Profiles of semantic-pragmatic disorder and the investigation of underlying psychological mechanisms

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Vol I

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Dedicated to

the memory of my friend and colleague,
Nicky Wass.

She always used to tell me that the
only way to eat an elephant
is one bite at a time.
She was right!

How lucky I am to have shared in her laughter.

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Preface

I first became interested in the notion of semantic-pragmatic disorder more than ten years ago, as an undergraduate in Speech and Language Therapy. At that time it was a new phenomenon and was little understood. After several years in practice, it was no longer new but was still little understood! Moreover, it appeared to be in danger of becoming *misunderstood* because strong claims and assumptions were beginning to be made about it in the absence of hard evidence. This frustrated me to the point of action and this thesis is the end result.

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Summary

Since the notion of semantic-pragmatic disorder (SPD) was first described (Rapin, 1982) there has been much discussion about its characteristic features. Diagnostic criteria have still to be agreed. There has also been much debate about the psychological mechanisms that underlie SPD, particularly in relation to speculation about the boundaries of SPD with autism and specific language impairment (SLI). Discussion has focused on whether SPD has cognitive, socio-cognitive or linguistic underpinnings.

In view of the above, the present study had two main aims: (1) to clarify the issue of diagnostic criteria by obtaining comprehensive behavioural profiles of a group of children, of a similar age, identified as presenting with SPD and (2) to provide preliminary evidence concerning the possible underlying psychological mechanisms of executive dysfunction, weak central coherence and impaired world knowledge in this group, in relation to normal and specifically language-impaired controls. A third aim was to provide further evidence concerning the suggestion that SPD results from impaired theory of mind.

Regarding the first aim, a number of common features in linguistic, conversational, intellectual and social functioning emerged. In line with the findings from several other recent studies (Conti-Ramsden et al., 1997, 1999), this would suggest that SPD constitutes a definable clinical entity. However, there were some inconsistencies between this study and other studies in the characteristic features that occurred. The clinical implications of these findings are considered.

Regarding the second and third aims, there were no significant differences between the three groups on the world knowledge tasks, failing to support the suggestion that SPD might stem from a lack of world knowledge (McTear, 1989; Bishop & Adams, 1992). In addition, there were few significant differences between

the three groups in theory of mind, executive function and central coherence, all of which have been implicated in autism. These findings are discussed in relation to the issues of boundaries between SPD, SLI and autism.

Chapter One

The Behavioural Characterisation of Semantic-Pragmatic Disorder

"Progress in classification, then, pursues a meandering course ..." (Bishop, 1989, p118)

1.1 Introduction

The notion of semantic-pragmatic disorder (SPD)[1] was born in the early 1980s during Rapin & Allen's (Rapin, 1982; Rapin & Allen, 1983) efforts to establish sub-groups within the broad diagnostic category of developmental language disability (now more commonly referred to as specific language impairment or SLI). There have since been numerous attempts to refine and validate its definition, in many different forms. Yet the task of presenting a clinical description is complicated because there are numerous discrepancies between accounts and, beyond general agreement that children given this label present with conversational difficulties, the defining features of SPD have still to be determined. Even within group comparison studies few common features appear to have emerged. This heterogeneity has caused the status of SPD as a distinct clinical entity to be called into question (Bishop, Hartley, & Weir, 1994). In spite of this, use of the term as a diagnosis has proliferated in clinical practice (Hyde-Wright & Cray, 1991).

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[1] Several different terms have appeared in the literature to describe the clinical picture to which this term refers. Rapin & Allen, who view the notion of 'SPD' as a (behaviourally defined) syndrome (Rapin & Allen, 1998) have favoured the terms *semantic-pragmatic syndrome* (Rapin, 1982; Rapin & Allen, 1983) and *semantic-pragmatic deficit syndrome* (Rapin & Allen, 1987). Bishop & Rosenbloom (1987) and Bishop & Adams (Adams & Bishop, 1989; Bishop & Adams, 1989; 1992) preferred to describe it as a disorder rather than a syndrome (and so coined the term *semantic-pragmatic disorder*) so as to reflect their view that the behaviours concerned were only "loosely associated". Others have adopted the term *semantic-pragmatic difficulties* (Kerbel & Grunwell, 1998; Vance & Wells, 1994) for the same reason. Some researchers have expressed concern at the association of the terms *semantic* and *pragmatic* in this way because the idea that semantic difficulties are invariable and/or distinctive has yet to be substantiated (McTear, 1991; Mogford-Bevan & Sadler, 1991). This observation has prompted use of terms which emphasise the pragmatic element, such as conversational disability (Conti-Ramsden, 1991; McTear, 1991) and, more recently, pragmatic language impairment (Bishop, 1998; Botting & Conti-Ramsden, 1999). Since semantic-pragmatic disorder (SPD) continues to be the term that is most commonly used in clinical practice, which is the authors background, it was decided to adopt it for the purpose of this thesis. It is not, however, intended to imply any assumptions about behavioural characterisation or cause.

However, there has been no attempt to collate what is known about SPD (at a behavioural level) in order to (i) determine more specifically where these discrepancies lie and (ii) to establish whether similarities do, in fact, exist. This puts the future of SPD in a precarious position because it creates the possibility that both research and practice might be misdirected. This chapter represents an attempt rectify this shortcoming. To do so, it is necessary to present a thorough and detailed review of all those studies which have informed the characterisation of SPD in some way. To be selective might introduce bias and to present findings out of context would limit the possibilities for the identification of confounding factors.

1.2 Early descriptions

In the early 1980s, Rapin and colleagues set out to identify sub-groups within the broad diagnostic category of developmental language disability (DLD) or specific language impairment (SLI), in an effort to demonstrate that it was no longer possible to view it as a single diagnostic entity. Initially they aimed to group the children according to their most salient behavioural characteristics (and produce clinical descriptions thereof), but ultimately to develop hypotheses regarding pathogenesis in each case.

Rapin and colleagues produced their first tentative sub-categorisation of SLI in 1982 on the basis of video-analysis of an unspecified number of pre-school children referred to the authors' clinic for suspected language delay, playing with one or both of their parents (Rapin, 1982). Informal analysis of mean length of utterance, vocabulary size, syntactic complexity, semantic focus, pragmatic abilities (which targeted range of pragmatic function, initiations, relevance of spontaneous contributions, naming ability and repetition skills) resulted in the description of five syndromes, one of which was*Semantic-Pragmatic Syndrome* . The term was used to describe a group of children whose clinical picture was dominated by problems with

language processing and use rather than with an inability to master language form[2]. The following features were described:

Comprehension

- No difficulty decoding phonology
- Good understanding of simple words and phrases
- Trouble understanding "sophisticated linguistic devices" e.g. embedded clauses and wh-questions (linguistic rather than cognitive in origin)
- Poor understanding of discourse
- Comprehension worse than expression
- Difficulty interpreting non-verbal communication

Expression

- Production of fluent, well formed utterances
- Word-finding difficulty in spontaneous speech

Conversation

- Utterances commonly tangential or inappropriate in context
- Use of language to maintain interaction rather than to share information

Other

- Sociable
- Intact/superior auditory memory
- Illogical thought processes
- May show hyperlexia
- May be hyperkinetic/distractible

The following year Rapin & Allen published additional details of their subtypes (Rapin & Allen, 1983) on the basis of data obtained from the following sources: (1) information from the clinical notes of 100 pre-school children referred for suspected language delay; (2) video-recordings of twenty of these children playing with their parent(s), taken at regular intervals across a three year period, together with linguistic analysis of the responses of a proportion of this group (those considered to be at an

[2] It has been suggested that earlier single case descriptions of children with semantic-pragmatic disorder had appeared in the literature (e.g. Blank, Gessner, & Eposito, 1979; Greenlee, 1981), but Rapin (Rapin, 1982) was the first to imply its existence as a distinct behaviourally defined clinical entity (within the broader diagnostic category of SLI).

appropriate developmental level) to a selection of items from three standardised language assessments[3]; (3) formal linguistic analysis of an additional twenty school-age children with severe developmental language delay, who had undergone neurological examination and testing; (4) video-recordings of mother-child interaction for a further fifteen children of between three and five years, with a variety of developmental disorders (including autism), taken biannually for two years. Video-analysis focused on linguistic and pragmatic aspects of the child's spontaneous expressive abilities. Receptive functioning was inferred on the basis of non-verbal behaviours, compliance with commands, and responses to questions and comments in conversation. The children were grouped "according to the most salient characteristics of their expressive language, interactive behaviour, and apparent comprehension" (167). The authors relied heavily on this final data set in refining their sub-syndromes of DLD (Rapin & Allen, 1983).

The concept of SPD - this time termed *semantic-pragmatic syndrome without autism* - was retained as one in which children have "very fluent expressive language *coupled with* a severe impairment in the ability to encode meaning relevant to the conversational situation, and a striking inability to engage in communicative discourse" (174) (my italics). Again, the authors noted that, in spite of intact comprehension of single words and simple phrases, the children's ability to understand the connected discourse of their conversational partner was impaired. In addition, a tendency to provide tangential responses to questions was observed and subtle syntactic deficits, echolalia and disruptions of sentence prosody were reported. Rapin & Allen (1983) suggested that SPD may or may not be associated with additional learning difficulties.

The same authors produced several further accounts of SPD towards the end of the decade, two of which are shown below. The first appeared in the context of a

[3] McCarthy Scale of Children's Abilities (McCarthy, 1972), Test for the Auditory Comprehension of Language (Carrow, 1975), and the Sentence Repetition Test (Menyuk, 1969).

Allen, 1987) and the second in a paper comparing "Syndromes in developmental dysphasia and adult aphasia" (Rapin & Allen, 1988).

> "*Children with the Semantic-Pragmatic Deficit Syndrome are often not recognised as language-impaired and are thought of as bizarre. They speak in fluent well formed sentences with adequate speech articulation. Some of them are verbose and have large sophisticated vocabularies. What is deviant in these children is language processing and use. They have comprehension deficits for the meaning of verbal messages, notably questions, and often they interpret messages quite literally. They may respond to one or two words in a sentence rather than to the meaning of the entire message. Many of them are echolalic and use over learned scripts rather than more appropriate greetings or comments. They often perseverate and chatter incessantly. Circumlocutions, semantic paraphasias, and lack of semantic specificity are common. This is the only group of children in whom expression is superior to comprehension: they may even fail to understand much of what they themselves are saying. They are pragmatically impaired in the ability to take turns and to maintain a topic in discourse* " (Rapin & Allen, 1987 p24).

> "*The children are fluent, speak in phonologically and grammatically correct sentences, but have a serious comprehension deficit for the content of what they hear. Echolalia, both immediate and delayed, is often prominent. Much of what the children say is empty verbiage, although their "canned" and repetitive scripts may actually be related to what would have been appropriate for them to say; the scripts stand for utterances the children have difficulty formulating themselves or serve as fillers for turn-taking in conversation ... These children have superior verbal memories and can often repeat extremely long syntactically complex sentences that they neither comprehend nor could produce spontaneously. A number of them are preoccupied with letters and numbers, and some learn to read precociously but often with little understanding of what they are reading*" (Rapin & Allen, 1988, p70).

Rapin & Allen's accounts of SPD have been influential and have prompted an explosion of interest in the field. What is striking about their descriptions, though, is the extent to which they vary. For instance, the two earliest descriptions highlight a

good understanding of simple words and phrases and subtle syntactic deficits, neither of which are mentioned in the later studies. Similarly, the two later accounts emphasise the use of over learned scripts, a feature which does not appear in either of the early accounts. Moreover, of the twenty-six behaviours mentioned in all four descriptions combined, only five appear three or more times. Table 1.1 (below and continued overleaf) illustrates the features that have been highlighted in each of Rapin & Allen's descriptions.

Table 1.1 Rapin & Allen's varying descriptions of SPD

Features	Studies			
	1982	1983	1987	1988
Comprehension				
No difficulty decoding phonology	√			
Good understanding of simple words and phrases	√	√		
Difficulty understanding sophisticated syntax	√			
Difficulty understanding questions	√		√	√
Poor understanding of discourse	√	√		
Comprehension worse than expression	√		√	√
Difficulty interpreting non-verbal communication	√			
Literal interpretation of non-literal messages			√	
Respond to one or two words rather than whole message			√	
Expression				
Production of fluent, well-formed utterances	√	√	√	√
Intact phonology				√
Word-finding difficulty	√		√	√
Subtle syntactic deficits	√	√		
Echolalia		√	√	√
Use of over-learned scripts			√	√
Disruptions of sentence prosody	√			
Large, sophisticated vocabularies		√		

Features	Studies			
	1982	1983	1987	1988
Conversation				
Verbosity		√		
Incessant chatter		√		
Tangential or inappropriate utterances (general)	√			
Tangential responses to questions		√		
Language use for interaction rather than information sharing		√		
Poor turn-taking			√	
Poor topic maintenance			√	
Other				
Sociable	√			
Intact/superior auditory memory	√			√
Illogical thought processes	√			
May show hyperlexia	√			√
May be hyperkinetic/distractible	√			
May show pre-occupations				√

At around the same time Bishop & Rosenbloom (1987) were also addressing the issue of the potential existence of sub-groups within SLI. In a paper discussing the possibilities of combining medical and linguistic approaches to the classification of language disorders, they , too, identified a group of children whose main problems lay with the content and use of language, together with aspects of its comprehension, rather than with the acquisition of language form. The clinical features which they identified are shown in Table 1.2. No details were provided about the population upon which their observations were based.

Beyond general agreement that conversational difficulties dominate, there are surprisingly few overlaps between the features that they describe and those that are highlighted by Rapin & Allen (Rapin, 1982; Rapin & Allen, 1983; Rapin & Allen, 1987).

Table 1.2 Behaviours included in Bishop & Rosenbloom's description of SPD

Comprehension	Expression
Poorer than expression Poor for non-verbal communication Good for single words and simple phrases in structured situations Poor for discourse Tendency for literal interpretation of non-literal language	Production of fluent, syntactically complex utterances Word-finding difficulties and phonemic paraphasias Minor problems with syntax, such as pronoun errors and difficulty with tense marking
Conversation	**Other**
Persistent questioning	History of language delay Fascination with the sound of language Misperception of objects Inattention

Collating the behaviours that have appeared in any three of Rapin & Allen's descriptions *and* in Bishop & Rosenbloom's account yields the following list:

1. Comprehension worse than expression
2. Fluent, well-formed utterances
3. Word-finding difficulties

If the criteria are changed from three to any *two* of Rapin & Allen's descriptions (and Bishop & Rosenbloom's account), a rather different set of behaviours is observed:

1. Good understanding of simple words and phrases
2. Poor understanding of discourse
3. Subtle syntactic deficits

To a certain extent, changes in, and discrepancies between, clinical descriptions of a newly identified condition are inevitable parts of its evolution. Thus, it is the problem that they pose for interpretation, rather than the fact that they exist, that is of issue[4]. Discrepancies like these make it very difficult for the clinician and/or researcher to determine which behaviours should or should not be included in the

[4] In fact, Rapin & Allen (Rapin, 1982; Rapin & Allen, 1983) emphasised the tentative nature of their early descriptions.

conceptualisation of SPD that they take away from these descriptions. In the case of Rapin & Allen's work, should they abandon early descriptions for later ones, or should they assume that some of the previously described behaviours have been omitted from later descriptions simply because they have been assumed, for instance? On a more general note, should they consider word finding difficulties to be critical? Should all children given this label demonstrate a good understanding of simple language in structured situations? Should it always be expected that utterances are fluent and well-formed? Without detailed information about the populations concerned and methodological approaches followed, and in the absence of explicit direction, the potential for confusion is clear. It becomes especially apparent when one considers that one or other of these descriptions, either in whole or part, have generally been used as a basis for participant selection in subsequent studies of SPD.

With regard to the inevitability of this position, it is necessary to consider what is involved in the classification of a clinical entity and the role that observations and descriptions of the kind offered by Rapin & Allen (1983, 1987) and Bishop & Rosenbloom (1987) play in such a process. In general, a new clinical category is proposed when a *cluster* of co-occurring symptoms are observed. The observed behaviours are then documented (as above) and the symptom cluster is given a name; in this case, SPD. Boucher (1998) calls this *the stage of clinical description.* For the clinical description to be afforded diagnostic status and the condition to become both recognised and recognisable, however, core features must be established. That is, behaviours which are both *necessary* and *sufficient* for the label to apply, regardless of any additional non-necessary symptoms, must be identified. This happens when the identified behaviours are verified by findings from subsequent studies of this same population.

As mentioned, there have been many further attempts to characterise SPD since the first descriptions of it appeared. These have taken the form of clinical observations (Culloden, Hyde-Wright, & Shipman, 1986; Smedley, 1989), the detailed exploration

of individual cases (e.g. Conti-Ramsden & Gunn, 1986; McTear, 1985; Willcox & Mogford-Bevan, 1995), group comparisons (e.g. Adams & Bishop, 1989; Bishop, et al., 1994; Kerbel & Grunwell, 1998; Vance & Wells, 1994) cohort studies (Conti-Ramsden & Botting, 1999; Conti-Ramsden, Crutchley, & Botting, 1997), and, more recently, checklist studies (Bishop, 1998; Botting & Conti-Ramsden, 1999). In the following sections, the results of the various studies will be presented and their contribution to the understanding of SPD considered.

1.3 Further clinical observations

Two other clinical observations of SPD have been documented in the literature (Culloden, et al., 1986; Smedley, 1989). Without reference to the exact population upon which their observations were based, Culloden et al (1986) provided the following profile.

Comprehension

Literal interpretation of non-literal messages
Difficulty understanding non-verbal communication
Failure to process a whole utterances or focus on its relevant parts

Expression

Mature phonology

Conversation

Poor turn-taking skills
Problems with topic control
Frequent use of questions (usually irrelevant and/or inappropriate)
Tendency to provide tangential responses to questions

Other

Slow concept development
Rigid concept boundaries
A multi-modal difficulty drawing inferences
Idiosyncratic reasoning skills
Hyperlexia
Obsessional or ritualistic behaviour
Inattention
Socially inappropriate behaviours
Distress in new situations
Naïvety

In describing a series of written activities to be used by teachers to help children with SPD, Smedley (1989) provided an incidental clinical account. In addition to conversational impairment he described word finding difficulties (manifest in false starts, hesitations, circumlocutions, semantic and phonemic paraphasias, and neologisms); non-specific vocabulary; rigid concept boundaries; and a generalised difficulty with temporality which results in tense-mixing within and across utterances, problems with appropriate tense-selection, difficulty sequencing events in narratives (despite few problems sequencing picture stories of four or more pictures), and difficulty grasping temporal vocabulary. He also noted problems with spatial vocabulary[5]; problems with sentence formulation at complex sentence level (in particular, problems with connectives and difficulty constructing relative clauses); difficulty understanding and expressing semantic relationships when complex syntax is involved; and problems establishing referents.

Not only are these descriptions different from one another but also from the earlier observational accounts. Table 1.3 shows the extent to which Culloden et al (1986) and Smedley's (1989) accounts agreed with the six common features

[5] Smedley (1989) linked these to a tendency for rigid concept boundaries. For example, he suggested that one child said "the clock is *by* the wall" because he had restricted his use of "on" to refer to objects on the horizontal plane.

highlighted by Rapin & Allen (1983, 1987, 1988) and Bishop & Rosenbloom (1987) (see page 8).

Table 1.3 Points of agreement across accounts

Features common to early descriptions	Culloden et al (1986)	Smedley (1989)
production of fluent well-formed utterances	---	---
word-finding difficulty	---	√
subtle syntactic deficits	---	√
conversational impairment	√	√
good understanding of simple words or phrases	---	---
comprehension worse than expression	---	---

Key: √ indicates features which were described and --- features which were not.

Again, it is interesting to observe what happens when the criterion for agreement is changed. If features that are mentioned in only *one* of Rapin's descriptions, in Bishop & Rosenbloom's description and in Culloden et al's account are compiled, the following profile emerges:

- literal interpretation of non-literal messages
- difficulty interpreting non-verbal communication
- may show hyperlexia
- may be hyperkinetic/distractible
- impaired conversational abilities

The potential for confusion is exacerbated by the lack of background information provided. It is not possible to determine whether these discrepancies reflect genuine differences between the populations or are the product of other factors such as differences in observational or descriptive focus or developmental stage.

1.3 Single case studies

In addition to these clinical descriptions, more than a handful of single case studies of children with a clinical diagnosis of SPD have been published. Approximately half of these have set out to obtain a behavioural profile of the individual concerned (Conti-Ramsden & Gunn, 1986; Jones, Smedley, & Jennings, 1986; McTear, 1985; Sahlen & Nettelbladt, 1993) and the remainder, to examine a specific research question about a narrowly defined aspect of functioning (Leinonen & Letts, 1997a; Snow, 1996; Willcox & Mogford-Bevan, 1995). The two 'sets' of studies will be considered separately.

1.31 Descriptive case studies

To facilitate comparison between these studies, the relevant background information from each has been tabulated, together with the key findings (see Tables 1.4 and 1.5, respectively). For the sake of clarity, the various 'levels' of language function (Crystal, 1987) have been reported separately. It is recognised that, in practice, they overlap.

Table 1.6, overleaf, illustrates the extent to which the studies concur. The figure in the right hand column indicates the number of times each behaviour was reported. Behaviours that were observed in three or more cases are listed below. Frequency of occurrence is noted in parentheses.

Comprehension

Poor performance on standardised assessments (5)
Difficulty understanding questions (4)
Impaired comprehension of temporal relations (4)
Weak grasp of causal & sequential relations (3)

Expression

Echolalia in early language development (3)
Poor naming skills (3)

Table 1.4 Background details provided in descriptive case studies of SPD

Author & Participant Details	Background Information
McTear (1985) • Male • Aged 10;0 • Referred to the author because of marked impairments in conversational functioning. His conversations had been described as "bizarre and confused" and "stilted and formal".	Concerned about the lack of conversational data in support of claims about semantic-pragmatic disability, McTear reports findings from the analysis of conversational data collected from the following three sources: • Four 15 minute samples of audio-/video-taped *conversation*. • *Referential communication tasks* in which the child was required to describe a set of sequentially related pictures so as to enable the experimenter to arrange his random set accordingly; and of an illustration to enable the experimenter to draw an identical one. • *Description* of an anomalous picture, narration of a story depicted in a sequence of pictures; and two-way discussion about a picture portraying a problem situation (e.g. a child locked out of his house). Some information regarding standardised test scores and case history are also given.
Conti-Ramsden & Gunn (1986) • Male • Aged 3;4 - 7;0 • In attendance at a Child Development Centre, then a Language Unit. • Known to both authors since his initial assessment at 3;4.	As an extension of McTear's call for thorough and comprehensive analysis of conversational functioning, Conti-Ramsden & Gunn (1986) aimed to demonstrate the importance of including both longitudinal data and the analysis of other aspects of functioning in efforts to elucidate the nature of SPD. Their report is the culmination of a series of observations made at six-month intervals over a three and a half year period. Again, data was collected from three sources: • *Systematic observation* in the classroom, playground, and home • The administration of *standardised language assessments* • The analysis of spontaneous *language samples*. Some salient points from the child's history are also presented.
Jones, Smedley & Jennings (1986) • Male • Aged 5-7 years • Attending a special school for language impairment. • Identified by the authors as demonstrating high level semantic and pragmatic difficulties over and above phonological and syntactic ones.	Jones et al (Jones, Smedley, & Jennings, 1986) give a descriptive account of a child who, unlike the majority of children in the specialised language school at which he was in attendance, showed higher level difficulties in the areas of semantics and pragmatics in addition to problems in the areas of phonology and syntax. Data was obtained from: • General *observation* • The administration of *standardised language assessments* and profiling procedures.
Sahlen & Nettlebladt (1991; 1993) • Two females • Aged 5;6-8;0 and 5;6-9;0, respectively • Identified by the authors as presenting with SPD in view of behaviours exhibited in a previous larger-scale study of Development Language Disorder.	Sahlen & Nettlebladt (1993) aimed to provide comprehensive profiles of two children with semantic-pragmatic disorder from a "neurolinguistic and interactional perspective" (p119) and, in light of these, hypothesise about underlying mechanisms. Longitudinal data was collected across two and a half years in one case at intervals of twelve and eighteen months and across three and a half in the other case at intervals of twelve and thirty months. Data was taken from five sources: • *Neurolinguistic examination* ,using a non-standardised procedure for which age-references were available. • Tasks of *categorisation*, *rhyming*, and *confrontation naming*. • *Standardised assessment* of receptive language functioning*. • Detailed *linguistic analysis*, focusing on phonology; prosody; syntax; and communicative behaviour • *Psychological investigation*, using the WISC (Wechsler, 1974) and Raven's Coloured Progressive Matrices (Raven, 1962) Key points from the children's case histories are also detailed.

* The SIT (Hellquist, 1992) was used for this purpose on initial assessment and the Token Test (De Renzi & Vignolo, 1962) at the time of the final assessment.

Table 1.5 Key findings from descriptive case studies of SPD

Comprehension	Expression	Conversation	Other
McTear (1985)			
• Problems grasping temporal and causal relations. • Occasional tendency for literal interpretation. • Unable to recognise the sequential relationships between a series of pictures illustrating everyday events. • Impaired inferential ability evident from discussion of the problem situation. Although able to make some simple inferences, they were not those that would be expected in the context of the picture.	• No apparent difficulty with syntax. • Pronoun errors. • Odd prosody giving his utterances a "flat and unemotional" quality (p 131) • Excessive volume from first words. Still apparent at the time of the study. • Previously treated for articulation disorder but phonology normal at the time of the study.	• Able to describe individual pictures. • Sequential and causal relations difficult to discern in his spontaneous description of everyday events. • Descriptions also littered with contradictions. • Failure to provide sufficient information in referential tasks and demonstration of a lack of awareness with regard to the confusion that this caused. • No problems with turn-taking. • Tendency to offer minimal responses (as regards the provision of information). • Failure to use ellipsis. • Tendency to ask questions to which the experimenter was unlikely to know the answer.	• Early childhood was characterised by rocking and a total lack of verbal communication; more interest was shown in objects than in people. • Poor eye contact/orientation to others. • Immature drawing skills. • Discrepancy between performance and verbal IQ (approximately 85 & 72, respectively), as measured on the WISC-R. • Poor short-term auditory memory, as measured on the ITPA and the Digit Span subtest of the WISC-R. • Odd gait and evidence of ideo-motor dyspraxia. • Not seen to engage in spontaneous play; preferred to cut out lists from the newspaper.
Conti-Ramsden & Gunn (1986)			
• No response to single word commands until end of third year. • Standardised assessment of receptive function yielded mixed results. On the RDLS a standard score of -3.0 was achieved repeatedly between 3;10 and 6;0 but had dropped to -1.0 at the close. On the PLS little discrepancy was observed between chronological age and age equivalent scores throughout. • Persistent difficulty understanding questions, feelings words, and time concepts were noted as comprehension developed. • Unable to distinguish 'yes' and 'no' until his fifth year.	• Echolalia heard until beginning of fifth year, then decreased until virtually absent. • No problems with phonology from first words. • First words heard by authors at 3;4. Extended two word phrases emerged at the end of his fourth year. Marked discrepancy observed between ability to produce language such as this in structured situations and the spontaneous use of it for communication. • No apparent difficulties with syntax and use of complex sentence structures by sixth year. • Persistent problems with pronouns noted until end of fifth year when they appeared to be lessening. • Difficulty marking and maintaining tense distinctions persistent into seventh year.	• Began to respond in conversation half way through his fourth year but did not initiate conversation spontaneously until the beginning of his fifth. These initiations were initially limited to comments; requests did not appear until the second part of that year. • Early verbal interactions were characterised by inappropriate grinning, giggling and shouting. • Did not talk to other children until well into his fifth year. • Did not use ellipsis in early responses. Began to do so in fifth year but inconsistently. • Able to initiate, respond, & maintain conversations by middle of sixth year but showed persistent problems with topic control, particularly when abstract reasoning was involved.	• Early development (both general and communicative) was said to be normal until his second year, when he stopped responding and communicating. From that point he would recite nursery rhymes and songs but did not use language otherwise. • Limitations in symbolic play evident at first but signs of development seen from fourth year. • Early assessment of non-verbal abilities (using the Leiter) showed them to be above average. • Pointing and showing behaviours still absent towards end of fifth year. • Shows good motor skills. • Hyperlexia noted from fifth year. • Distressed by change. • Displayed some obsessional behaviours.

* WISC-R = Wechsler Intelligence Scale for Children (Revised) (Wechsler, 1974); ITPA = Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, & Kirk, 1968); RDLS = Reynell Developmental Language Scales (Reynell, 1977); PLS = Pre-school Language Scale (Zimmerman, Steiner, & Pond, 1979); Leiter = Leiter International Performance Scale (Leiter, 1979)

continued overleaf ...

Table 1.5 continued: Key findings from descriptive case studies of SPD

Comprehension	Expression	Conversation	Other
Jones, Smedley & Jennings (1986)			
• Standardised assessments of receptive language (RDLS, TROG, BPVS) one and one and a half years below age level at 5;8 and 7;6, respectively. • Poor understanding of concepts, particularly temporal and causal relationships. • Tendency for literal interpretation. • Poor inferential ability. • Tendency to draw odd visual and auditory associations.	• Some minor residual phonological immaturities at school entry. • Immature syntactic development evident at outset but approaching age level at close. • Failure to use tense markers. • Word-finding difficulty. • Lack of semantic specificity and over-reliance on diexis. • Formulation difficulties. • Poor sequential presentation of ideas. • False starts.	• Poor topic maintenance. • Problems responding to and asking questions. • Difficulty selecting relevant parts of others' utterances. • Problems with amount of information. • Tendency to speak too fast.	• Normal peri-natal history and early development, except speech and language. • Early language development characterised by marked phonological immaturity, echolalia, receptive and expressive deficits. • Discrepancy between verbal and performance IQ on the WPPSI (verbal < performance) at 5;11. • Good auditory and visual memory. • Good symbolic play skills. • Friendly and sociable with adults and peers. • Motivated and attentive. • Hyperlexia.
Sahlen & Nettlebladt (1993) - Child 1 (5;6 8;0)			
• Poor understanding of logico-grammatical constructions (e.g. prepositions, possessives, comparatives) indicated throughout by responses on the SIT and NELLI, despite good performance on the Token Test at eight years. • Poor recognition of emotional prosody reported at outset but given no further comment. • Often reported to show difficulty understanding task instructions and/or requirements. • Persistent problems with phoneme discrimination until sixth year; resolved by eighth year. • Showed difficulty categorising pictures at outset. Able to do so by close but still unable to provide the appropriate category label.	• Some phonological immaturities at outset; mainly resolved by close. • Residual grammatical errors (e.g. omission of function words & semantic errors in use of subjunctives) identified throughout. • Word and sentence repetition below age level throughout. • Story repetition also poor; initially characterised by paucity in the number of events mentioned and latterly by the replacement of story characters and events with people and happenings from real life (despite memory of the events that occurred in the story script). • Poor word mobilisation (or fluency). • Echolalia noted at outset but decreased during sixth year. • Naming ability well below age level. Errors mainly semantic. • Problems with real word rhyming throughout. • Immature prosody.	• Reluctant to participate in dialogue at the outset but eager to do so by final assessment. • Initially, contributions were characterised by the abrupt introduction of new topics, perseveration (of topic) and the presence of echolalia and tangential responses. • Able to fulfil the demands of turn-taking by mid-way through her sixth year but still showing problems with topic control, manifest in tangentiality and abrupt topic shifts. • Poor orientation to own person, time & place and weak general knowledge often apparent in conversational contributions. • Eager to converse by eighth year despite persistent problems with topic maintenance, then indicated by frequent topic drift.	• Familial history of two siblings with severe developmental language disorder and maternal hearing impairment. • Normal early developmental milestones. • Recurrent otitis media in early years but audiometric testing indicated normal hearing at 5;10. • Discrepancy between verbal and performance IQ on the WISC-C (verbal < performance) at 8;0. Performed above mean on Raven's matrices at 7;6. • Motor skills commensurate with chronological age. • Good visuo-spatial function, including Block Design. • Poor short-term auditory memory implied by inability to reproduce simple word lists. • Variable attention and co-operation throughout the assessment period.

* BPVS = British Picture Vocabulary Scales (Dunn, Dunn, Whetton, & Pintile, 1982); TROG = Test for the Reception of Grammar (Bishop, 1982); NELLI (Holmberg & Sahlen, 1986); WPPSI = Wechsler Pre-school and Primary Scale of Intelligence (Wechsler, 1967)

continued overleaf ...

Table 1.5 continued: Key findings from descriptive case studies of SPD

Sahlen & Nettleblad (1993) - Child 2 - 5;6-9;0			
• Poor comprehension of logico-grammatical structures demonstrated throughout. Poor performance on the Token Test at close. • Good phoneme discrimination skills. • Difficulty understanding wh-questions (including requests for clarification) throughout. • Able to grasp central theme of composite picture but lacked understanding of how the events depicted were related. • Able to categorise pictures but unable to give category labels.	• Some phonological immaturities at outset: resolved by close. • Persistent grammatical errors regarding finiteness, gender, omissions, definiteness, and word-order. • Poor recall of words, sentences and stories throughout. Had difficulty retaining the word strings in the former and often provided semantically related words in response. Sentence recall was characterised by perseveration and omission and efforts at story recall lacked organisational structure and suffered from imprecise referring. • Poor word fluency - only able to generate three exemplars of the given category. • Persistent and marked difficulties with naming. • Echolalia evident in early conversational exchanges but steadily decreased until absent at close. • Hesitations, false starts, repetitions frequent throughout. • Prosody immature at the outset; odd at close.	• An active participant in dialogue despite striking conversational impairments. • Tendency to persist with own line of thought and for perseveration of topics. • Proclivity for abrupt topic shift and imprecise referring noted in sixth year. • Showed problems responding to questions and requests for clarification, especially when abstract reasoning involved. Tended to respond with another question or a tangential response. • Conversational difficulties accentuated with age.	• No family history of language impairment. • Recurrent otitis media in early years but audiometric testing indicated normal hearing at 6;6. • Discrepancy between verbal and performance IQ on the WISC-C (verbal < performance) at 8;6. Performed below the mean (but within normal limits) on Raven's matrices at 8;0. • Good motor skills. • Visuo-spatial skills generally good but Block Design poor. • Good sense of musical rhythm but poor performance on tasks of verbal rhyming ability.

Table 1.6 Features identified in those case studies which have focused on behavioural description

Highlighted Features	McTear (1989)	Conti-Ramsden (1986)	Jones (1986)	Sahlen 1 (1993)	Sahlen 2 (1993)	
Comprehension						
Poor performance on standardised tests	√	√	√	√	√	5
Difficulty understanding questions	√	√	√	√	√	5
Poor understanding of temporal concepts	√	√	√	√	—	4
Poor understanding of spatial concepts	—	—	—	√	—	1
Difficulty appreciating sequential/casual relations	√	—	√	—	√	3
Rigid concept boundaries	√	—	√	—	—	2
Literal interpretation	√	—	√	—	—	2
Difficulty making inferences	x	—	√	—	—	1
Poor phoneme discrimination	—	—	—	√	x	1
Problems with rhyming (real word)	—	—	—	√	√	2
Tendency to make odd associations	—	—	√	—	—	1
Expressive Language						
Intact phonology	(√)	√	x	(√)	(√)	4
Intact syntax	√	(√)	(√)	x	x	3
Difficulty marking/maintaining tenses	√	√	√	—	—	3
Poor word/sentence repetition	—	—	—	√	√	2
Poor naming skills	—	—	√	√	√	3
Hesitations, false starts, repetitions etc.	—	—	√	—	√	2
Pronoun errors	√	(√)	—	—	—	2
Excessive volume	√	—	—	—	—	1
Odd prosody	√	—	—	√	—	2
Excessive speed	—	—	√	—	—	1
Echolalia	—	(√)	—	(√)	(√)	3
Conversation						
Eager/willing to participate in conversation	—	(√)	—	(√)	√	3
Unresponsive in conversation	—	(√)[6]	—	—	—	1
Minimal responses	√	—	—	—	—	1
Failure to use ellipsis	√	(√)	—	—	—	2
Inappropriate utterances	√	—	—	—	—	1
Asks inappropriate questions	√	—	√	—	—	2
Tangential responses to questions	—	—	—	√	√	2
Contradictory utterances	√	—	—	—	—	1
Poor topic control	—	√	√	√	√	4
Poor referential skills	√	—	√	√	√	4
Poor turn-taking	x	—	—	—	—	-1
Verbose	—	—	—	—	√	1
Other						
Early language delay	[√]	√	√	—	—	3
Mismatch between performance and verbal IQ	√	[√]	[√]	√	√	5
Poor auditory memory	√	—	x	—	—	1
Good visuo-spatial skills	—	—	—	√	√	2
Gross motor movement deficits	√	—	—	[√]	[√]	2
Symbolic play lacking, atypical or absent	√	√	x	—	—	2
Hyperlexia	—	√	√	—	—	2
Inattention		√	x	—	—	1
Atypical interaction	√	—	—	—	—	1
Atypical behaviours	(√)	—	—	—	—	1
Lack of joint-referencing e.g. pointing	—	√	—	—	√	2

Key: √ = reported; x = refuted; — = not given mention; [ ] = inferred; ( ) = appeared early in development but resolved with time.

Use of bold type indicates that one or more of the studies describe the contrary behaviour.

6 In this case the child became *less* responsive in conversation, rather than more responsive, with the passage of time.

Conversation

Poor topic control (4)
Poor referential skills (4)
Eager to participate in conversation (3)

Other

Discrepancy between verbal and performance IQ (5)
Early language delay (3)

The level of agreement is striking, given the retrospective nature of these comparisons and inevitable differences in observational and descriptive focus between the studies involved. Poor performance on standardised assessments of receptive function, and a discrepancy between performance and verbal IQ were reported in every case. Poor comprehension of questions and temporal concepts were described in all but one case, as were problems with topic control and referential communication.

However, there were also some points on which the accounts contradicted one another. For example, McTear (1985), Conti-Ramsden & Gunn (1986) and Sahlen & Nettelbladt (1993) all highlighted age appropriate phonological development whereas Jones et al. (1986) reported persistent phonological deficits. Similarly, Conti-Ramsden & Gunn (1986), Jones et al. (1986) and McTear (1985) all reported intact syntactic functioning whereas Sahlen & Nettelbladt (1993) reported deficits in this domain.

