in terms of exchange structure, turn taking and information transfer. Data from the analysis of exchange structure are shown in Table 5.38, data from the analysis of turn taking are shown in Table 5.39 and data from the analysis of information transfer are shown in Table 5.40.

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
6	5	23	53	122	4	2

Table 5.38. Exchange structure analysis

The exchange structure analysis shows that MS used 5 soliciting and 2 non-soliciting initiations. The majority of his responses (i.e. about 60%) were extended and there was an extremely large number of continuations, i.e. a total of 118 out of 202 utterances). Within those118 continuations, 79 or 2/3rds were inadequate and 39 were adequate. The majority of the inadequate continuations were inadequate due to sentence formulation problems. Some of them however fell in the category of Too Much Information (TMI) since MS had a tendency to over elaborate on certain topics and provide unnecessary information.

Gap	**Inadvertent overlap**	**Violating overlap**	**Adult interrupt**
0	1	0	2

Table 5.39. Turn taking

As table 5.39 shows, MS had no problems with turn taking. There were no gaps and he never interrupted the interlocutor at an inappropriate point. There was only one inadvertent overlap and two occasions when the adult interrupted the child's conversational turn for clarification purposes, because it was felt that the child had not understood the initial adult's question.

Information (42)		Clarification (26)		Confirmation (17)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
23	19	13	13	14	3

Table 5.40. MS's responses to adult's open requests for information, requests for clarification and requests for clarification-confirmation.

Table 5.40 shows that out of 42 open requests for information on the part of the adult, MS responded inadequately to 23, which is almost 50%. A similar ratio occurs with the child's responses to the adult's requests for clarification, which in MS's case were numerous. MS responded adequately to 13 and inadequately to 13 requests for clarification. MS seemed to have the fewest problems with the adult's requests for clarification-confirmation, as he responded adequately to 13 out of 17 requests put to him on the part of the adult.

Table 5.41 shows the number of inadequate utterances out of a sample of 150 conversational turns and 215 utterances, which means that every turn was longer than a single utterance.

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	77 (36%)
Failure to comprehend literal/inferential meaning (FILIM)	3 (1.4%)
Ignoring initiation while remaining on the to topic (II)	9 (4%)
Failure to use context in comprehension (FCC)	1 (0.5%)
Too little information (TLI)	5 (2.3%)
Too much information (TMI)	11 (5%)
Socially inappropriate content/style (SICS)	9 (4%)
Other (O)	13 (5.5%)
Unclassified (U)	3 (1.4%)
Total	**131 (60%)**

Table 5.41. Categories of inadequacy and number (percentage) of inappropriate utterances in a sample of 150 conversational turns and 215 utterances.

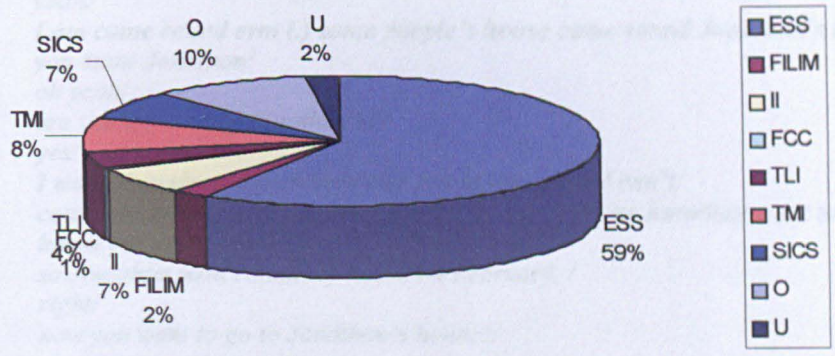


Figure 5.4 Categories of conversational inadequacy

As Table 5.41 and Figure 5.4 show, codes were allocated from all the available categories, however the majority of MS's inadequate utterances fell in the category of expressive syntax/semantics. Out of the 215 utterances, which MS produced in a randomly selected sample of 150 conversational turns, 77 or 36% of the utterances were syntactically or lexically problematic. This means that within the total of all the inadequate utterances that occurred in the selected sample, almost 60% were inadequate due to difficulties with *Expressive Syntax/Semantics*.

10% of the codes were allocated to the category *Other* while 8%o the codes were allocated to the category of *Too Much Information*. Equal percentage of codes, i.e. 7% each were allocated to the categories of *Ignoring Initiation while Remaining on the Topic* and *Socially Inappropriate Content or Style*.

A small percentage of codes was allocated to the remaining categories, i.e. *Too Little Information*, *Failure to Interpret Literal or Inferential Meaning*, *Unclassified Utterances* (2% of all the codes), *Failure to Use Context in Comprehension* (1% of all the codes).

The excerpt below taken from a sample of spontaneous speech illustrates clearly MS's sentence formulation problems.

M	*yeah/*
	I'm gonna start Middle School in September/
V	*oh brilliant/*
M	***I want to in summer but I am start in September/***
	that's take very long long holidays/

V *are you going anywhere for your holiday?/*
M ***on Easter/***
V *yeah/*
M ***I am come round erm (.) some people's house come round Jonathan's house/***
you know Jonathan/
V *oh yeah/*
are you a friend of Jonathan's?/
M *yes/*
I wanted to sleep somewhere else but at home but I can't/
cause my mum says I (.) remember I told mum about Jonathan went to Duncan's house for a weekend/
so Jonathan went round my house on February, /
V *right/*
now you want to go to Jonathan's house?/
M *yes/*
I come at Jonathan's house but it's not whole holidays but it's maybe three or two/
but he slept to his once Sunday once Monday/
V *right/*
M *and we sleep in the living room/*
I'll sleep into his sofas and he sleep in sea (.) in three and then he sleep in two and then I sleep in three/
so my brother went to school on Monday but not this week/
you know why because we don't sleep (.) we don't go to school when school is finish when we go home/
my mum used to take me (err) on Monday my dad or my mum/
dad takes me on Tuesday so/
V *right/*
M *and then we went to (err) I don't now what that's called/*
those big shops and I had a chocolate bar galaxy/
V *oh right/*
from those supermarkets you mean?/
M *yeah/*
V *oh right/*
so when was that?/
when did you have your galaxy?/
M ***that was in a shop/***
V *yeah but when?/*
was it when Jonathan was round or no?/
M *yeah/*
V *right with Jonathan, when he came round/*

The short excerpt from a conversational sample with MS shows that almost every sentence that MS attempted had morphological and/or syntactic problems. Often it was very difficult for the listener to follow what MS wanted to say. The main difficulties seem to be in relation to his use of articles and morphemes for marking the grammatical category of number and person; tense and aspect assignment; and the use of causal and temporal subordinators in order to link two or more events. There were also problems with lexical selection.

5.3.9. Narrative discourse abilities

5.3.9.1. Length information

Table 5.42 below shows the number of communication units that MS utilised in order to generate his version of the Frog Story, the number of clauses and words; and the mean length of a communication unit in terms of clauses and words, as well as the number of subordinate clauses used.

	CU	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
MS	78	146	863	1.9	11	8

Table 5.42 Length information

In comparison with the rest of the participants with SLI, MS used twice as many CUs in order to generate the Frog Story. The rather large number of CUs triggered a proportionately larger number of clauses. The CU to CL ratio was 1.9 clauses on average per communication unit, which was similar to that of the rest of the group. MS's mean length of communication unit in words was 11 words. It should be pointed out that MS had a very stereotypical way of starting every sentence, using the phrase '*what happens then/ happens then*' which was not included in the word count. MS also attempted to use 4 subordinate clauses, which did not always have adequate syntactic structure (this point will be extensively discussed in section 5.3.10.3.2 devoted to grammatical error analysis and use of syntax).

5.3.9.2. Macrostructure

5.3.9.2.1. Story structure level

MS's story structure level was judged to be at the level of a complete episode. The story included the aims and intentions of the main characters, their goal was made explicit, and attempts to reach the goal or solve the problem were stated.

Due to the severe linguistic deficits MS did not use words like *'decide to'* however he used direct speech in order to make the goals of the main characters more obvious (see Appendix 3, MS's story). In his story, MS included a very detailed conventional setting, where he successfully introduced the characters, gave them names and ages; an initiating event which MS elaborated upon and which set the story into motion, an internal plan and internal response, multiple attempts and consequences, a resolution and an ending. Even though MS had serious problems with syntactic expression, he did not miss any important point and he tried to make it clear for the listener what the main characters were trying to achieve.

5.3.9.3. Microstructure

5.3.9.3.1.Cohesion

Tables 5.43, 5.44 and 5.45 demonstrate MS's use of cohesion with regard to reference, conjunctive and lexical ties.

Reference ties

Reference ties (complete)			**Reference ties (erroneous/incomplete)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
32	**22**	**0**	**18**	**10**	**0**

Table 5.43 Number of complete and incomplete/erroneous reference ties

MS used 50 personal reference ties, out of which 18 (or 36%) were used inadequately. Thus for example in CU19 MS uses the pronoun *he* twice, however it is unclear as to who the pronoun **he** refers to.

M *and then Molly said (.) then* ***he*** *fall down(.) then(.) and* ***he*** *said: "Nooo Molly"!/*

MS employed 32 demonstrative ties out of which 22 or 69% were either erroneous or incomplete. Thus for example in CU4, the noun *frog* was introduced

with the definite article *the* erroneously as it was mentioned for the first time. In CU15, MS used the noun 'jar' for the second time (it had already been introduced once in CU 4), however instead of using the definite article MS erroneously used the indefinite article. There were no comparative ties.

Conjunctive ties

Conjunctive ties (complete)					**Conjunctive ties (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
18	1	0	10	0	1	1	0	2	1

Table 5.44 Number of complete and incomplete/erroneous conjunctive ties

***addit=additive; adver=adversative; tempor=temporal; contin=continuative**

With regard to the use of conjunctive ties, MS used 19 additive ties, out of which only one was erroneous:

CU33 *And then the squirrel was looking at Joe and Joe was looking in the tree, he said: "Frog!"*

CU34 ***Then** he can't find him/.*

Thus in CU34 instead of using an adversative tie, MS used an additive tie.

There were two adversative ties used, one of which was incomplete, as the example below shows:

CU41 *you can see he don't wanna get hurt so (.) and the owl say they got a horns (.) they get (.) say: "Froggy"*!

CU42 ***but** it wasn't/*

CU43 *it was a deer/*

The adversative tie introduced by the coordinator *but* is incomplete, as it does not tie in with what had been said before. Furthermore, the CU is not finished either. The other adversative tie was intrasentential and it was complete, as shown by the following example:

CU21 *and then hands in Mo (.) and then Joe got him and Molly is happy laughing and looking at him* ***but*** *Joe wasn't happy/*

There were 11 temporal ties, out of which 2 were erroneous, and there was only one continuative tie, and it was used erroneously.

Lexical cohesive markers

Lexical ties (complete)					**Lexical ties (incomplete/erroneous)**				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
34	68	0	2	0	0	2	0	0	0

Table 5.45 Number of complete and incomplete/erroneous lexical ties

***RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate**

Lexical cohesive markers	***CU***
- use of repetition for "boy"	10, 20, 40
- use of repetition for "frog"	7, 8, 10, 12, 17, 33, 63, 64, 65, 67, 73
- use of repetition for "dog"	10, 23, 54
- use of repetition for "bees"	37
- use of repetition for "bee"	27
- use of repetition for "jar"	15
- use of repetition for "window"	17
- use of repetition for "honey"	29, 31
- use of repetition for "mole"	28
- use of repetition for "tree"	33, 39, 58
- use of repetition for "owl"	35, 39 (2X), 41
- use of repetition for "rocks"	40
- use of repetition for "raindeer"	46, 48
- use of synonym for "boy"	6, 8, 11, 12, 13, 15 (2X), 16, 17, 19, 21(2X), 24, 27, 33 (2X), 36, 43, 50, 53, 54, 55, 56, 59, 64, 65, 66, 67, 70, 73, 75
- use of synonym for "frog"	14, 15, 24, 27, 39, 41, 70

- use of synonym for "deer" 49
- use of synonym for "mole" 28, 33
- use of synonym for "dog" 6, 8, 13, 15, 16, 18, 19 (4X), 21, 22, 26, 29, 30, 31, 32, 37, 51, 53, 57, 58, 61, 62, 65, 73, 76
- use of part/whole for "bee" 31
- use of part/whole for "frog" 77

MS used 106 lexical ties, out of which 104 were complete and 2 were erroneous. Most of the lexical ties used were repetitions; there were 5 instances of use of synonyms and there were two instances of the use of a part/whole relationship. There were 18 different words used as lexical cohesive markers.

5.3.9.3.2. Summary of MS's use of cohesive markers

MS used a wider variety and a large number of cohesion ties. Within the category of referential cohesion, MS used both personal and demonstrative ties, a number of which were incomplete/erroneous, which made the story sometimes difficulty to follow. With regard to his use of conjunctive ties, MS preferred to use additive ties, however there were a number of temporal ties as well. And regarding his use of lexical cohesion markers, he used many repetitions, and some [1]synonyms as well.

5.3.9.3.3. Grammatical error analysis

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	42	7	6
Prepositions	19	0	2
Plural 's'	7	1	1
Genitive 's	0	0	0
Pronouns	39	0	25
3rd person sing.	7	2	1
Irregular past	31	2	2
-ed past	9	1	4
-ing participle	23	5	4
past participle	6	2	1
auxiliary	24	4	8
Total	**207**	**24**	**54**

Table 5.46 Grammatical morpheme analysis

Syntax	Correct	Incorrect
Coordination	24	4
Subordination	4	4
Question formation	6	3
Passives	0	2
Conditionals	0	0
Total	**34**	**13**

Table 5.47 Syntactic analysis

As Tables 5.46 and 5.47 show, MS presents with severe problems with morphology and syntax. In the Frog Story, out of a total of 285 morphemes that he used, 54 or 19% were used incorrectly. There were 24 missing grammatical morphemes, which is 8%. This means that MS had problems with 27% of all the grammatical morphemes that he attempted to use. Pronouns were the ones that MS had problems with most often, followed by auxiliaries and determiners (i.e. articles). The articles were the most frequently omitted morphemes followed by the –ing participle and auxiliaries.

Problems with syntactic structure were also evident. MS had difficulty

[1] MS gave the main characters names; therefore if he used the name he had given them instead of calling them *the boy*, *the dog* or *the frog*, the lexical ties was marked as a synonym.

with question formation, coordination and subordination of sentences and the formation of passive sentences. There were no instances of a spontaneous use of conditionals. MS attempted 34 complex syntactic structures out of which 13 or 38% were problematic. Almost every communication unit which MS attempted had either a problem with morphology or syntax. The following excerpt is illustrative of MS's severe grammatical problems:

60. *then he try and hear a frog noise and he thinks* (.) *he don't know whether is a frog/*

61. *and then (.) so tolds him to shush because: "Shuh Molly because I wonna hear a frog"/*

In only two communication units there are 2 grammatical morphemes omitted and a syntactic error: 3rd person sing. 's', was omitted for two verbs, there was a 3rd person sing, 's' used on a verb which is already in past tense, and MS tried to use a subordinate clause he omitted the [2]expletive subject 'it'.

Furthermore, MS had difficulties with the grammatical categories of tense and aspect. There were 14 instances of the wrong tense being used and 3 instances where he manifested problems with aspect, usually using the progressive aspect instead of the perfective.

5.3.9.4. Summary of MS's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: There were not many initiations, the majority of his responses were extended, however there was a very large number of continuations. There were few problems with turn taking abilities and severe problems with information transfer in that MS responded inadequately to almost 50% of all the adult's requests for information and requests for clarification. **Conversational analysis:** 60% of all the utterances in a sample of 150 conversational turns were inadequate. 1/3 of all the inadequate responses fell within the category of expressive syntax and semantics. A very small percentage of MS's inadequate responses were spread amongst the pragmatic categories.			
Narrative discourse			
Microstructure: With regard to use of cohesion MS used quite a lot of reference ties but had problems especially with the use of personal ties and some problems also with the use of demonstrative ties. MS also used a large number of conjunctive ties but the majority with additive ties and there were some temporal ties, but there were no causal ties present. MS had serious problems with the production of grammatical morphemes, with frequent omission error or incorrect use. MS often attempted to produce more complex syntactic structures, however there were errors in this domain as well. **Macrostructure:** The level of story structure was a complete episode, which is what is expected from a typically developing 7-8 year-old child. All the story grammar parts were present, i.e. the story had a setting, an initiating event, attempts and consequences, a resolution and an ending, and there was a successful attempt to the plans of the main character to achieve their goals.			