Discrepancies like these have important implications for the characterisation of SPD. If a behaviour is not reported in every case it could be argued that it is neither a necessary nor sufficient feature of SPD. However, for this assertion to hold it must be clear that no extraneous factors are involved. It is interesting to note that the child who continued to show phonological immaturities was younger than the children whose phonological functioning was relatively unimpaired (see above). Thus, the

discrepancy could simply be a function of age. It is difficult to draw a similar conclusion about syntactic functioning since the two children who demonstrated persistent deficits were older than some of those who did not.

It is not only important to consider the extent to which findings from the case studies themselves concur, but also that to which they are consistent with previous accounts of SPD. This is attempted in Table 1.7. Behaviours common to the early observational accounts of SPD (see page 8) are listed in the left-hand column and agreement levels are shown in the right-hand column. A tick indicates that the behaviour was observed in three or more of the case-studies; a cross that it was refuted by three or more of the case studies; a dash that it was mentioned in fewer than three of the case-studies or not at all; and a question-mark, that the relevant findings were ambiguous.

Table 1.7 Comparison between behavioural descriptions yielded by early clinical observations and case studies.

Features Common to Early Descriptions	Level of Agreement
production of fluent well-formed utterances	x
word-finding difficulty	√
subtle syntactic deficits	?
conversational impairment	√
good understanding of simple words or phrases	x
comprehension worse than expression	--

The content of Table 1.7 provides strong support for the notion that the clinical picture of SPD is dominated by conversational impairment (on this point agreement was unanimous) and encompasses word-finding difficulties. However, it also highlights inconsistencies across the findings yielded by the different approaches. The most unequivocal of these concerns receptive language ability. Whereas the early observational accounts highlighted good understanding of simple language in structured settings, all five descriptive case studies described problems in this regard.

This prompts two questions. First, why might such a striking inconsistency have arisen? And second, at what point should the conceptualisation of a condition be reconsidered or changes to the original conceptualisation of it be made? To consider the first of these questions it is necessary to recall the basis upon which the observations of receptive function were made. In Rapin & Allen's studies, receptive language levels were mainly inferred from observation of the child's compliance with commands and responses to questions and comments in conversation[7]. In the case-studies, receptive language ability was determined using standardised measures. It is possible that, in the first instance, receptive deficits were overlooked. It is also worth noting that, unlike the majority of case-studies which involved school age children, Rapin & Allen focused their attention on *pre-schoolers*. It is possible that receptive difficulties become more apparent in the school years when more complex syntactic forms, concepts, and so on, become involved.

The second of the two questions above, regarding the point at which the conceptualisation of a condition should be revised, is more difficult to resolve as there is no simple answer. However, it is in serious need of attention. Rapin & Allen recognised their early characterisations as tentative and highlighted the need for more rigorous analysis in order to establish their validity (Rapin & Allen, 1983). Yet when the findings from such analyses have refuted or extended the early accounts they appear to have been rejected as idiosyncrasies, or simply neglected, rather than incorporated into the developing schema of SPD. This may, in part, be due to the fact that studies of this population are reported across disparate sources so that their cumulative capacity is rarely felt. It has almost certainly been perpetuated by the continued presentation of early descriptions (or worse, partially compiled accounts) of SPD, without acknowledgement of the inconsistencies and complexities involved in its characterisation, in both academic writing and clinical teaching. Whatever the reasons,

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[7] Recall that no information of this kind was provided by Bishop & Rosenbloom (1986) so no comments can be made about their work on this point.

it is difficult to envisage significant progress in the characterisation of SPD until this matter is given some thought.

1.32 Investigative case studies

As mentioned in the introduction to this section, there have also been a number of case studies that have focused on a more narrowly defined aspect of functioning (Leinonen & Letts, 1997b; Snow, 1996; Willcox & Mogford-Bevan, 1995). Willcox & Mogford-Bevan (1995) were interested in the extent to which abnormal conversational behaviours could be remediated. They investigated the conversational abilities of a boy who had been identified by his educational psychologist as having SPD (and who was considered by both authors to fit Rapin & Allen's (1983) clinical description of the condition) both before and after intervention. The child was aged 6;10-7;9 and was attending a Language Unit at the time of the study. No specific details were provided about the child's language level at that time but it was noted in passing that he showed some residual syntactic deficits. Background details indicated a history of language delay in spite of an unremarkable family history, the presence of atypical behaviours such as hand-flapping in early development and a chequered educational history[8].

Conversational data was obtained from two sources, before and after intervention. First, the child's communicative interactions were observed in a variety of school settings. Information about the child's conversational partners, conversational topic, the grammatical form his of initiations/responses, and the linguistic and extra-linguistic context was recorded. Second, audio- and video-recordings were made of conversational interactions during play with partners of different ages and varying degrees of familiarity. Analysis concerned the child's use

[8] The child had been in attendance in a mainstream nursery and had spent one year in a school for children with autism before being placed in the Language Unit in which the study took place.

of initiations, directives, attention-getting devices, social routines, responses, and cohesive devises. The child's ability to deal with conversational breakdown was also considered. The following conversational anomalies were highlighted in the first assessment. The child:

- made ineffective initiations because he (i) failed to secure the attention of the addressee, and (ii) tended to use the declarative form when making a request or attempting to direct others, despite being able to produce interrogatives. For example, when wanting his teacher to mark his work, he stood beside her and said "I done good work";
- asked inappropriate questions. For example, he asked the teacher "what shall I do?" immediately after she had given him instructions;
- was more likely to initiate interaction with adults than with other children;
- frequently failed to respond to others' initiations or gave a tangential response;
- did not attempt to request clarification when he had evidently failed to comprehend;
- did attempt to offer clarification when requested to do so - by non-verbal means or repetition - but with varying degrees of success;
- tended to repeat the speaker's last utterance to indicate agreement when interacting with an adult;
- failed to engage in social routines, such as greeting and departure;
- did not use politeness forms.

A programme of therapy was then implemented in two phases. The first phase aimed to increase the effectiveness of the child's directives by facilitating the use of polar interrogatives (as opposed to declaratives) for this purpose, increasing his use of attention-getting devices, and introducing the word 'please'. The second phase aimed to increase the child's responsiveness to others' initiations. Re-assessment indicated progress in every dimension, except for the the child's tendency to repeat part or all of his (adult) partner's last turn.

Willcox & Mogford-Bevan's study extended the scope of investigation to address the responsiveness of conversational deficits to intervention. There is clearly therapeutic value in this advance. It also has theoretical implications for the establishment of causal mechanisms.

Snow (1996) was concerned with the extent to which the tendency to provide inappropriate responses in conversation could be explained by an underlying linguistic deficit in the ability to understand certain interrogative forms (wh-words). His subject was a boy, aged 4;1, whom he considered to show the "constellation of behaviours compatible with Bishop's (Bishop & Adams, 1989) definition of 'specific semantic-pragmatic disorder'". The features that Snow highlighted in his behavioural description of the child are summarised in Table 1.8.

To test his hypothesis - that a difficulty understanding wh-questions was responsible for the production of inappropriate responses in conversation - Snow devised two question-and-answer activities. In the first activity, the child was told a story by the experimenter relating to the picture book at which they were both looking. On completion of the story, the child's mother was instructed to ask the child the sorts of questions that she might ordinarily pose in an activity of this kind. Thirty-seven questions and answers were recorded. In the second activity, a different story (about a familiar character) was told in the same way. This time, the questions were asked by the experimenter rather than the parent and were posed at appropriate junctures in the 'text' rather than at the end of the story. A total of fourteen questions, split evenly between *who* and *what* interrogative forms, were asked. In each case, the child's responses were judged to be appropriate or inappropriate[9]. Overall the results indicated variable comprehension of wh-question forms. In the first condition some developmentally 'easy' question forms, such as *yes/no* and *where*, were always responded to appropriately, whereas some developmentally advanced question forms,

[9] No definition of "appropriacy" was provided but inter-rater agreement was high (92%).

Table 1.8 Participant details provided by Snow (1996)

Comprehension	Expression
• Poor understanding of concepts indicated by a z-score of more than two standard deviations below the mean on the receptive scale of the ASSET. • Satisfactory understanding of syntax suggested by average scores on the receptive scale of the NSST.	• Jargon & echolalia during early language development, still present but diminishing by 4;0. • Good articulation and fluent expressive language. • Generally shows a good command of syntax and morphology in spontaneous speech although occasionally prone to use incorrect verb forms and make word-order errors. • Pronoun errors (regarding gender). • Word-finding difficulty evident in lexical selection errors and use of neologisms in spite of sound receptive command of the target words. • Scored poorly on standardised assessments of expressive function, achieving a z-score of/more than two standard deviations below the mean on the expressive scale of the NSST, and on the SPELT-II, respectively; and a z-score more than one and a half standard deviations below the mean on the expressive scale of the ASSET.
Conversation	**Other**
• Demonstrates functional use of language for commenting, labelling, requesting, responding, social interaction and affective expression.	• Good health in early development, with the exception of a severe lung infection at birth and a history of otitis media until 2;0. • Audiometric testing indicated normal hearing at the time of the study. • Unremarkable early speech/language development but for the onset of echolalia (see 'Expression'). • Teacher reports of overall good participation in school except for a tendency for inattention in group activities and a proclivity to make comments at inappropriate times.

such as *how* or *why* ,were never responded to appropriately. In the second condition the child provided more appropriate responses to *what* questions (such as "what is his name?") than *who* questions (such as "who is this?") even when there was no difference in the relational concept that was being expressed (in this case [predicate noun]). In view of these findings, Snow concluded that the child's problem was alinguistic, rather than cognitive, one. His findings support earlier observations of difficulties with the comprehension of wh-questions (Rapin, 1982; Rapin & Allen, 1987, 1988). They also have theoretical implications

which will be discussed in the next chapter.

Leinonen & Letts (1997b) also examined the comprehension of questions with regard to conversational inappropriacy but focused on inferential ability. Their subject was a girl (aged 9;8 - 10;3) whom they identified as presenting with "pragmatic impairment" on the basis of discussion with her class teacher and speech and language therapist. The child was attending a Language Unit at the time of the investigation. Those background details that were provided by the authors are summarised in Table 1.9.

Table 1.9 Participant details provided by Leinonen & Letts (1997a)

Comprehension	Expression
• Poor performance on standardised assessments of receptive language abilities, as indicated by age equivalent scores of 5;3 on the TROG at chronological age 8;10 and 10;2 and of 6;11 on the BPVS at chronological age 10;2. • Poor comprehension of time/space concepts. • Difficulties understanding discourse.	• Good expressive language abilities. • Use of both simple and complex grammatical structures indicated by LARSP. • Formulation difficulties evident in hesitation phenomena and re- formulations. • Difficulty constructing narratives as indicated by an age equivalent score of 4;0 at chronological age 8;10 (and only slight improvement by age 10;1) on The Bus Story.
Conversation	**Other**
• Eager to participate in conversations. • Tendency to make irrelevant conversational contributions.	• Hyperlexia. • Previous testing of non-verbal abilities reported to show them to be within normal limits (no more information available).

The child was asked a series of questions about two composite pictures (conditions 1 and 2), a story presented aurally with visual support (condition 3), and a story presented aurally without visual support (condition 4)[10]. Some of the questions could be answered directly on the basis of information that had been presented ('descriptive' questions) and some required the child to go beyond the information presented in order to arrive at a correct response ('inferential' questions). The inferential questions were followed by a justification question. In each case, the

[10] These were taken from Bishop & Adams (1992)

child's responses were scored for appropriacy. Answers to the descriptive questions were considered appropriate if they reiterated the relevant information given in the text or picture. Answers to inferential questions were considered appropriate if the *justification* that the child gave indicated logical (and relevant) reasoning. Although their study focused on a single child, Leinonen and Letts also collected control data from eight 6- and 8-year old normally developing children.

Leinonen & Letts noted that the ratio of appropriate to inappropriate responses made by their subject varied from one condition to the next. She made more appropriate responses than inappropriate responses in conditions 1 and 3. In the first condition the ratio of appropriate to inappropriate responses was 62:39; and in the third condition the ration of appropriate to inappropriate responses was 86:14. In condition 2 more inappropriate responses were made than appropriate responses (the ratio was 32:68) and in condition 4 the ratio of inappropriate to appropriate responses was even. In contrast, both control groups made more appropriate than inappropriate responses in all four conditions. In an attempt to explain the variability in their subject's performance, and to address their original research question, Leinonen & Letts re-analysed the data in relation to question type (see Table 1.10). They concluded that their subject had a specific difficulty interpreting inferential questions. The authors suggested that inappropriacy rates were particularly high in condition 2 because, in it, all of the questions asked were inferential. They explained the equal distribution of response types in condition 4 as a function of memory load.

Table 1.10 Ratio of appropriate:inappropriate responses according to question type

	Descriptive	Inferential
Condition 1 (*park picture*)	5:1	2:5
Condition 2 (*flood picture*)	0:0	6:31
Condition 3 (*story with pictures*)	7:0	5:2
Condition 4 (*story without pictures*)	3:3	2:2

However, there are a number of problems with Leinonen & Letts' study. The first concerns arithmetical error[11]. Although amendment of these errors falls in favour of their hypothesis, the anomalies do little to foster confidence in their analysis. The second point concerns the lack of consistency across conditions in the number of questions asked. In Condition 2, in which a high proportion of the subject's responses were inappropriate, thirty-seven questions were asked as compared with ten to fourteen in the other conditions. Given this disparity, it is possible that the results in Condition 2 were influenced by fatigue, boredom or the repeated experience of failure. The third issue involves the measure of appropriacy adopted in the case of inferential questions. Recall that the child's responses to inferential questions were measured in terms of her ability to *justify* her responses rather than with regard to the acceptability of her initial response. Although the inclusion of justification questions of this kind can be extremely telling, to rely on them alone to assess aspects of comprehension may be misleading. In this case, for example, it is possible that it was the child's ability to manipulate expressive language sufficiently to formulate a justification that was at fault (recollect her difficulties with narrative construction) rather than the ability to make the necessary inferences. Without information about the child's initial responses to the inferential questions, this possibility cannot be disregarded. For these reasons, the amount that can be inferred from Leinonen & Letts' study is questionable.

1.33 Summary

In a number of ways these case studies support the early observational accounts of SPD. For instance, like the observational accounts, they highlighted a

[11] The figures which the authors provided in their analysis of the overall percentage of appropriate versus inappropriate responses (see page 27) do not tally with those which they gave in their more detailed comparison of the ratio when question type is taken into account (see Table 1.10). Recalculation of the former on the basis of the latter prompts amendments to the first two conditions, such that the results become 54:46 and 16:84, respectively.

clinical picture dominated by conversational difficulties and marked by receptive deficits. They also highlighted word-finding difficulties as a prominent feature and implied relatively unimpaired phonological functioning. However, the single case descriptions also contradict the early observational accounts in a number of ways. Most notably, whereas the early accounts detail good understanding of simple language in structured situations, the case studies consistently highlighted poor performances on receptive language assessments. In some case studies, expressive formulation deficits have also been reported. These inconsistencies raise important questions about if and when changes to the original conceptualisation of SPD should be made.

1.4 Group comparison studies

As stated, other researchers have conducted group comparisons in their investigations of SPD (Adams & Bishop, 1989; Bishop & Adams, 1989, 1991, 1992; Bishop, Hartley, & Weir, 1994; Kerbel & Grunwell, 1998; Leinonen & Letts, 1997a; Vance & Wells, 1994). These have involved comparison between the performance of a group of children identified as presenting with SPD with a group who present with a more traditional form of language impairment (but not SPD) and/or with that of normally developing controls, both selected on the basis of their language level or chronological age. Each of these studies has set out to establish the extent to which a deficit highlighted in clinical observations or case descriptions to SPD is specific to, and universal in, SPD. There have been four main lines of enquiry. First, conversational ability (Adams & Bishop, 1989; Bishop & Adams, 1989); second, referential communication (Bishop & Adams, 1991; Leinonen & Letts, 1997a); third, inferential comprehension (Bishop & Adams, 1992); and fourth, the understanding of non-literal language (Kerbel & Grunwell, 1998; Vance & Wells, 1994). Each will be considered in turn.

1. 41 Group studies of conversational functioning

In 1989, Bishop & Adams set out to "find a means of objectively characterising *the conversational* problems *shown by* children with 'semantic-pragmatic disorder'" (Adams & Bishop, 1989, p213). For this purpose they recruited an experimental group of 57 language-impaired children, 14 of whom were identified as presenting with SPD on the basis of (a) school judgement; or (b) the extent to which they fitted the clinical picture described by Bishop & Rosenbloom (1987). All children in this experimental group attended schools or units specialising in the education of children with specific language impairments, were between the ages of eight and twelve years and scored within normal limits on the Block Design and Picture Completion subtests of the Wechsler Intelligence Scale for Children - Revised (WISC-R) (Wechsler, 1992). Children who did not meet these criteria, showed physical speech disorders, profound comprehension problems or who were unintelligible were excluded. Adams & Bishop (1989) also included a control group which consisted of 10 normally developing children at each of the following ages: 4, 5, 6, 8, 10 and 12 years. None of the children in this group were receiving Speech and Language Therapy and all had English as the primary language spoken at home. Between five and ten minutes of conversation between each child and one or other of the authors was collected. To control for content and topic, each conversation was initiated around a set of photographs depicting common events. The transcripts were then analysed using a procedure which was devised on the basis of normal conversation (Adams & Bishop, 1989), concerning exchange structure, turn-taking, conversational breakdown/repair and cohesion.

The findings highlighted trends for various conversational anomalies in the SPD group. For example, there was a trend for children in this group to produce

more utterances per turn than any of the other groups. Furthermore, unlike the other-SLI group, the SPD group did not produce significantly more unintelligible utterances than controls. However, only one conversational behaviour - a high rate of initiations - was found to be specific and stable. In addition, there were several respects in which the SPD group behaved in the same way as the other language impaired group and/or like younger normally developing controls. For example, both language impaired groups produced more initiating statements than age-matched controls, but were comparable to younger controls in this manner and no differences were found between either language-impaired group and age-matched controls with regard to responsiveness in conversation. Further details of the findings are shown in Table 1.11.

Table 1.11 Summary of key findings from Adams & Bishop (1989)

Exchange Structure

- The SPD group produced more initiating questions than all the other groups.
- Both language impaired groups produced more initiating statements than age-matched controls, but did not differ from younger controls.
- There were no differences between either language-impaired group and age-matched controls regarding the proportion of minimal verbal , minimal non-verbal , or extended responses given.
- Both language impaired groups produced more follow-ups than age-matched controls (the SPD group more so) and were comparable to younger controls in this respect.
- The other-SLI group produced more unintelligible utterances than age-matched controls. The SPD group did not.
- There was a non-significant trend for children with SPD to produce a higher number of utterances per turn than the other groups.

Turn-taking

- Adult interrupt was the only result to reach significance. The rate was significantly higher in the SPD group than any of the other groups.
- The SPD group demonstrated a non-significant trend for an excessive number of 'gaps' or "notable interval(s) between the completion of the end of the adult's last utterance and the beginning of the child's" .

Repairs

- Significantly more adult requests for clarification were made to both language impaired groups and there was a non-significant trend for this to be more so in the SPD group.

Cohesion

- The SPD group did not differ from age-matched controls on the indices of cohesion. The other-SLI group, who were poorer in this respect, did.

The authors did not feel that their findings captured the true essence of the conversational difficulties shown by children with SPD. The fact that significantly more adult interrupts were made in conversations with members of the SPD than any of the other groups and the trend for more adult requests for clarification in the SPD group would suggest significant problems in conversation. Yet a high rate of initiations was the only characteristic behaviour to emerge. This prompted the authors to re-analyse their data (Bishop & Adams, 1989). This time, rather than look for conversational behaviours that they had defined in advance, they identified inappropriate[12] utterances and then classified them. The results indicated an association between high inappropriacy ratings and SPD, but not without exception. They also highlighted differences in the types of inappropriacy shown by the two language-impaired groups and younger controls[13]. Unlike the younger controls, the SPD group demonstrated high rates of inappropriacy in the categories of expressive syntax/semantics, too much information, too little information and unusual content/style. Like the younger controls, and unlike their other language-impaired peers, they were also inclined to violate exchange structure and to fail to take context into account in comprehension.

Given repeated reports of verbosity in the clinical accounts of SPD (Rapin & Allen, 1983; Sahlen & Nettelbladt, 1993), Bishop was surprised to find that the SPD group did not produce *significantly* more utterances per turn nor used longer utterances than the other language impaired groups or normally developing controls (Bishop & Adams, 1989). Together with colleagues, she proposed that it might be the high frequency of initiations rather than amount of talking *per se* that gave rise to this impression of verbosity (Bishop, et al., 1994) and set about exploring the nature of the initiations made by these children more closely, focusing on the situation-

[12] Inappropriate utterances were seen as those which generated a "sense of oddness" and/or interrupted the "conversational flow" rather than those which were simplified or grammatically ill-formed (Bishop & Adams, 1989, p242).

[13] The older control children were excluded from this analysis because they showed exceptionally low rates of inappropriacy.

specificity of this behaviour and its relationship with interlocutor familiarity. Conversations between each child and a familiar adult (the child's speech and language therapist or teacher) and each child and an unfamiliar adult (one of the researchers) were elicited in both an 'interview' (as in Adams & Bishop, 1989) and a toy play setting. Six children, of between 9 and 12 years of age, judged by their teachers and speech and language therapists to fit the clinical picture of SPD described by Bishop & Rosenbloom (1987) and with a non-verbal IQ of above eighty, participated in the investigation. Six normal control children of a similar age and ability were also included.

The rate of initiations produced by the SPD was strongly influenced by setting. Significantly more initiations were observed in the toy setting than in the interview setting. A similar trend was shown by the control group but it did not reach significance. There were no significant effects regarding interlocutor familiarity, although the control group demonstrated a trend to produce more initiations in conversation with a familiar adult while the SPD group showed no effect. In an effort to determine whether a high rate of initiations entailed violation of turn-taking and the rules of conversational exchange, additional analysis of exchange structure was then undertaken. Investigation of the type of utterance that occurred immediately prior to the child's initiation failed to reveal any significant differences between the groups. Moreover, examination of the utterances that followed the adults' initiations demonstrated that, in both groups, it was uncommon for adult initiations to be ignored.

These investigations have made a valuable contribution to the drive to characterise SPD, not least because they have underlined the need to be more specific about what it is about the conversations of these children that is impaired and the need to make a distinction between abnormality and immaturity.

1.42 Group studies of referential communication

Two group studies of referential communication skills have been reported in the literature (Bishop & Adams, 1991; Leinonen & Letts, 1997a). Bishop & Adams (1991) administered a referential communication paradigm to those children who took part in their previous study of conversational inappropriacy (Bishop & Adams, 1989) (see page 31). Each child was presented with twelve sets of eight picture cards which were identical to one another except for one of three critical features. For example, in the case of the ice-cream item, the critical features were vanilla/strawberry, red/brown sauce, and flake/no flake. The cards were placed face up on a table at which the child and the experimenter were sitting opposite one another. In each set one card was designated the target and a star was drawn on its underside. The child was told to turn over the cards in order to find the star while the experimenter turned away. Once the child had done this, he[14] was instructed to replace the cards and to describe the target to the experimenter so that she, too, could find the star.

Leinonen & Letts' (1997a) used a similar task. The child and experimenter had an identical selection of objects in front of them and a pile of cards depicting those objects in a range of configurations. Each participant took it in turns to describe a card from his pile in sufficient detail that the other could arrange his objects to match the picture on the card. Seven children diagnosed by their therapist as presenting with SPD (mean age 7;4) and seven age matched normally developing controls (mean age 7;1) took part.

Contrary to expectation, neither study revealed a referential deficit specific to the SPD group, even when the number of relevant features known (as opposed to given) was taken into account (Bishop & Adams, 1991). Although the SLI group in Bishop & Adams' (1991) study performed more poorly than chronological age-

[14] For simplicity the pronoun he has been used to refer to the child throughout the main body of the text. When a specific child has been referred to the relevant pronoun has been used.

matched controls as a whole, there was considerable within group variation and degree of conversational inappropriacy was not found to bear any correlation with performance on the referential communication task. Six of the eight SLI children who achieved the highest scores regarding conversational inappropriacy performed well within normal limits on the referential communication task. On the other hand, non-verbal ability, comprehension of grammatical structure, naming ability, semantic score, expressive phonology were found to show a significant correlation ($p<.05$) with referential scores. Leinonen & Letts also failed to demonstrate a significant impairment in referential ability specific to the SPD group, although they did highlight trends in this direction. Neither set of researchers considered their findings to be a true reflection of the referential capacity shown by these children in everyday life. Bishop & Adams (1991) suggested that the performance of the SPD group may have been enhanced by the visual cues inherent in their picture based task. At first glance, this proposition would appear to be supported by the fact that the children with SPD in Leinonen & Letts' (1997a) study, which offered less in the way of visual support, did tend to fare worse than their peers.

Interestingly, Leinonen & Letts (1997a) also included some comparison between the children's ability to carry out the experimenter's instructions when these included sufficient information for the child to act accordingly and when they did not. This was done to explore the child's use of clarification requests and to investigate the impact of grammatical loading on their performance, relative to the controls. There was no significant difference between the two groups in their ability to carry out adult instructions but there was a trend for poorer performance in the SPD group. Moreover, the SPD group produced significantly fewer requests for clarification ($p<0.01$) than the control group. Both groups showed the same overall pattern of difficulty as far as grammatical loading was concerned, although the SPD group did show a trend to perform more poorly when complex grammatical structures were involved.

1.43 Group studies of inferential comprehension

Like Leinonen & Letts (1997b), Bishop & Adams (1992) also followed up earlier observations that children identified as presenting with SPD often demonstrate difficulties making inferences (e.g. Culloden, Hyde-Wright, & Shipman, 1986). For this purpose, Bishop & Adams used a series of story comprehension tasks. Each child was presented with four stories, two aurally and two pictorially in the form of a four or five picture sequence. After each story the child was asked fourteen questions. Half of these requested information that had been explicitly stated or shown ('literal' questions) in the story. The other half required the child to 'read between the lines' ('inferential' questions). Sixty-one 8- to 12-year-old children with SLI[14], and a mean age of 9;9 (s.d. 18 months), participated in the study. Within the SLI group, 19 of the children were designated by the authors as presenting with SPD because of their high conversational inappropriacy ratings. Ten normally developing children of each of the ages 5, 6, 8, 10, and 12 also took part. In each case, the same inclusion and exclusion criteria as those already reported in studies by the same authors applied (see page 30).

As anticipated, Bishop & Adams (1992) found that, as a whole, the SLI group performed significantly worse than their non language-impaired peers and at a level that was similar to normally developing controls several years their junior. Contrary to expectation, however, they failed to find a significant difference between the two SLI groups in inferential ability. The SPD group performed worse *regardless of question type.* Although they did show a trend for poorer performance on the inferential questions, this failed to reach significance. No effect was found for mode of story presentation in any group. Correlations were found between story comprehension and levels of inappropriacy and receptive language scores but not non-verbal function or expressive language level.

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[14] 54 children in this group had taken part in Bishop & Adams' studies of conversational functioning (Adams & Bishop, 1989; Bishop & Adams, 1989).

1.44 The exploration of idiom comprehension

The final aspect of functioning that has been studied in SPD using a group comparison approach is idiom comprehension (Kerbel & Grunwell, 1998; Vance & Wells, 1994). This, again, was prompted by clinical observations of difficulties interpreting non-literal language in SPD (Bishop & Rosenbloom, 1987; Rapin & Allen, 1987). Vance & Wells (1994) studied idiom comprehension in seven children identified as presenting with SPD and eleven with language impairments not primarily in the semantic or pragmatic domains. All of the children showed a language age of between 6 and 8 years on the receptive scale of the CELF-R (Semel, Wiig, & Secord, 1987) and non-verbal abilities within normal limits. A group of normally developing children matched for receptive language ability also took part. Ten tape-recorded idioms, set in a linguistic context, were played to each child. At the same time he was shown three line drawings, one of which depicted the usual non-literal interpretation of the idiom in question, one a literal interpretation, and the other of which served as a distractor. For instance, for the text which read *"Laura and James couldn't go out to play because it was raining cats and dogs"*, the line drawings represented (a) heavy rain falling, (b) cats and dogs falling through the air with raindrops, and (c) cats and dogs on the ground with no rain. The child had to select the picture that best fitted the text. Before the task began, the child was told that a non-literal interpretation would be required. Responses were scored as appropriate or inappropriate.

Contrary to expectation, no significant differences were found between the two clinical groups. Surprisingly, the SPD group showed a slight trend to perform better and no greater tendency to make literal errors. When their findings were collapsed, the two language-impaired groups did not differ from controls in their success rate or in their tendency for literal interpretation. Unfortunately, no indication was given of how each of the language-impaired groups faired individually in these respects. On the basis of their findings, Vance & Wells (1994) proposed that "non-literal

comprehension is not diagnostic of SPD" (p38). However, they also acknowledged a disparity between test performance and non-literal comprehension in everyday life, citing the example of an SPD participant who had performed well on their task but who was horrified by his mother's declaration that he was "full of beans" (when he had eaten nothing of the sort) just moments after the task was complete. This led them to suggest that the problem might not involve an inability to interpret idiomatic expressions but, instead, an inability to realise when such an interpretation is required.

This possibility was recently picked up on by Kerbel & Grunwell (1998) who devised an elegant play-based task designed to reflect this dichotomy between what they termed the 'semantic' and 'pragmatic' aspects of idiom comprehension[15] and more closely mirror the demands of idiom comprehension in everyday life. In this task, the child is told a short story into which twelve common idiomatic expressions have been embedded. The story is then told a second time and the child is required to 'act it out' sentence by sentence using appropriate play materials and props. Each idiom re-enactment is broadly coded as appropriate, inappropriate or ambiguous. Narrower codes are then allocated to indicate degree of appropriacy, type of inappropriacy and source of ambiguity, respectively.

Using this inventive approach, the authors set out to determine the true extent of idiom comprehension problems in children with semantic-pragmatic difficulties and the degree to which they might prove a valid diagnostic marker of primary impairments in these domains. They administered the task to four groups of children: a group with semantic-pragmatic difficulties (SP), a group with 'other language impairment' matched for chronological age, and two groups of normally developing controls (one comprising of 6- to 7-year olds and the other of 10- to 11-year olds). Unlike previous studies, the semantic-pragmatic group in this study included children

[15] In this context, Kerbel & Grunwell (1998) used the term 'semantic' to refer to the ability to interpret figurative language and 'pragmatic' to refer to the realisation that a figurative interpretation is required.

diagnosed as having either 'semantic-pragmatic difficulties/ disorder', high-functioning autism, or Asperger syndrome.

The study yielded some interesting results. The SP group made significantly fewer 'appropriate' responses, and significantly more 'inappropriate' responses than all of the other groups but, like the other groups, made significantly more appropriate than inappropriate responses overall. There were no differences in the number of ambiguous responses made. Interestingly, the SP group did not differ from the other groups in the number of literal responses they made but did produce significantly more "fuzzy" responses. That is, responses which were unrelated to the idiomatic sense, the literal sense or to any other feasible figurative interpretation.

Some within-group analysis of the SP group was also undertaken. Two subgroups were identified for this purpose. One subgroup consisted of children diagnosed as having 'semantic-pragmatic disorder/difficulties' (SPD) and the other subgroup consisted of children with Asperger syndrome/high-functioning autism (ASP). Some interesting discrepancies emerged. First, the ASP group made fewer appropriate responses and more inappropriate responses than the SPD group, at a level which approached significance. There was no difference in the number of ambiguous responses made. Second, the SPD group made significantly more appropriate than inappropriate responses. This was not the case for the ASP group. Third, there were no significant differences between the number of literal responses made by the two groups but the ASP group produced significantly more "fuzzy" responses.

As far as the characterisation of SPD is concerned, the conclusions that can be drawn from Kerbel & Grunwell's study are limited by the fact that, having established clear within group differences in the SP group, they failed to provide information about the performance of the two sub-groups relative to controls. Thus, it is possible to determine from their results that, as a whole, the performance of the SP group was

significantly poorer than that of their other language-impaired peers and both sets of 'normal' controls. It is also possible to determine that, within the SP group, those children with SPD showed greater facility with idiom comprehension than those with Autism &/or Asperger Syndrome (ASP). However, it is not possible to make any inferences about *levels* of ability (or disability) in idiom comprehension for either SP group. The fact that Kerbel & Grunwell (1998) persist in conflating the SP group in their discussion of the findings is, therefore, both surprising and misleading. Their observation that "[t]he significantly poorer SP group performance is consistent with a large body of literature which characterises children with semantic-pragmatic difficulties as having problems in comprehending non-literal language (Culloden et al, 1986, Jones et al, 1986, Bishop & Rosenbloom, 1987, Rapin & Allen, 1987, Bishop & Adams, 1989, Smedley, 1989, Hyde-Wright & Cray, 1991, McTear, 1991 and McTear & Conti-Ramsden, 1992)" (p34) is a case in point, given that all of the references that follow it concern SPD, rather than autism-related disorders.

One inference that it *is* possible to make on the basis of the information presented, however, is that, as a group, children with SPD were capable of understanding idioms some of the time. In fact, they made more appropriate responses than inappropriate ones. It would seem, then, that the problem is not categorical. Not only does this proposition serve as a timely reminder of the exploratory value of focusing on what a child *can* do as well as what he cannot, but it also has important theoretical (and clinical) implications. Seeking to explain (or treat) a deficit that is partial is quite a different task from seeking to explain (or treat) one that is absolute because it requires closer consideration of context of the subject's behaviour or responses. This issue appears to have been neglected in the literature on SPD.

The other supposition that can be made from Kerbel & Grunwell's study is that the children with SPD were no more prone to literal interpretation than any of the other

groups. Vance & Wells (1994) reported similar findings. As the authors point out, this "underlines the conception that 'getting it wrong' doesn't necessarily imply 'getting it literal'" and highlights the need for qualitative analysis of errors. Unfortunately, though, it is not possible to make any inferences about the type of errors made by this group on the basis of the information that was presented.

1.45 Summary

The findings from the investigation of conversational functioning in SPD (Adams & Bishop, 1989; Bishop & Adams, 1989) highlighted few problems with the mechanical aspects of conversation. The SPD group were just as responsive as their peers, showed no more problems with turn-taking than younger controls and faired better on the index of cohesion than children with other forms of language impairment. However, they did show a characteristically high rate of initiations (Adams & Bishop, 1989) which became even more pronounced in an unconstrained setting (Bishop, Hartley & Weir, 1994). They also showed a tendency to produce more utterances per turn than their other language impaired and non-language impaired peers. This ties in well with early descriptions of verbosity in children given this label (Bishop & Rosenbloom, 1987). Finally, unlike in the case of their other language impaired peers, unintelligibility was not a characteristic feature of this group.

Bishop & Adams' (1989) study also threw light on the types of conversational anomalies shown by children with SPD. It highlighted atypicalities in expressive syntax and semantics, a tendency to provide too much, or paradoxically, too little information for the listener, and high rates of inappropriacy on the grounds of utterance content and/or style. Contrary to several accounts of SPD that had previously appeared in the literature (e.g. Rapin & Allen, 1987; Culloden et al., 1986), problems with topic control were not a characteristic feature of Bishop & Adams' group.

The findings that the investigation of referential communication yielded were unexpected. Neither study found the difficulties that they had predicted in their SPD group. Moreover, in Bishop & Adams study, the degree of conversational inappropriacy was not shown to bear any correlation with performance on the referential communication task. Both sets of researchers commented that their findings were a poor reflection of the deficits in referential communication exhibited by these same children in everyday life. This led to the suggestion that their performance may have been enhanced by the visual cues inherent in the task materials.

The findings from the investigation of inferential comprehension were also unexpected (Bishop & Adams, 1992). Although the SPD group did show a trend to perform more poorly on the inferential questions than either of the other groups, they also performed more poorly on the descriptive questions. Post-hoc analysis led the researchers to suggest that the SPD group's performance may have been influenced by a difficulty in understanding the test questions. This suggestion is consistent with previous reports of comprehension deficits for questions in cases of SPD (Conti-Ramsden & Gunn, 1986; Jones, et al., 1986; McTear, 1985; Rapin, 1982; Rapin & Allen, 1987; Rapin & Allen, 1988; Sahlen & Nettelbladt, 1993).

Finally, the two investigations of idiom comprehension yielded some interesting results. Vance & Wells (1994) observed a similar mismatch in performance in relation to real life as that mentioned earlier with regard to referential communication. Although the participants with SPD in their study did well on the circumscribed task of idiom comprehension they demonstrated difficulty interpreting idioms in more naturalistic settings. This prompted the suggestion that the problem did not concern an inability to make inferences but a lack of appreciation for when a non-literal interpretation was required. This proposal was, to some extent, borne out by Kerbel & Grunwell (1998) because in their study, in which no prior instruction was given to the child about the need for a non-literal interpretation, problems with

idiom comprehension were apparent. However, the finding that these difficulties were not to be absolute raises important issues for both theory and practice. Interestingly, the participants with SPD were found to be no more literal in their erroneous responses than any of the other groups.

1.5 Findings from cohort studies

A further investigation of relevance to this review is Conti-Ramsden et al's recent cohort study (Conti-Ramsden, Crutchley, & Botting, 1997). Unlike the previous studies presented, the authors did not set out specifically to inform the characterisation of SPD but, rather, to examine *the extent to which psychometric tests differentiate subgroups of children with SLI.* This impressive study involved a randomised cohort of approximately half of the five hundred Year 2 children (aged 7 years) in attendance at Language Units across England. Each child in the sample was administered a battery of standardised assessments. This included measures of the understanding of syntax, number skills, mechanical reading facility, naming ability, articulation, story recall and non-verbal functioning. In addition, the child's teacher/speech and language therapist were asked to:

- describe the child's difficulties;
- state whether the child experienced problems in one or more of the following areas: articulation; phonology; syntax and/or morphology; semantics and/or pragmatics;
- indicate whether the child's difficulties were predominantly receptive, expressive, or significant in both domains;
- comment on whether or not the child showed additional learning difficulties, emotional problems or hearing impairment; and
- complete a behaviour questionnaire.

Visual inspection and subsequent cluster analysis of the standardised test data

(excluding that on non-verbal functioning) indicated six distinct clusters, five of which coincided well with Rapin & Allen's sub-classification of SLI and one of which in particular, with their original description of SPD (Rapin & Allen, 1987). Children in this cluster scored well on the tests of articulation, word reading and naming, less well with regard to the comprehension of syntax and story recall (although still within normal limits) and poorly on the test of number.

In contrast to the findings from the psychometric assessments, the information generated from the teachers/speech and language therapists of the children in this group suggested that they were significantly more likely to present with difficulties in the semantic and pragmatic domains; that they were significantly more likely than any of the other clusters to present solely with receptive problems; and that they were significantly less likely to demonstrate phonological deficits or additional learning difficulties. The authors suggest that this disparity between the test results and teacher report reflects the inadequacy of psychometric assessments in capturing pragmatic difficulties. Interestingly, no significant differences emerged across the clusters with regard to behavioural test scores or non-verbal function (measured using Raven's matrices (Raven, 1986)). Recently published follow-up data of the same cohort at 8 years indicated a high level of stability with regard to the six taxonomic subgroups that were delineated in the first phase of the study (Conti-Ramsden & Botting, 1999). Interestingly, however, group membership was less stable; 45% of children in the sample moved across subgroups in the intervening year. Of those children who fell into the SPD cluster at the time of the initial investigation, almost half fell into the "normal group" at re-test. This does not necessarily mean that their problems had resolved but it does suggest that they no longer showed structural language deficits as measured the assessments in the battery.

Conti-Ramsden et al's findings (Conti-Ramsden & Botting, 1999; Conti-Ramsden, et al., 1997) support the notion that children with SLI fall into distinct subgroups. More especially in the context of this review, they add weight to the suggestion that SPD constitutes a distinct subgroup within the clinical population. Their characterisation of SPD was consistent with previous reports in highlighting relatively unimpaired phonological functioning (Conti-Ramsden & Gunn, 1986; Culloden, et al., 1986; Rapin & Allen, 1998; Snow, 1996) and relatively unimpaired word reading (Conti-Ramsden & Gunn, 1986; Culloden, et al., 1986; Jones, et al., 1986; Leinonen & Letts, 1997b; Rapin, 1982; Rapin & Allen, 1998). As far as the more controversial matters of word finding and syntactic comprehension are concerned, they found that the former represented a relative strength in the profile and that the latter was relatively unimpaired.

1.6 Findings from checklist studies

Recently, Bishop (1998) has devised a checklist to evaluate aspects of communicative functioning that are not generally tapped by conventional psychometric measures. The checklist (known as the Children's Communication Checklist or the CCC) comprises a set of statements which relate to nine subscales concerning the child's speech, syntax, initiations*, coherence*, conversational content and/or style*, use of conversational context*, quality of conversational rapport*, social relationships and interests, respectively. Using a three point scale, the rater is required to make a judgement about the extent to which the statement applies in the case of the child concerned. The ratings given on the five subscales concerned with pragmatic functioning (marked here with an asterisk) are then compiled to yield a composite "pragmatic impairment score".

To evaluate the potential value of the CCC as a diagnostic tool, Bishop

obtained checklist data from two raters[16], together with diagnostic information, for 79 of the children who participated in Conti-Ramsden et al's initial cohort study, described above (Conti-Ramsden et al, 1997). Overall, inter-rater agreement for the checklist was high (0.80, range for subscales = 0.62 to 0.83). To assess its validity, Bishop compared the checklist data with the school diagnoses, of which there were three; SPD without additional autistic traits (SP pure), SPD accompanied by autism-related features (SP plus), and language impairment other than SPD (SLI). In support of the idea that SPD exists as a separate definable entity within the broader diagnostic category of SLI, she found that the pragmatic impairment score successfully differentiated children with a diagnosis of SPD from those without. The majority of children with a composite score below 132 fell into one or other of the SPD groups and the majority with a score above 132 were classified as other-SLI. Interestingly, however, there appeared to be a difference in the profiles yielded for the two SPD groups, particularly in respect of how these compared to that of the SLI subgroup. The difference between the SLI and SP plus groups was significant on all but one of the subscales (the SP plus group obtained lower scores), the exception being that which concerned syntactic functioning. In contrast, the difference between the SLI and SP pure groups was significant on just three of the subscales, coherence, conversational content/style and the use of context.

Botting & Conti-Ramsden have since demonstrated the value of Bishop's (Bishop, 1998) checklist for the purposes of research and, in particular, for the purpose of participant selection. They re-examined the data obtained for ten children with SPD who participated in their previous cohort studies (Conti-Ramsden, et al., 1997; Conti-Ramsden & Botting, 1999) in order to present a set of behavioural profiles. What is unique about their study is that, unlike the majority of those already reported in this review, Botting & Conti-Ramsden (1999) employed stringent selection

[16] In each case the raters were members of school staff who had known the child for a minimum of three months.

criteria, thus reducing the possibility of subjectivity in the selection process. Each child had been identified as presenting with SPD by both their teacher/therapist and the researcher over a two year period, obtained a composite score of less than 132 on the CCC, fell into the SPD cluster in both years and was aged between 7;7 and 8;9. Children who did not fulfil all of these criteria were excluded from the investigation. The performance levels of the SPD group were compared with those of the remaining SLI children in the cohort, as appropriate. The main findings are summarised below:

- Half of the children scored below normal limits on at least one of the tasks;
- Articulation, word reading and word finding[17] represented consistent strengths in the behavioural profiles;
- On the CCC, all but one of the children performed more than two standard deviations below the SLI group mean on at least one of the subscales concerning aspects of communicative functioning other than syntax or speech. Deficits were most prevalent on the subscales of content/style, context and rapport but anomalies concerning those of social, interests and initiation were also observed;
- The children's performance levels on the Raven's Progressive Matrices were generally found to be in advance of their chronological age;
- Six out of the eight children for whom data on the Rutter behaviour scale was available showed behavioural problems. In addition, problems with peer relationships were also detected on the Harter scale.

Together these studies provide support for the notion that SPD is a definable clinical entity. They also suggest the possibility that there may be sub-groups within it; one in which conversational impairment is accompanied with deficits in syntactic functioning and the other in which social deficits are more pronounced.

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[17] Botting & Conti-Ramsden noted that there was a qualitative difference between those lexical selection errors that the SPD group did make and those produced by the children with SLI. The authors underline the pragmatic quality of the errors that were observed in relation to the SPD group.

1.6 Summary and conclusion

As demonstrated by this review, there have been many attempts to establish clear diagnostic criteria for SPD since it was first described by Rapin & Allen (Rapin, 1982; Rapin & Allen, 1983). These have taken the form of clinical observations, single case studies, group studies, cohort studies and, latterly, 'checklist studies'. However, because the resulting accounts vary, there is still much confusion concerning its definition and authoritative diagnostic criteria have yet to be agreed. In spite of this, clinical use of the term has proliferated (Hyde-Wright & Cray, 1991; Smedley, 1989). This chapter reviewed the literature regarding the behavioural characterisation of SPD in an attempt to (i) determine whether, when information that is usually scattered among disparate sources is pooled any similarities do, in fact, emerge; and (ii) to establish a clearer picture of where the discrepancies lie.

Overall, and apart from the fact that conversational difficulties were central in every case, there were few points of consensus across all of the studies or accounts. Intact phonological development was the only other feature to come close to this level of agreement. Two distinct types of inconsistencies were observed. First, there were some cases in which descriptions directly contradicted one another. This tended to occur across methodological approaches. For instance, whereas the early clinical observations all report good understanding of simple language in structured situations (Rapin, 1982; Rapin & Allen, 1983; Bishop & Rosenbloom, 1987; Culloden et al, 1986) those descriptive case-studies that have been conducted have consistently highlighted poor performance on standardised tests of receptive function. Similarly, the findings from group studies in inferential understanding (Bishop & Adams, 1992), idiom comprehension (Vance & Wells, 1994; Kerbel & Grunwell, 1998) and referential communication (Bishop & Adams, 1991; Leinonen & Letts, 1997) have all contradicted clinical accounts in failing to highlight a deficit specific to the SPD group. Moreover, whereas word-finding deficits frequently feature in single case descriptions

(e.g. Jones, et al., 1986; Sahlen & Nettelbladt, 1993; Snow, 1996) and clinical observations (Bishop & Rosenbloom, 1987; Rapin, 1982; Rapin & Allen, 1987, 1988; Smedley, 1989) larger scale systematic investigations suggest that they may not be a critical feature (Conti-Ramsden et al., 1997; Bishop, 1998). Discrepancies like these pose problems for interpretation because it is impossible to discern whether they represent genuine differences or whether they are simply the product of extraneous factors such as differences in methodological approach, selection criteria or in the development stages of the children concerned.

The second type of inconsistency concerns cases in which a behaviour is reported in one study, but not in the next. In such cases, it is generally unclear whether a behaviour has not been reported because it was not within the child's behavioural repertoire or simply because it was not observed (Brook & Bowler, 1992). This situation is not helped by the fact that researchers often fail to specify their observational focus at the outset.

As mentioned at the beginning of this chapter, this lack of consensus about the definition of SPD has caused its status as a definable entity to be called into question (Bishop, Hartley & Weir, 1994). However, the findings from Conti-Ramsden et al.'s (1997, 1999) recent cohort studies suggest that SPD does constitute a unitary phenomenon. Limitations in the methodological approaches adopted in SPD may, in part, be to blame for the lack of progress in identifying characteristic features. While single case studies allow for breadth and depth of description they do not provide a strong basis for comparison. Group studies, on the other hand, enable overall trends to emerge. However, they do not allow for the exploration of potentially important individual differences. In addition, by virtue of the fact that they involve a greater number of children the focus of investigation is generally restricted to a single aspect of functioning. One of the aims of this study was to exploit the advantages of both methodologies.

Chapter Two
The Boundaries Debate

"... speculation is quite the easiest part of the business" (Boucher, 1996, p241)

2.1 Introduction

As detailed in the last chapter, the notion of semantic-pragmatic disorder (SPD) was borne out of attempts to differentiate sub-groups within specific language impairment (SLI). By implication it was originally viewed as one facet of this broad diagnostic category. In the past decade, however, there has been mounting belief that SPD may be more akin to autism, both because of increasing recognition of behavioural similarities between the two conditions (Aarons & Gittens, 1990; Bishop, 1989; Brook & Bowler, 1992; Conti-Ramsden & Gunn, 1986; Gagnon, Mottron, & Joanette, 1997) and because of Wing's (Wing, 1991) changes in the conceptualisation of autism that made space for it to be seen as such (Aarons & Gittens, 1990). This position remains contested by the view that SPD is a subtype of SLI (Crystal 1985; Sahlen & Nettelbladt, 1993; Smedley, 1989; Snow, 1996) and the issue of boundaries continues to form the focus of spirited academic and clinical debate[1]. This chapter is intended to provide a critical overview of the 'boundaries debate'.

2.2 SPD as SLI

As stated, there are a group of researchers who maintain that SPD is akin to SLI (Crystal, et al., 1976; Sahlen & Nettelbladt, 1993; Smedley, 1989; Snow, 1996). Crystal, for example, advocates caution in drawing a distinction between SPD and disorders of language structure, maintaining that "structure and use are two sides of the same coin" (Crystal, 1985, p11) while Sahlen & Nettlebladt (1993) proposed that

[1] This year (1999) this issue was the focus of a clinical forum in both the International Journal of Communication and Language Disorders and of the 4th National I-CAN Conference.

the pragmatic deficits shown by the two children in their investigation were secondary to a primary semantic deficit and, on the grounds of similarities between their profiles and those of patients with acquired posterior aphasia, implicated left hemisphere involvement (Sahlen & Nettelbladt, 1993; Sahlen, Nettelbladt, & Dravins, 1991). Before exploring the view that SPD is a manifestation of SLI in more detail, it is necessary to consider the definition of SLI.

2.21 What is SLI?

Specific language impairment has traditionally been defined in terms of exclusion criteria. That is, SLI is diagnosed if a child shows significant abnormalities of language acquisition which cannot be explained in terms of general learning difficulties, hearing loss, physical handicap, psychiatric disorder, frank neurological abnormality, or environmental deprivation (American Psychiatric Association, 1994). What constitutes "significant abnormalities of language acquisition", however, varies across accounts. For example, Leonard (1998) suggests language test scores of 1.25 standard deviations below the mean or lower; Bishop & Edmundson (1987) recommend a score of more than two standard deviations below the mean on any one language measure or a moderate deficit of more than 1.5 standard deviations below the mean on two or more measures of language function. In addition, Leonard (1998) specifies that there must be "no symptoms of impaired reciprocal social interaction or restriction of activities" (p10). It is not surprising, with a definition as broad as this, that the nature of the language deficits varies considerably from case to case and, in this respect, it is widely agreed that SLI represents a heterogeneous group. This heterogeneity is recognised in the various taxonomies of SLI that have been proposed across the years (e.g. Aram & Nation, 1980; Bishop & Rosenbloom, 1987; Rapin & Allen, 1983; Conti-Ramsden et al., 1997) and in the authoritative diagnostic manuals of developmental disorders (American Psychiatric Association, 1994; World Health Organisation, 1993).

2.22 SPD and SLI: Where are the boundaries?

Consider, then, what the proposition that SPD is akin to SLI entails. In the first place, it requires that, in all cases of SPD, there must be a significant level of linguistic impairment (although, as discussed above, what constitutes 'significant' varies across accounts). The last chapter has shown that there is little consensus as to the extent to which this is the case. Although the majority of case studies reveal language test scores that would fulfil even the most stringent of the above criteria (see Table 2.1 overleaf), their findings conflict with more generalised descriptions of the disorder (Bishop & Rosenbloom, 1987; Rapin, 1982; Rapin & Allen, 1983) in this respect. Further research into language functioning in SPD is needed if this dispute is to be resolved and the position of SPD in relation to SLI with regard to language ability (or disability) is to be determined.

Even if it were established that significant linguistic impairments are universal in SPD, that, in itself, would not be sufficient to secure its status as a subtype of SLI. It must also be demonstrated that these linguistic deficits are *primary*. That is, it must be shown that the difficulties that have been documented in other domains (such as conversation and social functioning) arise *because* of these linguistic deficits. Focusing on features commonly reported in cases of SPD, McTear and Conti-Ramsden (1992) presented some examples about how this might be so. For example, they suggested that a failure to acquire relative clause structures may preclude the ability to establish referents in conversation, a point also raised by Smedley (1989). They also pointed out that an inability to distinguish new information from old *could* stem from incompetence in using definite and indefinite articles, just as an inability to respond to requests for clarification *could* result from an inability to engage in complex syntactic manipulations such as the re-ordering of sentence constituents. Similarly, unmarked topic shift *could* be accounted for by a failure to acquire the syntactic structures needed to introduce new topics and to link them to the

Table 2.1 Summary of findings from case studies concerning poor performance on standardised language assessments[2]

Study	Language Functioning
Conti-Ramsden & Gunn (1986)	Scored more than three standard deviations below the mean on the RDLS between the ages of 3;10 to 6;0, subsequent to which the deficit diminished to one standard deviation.
Jones et al (1986)	Consistently scored more than one and a half standard deviations below the mean on the RDLS, the TROG and the BPVS at chronological age 5;8 and 7;6.
Sahlen & Nettlebladt (1993)	
Child 1	Performed between one and a half and two and half years below chronological age level on the SIT at ages 5;6 and 6;6. Showed 'considerable difficulties' on the NELLI at 8 years, despite good performance on the Token Test at this age.
Child 2	Performed two to three and a half years below age level on the SIT at 6;6. Demonstrated poor comprehension of grammatical structures on the NELLI and encountered multiple problems on the Token Test at 9;0.
Willcox & Mogford-Bevan (1996)	No details provided in regard to assessment scores but the authors did state that *"Assessments of [child's] language before his arrival at the language unit suggested that [child] had both grammatical and language difficulties"* (p147).
Snow (1996)	Scored at/more than two standard deviations below the mean on the receptive scale of the ASSET, the expressive scale of the NSST and on the SPELT-II; scored more than one and a half standard deviations below the mean on the expressive scale of the ASSET and within normal limits on the receptive scale of the NSST.
Leinonen & Letts (1997)	Achieved age equivalent scores of 5;3 on the TROG at chronological ages 8;10 and 10;2; and of 6;11 on the BPVS at chronological age 10;2.

* RDLS = Reynell Developmental Language Scales (Reynell, 1977); TROG = Test for the Reception of Grammar (Bishop, 1983); BPVS = British Picture Vocabulary Scale (Dunn, Dunn, Whetton, & Pintile, 1982); SIT = Sprakligt Impressivt Test för Barn (Hellquist, 1992); NELLI = Neurolingvistik Undersökningsmodell för Sprakstöra Barn (Holmberg & Sahlen, 1986); ASSET = Assessing Semantic Skills Through Everyday Schemes (Barrett, Zachman, & Husungh, 1988); SPELT = Structured Photographic Expressive Language Test (Werner & Kresheck, 1983).

conversational content that has gone before. It is also possible to appreciate how a tendency for tangential responding might be a function of weak vocabulary (Sahlen & Nettelbladt, 1993; Smedley, 1989), word-finding difficulties (Lucas, 1980), general comprehension problems (Fey & Leonard, 1983), or a more specific

[2] Cases in which performance on standardised language assessments was found to be age appropriate have not been included in the table.

receptive difficulty, such as a problem with the decoding of wh-question words (Sahlen & Nettelbladt, 1993; Smedley, 1989; Snow, 1996) or complex syntactic forms (Sahlen & Nettelbladt, 1993).

Only one of these propositions - that a *linguistic* deficit in the understanding of wh-questions may result in tangentiality - has been examined empirically (Snow, 1996) in the way in which McTear & Conti-Ramsden suggested. As detailed in the last chapter, Snow found that the single child in this study demonstrated an inability to understand *who* questions in spite of an ability to decode *what* questions that represented an overlapping set of concepts, and in spite of a clear understanding of the concept of animacy. Snow took this as indication that, "although the child did not interpret particular *wh*-forms, he did understand the underlying concepts when they were expressed in other forms" (p293). Thus, he saw the problem as *linguistic* rather than *cognitive* in nature.

Snow then went on to hypothesise about the form that such a linguistic deficit might take. Turning his attention to the lexical selection and pronoun errors that the child made in his spontaneous speech, and Martin & Saffran's (1992) adaptation of Dell's (1986) 'spreading activation model' of word retreival, Snow maintains that the problem lies in the storage/access of linguistic forms at the *phonological* level. More specifically, he suggests that semantically related words are produced when phonological pathways to the target are weakened. He holds that this same deficit underpins the more 'typical' morpho-syntactic expression of SLI but that different 'linguistic form classes' are affected in each case. He suggests that in SLI it is morphemes that have a syntactic function and in SPD it is the form classes that have a referring function (such as pronouns and lexemes). Thus, Snow concludes that "the semantic-pragmatic and morpho-syntactic types of SLI may be more closely related than the different names and ostensible behaviours imply", and suggests that "the two types of SLI are unified under the theoretical umbrella of a single phonological/storage account" (p296). Snow's work represents an important step for the linguistic account

of SPD inasmuch as it underlines the importance of establishing a solid theoretical grounding. However, his current model would appear somewhat flawed by the fact that it neglects to make explicit the link between expressive errors of lexical selection, on which his theory is based, and the inability to interpret particular wh-question forms - the very feature that he set out to explain. Exposition of this point is required if his account is to prosper.

Although viable in some respects, as Snow's work demonstrates, a linguistic account of SPD would not appear absolute by virtue of the fact that some of the deficits that his subject showed, such as a tendency to make comments at inappropriate times, seem difficult to explain in this way. The same applies to some of the aberrant behaviours documented in other cases of SPD, such as the tendency to provide too much information. There are a number of other complications for the linguistic account. First, a problem with the assumption of causal direction is signalled by the fact that some of the examples presented above work just as well when considered in reverse. For instance, it is conceivable that a child may fail to acquire relative clauses *because* he sees no need to establish referents. Equally he may fail to develop competence with the subtleties of article use *because* he lacks appreciation of the need to signal new information from old, and so forth (Donahue, 1987). The second problem stems from Conti-Ramsden & Gunn's (1986) observation that, in the case of the child in their study, pragmatic impairment persisted in spite of marked improvements in linguistic ability. This would suggest that, in some cases at least, the two aspects of functioning are dissociable. This possibility is supported by Willcox & Mogford-Bevan's (1995) observation that their subject failed to use interrogatives in order to initiate interaction in spite of the ability to produce them for other pragmatic functions. Variability in communicative ability in a more general sense has also been suggested to undermine the power of the linguistic explanation of SPD (Leinonen & Letts, 1997b).

Observations like these have prompted some researchers to reject the linguistic account of SPD, and so its association with SLI, and to look elsewhere for explanation. Aarons & Gittens (1990) suggest that to regard children who present with a profile of SPD as merely language impaired is too simplistic and that, "unless the language peculiarities are regarded as merely the tip of the iceberg the child's real underlying difficulties will not be recognised" (p2). Instead, they propose that children with SPD have "an underlying cognitive deficit which is the same as the deficit Frith ascribes to autism" (p2). Observation of behavioural dissimilarities between SPD and SLI, particularly as far as deficits in social functioning are concerned, have also provided impetus for this change in perspective (Leonard, 1998). For instance, Leonard maintains that "the criterion of no symptoms of impaired social interaction of activities excludes children with "semantic-pragmatic" disorder from the category of SLI" (p19).

2.3 SPD and Autism

Many researchers share Aarons & Gittens' (1990) view that SPD is related to autism some way (Bishop, 1989; Brook & Bowler, 1992; Conti-Ramsden & Gunn, 1986; Gagnon, et al., 1997; Shields, Varely, Broks, & Simpson, 1996a; Shields, Varley, Broks, & Simpson, 1996b). In order to provide a thorough overview of this perspective, it is first necessary to examine what is meant by the term 'autism'[3].

2.31 What is autism?

'Early Infantile Autism' was first described by Leo Kanner in 1943 who, in subsequent writings, identified two criterial features of the condition; acute aloneness and the obsessive desire for the maintenance of sameness (Kanner & Eisenberg, 1956). Other similar definitions of autism followed (Ornitz & Ritvo, 1968; Rutter,

[3] Latterly referred to as 'autistic disorder'.

1978). The definition was broadened when an epidemiological survey conducted by Wing and her colleagues (Wing & Atwood, 1987; Wing & Gould, 1979) indicated that the qualitative nature of the social impairment in autism was far more diverse than originally perceived. Wing & Gould (1979) screened all children under the age of fifteen who were known to social, educational or health services in a borough of London. Children were selected from this group if they presented with severe learning difficulties and/or one or more of the following: social impairment, verbal and non-verbal language impairment, and repetitive/stereotyped activities. The resulting cohort of 132 children was then observed and administered a number of psychological and medical tests and subsequently divided on the basis of social functioning. The severely socially impaired group (of which only 23% fulfilled Kanner's criteria for autism) were found to show a higher prevalence of communicative and imaginative impairment than the non-socially impaired group and, in the former, these three deficits were found to co-occur at a level greater than chance.

In view of these findings, Wing (1988) proposed that, rather than existing as a discrete syndrome, autism forms part of a continuum of autistic disorders defined by the presence of a triad of impairments in (i) reciprocal social interaction (ii) communicative abilities (both verbal and non-verbal) and (iii) imaginative capacity. This triad must exist, irrespective of other symptoms, in order for a child to fall within the continuum. Wing (1988) argued that a wide range of severity and expression is encompassed within each aspect of the triad. For example, in the social domain one child may be particularly 'aloof', another may be 'passive' and another still 'active but odd'. Within the communicative domain, severe impairment may be manifest as an absence of the desire to communicate with others; a less severe deficit may be manifest in conversational exchanges as a tendency to persist with topics of interest only to themselves, to ignore the initiations of others, and to make contextually inappropriate comments, for example. Finally, in the domains of social understanding and imagination, a severe case may involve an inability to engage in pretence and an

apparent lack of understanding of the social world; a less severe case may be seen in a lack of creativity in play and/or a lack of empathy. Wing's triad has become the basis of the authoritative diagnosis of autism today (American Psychiatric Association, 1994; World Health Organisation, 1993).

One year after Kanner described autism, Hans Asperger described several cases of what he called "autistic psychopathy" (Asperger, 1944). In spite of the fact that neither of these researchers knew about the other's work, strong similarities were apparent between his descriptions and Kanner's descriptions of autism. For instance, both noted severe social deficits, resistance to change, lack of imaginative capacity, obsessive interests and islets of ability. However, there were also differences between the two descriptions. Unlike Kanner, Asperger observed precocious language development by school age (6-9 years) and clumsiness in all cases. Since Asperger's work became better known in Britain in the early 1980s, there has been much discussion about the relationship of what is now referred to as Asperger's disorder (American Psychiatric Association, 1994) to autism (Frith, 1991; Gillberg, 1992; Happé, 1994b; Miller & Ozonoff, 1997), just as there is ongoing debate about the relationship of SPD to autism. Despite the recent appearance of Asperger's disorder in the DSM-IV (American Psychiatric Association, 1994) as a distinct diagnostic category within the Pervasive Developmental Disorders (PDD)[4], the controversy is ongoing (Happé, 1999).

2.32 Where are the boundaries?

The notion of an association between SPD and autism was first mooted by Rapin & Allen (1983) who, on the basis of clinical observation, postulated that children with autism show the same sub-types of language disorder as those with developmental language disorder (DLD). Within this proposal, they predicted a

[4] PDD is the umbrella term used by the diagnostic manuals to refer to conditions in the autistic spectrum.

particularly high prevalence of SPD among children with autism. Over the years that followed, Rapin & Allen went on to examine these proposals empirically (see Rapin, 1996, for a review).

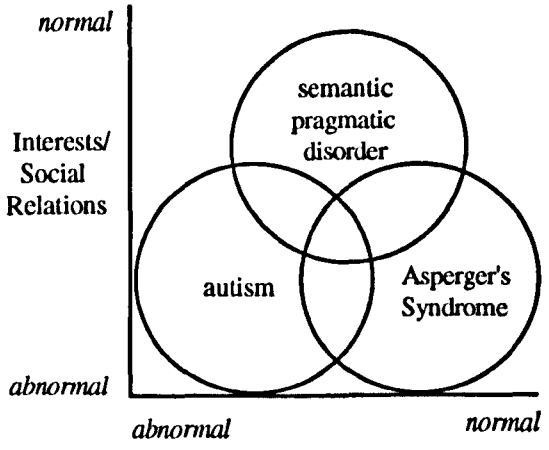
For this purpose, they compared the frequency of each of their previously defined language subtypes (see page 2) in 491 pre-school children, 229 of whom they considered to fulfil the DSM-III criteria for autistic spectrum disorder and 262 of whom they judged as presenting with non-autistic DLD. The majority of the sub-classifications were made retrospectively on the basis of information from case notes. Preliminary analysis offered strong support for their hypotheses. In the first place, there were no difficulties in allocating each child to one or other of the subtypes of language impairment. In the second place, of the 79 dysphasic and 47 autistic children studied at that stage, only 9% of the DLD group were judged to present with SPD as compared with 65% of the autistic group (Rapin & Allen, 1987). Though less striking, the final results echoed this pattern; 23% of the DLD group presented with higher-order processing deficits (SPD is one of two 'conditions' within this category) as compared with 37% of the autistic group (Allen & Rapin, 1992). Thus, Rapin & Allen's clinical impression was confirmed by their empirical findings. Emphasising the fact that SPD was not invariable in autism and was also encountered in some non-autistic children with SLI and other conditions, Rapin & Allen concluded that,

> "*semantic-pragmatic deficit syndrome ... is still only a language disorder. If one accepts this premise then there is no difficulty with the concept that SPD occurs most often in autism/PDD and much less often in some non-autistic children with disorders such as hydrocephalus, some cases of William's syndrome, and other genetic and non-genetic brain conditions*" (Rapin & Allen, 1998, p 86).

In Rapin & Allen's view then, it is possible to have autism *and* SPD or SPD *without* autism. There has since been a change in emphasis regarding the nature of the association between SPD and autism from inclusion to mutual exclusion.

Bishop (1989) was first to follow up the issue of boundaries since Rapin & Allen's work. She observed that, unlike other language-impaired children, those with SPD tended to show mild autistic features in conjunction with language difficulties. While she did not consider these severe or extensive enough to warrant a diagnosis of autism, she proposed a model of how these two conditions (and Asperger syndrome) might be *related* on a two dimensional continuum which encompassed meaningful verbal communication and interests/social relationships, as shown in Figure 2.1.

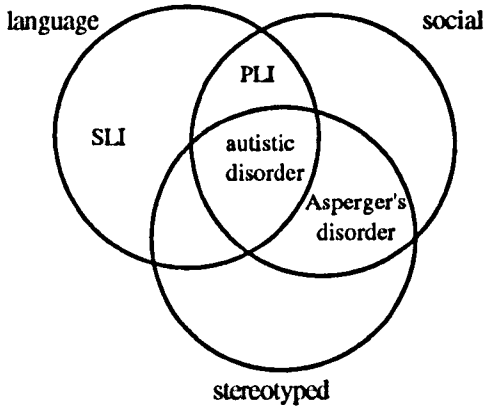
Figure 2.1 Bishop's (Bishop, 1989) Two Dimensional Model of the Autistic Continuum



Bishop noted that if a third dimension denoting language form were added, children with SPD would be clearly distinguishable from children with "other types of language disorder" (p117) who show marked problems with the mastery of language form but few problems with meaningful verbal communication. This, again, would suggest that it was not only observations of similarities with autism but also dissimilarities with SLI that incited the boundaries debate (see page 57). Bishop recommended that the term 'specific semantic-pragmatic disorder' be reserved for children "who are not autistic but who initially present with a picture of language delay and receptive language impairment, and who learn to speak clearly and in complex sentences, with semantic and pragmatic abnormalities becoming increasingly obvious

as their verbal proficiency increases" (p118). In Bishop's view, then, SPD and autism overlapped in respect of social and communicative functioning. A decade later her opinion is, essentially, unchanged (Bishop, 1998; Bishop, in press) (see Figure 2.3, below). She still maintains that the majority of children given the label of SPD fall short of the authoritative criteria for autism (American Psychiatric Association, 1994; World Health Organisation, 1993). However, recognising that in at least some cases of SPD deficits extend beyond language and into the social domain, Bishop suggests that SPD may be more appropriately placed within the category of Pervasive Developmental Disorder Not Otherwise Specified (PPD-NOS) than SLI (Bishop, 1998). This perspective is shared by Botting & Conti-Ramsden (Botting & Conti-Ramsden, 1999). However, both sets of authors express some concern about the usefulness of this diagnostic category in informing intervention.

Figure 2.2 Bishop's (Bishop, 1998) Three Dimensional Model of the Autistic Continuum



Aarons & Gittens (1990, 1991, 1993) maintain a far more categorical position. In their view, the characteristic features of "so-called semantic-pragmatic disorder" do not differ from those of autism as proposed by Rutter (1984). Namely, "a lack of receptivity and communicative quality ... a dearth of social components and creativity ... *and* ... an absence of descriptive qualities" (p3). They no longer draw a distinction between the two conditions (Aarons & Gittens, 1996).

Brook & Bowler (1992) also underlined the behavioural overlap between 'high-functioning autism' (in their view synonymous with Asperger's syndrome) and semantic-pragmatic disorder. In particular, they identified "echolalia, poor conversational turn-taking, unusual prosody, problems in tailoring the content of the conversation by taking the role of the other, and superficially good complex syntax with odd or inappropriate semantic content" as common features. In addition, they observed commonalities that extend beyond the language. As a result of these observations, they arrived at the same position as Aarons & Gittens (1990). Unlike Aarons & Gittens, however, Brook & Bowler (1992) recognised the need for more systematic evaluation of their claims. Hence they investigated the extent to which the findings from existing studies of children with SPD could be seen to indicate the presence of Wing's triad (Wing, 1988). Three of the ten studies that they listed described all three elements of the triad, four described two elements of the triad, and a further three studies described only one element of the triad. Given that none of the studies had set out to observe the triad or to explore the relationship between SPD and autism, Brook & Bowler considered these results to provide striking support for their claim.

Gagnon et al (1997) engaged in a similar exercise, setting out the DSM-IV criteria for autism (American Psychiatric Association, 1994) and examining the extent to which they could be fulfilled by findings from existing studies of SPD. They, too, thought their efforts a success and concluded that "there are no differential symptoms or features present in either disorder to anchor a distinction between SPS (*semantic-pragmatic syndrome*) and autism" (p 45).

The intention behind such comparisons is sound and their eventual outcome feasibly valid. However, there is a danger in placing too much credence in them until the defining features of SPD have been identified and agreed. Until this time, research studies are liable to error with respect to the selection of participants. The problem is

compounded by the fact that many of the comparisons have been made on the basis of findings from single cases.

Although Bishop (1989) and Brook & Bowler (1992) had different views about the nature of the relationship between SPD and autism, both recognised a need to extend the focus of investigation in SPD to incorporate the analysis of the underlying psychological mechanisms implicated in autism if the matter of boundaries was to be resolved. Bishop, because of a realisation that superficial behavioural similarities between disorders may be misleading and Brook & Bowler (1992), because of a desire to prove that the two conditions were indistinguishable at a more fundamental level. Shields, Varley, Broks, & Simpson (1996a), who share Brook & Bowler's perspective, recently followed up this suggestion.

At the time at which Shields et al (1996a) undertook their investigation, one particular psychological theory dominated the literature on autism. It proposed that autism stemmed from a subtle and innate socio-cognitive deficit manifest in the impairment of "the fundamental human ability" to employ a 'theory of mind' or to 'mentalise' (Happé, 1994b, p38). That is, an inability to attribute mental states (such as knowledge, belief, desire and deceit) to oneself and others and to predict and explain behaviour on the basis of those mental states. When the theory was first put forward (Baron-Cohen, Leslie, & Frith, 1985), it was the autistic child's ability to attribute a false or mistaken belief to a protagonist, and to predict the protagonist's behaviour on the basis of that belief, that received the most research attention. Understanding the protagonist's mistaken belief requires the explicit representation of the falseness of that belief in relation to the child's own knowledge and, as such, was considered "a litmus test for the understanding of psychological causality" (Wellman, 1988).

Probably the best known of the tasks devised to assess this, and the one that was used by Baron-Cohen et al (1985), is the Sally-Ann task. In this task, the child is

presented with two dolls, one of which is called Sally and the other, Ann. Sally has a marble and a basket, Ann has a box. The child observes Sally put her marble in the basket and then go out of the picture. While she is out, the child sees Ann take Sally's marble out of the basket and put it into her box. Sally comes back in and the child is asked "Where will Sally look for her marble?". It is well established that the level of mentalising required in this task (and others like it) is well within the capacity of most normally developing four year olds (Happé, 1994b). Yet, of the twenty autistic children in Baron-Cohen et al's sample, only four succeeded, in spite of a verbal mental age advantage, adequate memory of the events and the ability to respond to linguistic control questions. In contrast, twelve of the fourteen children whom they tested with Down's Syndrome (and a lower mental age) were easily able to accomplish the task. Baron-Cohen et al took their results as confirmation of their hypothesis.

Their finding has since been replicated in other versions of the false-belief task in which the dolls have been replaced with real people, the look question with a think question and a control group of specifically-language impaired children has been included to rule out a language deficit explanation of task failure (Leslie & Frith, 1988; Perner, Frith, Leslie, & Leekam, 1989). It has also been reproduced using different false-belief paradigms (Baron-Cohen, 1991; Baron-Cohen, Leslie, & Frith, 1986; Perner, et al., 1989). In addition, deficits in the understanding of other mental states have been found. For example, impairments have been identified in the ability to impute true knowledge (Leslie & Frith, 1988; Perner, et al., 1989) and desires (Harris, 1989), to differentiate mental entities (such as dreams and memories) from physical ones (Baron-Cohen, 1989) and to understand and engage in deception (Sodian & Frith, 1992). It has also been demonstrated that the deficit is specific to the representation of mental representations, as opposed to non-mental representations such as false drawings or photographs (Charman & Baron-Cohen, 1992; Leslie & Thaiss, 1992).

Thus, there was converging evidence to suggest that deficient theory of mind functioning was responsible (at the level of psychological mechanisms) for the triad of impairments characteristic of autism. However, in every study of mentalising ability at this level, a proportion of autistic participants have been found to pass. Baron-Cohen observed that the four who passed the Sally-Ann task (in his landmark study with Leslie and Frith) were among the oldest of the group and considerably older than the age at which normally developing children pass this task. This prompted him to suggest that, rather than present with a categorical impairment in the ability to employ a theory of mind, children with autism might manifest a *specific developmental delay* in this regard.

To test this notion, he investigated the ability of these children to engage in more complex mental state reasoning, predicting that this would be beyond their capabilities. For this purpose, he administered a version of Perner & Wimmer's Ice-Cream Van Task (see Figure 1.3). Unlike "first-order" theory of mind tasks, like the Sally-Ann task, this "second-order" task demands recursive thinking about mental states, an ability which normally develops at around seven years of age (Happé, 1994b). More specifically it requires the participant to reason about one protagonist's mistaken belief about another protagonist's (true) belief about a state of affairs. Baron-Cohen's prediction was borne out by the finding that, whereas 90% of the normally developing control group (of seven-year-olds) and 60% of the Down's Syndrome group (matched for chronological age) passed, all of the children in the autistic group failed to do so in spite of the fact that they were more than seven years of age and possessed verbal mental ages at least commensurate with (and usually in advance of) their chronological age (range = 7-17). Ozonoff (Ozonoff et al., 1991a) has since demonstrated similar deficiencies in the performance of autistic

Figure 1.3 Transcript of the ice-cream van task (Perner & Wimmer, 1985)

John wants to buy an ice-cream, but he has left his money at home. He'll have to go home first and get his money before he can buy an ice cream. The ice cream man tells John, "It's alright John, I'll be here all day in the park so John goes home ,but then the ice-cream man decides not to stay in the park. He's going to the church. The ice cream man tells Mary. He says, "I'm going to the church".

Comprehension check 1: Did John hear the ice cream man tell Mary that? before the story continued.

In the afternoon Mary goes home. The ice cream man goes to the church, but on his way he meets John. He tells John "I won't be in the park. I'll be at the church".

Comprehension check 2: Did Mary hear the ice cream man tell John?

In the afternoon Mary goes to John's house. John's mum says "John's gone to buy an ice cream".

Belief question:	*Where does Mary think John has gone to buy an ice cream?*
Justification question:	*Why does Mary think that?*
Reality question:	*Where did John really go to buy his ice cream?*
Memory question:	*Where was the ice cream van in the beginning?*

adolescents (mean age 12;5; range 8 - 20 years) on this same task, relative to a clinical control group matched for chronological age and sex. Of the 23 autistic individuals tested, 87% fared worse than the control group mean. More recently, using her *Strange Stories* task, Happé has shown that even those autistic individuals who are able to pass these more difficult second-order tasks show problems relative to controls when required to use their mentalising ability to determine if and why a story character

said something which was not literally true (Happé, 1994)[5].