Table 5.48 Summary of MS's overall profile

[2] Expletive – an element that has a syntactic category and a grammatical function but no independent meaning (Culicover, 1997:390).

5.4. SLI Case study 4 – SS (CA 10;03)

5.4.1. Language abilities

SS's performance on standardised language tests is presented in Table 5.49. The scores on the individual subparts of the CELF-E are presented in Table 5.50.

Test	Raw Score	Stand Score	Z-score
BPVS	16	75	-1.66
TROG	12	72	-1.86
CELF-E	92	67	-2.20

Table 5.49. Scores on standardised language tests.

CELF-E	Raw Score	Scaled score	Z-score
Formulated sentences	32	3	-2.33
Recalling sentences	48	4	-2
Sentence Assembly	12	8	-1.66

Table 5.50 Scores on the individual subparts of the CELF-E.

5.4.2. Performance on standardised language tests

As tables 5.49 and 5.50 show SS scored between one and a half and two and a half SDs below the mean on standardised language tests. Her highest score (though still one and a half SD below the mean) was on the BPVS followed immediately by her score on the TROG, which was approaching two SDs below the mean with the lowest score being the one that SS obtained on the CELF-E.

5.4.3. Expressive language abilities

SS's expressive language abilities as measured by the CELF-E fell ranged between 1½ and 2½ SDs below the mean. Her score was the lowest on the Formulated Sentences subpart which fell more then 2SDs below the mean. SS had difficulty using subordinators and coordinators. Thus for example, given the

target word *before* which is supposed to introduce a subordinate clause, SS produced a sentence using *before* as a preposition, which resulted in an unfinished sentence, i.e. a sentence with an incomplete argument structure as the example shows: "*The man gave the lady before him*" (item 3, FS – CELF-E). The same happened on item 5, when SS was given the target word *After*. Instead of using it as a subordinator, she attempted to use it as a preposition: "*She is after us*". In this case the sentence was grammatical.

5.4.4. Receptive language abilities

SS's receptive language abilities were slightly better according to the standardised language tests, however they were still at least 1.5 SD below the mean. On the TROG, SS failed the block on the use of pronouns, passives, prepositions, subject and object relatives, embedded clauses.

5.4.5. Use of grammar in context – Bus Story

	Raw score	**Age equivalent**
Information	**25**	**5;05**
Sentence length	**14**	**8;02**
Subordinate clauses	**1**	**4;02**

Table 5.51 SS's Bus Story

SS's Bus Story was poor on information where SS's score is equivalent to what would be expected from a typically developing 5-year-old child. SS's score of use of subordinate clauses was the poorest, as she only used one in her story, which resulted is her score of use of subordinate clauses to be equivalent to a typically developing 4 year old chid. However SS's score on sentence length was approaching almost age appropriate.

5.4.6. Overview of SS's linguistic abilities

SS's linguistic profile was ranging between 1.5 and 2.5 SDs below the mean, which is suggestive of moderate to severe linguistic deficits both in the domains

of expressive and receptive language. Her sentence length however was better however since the Bus Story does not have norms above chronological age 8, it would be difficult to say whether SS's sentence length is developing in line with her chronological age.

5.4.7. Non-verbal abilities – standardised test scores

SS's non-verbal abilities as measured by the four performance tests of the WISC-P are presented in Table 5.52.

Test	Raw	Scaled score	Z-score
Picture completion	**14**	**7**	**-1**
Picture arrangement	**33**	**13**	**1**
Block Design	**19**	**8**	**-0.66**
Object Assembly	**8**	**4**	**-2**

Table 5.52 Scores on the WISC-R

Intellectual abilities – Ravens Coloured Matrices

Test	Raw	Centile
Ravens	17	5

Table 5.53 Score on the Ravens Coloured Matrices

As tables 5.52 and 5.53 suggest, SS's non-verbal profile was rather uneven with z-scores ranging from 1 SD above the mean to 2SDs below the mean on the four tasks of the WISC-P battery. Her intellectual abilities as assessed by the Ravens Coloured Matrices fell below the 5th centile which is indicative of below average general intellectual abilities.

5.4.8. Summary of SS's performance on standardised verbal and non-verbal tests

SS's profile was extremely variable with definitive weaknesses in the verbal domain where her performance always fell at least 1.5SDs below the mean. However her non-verbal profile was much less clear-cut with strengths and weaknesses in various domains.

5.4.9. Conversational abilities

Within the selected 150 conversational turns, SS produced 158 utterances.

Conversational abilities were assessed in terms of exchange structure, turn taking and information transfer. Data from the analysis of exchange structure are shown in Table 5.54.

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
1	7	19	63	64	1	3

Table 5.54: Exchange structure analysis

Data from the analysis of turn taking are shown in Table 5.55.

Gap	**Inadvertent overlap**	**Violating overlap**	**Adult interrupt**
0	0	1	1

Table 5.55: Turn taking

Information transfer

The analysis of information transfer showed that out of the 91 soliciting utterances on the part of the adult, 66 were open requests for information, 10 were requests for clarification and 15 sought clarification-confirmation. SS responded inadequately to 9 open requests for information, to 4 requests for clarification and to 4 requests for clarification-confirmation.

Information (68)		Clarification (10)		Confirmation (15)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
57	9	6	4	11	4

Table 5.56 Child's responses to adult's open requests for information, requests for clarification and requests for clarification-confirmation.

Conversational inadequacy (i.e. number of inadequate utterances out of 158 presented as raw numbers and percentages) is shown in Table 5.57:

Categories of inadequacy	**Number of utterances (percentage)**
Expressive syntax and semantics (ESS)	17 (11%)
Failure to comprehend literal/inferential meaning (FILIM)	2 (1.3%)
Ignoring initiation while remaining on the topic (II)	2 (1.3%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	7 (4.4%)
Too much information (TMI)	12 (7.6%)
Socially inappropriate content/style (SICS)	0 (0%)
Other (O)	1 (0.7%)
Unclassified (U)	1 (0.7%)
Total	**42 (27%)**

Table 5.57: Categories of inadequacy and number (percentage) of inappropriate utterances in a sample of 150 conversational turns and 158 utterances.

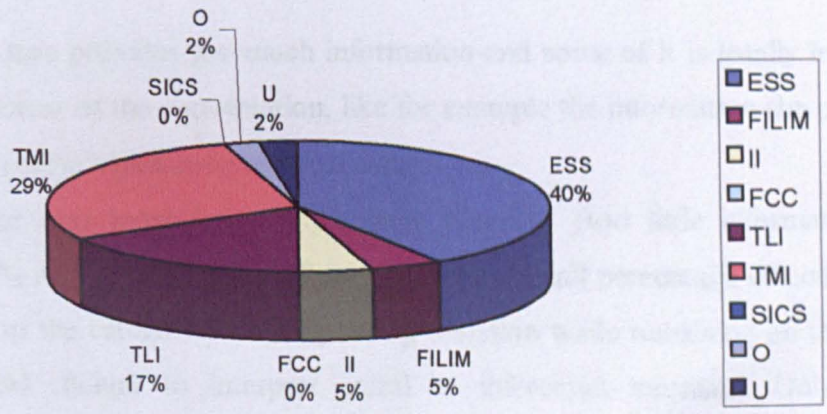


Figure 5.4 Categories of conversational inadequacy

SS's conversational inadequacy score was 27% and the majority of her inadequate utterances (40%) was due to problems with expressive syntax and semantics (ESS).Her problems were with the use of pronouns and omissions of inflectional endings. The following examples below will illustrate these problems:

S	*I've got two friends, Amelia and Amy and Zara/*
V	*so are they all in the same class?/*
S	*yeah/*
V	*they are/*
	[3]so what do you play with them?/
S	***I play football with Zara sometimes, but when they don't want to play football I play with Mahelia or Amy/***

The pronoun **they** does not have a referent from the preceding discourse, which makes the utterance inadequate on grounds of inappropriate use of a grammatical morpheme, i.e. a pronoun.

The next most frequent category was TMI (too much information), which accounted for 29% of all the allocated codes. The next excerpt illustrates SS's tendency to over elaborate and provide much more information than it is adequate for the conversational situation.

C	*what would you like?/*
V	*what do I want?/*
	I would like a dog, I would like a dog really/
C	***my auntie's got two dogs, one's ox-bred and one's really big, it's like a monkey/***
	And we call it Shante and my auntie's name we call it Gina, but her real name is Virgina/

SS in her turn provides too much information and some of it is totally irrelevant for the context of the conversation, like for example the information she provided about her auntie's nickname and real name.

The next most frequent category was TLI (too little information), to which 17% of the codes were allocated. A very small percentage of codes were allocated to the categories of II (ignoring initiation while remaining on the topic) and FILIM (failure to interpret literal or inferential meaning). Only a few

[3] SS does not directly answer the question, however this could have been due to her mishearing the adult's question and therefore her answer was only coded for grammatical problems.

utterances were allocated to the category O (other) and there was only one utterance which was unanalysed due to some intelligibility problems.

5.4.10. Narrative discourse abilities

5.4.10.1. Length information

Table 5.58 below shows the number of Communication Units that SS utilised in order to generate his version of the Frog Story, the number of clauses and words; and the mean length of his communication units in terms of clauses and words as well as the number of subordinate clauses used.

	CU	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
SS	59	109	682	1.8	11.5	20

Table 5.58: Length information

As Table 5.58 shows, SS used 59 communication units, 109 clauses and 682 words in order to retell the Frog Story. The mean length of her communication units was 1.8 clauses per unit and 11.5 words per unit. SS used a large number of subordinate clauses, 17 in total, which is much more than any other of the participants. She used a variety of subordinate clauses, both finite and non-finite. The finite ones were mainly temporal adverbial clauses. This was very unexpected given that SS's linguistic and general intellectual abilities were the lowest in comparison with the other participants with SLI.

5.4.10.2. Macrostructure

5.4.10.2.1. Story structure level

SS's story structure level was judged to be at the level of an abbreviated episode (see Appendix 3, SS's story). Even though the aims and intentions of the main character were provided, there was not strong evidence of planning in the attempts of the character to achieve their goal. Their attempts in order to find the

frog were causally connected and SS did not miss any important points, yet there was not a clear plan for an intentional action to attain it. SS's story contained the following story grammar parts: a setting (though it was not a conventional story setting), an initiating event, attempts and consequences and a resolution.

5.4.10.3. Microstructure

The microstructure development of SS's story was addressed by focusing on cohesion, grammatical error analysis and use of syntactic structures beyond the level of a simple active declarative sentence.

5.4.10.3.1. Cohesion

SS's use of reference, conjunctive and lexical cohesive ties is presented in tables 5.59, 5.60 and 5.61 respectively.

Reference ties

Reference (complete)			**Reference (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
55	68	0	8	0	0

Table 5.59: number of complete and incomplete/erroneous reference ties

SS used a total of 131 reference ties (personal and demonstrative), out of which 123 were complete and 8 were incomplete. All of the incomplete ties were personal, which reflects once again SS's difficulties with pronouns.

Conjunctive ties

Conjunctive (complete)					**Conjunctive (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
14	1	1	12	14	0	0	0	0	5

Table 5.60: number if complete and incomplete/erroneous conjunctive ties

***addit=additive; adver=adversative; tempor=temporal; contin=continuative**

SS used 47 conjunctive ties, 14 additive, 1 adversative, 1 causal, 12 temporal and 19 continuative. There were 5 ties which were incomplete and they were all continuative.

Lexical cohesive markers

Lexical ties (complete)					**Lexical (incomplete/erroneous)**				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
66	1	0	7	0	1	0	0	0	0

Table 5.61: Number of complete and incomplete/erroneous lexical ties

***RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate**

With regard to the lexical cohesive markers, SS used a total of 75 markers. The majority of the lexical ties used were repetitions of a word, there were 7 lexical markers reflecting a part-whole relationship and only one synonym. There was only one incomplete lexical markers and it was a repetition.

Below are presented examples of all the lexical cohesive markers, citing CU numbers.

*only the complete lexical cohesive markers are presented

Lexical cohesive markers	***CU***
- use of repetition for "boy"	5, 6, 8, 10, 12, 14, 15, 17, 23, 25, 30, 33, 41, 42, 43, 48, 56
- use of repetition for "dog"	3, 6, 8, 11, 13, 15, 16, 18 (2X), 22, 24, 25, 29, 31, 32, 35, 40, 41, 47, 52, 58
- use of repetition for "frog"	5, 7, 8, 14, 54
- use of repetition for "window"	15, 17
- use of repetition for "jar"	3, 8, 11, 13, 18
- use of repetition for "bees"	24, 26, 29, 31, 32
- use of repetition for "rat"	27

- use of repetition for "tree" 27, 30
- use of repetition for "hole" 28
- use of repetition for "beehive" 29
- use of repetition for "owl" 33, 36
- use of repetition for "rocks" 35
- use of repetition for "deer" 44
- use repetition for "piece of tree" 50
- use of repetition for "other side" 51
- use of part – whole for "dog" 3, 11, 22, 25
- use of part-whole for "tree" 38
- use of part-whole for "deer" 44
- use of part-whole for "boy" 47
- use of synonym for 'jar' (glass-circle) 7

5.4.10.3.2. Summary of SS's use of cohesion markers

SS explored the use of various cohesion markers. She used almost an equal number of demonstrative and personal reference markers. She also used every category of the conjunctive cohesion markers, even though additive and temporal ties predominated. With regard to her use of lexical cohesion markers, SS showed preference for repetitions, however there were a few part-whole relationships which were used to signal lexical cohesion. There were a few erroneous/incomplete ties, especially within the reference and conjunctive ties categories.

5.4.10.3.3. Grammatical error analysis

Table 5.62 shows the total number of grammatical morphemes that SS used and also the number of grammatical morphemes she omitted or used incorrectly.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	97	1	1
Prepositions	43	0	3
Plural 's'	11	0	0
Genitive 's	2	0	0
Pronouns	52	0	9
3rd person sing.	21	2	3
Irregular past	5	0	4
-ed past	4	1	1
-ing participle	12	0	0
past participle	5	0	1
primary auxiliary	18	4	1
Total	**270**	**8**	**23**

Table 5.62: Grammatical error analysis

SS used a total of 301 grammatical morphemes, out of which 270 (or 90% were used correctly). There were some omissions (mainly primary auxiliaries) and there were 23 instances of grammatical morphemes being used incorrectly. The largest number of grammatical morphemes used incorrectly were pronouns, followed by the irregular past tense morpheme.

Syntax	Correct	Incorrect
Coordination	20	5
Subordination	20	0
Question formation	2	0
Passives	0	0
Conditionals	2	0
Total	**44**	**5**

Table 5.63: Syntactic analysis

SS's use of complex syntactic structures, i.e. structures beyond the level of a simple declarative active sentence is shown in table 5.63. SS used quite a large number of more complex syntactic structures, a total of 49, out of which 5 were used incorrectly. SS spontaneously produced structures with 2 or more coordinated clauses in them; and subordinate structures with often more than 2 subordinate clauses in them. She also correctly produced 2 interrogative structures and 2 conditionals. All the incorrect complex structures were the ones when she tried to coordinate 2 or more clauses by using the continuative

coordinator 'so'. This problems has already been discussed in section 5.4.10.3.1 on cohesion. The following examples illustrate this problem:

CU18 *and the jar smash **so** the dog's OK **so** he picks him up **and** he's really angry/*

The first 'so' is the incorrect coordinator as an adversative tie would be much more appropriate for the present context, however the second continuative coordinator 'so' and the additive coordinator 'and' are used correctly.

5.4.10.3.4. Other comments

SS was capable of producing structures which contained 3 clauses containing both coordination and subordination as the following examples show:

CU25 *then when the boy gets right through, this rat or something like bites him on the nose and the dog was like nearly on the tree/*

In this communication unit for instance SS used correctly a temporal subordinate clause introduced with 'when' and then coordinated this structure with another clause suing the coordinator 'and'.