Thus, Shields et al (1996a) set out to examine the extent to which this same socio-cognitive deficit was evident in SPD. They administered a battery of tasks, to assess different aspects and levels of social cognition, to four groups of ten 7- to 11-year old children. The first group consisted of children who demonstrated problems with language form but not semantics or pragmatics (hitherto refereed to as 'phonological-syntactic'); the second, was made up of children whose clinical picture was dominated by semantic and pragmatic difficulties. These groups were selected on the basis that they met Rapin & Allen's criteria for 'phonological-syntactic syndrome' and 'semantic-pragmatic syndrome', respectively (Rapin & Allen, 1987)[6]. The third group comprised children who had been given a medical diagnosis of autism in accordance with the DSM-III-R criteria (American Psychiatric Association, 1994) and who were "high-functioning", and the fourth group consisted of normally developing children. All groups were matched for chronological age and socio-economic status. The assessment battery included six tasks of mentalising ability, at both first and second order level; Baron-Cohen's (1992) Eye Direction Detection tasks (designed to

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[5] Whether or not individuals with Asperger's Syndrome demonstrate impaired mentalising ability is currently a matter of debate. In an effort to determine the external validity of the "Asperger's Syndrome" diagnosis, Ozonoff et al (1991b) conducted a second study in which they re-analysed the findings reported above, sub-dividing the "autistic group" into a two; one group comprised children given a diagnosis of high-functioning autism (n=13) and the other, Asperger's Syndrome (n=10). Unlike the autistic group, the Asperger's group showed no deficits in their performance relative to controls on the theory of mind tasks. Similarly, Bowler (1992) found that the performance of adults with AS on two second-order theory of mind tasks was no worse than that of schizophrenics matched for verbal and performance IQ or normal controls. However, as Baron-Cohen (Baron-Cohen et al., 1997) points out, these results do not constitute conclusive evidence for intact theory of mind functioning because of the young age at which normally developing children are able to pass these tasks. He notes that "all we can conclude is that they have intact theory of mind skills at the level of a 6-year-old" (p814). In view of these observations, Baron-Cohen devised an 'adult test of theory of mind competence', which requires the participant to look at photographs of the eye region of faces and make a forced choice between which of two words best describes what the photographed individual is feeling. He found that a group of high-functioning adults with autism and Asperger's syndrome demonstrated impaired performance on this task and on Happé's Strange Stories task (Happé, 1994a) relative to age matched normal and Tourette Syndrome controls. Visual inspection suggested that there was no difference between the two experimental groups but statistical analysis was precluded by small sample sizes. The debate is ongoing.

[6] Features of phonological-syntactic disorder include primary impairments in language form, impaired phonology, restricted use of function words, normal desire to communicate, relatively unimpaired comprehension and normal eye contact. Features of semantic-pragmatic disorder include primary impairments in semantics and pragmatics, relatively intact phonology, relatively fluent expressive language, stereotyped, tangential or inappropriate utterances, poor understanding of discourse, over-literal interpretation, poor eye contact.

assess the perception of gaze in the understanding of mental states); and selected questions from the verbal comprehension subtests of the Wechsler Pre-school and Primary Scale of Intelligence (Wechsler, 1967).

The authors hypothesised that both the SPD (S) and autistic (A) groups would perform more poorly than the phonological-syntactic (P) and normal controls (C) in all respects. Indeed, they found that these two groups (S and A) showed approximately coincident profiles and mean scores below those of both control groups on all measures. Moreover, the combined performance of the two experimental groups (S and A) was significantly poorer than that of the two control groups (P and C) combined. The authors considered the findings to "support the opinion that 'semantic-pragmatic disorder' is a disorder of the autistic spectrum and that the weaknesses in communicative competence in this group of children may result from, or be associated with, an underlying cognitive deficit which is not primarily linguistic in nature" (p492).

While Shields et al's findings seem persuasive, and the SPD group did appear to show an impressive likeness to their autistic peers, a closer look at the results would suggest that matters may not be quite so straight forward, at least in respect of theory of mind functioning. This is because some members of the other-language impaired group and, indeed, the control group faired poorly as well (Shields, 1995). Although the phonological-syntactic group were superior to the SPD and autistic groups in their ability to employ a partial[7] theory of mind (ten children in this group displayed some mentalising ability as opposed to four in either of the experimental groups), only two members of this group demonstrated a full theory of mind. In this respect, the phonological-syntactic group performed considerably worse than their normally developing counterparts, of whom just seven passed at this more difficult level. Although there were no passers at this standard in either experimental group, the fact

[7] That is, at first order but not second order level; or with regard to only one mental state at both first and second order level.

that any members of the control groups failed creates the possibility that the inability to succeed stemmed from some factor other than impaired mentalising ability[8].

Bishop has also evaluated theory of mind functioning in this group, again with inconclusive results (Bishop, 1997). She administered a version of the Sally-Ann task, modified to incorporate simpler vocabulary and additional questions to check for knowledge and understanding, to eighteen of the language-impaired children who took part in an earlier study (Bishop & Adams, 1991) (see page 30). Five of these children were regarded as having semantic-pragmatic disorder. The remaining thirteen presented with language impairments of a different kind. Of the five children with SPD only one fulfilled the criteria for passing theory of mind in comparison to nine of the other language-impaired children. However, qualitative analysis of the SPD children's responses indicated that two of the five children in this group failed the reality check. In those cases responses to the test question could not be interpreted. Moreover, all but one of the children who failed the first criterial false-belief question (in both groups combined) went on to pass subsequent questions which also required an understanding of the protagonist's mental states. Bishop suggested that this unexpected finding may have resulted from subtle differences in the linguistic demands of the questions. Acknowledging her results as ambiguous, Bishop concluded that "they suggest that children with SLI, including those with semantic-pragmatic disorder, can appreciate another's false belief, provided they are questioned about this using simple language" (p217).

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[8] Several researchers have explored extraneous influences on theory of mind performance. The results have been mixed. Some researchers have found little connection between participant characteristics and task success (Baron-Cohen, et al., 1985). Others have found evidence to suggest that performance is influenced by verbal ability (Eisenmajer & Prior, 1991; Happé, 1994a; Sparrevohn & Howie, 1995). However, as Happé (1994b) points out, the relationship between these two factors does not seem to be straightforward since the verbal mental ages of those autistic children who pass exceeds that of young normal children who pass, participants who fail equally difficult control questions are excluded from analyses and because children with SLI have been shown to pass theory of mind tasks (Leslie & Frith, 1988). On these grounds she suggests that some third factor might underlie both better theory of mind performance and better language facility. Some researchers have found evidence to suggest a link between task success and chronological age but this has not always been shown to be the case (Eisenmajer & Prior, 1991). A relationship between theory of mind functioning and general (non-verbal) ability has yet to be demonstrated. Subtle differences in the task itself (Rapin & Allen, 1988; Tager-Flusberg & Sullivan, 1994) have also been shown to affect performance.

One further study has involved the direct comparison of children with autism and those with SPD, this time from a neuropsychological perspective (Shields, et al., 1996b). This study was undertaken as part of an investigation which set out to distinguish SPD as a disorder of the right hemisphere and, in this regard, as distinct from phonological syntactic disorder. A secondary aim of the study was to examine the extent to which profiles of hemispheric dysfunction in SPD and autism would coincide. To these ends, Shields et al (1996b) administered a battery of neuropsychological tests to the same children who were involved in their investigation of socio-cognition (detailed above). The tests were chosen on the grounds that they were selectively sensitive to left/right hemispheric functioning. The authors hypothesised that the phonologic-syntactic group would demonstrate selective deficits on those tasks which tapped left hemisphere function, while the SPD group would show the reverse of this pattern. In line with their belief that SPD is a case of autism misdiagnosed, they also predicted that the groups with SPD and autism would show highly concordant profiles.

With regard to the right hemisphere battery, and in keeping with their proposal, Shields et al. found that the performance of SPD and autistic groups was not only similar but also worse than that of either of the other two groups (Shields, et al., 1996b). Whereas there were no significant differences between the phonological syntactic group and the controls, both the SPD and autistic groups differed significantly from their normally developing peers in several respects. Both demonstrated relative problems with face recognition, postural expression and visual object and space processing and the autistic group, alone, with design learning and visual non-verbal short term memory. Both of the experimental groups scored more poorly than their language-impaired peers on the non-verbal memory task. In addition, the SPD group showed significantly poorer performance than the language-impaired group in terms of visuo-spatial perception and the autistic group, with regard to memory for faces (Shields, 1995). Combined, the phonological syntactic and

control groups were superior to the SPD and autistic groups (also combined) on all parameters and at a level which reached significance (Shields, et al., 1996b).

The results from the left hemisphere battery were less clear cut. Only two significant differences emerged between the phonologic-syntactic and SPD groups (on the tasks of word reading and word definition) and in one of these cases (word definition) the difference did not go in the predicted direction. Like their language impaired peers, the SPD group scored significantly lower than their typically developing counterparts in terms of their understanding of both vocabulary and grammar, categorisation skills, and the ability to define words. In contrast to the phonological syntactic group (who faired significantly worse than the controls), however, they did not differ significantly from their normally developing peers on word reading or digit recall. No significant differences were found between the two experimental groups on any measure but there were distinctions between them in which they functioned relative to controls (Shields, et al., 1996b). Unlike the SPD group, the autistic group differed from the normally developing controls on a single parameter and did not differ from the phonological-syntactic group in any respect (Shields, 1995).

In summary, in support of their hypothesis the authors found marked similarities between the profiles of the SPD and autistic groups on both the left and right hemisphere battery. However, in each case (although more so with regard to the left hemisphere battery) there were differences in the way in which the two groups performed in relation to the phonological-syntactic and normally developing controls.

2.4 Summary and conclusion

As this chapter has shown, the past decade has seen much debate about the standing of SPD in relation to SLI and autism. The proposition that SPD is related to autism was prompted by clinical observations of behavioural similarities between the two conditions (e.g. Brook & Bowler, 1992; Gagnon, et al., 1997) and behavioural dissimilarities between SPD and SLI (e.g. Leonard, 1998). Recognising the need for more systematic evaluation of these observations, several authors have set out to demonstrate the extent to which SPD fulfils the behavioural criteria for autism. Brook & Bowler (1992) did so with reference to Wing's triad of impairments (Wing, 1988) and Gagnon et al (1997) did so with reference to the DSM-IV (American Psychiatric Association, 1994). Both sets of authors considered their results to support their view that SPD is essentially a case of autism mis-diagnosed. However, the value of these comparisons is limited by the fact that the necessary and sufficient features of SPD have still to be established as a result of which there is a risk that individuals with autistic disorder or Asperger's Syndrome are included in the sample.

For this reason, and because they have at last shifted the debate into the empirical domain, Shields et al's (1996a, 1996b) recent attempts to identify more fundamental links between the two conditions at the levels of psychological underpinnings and hemispheric function are a welcome development. What is more, they have yielded some provocative results. In respect of hemispheric function, the authors identified marked similarities between the profiles of the SPD and autistic groups on both the left and right hemisphere tasks; and in their investigation of social cognition, the performances of the two groups were, again, largely coincidental. Thus, Shields et al. (1996a) found strong support for their hypothesis that the two conditions were related. However, support was not unequivocal. With regard to hemispheric function, there were some noteworthy differences between the two groups in the way in which they performed relative to the phonological-syntactic and

normal controls, particularly on the 'left hemisphere tests'. With regard to social cognition, some of the participants from the two control groups performed poorly as well which makes it difficult to determine the source of the errors made by failers from either of the two experimental groups.

The view that SPD is a type of SLI has received less attention in the literature. To summarise, its proponents maintain that the pragmatic deficits shown by children with SPD are secondary to primary impairments of linguistic function (Crystal, 1985; Sahlen & Nettlebladt, 1993; Snow, 1996). A fundamental tenet of this perspective must, then, be that SPD entails linguistic deficits. However, as discussed in the previous chapter, the extent to which this criterion is fulfilled is uncertain. While reports of impaired linguistic function have increased in recent years, particularly as a feature of single case studies, they have not been incorporated into current descriptions of the disorder but instead seemingly dismissed as idiosyncratic or secondary. Behavioural comparisons with SLI, like those conducted by advocates of the 'SPD as autism' view, have not been undertaken since it is widely accepted that sub-types of SLI are manifest in different ways. It is interesting to note, however, that in studies in which the performance of SPD and SLI groups have been compared, anticipated differences in behaviour have not been found. For example, no differences were observed in referential ability (Bishop & Adams, 1991; Leinonen & Letts, 1997a), inferential ability (Bishop & Adams, 1992) or idiom comprehension (Vance & Wells, 1994).

Prior to Snow's recent attempt to establish empirical evidence in support of the view that SPD is, essentially, a manifestation of SLI, this position was entirely speculative. Snow set out to demonstrate how one child's tendency to provide tangential responses in conversation might be explained in terms of his inability to understand particular question words. Using a question and answer format, he succeeded in illustrating how the child's inappropriate responses to questions about a picture-book could be explained in this way. In doing so, he underlined the need to

consider the possibility of linguistic involvement as a factor in SPD, at least in some cases. However, the extent to which this tendency parallels that of giving tangential responses in conversation, in which many other processing demands come into play, is uncertain. How well the linguistic account can explain other features of SPD is also open to question.

It is evident from this chapter that the issue of boundaries is far from resolved. More research is needed before strong claims can be made in either direction or either case justifiably dismissed. As far as the linguistic account is concerned, the need to establish the universality of linguistic deficits in SPD is paramount. In terms of the autism account of SPD there is a need, not only to clarify the position with regard to mentalising ability but also, to consider alternative explanations of autism that have come to the fore in recent years. In particular, executive dysfunction and weak central coherence. Both of these theories have gained momentum from fact the that (i) in virtually every study of theory of mind function in autism a proportion of participants pass; and (ii) they are more prevalent than theory of mind deficits (Bowler, 1992; Ozonoff, et al., 1991a, 1991b). If these developments are not taken into account there is a risk that false negatives will be inferred.

Progress in the boundaries debate has not only been hampered by limitations in our knowledge and understanding of SPD, but is also complicated by the fact that, "... we do not really know what kind of diagnostic entities/categories 'autism' (in particular) but also 'SLI' are *either*" (my italics) (Boucher, 1998, p 73). As Boucher (1998) points out, both autism and SLI can be viewed as a syndrome, continuum, or spectrum of subtypes. Boucher's recent observation that each of these perspectives entails a unique set of assumptions about the form that a relationship with SPD could, logically, take, has added another dimension to the debate. Boucher describes a syndrome as "a unitary disorder *in which* its diverse signs and symptoms stem from a single cause ... at any one of the various levels of the causal chain" (p74). She maintains that, if SPD is considered to be a form of SLI or autism conceptualised as

syndromes, it must, at some level, have the same cause. It must also have the same criterial symptoms, tending to co-vary in the same way as in other cases of the condition. As such, she argues that, from a logical perspective, there is not space within a syndrome concept of either condition for another diagnostic entity such as SPD. Similarly, she proposes that there is, logically, no room for SPD within either SLI or autism if these are conceptualised as a continuum since the notion of a continuum implies that "developmental impairments occur independently of each other across multiple dimensions of behaviour in individual children" (p76) and does not allow for the existence of discrete clinical entities. In Boucher's view, logic dictates that there is only room for SPD (as a distinct clinical entity) within either SLI or autism if these are conceptualised as spectrums of related subtypes. She goes on to point out that, from this perspective, there is also logically space for SPD to exist as a subtype of SLI *and* autism. She also points out that, "for *any of these three alternatives* to be established it would be necessary to show clear and reliable *differences* as well as similarities in the set of defining features of SPD and other subtypes, and to show differences in the causal mechanisms underlying the different sets of defining features of the various subtypes" (p77) (my italics). Although some aspects of Boucher's argument have been called into question (Bowler & Lister Brook, 1998; Rapin & Allen, 1998) (in particular her notion of *syndrome*) her discussion has provided a useful framework for future research into the borderlands of these conditions.

One important question that has yet to be addressed in this discussion is whether or not it matters whether SPD is akin to autism or SLI? The answer is that it does because the clinical implications are different in each case. If SPD is essentially a language disorder then intervention directed at language learning and placement in a school or unit for children with language impairment which provides this sort of input would be appropriate; if it is akin to autism then a broader approach to remediation which focuses as much on behaviour modification as communication might be more beneficial and placement in an educational establishment where such methods are

adopted would, probably, be more suitable. There are also implications for prognosis, since the outcome of autism is generally considered to be less favourable than that of SLI. For these reasons, different networks of carer support may also be appropriate.

In this context, the boundaries debate serves as a means to an end. The end being the implementation of appropriate and efficacious therapeutic and educational management. If this is so, then, other hypotheses about the underpinnings of SPD, which bear no apparent relation to the boundaries debate, should also be considered. One such alternative has been put forward by McTear (1989). Based on detailed analysis of conversational data from a child whom he considered to present with SPD, he suggested that impairment of the storage/access to/application of world knowledge might have a causal role to play. This proposal was made following his detailed case study of a ten year old boy with SPD who showed a striking inability to arrive at the expected interpretations of pictorially presented problem situations. For example, he was not able to interpret a picture in which a boy was standing on the doorstep of a house, looking lost, having emptied the contents of his pockets onto the ground. The expected interpretation, and the one made instantly by normally developing children of the same age, was that the boy had lost his key and so was unable to enter the house. Given that this information was not explicit in the picture, McTear suggested that it had to be inferred on the basis of a mental representation of what entering a building entails or by what he referred to as an 'entering buildings script'. McTear noted that the child's difficulty might, then, have stemmed from the fact that he lacked the necessary script or that he had developed a faulty script. However, he also observed that, when probed, the child did demonstrate some knowledge of entering buildings. When told that the boy was locked out and asked what he might do, for example, the child suggested that he could try the back door. This led McTear to hypothesise that the child's difficulty lay not in deficient world knowledge *per se*, but rather in an inability to "integrate his current knowledge and schemata with new information in order to make sense of that new information" (McTear, 1989, p133).

Bishop & Adams (1992) also refer to the potential involvement of impaired world knowledge in SPD (and SLI in general), in relation to the findings from their investigation of story comprehension (see page 36). They postulated that some sort of impairment in world knowledge might not only explain the deficits that were apparent in inferential ability in this group but may also, indirectly, account for the difficulties that they demonstrated with literal understanding. More specifically, Bishop & Adams hypothesised that because of deficient world knowledge the children were unable to interpret information that was implicit in the story and that this lack of constructive processing in turn influenced their ability to understand and remember information that had been explicitly stated in the text. The authors highlighted the need for further research to determine whether these children do lack world knowledge or whether they possess it but lack the ability to apply it, as McTear (1989) suggests.

This hypothesis holds the appeal of being data driven. Yet it would appear to have been largely ignored. It is not clear why this might have happened but if it is because it appears to have little to offer the 'categorisation puzzle', there is a danger that the boundaries debate is no longer a means to an end but has, somewhere along the line, become an end in itself.

In view of the conclusions made here and in Chapter One the current investigation has two main goals. The first is to help to clarify the issue of diagnostic criteria by (i) broadening the scope of investigation and (ii) removing some of the extraneous factors and methodological limitations which have hindered previous attempts to do so. The second is to provide *preliminary* evidence concerning possible underlying psychological mechanisms. In particular, executive dysfunction, weak central coherence and impaired world knowledge. A subsidiary third aim is to provide further evidence concerning the suggestion that SPD results from impaired theory of mind. As the notions of deficient theory of mind, executive dysfunction and weak central coherence have all been proposed as theories of autism, studying them in relation to SPD will inevitably inform the boundaries debate. However, it is important

to point out that, in this case, it was not the primary motivation for doing so; rather it was seen as part and parcel of the more open-ended question, "what could possibly explain SPD?".

In the next chapter the concepts of executive dysfunction, weak central coherence and impaired world knowledge will be discussed in more detail. Since the theory of mind concept has been detailed in this chapter it will not be discussed again in the next.

Chapter Three
What Might Explain SPD?

"... research on classification and research on underlying cognitive processes must go hand in hand" (Bishop, 1997, p37)

3.1 Introduction

In this chapter an overview of the concepts of executive dysfunction, weak central coherence and impaired world knowledge is presented. The first two of these will be discussed with regard to what is known about them in relation to autism and the third, in the context of normal development. Why these theories might usefully be studied in relation to SPD will also be considered.

3.2 Executive dysfunction

Executive function has been defined as "the ability to maintain an appropriate problem-solving set for the attainment of a future goal" (Luria, 1966). It is an umbrella term which encompasses a range of cognitive constructs including flexibility of thought and action, planning, the inhibition of pre-potent responses, organised search and working memory (Goldman-Rakic, 1987). Thus executive *dysfunction* - impairment to any or all of these operations - may manifest itself as rigid and inflexible behaviours, difficulty adapting to change, the presentation of repetitive or stereotyped behaviours and actions, the failure to plan or anticipate long-term consequences, lack of self-monitoring, impulsivity and the inability to inhibit pre-potent (irrelevant) responses.

Exhibition of the above behaviours by individuals with autism prompted the suggestion that executive dysfunction might be implicated in autism (Ozonoff,

Pennington, & Rogers, 1991a). The first empirical investigation of this notion was conducted by Rumsey in 1985. She administered the Wisconsin Card Sorting Task (Heaton, 1981) to a group of high-functioning verbal men with 'residual state autism'. In this test, which has been described as "the prototypical task *of executive function* in neuropsychology" (Pennington & Ozonoff, 1996), the participant is required to match cards according to one of three dimensions (colour, shape and number). The sorting principle is not disclosed but must be inferred by the participant on the basis of the feedback that he receives from the examiner after each turn as to whether or not an appropriate match has been made. Once ten consecutive cards have been sorted correctly, the sorting principle is changed without caution or comment. Hence all cards sorted in accordance with the previously correct strategy receive negative feedback on the basis of which the participant is expected to shift to the newly introduced rule. The primary dependent variable of interest is the number of perseverative responses; that is, the number of trials on which sorts are made on the basis of a previously correct rule in spite of negative feedback to the contrary. This is generally considered to provide an index of the participant's ability to shift cognitive set or of their 'cognitive flexibility'. Rumsey found that, relative to a normal control group matched for chronological age, the autistic participants in her study did, indeed, show deficits in this respect. Later, she identified significant impairments on other parameters of the task, such as the number of categories completed (Rumsey & Humburger, 1988) and showed that these were specific to autism as opposed to a more generalised consequence of learning difficulties (Rumsey & Humburger, 1990).

These findings have since been replicated in numerous studies of autistic individuals of varying ages and IQ levels. For example, Ozonoff et al (Ozonoff, et al., 1991a) found that high-functioning children with autism showed significantly more perseverative errors than learning disabled controls. Prior and Hoffman (1990) found that these deficits persisted in spite of explicit instruction that a shift of set was required and of the removal of ambiguous cards; and Szatmari et al (1990)

demonstrated impairments in the proportion of perseverative errors made and the number of categories completed in relation to a group of controls of whom 80% met the criteria for conduct disorder and/or attention deficit hyperactivity disorder (ADHD). Both of these conditions may also be associated with executive dysfunction (Lueger & Gill, 1990, and Chelune et al., 1986, respectively). More recently, Ozonoff & McEvoy (1994) have demonstrated the stability of these deficits over a two and a half year period.

Thus there is converging, although not unequivocal (Minshew et al, 1992), evidence to suggest that deficits on the WCST - and so problems in shifting cognitive set - are prevalent in autism. However, the task has been criticised for the fact that it brings a number of other cognitive operations into play as well (Pennington & Ozonoff, 1996). The identification of attributes, categorisation skills and selective attention are just a few examples. As such, failure to perform successfully on this task cannot necessarily be attributed to an inability to shift cognitive set. More recently, Hughes et al (1994) have replicated the above findings using a cleverly designed computerised task - known as the Intra-Dimensional/Extra-Dimensional (IDED) Shift task - which surmounts most, if not all, of these shortcomings. Like the WCST, the IDED shift task is essentially concerned with the participant's ability to apply a discrimination principle which is not made explicit but which must be inferred on the basis of feedback and which is changed without warning. Unlike the WCST, it incorporates internal controls of external influences on performance (such as discrimination learning, rule-reversal and the transfer of learning), as it proceeds in a step-wise format. A schematic overview of the task is shown overleaf in Figure 3.1.

Hughes et al found that the autistic group in their study were less likely to complete the task than a non-autistic learning disabled group (matched for VMA and CA) and a group of younger normally developing controls because of differences at the extra-dimensional shift (EDS) stage of the task but at no other stage of the task.

Figure 3.1 Outline of the Intra-Dimensional Extra-Dimensional Shift task

Stage 1

The participant is shown two cards each depicting one of two geometric shapes, one of which has been designated the target by the experimenter. The participant is required to point to the one that he thinks is 'right' on repeated trials. Each time, feedback is given as to whether or not the correct choice has, in fact, been made. Once a criterion of six successive correct responses has been achieved, the target is changed to the alternative shape.

Stage 2

Again at criterion, a second stimulus dimension - lines - is introduced. The participant is shown the same two shapes but this time each is paired with one of two lines. Although present, the newly introduced dimension is irrelevant at this stage and the target stimulus dimension remains shape.

Stage 3: The Intra-Dimensional Shift (IDS) Stage

This is the first of the task's two key transfer stages. The participant is presented with new exemplars for both stimulus dimensions. That is, both the shapes and lines are changed. The target dimension (of shape), however, remains unchanged. Thus, although the participant must learn to discriminate between novel stimuli the principle for doing so is no different from that which has been reinforced throughout the preceding stages.

Stage 4: The Extra-Dimensional Shift (EDS) Stage

The is the second transfer stage. In it, not only are the exemplars changed for a second time but the sorting principle is also changed so that the target stimulus dimension becomes line rather than shape. Success at this stage necessitates a true shift of attentional set because it requires the participant to shift attention away from the previously reinforced dimension.

Moreover, they produced more errors than controls at the EDS stage but not at the preceding IDS stage. The authors saw this as further evidence of impaired cognitive set shifting ability in autism. Additional support for this position has since been gained not only from the administration of other computerised tasks (Ozonoff, et al., 1994; Turner, 1997) but also from a simple pen and paper task in which the participant has to generate as many different abstract designs as possible in a given

time period (Turner, 1997). Turner administered this task to a group of autistic individuals and found that, although they did not differ in respect of the overall number of designs they generated, they produced significantly fewer novel designs than learning disabled controls. Their performance was characterised by a high rate of repetitive and redundant responses. This was taken as further indication of a difficulty in inhibiting previous pre-potent responses and in shifting cognitive set.

Impairments in other components of executive function have also been found. For example, deficits in planning have been repeatedly demonstrated on the Tower of Hanoi task (or derivations thereof) which *"requires subjects to plan and carry out a sequence of moves that transforms a random arrangement of disks into a pyramidal goal configuration"* (Ozonoff, 1997).

Thus executive function deficits have been consistently shown using a wide range of measures and in subjects of varying ages and levels of ability. In view of this, and the fact that a proportion of autistic subjects have been found to pass theory of mind tasks in every study in which they have been employed, Ozonoff et al set out to uncover the 'primary configuration of deficits' in autism (Ozonoff, Pennington, & Rogers, 1991; Ozonoff, Rogers, & Pennington, 1991). To do so they examined both theory of mind and executive functioning in the same group of autistic adolescents. Not only did they find that problems with the latter were more widespread (96% of the autistic group performed below the control group mean on these tasks as opposed to 87% on the theory of mind battery) but also that, when the autistic group was subdivided into those with a diagnosis of autism and those with a diagnosis of Asperger's syndrome, some interesting and important performance discrepancies emerged. Whereas both groups were equally impaired in terms of executive function, problems with mentalising were restricted to those with an authoritative diagnosis of autism. Bowler (1992) has also found adults with Asperger's Syndrome to perform well on second-order theory of mind tasks. On the basis that Asperger's Syndrome is

basis that Asperger's Syndrome is currently considered to be a sub-type of autism, these findings led Ozonoff et al to propose executive dysfunction as a more suitable candidate for the primary deficit in autism than a deficit in the ability to mentalise. They do not discard the mentalising deficit account altogether. Instead, and in view of evidence from neuro-imaging studies which suggests that theory of mind capacities may be sub-served by the pre-frontal cortex (Baron-Cohen et al., 1994; Fletcher et al., 1995), they propose that the two psychological impairments might be linked at the biological level, by virtue of neural proximity (Ozonoff, 1997).

While evidence in support of the executive account of autism mounts, it suffers from a problem of discriminant validity. That is, autism is not the only disorder in which executive functions have been found to be impaired. Executive function deficits have consistently been found in children with attention hyperactivity deficit disorder (ADHD) as well (see Pennington & Ozonoff, 1996, for a detailed review)[1]. However, recent advances in executive function research, that have been afforded by the introduction of information processing paradigms, suggest that component executive functions are dissociable and, moreover, that in the two disorders different components are selectively impaired. For example, autism would appear to be marked by impaired cognitive flexibility and ADHD by problems concerned with inhibition (Ozonoff, 1997; Pennington & Ozonoff, 1996).

3.3 Weak drive for central coherence

It is not only the apparent inability of the theory of mind account to explain all people with autism that has prompted researchers to look elsewhere for explanation but also the notion that it is unable to explain all the *features* of autism. In aiming to account for the islets of ability in the behavioural profile of autism that have been

1 There are some findings of executive function deficits in other developmental disorders such as Tourette Syndrome and early treated phenylketonuria but these have been inconsistent (see (Pennington & Ozonoff, 1996, for a review).

reported - such as superior ability on the Children's Embedded Figures Test[2] (Shah & Frith, 1983), on Block Design[3] subtest of Wechsler intelligence scales (Bowler, 1992; Lockyer & Rutter, 1970; Venter, Lord, & Schopler, 1992), in the recall of random strings of words (Hermelin & O'Connor, 1970) and in the ability to recognise inverted faces (Langdell, 1978) - as well as the deficiencies, Frith (1989) suggested one such alternative . She proposed that autism stems from an underlying weakness in the *drive for central coherence* that typifies normal information processing. That is, a deficit in the automatic mechanism by which "high-level meanings are derived through the weaving together of otherwise piece-meal information" in context (Happe, 1994, p 225). She hypothesised that it was as a direct result of this propensity to see parts over wholes that the children with autism demonstrated preservation of function on the above tasks[4].

On this basis, Shah & Frith (1993) predicted that, whereas the performance of normally developing children on a Block Design task would be enhanced by the pre-segmentation of the designs, the performance of individuals with autism would not, since it was their natural affinity for mental segmentation of this kind that was thought to give them the advantage on this task in the first place. To test their hypothesis they administered a modified version of the Block Design task to sixty-five children, twenty of whom presented with autism, twelve with learning disability, and thirty-three of whom were developing normally. The autistic group (age range 16-25 years) was divided into two equally sized groups on the basis of IQ scores and the normally developing group on the basis of chronological age. The high-functioning autistic

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2 The CEFT requires the child to pick out a simple figure hidden within a larger meaningful drawing.
3 The Block Design Task "requires the breaking up of line drawings into logical units, so that individual blocks can be used to reconstruct the original design from its separate parts" (Happé, 1994, p121)
4 Brian & Bryson (1996) have argued that children with autism show preservation of function on these tasks relative to other skills as opposed to superiority in relation to the norm. This observation was made in light of their failure to find a discrepancy between the performance of high-functioning children with autism and controls matched for language age or non-verbal ability on a modified version of the CEFT coupled with Ozonoff et al's (1991a) failure to replicate findings of superior block design performance. On this point it is interesting to note that in Shields et al' study (Ozonoff, et al., 1991a; Shields, Varley, Broks, & Simpson, 1996), the autistic group performed no better than their normally developing peers on the block design task.

group (who boasted normal or near-normal non-verbal IQ) was matched with the older normally developing group (n=17) for performance IQ; and the low functioning autistic group both with the learning disabled group for performance IQ and chronological age (18 years) and the younger normally developing group (mean age 10;9) for performance IQ alone. The modifications entailed the manipulation of three aspects of the target designs, namely the presence/absence of oblique lines, the orientation or rotation of the designs relative to the page, and the presence or absence of pre-segmentation. The results showed that, regardless of IQ, the autistic participants performed better than their controls in one condition only; when whole designs were presented. This superiority disappeared when the designs were presented in their pre-segmented form. Segmentation was the only task component which was found to discriminate the autistic participants from the controls; the other conditions affected all groups equally. The authors considered their findings to support their suggestion that superior performance on the block design task was a function of the tendency for piecemeal processing rather than the more general result of superior visual-spatial processing ability.

In an effort to establish whether coherence was weak at a lower perceptual level and in stimuli "devoid of 'higher level meaning'", Happé (1996) examined the judgements of children with autism about visual illusions. On the basis of central coherence theory and inasmuch as these "require the integration of perceptual features" (Happé, 1996, p874) she predicted that children with autism would be less likely to succumb to the usual illusionary effects than controls and that, unlike controls, would not profit from the artificial accentuation of the part of the illusion to be judged. To test these proposals, Happé presented six common illusions to three groups of children. The first comprised twenty-five children with autism; the second, twenty-one normal children approximately matched for verbal mental age; and the third, twenty six with moderate learning difficulties, but without autism. Each illusion was presented in two conditions. In the two-dimensional condition the illusions were

shown on card in black and white; in the three-dimensional condition, the same cards were presented but a brightly coloured plastic strip/shape was placed over the part of the figure to be judged. In addition, control figures were presented for each illusion, in order to confirm that each participant had sufficient language to understand and answer the test questions and was able and sufficiently motivated to assess line length and orientation in non-illusionary figures. Participants who were unable to pass these items were excluded from the sample. The results supported Happé's predictions. In the two-dimensional condition, the autistic group did succumb to fewer illusions than did controls. Furthermore, in contrast to the autistic group whose performance was not significantly enhanced in the three-dimensional condition, the control groups made significantly fewer accurate judgements in the two-dimensional than three-dimensional condition, in which the number of accurate judgements made increased to a level on a par with that of the autistic group.

Just as the central coherence theory predicts that individuals with autism will show characteristic strengths it also predicts that they will show specific weaknesses. In particular, it proposes that they will perform poorly on tasks which rely on the extraction of "context-dependent meaning" (Happé, 1997). Frith & Snowling (1983) have tested this hypothesis. They examined the ability of autistic children to disambiguate, and so provide the correct pronunciation of, homographs (words which have two meanings) in a sentence reading task. For example, the children were required to read aloud sets of contrasting sentences, such as, "He had a pink *bow*" and "He made a deep *bow*". The authors found that, relative to dyslexic and normally developing controls matched for reading age, the participants with autism were more inclined to give the most frequent pronunciation regardless of context.

Together these findings provide strong support for the notion that an inability to integrate meaning to enable the context-dependent processing of ambiguous information may be central to autism. How, though, does this fit in with alternative

theories? In a recent study, Happé undertook to investigate the links between central coherence and theory of mind. To this end she administered a version of Frith & Snowling's homograph task, modified to assess effect of the position of the target word relative to the disambiguating context, to autistic individuals who had already been tested on a battery of first and second order theory of mind tasks and grouped on the basis of their performance. She found that, unlike a control group of normally developing 7- to 8-year olds[5] who showed a significant advantage when the sentence context occurred before the target word (for example, "In her dress there was a big *tear*", as opposed to "There was a big *tear* in her eye"), the autistic participants tended to give the more frequent pronunciation regardless of context and irrespective of level of theory of mind performance.

Thus, Happé found evidence for weak central coherence even in those individuals who do exhibit some mentalising ability. Recognising the preliminary nature of her findings and acknowledging the need for further research to establish their specificity to autism, she suggests that they might help to explain the persisting real-life handicaps that are demonstrated by those individuals with autism who are able to pass the standard first and second-order theory of mind tasks. Similarly, it may clarify why they demonstrate difficulties in attributing mental states in more naturalistic contexts, such as in Happé's Strange Stories task (1994b). Like Ozonoff et al. (1991a) in the case of executive function theory, Happé does not discount the value of the mentalising deficit account in explaining the triad of impairments in autism. Instead, she postulates that, " ... a theory of mind mechanism which is not fed by rich and integrated contextual information is of little use in everyday life" (1994a, p 124).

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5 The lowest chronological age in the autism group was 8;9 and the lowest verbal mental age, 7;7.

3.4 Impaired world knowledge

As mentioned, McTear (1989) offers a rather different perspective on the underpinnings of SPD. He suggests that it might stem from "an inability to make rational inferences on the basis of everyday world knowledge" (p131). Bishop & Adams (1992) have also suggested that the storage or application of world knowledge might be impaired in SPD. There is now an impressive body of research to suggest that normally developing children represent their knowledge of the world, and more specifically, the everyday events that they encounter within it in the form of *scripts* (Schank & Abelson, 1977) or *generalised event representations* (GERs) (Nelson, 1986), as described by McTear. These are seen as experientially derived and are conceptualised as generalised hierarchical mental structures that incorporate a temporally/causally ordered sequence of events around a goal. Within this model, the script is viewed as comprising a series of slots which are filled by the actors, actions and props that are integral to the fulfilment of that goal, as determined by the context. In a restaurant script (see Figure 3.2, overleaf), for instance, in which the goal is obtaining food to eat, actions would include entering the restaurant, ordering and eating, each of which would themselves encompass a series of sequentially ordered activities or 'subscripts'. Hence the hierarchical structure. For example, entering might involve moving oneself into the restaurant, looking for and selecting a table, moving to the chosen table, and sitting oneself down. The actors might include a customer, waitress and chef; and the props, a table, a menu and food. Although all restaurant scripts will necessarily involve some of these components (entering and eating, for example) others (in this case, the subscripts, actors and props) will vary as a function of restaurant type or 'context'. It is the aforementioned 'slots' within GER architecture that endow them with the flexibility to deal with such variability.

Just as the components themselves may vary, so too can the order in which they are executed - both as a function of the context in which the event occurs (in some

Figure 3.2 Schank & Abelson's prototypical restaurant script. Based on Slackman, Hudson & Fivush, 1986, p 50)

Script: **Restaurant**

Actors: Customer, waitress, chef, cashier

Props: Tables, menu, food, bill, money, tip

Goal: To obtain food to eat

Subscript 1: Entering

move self into restaurant
look for empty tables
decide where to sit
move to table
sit down

Subscript 2: Ordering

receive menu
read menu
decide what you want
give order to waitress

Subscript 3: Eating

receive food
ingest food

Subscript 4: Exiting

ask for [bill]
receive [bill]
give tip to waitress
move self to cashier
move self out of restaurant

restaurants payment precedes the meal and in others it proceeds it, for example) and of the event itself. In some events, the components follow a specified order, or demonstrate what are known as 'enabling relations' (Fivush & Haden, 1997). For example, in a restaurant it would be usual to expect the main course to precede the dessert and the tip to be paid only after the meal has been eaten and the bill paid. In others, such as a birthday party, the order in which component acts are executed is largely arbitrary.