SS used some advanced syntactic structures. Thus in her story generation there was an instance of a cleft construction:

CU30 *...and it was an owl what was in it/*

SS attempted on a number of occasions to expand the verb phrase via modal auxiliaries, however the produced structures were typically grammatically incorrect, as she tended to omit the second auxiliary. A couple of examples have been chosen for illustration:

CU7 *and when he was sleeping the frog **might jumped** out of the glass circle/*

CU17 *so the boy **might jumped** over the window/*

There was also an attempt to produce a passive construction with the verb 'get', however the result was an ungrammatical construction with the auxiliary get in the incorrect tense and with the main verb without being inflected for past participle.

CU22 *and he **might got sting** on his nose/*

5.4.10.4.Summary of SS's overall profile

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly	■		
Recalling Sentences	■		
Sentence Formulation	■		
Sentence Length	■		
Subordinate Clauses	■		
Information	■		
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)	■		
TROG	■		
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion	■		
Picture arrangement		■	
Block design			■
Object assembly	■		
RCM	■		
Conversational abilities			
Exchange structure, turn taking and information transfer: SS's did not produce many initiations, the majority of her responses were extended and there were a large number of continuations. In terms of turn taking, SS interrupted the adult incorrectly once and the adult had to interrupt once because the child was not very clear in what they were saying. There were some problems with information transfer. SS replied inadequately to 15% of them. The adult did not need to put many requests for clarification, however SS was not always successful in responding to them adequately. **Conversational inadequacy:** SS's inadequacy score was 27%. The majority of her inadequate utterances resulted from problems with expressive syntax and semantics followed by problems with providing too little information and providing too much information.			
Narrative discourse			
Microstructure: In terms of use of cohesive ties, SS used a large number and variety of ties. She had some difficulty with reference ties, especially with personal ties and she also had some problems with conjunctive ties, in particular with the use of continuative ties. Most of the lexical ties employed were complete. In terms of grammar, SS used a vast number of grammatical morphemes, but had some difficulty with pronouns and the irregular past tense morpheme. **Macrostructure:** SS's generated narrative had a setting, an initiating event, several attempts and consequences and a resolution. It stated the characters' aims however there was no evidence of planning as to how the goal is to be achieved. Thus the story structure level was an abbreviated episode.			

Table 5.64 Summary of SS's overall profile

5.5. SLI Case study 5 – JS (CA 11;03)

5.5.1. Language abilities

JS's performance on standardised language tests is presented in Table 5.65. The scores on the individual subparts of the CELF-E are presented in Table 5.66.

Test	Raw Score	Stand. score	Z-score
BPVS	19	80	-1.33
TROG	19	112	0.80
CELF-E	113	78	-1.46

Table 5.65. Scores on standardised language tests

CELF-E	Raw Score	Scaled score	Z-score
Formulated sentences	31	3	-2.33
Recalling sentences	66	9	-0.33
Sentence Assembly	15	8	-0.66

Table 5.66. Scores on the individual subtests of the CELF-E

5.5.2. Performance on standardised language tests

As Table 5.65 shows, JS performed as expected from his chronological age on the TROG, which means that his understanding of grammar is adequate for his chronological age. However he performed below normal limits on the other two of the standardised assessments. His receptive vocabulary fell more than 1SD below the mean, putting JS within the 10 percentile for his chronological age. His scores on the CELF-E were even lower, where he performed just below more than one SD below the mean. This suggests that JS may present with pervasive expressive language difficulties.

5.5.3. Expressive language abilities

Table 5.66 shows the peaks and valleys in JS's expressive language profile. From the results he obtained on the 3 subparts of the CELF-E it seems that JS had severe difficulties with formulating sentences, scoring about one and a half SD below what would be expected from his CA. Some of his sentences were unfinished and some sounded rather peculiar semantically. Thus for instance when asked to make a sentence using the temporal subordinator '*when*' he produced the following: '*When the man gave the children ice-cream*'. This indicated that even though JS was aware of verb argument structure and tense, he found it difficult to use sentence subordination and produced an unfinished sentence.

When asked to use two subordinators in a sentence, JS typically came up with semantically aberrant sentences as some sample sentences from the Formulated Sentences subpart of the CELF-E suggest in table 5.67:

Target words	**Response**
and because	The builders were building the rail **because** the people **and** the workers were building.
and but	A clown was juggling **but** a clown held balloons.
whenever until	**Whenever** the match starts, you've just got to wait **until** the match starts.
after unless	**Unless** the rain stops **after** the bus comes until the rain stops.
before if	**Before** the man or the lady **if** the plane flies without them.

Table 5.67: Examples of JS's responses on some of the items of the Formulated Sentences subtest of the CELF-E.

Even though JS's responses usually included the target item and there were not major syntactic problems, the sentences he produced were a combination of phrases or clauses, which were not logically connected, hence the sentences sounded semantically anomalous.

On the other hand, no problems were revealed on the Sentence Assembly subpart of the CELF-E, as JS could produce perfectly well formed sentences if he were given the exact words to use in the form of written chunks. He scored well within the range of what would be expected for his chronological age. He was able to manipulate sentence structure, thus producing both statements and

questions, turning statements into questions and vice versa, turning active sentences into passive ones thus manipulating the thematic roles, producing coordinate and subordinate clauses, verb negation, negative interrogative structures, complex verb phrases consisting of a verb followed by infinitive, prepositions and complex prepositional phrases.

JS also performed very well on the Recalling Sentences subpart of the CELF-E, scoring within the normal range. It should be noted though that on a couple of occasions when repeating a sentence JS omitted open class words, thus producing rather odd sounding sentences as the examples below show (the words in brackets are the ones he omitted):

1. *After the (family) had finished dinner, they decided to go for a ride in the country.*
2. *The postman (sorted), labelled, bundled, and (delivered) the magazines.*

This was an exception in JS's case though rather than a tendency, as he repeated perfectly well 17 out of 26 sentences.

5.5.4. Receptive language abilities

With regard to receptive grammar skills, JS scored almost at ceiling level on the TROG, failing only one item out of 80 (an object relative clause). He scored within the 95$^{th\ percentile}$, which means that his understanding of grammar was perfectly appropriate for his chronological age.

JS's receptive vocabulary was 1SD below the mean, which suggests a slight delay in this domain.

5.5.5. Use of grammar in context - Bus Story

JS's performance on the Renfrew Bus Story is presented in table 5.68.

	Raw score	Age equivalent
Information	**36**	**8;2**
Sentence length	**14**	**8;2**
Subordinate clauses	**3**	**6;3**

5.68 JS's performance on the Bus Story

JS's retelling of the Bus Story was very successful in terms of the information he provided and the length of the sentences produced. It should be pointed out that the Bus Story only provides age equivalent scores up to the age of 8;02 (and JS was 11;03). He used only 3 subordinate clauses though, achieving an age equivalent score of 6;3. This suggests preference for simple sentences over complex ones. Even though he was given the credit for supplying the most relevant information, he sometimes produced mildly deviant syntactic structures, which often resulted from missing out sentence elements. Thus in the following example, he attempted a complex sentence and omitted the relative pronoun *who*: "*so he jumped over the fence and saw a cow went Moo I can't believe my eyes*".

5.5.6. Overview of JS's linguistic abilities

JS presents with a verbal profile of strengths and weaknesses. Thus he demonstrated striking strengths in receptive grammar, recalling sentences of various length and complexity and assembling sentences when the sentence elements are given. Furthermore, the Bus Story showed that he is able to successfully integrate information in syntactically appropriate constructions, having problems only on few occasions.

On the other hand, JS showed mild deficits with receptive vocabulary and profound difficulties in formulating sentences especially when he had to use coordinating or subordinating conjunctions. The Bus Story also revealed a preference for short coordinated structures and avoided the use of more complex structures which include subordination.

The standardised language tests identified a specific area of difficulties for JS, namely mild deficits in receptive vocabulary and rather severe deficits in the production of complex subordinate structures.

5.5.7. Non verbal abilities – standardised test scores

JS's non-verbal abilities as measured by the four performance tests of the WISC-P are presented in Table 5.69.

Test	Raw	Scaled score	Z-score
Picture completion	**20**	**11**	**0.33**
Picture arrangement	**24**	**9**	**- 0.33**
Block Design	**28**	**9**	**- 0.33**
Object Assembly	**23**	**10**	**0**

Table 5.69. Scores on the WISC-R

JS's general intellectual abilities as measured by the Ravens Coloured Matrices (RCM) are presented in Table 5.70.

Test	Raw	Centile
RCM	27	Between 25-50

Table 5.70 Scores on the Ravens Coloured Matrices

Table 5.69 and 5.70 show that with regard to non-verbal abilities JS scores within the normal range. There was not much discrepancy in JS's performance on the four different subtests of the WISC battery, which is indicative of a rather even non-verbal profile (in contrast to his verbal profile which had apparent 'peaks' and 'valleys').

JS's general intellectual abilities as the scores on the RCM show are within the normal range as well, falling between the 25th and the 50th centile.

5.5.8. Summary of JS's performance on standardised verbal and non-verbal tests

JS's overall profile is characterised by no obvious deficits in the non-verbal domain and some deficits only in specific areas of the verbal domain, where there was substantial discrepancy between certain areas of linguistic competence.

5.5.9. Conversational abilities

In 150 randomly selected conversational turns, JS produced 190 utterances. This which means that a number of his conversational turns consisted of more than one utterance.

Conversational abilities were assessed in terms of exchange structure and turn taking. Data from the analysis of exchange structure are shown in Table 5.71.

Initiation		**Response**		**Continuation**	**Follow-up**	**Unanalysed**
IS	**IN**	**MV/N**	**EXT**			
14 (7%)	5 (3%)	28 (15%)	78 (41%)	54 (28%)	4 (2%)	7 (4%)

Table 5.71: Exchange structure analysis

As table 5.71 demonstrates, 10% of JS's utterances were initiations and the majority of his initiations were soliciting, which means that JS was trying to actively engage in conversation, by asking questions and seeking further information of the conversational partner. 41% of his responses were extended, however there was also a high percentage of minimal verbal and non-verbal responses (15%). JS had a high percentage of continuations, which means that he was willing to expand on his utterances and provide a lot of additional information, though sometimes the information he provided was deemed unnecessary and superfluous. A small proportion of JS's utterances were unanalysed, usually due to being unintelligible.

Data from the analysis of turn taking are shown in Table 5.72:

Gap	Inadvertent overlap	Violating overlap	Adult interrupt
1	0	4	0

Table 5.72: Turn taking

From table 5.72 it follows that JS did not have great difficulties in turn taking, though there was a slight tendency to interrupt the conversational partner in the middle of her utterance.

The analysis of information transfer showed that out of the 94 soliciting utterances on the part of the adult, 68 were open requests for information, 12 were requests for clarification and 14 sought clarification-confirmation. JS responded inadequately to 9 open requests for information, to 4 requests for clarification and to 1 request for clarification-confirmation.

Information (68)		Clarification (12)		Confirmation (14)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
59	9	8	4	13	1

Table 5.73: Child's responses to adult's open requests for information, requests for clarification and requests for clarification-confirmation.

Conversational inadequacy (i.e. number of inadequate utterances out of 190 presented as raw numbers and percentages) is shown in the following table:

Categories of inadequacy	Number of utterances (percentage)
Expressive syntax and semantics (ESS)	18 (9%)
Failure to comprehend literal/inferential meaning (FILIM)	0 (0%)
Ignoring initiation while remaining on the topic (II)	7 (3.7%)
Failure to use context in comprehension (FCC)	0 (0%)
Too little information (TLI)	3 (1.6%)
Too much information (TMI)	5 (2.6%)
Socially inappropriate content/style (SICS)	3 (1.6%)
Other (O)	1 (0.5%)
Unclassified (U)	4 (2.1%)
Total	**40 (21%)**

Table 5.74: Categories of inadequacy and number (percentage) of inappropriate utterances in sample of 150 conversational turns and 190 utterances.

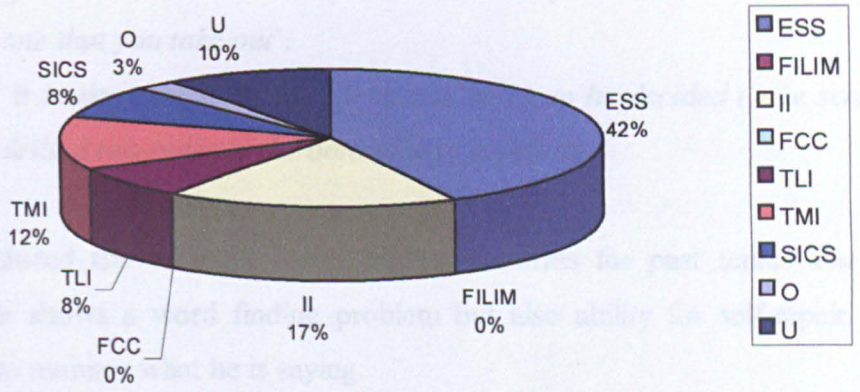


Figure 5.5. Categories of conversational inadequacy

As Table 5.74 and Figure 5.5 show, 21% of JS's utterances in the 150 turn sample were conversationally inadequate. The greatest number of codes was allocated from the categories of expressive syntax/semantics (42%), which is indicative of problems with expressive language. This correlates well with the score JS obtained on the Formulated Sentences subpart of the CELF-E, where he scored rather poorly and also with his rather poor receptive vocabulary score. A closer analysis of his expressive syntax and semantics shows that out of the 18 utterances which were problematic because of unusual semantics and syntax, 13 were within the domain of syntax and 5 were utterances with lexical problems. JS demonstrated question formation problems and produced the following:

'*do you know which order these going*'?
'*does it just these pictures or is there more*'?
'*how long do you come to come by train*'?

It is interesting to note that in all the three examples cited above JS attempted a multiple structure, either a complex or a coordinate structure and it seems that his syntactic accuracy drops substantially as soon as he attempts a structure involving coordination or subordination.

On two occasions JS had problems with tense as the following examples show:

'*yeah once someone* ***break*** *into our car, pulled the radio out cause it's one that you take out*'.

'*it broke once so he* ***take*** *it in and he (.) so he decided (.) he screwed (.) drilled two holes in the bottom very carefully.*

JS produced the verbs in their uninflected forms for past tense. The second example shows a word finding problem but also ability for self-repair, i.e. the ability to monitor what he is saying.

His lexical problems stemmed mainly from his inability to always provide the exact word (thus he used the word *supermarket* instead of *market*, and sometimes coined new words: *gnawmax* for *rat*). He tended to use the word *thing* or *thingy* often rather than try to find the precise word.

A larger proportion of utterances (7%) were inadequate due to JS ignoring the adult's initiation while still remaining on the topic of conversation. One such example is the following excerpt from a transcript:

A *but in what order do they buy things?/*

C *uh-huh/*

they bought something already/

There were several examples like this one when JS did not directly address the adult's question but was still talking within the frames of the topic of conversation.

A small proportion of his utterances were inadequate because JS provided either too much information (he tended to over-elaborate) or too little information (when he provided information that was vague and not enough). Only a small number of his utterances were inadequate because they were socially inappropriate. He sometimes would drift from the topic of conversation or make a complete topic shift. On the other hand, JS had no problems with using context in comprehension nor problems with understanding literal or inferential meaning.

5.5.10. Narrative discourse abilities

5.5.10.1. Length information

Table 5.75 below shows the number of Communication Units that JS utilised in order to generate his version of the Frog Story, the number of clauses and words; and the mean length of his communication units in terms of clauses and words as well as the number of subordinate clauses used.

	CU	CLs	Words	MLCU (CL)	MLCU (Words)	Sub
JS	30	49	349	1.6	13.4	8

Table 5.75: Length information

From table 5.75 it follows that JS used 30 communication units in order to generate the Frog Story and a total of 49 clauses. The mean length of a communication unit in terms of clauses was 1.6. JS made use of subordinate clauses as well, their number being 8 in total. The mean length of his communication units in terms of words was approximately 13 words per communication unit.

5.5.10.2. Macrostructure

Macrostructure was addressed with regard to the story structure level and the story grammar parts present in the child's narration.