There is a large body of evidence to suggest that children form mental representations of events, of the sort described above, from an early age. Using a basic interview format in which the child is simply asked by the researcher, "what happens when ...?", Nelson demonstrated that children as young as three years of age are able to produce virtually error-free reports of everyday events and to execute precise re-enactments of them using props (Nelson & Gruendel, 1986). Subsequent research has shown that children's reports of events, or 'scripts', are not only accurate but also characteristic in form.

In the first place, they are general rather than specific to a single episode. This is evident in (i) the prevalence of timeless present tense verbs and impersonal pronouns such as 'you' and 'we', as in 'you eat and drink' (French, 1986; Nelson & Gruendel, 1986); and (ii) the infrequency with which personal or idiosyncratic elements are reported (Nelson & Gruendel, 1986). This generality is a consistent feature of recall, even after as little as one or two experiences of an event (Fivush, 1984; Nelson, 1980), and is seen to reflect the general nature of the underlying mental representation (Nelson & Gruendel, 1986).

In the second place, children's scripts are well ordered (Fivush, 1984; Nelson, 1997; Nelson & Gruendel, 1979; Slackman, Hudson, & Fivush, 1986). The extent of children's sensitivity to the temporal structure of events has been demonstrated using a recall task in which 4-6 year olds were required to recount script based stories in which the acts/events occurred in non-canonical order (Hudson & Fivush, 1983). The researchers found that the older children restored canonical order or transformed the misordered events so that they made sense in their existing location. The younger children simply omitted the misordered actions.

These basic characteristics of scripts are unchanging. However, within these parameters, the complexity and consistency of children's reports have been shown to

vary as a function of age, experience, and of the event itself. For example, older children's reports tend to include more acts and more optional elements than younger ones (Fivush & Slackman, 1986); and reports of familiar events are more consistent than reports of unfamiliar ones (Nelson, 1986).

Representing knowledge of the world in this way benefits the child in a number of respects. In the first place, it provides him with a framework from which to guide his behaviour in familiar situations (Slackman, et al., 1986) thus preventing him from having constantly to attend to the ongoing action (Nelson, 1981). It also assists his interpretation of novel situations and events as they unfold in everyday life (Nelson, 1986; Fivush & Slackman, 1986) and enables him to make sense of deviations from their usual course (McTear, 1991). Moreover, from the perspective that GERs are "essentially ways of summarising common cultural assumptions" (Baddeley, 1991) p344) and social understanding (Fivush & Slackman, 1986), they also allow for the exhibition of socially appropriate behaviour (Baddeley, 1991) and the smooth operation of social exchange (Fivush & Slackman, 1986).

Not only do GERs help the child to interpret and participate in the events themselves, but also to make sense of the rendition of these in dialogue (Nelson & Gruendel, 1979), stories (Seidman, Nelson, & Gruendel, 1986) and written text (Oakhill, 1994). Inasmuch as they are "an organised body of knowledge such that a part implies the whole and the whole is more than the sum of the parts" (Nelson, 1981 p13), that are automatically activated (McTear, 1991), they enable the child to make inferences and go beyond that which has been explicitly stated. If a child is told that a person has been to a restaurant, for example, he can assume without being told that, among other things, they are highly likely to have paid money and eaten food. Similarly, if informed that a person has been shopping, he can surmise that money has been paid and goods received in return (McTear & Conti-Ramsden, 1992). Moreover, on the premise that they enable the child to make predictions about what they are likely

to hear next on the basis of what they have just heard, GERs have also been suggested to reduce processing demands (McTear, 1991).

GERs can also be seen to benefit expressive function. Given that they determine which information can be pre-supposed and that which must be made explicit, they are considered to facilitate the production of coherent (Nelson & Gruendel, 1979) and plausible dialogue (Johnson-Laird, 1983). In addition, Nelson notes that,

> *".. when dialogue is organised around shared script knowledge ... children will reveal a high level of competence in exchanging information and keeping a conversation "on target", that is, sustaining a topic over many turns. On the other hand, when there is no shared script, when the situation is novel, when one or both participants lack script knowledge, or when a script is not invoked ... then the conversational support of the shared script will be lacking and "egocentric" speech may result"* (Nelson, 1981, p 112).

3.4 Summary and conclusion

It could be argued that executive dysfunction and weak central coherence both become candidates for the primary deficit in SPD by simple virtue of the fact that they are implicated in autism and it has been suggested that SPD is akin to autism. However, if one accepts this premise without question, an important stage in the research process may be lost; that of assessing how well the theories actually fit or, more specifically, in this case, that of appraising the extent to which the behavioural profile of SPD can actually be cast in executive or central coherence terms. Until the defining features of SPD have been established it is difficult to see how this might be achieved. As Happé points out, "the first step in a psychological theory is knowing what must be explained" (Happé, 1994a). The same problem applies in the case of world knowledge.

Does this mean that efforts to ascertain underlying mechanisms should be abandoned until diagnostic criteria for SPD have been agreed? There are several reasons to suggest not. In the first place, doing so would limit the potential for therapeutic advances since it is only by understanding why children behave as they do that appropriate and effective therapeutic and educational approaches can be developed; and second, it would neglect the possibility that it could be at this level that universals are eventually found. Perhaps the most pressing reason for pursuing the investigation of underlying mechanisms, however, is the need for substantiation of the strong claims that continue to be made about the standing of SPD in relation to autism (e.g. Aarons & Gittens, 1990; Gagnon, et al., 1997).

These observations notwithstanding, the amount that the investigation of underlying mechanisms can contribute to the understanding of SPD in the absence of diagnostic criteria is questionable. This is due to the problem that this short-coming poses for participant selection and the subsequent interpretation of the results. Thus it would seem that "... research on classification and research on underlying cognitive processes must go hand in hand" (Bishop, 1997, p37) if any real progress is to be made. This maxim is central to the present investigation in which the goals of clarifying diagnostic criteria and providing evidence concerning underlying mechanisms (see page 78) have been pursued in relation to the *same* children.

The remainder of this thesis concerns the present study. Chapters 4 and 5 relate to the first of the aims above (clarification of diagnostic criteria) and Chapter 6, the second (providing evidence about underlying mechanisms). In the final chapter, Chapter 7, the findings will be discussed in the context of the issues raised in Chapters 1, 2 and 3. That aspect of the investigation concerned with behavioural profiling (described in chapters 4 and 5) will be referred to as Phase 1 and that concerned with underlying mechanisms will be referred to as Phase 2.

Chapter Four
Phase 1: The Behavioural Profiling of SPD
A Pilot Study

4.1 Introduction

In conclusion to the first chapter it was suggested that previous efforts to refine and validate the definition of SPD have been hampered by limitations in the two main methodological approaches that have been adopted for this purpose. That is, single case studies and group comparisons. The first of these allows for detailed exploration of a broad range of behaviours, resulting in comprehensive profiles of strength and weakness. However, due to differences in procedures, observational focus and/or the developmental stage of the children concerned, single case studies do not provide a strong basis for comparison. In contrast, the second approach focuses on overall group trends but does not allow for the exploration of potentially important individual differences. In addition, the amount of data that can be collected and the breadth of focus are often restricted by the number of participants that are involved. Furthermore, group studies rest on the assumption that the participants concerned can be divided into discrete homogeneous groups *a priori*. This premise is problematic in relation to SPD.

With regard to the aim of establishing diagnostic criteria in this study an attempt has been made to overcome these methodological shortcomings by combining the two approaches and by studying children of a similar age. Detailed and comprehensive profiles of linguistic, conversational, social and intellectual functioning have been obtained for twelve children, of between nine and twelve years of age, all of whom have been identified as presenting with SPD by their speech and language therapists. Comparisons were then made across the cases to see which, if any, behavioural similarities emerged.

An effective assessment battery for the purpose of gaining comprehensive behavioural profiles was developed in a pilot study of three children, as described in this chapter. The next chapter concerns the administration of the finalised battery to a further nine children. Comparisons are made across all twelve cases at the end of Chapter Five.

4.2 Method

4.21 Participants

Three children with SPD were selected to take part in the study. All of them attended the same school for children with special educational needs in the areas of language, social interaction and social communication. In studies of SPD, the process of participant selection is complicated by the fact that there are no specified diagnostic criteria. In this instance, two options are available to the researcher. Participants can either be selected (i) on the basis of a working definition of SPD taken from the literature or (ii) on the grounds of the judgement of school staff in the absence of prescribed criteria[1]. Neither approach is ideal. The first alternative requires the selection or compilation of a definition of SPD and, as such, entails assumptions about which behavioural features are important and which are not. Futhermore, it engenders circularity because it is likely to yield profiles which simply match the assumptions made in the identification of the selection criteria. The second alternative risks being influenced by the selectors' perception of SPD. In spite of this shortcoming, the second approach was considered preferable in the case of this study since it is less prone to circularity.

The chronological ages of the participants were 10;4, 9;5 and 9;3, respectively, at the time at which the study commenced. All three of the children were monolingual

[1] This was written before Bishop's (1998) Children's Communication Checklist (CCC) became available.

English speakers, none presented with hearing impairment and all were, by chance, male. Intellectual function was not included within the selection criteria because it was intended as part of the investigative assessment battery.

4.22 Materials

A battery of eight standardised assessments was selected for the purpose of this study (see Table 4.1). Of these, six concerned language functioning, one concerned intellectual functioning and one, social and behavioural functioning. Two informal measures - the South Tyneside Assessment of Phonology (Armstrong & Ainley, 1990) and a conversational sampling and analysis procedure (Adams & Bishop, 1989) - were also included. With the exception of the Bracken Basic Concept Scale, which has a ceiling of 7;11 and 30 days, all of the assessments were age appropriate. The Bracken was used in the absence of a more suitable alternative. The purpose of each assessment is summarised in Table 4.1, overleaf. Appendix I contains more detailed descriptions. The conversational sampling and analysis procedures are described below.

4.23 Procedure for the administration of the standardised measures

With the exception of the CARS (Schopler, et al., 1988), the assessment battery was administered to each child individually by the researcher, in a quiet room, over a series of sessions that spanned a two month period. The sessions took place in the participants' school, weekly or bi-weekly. Each was kept to a maximum of forty-five minutes. No specific order of administration was followed but the same assessments were administered across sessions from one participant to the next.

The CARS procedure was explained to both the participants' speech and language therapist and teacher, who were asked to work together to complete the form

Table 4.1 An overview of the standardised tests included within the assessment battery.

Assessment	Aspects of Functioning Tapped
Test for the Reception of Grammar [*TROG*] (Bishop, 1982)	Understanding of a range of syntactic structures.
British Picture Vocabulary Scale [*BPVS*] (Dunn, Dunn, Whetton, & Pintile, 1982)	Receptive vocabulary.
Test of Word Finding [*TWF*] (German, 1989)	Picture naming (nouns, verbs, categories), sentence completion, and description naming.
Clinical Evaluation of Language Fundamentals - Revised (UK Version) [*CELF-R (UK)*] (Semel, Wiig, & Secord, 1994)	Various aspects of syntactic and semantic functioning. Taps receptive and expressive abilities.
The Bracken Test of Basic Concepts [*The Bracken*] (Bracken, 1984)	Understanding of concepts.
British Ability Scales - Revised [*BAS-R*] (Elliot, 1987)	Non-verbal and verbal abilities. Gives an IQ score.
Childhood Autism Rating Scale [*CARS*] (Schopler, Reichler, & Renner, 1988)	Autism rating on the basis of observations of a range of abilities.
South Tyneside Assessment of Phonology [*STAP*] (Armstrong & Ainley, 1990)	Phonological production at single word level.

The completed form was then returned to the researcher who totalled the ratings for each of the items in order to arrive at an overall autism rating for each child.

4.24 Conversational sampling procedures

The conversational sampling procedure used in this study was modelled on Adams & Bishop (1989). Conversation was developed around a series of four photographs depicting (a) a boy trying on wellington boots in a shoe shop; (b) children in a swimming pool with water slides; (c) a boy helping his father with the washing up; (d) a girl with a suitcase being waved off or greeted at a railway station. These were thought to represent everyday scenes of which the participants might have some personal experience. Each picture was presented and the child was encouraged to talk about his own similar experiences. The picture was only intended to serve as a springboard for discussion and was removed once a conversational exchange was underway. As in Adams & Bishop (1989) the conversation was allowed to develop

naturally and not restricted to only those topics covered by the pictures. However, a conscious effort was made to cover a uniform set of topics in order to (i) prevent the possibility that the children might mask their difficulties by keeping strictly to their own prescribed familiar or "safe" topics; and (ii) to aid comparison between participants' performance. These included school, family, home, pets, shopping, hobbies/sport and outings/holidays.

Each participant was audio and video-recorded in conversation with the researcher for approximately thirty minutes. The conversations were transcribed from the audio-tapes as soon as possible after the session, using the conventions of Crystal et al (Crystal, Fletcher, & Garman, 1976). These conventions will not be described in full but will be specified as necessary throughout the text. The video-tapes were then observed to resolve ambiguities and provide any contextual information considered relevant.

4.25 Procedure for conversational analysis

A minimum of 155 and a maximum of 185 turns of conversation were selected for analysis. The two complementary procedures devised by Adams & Bishop (Adams & Bishop, 1989; Bishop & Adams, 1989) were adopted for this purpose[2]. The first of these is concerned with exchange structure, conversational repair and turn-taking, and is based on normal conversational patterns. The second procedure focuses on appropriacy. It involves the identification of all of the child contributions which created *"a sense of oddness and disruption of the normal conversational flow"*. Both coding systems are outlined below. Further details are given in Appendix II.

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2 For reasons of time, the analysis of cohesion was not undertaken in this study; it was recognised that there was some overlap with the second of the two analysis procedures in terms of the information that it would yield.

Adams & Bishop's (1989) Coding system I: Exchange structure, repairs, turn-taking

1. Exchange structure
   - A. *Initiation - question / statement (IQ/IS)*
   - B. *Response - minimal, non-verbal / minimal, verbal / extended (RMn/RMv/RE)*
   - C. *Continuation - statement (CS)*
   - D. *Follow-up (F)*
   - E. *Unintelligible (Un)*
   - F. *Incomplete (X)*
2. Turn-taking
   - A. *Gap (<G>)*
   - B. *Overlap - inadvertent / rule violating / adult interrupt (<I>/<V>/<A>)*
3. Repairs
   - A. *Appropriate response to request for clarification (<R1>)*
   - B. *Inappropriate response to request for clarification (<R2>)*
   - C. *Child request for clarification (<R3>)*
   - D. *Child repair (<R4>)*

Bishop & Adam's (1989) Coding system II: The categorisation of inappropriate utterances

1. Expressive semantics/syntax
2. Failure to comprehend literal meaning
3. Pragmatics I: Violations of exchange structure
   - A. *Nil response*
   - B. *Ignores initiation*
4. Pragmatics II: Failure to use context in comprehension
5. Pragmatics III: Too little information
   - A. *Inappropriate presupposition*
   - B. *Unestablished referent*
   - C. *Logical step omitted*
6. Pragmatics IV: Too much information
   - A. *Unnecessary assertion/denial*
   - B. *Excessive elaboration*
   - C. *Unnecessary reiteration*
   - D. *Ellipsis/reference not used*
7. Unusually or socially inappropriate content or style
   - A. *Topic drift*
   - B. *Unmarked topic shift*
   - C. *Stereotyped/formulaic*
   - D. *Inappropriate questioning*
   - E. *Socially inappropriate*
8. Other
   - A. *Lack of knowledge/experience*
9. Problem

4.3 Results

The results are presented as three single case descriptions. Following a brief outline of the child's overall language profile, the findings are discussed in sections relating to the various 'levels' of language function. Quantitative information from the standardised assessments is presented in terms of levels of performance in accordance with the criteria shown in Table 4.2, after Bishop & Adams (1992). The "good" category has been added here in order to recognise strengths in the children's profiles as well as weaknesses. The standard score and percentile rank equivalents for these scoring criteria are presented in Table 4.3. It should also be noted that the "average" category has been subdivided in order to demonstrate whether the child scored above or below the mean.

Table 4.2 Criteria for performance levels on the standardised assessments.

Performance Level	Criterion
Impaired	scores more than 2 standard deviations below the mean
Poor	scores between -1.5 and 2 standard deviations below the mean
Average	scores between 1.5 standard deviations below and above the mean
Good	scores more than 1.5 standard deviations above the mean

Table 4.3 Standard score and percentile rank equivalents for the performance criteria.

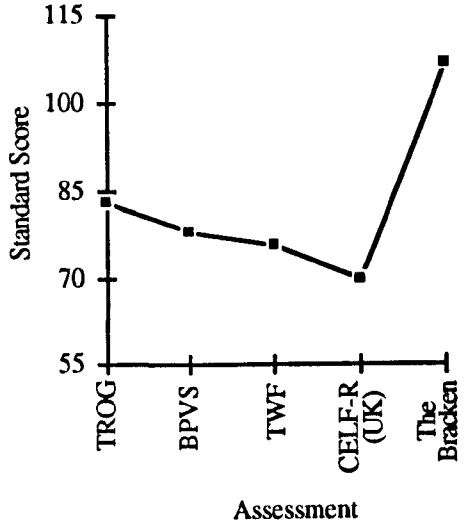
Performance Level	Standard Score	Percentile Rank
Impaired	• composite score at or below 70 • subtest score at or below 4	• score at or below 3
Poor	• composite score between 77 & 71 • subtest score of 5	• score between (and including) 4 and 7
Average	• composite score between 78 & 122 • subtest score between 6 and 15	• score between (and including) 8 and 94
Good	• composite score above 123 • subtest score of 16 or above	• subtest score of above 95

4.31 Case 1 - D (CA 10;4)

4.31.1 Language functioning

D's profile of performance on those language assessments that yield a standard score is presented in Figure 4.1 below.

Figure 4.1 Profile of performance on standardised language assessments



His overall scores were more than one and a half standard deviations below the mean on three of the five standardised assessments in the battery. A more detailed description of D's language functioning follows.

4.31.11 Receptive functioning

A breakdown of D's receptive functioning is presented in Table 4.4 below[3].

3 In this, and all subsequent tables of this kind, the "average" column has been subdivided in order to indicate on which side of the mean (albeit within the normal range) the child's performance fell.

Table 4.4. Profile of D's receptive language functioning (assessment)

Aspect of functioning	Impaired	Poor	Average		Good
Vocabulary (BPVS)		■			
Concepts (The Bracken)				■	
Semantic Links (CELF-R (UK) subtest)			■		
Semantic Relationships (CELF-R (UK) subtest)			■		
Syntax (TROG)			■		
Commands (CELF-R (UK) subtest)			■		

As the table shows, only D's vocabulary was below normal limits (he obtained a standard score of 78 on the BPVS). On the remainder of tasks, D performed within the normal range although, usually, on the lower side of it. On the TROG, D showed some difficulty on the more complex items involving relative clauses and embedded sentences. On the CELF-R (UK), his performance on the receptive language subtests was better than on expressive language subtests, but still stood (consistently) more than one standard deviation below the mean. On the *Word Classes* subtest, the majority of D's errors involved spatial concepts (such as *ahead/front* and *beside/below*) and temporal concepts (such as *early/morning* and *seconds/minutes*). The *Semantic Relationships* subtest showed up some selective weaknesses which mirrored those identified in the *Word Classes* task. Despite showing a good command of comparatives (6/8 items correct) and a developing grasp of passive relationships (4/8 items correct) he showed marked difficulties with spatial and temporal relationships (1/5 and 0/4 items correct, respectively).

4.31.12 Expressive functioning

A breakdown of D's expressive functioning is presented in Table 4.6.

Table 4.6. Profile of D's expressive language functioning (assessment)

Aspect of Functioning	Impaired	Poor	Average		Good
Word Finding (TWF)*		■			
Categorisation (*similarities* subtest of BAS)			■		
Sentence Formulation (subtest of CELF-R (UK))	■				
Sentence Assembly (subtest of CELF-R (UK))			■		

As Table 4.6 shows, D's expressive profile was less favourable than his receptive one. This is barely reflected in the differential between the receptive and expressive subscales of the CELF-R(UK), on which he achieved standard scores of 74 and 70, respectively. Of the expressive assessments in the battery, D scored most poorly on the *Formulating Sentences* subtest of the CELF-R (UK), achieving a standard score of 4. Although he was able to formulate both simple and complex sentence structures, he made errors on the items involving conjunctions (e.g. *or* and*either*) and showed a poor understanding of some of the stimulus words (see below). He failed on all of the items which required him to incorporate two stimulus words in his response. Some examples of his responses - both with and without error - are shown in Table 4.7. In contrast, his performance on the *Sentence Assembly* task within normal limits.

Table 4.7. Examples of D's responses on the *Formulating Sentences* subtest of the CELF-R (UK)

Stimulus	Response
if	*If* I had some books I would read them.
although	*Although* I've broken my arm I can still play with you.
but	*But* the boy fell off his bike.
either	I'll have the burger *either* the drink.
and/because	*And* I was there *because* I was in the race.

D's response to the stimulus "tall" (shown below[4]) on the *Formulating Sentences* task was interesting because it not only exposed a gap in his concept development but also highlighted a difficulty with sentence construction.

A tall/ [*said at the same time as presenting the stimulus picture*]
C what?/
A tall/
C I don't know what any of the picture or myself/
A do you want to try?/
C tall?/
I don't even know what it means, tall/
A okay then/

Similar gaps were evident on the Bracken, although D's overall score on this test was within the normal range[5]. Concepts that were problematic include comparison (such as *identical*), shape (such as *space*, and *angle*), size (such as *large*), texture/material (such as *gas* and *bright*), quantity (such as *neither, another* and *as many*) and time/sequence (such as *just*).

In addition, D demonstrated poor word findings abilities, scoring more than one and a half standard deviations below the mean on the TWF. A summary of his performance across subtests is shown in Table 4.8.

Table 4.8. Summary of D's performance on the TWF.

Section	Percentage of items named correctly
Picture Naming: Nouns	79%
Sentence Completion Naming	63%
Description Naming	83%
Picture Naming Verbs	65%
Picture Naming: Categories	71%

D scored most poorly on the *Sentence Completion* and *Picture Naming of Verbs* subtests. However, it should be noted that, on the *Sentence Completion* subtest, D

4 In this and all subsequent examples of expressive exchanges shown in this text, 'A' refers to the adult researcher and 'C' to the child.
5 Recall the children's age advantage on this task (see page 98).

spontaneously corrected several of his errors. On the *Picture Naming of Verbs* subtest, D's responses tended to be less specific than the target. For example, he said "growing" for 'planting', "carrying" for 'towing', and "standing" for 'weighing'. On the *Picture Naming of Categories* task D tended to express an inability to respond rather than to make errors per se. He encountered fewer problems with the *Picture Naming of Nouns* and the *Description Naming* tasks on which his errors were restricted to low frequency words such as "jack" (as in the old-fashioned game), "cactus", "fan" and "skate". In all subtests, his comprehension of the target words was good.

In contrast, D performed within normal limits on the *Similarities* subtest of the British Ability Scales, obtaining a percentile rank of 46. For the most part, D was able to give exemplars of the target category together with the category name, even when the target was a category which he had been unable to recall on the *Picture Naming of Categories* subtest of the TWF, described above. However, he did make some errors. The following was particularly interesting because of the unexpected association that it prompted with "Treasure Island".

Stimulus	Response
steel, copper, silver	*Jim Hawkins, Pleasure Island, Long John Silver*

On the STAP, D produced 96% of the target words correctly. His errors involved the substitution of "th" with "f". On some items D commented on the stimulus picture. This provided further insight into his spontaneous expressive skills. For example, when shown a picture of a two hands, one of which was clothed in a glove, he said, "that one has bare and that one has got a glove".

4.31.3 Conversational functioning

4.31.31 Exchange structure

The percentage of codes allocated to each exchange structure category is shown in Table 4.9. The figures highlight the prevalence of responses among D's contributions.

Table 4.9 Allocation of codes within the category of exchange structure.

	CHILD		ADULT	
Coding Category	No. of Occurrences	% of Total Utterances	No. of Occurrences	% of Total Utterances
Initiations				
Questions	4	5	44	56
Statements	3	4	3	4
Total	7	9	47	60
Responses				
Minimal Verbal	15	19	0	0
Minimal Non-Verbal	3	4	0	0
Extended	29	36	3	4
Total	47	59	3	4
Continuations				
	20	25	2	3
Follow-Ups				
	7	9	26	33
Unintelligible				
	0	0	0	0
Incomplete				
	0	0	1	1
Problems				
	0	0	0	0
Total Number Utterances	80		79	

4.31.32 Turn-taking

As Table 4.10 shows, violations of turn-taking rules were infrequent.

Table 4.10. Number of occurrences of the turn-taking codes

Inadvertent Overlap (I)	Violating Overlap (V)	Adult Interrupt (A)	Gap (G)	No Response (NR)
2	2	0	2	2

4.31.33 Conversational repair

Findings from the analysis of conversational breakdown and repair are shown in Table 4.11. D did not request clarification or self-repair. His ability to respond successfully to the adult's clarification requests was variable.

Table 4.11. Number of instances of each repair behaviour

Adequate Response to RQCL*	Inadequate Response to RQCL	Child RQCL	Child Self-Repair
3	3	0	0

* RQCL = request for clarification

4.31.34 The categorisation of inappropriate utterances

The findings from the classification of inappropriate utterances are shown in Table 4.12.

Table 4.12 Allocation of codes in the categories of inappropriacy

Coding Category	No. of Occurrences	% of Total Codes Allocated	% of Total Utterances
Too Little Information	5	25	6
Unusual Content/Style	1	5	1
Expressive Syntax/Semantics	1	5	1
Too Much Information	1	5	1
Violations of Exchange Structure	1	5	1
Failure to Comprehend Literal Meaning	0	0	0
Failure to Use Context in Comprehension	0	0	0
Other	0	0	0
Problem	11	55	14
Total Number of Codes	20		25
Number of Unsatisfactory Utterances	20		
Total Number of Utterances in Sample	80		

In total, 25% of D's contributions were considered inappropriate in some way but the high figure in the problem category (55% of total allocated codes) indicates that many of these were difficult to code using the existing categories. In some instances, D was

inappropriately uncooperative, indicating a lack of knowledge or opinion when this could reasonably be expected. In others, he did attempt to respond, but the form of his response did not match the question; in others still, he was inappropriately vague or he contradicted himself. Some excerpts from the transcripts are shown below.

A what do you like to play?/
C I don't know/

A what music do you like?/
C I don't know/

A is that your best game?/
C sort of/
A do you like music?/
C sort of/

A what's your best game?/
C playing with toys and stuff/

A and who's got the computer?/
is it you or your friend?/
C me/
A and then he hires the games?/
(2.79)[6]
C it's like (2.48) it's his computer/
A mmm/
C he hires the games/

Of those contributions that did meet the criteria for Bishop & Adams' codes, 25% were in the category of "too little information". Most of these involved the failure to establish a referent, as in the example below (the unestablished referents have been italicised). Moreover, 5% of codes were allocated from each of the categories of "unusual content/style", "too much information", "expressive syntax/semantics" and "exchange structure".

6 The figures in brackets indicate pause length in seconds. Pauses were only measured when a perceptible gap occurred within or between utterances and were determined using hand a held stop-watch. Shorter pauses are indicated using dots rather than figures).

A what's Streetfighter all about?/

C well right there's twelve people fighting from different countries and that's Streetfighting and they [makes noise and gestures fighting] (...) just fight like that (unintelligible segment) moves/
I don't do *the special moves/*
I just use *the normal buttons/*

4.31.4 Recall abilities

The breakdown of D's recall abilities, shown in Table 4.13, indicates marked variation in performance according to the type of information that he was required to retell.

Table 4.13 Summary of D's recall abilities

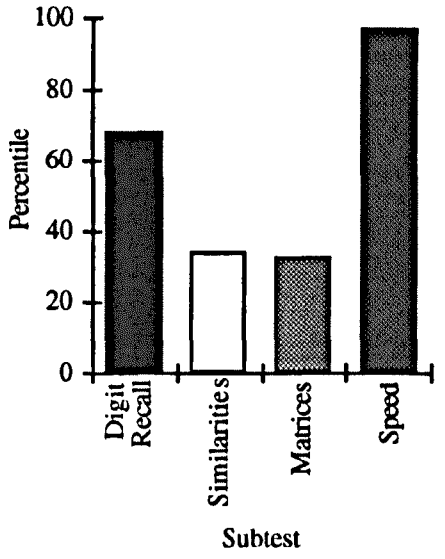
Recall	Impaired	Poor	Average		Good
Recall of Sentences (CELF-R (UK) subtest)					
Recall of Digits (BAS subtest)					

D's ability to recall digits was a relative strength in his profile. He was consistently able to recall strings of four digits. In addition, he was able to recall the majority of five digit items and some of the six digit items. In contrast, he scored more than two standard deviations below the mean on the sentence recall task. His errors included substitutions and reversals and increased with stimulus length. Regrettably, no qualitative record of his responses was made.

4.31.5 Intellectual functioning

Overall D obtained an overall IQ Score on the short form of the BAS of 109.5. He scored within normal limits on both verbal indices (*Similarities* and *Digit Recall*) and on the *Matrices* task. He scored above normal limits (in the hundredth centile) on the *Speed of Information Processing* task.

Figure 4.2 Profile of performance on the BAS- R



4.41.5 Social functioning

Social functioning was explored using the Childhood Autism Rating Scale (CARS) which comprises 15 items. Each of the items concerns a different aspect of social or behavioural function and is scored on a scale from 1 (no abnormality) to 4 (severe abnormality) with half-point scores in between, yielding a minimum rating of 15 and a maximum of 60. The cut-off point for autism is a rating of 30; ratings between 30 and 36 indicate mild-moderate autism and ratings above 37, severe autism (see Appendix I for further detail). On this measure D achieved a total rating of 27 which falls within the 'non-autistic' range. With exception of imitation for which D was given a rating of 1, all the ratings fell between 1.5 and 2.5, indicating only mildly (and occasionally moderately) abnormal behaviours (see Table 4.14 for a breakdown of ratings).

Table 4.14 Summary of ratings on the CARS

Rating of 1.5 (very mildly abnormal)	Rating of 2 (mildly abnormal)	Rating of 2.5 (mildly to moderately abnormal)
object use taste/smell/touch activity level non-verbal communication intellectual response	relating to people body use adaptation to change listening response verbal communication	emotional response visual response fear/nervousness

In addition to the ratings, the following observations were made by D's teacher and therapist:

- avoids eye contact, even when reminded, and to turns his head and body away from the listener when talking;
- become easily upset, for example when losing a game with peers;
- shows a strong reaction to minor discomforts such as a grazed knee;
- becomes troubled by a change in routine and shows nervousness in new situations;
- has difficulty adapting to the communicative environment, failing to make any changes to his interactive style when interacting with a peer versus an adult;
- speaks in a loud voice;
- incorporates learned phrases into his expressive output;
- interprets language literally and encounters difficulty picking up on non-verbal cues;
- demonstrates mechanical reading ability that is age appropriate and approximately one year in advance of reading comprehension;
- plays with objects in a manner appropriate for a younger child.

4.41.6 Summary

D's performance was within the poor or impaired range on three of the five standardised language assessments administered. His linguistic profile was dominated by difficulties in expressive language, especially word-finding and sentence formulation difficulties. D also showed some receptive deficits. There were gaps in his understanding of vocabulary and concepts, in addition to which he demonstrated difficulty interpreting complex syntactic forms on the TROG. D's phonological development was virtually intact.

As far as the mechanics of conversation are concerned, D tended to respond rather than to initiate in exchanges. Turn-taking errors were relatively infrequent. In addition, D demonstrated some facility with conversational repair, offering appropriate responses to half of the requests for clarification posed by the researcher. He did not request clarification or self-repair. As far as the content of the conversation was concerned, approximately one quarter of D's contributions were considered inappropriate in some respect but these were often difficult to code in terms of Bishop & Adams' analysis procedure. Problems included non co-operation, imprecision, and inconsistency/contradiction. In line with Bishop & Adams coding categories, D also showed a tendency to provide too little information, by failing to establish referents or inappropriately presupposing knowledge on the part of the researcher, in addition to which occasional problems in the categories of unusual content/style, expressive syntax/semantics, too much information, and violations of exchange structure were noted.

D's ability to recall information was dependent on the nature of the information involved. He scored more than two standard deviations below the mean on the *Sentence Recall* task but on the *Digit Recall* task his score was high average.

On the assessment of intellectual functioning (BAS) D achieved an overall IQ score of 109.5. On all but the *Speed of Information Processing* task, on which he scored above the normal range, D performed well within normal limits.

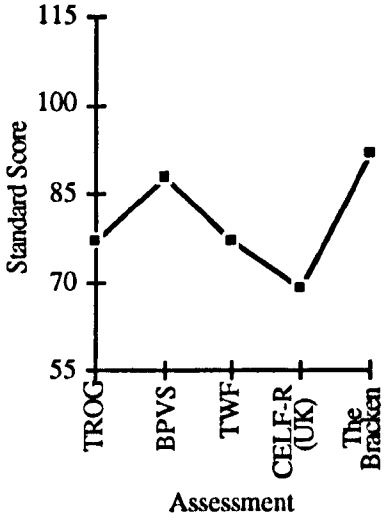
Teacher/Therapist observations and ratings on the Childhood Autism Rating Scale indicated mild and moderate abnormalities in social and adaptive functioning. D's emotional response (easily upset), visual response (poor eye contact), and tendency for fear or nervousness (in new situations) were the most impaired. Each was rated as mildly to moderately abnormal. In addition, D was reported to lack communicative flexibility, demonstrate a tendency for literal thought and literal interpretation of language and to show signs of hyperlexia.

6.42 Case 2 - N (CA 9;5)

4.42.1 Language functioning

N's profile of performance on those language assessments that yield standardised scores is shown in Figure 4.3. He scored more than one and a half standard deviations below the mean on three of the five tests presented.

Figure 4.3 Profile of performance on standardised language assessments



N's expressive sub-scale standard score (or 76) on the CELF-R (UK) was greater than his receptive sub-scale standard score (of 65) on the same test. This is contrary to the usual developmental pattern. In addition, N's performance on many of the assessments was "patchy". Together these factors indicate deviant rather than delayed language development. A more detailed description of N's language functioning follows.

4.42.1 Receptive language

A summary of N's receptive profile is shown in Table 4.15.

Table 4.15 Summary of N's receptive language profile

Receptive Language	Impaired	Poor	Average		Good
Receptive Vocabulary					
Understanding Concepts					
Understanding Semantic Links					
Semantic Relations					
Understanding Syntactic Structures					
Understanding Commands					

His problems were most marked on the *Semantic Relationships* subtest of the CELF-R (UK), on which he scored poorly regardless of item type (see Table 4.16).

Table 4.16 Summary of N's raw scores on the Semantic Relationships subtest of the CELF-R (UK)

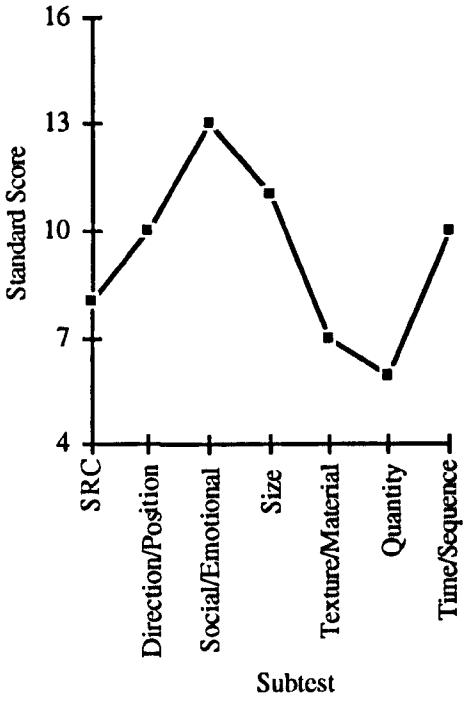
Section	Raw Score
Comparatives	2/8
Spatial Relationships	0/5
Passive Relationships	2/8
Temporal Relationships	2/7

N's understanding of *Semantic Links* was also poor, especially for spatial and temporal concepts. It is important to note that he made several requests for repetition during the task. Although he generally provided the correct answer once the stimulus had been repeated he was required to receive zero scores, in accordance with the test procedure.

In spite of the fact that N's scores on the Bracken and the BPVS were within the normal range, his responses indicated a number of gaps in his understanding of vocabulary and concepts. For instance, the Bracken highlighted specific deficits in his understanding of concepts which relate to quantity and in his understanding of spatial concepts (as measured by the *School Readiness Composite* (SRC)) (see Figure 4.4).

Given the spiky nature of his profile on this test and his low scores on several of the subtests, it is likely that, had norms been available for children of his own age, N's would have scored below average.

Figure 4.4 Profile of performance on the Bracken



*SRC = School Readiness Composite

N's understanding of grammatical structures was also patchy. An overview of his pass rates on the TROG, from the point at which he began to encounter difficulties, is shown in Table 4.17, overleaf.

Finally, N's understanding of commands was poor (as assessed on the *Oral Commands* subtest of the CELF-R (UK). Most of his errors involved two and three level commands, number and serial orientation but a few were also made on easier items which involved only single level commands.

Table 4.17 Breakdown of N's TROG scores

Block	Content	N
J	singular/plural noun inflection *The cats look at the ball*	3/4
K	comparative/absolute *The knife is longer than the pencil*	√
L	reversible passive *The girl is chased by the horse*	3/4
M	in / on *The cup is in the box*	√
N	post-modified subject *The boy chasing the horse is fat*	2/4
O	X but not Y *The box but not the chair is red*	3/4
P	above / below *The pencil is above the flower*	√
Q	not only X but also Y *Not only the bird but also the flower is blue*	√
R	relative clause *The pencil is on the book that is yellow*	2/4
S	neither X nor Y *Neither the dog nor the ball is brown*	0/4
T	embedded sentences *The book the pencil is on is red*	2/4

4.42. 2 Expressive functioning

N's expressive language abilities are profiled in Table 4.18.

Table 4.18 Profile of N's expressive language abilities

Expressive Language	Impaired	Poor	Average		Good
Word Finding		■			
Categorisation			■		
Sentence Formulation		■			
Sentence Assembly			■		

As the table shows, N demonstrated word-finding difficulties. He obtained an overall standard score on the TWF of 77. A breakdown of his performance across the subtests on this test shown in Table 4.19.