5.5.10.2.1. Story structure level

JS's story structure level was judged to be at the level of an abbreviated episode (see Appendix 3, JS's story), as it states the aims and intentions of the main characters but it does not state how the main characters planned to achieve their aims. It seems from the narration that the boy and the dog are trying to find the frog, however this is not made very explicit, i.e. it is not signalled linguistically. In terms of story grammar parts, JS's story contains a conventional setting, an

initiating event, a series of attempts and consequences, a resolution and an ending. There were neither internal responses nor internal plans.

5.5.10.3. Microstructure

The story's microstructure was assessed by focusing on cohesion, grammatical error analysis, lexical diversity and the presence of any advanced syntactic structures that occur with low frequency.

5.5.10.3.1. Cohesion

In the generation of his Frog Story narration, JS showed some ability to use cohesion appropriately, i.e. he used reference, conjunctive and lexical cohesive markers.

Reference

Reference (complete)			**Reference (incomplete/erroneous)**		
personal	demonstrative	comparative	personal	demonstrative	comparative
15	13	0	4	1	0

Table 5.76: number of complete and incomplete/erroneous reference ties

There was evidence of appropriate use of reference, both intersentential and intrasentential. As Table 5.76 above demonstrates, JS produced correctly 15 reference ties using personal pronouns. CU 1 and 2 above (see 6.5.10.2.2) are a good example of appropriate use of intersentential reference, as *they* in the second utterance appropriately refers back to the three main characters that the child introduced in CU1, i.e. *a little boy called Jack* and *a little dog called Bes* and *a little frog called Harry*/

There were several examples of appropriate use of intrasentential reference, such as CU 7 ('and *the dog* was walking around with a jar stuck on *his head*') where the pronoun *his* head refers back to the dog within the same CU.

However, there was also evidence of failure to use intersentential reference (there was a total of 4 incomplete/erroneous reference ties). CU 28 and

29 are examples of unestablished reference. The child failed to provide any information as to who uttered the words in CU29:

CU 28. *and they met some little other frogs too/*
CU29 'yeee I found it I found it'/.

Furthermore, JS used inappropriate reference in CU23: *('and then he realised Jack was sitting on the reindeer').* It is interesting to note how the child used the pronoun as the first referent and then used the full nominal expression to refer back to the pronoun. As it stands the utterance may well be interpreted as if *Jack* and *he* were not coreferential.

JS used 13 demonstrative reference ties correctly and there was only one tie which was used incorrectly.

There were no comparative ties.

Conjunctive ties

Conjunctive (complete)					**Conjunctive (incomplete/erroneous)**				
addit	adver	causal	tempor	contin	addit	adver	causal	tempor	contin
12	1	1	4	0	2	0	0	0	0

Table 5.77: number if complete and incomplete/erroneous conjunctive ties

***addit=additive; adver=adversative; tempor=temporal; contin=contuiative**

JS used conjunctive ties as well, there were 18 conjunctive ties in total. The additive ties were the most frequent ones, however JS also used temporal, causal and adversative ties. There were a couple of instances when JS used additive ties inappropriately, where it would be more appropriate from the context to use an adversative tie (example: CU 10 and 11).

CU10. '*Harry Harry where are you' and Bes was going* (mimics dog's voice)/
CU11. ***and*** *all they saw was a beehive with bees coming out/*

Lexical cohesive markers

Lexical ties (complete)					Lexical (incomplete/erroneous)				
RPT	SYN	ANT	PW	SS	RPT	SYN	ANT	PW	SS
31	1	0	2	0	1	0	0	0	0

Table 5.78: Number of complete and incomplete/erroneous lexical ties

***RPT=repetition; SYN=synonymy; ANT=-antonymy; PW=part-whole; SS=subordinate-superordinate**

Table 5.78 shows the number and type of lexical ties that JS used. Lexical ties were used frequently both intersententially and intrasententially. There were a total of 34 lexical markers, out of which 7 were different words. They were all repetitions of words apart from one case where a synonym was used (*swarm of bees* for *bees*) and two cases where a word which forms a part-whole relationship with the words it coheres was used (*beehive* for *bees*).

Below are presented examples of all the lexical cohesive markers, citing CU numbers.

Lexical cohesive markers	***CU***
- use of repetition for "boy"	3, 5, 7, 9, 13, 16, 19, 23, 24
- use of repetition for "dog"	4, 5, 6, 8, 9, 10, 12, 14, 15, 18, 21, 23, 24
- use of repetition for "frog"	3, 5, 13
- use of repetition/part-whole/synonym for "bees"	12, 14, 15, 18
- use of repetition for "jar"	7, 9
- use of repetition for "tree"	17, 19
- use of repetition for "water"	25

5.5.10.3.2. Summary of JS's use of cohesive ties

JS's used both personal and demonstrative reference ties equally frequently, with occasional errors. His preferred conjunctive ties were additive, which he used correctly most of the time. He also attempted to use temporal, causal and adversative ties, though less frequently. With regard to his use of lexical cohesive markers, JS used repetitions of lexical items most of the time,

5.5.10.3.3.Grammatical error analysis

Table 5.79 shows the total number of grammatical morphemes that JS used and also the number of grammatical morphemes he omitted or used incorrectly.

Gram.morphemes	Correct	Omitted	Incorrect
Determiners	45	0	0
Prepositions	17	0	0
Plural 's'	4	0	0
Genitive 's'	0	0	0
Pronouns	26	0	2
3rd sing.present	0	0	0
irreg.past	16	0	0
-ed past	3	0	0
-ing part	19	0	0
past participle	3	0	0
auxiliary	14	0	0
Totals	**130**	**0**	**2**

Table 5.79 Grammatical error analysis

As table 5.79 indicates, JS had very few problems with grammatical morphemes. Out of a total of 132 grammatical morphemes, there were only 2 occasions when JS used grammatical morpheme incorrectly. The analysis of aspects of syntax (see Table 5.80 below) also shows good performance. There were no problems with coordination or subordination of sentences, though JS preferred coordination to subordination. There were only two instances of a spontaneous use of question formation, and one use of a passive. There were not any examples of inappropriate use of more complex syntax, as specified above.

Syntax	Correct	Incorrect
Coordination	10	0
Subordination	8	0
Question Formation	2	0
Passives	1	0
Conditionals	0	0
Totals	**21**	**0**

Table 5.80 Syntactic analysis

5.5.10.3.3. Advanced syntactic structures that occur with low frequency

JS made use of some advanced syntactic structures indicating a more advanced development of grammar. Thus there was evidence of use of complex noun phrases, whereby the head noun has been postmodified via nonfinite clauses. For example:

CU 1 *A little* ***boy called Jack****, a little* ***dog called Bes*** *and a little* ***frog called Harry***

CU11 *A beehive with* ***bees coming out***

There was also one example of a use of a non-finite adverbial clause:

CU13 *While Jack was looking in a hole* ***shouting Harry Harry***

5.5.10.4. Summary of JS's overall profile

A summary of JS's overall profile is presented in table 5.81.

Expressive Language	**Weakness**	**Strength**	**Average**
Sentence Assembly			
Recalling Sentences			
Sentence Formulation			
Sentence Length			
Subordinate Clauses			
Information			
Receptive Language	**Weakness**	**Strength**	**Average**
Vocabulary (BPVS)			
TROG			
Non-verbal abilities	**Weakness**	**Strength**	**Average**
Picture completion			
Picture arrangement			
Block design			
Object assembly			
RCM			
Conversational abilities			
Exchange structure, turn taking and information transfer: JS produced a large number of initiations, the majority of which were soliciting. He also produced quite a large number of continuations and the majority of his responses were extended. JS had some problems with turn taking as he tended to interrupt in the middle of the interlocutor's utterance. He also had problems with information transfer, in that he sometimes did not provide adequate responses to the adult's requests for information and clarification. **Conversational inadequacy:** JS's inadequate score was 21%. The majority of his inadequate utterances were due to problems with expressive syntax and semantics, followed by a tendency to ignore the adult's initiation while remaining on the topic. There were also a few problems with the quantity of information he provided in that he sometimes over elaborated and provided more information than required by the conversational situation.			
Narrative discourse			
Microstructure: In terms of use of cohesion, JS had some difficulties with personal reference ties and also some minor problems with conjunctive additive ties. The majority of his lexical ties were repetitions and most of them were complete. The grammatical error analysis did not reveal any major problems with the use of grammatical morphemes. Apart from 2 pronouns which were used incorrectly, the rest of the grammatical morphemes he produced were correct. In terms of syntax, JS did produce spontaneously quite a number of structures (coordinated sentences, subordinate sentences, questions and one passive sentence), which were beyond the level of a simple active declarative sentence. There was almost an equal number of co ordinate and subordinate structures and they were all produced correctly. **Macrostructure:** JS's story had a conventional setting, an initiating event, attempts and consequences, a resolution and an end. However even though all the essential grammar parts were present and there was a goal-directed behaviour, the story structure level was an abbreviated episode because there was no overt planning as to how the characters were going to achieve their goal.			

5.81 Summary of JS's overall profile

5.6. Summary of the SLI profiles

The profiles of five participants with SLI were presented. Each case study included analysis of their verbal and non-verbal abilities through their performance on tasks which form part of standardised measures, analysis of their conversational abilities, and narrative discourse abilities. Even though a detailed statistical analysis of the SLI profiles will be carried out and presented in Chapter 6, a general summary at this point would be useful and informative.

The general picture that emerged from the five single case studies was not even across domains of verbal and non-verbal abilities. Although the participants were selected as having specific language impairment (on the basis of judgements by Speech and Language Therapists) there was a range of abilities (both verbal and non-verbal). Their performance on standardised language tests was exceptionally variable, with some participants achieving age-appropriate performance on some tests (JS on the TROG) and some performing very low. The same inconsistency emerged with regard to their performance on the BPVS. However, there was a relative consistency with regard to their performance on the expressive part of the CELF-E, on which all the participants performed at least one and half SD below the mean. Also on the Bus Story there was a general trend to score lower on providing the relevant information in comparison to sentence length, although one participant, (JS), had a very even profile on the Bus Story in that his score on information exceeded the maximum score available in the Bus Story norms.

The non-verbal profiles were relatively more even than the verbal ones. Three participants (TS, MS and JS) performed as expected for their chronological age on the four tasks from the WISC-R Performance Battery. SS and BS however had a more varied profile, showing strengths and weaknesses on different tasks. The same participants (BS and SS) also scored on the lower end of the scale on the Progressive Coloured Matrices, whereas JS scored average and TS and MS performed exceptionally well.

The following table (5.82) is a summary of the profiles of all the participants with SLI on standardised measures.

	BS (9;01)	TS (9;01)	MS (11;01)	SS (10;03)	JS (11;03)
	Z-score	Z-score	Z-score	Z-score	Z-score
BPVS	-1.46 W	-.87 W	-2 W	-1.66 W	-1.33 W
TROG	-1.46 W	-1.73 W	- 1.26 W	-1.86 W	.80 A
CELF	-1.76	-2.40	-2.73	-2.73	-1.46
FS	-2.33 W	-2.33 W	-2.33 W	-2.33 W	-2.33 W
RS	-1.33 W	-1.66 W	-2.33 W	-2 W	-.33 A
SA	-0.66 A	-1.33 W	-1.33 W	-1.66 W	-.66 A
BUS STORY	Age equivalent	Age equivalent	Age equivalent	Age equivalent	Age equivalent
Information	4;11 W	4;00 W	Information not available	5;05 W	8;02+ A
Length	7;09 W	7;04 W		8;02 W	8;02+ A
SubCl	7;09 W	6;03 W		4;02 W	6;03 W
WISC -P	Z-score	Z-score	Z-score	Z-score	Z-score
PC	-1.33 W	1.66 S	-.33 A	-1 W	.33 A
PA	1 S	0.66 A	0 A	1 S	-.33 A
BD	-1.33 W	1 S	.66 A	-.66 A	-.33 A
OA	-1.33 W	0 A	0 A	-2 W	0 A
RCM	Centile	Centile	Centile	Centile	Centile
	10-25 W	75 S	95 S	5 W	25-50 A

Table5.82: A summary of the scores of the participants with SLI on standardised tests

A- average performance, W – weakness, S - strength

The conversional analysis procedure identified two consistent areas of weakness with all the participants. Firstly, they all had a tendency to violate a pragmatics principle of quantity of information, in that they tended to provide more information than required by the conversational context. This tendency was more emphasised with some participants (MS, SS, and JS in particular). Another category with which all of the participants had difficulties was expressive syntax/semantics. Syntactic structure, lexical selection, grammatical morphemes (pronouns, prepositions etc) were all domains of difficulty, although to a different degree.

The narrative discourse analysis demonstrated a similar level of story structure for four out of the five participants with SLI, which was the level of *abbreviated episode*. Even though the story length was variable, that did not have a significant impact on the complexity of story structure, which most typically had all the story grammar parts present, and there was a goal-directed behaviour, however the planning of the main characters as to how to achieve their goal was not stated explicitly. There was only one story which was at the level of a complete episode (MS's story) because it made more overt and more obvious the plans of the main characters as to how they were going to reach their goal.

The grammatical error analysis indicated different levels of correct use of grammatical morphemes. Thus MS and SS in particular used incorrectly a number of grammatical morphemes, whereas BS, TS and JS used incorrectly a very small number of grammatical morphemes. A similar picture emerged with regard to the SLI participants' use of syntax. The participants who had more difficulty with morphology also had more difficulty with using correctly syntactic structures. The number of complex syntactic structures attempted by SS and MS was much higher than TS, BS, and JS, which means that the fact that the latter did not make any errors does not automatically imply that they are syntactically more competent. It could be the case that they are avoiding more complex structures in preference to syntactically simpler formations. The possible exception to this may be JS, who attempted 21 complex syntactic structures (more than BS and TS, but less than SS and MS), and for whom syntax seems to present with no major difficulties, as his score on the TROG and the CELF was the highest.

With respect to the use of cohesion, again the participants divided into 2 groups. MS had a stronger preference for using pronominal referential ties as opposed to demonstrative ties. The opposite was the case for BS, TS, and SS, who used more demonstrative than pronominal reference ties. JS was an exception in that he used both types of reference ties with almost equal frequency. With regard to their use of conjunctive ties, the additive ties were most often used by all of the participants. MS and SS also used a number of temporal ties, and SS produced many continuative ties as well. Generally speaking there were not many incomplete or erroneous ties, however that does not necessarily suggest that these participants do not have problems with cohesion. The fact that they preferred additive ties to all other conjunctive ties means that their narratives were chains or sequences of events rather than causally structured in terms of a hierarchically organised goal plan of action (Berman and Slobin, 1994).

Given that the profiles of the participants with SLI were inconsistent in several domains of both linguistic and non-verbal performance the question arises as to how appropriate it is to contrast the SLI group profile with the WS group profile. This issue will be scrutinised in the final chapter (Chapter 7). It should be noted however that the above comments with regard to the general profile of the SLI group are only impressionistic and rather ad hoc, and a statistical analysis needs to be carried out in order to confirm, dispute or amend these impressions before there are considered in light of the main research questions of this thesis.

CHAPTER 6.

Williams Syndrome and Specific Language Impairment– group profiles and comparison within and between groups

> *The individual differences stand out, at the expense of the common features. We can see the trees, but not the wood. Indeed, at present we are only at the stage of realising that there is a wood. And it will be years before the main pathways are traced through it.*
>
> (Crystal, 1987:76 et seq)

6.1. Introduction

In this chapter the individual profiles of the five participants with WS presented in Chapter 4 and the individual profiles of the five participants with SLI presented in Chapter 5 will be compared in order to investigate how unitary the profiles within the groups are and the degree of individual variation, and also whether WS and SLI are two clearly distinctive profiles. The comparisons within

and between the WS and the SLI groups will be made using descriptive and referential statistics, and will be carried out with respect to the participants' performance on standardised verbal and non-verbal measures, conversational abilities and narrative discourse abilities.

6.2. Within and between group comparisons on standardised tests performance

The box plot chart[1] below (Figure 6.1) summarises the performance of the five participants with WS and the five participants with SLI on nine standardised language and non-verbal measures.