Table 4.19 Summary of N's performance on the TWF

Section	Percentage of Items Named Correctly
Picture Naming: Nouns	90%
Sentence Completion Naming	75%
Description Naming	58%
Picture Naming Verbs	65%
Picture Naming: Categories	82%

The majority of N's errors on the *Picture Naming of Verbs* subtest concerned his tendency to use more than one word. Non-specific vocabulary and semantic paraphasias were also evident. For example, N said "carrying the car" for 'towing' and "chopping" for 'peeling'. On the *Description Naming* task, three of his five errors involved a tendency to focus on part of the stimulus (see below).

Stimulus Item (+ Target Response)	N's Response
What floats in the sky, may be full of rain, and is grey or white? (cloud)	*sea-gull*
What is a small cloth or piece of paper that is found at the table and is used to wipe your mouth when eating? (napkin)	*table-cloth*
What is something used to slide on ice, has a blade, and has a top made of leather? (skate)	*shoe*

A similar error was made in the *Sentence Completion Task* ; N completed the stimulus sentence 'In a lamp you screw in a light ....' with the word "Genie".

N also scored poorly on the *Sentence Formulation* task, achieving a standard score of 5. On the majority of items N made at least one semantic or syntactic error. However, he was able to generate some complex sentence constructions. Examples of his responses (both with and without error) are included in Table 4.20.

Table 4.20 Examples of N's responses on the *Sentence Formulation* subtest of the CELF-R (UK).

Stimulus	Response
if	*If* they miss the bus they will be late.
before	The people are *before* the lady.
or	They will choose some food *or* some special things.
but	But they are alright but the boy isn't.
although	He is riding his bike *although* the boy is riding his skateboard.
either	They can have some food *either* a hamburger.
before, if	They have to go on the aeroplane before it's too late if they miss it.

In contrast to the sentence generation task, and all other CELF-R (UK) subtests, N performed within normal limits on the *Sentence Assembly* task, demonstrating the ability to construct a range of syntactic forms. However, he showed some difficulty with the more complex items, such as those involving reversed word-order (*the man gave the girl a present*) and non-reversible actives (*the girl is going to fall of the fence*).

On the *Similarities* subtest of the BAS (categorisation), N's performance was low average. On several items N's response was less specific than the target. For example, when the target was 'vegetables' N said "food" and when the target was 'furniture' N said "things you have in your house". His response to the 'metals' item was particularly interesting :

A steel, silver, copper ...
C robber, copper
A why?
C because they got some robber things
I know one - money
A why money?
C because robbers steel money

This odd association would appear to stem from N's interpretation of the noun "steel" as a verb (to steal). It may also have been influenced by a less usual interpretation of the word "copper" as policeman.

On the STAP, N produced 79% of the target words correctly. Some minor phonological immaturities were observed, such as the substitution of 'th' with 'f' and the substitution of 'r' with 'w'.

4.42.3 Conversational functioning

6.42.31 Exchange structure

The percentage of codes allocated to each exchange structure category is shown in Table 4.21. As in D's case, responses dominated, accounting for 70% of all his contributions. Initiations were infrequent.

Table 4.21 Allocation of codes within the category of exchange structure.

	CHILD		ADULT	
Coding Category	No. of Occurrences	% of Total Utterances	No. of Occurrences	% of Total Utterances
Initiations				
Questions	3	4	51	47
Statements	2	3	21	19
Total	5	7	72	67
Responses				
Minimal Verbal	17	22	0	0
Minimal Non-Verbal	0	0	0	0
Extended	36	47	0	0
Total	53	70	0	0
Continuations				
	12	16	5	5
Follow-Ups				
	5	7	30	28
Unintelligible				
	0	0	1	1
Incomplete				
	0	0	0	0
Problems				
	1	1	0	0
Total Utterances	76		108	

4.42.32 Turn-taking

The number of utterances allocated to each of the turn-taking codes is shown in Table 4.22. As the figures show, N demonstrated a tendency for violating overlap.

Table 4.22 Allocation of turn-taking codes

Inadvertent Overlap	Violating Overlap	Adult Interrupt	Gap	No Response
0	5	0	0	1

4.42.23 Conversational repair

The number of times each repair code was used is shown in Table 4.23. Codes were allocated from all categories. The rate of adult requests for clarification signifies a difficulty in understanding N. N responded to the majority of these requests appropriately.

Table 4.23 Allocation of codes in the category of repair.

Adequate Response to RQCL	Inadequate Response to RQCL	Child RQCL	Child Self-Repair
5	2	3	2

4.42.34 The categorisation of inappropriate utterances

Overall, 34% of N's contributions were considered inappropriate in some way. The *types* of inappropriacy that were observed are shown in Table 4.24, overleaf.

Table 4.24 Allocation of codes in the categories of inappropriacy

Coding Category	No. of Occurrences	% of Total Codes Allocated	% of Total Utterances
Expressive Syntax/Semantics	12	44	16
Too Little Information	4	15	5
Unusual Content/Style	1	4	1
Violations of Exchange Structure	1	4	1
Failure to Comprehend Literal Meaning	1	4	1
Failure to Use Context in Comprehension	0	0	0
Too Much Information	0	0	0
Other	0	0	0
Problem	8	30	11
Total Number of Codes	27		36
Number of Unsatisfactory Utterances			
Total Number of Utterances in Sample	76		

Almost half of the codes (44%) were allocated from the category of expressive syntax/semantics. Some examples of the errors he made in this category follow:

A what's it like?/ [referring to N's new class]
C *it's good but they've got hard work/*
A what do you mean?/
C *they got hard work in Class &/*

A what's your favourite story?/
C Birt and Flirt/
A what?!!/
C Birt and Flirt/
it means (..) snooker balls/

A what have you got to do then?/ [referring to a class activity]
C *you've got to solve how and I did it/*

In addition, 15 % of the coded utterances were categorised as "too little information" and 4% were categorised as "unusual content/style", "violations of exchange structure" and "failure to comprehend literal meaning".

As in D's case, a large proportion (30%) of inappropriate utterances were unclassifiable within Bishop & Adams' system. Some examples of problem utterances follow. See Appendix II for further discussion of coding difficulties.

A how did you choose which shoes you wanted?/
C this one/ [points to own shoe]

A don't you like work?/
C sort of/
A what do you mean?/
C I like it and I don't like it/
A why do you like it?/
C I might not like it/

4.42.4 Recall ability

N's performance on the two recall tasks in the battery is summarised in Table 4.25.

Table 4.25 Summary of recall abilities.

Recall	Impaired	Poor	Average		Good
Recall of Sentences					
Recall of Digits					

On the *Recall of Digits* task N was unable to recall more than three digits consistently. On the *Sentence Recall* task (CELF-R(UK)) he scored just within normal limits; he made errors involving substitution, repetition, perseveration, reversal and, on the longer items towards the end of the subtest, omission. Examples of each error type are shown in Table 4.26, overleaf.

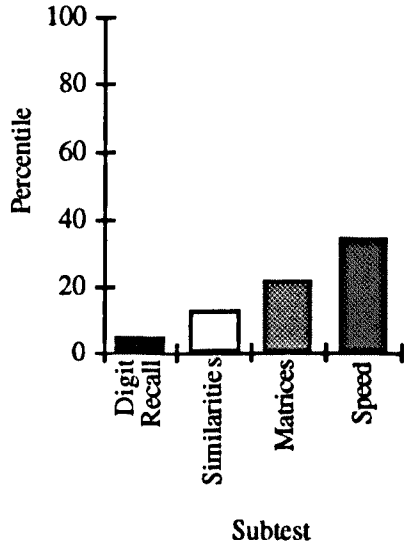
Table 4.26 Examples of N's error responses on the Recalling Sentences subtest of the CELF-R (UK)

Error Type	Target	Response
Substitution	The dog chased the ball and the cat didn't follow.	The *boy* chased the ball and the cat didn't follow.
Repetition	The ball was not thrown by the boy or the girl.	The ball was not thrown by the *ball* or the girl.
Reversal	The big, brown dog chased the red ball.	The big brown *ball* was chased by the brown dog.[7]
	The woman has read the twelve big, heavy, brown books.	The woman has read the twelve *heavy, big,* brown books.
Omission	The postman sorted, labelled, bundled and delivered the magazines.	The postman labelled and bundled the magazines.

4.42.5 Intellectual functioning

On the British Ability Scales (short form), N scored just within normal limits, achieving a total IQ score of 85. His performance across the tasks is profiled in Figure 4.5. He scored within the normal range on all except the digit recall subtest (see above). Overall, he performed better on the non-verbal than verbal tasks.

Figure 4.5 Profile of performance on the BAS



[7] It is interesting to note that N changes the syntactic form of his response from an active to a passive in order to maintain meaning.

4.42.6 Social functioning

On the CARS, N achieved a total rating of 34.5 which falls within the range of mild-to-moderate autism. A breakdown of teacher/therapist ratings for each of the items is shown in Table 4.27.

Table 4.27 Breakdown of ratings on the CARS

Rating of 1.5	Rating of 2	Rating of 2.5	Rating of 3
imitation intellectual response	body use object use listening response taste/touch/smell verbal communication	relating to people emotional response non-verbal communication activity general impressions	adaptation to change visual response fear/nervousness

In addition, the following teacher/therapist observations were made:

- has difficulty imitating movement
- interrupts a lot when talking
- speaks with excessive volume
- becomes upset easily (for example, when criticised or when losing a game)
- laughs loudly for extended periods
- pays little attention to others' body language and facial expression
- flits from one activity to the next in unstructured play
- gets anxious when established routine is altered in some way
- constantly checks the clock for the time of the next activity
- finds it difficult to look closely at an object
- refuses to take off his jumper even in the hottest weather; refuses to wear shorts
- obsessive and rigid
- has difficulty taking others' thoughts and feelings into account
- shows age appropriate mechanical reading but reading comprehension below normal

4.42.7 Summary

N's performance on the standardised language assessments administered (below normal limits on three out of five), was indicative of marked and pervasive

language impairment. Furthermore, his profile indicated deviant language development rather than delay; his expressive skills exceeded his receptive ones (though both were impaired) and, on many of the tasks, his performance was patchy.

N demonstrated a range of receptive difficulties. Findings from the TROG and *Semantic Relationships* subtest of the CELF-R (UK) indicated problems interpreting complex syntactic forms. In addition, the Bracken highlighted gaps in his concept development, particularly with regard to spatial and temporal terms. As far as expressive language functioning is concerned, N demonstrated the ability to produce a wide range of syntactic constructions, but not without error. There were several instances of syntactic and/or semantic formulation difficulties in his responses on the various tasks. In addition, the TWF highlighted word-finding difficulties. He performed relatively well when required to name nouns but when required to name verbs his response was often less specific than the target. His overall score on the TWF was also influenced by a failure to take linguistic context into account (see page 119).

On the assessment of intellectual functioning, N's overall score was just within normal limits. There was a noteworthy mismatch between his verbal and non-verbal scores (the former being poorer). His performance on the *Digit Recall* task was particularly poor.

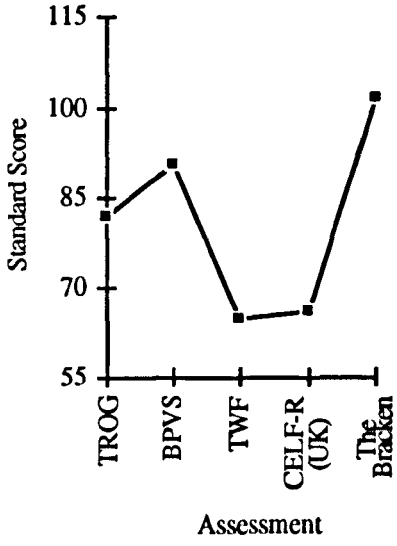
Teacher/Therapist observations on the Childhood Autism Rating Scale indicated various abnormalities in social and adaptive functioning. Mild-to-moderate abnormalities were noted in relating to people, emotional response, non-verbal communication, and activity levels. Severe abnormalities were noted in adaptation to change, visual response, and fear/nervousness. His overall rating placed him in the category of mild to moderate autism.

6.43 Case 3 - M (CA 9;3)

4.43.1 Language functioning

A profile of M's performance on those language assessments that yield standardised scores is shown in Figure 4.6.

Figure 4.6 Profile of performance on the Standardised language battery



M's linguistic profile was dominated by expressive difficulties although some specific receptive deficits were also apparent. This differential was reflected in M's respective receptive and expressive language scores of 74 and 62 on the CELF-R (UK). A more detailed breakdown of M's language functioning follows.

4.43.11 Receptive functioning

A summary of M's receptive functioning is illustrated in Table 4.28, overleaf.

Table 4.28 Profile of M's receptive language abilities

Receptive Language	Impaired	Poor	Average		Good
Vocabulary					
Concepts					
Semantic Links					
Semantic Relationships					
Syntactic Structures					
Commands					

M scored within normal limits on five of the six aspects of functioning assessed, the only exception being the *Oral Directions* subtest of the CELF-R (UK). His errors on this task concerned both two and three level commands and involved all three orientation types (number, serial and left-right). It is important to note that several of the early items on this task had to be repeated. Although M gave correct responses on second hearing in these cases, he was credited with zero scores, in accordance with test procedure.

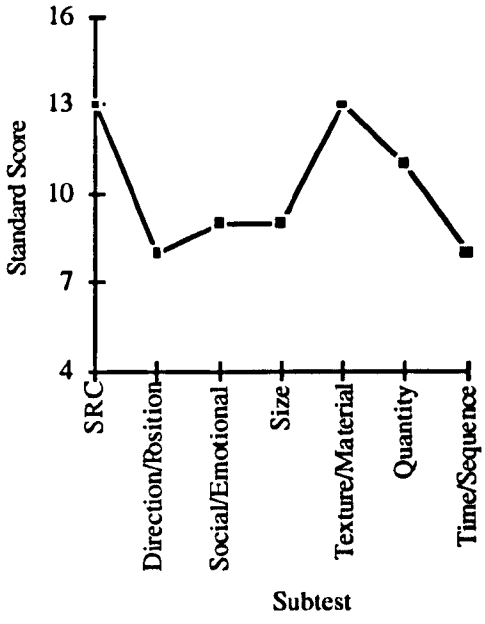
M scored within the normal range on the remaining assessments. However, on four out of five of them his score was low average. Moreover, on three of these assessments (semantic links, semantic relationships and syntax) he scored more than one standard deviation below the mean. Thus, weak points were evident in M's receptive profile. On the *Semantic Relationships* subtest of the CELF-R (UK), for instance, he showed particular difficulty understanding passives (see Table 4.29). On the TROG, he had problems interpreting complex syntactic structures, scoring below chance on those items concerning *not only X but also Y* constructions, *relative clauses*, and *embedded sentences*.

Table 4.29 M's raw scores on the Semantic Relationships subtest of the CELF-R (UK)

Section	Raw Score
Comparatives	2/8
Spatial Relationships	3/5
Passive Relationships	1/8
Temporal Relationships	4/7

M's profile of performance on the subtests of the Bracken was, similarly, patchy (see Figure 4.6). Gaps were observed in his understanding of the concepts of direction/position (such as *corner, opposite,* and *separated*) and time/sequence (such as *after, just,* and *early*). Other concepts that he failed to understand include *underlined, short, thick,* and *exhausted.*

Figure 4.6 Profile of performance on the Bracken



*SRC = School Readiness Composite

4.43.12 Expressive language functioning

M's expressive language abilities are profiled in Table 4.30.

Table 4.30. Profile of M's expressive language abilities

Expressive Language	Impaired	Poor	Average		Good
Word Finding	■				
Categorisation			■		
Sentence Formulation	■				
Sentence Assembly			■		

As the Table shows, M presented with severe word-finding difficulties. On the TWF he achieved a pro-rated accuracy standard score[8] of 71 and performed poorly on all subtests (see Table 4.31, below).

Table 4.31 Summary of M's performance on the TWF

Section	Percentage of Items Named Correctly
Picture Naming: Nouns	59%
Sentence Completion Naming	58%
Description Naming	75%
Picture Naming Verbs	65%
Picture Naming: Categories	76%

M's difficulties were most pronounced on the *Picture Naming of Nouns* and the *Sentence Completion* subtests. On the *Picture Naming of Nouns* subtest, the majority of his errors were phonemic. For example, he said "beard" for the target *bead* and named a *domino* as "domico". If unable to name an item, M would occasionally circumlocute. For instance, he described an *icicle* as a *"thing that hangs on the roof"* and a cactus as *"a prickly thing"*. On the *Sentence Completion* task his errors were varied. Two particularly interesting ones occurred across consecutive items, as shown below.

A when you drive a car, you must be old enough for a driver's (licence)
C when you're old enough to drive a [said to self] ... *car* [said aloud]

A you part your hair with a (comb)/
C you what?/
part your hair?/
A you part your hair with a (comb)/
C *park* your hair with a (...) with a (...) don't know/

In the first instance, it would seem that M is unable to retain all of the stimulus information. In the second, it is the phonemic paraphasia "park" for *part* that is of interest because it implies interference from the previous item.

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[8] In this test a pro-rated accuracy score is obtained if fewer than 94% of the target words are understood, thus partialling out the influence of weak vocabulary.

Errors were also common on the *Picture Naming of Verbs* subtest. Approximately half of these were semantic. For example, he said "ripping" for 'tearing', "bending" for 'bowing', and "pouring" for 'watering'. The remaining half of his errors involved neologisms. For instance he said "mechaning" for 'towing', "prayering" for 'praying', and "weighting" for 'measuring'.

M also scored poorly on the *Formulating Sentences* subtest of the CELF-R (UK), obtaining a standard score of 3. However, it must be noted that this task was discontinued prematurely because it prompted an unacceptable level of frustration on M's part[9], despite the fact he approached it with eagerness at the outset and willingly co-operated with the other subtests administered during that session.

On the *Sentence Assembly* subtest of the CELF-R (UK) M scored within normal limits and demonstrated the ability to construct a range of simple sentence forms. However, he failed to score on the majority of items involving complex constructions. Interestingly, several of his responses were syntactically anomalous.

Target	*Response*
Is the ball in the box?	In the box is the ball
The girls were walking with the girls	The girls walking were with the boys
The girl is going to fall off the fence	The fence going to fell off the girl[10]

M also scored within normal limits on the *Similarities* subtest of the BAS, indicating relatively good categorisation skills. His responses on this task highlighted a rich vocabulary of nouns. For example, M gave trout, swordfish and octopus as examples of fish. Phonemic errors were noted on occasion.

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9 M indicated an inability to respond on the first four items but urged the examiner to continue nonetheless. On the fifth, however, he exclaimed "Oh damn! I don't know that one as well. Can't think of a sentence for *after* ".

10 Note also tense errors and omissions

On the assessment of phonology, M pronounced 93% of the target words correctly. His errors involved the substitution of "th" with "f".

4.43.3 Conversational functioning

4.43.31 Exchange structure

The percentage of codes allocated to each exchange structure category is shown in Table 4.32. The pattern of code allocation mirrors that seen in the two preceding cases. In terms of response type, and unlike D and N, M produced as many minimal responses as extended ones.

Table 4.32 Breakdown of exchange structure codes

	CHILD		ADULT	
Coding Category	No. of Occurrences	% of Total Utterances	No. of Occurrences	% of Total Utterances
Initiations				
Questions	1	1	60	56
Statements	2	3	19	18
Total	3	4	79	74
Responses				
Minimal Verbal	23	32	0	0
Minimal Non-Verbal	9	12	0	0
Extended	20	27	1	1
Total	52	71	1	1
Continuations				
	8	11	7	7
Follow-Ups				
	8	11	16	15
Unintelligible				
	2	3	0	0
Incomplete				
	0	0	0	0
Problems				
	0	0	4	4
Total Utterances	73		107	

4.43.32 Turn-taking

The allocation of turn-taking codes is shown in Table 4.33. M showed occasional tendencies for violating overlap and failing to respond.

Table 4.33 Breakdown of the allocation of turn-taking codes

Inadvertent Overlap	Violating Overlap	Adult Interrupt	Gap	No Response
0	2	0	0	3

4.43.34 Conversational repair

Findings from the analysis of conversational breakdown and repair are shown in Table 4.34. The number of adult requests for clarification highlights the difficulty that the researcher experienced in understanding M. The majority of his responses were appropriate.

Table 4.34 Summary of the allocation of repair category codes

Adequate Response to RQCL	Inadequate Response to RQCL	Child RQCL	Child Self-Repair
4	2	1	0

4.43.35 Categorisation of inappropriate utterances

Thirty-two percent of M's conversational contributions were considered inappropriate. A breakdown of the allocated codes is shown in Table 4.35, overleaf. The majority of M's inappropriate utterances (70%) were difficult to code using Bishop & Adams' system. For the most part, these 'problem' utterances involved M's declaration of a lack of knowledge or opinion as regards a matter about which he

Table 4.35 Allocation of codes in the categories of inappropriacy

Coding Category	No. of Occurrences	% of Total Codes Allocated	% of Total Utterances
Violations of Exchange Structure	5	22	7
Too Much Information	1	4	1
Failure to Comprehend Literal Meaning	1	4	1
Expressive Syntax/Semantics	0	0	0
Too Little Information	0	0	0
Unusual Content/Style	0	0	0
Failure to Use Context in Comprehension	0	0	0
Other	0	0	0
Problem	16	70	23
Total Number of Codes	23		32
Number of Unsatisfactory Utterances			
Total Number of Utterances in Sample	71		

could reasonably be expected of him given his age, experiences and interests. Some examples follow:

A so who do you play with instead?/
C I don't know/
A you don't know/
C no/
A you must know who you play with/
C I don't know/
A what do you like to play then?
C I don't know/

A what do you play on your computer?/
C I don't know

A what else do you do in school that you like?/
C I don't know/

The remainder of codes were allocated from the category of exchange structure and in particular, from the sub-categories of failure to respond or ignored initiations.

4.43.4 Recall abilities

M's ability to recall information was one of the weakest aspects of his overall performance (see Table 4.36).

Table 4.36 Profile of recall abilities

Recall	Impaired	Poor	Average		Good
Recall of Sentences	■				
Recall of Digits		■			

On the *Recalling Sentences* subtest of the CELF-R (UK), M made several different types of errors, some examples of which follow.

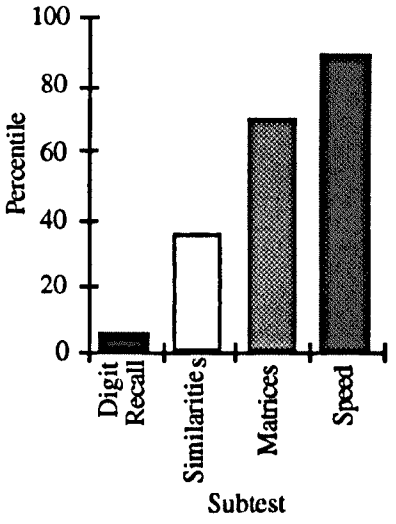
Error Type	Target	Response
Phonemic	The man who painted the railings was very kind.	The man who painted the *railer* was very kind.
Environmental	The big brown dog chased the red ball.	The dog chased the *cat.*
Semantic	The boy sent a letter to the lady who moved away last year.	The boy sent a letter to the *woman* who moved away last year.
Omission	The children cut and pasted the pictures and hung them on the wall.	The children cut and posted and hung them on the wall.

M also performed poorly on the *Digit Recall* subtest of the BAS. He was unable to consistenly recall strings of more than three digits.

4.43.5 Intellectual functioning

On the short form of the BAS, M scored well within normal limits and just below the mean, achieving a total IQ score of 99. His performance across the four subtests is profiled in Figure 4.7. He scored within normal limits on all but the *Digit Recall* task (see above).

Figure 4.7 Profile of performance on the BAS



4.43.6 Social functioning

On the CARS, M received a total rating of 35.5 which falls within the range of mild-to-moderate autism. A breakdown of the ratings for each item is given in Table 4.37.

Table 4.37 An overview of teacher/therapist ratings on the CARS

Rating of 1.5	Rating of 2	Rating of 2.5	Rating of 3
imitation intellectual response	adaptation to change listening response	relating to people emotional response body use object use non-verbal communication activity fear/nervousness verbal communication general impressions	visual response taste/touch/smell

In addition, the following observations were made by M's teacher and therapist:

- shows some difficulties with physical imitation
- likes to stick to a routine
- is easily distracted
- finds it difficult to make eye contact
- finds unstructured times (such as play-time and lunch-time) difficult
- turns away from the listener when talking

- covers eyes and turns his body away when being reprimanded
- cries when he loses a game
- is clumsy
- does not play with toys
- likes mirrors and shows an obsession for computers
- produces disjointed and repetitive speech
- often at a loss for words
- dominates conversation with the topic of computers
- demonstrates activity levels which vary from over-active to excessively lethargic
- shows a highly developed sense of smell but a poor sense of touch
- shows age appropriate mechanical reading but reading comprehension below average

4.43.6 Summary

M scored below the normal range on two of the five standardised language assessments administered (TWF and the CELF-R (UK)). This suggests isolated rather than pervasive language deficits. Except for a poor understanding of commands, M scored within normal limits on all of the receptive language tasks. However, in most cases, his scores fell on the lower side of the mean and there were clear weaknesses in his receptive profile. For example, he had difficulty interpreting semantic relationships (especially comparatives and passives) and demonstrated gaps in his understanding of concepts (in particular those concerned with direction/position and time/sequence).

M's linguistic profile was dominated by expressive deficits. On the Test of Word Finding (TWF), he showed difficulties on all of the subtests and achieved an overall standard score of 70. His responses were characterised by phonemic paraphasias, neologisms and circumlocutions. M also scored poorly on the sentence generation task but his withdrawal of co-operation from the task makes it difficult to interpret his overall score. On the *Sentence Assembly* task, M demonstrated the

ability to construct a range of simple sentence forms but failed the majority of items which concerned complex constructions.

In conversation, the majority of his contributions were responses. Initiations were rare. Turn-taking errors (in the categories of violating overlap and no-response) were apparent but were infrequent. M demonstrated some capacity to deal with conversational repair; he gave appropriate responses to four of the six requests for clarification made by the researcher. As far as the second of the two conversational analysis procedures is concerned, 32% of M's contributions were considered inappropriate. This was usually due to non-co-operation or violation of the rules of exchange.

On the short form BAS, M achieved an overall IQ score of 99. He scored within normal limits on all of the subtests except *Digit Recall.* Problems with recall were also evident on the *Sentence Recall* subtest of the CELF-R (UK).

With regard to social functioning, M's overall rating on the CARS placed him well within the range of mild-to-moderate autism. Moderate abnormalities were reported in M's visual response and touch/taste/smell response; mild-to-moderate abnormalities were reported in relating to people, emotional response, body use, object use, non-verbal communication, activity, fear/nervousness and verbal communication; and mild abnormalties were reported in adaptation to change and listening response.

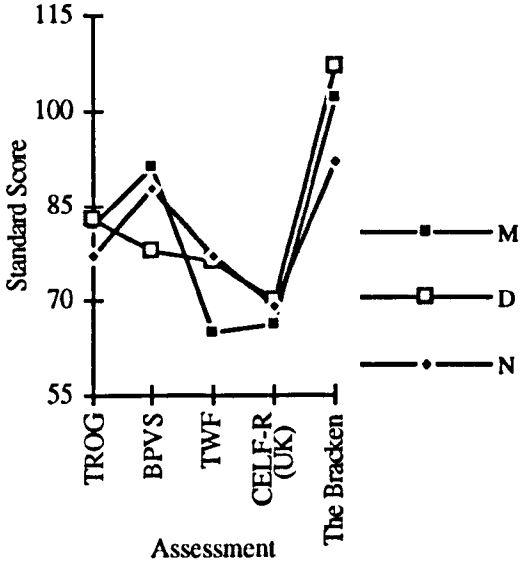
4.44 Summary and synthesis of the three cases

4.44.1 Language functioning

- Significant problems were identified in all three cases. Two of the three children performed below normal limits on three of the five assessments and the remaining child performed below normal limits on two of the five assessments. In each case there were signs of disorded, rather than delayed, language development.

- As figure 4.8 indicates, the pattern of performance, in terms of overall assessment scores, was similar across the three cases [Friedman; $p < 0.001$].

Figure 4.8 Comparison of performance profiles across the standardised language battery



With regard to consistency in *levels* of performance, all three children performed below normal limits on the TWF and on the CELF-R (UK) and within normal limits on the Bracken. Performance levels varied on the two receptive tasks (BPVS and TROG). The relationship between receptive and expressive functioning (as measured by the two subscales of the CELF-R (UK)) also varied. Further similarities in performance level were evident on the CELF-R (UK) subtests; two

of the three children showed a poor understanding of commands, and all performed below normal limits on the *Formulating Sentences* task.

- In each case, phonological functioning (at single word level) was a relative strength but the percentage of words produced correctly ranged from 79% to 98%.

4.44.2 Conversational functioning

- In terms of exchange structure, the children's profiles were dominated by responses. In each case initiations were rare.
- Problems with turn-taking were only encountered in one case (N).
- Two of the three children gave appropriate responses to more than half of the researcher's requests for clarification.
- As far as the second of the two conversational coding procedures was concerned, the percentage of inappropriate utterances varied from 25% to 34%. However, between 30% and 70% of these were problematic to code using Bishop & Adams' system (Bishop & Adams, 1989). As regards those utterances that were possible to code, the prevalence of inappropriacy types differed from one case to the next.

4.44.2 Intellectual functioning

- Overall IQ scores ranged from 85 to 109.5.
- Speed of Information Processing was the strongest aspect of performance in all three cases. Digit Recall was the poorest aspect of performance in two cases.

4.44.3 Recall abilities

- Problems were evident on both the sentence and digit recall tasks. Only one child scored below normal limits on both tasks (see Table 4.38)

Table 4.38 Summary of performance level on the two recall tasks

	D	N	M
Digits	average	poor	impaired
Sentences	impaired	average	poor

4.44.4 Social functioning

- In each case, various abnormalities in social functioning were reported but were mainly mild or moderate. Those behaviours that were most impaired varied from one case to the next.

- Two of the three children received overall ratings on the CARS which placed them within the category of mild-moderate autism.

4.5 Appraisal of measures and suggested modifications

4.51 Standardised measures

None of the standardised measures were considered superfluous to the aim of obtaining objective and comprehensive profiles of functioning; all provided valuable information about the participants' strengths and weaknesses. Thus it was decided that all would be retained in the final battery. However, there appeared to be some gaps in the pilot battery with regard to expressive language function, particularly in respect of connected speech. In view of this, it was decided to include two additional procedures in the final battery, namely The Bus Story (Renfrew, 1991) and the

Language Assessment, Remediation and Screening Procedure (LARSP) (Crystal, et al., 1976). The former concerns the child's ability to recall a story with visual support (and so provides some indication of his/her ability to (re)construct narrative) and the latter, the structural analysis of a sample of spontaneous utterances. Further details of each are provided in Appendix I.

4.52 Conversational sampling

The pattern of conversational behaviour elicited here was different from that described by Adams & Bishop's (1989) who identified a high rate of initiations as a stable conversational characteristic of their SPD group. Given that the procedure for conversational sampling used here mirrored that employed by Adams & Bishop (1989) it is difficult to appreciate how the sampling materials might have been responsible for this discrepancy. Nevertheless, the interactions elicited using the procedure did not appear representative of the small segments of incidental conversation that had occurred during previous sessions. The participants seemed intent to hold discussion around the photos and as soon as they were removed made moves (either verbal or non-verbal) to see the next 'stimulus' card. If this was not immediately forthcoming they became both non co-operative and unresponsive. Thus, it was considered necessary to devise an alternative approach to conversational sampling for the purpose of the main study, in which the child's focus of conscious attention was drawn away from the conversation and onto the materials involved. It was proposed that, rather than try to develop conversation around a set of photographs, it should be left to develop spontaneously while the child helped the researcher to perform a simple task.

For this purpose pages depicting everyday scenes or events were taken from the picture book *A First Thousand Words* (Amery, 1979) and cut into between 3 and 10 large pieces. These included various household scenes, a birthday party, a sea-side scene, a shopping scene, a station, and a classroom scene. Each 'set' of pieces

was then put into a separate unmarked envelope. The researcher was to tell the child that the envelopes contained cut-up pictures that had been given to her by a friend and to explain that she did not know what the pictures were and so needed help to reconstruct them. Several envelopes were to be selected at random by the child, with the aim of maintaining conversation for between 20 to 30 minutes.

4.53 Conversational analysis

As evident from the case descriptions, some problems were encountered with both of the conversational analysis procedures employed, suggesting a need for comment and modification. To do this on the basis of the three pilot cases alone would risk encountering yet another set of problems when attempting to employ the modified codes in the main study. It was therefore considered more appropriate to make the comments and changes on the basis of all twelve conversational samples. The finalised coding procedures are outlined on pages 144-145 and are described in further detail in Appendix II. Comments on Bishop & Adams coding system and details of the modified procedures are also provided in Appendix II.

4.6 Administration of the additional and modified procedures

The modified procedures were administered to the three children who participated in the pilot study, during two subsequent sessions that took place approximately six months after the final session of the pilot. This was done so that the data could be included in the final whole group comparison. The Bus Story was performed in one of the sessions and conversational sampling in the other. The conversations were transcribed as soon as possible after the session. The middle three hundred turns were then analysed and, of these, the syntactic structure of approximately 150 child utterances were analysed using LARSP[11].

11 Due to non co-operation, only 158 turns of conversation - and 78 child turns - were elicited in M's case.

Modified conversational analysis procedure I: Turn-taking and information transfer

1. Exchange structure
   - A. Initiation
     - *Soliciting initiation (IS)*
     - *Non-soliciting initiation (IN)*
     - *Re-initiations (R-Ix)*
   - B. Response
     - *Minimal verbal response (RMv)*
     - *Minimal non-verbal response (RMn)*
     - *Extended response (RE)*
     - *Response/initiations (R/Ix)*
   - C. Continuation (C)
   - D. Follow-Up (F)
   - E. Empty Turn
   - F. Unintelligible (U)
   - G. Incomplete (X)
   - H. Problems (P)
2. Turn-Taking
   - A. Gap (<G>)
   - B. Overlap
     - *Inadvertent overlap (<I>)*
     - *Rule-violating overlap (<V>)*
     - *Adult interrupt (<A>)*
3. Transfer of Information
   - A. Requests for information
     - *Open request for information (RIO)*
     - *Request for information - confirmation (RIC)*
   - B. Requests for clarification
     - *Request for clarification - confirmation (RCC)*
     - *Neutral request for clarification (RCN)*
     - *Specific request for clarification (RCS)*
     - *Child request for clarification (CRCx)*
   - C. Responses to requests for information
     - *Adequate response (AR)*
     - *Inadequate response (IR)*
   - D. Responses to requests for clarification
     - *Adequate response (AR)*
     - *Inadequate response (IR)*

Modified conversational analysis procedure II: Conversational inadequacy

1. Unusual expressive syntax/semantics

connective	*verb*	*pronoun*	*tense*
preposition	*noun*	*adverbial*	*formulation*
discourse devices	*immaturity*	*number*	*other*

2. Pragmatic problems I: Violations of exchange structure

   Nil response
   Ignores initiation
   Mismatch

3. Pragmatics problems II: Failure to use context in comprehension

   Literal interpretation
   Scope

4. Pragmatic problems III: Too little information

   Inappropriate presupposition
   Unestablished referent
   Logical step omitted
   Other

5. Pragmatic problems IV: Too much information

   Unnecessary assertion/denial
   Excessive elaboration
   Unnecessary reiteration
   Ellipsis not used
   Other

6. Pragmatic problems V: Violations of quality

   Consistency
   Co-operation
   Vague
   Minimal

7. Unusual or socially inappropriate content/style

   Topic drift
   Unmarked topic shift
   Stereotyped 'learned' language
   Inappropriate questioning
   Socially inappropriate remarks
   Rigidity

8. Other

9. Problems

4.7 Findings from the administration of the additional and modified procedures

Findings from the administration of the modified procedures will be discussed case by case. All three procedures were considered appropriate to include in the finalised battery.

4.7.1 Case 1 - D (CA 10;9)

4.71.1 The Bus Story

D produced a coherent and well ordered version of The Bus Story but did omit some of the finer details. Although he relied heavily on simple sentence forms, he did demonstrate the ability to produce subordinate clauses, but not without error. D achieved age equivalent scores of 7;1[12] for both information and subordinate clauses.

4.71.2 LARSP

LARSP highlighted a preference for simple sentences in spontaneous language use. Of the analysable utterances in the sample (93%), only 8% involved complex constructions. For the most part, D relied on stage III[13] clause constructions but he did show some facility with stage IV forms. A range of phrase structures were observed across stages I to IV. Pronouns, auxiliaries and copulas were commonly used and rarely with error (although he was inclined to omit auxiliaries on occasions), in addition to which D demonstrated a good command of morphology. D showed a tendency to produce reduced syntactic forms.

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12 The Bus Story yields age equivalent *ranges* rather than age equivalent scores. For the purpose of this study the mid-point has been quoted as an age equivalent score.

13 Approximate age equivalents are as follows: Stage I (0;9-1;6); Stage II (1;6-2;0); Stage III (2;0-2;6); Stage IV (2;6-3;0); Stage V (3;0-3;6); Stage VI (3;6-4;6); and Stage VII (4;6+).

4.71.3 Conversational analysis

Since conversational data was not collected from normally developing children, no direct comparison with normality can be made. However, it was thought that Adams & Bishop's data (see final section, Appendix II) would provide a useful benchmark for this purpose[14]. It must be emphasised that, since the procedures for conversational sampling and analysis were different in this study, their data was only intended to provide a rough guide and was only relevant for exchange structure, turn-taking and some aspects of breakdown and repair.

Data from the analysis of exchange structure are shown in Table 4.39, below.

Table 4.39 Proportion of exchange structure codes.

Initiation	Response	Continuation	Follow-Up	Unanalysed
12%	41%	34%	11%	2%

The majority of D's responses were extended or minimal verbal (together these accounted for 87% of his responses). Three quarters of his initiations and continuations were non-soliciting (76%[15] and 89%, respectively). In the context of Adams & Bishop's normative data, and like their SPD group, D showed a high rate of initiations and follow-ups.

The findings from the analysis of D's turn-taking are summarised in Table 4.40, below. He showed a slight tendency for violating overlap but no other problems with turn-taking were observed.

Table 4.40 Allocation of turn-taking codes.

Gap	Overlap		
	Inadvertent	Violating	Adult
0	1	3	0

14 In this and all subsequent cases.

15 This figure includes a small percentage of non-soliciting re-initiations.

The analysis of information transfer showed that of the 70 requests put to D by the researcher, 89% sought information and 11%, clarification. In each case, the majority of D's responses were considered adequate (see Tables 4.41 and 4.42, overleaf). Again, in relation to Adams & Bishop's normative data the rate of requests for clarification was high.