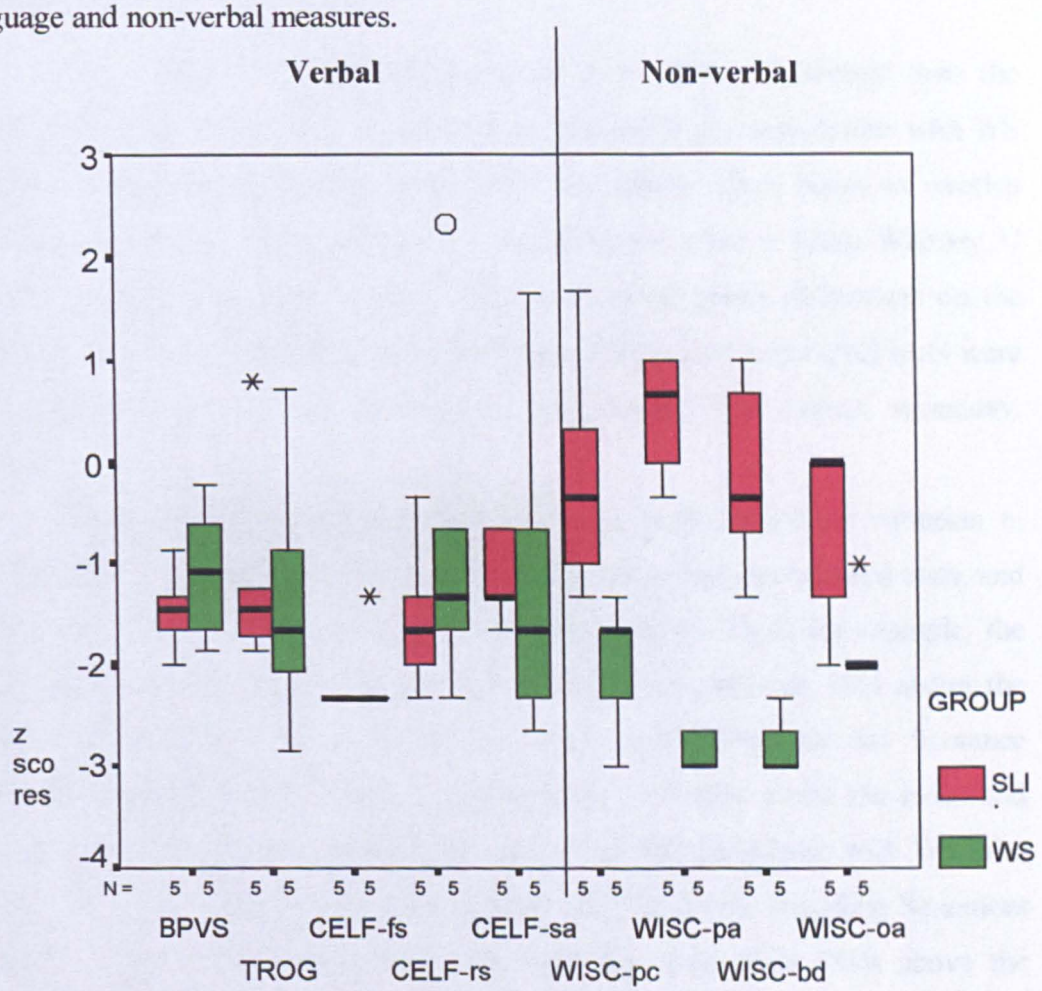


Figure 6.1. WS and SLI participants' performance on standardised tests

[1] Box plot charts present the data in terms of the median and quartiles. A quartile represents a quarter (25%) of the sample. The central point is the median. The boxes represent the interquartile range, from 25% to 75% of the sample. The whiskers show the full range of the data, excluding outliers (which lie 1.5 to 3 box lengths [i.e. quartiles] from the edges of the boxes) which are presented with empty circles and extreme values (which lie more than 3 box lengths from the edges of the boxes) represented with an asterisk.

BPVS, TROG, CELF-fs, CELF-rs, CELF- sa – verbal standardised tests
WISC-pc, WISC-pa, WISC – bd, WISC- oa – non verbal standardised tests

From Figure 6.1 it is apparent that the two groups of participants performed similarly on the five language tests. The performance of both the participants with WS and those with SLI on verbal standardised measures had a mean value between one and two and a half SDs below the mean. There was a lot of overlap between the two groups, with the groups performing exactly the same on the Formulated Sentences subpart of the CELF-E. The participants with SLI were on average better than the participants with WS on the TROG and on the Sentence Assembly subpart of the CELF-E.

With respect to their performance on non-verbal standardised tests the participants with SLI were far superior in comparison to the participants with WS on all four non-verbal subtests of the WISC-P battery, there being no overlap between the groups. This impression was confirmed when a Mann-Whitney U test was carried out: while none of the five between group differences on the language tests were significant, the differences on the four non-verbal tests were all significant ($p<.01$) or approaching significance (for Object Assembly: $p=.055$).

Figure 6.1 also suggests that there is a great degree of variation in performance, in particular within the WS group, on verbal standardised tests, and within the SLI group, on standardised non-verbal tests. Thus, for example, the performance on the TROG for the WS group ranges between 1SD above the mean and 3SDs below the mean and their performance on the Sentence Assembly subpart of the CELF-E ranges between 1.5 SDs above the mean and 2.5 SDs below the mean. Furthermore there was one participant with WS who scored well above all the other participants with WS on the Recalling Sentences subpart of the CELF-E with their score reaching more than 2SDs above the mean. While there was a greater within group variation on the verbal standardised tests within the WS group, the opposite occurred with respect to the non-verbal standardised tests, where the participants with SLI showed much greater variation (with their scores ranging between 2SDs below the mean and

2SDs above the mean) in contrast to the individuals with WS, whose scores were much less variable (always between 1.5 and 3 SDs below the mean).

In order to investigate whether there was any statistical significance in the similarity of the participants with WS and SLI respectively and whether there was any statistically significant difference between the groups (i.e. any statistically significant dissociations between the verbal and non-verbal domain), Spearman's correlations were carried out. Hence correlations of 'everyone with everyone' were computed (i.e. the profile of each and every participant with SLI and each and every participant with WS was compared to all the other participants with SLI and with WS), thus producing 45 correlations altogether. The results are presented in table 6.1.

NB: the correlations here are taken as measures of SIMILARITY between individuals: the higher the (positive) correlation, the more similar two participants are in their cognitive skills and deficits.

	correlations within the SLI group (N=10)	**correlations within the WS group (N=10)**	**correlations between SLI and WS groups (N=25)**
MEDIAN	**.47**	**.43**	**-.29**
MEAN	**.45**	**.41**	**.-28**
MIN	**,08**	**.06**	**-.35**
MAX	**.83**	**.86**	**-.74**

Table. 6. 1 Correlations of the psychometric profiles of individual children: a summary.

Figure 6.2 below presents the 95% confidence intervals for mean correlations in the three groups, i.e. within the SLI group, within the WS group, and between the SLI and WS group.

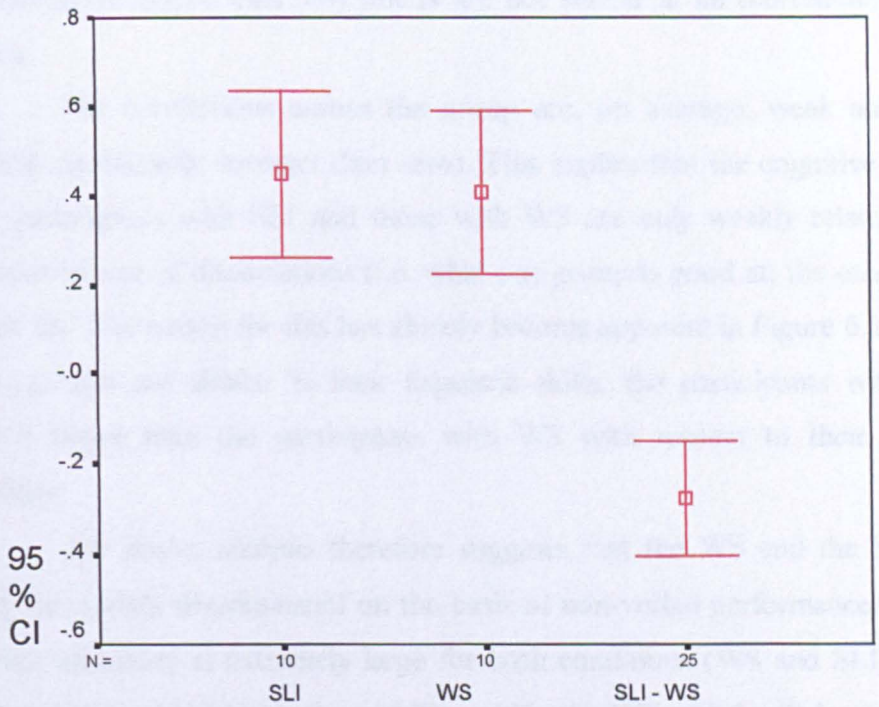


Figure 6.2 95% confidence intervals for mean correlations in the three groups.

As the confidence intervals do not overlap with zero, it may be concluded that all three average correlations are significantly different from zero.

If WS and SLI were 'true' syndromes of cognitive strengths and weaknesses, then the correlation of individual psychometric profiles 'within a syndrome' (the profile of every participant with SLI against all the other participants with SLI; and the profile of each participant with WS against all the other participants with WS) should be strong and positive. In contrast, the correlations 'across syndromes' (the profiles of the participants with WS correlated with the profiles of the participants with SLI) should be either close to zero (suggesting lack of similarity) or negative (suggesting that the two groups are 'mirror images' of each other). The correlations in the present study are taken as measures of SIMILARITY between individuals: the higher the (positive) correlation, the more similar two participants are in their cognitive skills and deficits.

Table 6.1 and Figure 6.2 suggest that the within group correlations are, on average, moderate (explaining approx. 20% of variance), but they are significantly higher than zero. Large individual variability is also apparent: while some children within the same group are very similar in their cognitive skills

(correlations higher than .80) others are not similar at all (correlations close to zero).

The correlations across the group are, on average, weak and negative (albeit significantly stronger than zero). This implies that the cognitive profiles of the participants with SLI and those with WS are only weakly related, and the relation is one of dissociations (i.e. what one group is good at, the other group is poor at). The reason for this has already become apparent in Figure 6.1: while the two groups are similar in their linguistic skills, the participants with SLI are much better than the participants with WS with respect to their non-verbal abilities.

The above analysis therefore suggests that the WS and the SLI groups may be reliably discriminated on the basis of non-verbal performance, but within group variability is extremely large for both conditions (WS and SLI). In what follows next, the individual variability within the WS and the SLI groups will be explored in more detail.

6.3. WS group profile

The box plot below (Figure 6.3) shows the profile of the participants with WS on nine standardised measures.

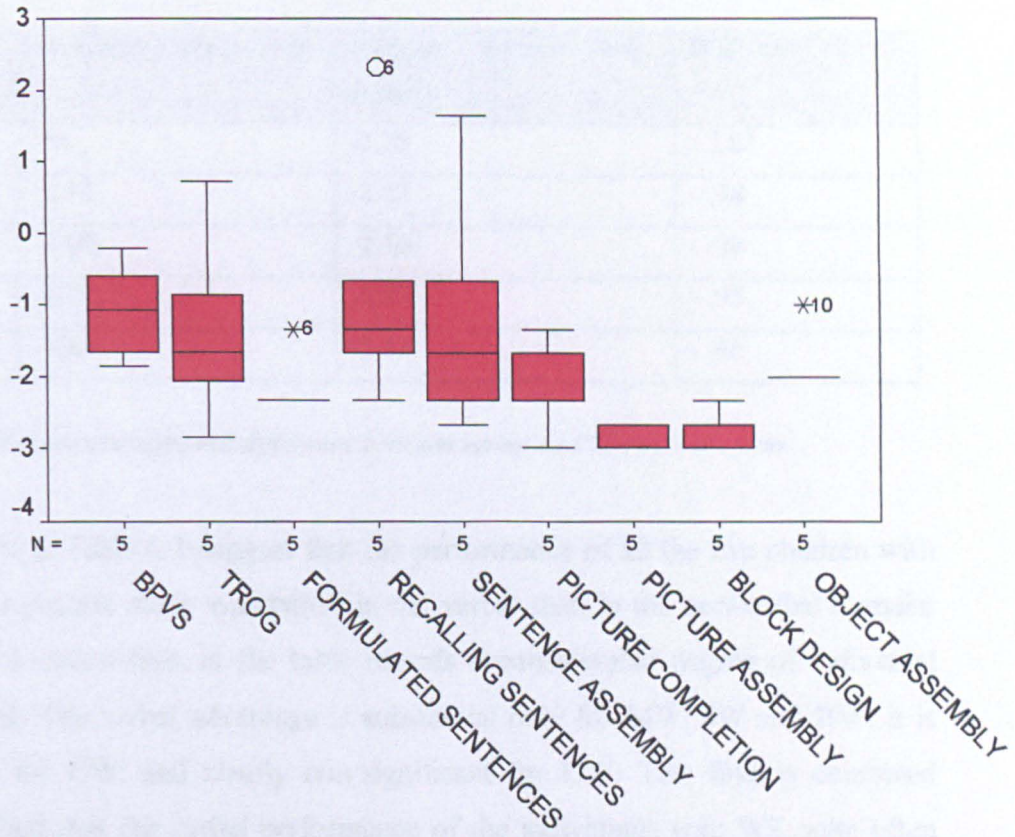


Figure 6.3. Performance of the participants with WS on nine standardised measures

The mean value of the scores that the individuals with WS obtained on standardised verbal and non-verbal measures falls between 1 and 3 SDs below the mean. However whereas all of the non-verbal scores cluster on the negative side of the z-score scale, the verbal scores are more variable and more spread out, some of them reaching 2SDs above the mean.

Since the Spearman's correlations (presented in Table 6.1) only inform about overall similarity or lack of similarity within the cognitive profiles of individual participants, it is important to investigate whether the discrepancy between the verbal and the non-verbal domain within a cognitive profile is consistent and strong for each and every individual (in this case every participant with WS). In order to investigate this, the average z-scores for the five verbal and non-verbal indices of performance were computed for every individual participant with WS and the two were subsequently compared. The results are presented in Table 6.2.

Subject	Average z-score (verbal)	Average z-score (non-verbal)	Difference
MW	.56	-2.25	- 2.81
JW	-1.43	-2.42	- .98
DW	-2.08	-2.16	- .08
BW	-1.72	-2.67	- .95
CW	-1.88	-2.33	- .46

Table 6.2 Z-score averages and difference between verbal and non-verbal scores

The results in Table 6.2 suggest that the performance of all the five children with WS in the present study was better in the verbal than in the non-verbal domain. However a closer look at the table reveals a considerable degree of individual differences. The verbal advantage is substantial only for MW, JW and BW; it is moderate for CW; and clearly non-significant for DW. This finding combined with the fact that the verbal performance of the individuals with WS quite often fell within the inferior range (i.e. below average) suggests that the verbal advantage for some individuals with WS is not always existent, whereas there is consistent evidence for non-verbal impairment with all the individuals with WS.

Figure 6.3 above also suggests that the overall cognitive profiles of the participants with WS may not be uniform. There are discrepancies emerging between poor non-verbal skills and relatively better verbal skills.

In order to investigate whether any of these discrepancies were statistically significant, the Friedman test was carried out on all the nine measures and it was significant (Friedman chi-square = 21.130, p= .003). This confirms that the cognitive profile of the children with WS is uneven. Post-hoc pairwise Wilcoxon comparisons were carried out between all pairs of tests in order to find out the locus of the discrepancy. The following significant ($p<.05$) discrepancies were found:

BPVS>PA, BD, FS

TROG>PA, BD

FS>PA

This suggests that there was a strong tendency among the participants with WS to score significantly better on the British Picture Vocabulary Scale, which is a test of receptive vocabulary, than on the Picture Arrangement and on the Block Design, which are both non-verbal tests. However there seems to be a discrepancy within the verbal domain as well, as the participants with WS scored significantly higher on the BPVS than on the Formulated Sentences subpart of the CELF-E battery, which is a measure of expressive grammatical abilities. A very interesting finding is that even though their performance on the BPVS was significantly better than on the Formulated Sentences, their performance on the Formulated Sentences was still significantly higher than their performance on one of the non verbal measures, namely the non-verbal Picture Arrangement task. This implies a significant verbal advantage for the WS participants in the present study.

6.4. SLI group profile

The following box plot summarises the performance of the participants with SLI on standardised verbal and non - verbal measures.

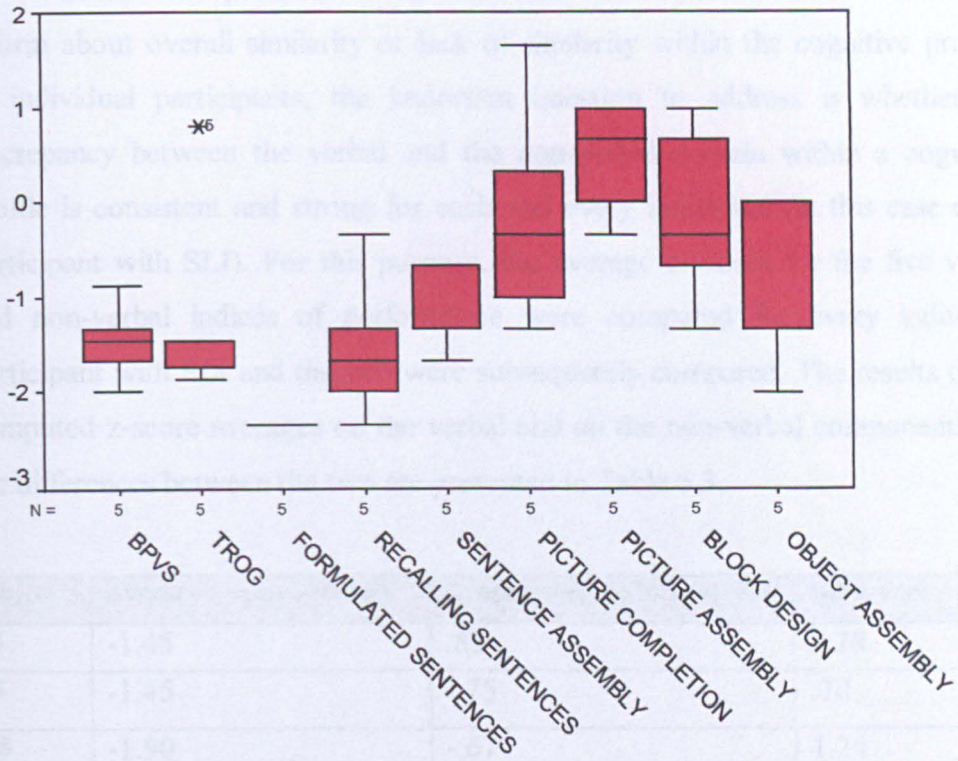


Figure 6.4 Performance of the participants with SLI on standardised tests

As shown in Figure 6.4 the mean value of the scores that the individuals with SLI obtained on standardised verbal and non-verbal tests ranges between 2SDs below the mean and 1SD above the mean. All of the non-verbal scores cluster around the mean, between –0.85 and +0.85, which is the normal range. All of the verbal scores however are in the range of 1 and 2 SDs below the mean[2] with the exception of the Sentence Assembly task on which all the participants performed within the average range, even though at the lower end of the average.

The Spearman's correlations above (see Table 6.1) indicate that on average there is some similarity between the profiles of the participants with SLI. However, as in the case with the WS group, great individual variability is evident. While some participants with SLI are very similar (the maximum correlation score reaching .80) others have cognitive profiles which do not resemble each other at all (the minimum correlation being as low as .08).

[2] There was only one participant whose score on the TROG was almost 1SD above the mean.

Since the Spearman's correlations, as already mentioned above, only inform about overall similarity or lack of similarity within the cognitive profiles of individual participants, the important question to address is whether the discrepancy between the verbal and the non-verbal domain within a cognitive profile is consistent and strong for each and every individual (in this case every participant with SLI). For this purpose, the average z-scores for the five verbal and non-verbal indices of performance were computed for every individual participant with SLI and the two were subsequently compared. The results of the computed z-score averages on the verbal and on the non-verbal components and the differences between the two are presented in Table 6.3.

Subject	Average z-score (verbal)	Average z-score (non-verbal)	Difference
TS	-1.45	.83	2.28
BS	-1.45	-.75	.70
MS	-1.90	-.67	1.24
SS	-1.94	.08	2.03
JS	-.77	-.08	.69

Table 6.3 Z-score averages and differences between verbal and non-verbal scores

Table 6.3 shows that there are indeed significant differences between the verbal and the non-verbal domains for some of the participants of the SLI group. Thus for three subjects (TS, MS and JS) there is a substantial non-verbal advantage and for two subjects the non - verbal advantage is moderate.

Figure 6.4 above also suggests that the cognitive profiles of the participants with SLI may not be uniform. There are discrepancies emerging both within and between their non-verbal and verbal skills. In order to investigate whether any of these discrepancies were statistically significant, the Friedman test was carried out on all the nine measures and it was significant (Friedman chi-square = 22.427, p= .004). This confirms that the cognitive profile of the participants with SLI is uneven. Post-hoc pairwise Wilcoxon comparisons were carried out between all pairs and the following significant differences emerged ($p<.05$):

PC>BPVS, FS

PA>BPVS, FS, SA

BD>BPVS, FS

OA>FS

BPVS>FS

TROG >FS

SA>FS

The results suggest that the participants with SLI, as a group, performed significantly better on the Picture Completion, Picture Arrangement and Block Design tasks (all non verbal tasks) than on the British Picture Vocabulary Scales and Formulated Sentence (both verbal). The above also shows that the performance of the individuals with SLI as a group was significantly better on the Picture Arrangement task (non-verbal) than on the Sentence Assembly task (verbal), and their performance on the Object Assembly task was also significantly better than their performance on the Formulated Sentences task. All this is indicative of a significant non-verbal advantage for the SLI group.

There were some significant discrepancies within the verbal domain as well in that the participants with SLI seemed to perform significantly worse on the Formulated Sentences than on the British Picture Vocabulary Scale, the Test for the Reception of Grammar and the Sentence Assembly.

6.5. General Intellectual Abilities - performance on the Coloured Progressive Matrices (CPM)

Performance on CPM was computed separately from the other non-verbal standardised tests due to the fact that the manual of the version used (Raven, 1982) did not provide standardised scores, only percentiles, which made it impossible to derive z-scores. Since performance on the other standardised tests was computed in z-scores, it was not appropriate to include the CPM with the other tests in the absence of the possibility to derive z-scores. Figure 6.5 presents the group performance (WS and SLI respectively) on the Coloured Progressive

Matrices, whereas Figure 6.6 shows the performance of each individual participant on the same measure.

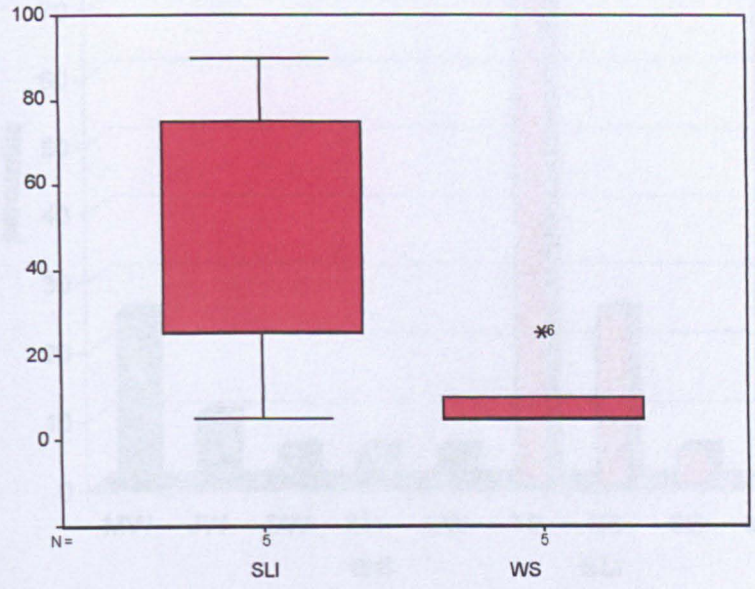


Figure 6.5. Coloured progressive matrices for the SLI and the WS group.

Figure 6.4 shows that there is hardly any overlap between the two groups of participants in their performance on the CPM, and figure 6.5 shows the individual performance on the same test. The participants with SLI show a vast range of performance, their scores being between the 5th and the 95th percentile, though it seems that most of them cluster around what is supposed to be average performance (25th –75th centile). The picture is very different for the WS group. The range of scores is extremely limited, with all the participants performing at around the 5th centile, apart from one participant whose performance was at the 25th centile. Such performance only confirms the previous findings (c.f. 6.1) that the participants with WS are very consistent in showing deficits in the non-verbal domain, and also scoring much lower than the participants with SLI, whereas the participants with SLI consistently show great variability in their non-verbal performance, ranging from superior to mildly impaired.

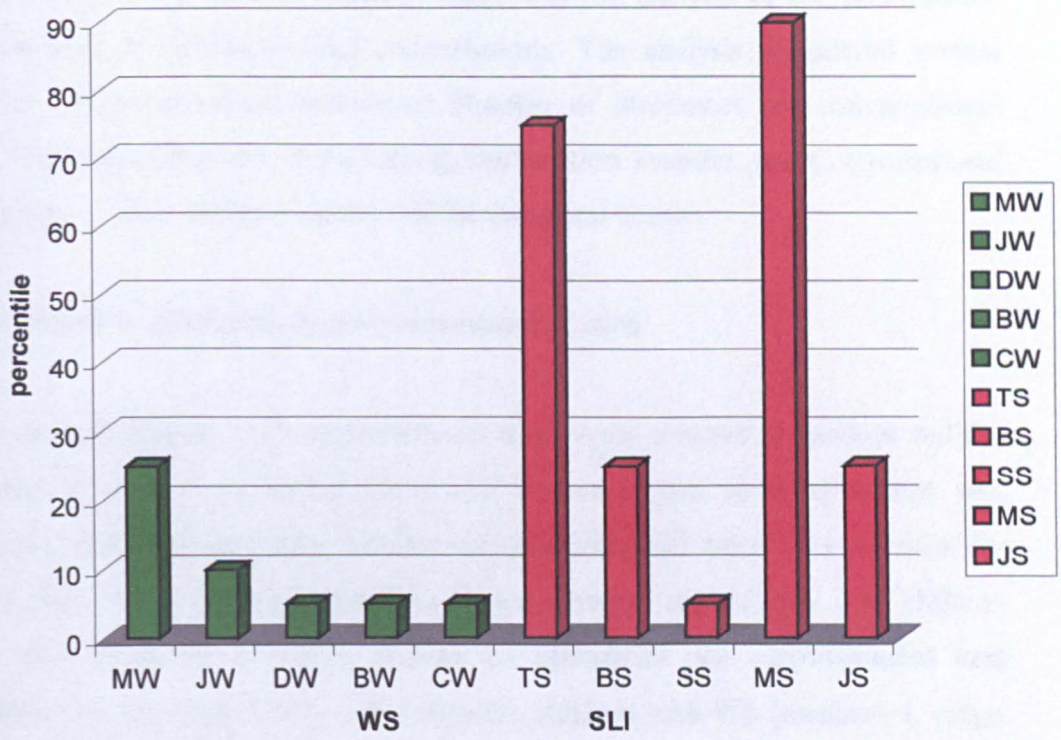


Figure 6.6. Individual performance of the participants with WS and the participants with SLI on the Coloured Progressive Matrices

6.6. Summary of the standardised measures analysis

The analysis of the WS and SLI participants' performance on standardised verbal and non-verbal tests indicated that the two groups of participants differed significantly with regard to their performance on non-verbal standardised tests, with there being no overlap between the WS and the SLI group. However with regard to their performance on standardised verbal measures, there was not a significant difference between the two groups of participants. The analysis also showed that there was a wide range of performance within the groups. These results will be fully discussed in Chapter 7.

6.7. Analysis of conversational abilities

As already elaborated in Chapter 3, and as it has been evident from the presentation of the single case studies in Chapters 4 and 5, an important part of

the profiling in the present research study was the analysis of the participants' performance in semi-structured conversations. The analysis considered several aspects of conversational behaviour: Number of utterances per conversational turn, Exchange Structure, Turn Taking, Information Transfer, and Conversational Inadequacy. Each of these aspects will be discussed in turn.

6.7.1. Number of utterances per conversational turn

For every participant, 150 conversational turns were selected at random and the number of utterances which these 150 conversational turns contained was counted. Although the same number of conversational turns was selected for every child, the number of utterances varied between the children. The children with SLI produced a higher number of utterances per conversational turn (median = 1.27, range 1.05 – 1.43) than the children with WS (median= 1, range 0.97 – 1.04). The difference was not only significant (p=.009 on the Mann-Whitney test); in fact, this differentiated the two groups perfectly, with no overlap whatsoever. As Figure 6.7 clearly shows, the participants with WS produced fewer utterances than the participants with SLI.

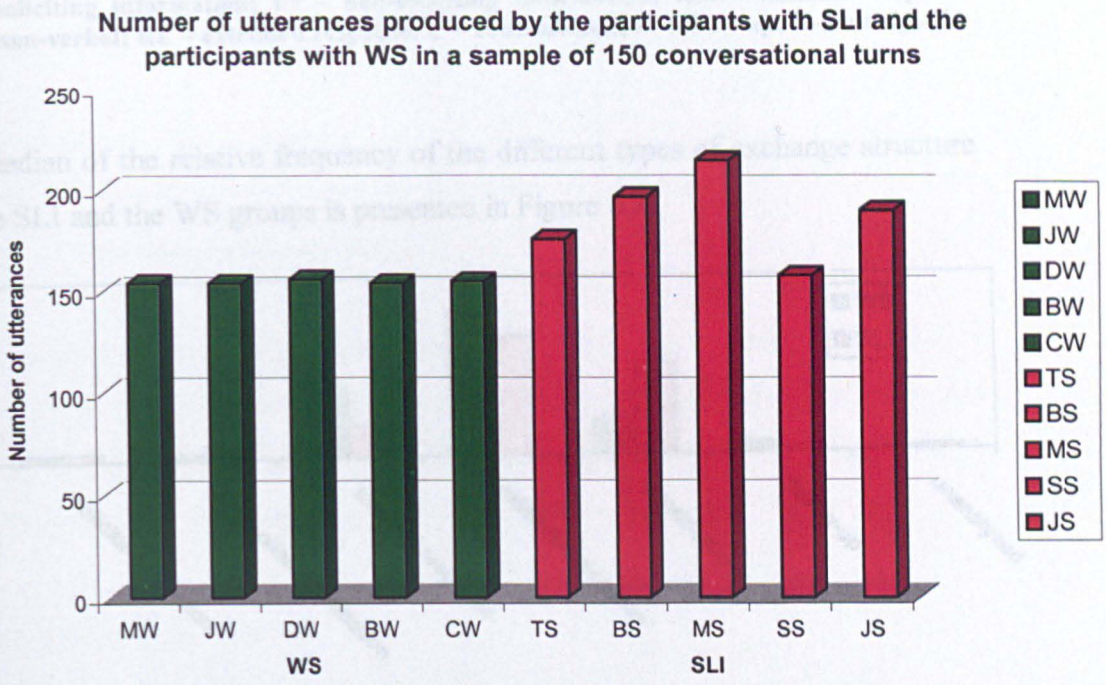


Figure 6.7. Number of utterances produced by participants with WS and participants with SLI in 150 conversational turns.

6.7.2. Exchange structure analysis

The analysis of Exchange Structure included several aspects: soliciting initiations (those which require information from the interlocutor), non-soliciting initiations (those which do not require information from the interlocutor), minimal verbal (non verbal responses), extended responses, continuations, follow-ups, and unanalysed utterances. The relative frequency in percentages of different types of exchange structure in SLI and WS groups (relative to overall number of utterances produced by each child) is presented in Table 6.4.