Table 4.41 Adequacy of responses to requests for Information (number of requests made).

Confirmation (38)		Open (24)	
Adequate	Inadequate	Adequate	Inadequate
79%	21%	79%	21%

Table 4.42 Adequacy of responses to requests for Clarification* (number of requests made).

Confirmation (5)		Neutral (2)	
Adequate	Inadequate	Adequate	Inadequate
80%	20%	100%	0%

* In addition, one request was made for specification. This was met with an adequate response.

In an attempt to illustrate how much the flow of conversation was affected[16], a percentage inadequacy score was calculated using the formula, shown below, with the resulting figure of 17%.

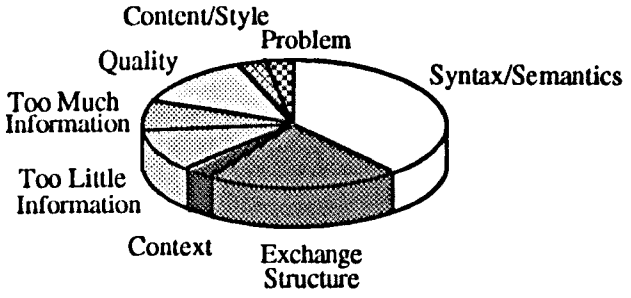
$$\frac{\text{number of utterances coded for inadequacy}^{17} + \text{number of failures to respond}}{\text{total number of utterances + number of failures to respond}} \times 100$$

A breakdown of the categories of inadequacy that were observed are shown in Figure 4.9.

16 This may differ from the *extent* to which conversation is affected, if extent implies severity, since some anomalous conversational behaviours may have more of an impact on conversational success than others. This point is followed up in Chapter Seven.

17 It should be noted that on rare occasions, in this and subsequent cases, more than one code was allocated to an utterance. The formula does not take account of this fact.

Figure 4.9 Categories of conversational inadequacy



As the figure demonstrates, codes were allocated from all of the available categories. However, the greatest proportion (39%) were allocated from the category of expressive syntax/semantics. Within this category, formulation difficulties (in the form of false starts and repetitions) were most prevalent. In addition, 21% of codes were from the category of exchange structure. For the most part, these concerned ignored initiations and mismatch. A further 13% of codes were allocated from the category of quality (mainly because of inconsistency or unintelligibility) and 11%, that of too little information. A small proportion of codes were allocated from each of the remaining categories. Excerpts from the transcript are shown below.

A I've never been in a car-wash/
C I have/
A have you?/
what's it like?/
C it's great/
these [*shakes hand*] (1.04) (?damn)[18] it's like these [*tumbles hands around*] (1.87) thing that spins round washes your car/
A does it get wet?/
C well you have to shut your windows/
A right/
C pull (..) pull up your windows/
A what if you've got a car like this?/
C pardon?/
A what if you've got a car with no roof?/
C I haven't got a (...) I haven't got a car like that/

A does he have to leave really early in the mornings?/

[18] Partially unintelligible words or parts of utterances are bracketed and preceded with a question-mark.

C yup/
not about six/
A not at six?/
C no/
A what time?/
C 'bout 7 o'clock/

A have you been on a train?/
C yes/
A where to?/
C Scarborough/
A oh you go (..) you get there by train/
C I go on the train/
A right/
C go all the way (..) to York/
A how (..) how long does that take?/
C oh a long way/
it's in Yorkshire/

4.7.2 Case 2 - N (CA 9;10)

4.7.21 The Bus Story

N's account of the Bus Story was characterised by embellishment, generally with irrelevant information (for example, he gave a name to both the train and the bus), the omission of logical steps (for instance, without mentioning the pond, N said "'*Oh no! Help* ' and then '*splash*!' "), unestablished referents and errors in event order. No complex sentences were observed. He achieved an age equivalent score for subordinate clauses of 3;10 and an age equivalent score for information of 4;0.

4.7.22 LARSP

The findings from LARSP also pointed to a preference for simple syntax. Of the analysable utterances in the sample (89% of the total), just 5% involved complex forms. No instances of post-modification were observed. The majority of N's utterances involved stage III clause level constructions, although some at stage IV were used. A wider range of phrase level constructions was apparent and N

demonstrated good facility with pronouns, copulas and auxiliaries (although the latter were omitted on occasions). Phrasal expansion was common across all clause elements except subject. A number of developmental errors were recorded. These mainly involved the omission of clause elements (7% of N's analysed utterances were reduced).

4.7.23 Conversational analysis

Data from the analysis of exchange structure are shown in Table 4.43. The majority of N's responses were extended or minimal verbal (together these accounted for 92% of his responses). The majority of both his initiations and continuations (87% and 95%, respectively) were non-soliciting. N's rate of initiations was high. A proportion of his utterances were not analysed because they were either incomplete or unintelligible.

Table 4.43 Proportion of exchange structure codes.

Initiation	Response	Continuation	Follow-Up	Unanalysed
25%	38%	21%	6%	10%

The findings from the analysis of turn-taking are summarised in Table 4.44. As the figures show, N showed some problems with the timing of his turns but rarely violated turn-taking rules.

Table 4.44 Allocation of turn-taking codes.

Gap	Overlap		
	Inadvertent	Violating	Adult
0	4	1	0

The analysis of information transfer showed that of the 89 requests put to N by the researcher, 81% sought information and 19%, clarification. The adequacy of his

responses appeared to vary as a function of the nature of the request. This is illustrated in Tables 4.45 and 4.46.

Table 4.45 Adequacy of responses to requests for information (number of requests made).

Confirmation (32)		Open (40)	
Adequate	Inadequate	Adequate	Inadequate
88%	12%	43%	57%

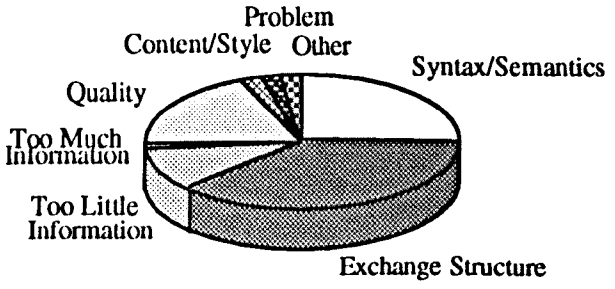
Table 4.46 Adequacy of responses to requests for clarification* (number of requests made).

Confirmation (8)		Specific (8)	
Adequate	Inadequate	Adequate	Inadequate
88%	13%	50%	50%

* In addition, one neutral request for clarification was made and was met with an inadequate response.

N obtained a percentage inadequacy score of 20%. A profile of the categories of inadequacy that were observed are shown in Figure 4.10, below.

Figure 4.10 Categories of conversational inadequacy



As Figure 4.10 shows, codes were allocated from all of the available categories, with the exception of context in comprehension. The greatest proportion (37%) were allocated from the category of exchange structure, mainly because of ignored initiations and failures to respond. In addition, 24% of codes were allocated from the

category of expressive syntax/semantics and 18% to that of quality. With regard to the former, verb errors and formulation difficulties were most prevalent. With regard to the latter, unintelligibility dominated. A further 10% of codes were allocated from the category of too little information because of a failure to establish referents and a tendency to presuppose knowledge on the part of the researcher. A small proportion of codes were allocated from each of the remaining categories. Excerpts from the transcript are shown below.

A have you got a garage N?/
C yeah/
a blue one/
A a blue garage?/
C yeah/
A to keep the car in?/
C no /
she keeps the car out/
A oh right/

A I wonder why they're in the garage/
C to have petrol?/
A yeah/
it could be/

A and how do you like the class you're in now?/
because last time I saw you, you were in [old teacher's name] class/
C that goes there/
[*C's head is down - he's concentrating on and talking about the puzzle*]
A N!
how's this class?/
C good but I've got ---/
oh yes that's the one/ [*talking about the task*]
that goes there/
A good but what?/
C that goes there/
what?/
A you said (..) I said how do you like
this class* and you said it's good but --- /[19]
C * it's good/
it's good but I like it/
A it's good but you like it?!/
do you have to do a lot of work?/
C yes/
A what sort? /
C we're in [name of teacher] next I think/
A oh are you?/
C yeah/
while they're in Thornbridge/

[19] Incomplete utterances are marked with - - - / and overlaps with an asterisk.

A oh right (..) right/
so what sort of work do you do in [name of C's teacher] class?/
C um (..) we do maths/

4.7.3 Case 3 - M (CA 9;9)

4.7.31 The Bus Story

M gave a coherent and well ordered account of the Bus Story which contained the majority of key elements. However he made several tense errors and rarely used complex syntax. He achieved an age equivalent score of 6;4 for information and an age equivalent score of 4;7 for subordinate clauses.

4.7.32 LARSP

The amount that can be inferred from LARSP is limited by the fact that, due to M's unresponsiveness in conversation, a sample of only 91 utterances was available for analysis. The majority of these were minor. Most of M's remaining utterances were at stage III clause level. Only two complex sentence constructions were observed. However, a range of phrase level constructions were observed across stages I to IV. Pronouns and auxiliaries were used without error, although the latter were occasionally omitted. A limited range of morphological markers were recorded, but no errors were noted in this regard.

4.7.33 Conversational analysis

As mentioned, the amount of conversational data collected in M's case was limited by his unresponsiveness. In total the sample comprised 158 turns, of which 78 were child turns. Thus, caution is required in the interpretation of the results. Data from the analysis of exchange structure are shown in Table 4.47.

Table 4.47 Proportion of exchange structure codes.

Initiation	Response	Continuation	Follow-Up	Unanalysed
4%	73%	8%	10%	5%

The majority of M's contributions were responses. Of these, 55% were minimal verbal, 25% extended and the remaining 20% soliciting or non-soliciting response/initiations[20]. Initiations were rare; only three were recorded. All of the continuations that M made were non-soliciting. In relation to Adams & Bishop's data, M produced an unusually high rate of responses and follow-ups. Finally, a proportion of M's utterances were unanalysed because they were incomplete.

The findings from the analysis of turn-taking are summarised in Table 4.48. As the figures indicate, M demonstrated few problems with turn-taking.

Table 4.48 Allocation of turn-taking codes.

Gap	Overlap		
	Inadvertent	Violating	Adult
1	2	1	0

The analysis of information transfer showed that of the 54 requests put to M, by the researcher, all but two (which sought specification) sought information. As illustrated in Table 4.49, below, the adequacy of M's responses to these varied as a function of the form of the request. Whereas all of M's responses to requests for confirmation (e.g. 'do you like football?') were judged to be adequate the majority of his responses to open requests for information (e.g. 'which sports do you like?') were not. His response to the two clarification requests were considered inadequate.

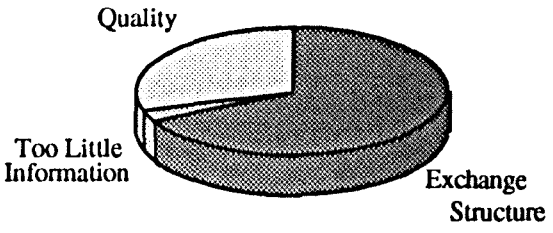
20 The rate of response/initiations was high because M spent several turns guessing where the researcher had been on her holiday. Usually, while initiating a guess, M simultaneously responded to the researcher's previous clue.

Table 4.49 Adequacy of responses to requests for information (number of requests made).

Confirmation (20)		Open (33)	
Adequate	Inadequate	Adequate	Inadequate
100%	0%	36%	64%

M obtained a percentage inadequacy score of 42%. A breakdown of the categories of inadequacy that were observed are shown in Figure 4.11. As illustrated, M's conversational profile was dominated by unresponsiveness; 67% of codes were allocated from the category of exchange structure. Violations of quality, in the form of non co-operation, were also observed and these accounted for 30% of the allocated codes. A small proportion were also allocated from the category of too little information.

Figure 4.11 Categories of conversational inadequacy



Excerpts from M's transcript follow:

A so how are you?/
I haven't seen you for a long time/
C fine/
A what have you been up to?/
C [*M carries on sorting out the pictures*]
(7.09)
A hey?/
what have you been up to [child's name]?/
C I don't know/
A there must be something you've been doing!/
C um --- / [*sits back & smiles*]
A well, what have you *just* been doing?/
just a minute ago?/
C um --- / [*smiles*]
A you were playing a game or something, weren't you?/
C yeah/

A what was it?=[21]/
C =Trivial Pursuits/
A oh I've not played that/
how do you play it?/
C well, um (6.67) --- /
[*C reaches for some blu-tack*]
A oh, do you need some?/ [*gives C some blu-tack*]
so, yeah?/
(3.20)
how do you play the game?/
(8.68)
C huh?/
A how do you play it?/
C I dunno/

A hey!/
the others told me they're going [on a school trip]/
C yup/
A are you going?/
C no/
A how come?/
C not old enough/
A what do you mean?/
[*M takes some blu-tack from R*]
C [*makes a screeching sound*]
(4.36)
A who goes then, to Thornbury?/
(8.52)
hey/
who goes to Thornbury?/
C I don't know/
A well who's going from your class?/
(10.01)
who's going from your class?/
C I dunno/
A yes you do/
okay I'll go through everybody/
is N going?/
C no/
A is L going?/
C yeah/
A is S going?/
C no/
A is (..) oh I can't remember his name/
C D?/
A yeah/
I know D's name/
is he going?/
* he's going isn't he/
C * yup/
A who else?/
C P?/
A ah that's whose name I've been trying to remember/
S?/
C yup/
A B?/
C no/

---

21 The equal sign is used to indicate occasions in which there is no perceptible gap between the end of one utterance and the start of the next.

4.8 Overall summary and conclusion

In this chapter a pilot study to the main study was described. The aim of the pilot study was to develop an assessment battery which would yield comprehensive behavioural profiles, encompassing information about linguistic, conversational, social and intellectual functioning. A preliminary battery of assessments was administered to three children identified by their speech and language therapists as presenting with SPD. The results are presented as a series of case studies. Suggested modifications are also presented and the findings from their administration to the three pilot cases are described.

Comparison across the three profiles highlighted similarities across the participants with regard to both linguistic and conversational functioning. Marked linguistic deficits were highlighted in every case. In contrast, phonological functioning was relatively unimpaired. The extent of social involvement varied, with two of the three children receiving overall ratings on the CARS within the autistic range. In each case, overall IQ scores were within normal limits.

Condensed case descriptions of a further nine children, yielded using the assessment battery developed in this pilot study, are presented in Chapter Five. At the end of that chapter comparisons are made across all twelve cases.

Chapter Five
Phase 1: The Behavioural Profiling of SPD
The Main Study

5.1 Introduction

This chapter contains condensed behavioural profiles, yielded using the finalised battery from Pilot Study, of a further nine children identified by their teachers/therapists as presenting with semantic-pragmatic disorder (SPD). In the final section, and in relation to the aim of helping to clarify diagnostic criteria, the findings across all twelve cases (the nine described here together with the three detailed in the previous chapter) are then compared. The implications of the findings are discussed in Chapter Seven.

5.2 Method

5.21 Participants

Nine participants were recruited for the purpose of the main study, eight of whom were attending one of two schools which catered specifically for children with special educational needs in the area of language, and one of whom was attending a language unit attached to a mainstream school. The same selection criteria applied as in the pilot study (see page 96). All of the participants were between ten and twelve years of age at the outset. Details of their chronological ages at that point are given in Table 5.1, overleaf. Eight of the nine participants were male.

5.22 Materials

All of those standardised assessments used in the pilot study were used in the main study, together with the two additional procedures - The Bus Story and LARSP -

Table 5.1. Summary of participants' background details

Participant	Chronological Age	Gender	School
J	10;9	M	B
C	10;10	M	B
T	10;6	M	C
E	10;7	F	D
R	10;3	M	D
W	10;3	M	D
P	11;5	M	D
G	11;11	M	D
A	11;7	M	D

(see page 141 and Appendix I). Furthermore, the suggested modifications to the conversational sampling and analysis procedures were applied (see Appendix II for details).

5.23 Procedure

The same procedures for administration were followed as those described in the pilot study.

5.3 Results

In this section, individual behavioural profiles for each of the nine participants are presented. The findings are then synthesised, together with those from the three pilot cases, in section 5.5. For ease of reference summary profiles for each the pilot participants have been included in section 5.4.

The levels of inter-rater agreement that were obtained for conversational analysis procedures are detailed below.

Exchange structure: Overall, there was 94% agreement between the raters with regard to which code should be allocated. The level of agreement for each exchange structure code varied between 81% and 100%.

Turn-taking: There was 100% agreement between the raters both as regards when a turn-taking code was allocated and which of the turn-taking codes was considered most appropriate in these instances.

Information transfer: There was 98% agreement between the raters with regard to those instances in which a request for information/clarification code was allocated. Levels of agreement for the codes within this category ranged from 86% to 100% with a mean agreement level of 94%.

Conversational inadequacy: There was 95% agreement between the raters as to when an inadequacy code should be applied. Levels of agreement for each inadequacy category and the range of agreement levels for the sub-categories within it are shown in Table 5.2.

Table 5.2 Inter-rater agreement levels for the coding of inadequacy[1]

	Overall Agreement	Range
Expressive syntax/semantics	94%	75%-100%
Exchange structure	100%	- - -
Context	100%	- - -
Too Little Information	88%	77%-100%
Too Much Information	80%	63%-100%
Quality	96%	91%-100%
Content/Style	91%	67%-100%
Other	---	---
Problem	---	---

--- coding category not used by either rater
- - - agreement level for sub-categories commensurate with overall level

[1] Inter-rater agreement was below 75% for two sub-categories, namely excessive elaboration (too much information) and topic drift (content/style). In the case of the former, the level of agreement was thought to be affected by the subjective nature of the category and in the case of the latter, by the infrequency with which the behaviour was observed (there were only three instances within the inter-rater sample). Conversely, it should be noted that in other cases low frequency of occurrence may have resulted in artificially high agreement levels.

5.31 Case 4 - J (CA 10;9)

5.31.1 Language functioning

J scored more than one and a half standard deviations below the mean on two of the five standardised assessments administered - the BPVS and the CELF-R (UK). On the remaining three, his scores were low average. His performance on the CELF-R (UK) indicated marked impairments in both receptive and expressive language but receptive functioning was most affected (he obtained sub-scale standard scores of 54 and 62, respectively).

5.31.11 Receptive language

J presented with pervasive receptive difficulties. His ability to understand semantic relationships (especially, temporal and passive ones) and commands was most impaired. He performed more than two standard deviations below the mean on both. J's receptive vocabulary and understanding of semantic links were also poor; he showed particular difficulty interpreting verbs and spatial and temporal concepts. On the TROG and the Bracken, J scored within the (low) normal range[2]. However, his performance on the latter was patchy. Weaknesses were apparent in his understanding of concepts of comparison, direction/position and time/sequence.

5.31.12 Expressive language

Of the expressive tasks in the battery, J performed most poorly on the *Sentence Formulation* subtest of the CELF-R (UK), gaining a standard score of 3. However, several of his errors appeared to result as much from a lack of understanding of the stimulus word as from a problem with sentence construction. In most cases,

2 Recollect the participants' age advantage on this task.

removing the target word (which he generally used to start the sentence) from his response left a more semantically and syntactically intact form. For instance, "after when the girl finishes the race she's gonna win the prize". Nevertheless, there were some anomalies which could not be explained in this way, as in "before a lady was gonned was doing the checkout before the lady pays". In contrast, J showed few problems when required to construct sentence forms from written component chunks; on the *Sentence Assembly* subtest of the CELF-R (UK) he performed within normal limits. J performed poorly on the *Recalling Sentences* subtest of the CELF-R (UK) (standard score, 4), making substitution and omission errors. Meaning was generally maintained.

LARSP afforded some insight into J's spontaneous expressive function. It yielded four key findings:

- J was prone to make both developmental errors (19 were noted in total) and to produce deviant utterances (10 of his utterances were unanalysable for this reason). Some examples of the latter are shown below.

> I know where the Statue of Liberty was made in
> and there are two rabbits what Jason's is
> when it was dinner time to wear an apron and I thought it was very odd
> I would like to gone there but then only one didn't
> and one picked an apple and licked it

- J showed a preference for simple sentence forms and favoured certain clause and phrase level constructions.

- J demonstrated competence with function words, in particular pronouns, auxiliaries (other) and the copula; and fourth, it highlighted a good command of morphology.

- J showed a tendency to produce incomplete utterances. Ten percent of the sample was unanalysable for this reason.

Syntactic and semantic errors were also apparent in J's retelling of The Bus Story and these, together with his repeated failure to establish referents, resulted in an age equivalent information score of 5;4. In contrast to the findings from LARSP, he scored above ceiling (8;3) for subordinate clauses.

Word finding ability was a relative strength in J's expressive profile, although his overall standard score (of 82) on the TWF was more than one standard deviation below the mean for his age. The proportion of known words that he named correctly across the five subtests ranged from 67% to 88%. His comprehension of the target words was good. Some examples of his responses on the *Description Naming* subtest, on which he named the fewest items correctly, are shown below.

Target	*Response*
What is something used to cover a hole in your trousers, is sewn or ironed on, and it made of cloth?	Is it a clothes?
What floats in the sky, may be full of rain, and is grey or white?	weather forecast
What is a chart that shows the days, weeks and months of the year and is used to make appointments?	s .. wi .. ks .. weekends and weekdays

Due to constraints of time, the STAP was not administered. However, his responses on the various assessments of expressive language indicated intact phonological development.

5.31.2 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.3. A

Table 5.3 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
15%	42%	33%	5%	5%

little over half of his responses were extended and the remainder, minimal verbal. The majority of his initiations and all of his continuations were non-soliciting. A proportion of his utterances were unanalysable because they were incomplete. In relation to Bishop & Adams' (1989) normative data, J's rate of initiations and follow-ups was high (see page 147).

As far as turn-taking was concerned, J showed a strong tendency for violating overlap but no other problems were observed (see Table 5.4).

Table 5.4 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
0	0	7	0

The analysis of information transfer showed that of the 94 requests put to J by the researcher, 72% sought information and 28%, clarification. The prevalence of clarification requests indicates the difficulty experienced by the researcher in understanding J. In each case, the majority of J's responses were considered to be adequate, but the size of the differential between adequate and inadequate responses varied from one request type to the next (see Tables 5.5 and 5.6).

Table 5.5 Adequacy of responses to the researcher's requests for information (number of requests made)

Confirmation (24)			Open (44)		
Adequate	Inadequate	Problem	Adequate	Inadequate	Problem
75%	25%	0%	59%	36%	5%

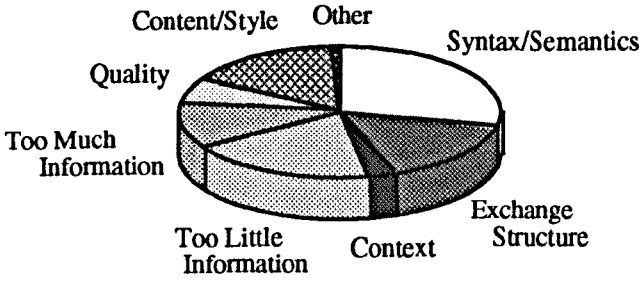
Table 5.6 Adequacy of responses to the researcher's requests for clarification (number of requests made)

Confirmation (14)		Specification (11)	
Adequate	Inadequate	Adequate	Inadequate
57%	43%	64%	36%

* In addition, one neutral request for clarification was made. This was met with an adequate response.

J received a percentage inadequacy score of 37%. A breakdown of the categories of inadequacy that were observed is shown in Figure 5.1.

Figure 5.1 Categories of conversational inadequacy



Codes were allocated from all of the available categories but the greatest proportion (29%) was allocated from that of expressive syntax/semantics. Within this category, formulation difficulties (manifest in false starts and repetitions) and atypical tense errors were most prevalent. In addition, 18% of codes were from the category of too little information. For the most part, these reflected J's tendency for unestablished reference, but inappropriate presupposition and omission of logical steps were also apparent. J also tended to provide too much information, elaborating information to excess and re-iterating it unnecessarily; 12% of codes were allocated from this category. In addition, 15% of the allocated codes were from the category of exchange structure because of ignored initiations. A further 15% were allocated from the category of unusual content/style, primarily due to a tendency for unmarked topic shift. Violations of quality and a failure to use context in comprehension were also

coded but were less common, accounting for 6% and 3% of all allocated codes, respectively. Excerpts from the transcript follow:

A and have you been to the beach again?/
(2.53)
since you were six?/
C mmm/
I went to Barry Island/
A that's in Wales/
who did you go there with?/
C I have um (..) I have a (..) um (..) I used to have some fr (..) well the other /f/ (..) I used to have some teenager friends (..) friends which were teenagers/
A mmm/
and do you still know them now?/
C no/
I don't know all them but I know some of them/
A and --- /
C at and my (..) um have a girlf (..) have a girlfriend which lives near (..) which lives near my granny's house/
A ah/
what's your girlfriend called?/
C Alex/
A and do you get to see Alex when you go home (..) when you* go to your granny's?/
C * no/
not always /
she doesn't always come out/
A but sometimes *you --- /
C * I used to um I used to have a picnic with her/
A did you?/
C and do you know what used to came?/
a wa (.) a (.) a fl (.) a wa (.) a wasp or fly/
A uh-huh/
C and then I (..) I used to drank all (..) the drink/
A but what about Alex?!/
C I think she had some/
A where did you go on your picnic?/
C gone near the forest where I go/
A uh-huh/
C we picked some grass and put it for a cushion/
A ah/
when did you do that?/
C when I was (..) when I was six/
A oh * right/
C * think it was when I was six/
A that was quite a long time ago wasn't it/
C mmm/
I used to go to another /s/ I used to go to school which is called [name of school]/

A so you must have to go (..) which airport to you go from?/
C to Birmingham/
and the one where I land is Dusseldorf/
A right/
C and when I was (..) and then I bought ---/
at dinner time I (..) I had to wear an apron and I didn't wanted to because I thought it was quite odd/
A when?/

C /t/ /t/ when I was when it was dinner time to wear an apron and I thought it was very odd/
A today?/
C no (..) no/
in [name of previous school]/
A right/
C but I had to wear an apron but I didn't want it because I thought it was very odd/
A did all the children wear aprons?/
C yeah/
except me/
I had (..) I was (..) I was going (...) I does (..) I didn't wanted to wear one because I thought it was very strange/

5.31.4 Intellectual functioning

On the British Ability Scales, J obtained an overall IQ score of 81. He performed within the normal range (although below the mean) on all but the *Digit Recall* subtest. He was unable to recall strings of more than four digits and scored in the fifth percentile.

5.31.5 Social functioning

Teacher/Therapist ratings on the CARS indicated mild abnormalities in J's emotional response, body use, visual response, listening response, fear/nervousness and activity level; mild-to-moderate impairments in his ability to relate to people and intellectual response; and normal imitation, object use, adaptation to change, taste/touch/smell response, verbal and non-verbal communication. His overall rating, of 27, was within normal limits.

5.31.6 Summary

A summary of J's profile is shown in Table 5.7, overleaf.

Table 5.7 Summary of J's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary		■		
Understanding Concepts			■	
Understanding Semantic Links		■		
Understanding Semantic Relationships	■			
Understanding Syntactic Structures			■	
Understanding Commands	■			
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding			■	
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP indicated a tendency for developmental error and syntactic deviance; a preference for simple sentence forms; a prevalence of Stage III constructions at clause level; and a range of phrase level constructions across Stages I-IV. J did use complex syntactic constructions in his account of the Bus Story. He scored above ceiling for subordinate clauses and 5;4 for information. His information score was influenced by a tendency for unestablished referents. The STAP was not administered but J's responses on the expressive language tests indicated intact phonological development.

Conversational Functioning

Exchange structure, turn-taking and information transfer: J produced a high rate of initiations and follow-ups; showed a strong tendency to produce violating overlaps; and prompted a high rate of requests for clarification from the researcher, which he was no less successful in responding to than requests for information.

Conversational Inadequacy : J achieved a percentage inadequacy score of 37%. This was due to expressive problems with syntax/semantics (mainly formulation difficulties and tense errors), together with his tendencies to provide too little information (unestablished referents), to shift topic abruptly, to ignore the researcher's initiations and to provide inconsistent information.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall		■		
Similarities			■	
Matrices			■	
Speed of Information Processing			■	

Social & Behavioural Functioning

J's overall CARS rating was 27 (non-autistic). Mild abnormalities were reported in emotional response, body use, visual response, listening response, fear/nervousness and activity level. Mild-to-moderate abnormalities were reported in relating to people and in intellectual response.

5.32 Case 6 - C (CA 10:10)

5.32.1 Language functioning

C performed below normal limits on two of the standardised assessments in the battery - the TWF and the CELF-R (UK). Moreover, sub-scale scores which fell more than three standard deviations below the mean on both the receptive and expressive sub-scales of the latter indicated pervasive deficits.

5.32.11 Receptive functioning

C's receptive difficulties were most apparent in his understanding of *Semantic Links* and *Semantic Relationships* . On both subtests of the CELF-R (UK) he gained a standard score of 3. C's understanding of commands was also poor. On the *Oral Directions* subtest of the CELF-R (UK) his standard score was 5. He was able to comprehend single-level commands but had difficulty with two and three level commands. He showed little difficulty with left-right or number orientation but made numerous errors on items which involved serial orientation (such as, point to the *first* x and the *last* y). In contrast, C's receptive vocabulary, understanding of concepts and comprehension of syntactic structures were all within the normal range (he achieved standard scores of 81, 91[3] and 94, respectively). In each case, however, he scored on the lower side of the mean and clear gaps were apparent in his understanding. On the Bracken (on which he scored below the mean on all but the subtest of 'size'), he had difficulty interpreting concepts relating to direction/position, texture/material and quantity. On the TROG he failed items which involved 'x but not y' constructions, relative clauses and embedded sentences.

3 It is important to recollect the age advantage afforded to C on this test.

5.32.12 Expressive functioning

Of the assessments in the expressive battery, C scored most poorly on the *Formulating Sentences* subtest of the CELF-R (UK), gaining a standard score of 3. However, his score was strongly influenced by a repeated failure to use the target word in his sentence, in spite of frequent reminders to do so and the ability to provide the correct answer to the question, "what word do you have to use in your sentence?" prior to giving each response. Instead C would describe the various elements of each stimulus picture. In the example below, the stimulus word was 'after' and the stimulus picture was of children running a race.

he's having a drink/
he's got a towel round him/
they're doing a --- /
he's standing/
she's put one leg up/
number ten's finished as well/

In order to examine whether C was better able to generate sentences without a picture stimulus, the task was repeated without picture prompts. His responses were not formally scored. The result was interesting. Although C's responses did include the stimulus word, they were not only syntactically and semantically anomalous, but also bizarre and perseverative (see Table 5.8). C was better able to construct sentences from written chunks (*Sentence Assembly* subtest of the CELF-R (UK)) than to generate them from a single word. However, his score on the *Sentence Assembly* task was still below normal limits (standard score, 5). Interestingly, he did show some awareness of his errors and made attempts to rectify them, although with variable success.

Table 5.8 Examples of C's responses on consecutive items of the *Formulating Sentences* subtest of the CELF-R (UK)

Stimulus	Response
when	(2.53 secs) *when* he went to (..) shop (..) then (..) got some bread and then he come home again
after	after you come back (..) um (..) after he come back (3.17 secs) he brought a lot of food and things
if	(2.82 secs) *if* he had buyed the bread (3.20 secs) /unjung/ (2.63 secs) n (.) then he (4.42 secs) said if I can go home
and	*and* he went (...) somewhere else *and* then he went to the shop for some more things/
because	*because* he forgot the bread (3.10 secs) he /wun/ (...) mum told him off/ then he went back to get it/
but	*but* he didn't buy any bread because (2.44 secs) he forgot to buy some
or	*or* he could've buyed a (2.06 secs) mmm (2.59 secs) cake (1.93) cooking at home
although	*although* he had cake instead of bread (1.63 secs) it would be nicer

C also performed poorly on sentence recall, gaining a standard score of 3 on the *Recalling Sentences* subtest of the CELF-R (UK). His errors, which mainly involved omission, increased with sentence length and complexity. Meaning was generally maintained.

LARSP afforded the following insights into C's expressive functioning:

- C showed a preference for simple sentence forms; only 16 complex constructions were observed. At the simple sentence level, C produced a range of clause and phrase structures across each of the first four stages. In each case, however, he showed a strong reliance on less developmentally advanced constructions;
- Pronouns, auxiliaries (other) and the copula were apparently well established, although occasionally prone to error;

- Phrasal expansion was evident but largely restricted to object and verb; cases of subject expansion were rare;

- C used a range of morphological markers but not without error;

- Eleven percent of the utterances in the sample were unanalysable, mainly due to deviance and ambiguity. Unintelligibility and omission were also evident. Some examples of C's deviant utterances are shown below:

> there's sometimes in the Beano sometimes sweet on it
> long time ago long
> there's some of it the fox come in the cat flap
> sort of sheets you have to (..) it true or false

C's preference for simple sentence forms was also apparent in his retelling of The Bus Story, for which he obtained an age equivalent score for subordinate clauses of 3;10. Although C's account contained many of the key events concerned some important information was omitted. In addition, referents were frequently unestablished, events were rarely set in context and tense errors (in the form of both over-regularisation and mixing) were common. He achieved an age equivalent information score of 5;2.

Word finding was a relative strength in C's profile, although this too was below normal limits (he received a standard score of 71). C demonstrated marked problems on the *Picture Naming: Verbs* and *Description Naming* tasks, naming only 57% and 58% of the targets correctly. On the former, the majority of his error responses related to *part* of the stimulus and on the latter, to the objects or attributes involved in the actions depicted. For instance, when asked "what is a long seat that you would find in a park that seats more than one person?" he responded with "swing"; when shown a picture of a person yawing he said "tired" and of a person planting seeds, he said "seeds". He passed between 79% and 83% of the items on the remaining three tasks.

Phonological functioning (at single word level) was a further strength in C's profile; he produced 97% of the target words on the STAP correctly.

5.32.3 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.9. Two thirds of his responses were extended and the remainder, minimal non-verbal. The

Table 5.9 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
12%	58%	16%	6%	8%

majority of his initiations and all of his continuations were non-soliciting. A proportion of C's utterances were unanalysed, usually because of difficulty in determining whether the response or initiation code would be most appropriate. Finally, in relation to Adams & Bishop's (1989) normative data, C's profile was characterised by a high rate of initiations and follow-ups.

Findings from the analysis of turn-taking are summarised in Table 5.10. As they show, C demonstrated a strong tendency to provide delayed responses. In contrast, overlaps were rare.

Table 5.10 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
8	1	0	0

The analysis of information transfer showed that of the 114 requests put to C by the researcher, 75% sought information and 25% clarification. As in the previous case, the high rate of requests for clarification reflects the difficulty that the researcher experienced in interpreting C. C gave adequate responses to the majority of requests

for information and clarification-confirmation. However, the majority of his responses to open requests for information, neutral requests for clarification and requests for specification (clarification) were considered inadequate (see Tables 5.11 and 5.12, below).

Table 5.11 Adequacy of responses to the researcher's requests for information (number of requests made)

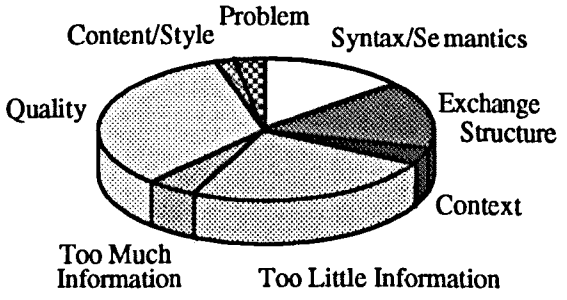
Confirmation (30)		Open (55)	
Adequate	Inadequate	Adequate	Inadequate
53%	47%	36%	64%

Table 5.12 Adequacy of responses to the researcher's requests for clarification (number of requests made)

Confirmation (14)		Specification (11)		Neutral (4)	
Adequate	Inadequate	Adequate	Inadequate	Adequate	Inadequate
64%	36%	36%	64%	25%	75%

C received a percentage inadequacy score of 56%. A profile of his inadequate contributions is shown in Figure 5.2.

Figure 5.2 Categories of conversational inadequacy



As Figure 5.2 demonstrates, codes were allocated from all of the available categories. The greatest proportion of codes was allocated from the categories of quality and too little information. These, respectively, accounted for 33% and 24% of all allocated codes. Within the category of quality, all of the available codes (inconsistency, non co-operation, vague or inappropriately minimal responses and unintelligibility) were used, in roughly equal proportions. C's tendency to provide too little information was

most marked by a failure to establish referents and a tendency for inappropriate pre-supposition. In addition, 15% of codes were allocated from the category of exchange structure. Again, all three of the codes (failure to respond, ignores initiation, and mismatch) were allocated equally. A further 14% of the allocated codes were in the category of expressive syntax/semantics; formulation difficulties were most prevalent. Finally, a small proportion of codes were allocated from the categories of failure to use context in comprehension, too much information, or unusual content/style. Some excerpts from the transcript follow:

A	do you ever read any books (..) or watch any films?/
C	don't know/
A	I some*t --- /
C	* but I do though/
A	you do?/
C	no/
	in bed sometimes/
	not always/
A	what you sometimes read books in bed?/
C	mmm/
A	do you have a favourite story?/
	(9 secs)
	Christopher?/
C	mmm/
A	do you have a favourite story?/
C	yes/
A	what's that?/
C	there's the Beano/
A	the comic?/
C	mmm/
A	I used to get the Beano/
C	mmm/
A	who do you like best in it?/
	(6 secs)
	actually who's in it?/
C	Dennis the Menace still/
A	yeah/
	and his dog/
C	hey where's the other bit/
	it's missing/
	a bit's missing/
A	what's Dennis the Menace's dog called?/
C	Gnasher/
A	yeah/
C	sometimes there's Gnasher and Gripper/
A	who's Gripper?/
C	his other one/
A	have they got two dogs now?/
C	they 've got Dennis so (..) it's there sometimes/

C there's sometimes in the Beano sometimes sweet on it/
A what do you mean?/
C sweets on it/
A on ---/
C you get free with it/
A oh right on the front?/
C yes/
A what sorts of sweets have you had with the Beano?/
C gob stoppers and lolly/
A wow that sounds good/
C yes/
lots of things/
A yes/
C not all the time you give they give you one/
A just sometimes/
C just the (.) just the cover/
A right/
C no sweet on it/

A so (..) where does your sister sleep?/
C (5 secs)/
that side/
had to sleep near the window/
A oh you sleep in the same room?/
C yeah/
A and you sleep near the window?/
C yes/

C it's a birthday/ [*referring to the picture*]
A yeah/
like your birthday/
what will you do on your birthday do you think?/
will anything special* happen?/
C * open my presents/
A mmm/
when will you do that?/
C in um March/
A but will you do it in the morning or after school or what?/
C no/
look!/ [*referring to the picture*]
A oh we're not doing that side/
when will you open your presents?/
C it's tomorrow/
A mmm/
in the morning or after school?/
C I don't know if it's after school/
A and who will you have some presents from?/
C people/

5.32.4 Intellectual functioning

On the BAS, C achieved an overall IQ score of 79. On all but the *Digit Recall* task, C scored within the normal range. However, his performance on the *Similarities*

subtest was patchy. For example, he was able to identify that 'steel, silver and copper' were "metals" and that 'water, oil and blood' were "liquids" but labelled 'peas, cabbage and carrots' as "food" and 'cupboard, table and bed' as "all made of wood". On this and the *Matrices* subtest, his scores were below the mean. On the *Speed of Information Processing* task, C achieved a percentile score of 56. This was unexpected given his tendency for long pauses on other tasks in the battery and in conversation (see above). On the *Digit Recall* task (on which he scored in the 4th percentile), C was unable to recall strings of more than four digits.