	SLI				WS			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
IS	3.37	2.79	.63	7.37	3.06	2.74	.65	6.41
IN	5.56	4.43	2.33	12.18	1.71	2.07	.00	3.21
RM	10.03	10.70	3.05	14.74	24.05	24.14	15.75	34.00
RE	36.73	39.87	24.65	46.59	51.43	49.03	44.83	67.12
C	37.25	30.46	28.42	56.74	14.11	11.61	10.00	21.38
F	4.52	2.11	.63	15.74	3.81	4.00	2.05	6.41
U	2.53	1.90	.57	5.58	1.83	1.29	.67	5.13

Table 6.4 Relative frequency (%) of different types of exchange structure in SLI and WS groups (relative to overall number of utterances produced by each child)

***IS – soliciting information; IN – non-soliciting information; RM – minimal response verbal/non-verbal; RE – extended response, C – continuation; F- follow-up; U-unanalysed.**

The median of the relative frequency of the different types of exchange structure for the SLI and the WS groups is presented in Figure 6.8.

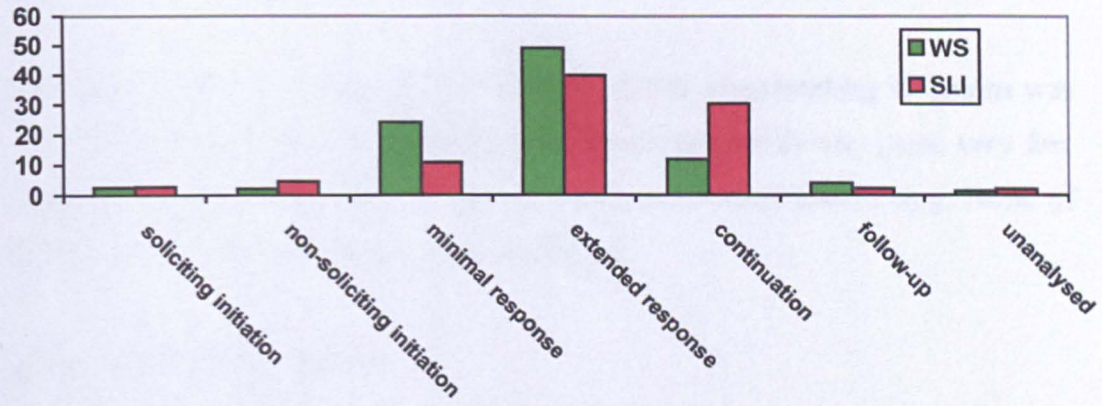


Figure 6.8 Relative frequency (%) of different types of exchange structure in SLI and WS groups. The bars represent the median % for each group.

A series of non-parametric (Mann-Whitney) tests was carried out in order to investigate any between-group differences. Two differences approached significance p=.009). The children with WS produced relatively more minimal responses (responses with yes/no and non-verbal minimal responses) and fewer continuations than their SLI counterparts. However, in both groups the same three types of exchange structure (extended response, continuation, minimal response) appear most frequently, constituting approx. 80% of all exchanges.

6.7.3. Turn-taking

Another aspect of the conversational abilities analysis was an investigation of turn- taking abilities. Gaps, inadvertent overlaps, violating overlaps, and instances where the adult had to interrupt for both groups of children are presented in table 6.5.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
gap	.00	.00	1.00	2.00	.00	3.00
inadvertent overlap	1.00	.00	4.00	.00	.00	1.00
violating overlap	1.00	.00	4.00	.00	.00	2.00
adult interrupt	1.00	.00	2.00	.00	.00	.00

Table 6.5 Turn taking in SLI and WS

The data in table 6.5 shows that the overall number of turn-taking violations was very small in both groups of participants. There are hardly any gaps, very few violating overlaps and only a couple of instances of adult interrupting. None of the between- group differences were significant.

6.7.4. Information transfer

Information transfer was analysed by taking into consideration the number of the adult's requests for information, clarification and confirmation, and the adequacy of the child's answer. Table 6.6. shows that the 2 groups of children are no different in terms of absolute frequency of the different types of response to the different types of requests.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
information-adequate response	40.00	23.00	59.00	62.00	38.00	82.00
information- inadequate response	19.00	9.00	25.00	17.00	16.00	46.00
clarification adequate	8.00	4.00	15.00	9.00	4.00	10.00
clarification-inadequate	4.00	1.00	13.00	5.00	3.00	8.00
confirmation adequate	14.00	11.00	21.00	19.00	7.00	31.00
confirmation-inadequate	3.00	1.00	4.00	1.00	.00	5.00
SUM	91.00	77.00	104.00	125.00	95.00	131.00

Table 6.6 Information transfer

However, the overall number of requests put to the child on the part of the adult was greater in relation to the children with WS (median=125) than in relation to the children with SLI (median =91) (p=.016 on Mann-Whitney test). In particular, the adult put more requests for information to the children with WS than to the children with SLI, (median score 65 and 81, respectively, p=.012 on Mann-Whitney test) whereas there was no statistically significant difference with

regard to the adult's requests for clarification and confirmation put to the two groups of children. This is an interesting finding as it suggests that the utterances of children with WS may have a greater tendency, than the utterances of children with SLI, to lack adequate information.

The overall adequacy of information transfers was nearly identical in the WS group (73%) and in the SLI group (74%). The relative frequency of the various adequate and inadequate responses for the 2 groups of participants is shown in table 6.7 and figure 6.9.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
info - adequate	42.86	27.06	62.77	48.11	40.00	62.60
info - inadequate	22.35	9.57	27.27	16.04	12.21	35.38
clarification - adequate	8.51	5.19	15.29	6.87	3.20	10.53
clarification - inadequate	4.26	.96	15.29	3.85	2.83	6.40
confirmation - adequate	16.47	12.09	20.19	14.50	5.38	24.80
confirmation - inadequate	3.53	1.06	5.19	.80	.00	4.72

Table 6.7. Relative frequency (%) of various types of information transfer provided

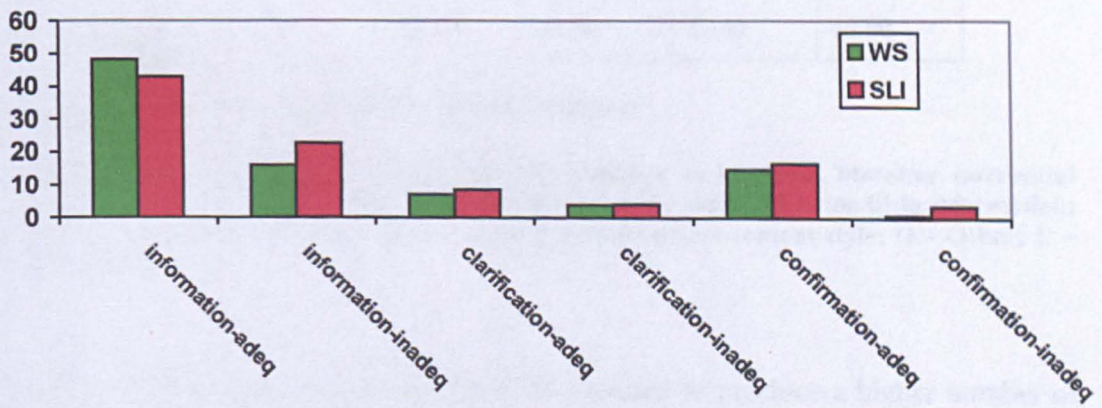


Figure 6.9 Relative frequency (%) of various types of information transfer provided.

As table 6.7 and figure 6.9 illustrate, the relative frequency of various types of information transfers for the two groups are small and non-significant. The relative overall frequency of adequate transfers is also similar for the 2 groups (76% vs 73% in the WS and the SLI group, respectively.

6.7.5. Categories of inadequacy

A very important aspect of the conversational data analysis was the analysis of conversational inadequacy. There were several categories to which all the inadequate utterances were assigned (see Chapter 3 for a full description about each category). Table 6.8 presents the number of inadequate utterances in every category for the two groups of participants.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
ESS	17.00	3.00	77.00	11.00	3.00	25.00
FILIM	2.00	.00	3.00	1.00	1.00	5.00
II	7.00	2.00	12.00	4.00	1.00	5.00
FCC	.00	.00	1.00	.00	.00	6.00
TLI	4.00	1.00	7.00	12.00	5.00	26.00
TMI	9.00	5.00	12.00	.00	.00	1.00
SICS	3.00	.00	9.00	.00	.00	4.00
O	8.00	1.00	13.00	5.00	3.00	7.00
U	2.00	1.00	4.00	2.00	1.00	8.00
SUM	42.00	36.00	131.00	30.00	27.00	69.00

Table 6.8 Categories of inadequacy – absolute numbers

***ESS – expressive syntax/semantics; FILIM – failure to interpret literal/or inferential meaning; II – ignoring initiation while remaining on the topic; TLI- too little information; TMI – too much information; SISC – socially inappropriate content/style; O – Other; U – Unanalysed.**

Table 6.8 shows that the children with SLI tended to produce a higher number of inadequate utterances overall (median 42) compared to the children with WS (median = 30); the difference was not significant, though.

Two differences in the absolute number of inadequate utterances were significant. The children with WS had a much higher number of utterances coded as TLI (too little information) than the children with SLI (p=.021). The opposite was the case with the category of TMI (too much information) to which the utterances of children with SLI were more frequently assigned but practically

none of the utterances of the children with WS were assigned to this category. The difference between the two groups was statistically significant (p=.008).

Apart from presenting the raw number of inadequate utterances, the relative frequency of each category of inadequacy was also computed and it is shown in table 6.9 and in figure 6.10.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
ESS	40.48	8.33	58.78	20.00	11.11	48.15
FILIM	2.78	.00	4.76	3.33	1.45	18.52
II	6.87	4.76	33.33	7.41	1.45	18.52
FCC	.00	.00	1.96	.00	.00	10.91
TLI	7.32	2.78	16.67	29.63	18.52	47.27
TMI	17.65	8.40	28.57	.00	.00	1.82
SICS	6.87	.00	7.84	.00	.00	5.80
O	9.92	2.38	22.22	11.11	7.27	18.52
U	2.38	1.96	9.76	3.70	3.64	11.59

Table 6.9 Relative frequency (%) of various categories of inadequacy

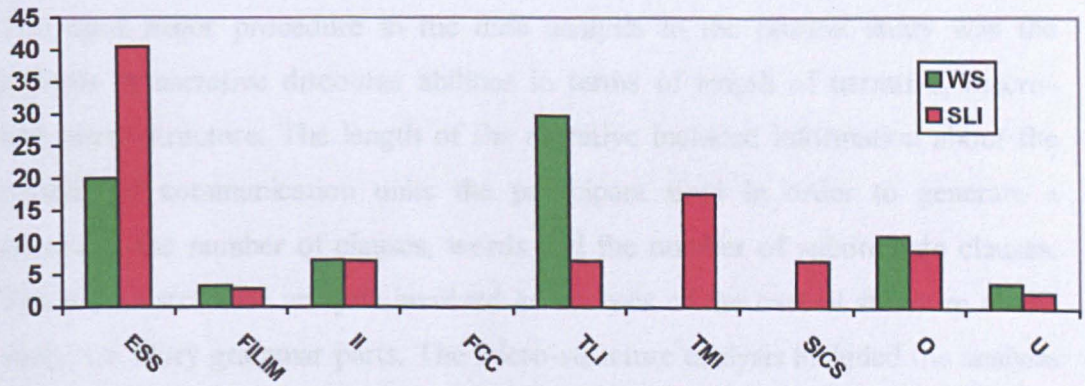


Figure 6.10 Relative frequency (%) of the categories of inadequacy

The results are similar to those obtained in the absolute frequency analysis. The children with WS provided too little information relatively more often than the children with SLI. The children with SLI on the other hand tended to provide too much information, which was not the case at all with the children with WS (both differences significant at p=.008). The children with SLI also tended to produce relatively more errors of expressive syntax and semantics, which was, in fact,

their most frequent error type in comparison to the children with WS. This difference, however, did not approach significance.

6.7.6. Summary of the conversational data analysis

The results obtained from the conversational analysis procedure suggest that in terms of exchange structure the participants with WS had significantly fewer continuations than the participants with SLI and produced relatively more minimal verbal responses in comparison to the children with SLI. There were no differences between the two groups in terms of turn taking and information transfer. With regard to conversational inadequacy, the children with SLI tended to make more expressive syntactic-semantic errors, and definitely provide too much information. The children with WS, on the other hand, had an increased tendency to provide less information than expected from the conversational situation.

6.8. Narrative discourse analysis

The third major procedure in the data analysis in the present study was the analysis of narrative discourse abilities in terms of length of narrative, macro- and micro-structure. The length of the narrative included information about the number of communication units the participant used in order to generate a narrative, the number of clauses, words and the number of subordinate clauses. The macro structure analysis involved an analysis of the overall structure of the story, i.e. story grammar parts. The micro-structure analysis included the analysis of the participants' use of cohesive ties and their use of grammatical morphemes and syntactic structures beyond the level of a simple declarative clause. Each of these components of analysis will be discussed in turn.

6.8.1 Length information

Information about the length of the narratives produced by the children with WS and SLI is presented in table 6.10.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
CUs	34.00	18.00	78.00	52.00	25.00	68.00
Clauses	49.00	25.00	146.00	40.00	33.00	54.00
Words	349.00	183.00	863.00	234.00	209.00	412.00
Subordinate	8.00	2.00	20.00	3.00	.00	4.00

Table 6.10. Length of narratives

The children with WS produced a higher number of communication units and words than the SLI children. The opposite was the case with respect to the number of clauses and subordinate clauses, where the children with SLI produced on average a higher number of clauses and subordinate clauses per narrative. None of these differences however reached significance on the Mann-Whitney test.

There is a slight problem though with the fact that it looks as if the children with WS produced more communication units than the children with SLI. Two participants with WS (MW and DW) were not able to generate the story independently; therefore the fact that the participants with WS appear to have produced longer stories (in terms of the number of communication units) is actually artificial. In order to show the extend to which the adult may have helped in the generation of a story, the number of the adult's contributions were calculated for each story. The results are presented in table 6.11 and in table 6.12.

NB: By adult contributions we mean both utterances such as: *And then*? *What happened next*? *And see what's going on here*? These were coded as open adult contributions - AC (O) whereas more specific questions of the type: W*here is the frog now*? W*hat is the boy doing there*? W*hat is the dog doing*? Were coded as specific adult contributions: AC (S).

WS group	No of CU	AC (O)	AC (S)
MW	68	4	50
JW	25	0	1
DW	59	7	52
BW	52	0	9
CW	41	2	12
Group	**245**	**13**	**124**
SLI group	**No of CU**	**AC (O)**	**AC (S)**
TS	18	1	4
BS	34	6	4
SS	59	0	1
MS	78	4	2
JS	30	0	0
Group	**192**	**11**	**11**

Table 6.11: Number of communication units produced by each child, open adult contributions and specific adult contributions.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
ACO	1.00	.00	6.00	2.00	.00	7.00
ACS	2.00	.00	4.00	12.00	1.00	52.00

Table 6.12: Median, minimum and maximum open and specific adult contributions

***ACO – Adult Contributions Open, ACS – Adult Contributions Specific**

In order to investigate whether there were any significant differences in the number and type of adult contributions between the WS and the SLI group, the Mann Whitney test was carried out. From the raw numbers presented in Table 6.11 it seems that one should expect a significant difference, in particular with the number of specific contributions by the adult. The difference however only approached significance, p=.059.

6.8.2. Analysis of macro-structure

The analysis of macro-structure consisted of story grammar elements analysis, story structure level analysis and the developmental age equivalent. Table 6.13

presents the story grammar elements, the story structure level and the developmental age for the two groups of participants.

Children with WS	Story grammar elements	Story structure level	Developmental age
MW	N/A	N/A	N/A
DW	N/A	N/A	N/A
BW	IE, A, C, IR	Abbreviated episode	about 6 years
CW	S, A, C, R, IR	Abbreviated episode	about 6 years
JW	S, IE, A, C	Abbreviated episode	about 6 years
Children with SLI	**Story grammar elements**	**Story structure level**	**Developmental age**
TS	IE, A, C, E	Abbreviated episode	about 6 years
BS	IE, A, C, R	Abbreviated episode	about 6 years
SS	S, IE, A, C, R	Abbreviated episode	about 6 years
MS	S, IE, A, C, R, E	Complete episode	about 7-8 years
JS	S, IE, A, C, R, E	Abbreviated episode	about 6 years

Table 6.13: Macro structure analysis

S – setting; IE – initiating event; A – attempt; C – consequence; IR – internal response; R – resolution; E- ending.

On the level of macro-structure, the participants with WS were generally poorer. Two out of the five participants were not able to tell the story independently. Their stories proceeded with the adult providing prompts and guiding them through the story. The three more complete stories were similar in that there was a relatively good description of the events and often it was not until the last part of the story that it became obvious what the goal of the main characters was. Therefore, they were all classified as being at the level of an abbreviated episode, where there was some goal directed behaviour and all the story grammar parts were present at the global level, but there was no evidence of overt planning nor were the goals of the main characters made very explicit.

Interestingly, the stories of some of the participants with SLI were not significantly more advanced than the stories generated by the children with WS. The participants with SLI, with no exception, could generate the story independently, which was a definite advantage, however apart from the story of MS, which was at the level of a complete episode, the remaining stories were at the level of an abbreviated episode.

6.8.3. Micro-structure analysis

The analysis of micro-structure included the analysis of the children's use of cohesive ties (reference, conjunctive, and lexical), and the analysis of use of grammatical morphemes and syntactic structures beyond the level of a simple declarative clause.

6.8.3.1. Use of cohesive ties

a) reference ties

Table 6.14 presents the use of personal, demonstrative and comparative ties for the two groups of children.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Ref personal complete	15.00	4.00	55.00	8.00	4.00	12.00
Ref demonstrative complete	27.00	22.00	68.00	17.00	11.00	75.00
Ref comparative complete	.00	.00	.00	.00	.00	.00
Re personal incomplete	4.00	1.00	18.00	4.00	1.00	12.00
Ref demonstrative incomplete	1.00	.00	10.00	.00	.00	5.00
Ref comparative incomplete	.00	.00	.00	.00	.00	.00
Sum	58.00	31.00	131.00	36.00	21.00	86.00

Table 6.14: Number of different types of reference ties used by the children with WS and SLI.

From table 6.12 it follows that the most frequently used reference ties were personal ties followed by demonstrative ties. There were no comparative reference ties used at all. The numerical data from table 6.12 is also presented in Figure 6.4.

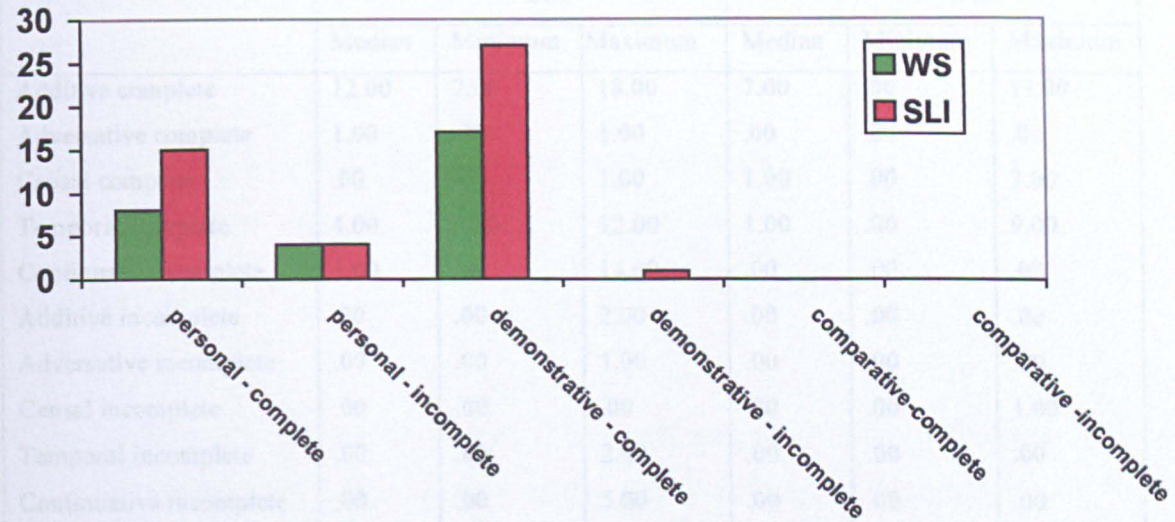


Figure 6.11 Number of different types of reference ties used by the participants with WS and SLI.

The children with SLI tended to produce more reference ties overall, especially complete personal and demonstrative ties. None of the differences between the two groups were significant, though. There were very few erroneous/incomplete reference ties in both groups of participants.

b) use of conjunctive cohesive ties

Table 6.15 and Figure 6.12 below show the different types of conjunctive ties used by the children with WS and the children with SLI.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Additive complete	12.00	7.00	18.00	7.00	.00	11.00
Adversative complete	1.00	.00	1.00	.00	.00	.00
Causal complete	.00	.00	1.00	1.00	.00	2.00
Temporal complete	4.00	3.00	12.00	1.00	.00	9.00
Continuative complete	1.00	.00	14.00	.00	.00	.00
Additive incomplete	.00	.00	2.00	.00	.00	.00
Adversative incomplete	.00	.00	1.00	.00	.00	.00
Causal incomplete	.00	.00	.00	.00	.00	1.00
Temporal incomplete	.00	.00	2.00	.00	.00	.00
Continuative incomplete	.00	.00	5.00	.00	.00	.00
Sum	20.00	11.00	47.00	11.00	2.00	20.00

Table 6.15: Number of different types of conjunctive ties

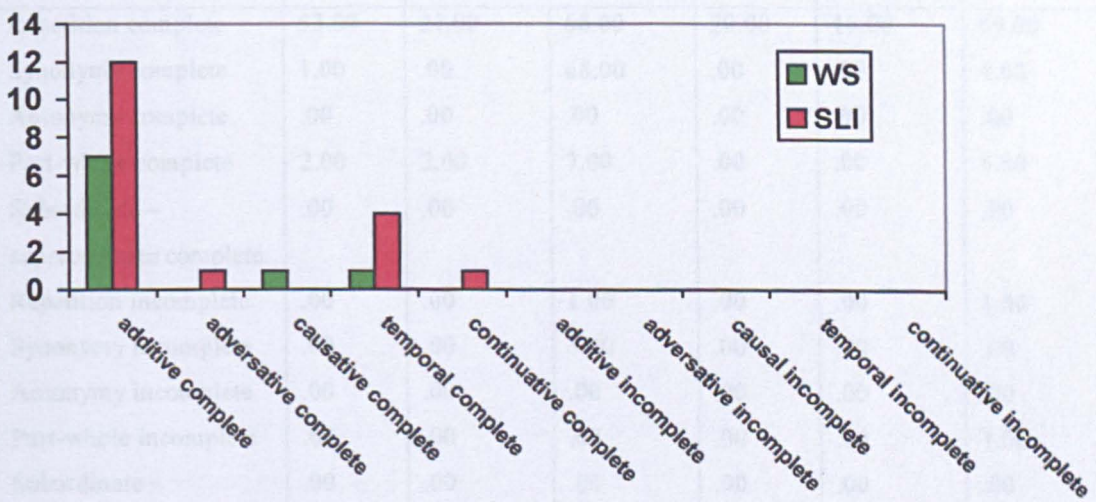


Figure 6.12 Use of conjunctive ties

As table 6.15 and figure 6.12 show, the children with SLI produced more conjunctive ties than the children with WS. This difference fell short of significance though (p=.073 on the Mann-Whitney test). However, the Mann-Whitney test also identified the following significant or borderline significant differences:

- conjunctive complete adversative ties (p=.014)
- conjunctive complete temporal ties (p=.046)

- conjunctive complete continuative ties (p=.053)
- conjunctive complete additive ties (p=.056)

In all four cases, it was SLI children who produced more ties than the children with WS.

c) lexical ties

The third type of reference ties analysed in the present study were lexical ties. The median, minimum and maximum of the use of lexical ties is presented in table 6.16.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Repetition complete	33.00	21.00	66.00	20.00	16.00	69.00
Synonymy complete	1.00	.00	68.00	.00	.00	4.00
Antonymy complete	.00	.00	.00	.00	.00	.00
Part-whole complete	2.00	2.00	7.00	.00	.00	5.00
Subordinate – superordinate complete	.00	.00	.00	.00	.00	.00
Repetition incomplete	.00	.00	1.00	.00	.00	1.00
Synonymy incomplete	.00	.00	3.00	.00	.00	.00
Antonymy incomplete	.00	.00	.00	.00	.00	.00
Part-whole incomplete	.00	.00	.00	.00	.00	1.00
Subordinate – superordinate incomplete	.00	.00	.00	.00	.00	.00
Sum	37.00	26.00	106.00	20.00	18.00	79.00

Table 6.16: Number of different types of lexical ties

The majority of the lexical ties employed by both groups of participants were complete repetition ties. None of the between group differences were significant, however the overall number of lexical ties used was higher in the SLI group. The difference though was not significant (p=.075).

If we add together all the three different types of cohesive ties (reference, conjunctive, and lexical) it appears that the children with SLI tended to produce

more cohesive ties (median = 113) in comparison to the participants with WS (median = 67). This is a substantial difference, as the participants with SLI produced twice as many ties as the participants with WS. However the difference between the two groups fell short of significance (Mann-Whitney, p=.076).

6.8.3.2. Summary of the use of cohesive ties

With regard to the use of reference ties, no significant difference between the two groups was revealed. However the participants with SLI tended to use more reference ties on average in comparison to the participants with SLI.

6.8.3.3. Morpho-syntactic analysis

The second part of the micro-structure analysis was the analysis of the use of grammatical morphemes and use of syntax beyond the level of a simple declarative clause. The participants' use of grammatical morphemes and their use of syntax will be dealt with in turn.

6.8.3.4. Use of grammatical morphemes

Table 6.17 below presents the participants' use of grammatical morphemes: i.e. grammatical morphemes which were used correctly, those which were omitted and those which were used incorrectly.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Determiner correct	45.00	40.00	97.00	28.00	26.00	91.00
Determiner omitted	.00	.00	7.00	.00	.00	6.00
Determiner incorrect	1.00	.00	6.00	.00	.00	2.00
Preposition correct	19.00	13.00	43.00	12.00	6.00	35.00
Preposition omitted	.00	.00	.00	.00	.00	.00
Preposition incorrect	.00	.00	3.00	1.00	.00	2.00
Plural 's' correct	5.00	2.00	11.00	5.00	1.00	11.00
Plural 's omitted	.00	.00	1.00	.00	.00	.00
Plural 's' incorrect	.00	.00	1.00	.00	.00	.00
Genitive 's correct	.00	.00	2.00	.00	.00	2.00
Genitive 's omitted	.00	.00	.00	.00	.00	.00
Genitive 's incorrect	.00	.00	.00	.00	.00	.00
Pronoun correct	26.00	10.00	52.00	10.00	5.00	27.00
Pronoun omitted	.00	.00	.00	.00	.00	.00
Pronoun incorrect	3.00	1.00	25.00	6.00	1.00	12.00
3s correct	3.00	.00	21.00	1.00	.00	4.00
3s omitted	.00	.00	2.00	.00	.00	.00
3s incorrect	.00	.00	3.00	.00	.00	.00
irregular past correct	15.00	5.00	31.00	13.00	3.00	21.00
irregular past omitted	.00	.00	2.00	.00	.00	.00
irregular past incorrect	.00	.00	4.00	.00	.00	1.00
ed -past correct	9.00	3.00	12.00	5.00	.00	16.00
ed-past omitted	.00	.00	1.00	.00	.00	.00
ed-past incorrect	1.00	.00	4.00	.00	.00	1.00
ing-part correct	12.00	1.00	23.00	12.00	.00	18.00
ing-part omitted	.00	.00	5.00	.00	.00	1.00
ing-part incorrect	.00	.00	4.00	.00	.00	.00
en-part correct	3.00	.00	6.00	3.00	1.00	4.00
en-part omitted	.00	.00	2.00	.00	.00	2.00
en-part incorrect	.00	.00	1.00	.00	.00	.00
aux correct	14.00	5.00	24.00	13.00	1.00	21.00
aux omitted	.00	.00	4.00	.00	.00	3.00
aux incorrect	.00	.00	8.00	.00	.00	.00

Table 6.17: Number of grammatical morphemes used by the children with WS and SLI

As already mentioned above, table 6.17 combines all the morphemes into three groups: correct, omitted and incorrect. There was no difference between the two groups of participants on their use of grammatical morphemes; in fact, the majority of the differences were not even approaching significance. The only difference that approached significance was the correct use of determiners (p=.076) where the children with SLI were better than the children with WS.

The overall frequency of the use of morphemes was also calculated for the two groups. The results are presented in table 6.18.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Gram.morph.correct	147.00	98.00	270.00	110.00	61.00	222.00
Gram.morp. omitted	.00	.00	24.00	1.00	.00	12.00
Gram. morph.incorrect	5.00	2.00	54.00	6.00	2.00	16.00

Table 6.18: Overall frequency of correct use, omissions and incorrect use of grammatical morphemes.

The overall number of the use of grammatical morphemes was calculated as a percentage and presented in table 6.19.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Correct	95.15	72.63	98.66	91.04	81.88	98.23
Omitted	.00	.00	8.42	.44	.00	8.70
Incorrect	4.85	1.34	18.95	8.96	1.33	14.81

Table 6.19: % of correct uses, omissions and incorrect uses

Tables 6.18 and 6.19 suggest that the participants with WS had a slightly higher percentage of incorrect morpheme uses in comparison to the participants with SLI. The difference was not significant, though.

6.8.3.5. Use of complex syntactic structures

The second aspect of grammatical analysis was the participants' use of syntactic structures beyond simple declarative clauses. The number of correctly and incorrectly used structures below the level of a simple declarative clause was calculated for the two groups of participants and is presented in table 6.20.

	SLI			WS		
	Median	Minimum	Maximum	Median	Minimum	Maximum
Syntax correct	21.00	7.00	44.00	6.00	3.00	10.00
Syntax incorrect	.00	.00	13.00	.00	.00	.00

Table 6.20: Use of complex syntactic structures

Table 6.20 also shows that the participants with WS did not spontaneously use many more complex syntactic structures but when they were used, they were used correctly. There was no significant difference between the two groups with regard to the incorrect use of complex syntactic structures (Mann-Whitney, p= .310), however the difference between the SLI and the WS group on the correct use of complex syntactic structures was approaching significance, p=0.56 and it was in favour of the participants with SLI.

6.8.3.6. Summary of the analysis of story micro-structure

The analysis of narrative discourse abilities of the participants with WS and SLI in terms of micro-structure showed that there were no significant differences between the two groups on any of the variables. However there was a prominent tendency for the participants with SLI to use more clauses, words and subordinate clauses within the communication units, more cohesive ties, a greater number of grammatical morphemes and a greater number of more complex syntactic structures (i.e. beyond the level of a simple declarative clause).

6.9. Overall summary

This chapter presented the results from the two groups of participants, WS and SLI, on a number of measures: standardised test performance, analysis of conversational abilities in terms of exchange structure, turn taking, information transfer, and conversational inadequacy, and the analysis of narrative discourse abilities with regard to macro and micro-structure. There were significant differences between the WS and the SLI groups on their performance on non-verbal measures, whereas there were not any between group differences on the verbal measures in global terms. However, there were significant differences within both groups on their performance on various aspects of functioning within the verbal domain.

The analysis of performance in conversational settings indicated two main significant differences between the groups: the participants with WS produced fewer continuations and preferred minimal responses in terms of exchange structure. There were no differences between the groups in terms on turn taking and information transfer. Significant differences between the two groups were revealed regarding conversational inadequacy in that the participants with WS tended to provide less information while the participants with SLI tended to provide more information than required by the conversational situation. And the participants with SLI had significantly more problems with expressive syntax/semantics than their WS counterparts.

Finally, the analysis of the narrative discourse data revealed no major significance between the groups apart from the use of cohesive ties, where the participants with SLI tended to produce significantly more complete adversative, temporal, continuative and additive conjunctive cohesive ties, although there was no statistically significant difference regarding the overall use of conjunctive cohesive markers.

The implications of the results for the main research questions of the thesis will be discussed in the following chapter.