5.32.5 Social functioning

Teacher/Therapist ratings on the CARS indicated mild impairments in relating to people, listening response, taste/touch/smell response and intellectual response; mild-to-moderate impairments in emotional response, body use, object use and verbal communication; and normal imitation, adaptation to change, visual response, fear/nervousness, non-verbal communication and activity levels. C's overall rating of 29 was just within the normal range of functioning.

5.32.6 Summary

A summary of C's profile is given in Table 5.13

Table 5.13 Summary of C's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Concepts			■	
Understanding Semantic Links	■			
Understanding Semantic Relationships	■			
Understanding Syntactic Structures			■	
Understanding Commands		■		
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding		■		
Sentence Formulation	■			
Sentence Assembly		■		
Sentence Recall	■			

Other	LARSP highlighted a prevalence of simple sentence constructions in spontaneous speech; use a range of clause and phrase structures at this level (Stages I - IV) but a preference for less developmentally advanced ones; some facility with function words and morphology; and a tendency for syntactic deviance. On the Bus Story, C scored 3;10 for subordinate clauses and 5;2 for information. He frequently failed to establish referents and to set events in context. Tense errors and tense mixing were also evident. On the STAP, C produced 97% of the target words correctly.

Conversational Functioning

Exchange structure, turn-taking and information transfer: C produced high rates of initiations and follow-ups; demonstrated a strong tendency to give delayed responses; and prompted a high rate of clarification requests from the researcher. He responded to these with the same degree of success as he did requests for information. In both cases, the majority of his responses were considered inadequate.

Conversational Inadequacy: C obtained a percentage inadequacy score of 56%. Violations of quality and a failure to provide sufficient information dominated his conversational profile. Violations of exchange structure and expressive problems with syntax/semantics were also apparent.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall		■		
Similarities			■	
Matrices			■	
Speed of Information Processing				■

Social & Behavioural Functioning

C's overall CARS rating was 29 (non-autistic). Mild impairments were reported in relating to people, listening response, taste/touch/smell response and intellectual response. Mild-to-moderate impairments were reported in emotional response, body use, object use and verbal communication.

5.33 Case 6 - T (CA 10;6)

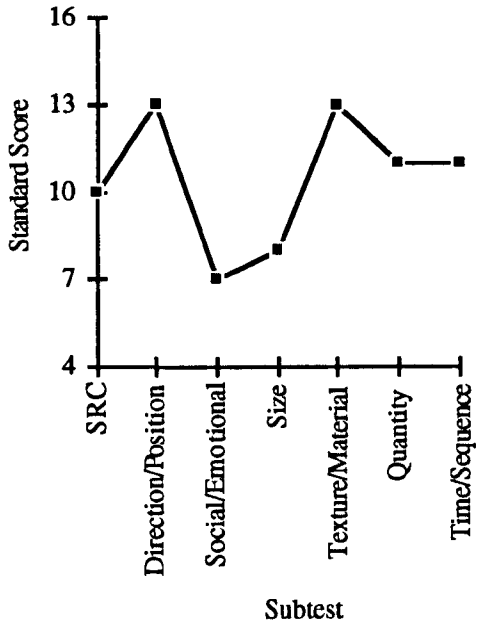
5.33.1 Language functioning

T's performance on the standardised language assessments in the battery highlighted marked and pervasive language impairments; he scored more than one and a half standard deviations below the mean on two of the five tests (BPVS and TROG) and at more than two standard deviations below the mean on a third (CELF-R (UK)). On the latter, receptive and expressive functioning were equally impaired (he achieved composite standard scores of 67 & 64, respectively).

5.33.11 Receptive functioning

T's receptive deficits were pronounced in several areas, but most notably on the *Semantic Relationships* subtest of the CELF-R (UK), for which he achieved a standard score of 3. T demonstrated little or no understanding of spatial, passive, and temporal relationships but did show some grasp of comparatives. In addition, his receptive vocabulary, comprehension of syntactic structures and ability to follow commands were not only poor but also patchy. On the TROG, T showed a good understanding of prepositions but a poor understanding of passives, post-modified subjects, and 'x but not y' constructions. These appear earlier in the test. In addition, he was unable to comprehend more complex forms, such as relative clauses and embedded sentences. He achieved an overall standard score of 73. Similarly, his difficulties in understanding commands (standard score 5) were specific to the concepts of position and size. Performance variability was also evident on the Bracken (standard score 103) (see Figure 5.3).

Figure 5.3 Profile of performance on the Bracken



*SRC = School Readiness Composite

5.33.12 Expressive functioning

Of the expressive assessments in the battery, T scored most poorly on the *Formulating Sentences* subtest of the CELF-R (UK), achieving a standard score of 3. However, his score was influenced by a tendency to produce incomplete sentences and to omit the target word from his response. In contrast, T's ability to construct sentences on the *Sentence Assembly* subtest of the CELF-R (UK) was low average. It is interesting to note that he scored poorly on items which involved complex syntactic forms, such as subordination and post-modification. In addition, some problems with co-ordination were apparent. T's ability to recall sentence recall was also poor (he received a standard score of 3 on the CELF-R (UK) *Recalling Sentences* subtest). The majority of his errors occurred on the more complex items, towards the end of the task, and involved omission and substitution of words and morphological markers.

LARSP yielded the following findings:

- T showed a preference for simple syntactic forms in his spontaneous speech; only 10 complex syntactic constructions were recorded. At simple sentence level, T used a wide range of different clause and phrase structures but favoured those at Stage III.

- Pronouns were used often and largely without error. Copulas were also used appropriately. In contrast, auxiliaries were frequently omitted from his utterances, as were other phrase and clause elements; 19% of the utterances in the sample were reduced.

- Morphological markers were observed but were both prone to error and somewhat limited in scope.

- 7% of the sample was deviant. Some examples of deviant utterances follow:

  went .. water and jumped out
  I don't know it's got a glass bottom
  you cross some stairs what you go in the air

T's tendency to produce reduced forms influenced his score on the Bus Story. In spite of his ability to recall the key events, he achieved an age equivalent information score of 6;1. His preference for simple syntax in conversation was also apparent in narrative recall; his age equivalent score for subordinate clauses was 4;7.

Phonological functioning was a relative strength in T's profile; he named 96% of the words in the STAP correctly.

5.33.3 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.14. Of T's

Table 5.14 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
14%	56%	23%	6%	2%

responses, approximately half were coded as minimal verbal and the remainder, extended. The majority of his initiations and all of his continuations were non-soliciting. In relation to Adams & Bishop's (1989) normative data, T produced a high rate of initiations and follow-ups.

As regards turn-taking, T demonstrated a tendency to produce violating overlaps (see Table 5.15).

Table 5.15 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
0	0	4	0

The analysis of information transfer showed that of the 90 requests put to T by the researcher, 88% sought information and 12% clarification. Although the proportion of clarification requests is low in relation to that of requests for information, it is high in relation to Adams & Bishop's (1989) normative data. In each case, the majority of T's responses were considered adequate, as indicated in Tables 5.16 and 5.17.

Table 5.16. Adequacy of responses to the researcher's requests for information (number of requests made)

Confirmation (34)		Open (45)	
Adequate	Inadequate	Adequate	Inadequate
74%	26%	80%	20%

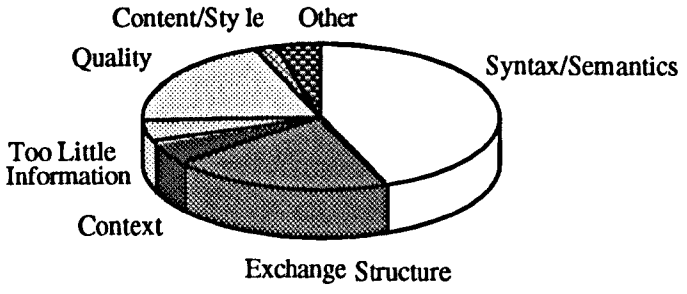
Table 5.17 Adequacy of responses to the researcher's requests for clarification (number of requests made)

Confirmation (10)	
Adequate	Inadequate
90%	10%

* In addition, one request was made for specification. T's response was considered adequate.

T obtained a percentage inadequacy score of 22%. A breakdown of the categories of inadequacy that were observed are shown in Figure 5.4. Codes were

Figure 5.4 Categories of conversational inadequacy



allocated from all of the categories except 'problem'. The greatest proportion of T's inadequate contributions (44%) was in the category of expressive syntax/semantics. Within this category, tense errors, the tendency to produce reduced utterances and formulation errors dominated but pronoun errors were also observed. In addition, 20% of codes were in the category of quality and another 20% in the category of exchange structure. With regard to the former, lack of consistency and unintelligibility dominated but the tendency to provide inappropriately minimal responses and a lack of co-operation were also apparent. As far as the latter was concerned, all three codes (no response, ignores initiation and mismatch) were allocated but syntactic mismatch was most prevalent. A small proportion of codes were also allocated from the categories of context in comprehension, too little information, content/style and other. Some excerpts from the transcript follow:

A have you got any other animals?/
C no/
guinea pig/
got guinea pig (..) two guinea pigs/
A oh right/
where do they live?/
C at my step sisters house/
A and do they live um (..) outside or inside?/
C outside/
A right/
(7 secs)
and does she have to feed them a lot and things?/
C no/
it's in and out a lot/
A oh/
do you ever pick them up?/
C yeah/
A mmm/
so no other animals just a dog and some guinea pigs?/
C and rabbits/
A oh and some rabbits/

A so tell me about your house then/
C um (..) a bit mad/
A it's a bit mad/
C a bit noisy/
got dog inside/
A what's your* --- /
C * got cat inside/
A what's your dog called again?/
C I got (..) got two dogs/
A oh right/

C this looks like at a train station/
A yeah could be/
C so that goes somewhere round here/
A yeah/
I need to go to the station later to get a train ticket/
C and I don't like going on underground trains/
A you don't like it/
why not?/
C dark/
A when you get stuck in the tunnel you mean?/
C mmm/
A have you been on them before?/
C no/
A you don't like the idea/
maybe* --- /
C * and I don't like going in lifts as well/
A right/
C sometimes you get stuck and shout/
once in Majorca in Callador
A uhuh/
C I got stuck in the bathroom/
A did you?/
C yeah/

---

4 In this, and all subsequent excerpts from conversational transcripts that appear in this thesis, the arrow indicates that a section of the original transcript has been omitted.

A do you mind the dark at other times?/
C yeah (rising intonation)/
A it's okay is it?/
C yeah/
A do you sleep with your light on?/
C a bit/

5.33.4 Intellectual functioning

On the BAS, T obtained an overall IQ score of 76. On all four subtests he scored within the normal range, but in each case on the lower side of the mean. His performance on the non-verbal tasks outweighed his performance on the verbal tasks.

5.33.5 Social functioning

As far as social functioning is concerned, T's behaviour was rated within the normal range on eight of the fifteen items on the CARS. Mild abnormalities were reported in emotional response, imitation, activity level and intellectual response. In addition, T's ability to relate to people and verbal communication skills were rated as mildly-moderately impaired. He achieved an overall rating of 23, well within the 'non-autistic' range.

5.33.6 Summary

An overview of T's profile is presented in Table 5.18

Table 5.18 Summary of T's overall profile

Receptive Language	**Impaired**	**Poor**	**Average**	**Good**
Receptive Vocabulary		■		
Understanding Concepts			■	
Understanding Semantic Links			■	
Understanding Semantic Relationships	■			
Understanding Syntactic Structures		■		
Understanding Commands		■		
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding			■	
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP revealed a preference for simple sentence forms (at clause level Stage III forms dominated); a good command of pronouns and the copula; some facility with morphology; a tendency to omit auxiliaries together with varied clause elements; and a tendency to produce syntactically deviant forms. Many of these features were also apparent in T's account of The Bus Story on which he scored 6;1 for information and 4;7 for subordinate clauses. On the STAP, T produced 96% of the target words without error.

Conversational Functioning
Exchange structure, turn-taking and information transfer: C produced high rates of initiations and follow-ups; demonstrated a tendency for violating overlap; and prompted a high rate of requests for clarification by the researcher. The adequacy rates of his responses to these were on a par with those observed for requests for information. In both cases he provided more adequate than inadequate responses.
Conversational Inadequacy : T achieved an overall percentage inadequacy score of 22%. This was primarily due to expressive problems in syntax and semantics, but violations of quality (inconsistency and unintelligibility) and exchange structure (mismatch) were also apparent.

Intellectual Functioning	**Impaired**	**Poor**	**Average**	**Good**
Digit Recall			■	
Similarities			■	
Matrices			■	
Speed of Information Processing			■	

Social & Behavioural Functioning
T's overall CARS rating was 23 (non-autistic). Mild abnormalities were reported in emotional response, imitation, activity level and intellectual response. Mild-to-moderate abnormalities were reported in relating to people and in verbal communication.

5.34 Case 7 - E (10;7)

5.34.1 Language functioning

E's performance on the standardised assessments in the language battery indicated severe deficits in linguistic function. On one of the five assessments (the TROG) she scored more than one and a half standard deviations below the mean; and on another (the CELF-R (UK)), more than two standard deviations below the mean. On the remaining three, she scored within the normal range, but on the BPVS and TWF her scores were low average. On the CELF-R (UK), her receptive and expressive sub-scale standard scores were 72 and 59, respectively.

5.34.11 Receptive functioning

On the receptive battery, E showed performed most poorly on the *Word Classes* subtest of the CELF-R (UK) (semantic links), obtaining a standard score of 4. She showed particular difficulty on items which concerned semantic class or the concept of time. In addition, E showed a patchy understanding of syntactic structures on the TROG, for which she obtained a standard score of 72. She performed below chance on items which concerned post-modification of the subject, relative clauses and embedded sentences, yet passed items which concerned 'x but not y', 'not only but also' and 'neither x nor y' constructions. A weak grasp of pronouns, comparatives, passives and prepositions was also evident.

On the remaining tests of receptive function, E scored within the normal range. Nevertheless she did demonstrate some significant gaps in comprehension and only scored above the mean on the Bracken (on which she had a chronological age advantage). On the *Semantic Relationships* subtest of the CELF-R (UK) she

demonstrated specific difficulty interpreting temporal relationships. Similarly, on the *Oral Directions* subtest, she failed on items which involved serial orientation but had few problems interpreting items which involved left-right or number orientation. Moreover, poor comprehension of concepts relating to shape, quantity and time/sequence was highlighted by the Bracken.

5.34.12 Expressive functioning

Of the expressive language assessments in the battery, E scored most poorly on the *Formulating Sentences* subtest of the CELF-R (UK), obtaining a standard score of 3. Although E was able to produce both simple and complex syntactic forms, she made semantic and syntactic errors in most of her responses. Some examples of her responses, both with and without error, are shown below (the stimulus words are underlined).

> If the bus didn't come they couldn't go to work.
>
> If we didn't have the lollipop lady the children couldn't go to school because the cars will go back and forwards so that's why we got the lollipop lady
>
> The man is weighing how much the cauliflower or he could have the lighter one.
>
> If he didn't go too fast he wouldn't have an accident but his mum came out to him.
>
> He couldn't ride his bike because he's got a broken arm although he could have his skateboard.
>
> Either the shoes wouldn't fit both of the boys.

LARSP provided the following insights into E's spontaneous expressive language use:

- E showed a preference for simple sentence forms; only 13 complex sentences were recorded. At the simple sentence level, E produced a range of clause and phrase structures across each of the first four stages. and the use of a range of different

constructions at this level. In addition, a variety of phrasal expansions were observed.

- E demonstrated a good command of pronouns, auxiliaries (other) and of the copula.
- Morphological markers were used frequently and without error.
- Ten percent of the sample was unanalysable, mainly due to the fact that utterances were incomplete but also because of unintelligibility, syntactic deviance, ambiguity and stereotyped language. An example of syntactic deviance is given below:

> then was three (.) three (.) three (.) three calls and then two stopped and she heard a noise like a tractor not can't stop

E's preference for simple sentence forms was also apparent in her retelling of the Bus Story, for which she achieved an age equivalent score for subordinate clauses of 4;2. In addition, E's account was characterised by a tendency for unestablished referents. Semantic and syntactic errors were also observed. She obtained an age equivalent information score of 4;11.

Word finding was a relative strength in E's expressive profile. On the TWF she gained an overall standard score of 87. E's phonological development was also strong. On the STAP, 89% of the target words were produced correctly. As regards the remaining 11%, the phonological process of gliding was the most common source of error.

5.34.3 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.19. The majority (62%) of E's responses were minimal verbal and, with the exception of a

Table 5.19 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
15%	37%	29%	11%	8%

single response/initiation, the remainder were extended. The majority of E's initiations and all of her continuations were non-soliciting. A proportion of her utterances was not analysed, generally because they were incomplete. In relation Adams & Bishop's (1989) normative data, E's rate of initiations, follow-ups and unanalysed utterances was high.

As the figures in Table 5.20 indicate, E did not show any problems with turn-taking.

Table 5.20 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
0	1	0	0

The analysis of information transfer showed that of the 57 requests put to E by the researcher, 72% were requests for information and 28%, requests for clarification. The high rate of clarification requests highlights the problems that were encountered by the researcher in interpreting E's contributions. The adequacy of E's responses varied as a function of the nature of the request. This is illustrated in Tables 5.21 and 5.22.

Table 5.21 Adequacy responses to the researcher's requests for information (number of requests made)

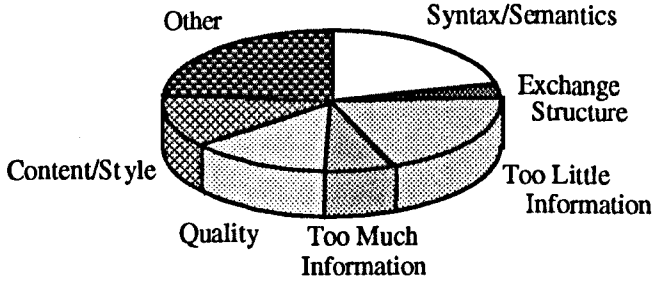
Confirmation (24)			Open (17)		
Adequate	Inadequate	Problem	Adequate	Inadequate	Problem
83%	17%	0%	59%	41%	0%

Table 5.22 Adequacy of responses to the researcher's requests for clarification (number of requests made)

Confirmation (10)			Specification (6)		
Adequate	Inadequate	Problem	Adequate	Inadequate	Problem
80%	20%	0%	50%	50%	0%

Overall, E obtained a percentage inadequacy score of 24%. A breakdown of the categories of inadequacy is shown in Figure 5.5.

Figure 5.5 Categories of conversational inadequacy



With the exception 'failure to use context in comprehension' and 'problem', codes were allocated from all categories. The greatest proportion (23%) was in the category of 'other'. Utterances coded as such involved the direct repetition of the researcher's question[5], apparent difficulty in finding words (E often said "what's it called now?" mid-utterance)[6], and a seeming lack of memory for (ostensibly memorable) events, such as whether or not she had been in a boat or an aeroplane. In addition, 21% of codes were allocated from the category of expressive syntax/semantics, primarily because of formulation difficulties, tense and preposition errors; and 20% were from the category of 'too little information', mainly because of a failure to establish referents and a tendency to omit logical steps in the description of an event. A further 13% of codes were allocated from the each of the categories of quality (primarily because of

5 E appeared to use this as a strategy with which to buy time for formulating a response.
6 Note that E's score on the TWF fell within normal limits and that, as such, word finding represented a relative strength in her profile.

inconsistency and unintelligibility) and unusual content/style (primarily because of topic shift and drift). Finally, a small proportion of codes were allocated from the categories of exchange structure and too little information. Some excerpts from the transcript are shown below. The intentional mis-spellings reflect pronunciation errors.

A have you ever been in a boat?/
C um (.) I think I have/
oh I don't (.) um (.) not sure
I don't know/
I don't really know/
A can't remember/
what about an aeroplane?/
C no/
A would you like to?/
C yeah/
oh no I have/
A you have what?/
C I have been in an aeroplane/
A have you?/
C yeah/
A where did you go?/
let's use this one/ [*referring to the task*]
C we (.) 'cause we couldn't find where Kendal was/
A uh-huh/
C so (.) so we stopped (.) to ask um (...) to see where Kendal was/
A right/
C and my Dad (...) he likes aeroplanes/
A uh-huh/
and (.) did you find out where Kendal was?/
C yeah/

A does your car (.) does your Dad's car ever break down?/
C sometimes/
let me just tell you what happened in New Years Eve/
A yeah/
if you like/
C a car (.)/
A yeah/
C drove fast /
t'was coming down (.) to our drive/
A right/
C and then (.) he crashed in granddad's car/
A [gasp]
oh!/
into Granddad's car?/
C and (.) he knocked the glass out of the (.) er wood (.) wood (.) door (.) wood gate in (.) in (.) in (.) on New Years Eve/
and after that
A yeah/
C a car
A mmm/
C was (.) was um _ was was going fast
A mmm/
C and he hurt three people in the car/

A did he?/
in which c (.) in whose car?/
C his car, I think/
A so (.) so (.) this guy (.) so tell me again what happened?/
this guy was going very fast in a car?/
C yeah/
A what did he do to your granddad?/
C no/
it was ---/
then after that night - after that (.) thing - at two o'cl (.) about two o'clock/
A in the morning?/
C no (.) no /
I think I got this wrong/
oh yeah (.) then was three (.) threeee (...) threeeee (...) three calls and then two stopped and then m (.) momma (.) grandma answered one and n (.) nobody ceplied and there was a ---/
then she went back to bed
A uh-huh/
C and she heard some noise
A right/
C like a tractor not can't stop/
A right/
C and (.) it was on the drive/
and she went downstairs/
A uh-huh/
C and she put the light (.) on/
and she c (.) she _ _ she shouldn't do that/
she want (.) she wanted to (.) see them _ who (.) who it was/
A right/
C and she rang _ in the morning she rang the police up/
they had twenty-eight (.) twenty-nine complaints that night/
A did they?/
C yeah/
A about people doing naughty things/
so what was this about the car?/
I got a bit confused then/
C er (.) after that moment um there was a car
A uh-huh/
C there was two (.) two ladies saying "there's a car coming" and they didn't listen to them and she was in hosp (.) the me (.) three people were in hospal/
A oh no!/
C and the man who was driving the (.) - what's it called now? - the ( ) the tractor (.) prinched it and he had a mo (.) bone (.) phone/
A mobile 'phone?/
C yeah/
and he ringed up the hospal and get a ambulance/
and (.) he went off/
A then he drove away?/
C yeah/
A oh dear/
that's not very nice, is it?/

5.34.4 Intellectual functioning

On the BAS, E performed well below the normal range on three of the four subtests and obtained an overall IQ score of 63.5. She performed most poorly on the *Digit Recall* and *Speed of Information Processing* subtests, in both cases scoring below scale. On the *Matrices* subtest she scored in the sixth percentile. On the *Digit Recall* task, she was unable to consistently recall strings of two or more digits.

5.34.5 Social functioning

Teacher/Therapist ratings on the CARS highlighted a range of abnormalities in social/behavioural function. Mild abnormalities were noted in body use, listening response, verbal communication, non-verbal communication and activity level. Mild-to-moderate abnormalities were observed in emotional response, imitation, fear/nervousness and intellectual response. Moderate abnormalities were reported in relating to people. Object use, adaptation to change, visual response and taste/touch/smell response were rated normal. E's overall rating was 29, just within the normal range.

5.34.6 Summary

A summary of E's behavioural profile is shown in Table 5.23.

Table 5.23 Summary of E's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Concepts				■
Understanding Semantic Links	■			
Understanding Semantic Relationships			■	
Understanding Syntactic Structures		■		
Understanding Commands				■
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding			■	
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP indicated a preference for simple sentence forms; a range of clause and phrase structures at this level (Stages I-IV) a good command of function words; and some facility with morphology. Developmental errors were uncommon but some syntactic deviance was observed. On the Bus Story, E scored 4;11 for information and 4;2 for subordinate clauses. Her information score was influenced by a tendency for unestablished referents. On the STAP, E produced 89% of the target words correctly.

Conversational Functioning

Exchange structure, turn-taking and information transfer: E produced high rates of initiations and follow-ups; showed a good command of turn-taking rules; and prompted a high rate of requests for clarification from the researcher. The adequacy of E's responses varied as a function of request type. While the majority of her responses to yes/no questions (both for information and clarification) were adequate, approximately half of those to requests for specification (clarification) and open requests for information were inadequate.

Inadequate Contributions: E received a percentage inadequacy score of 24%. Her conversational profile was dominated by a tendency to repeat the researcher's questions, to demonstrate word search behaviours, and by a lack of memory for events. Problems with syntax/semantics, the tendency to provide insufficient information, inconsistency, unintelligibility (quality) and the tendencies for topic shift and drift also interfered with conversational success.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall	■			
Similarities			■	
Matrices		■		
Speed of Information Processing	■			

Social and Behavioural Functioning

E's overall CARS rating was 29 (non-autistic). E was reported to show mild abnormalities in body use, listening response, verbal communication, non-verbal communication and activity level; mild-moderate abnormalities in emotional response, imitation, fear/nervousness and intellectual response; and moderate abnormalities in relating to people.

5.35 Case 8 - R (CA 10;3)

5.35.1 Language functioning

R's performance on the battery of standardised language assessments indicated severe and pervasive impairments of language function. He scored more than two standard deviations below the mean on three of the five assessments (BPVS, CELF-R (UK) and TWF) and more than one and a half standard deviations below the mean on another (the TROG). Respective composite standard scores of 59 and 61 on the receptive and expressive sub-scales of the CELF-R (UK) underline the severity and extent of his difficulties.

5.35.11 Receptive functioning

Of the receptive language assessments in the battery, R performed most poorly on the *Semantic Relationships* and *Oral Directions* (commands) subtests of the CELF-R (UK) and on the BPVS (vocabulary). In each case, he scored more than two standard deviations below the mean. R's comprehension of semantic links and of syntactic structures was also poor and, as far as the latter is concerned, patchy. On the TROG, R was able to understand prepositions and 'X but not Y' constructions but not reversible passives and post-modified subjects, both of which appear earlier in the test. He showed no understanding of complex syntactic structures (relative clauses and embedded sentences) on this task.

The Bracken was the only test of receptive function on which R performed within the normal range. However, in spite of his chronological advantage on this task (see page 97), his standard score (of 90) was low average. The test highlighted gaps in his understanding, particularly of temporal and sequential concepts.

5.35.2 Expressive functioning

Of the expressive language assessments in the battery, R performed most poorly on the TWF, naming 54 % of known words correctly overall. His pro-rated standard score was below scale (less than 67). R's scores varied across subtests. He performed most poorly on the *Description Naming, Picture Naming: Verbs* and *Sentence Completion* tasks, naming between 36% and 45% of known words correctly. On the *Picture Naming: Nouns* and *Picture Naming: Categories* subtests, he named 60% and 70% of known words correctly, respectively. On the *Sentence Completion Task,* R tended to give responses that related to only part of the stimulus, as in the following examples:

Target	*Response*
You part your hair with (a comb)	shampoo
In a lamp you screw in a light (bulb)	with a screw-driver

The same tendency was observed in his responses on the *Description Naming* task. With regard to the *Picture Naming* of *Verbs* , many of R's responses were non specific. For example, for 'curling' he said "combing" and for 'watering' he said "planting".

R also performed poorly on the *Formulating Sentences* subtest of the CELF-R (UK), achieving a standard score of 4. R made a combination of syntactic and semantic errors, some of which appeared to stem from a poor understanding of the target word. Some examples of his responses follow.

they are waiting *before* that woman
the other children are riding their bike *but* that child has been worried
the boys got hurt *although* the boy didn't go on his bike
the other people's having some food but *either* these two child is waiting

R showed comparable difficulties on the *Recalling Sentences* subtest of the CELF-R (UK); he gained a standard score of 3 and made numerous errors. For the most part these involved substitution and omission. Meaning was generally maintained.

LARSP yielded the following findings:

- R showed a preference for simple sentence forms; only one complex structure was observed. At the simple sentence level, R produced a range of phrase and clause level constructions across Stages II to IV. Various phrasal expansions were also observed;
- R demonstrated a good command of function words (pronouns, auxiliaries and copula);
- R used a range of morphological markers but these were prone to developmental error;
- R showed a tendency to produce syntactically deviant forms, as in the examples below. 8 % of the sample was unanalysable for this reason.

I was very carefully
she's eating those chocolate
mine does it at the bottom in the middle

R's narrative recall was also impaired. His account of the Bus Story was characterised by tense errors, the omission of relevant information, contradiction and inappropriate pre-supposition. His information score was below scale (less than 3;9). The preference that he showed for simple sentences in conversation was also apparent in recall; he scored an age equivalent for subordinate clauses of 4;7. A brief extract of the transcript follows:

he stopped the engine but he didn't/
and he stopped but he couldn't stop because he went in there/

R's strongest expressive performance was on the *Sentence Assembly* subtest of the CELF-R (UK). Interestingly, in spite of the fact that he performed within normal limits on this task, R failed all of the items which concerned complex syntax.

Phonological functioning was also a peak on R's profile. He produced 93% of the target words on the STAP correctly.

5.35.3 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.24.

Table 5.24 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
11%	40%	35%	10%	4%

The majority of R's responses were extended (63%) and most of the remainder, minimal verbal (30%). All of his continuations, and the majority of his initiations, were non-soliciting. In relation to Adams & Bishop's (1989) normative data , R's rate of initiations and follow-ups was high.

The findings from the analysis of turn-taking are summarised in Table 5.25. As they show, R demonstrated some problems with turn-taking, producing both violating and inadvertent overlaps.

Table 5.25. Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
0	3	5	2

The analysis of information transfer showed that of the 57 requests put to R by the researcher, 85% sought information and 15% clarification. Again, in relation to Adams & Bishop's (1989) normative data, the number of clarification requests made by the researcher was high. The proportion of adequate responses that he provided as regards of each type of request is shown in Tables 5.26 and 5.27. In each case, R provided more adequate responses than inadequate ones but the differential varied as a function of question type. As regards requests for information, he was more successful in responding to those which required a yes/no response than to open requests. Similarly, he was more successful in responding to clarification requests for confirmation than to clarification requests for specification.

Table 5.26 Adequacy of responses to the researcher's requests for Information (number of requests made)

Confirmation (18)		Open (30)	
Adequate	Inadequate	Adequate	Inadequate
100%	0%	67%	27%

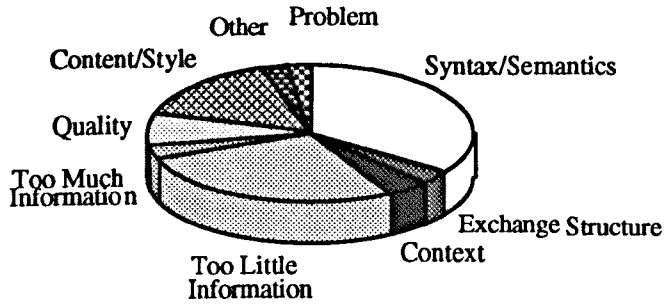
Table 5.27 Adequacy of responses to the researcher's Requests for clarification (number of requests made)*

Specification (7)	
Adequate	Inadequate
57%	43%

* Two requests for clarification-confirmation were also made. R responded adequately to both.

R obtained an overall percentage inadequacy score of 38%. A profile of the categories of inadequacy that were observed is illustrated in Figure 5.5

Figure 5.5 Categories of conversational inadequacy



As the figure shows, R's conversational profile was dominated by anomalies in the categories of expressive syntax/semantics (35%), too little information (27%), and content/style (15%). Within the first of these categories formulation difficulties, verb, tense, and preposition errors were most prevalent. The tendency to provide too little information was predominantly manifest in a failure to establish referents but inappropriate presupposition was also apparent. Within the category of content/style, topic drift and shift, stereotyped language, inappropriate questioning and rigidity were all observed. Finally, a small proportion of codes were allocated from the categories of quality (unintelligibility was the main problem), exchange structure, failure to use context in comprehension, too much information, problem and other. Some excerpts from the transcript follow:

A do you like animals?/
C yup/
I like looking after them/
have you seen the film?/
A which film?/
C called 101 Dalmatians/
A no /
I haven't seen that/
is it (..) can you tell me about it?/
C I sawed Olive and Jasper stold fifteen puppies
A fifteen puppies?!/
C when they already were born/
A uh-huh/
C they got spots/
A right/
that's why they're called Dalmatians, yeah?/
C yeah/
A and (..) who did she sell the puppies to?/
C no one/
he just (..) Grelish said drown them, bash them on their heads and kill them/

she said (..) Nita said, "she's going to kill the puppies"/
A no!/
C and (..) and Pongo and Purdy was trying (..) to (..) make the puppies (stay their skins)/
and that dog (..) and that other dog
A mmm/
C made them on their way/
A oh no/
C at home/
A right/
C at the end the police car's trying to sell the puppies back to their home/
A mmm/
and do they manage?/
C yeah/

A is that in the evening then?/
C yup/
A ah/
C at *about* 7.50[7]/

A it was a long time ago though was it?/
or can you remem* --- /
C *no/
about when one nine nine five/

C look at her mum she thinks he's nau (..) her naughty is/
A yeah/
how do you know that?/
C because she can (...) see/
A yeah/
C look at (..) (?they look smiling)/
A mmm?/
C are they smiling?/
A who?/
C those two (...) girls/
two boy and girl/
A in the back?/
C yeah/
A they are smiling, aren't they/
C because they in a happy mood/
A yeah/
well maybe they think it's funny/
C I saw her hair sticking up/
A yeah/
look they're in the garage =/
C =when its switching it off you gone
(..) gone (..) her hair stick down/
A it will/
it will go flat again/
looks like they're getting some petrol/
maybe they're away on holiday/
C yup/
A who knows?/
right/
let's write (..) shall we write ---/
where are they?/
where are they?/
C they mi (..) are they in the envelope/
A no/

---

7 R repeatedly used this word, which signifies approximation, when giving precise information.

where are the (...) where are these people?/
C in the petrol/
A yeah/
in the garage aren't they/

5.35.4 Intellectual functioning

On the BAS, R achieved an overall IQ score of 73.5. On the *Similarities, Matrices* and *Speed of Information Processing* subtests, R scored within normal limits, although in each case on the lower side of the mean. His score on the *Digit Recall* subtest was below-scale; he was unable to recall strings of three or more digits.

5.35.5 Social functioning

On the CARS, mild abnormalities were recorded in visual response; mild-moderate abnormalities in emotional response, listening response, verbal communication and activity level; and moderate abnormalities in relating to people and intellectual response. Imitation, body use, object use, adaptation to change, taste/touch/smell response, fear/nervousness and non-verbal communication were considered normal. His overall rating of 27.5 was within normal limits.

5.35.6 Summary

An overview of R's behavioural profile is shown in Table 5.28.

Table 5.28 Summary of R's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary	■			
Understanding Concepts			■	
Understanding Semantic Links		■		
Understanding Semantic Relationships	■			
Understanding Syntactic Structures		■		
Understanding Commands	■			
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding	■			
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP indicated a preference for simple sentence forms; the use of a range of clause and phrase structures across Stages I-IV; a good grasp of function words; a varied command of morphology; and a tendency to produce syntactically deviant forms. R's account of The Bus Story was characterised by tense errors, omission of information, contradiction of fact and the inappropriate use of ellipsis. He scored below scale for information and scored 4;7 for subordinate sentences. On the STAP R produced 93% of target words correctly.

Conversational Functioning

Exchange structure, turn-taking and information transfer: R produced high rates of initiations and follow-ups, demonstrated a tendency for both inadvertent and violating overlap; and prompted a high rate of clarification requests from the researcher. His ability to provide adequate responses to these was comparable to that for requests for information.

Conversational Inadequacy : R obtained a percentage inadequacy score of 35%, due to problems with syntax/semantics, the tendency to provide too little information (unestablished referents and inappropriate presupposition) and anomalies of content/style (topic shift/drift).

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall	■			
Similarities			■	
Matrices			■	
Speed of Information Processing			■	

Social & Behavioural Functioning

R's overall CARS rating was 27.5 (non-autistic). R was reported to show mild abnormalities in visual response; mild-moderate abnormalities in emotional response, listening response, verbal communication and activity level; and moderate abnormalities in relating to people.

5.36 Case 9 - W (CA 10;3)

5.36.1 Language functioning

W's overall scores on all five of the standardised assessments were within the normal range.

5.36.11 Receptive functioning

W scored within normal range on all of the assessments of receptive functioning administered. Moreover, with the exception of *Commands* and *Semantic Links*, his scores were above the mean.

5.36.12 Expressive functioning

W also scored within normal limits on three of the four standardised expressive tasks administered: the TWF, the *Similarities* subtest of the BAS, and the *Sentence Assembly* subtest of the CELF-R (UK). However, he scored poorly on *Sentence Formulation* (CELF-R (UK)), gaining a standard score of 5. His responses were characterised by semantic and syntactic errors and, on occasion, a failure to use the target word. Examples of his erroneous responses are shown below. The stimulus words have been underlined.

> before the woman is finished the man goes afterwards
> the man chooses two cauliflowers or the lady chooses a fruit
> there's two people trying on shoes but neither of them don't know what they want

However, not all of W's responses contained errors and on several of the items he demonstrated the ability to produce complex syntactic forms:

although he has broken his arm he can still play on his skateboard

if the girl messes about she will forget to get on the bus

when there's a person with a stop sign you have to stop because other people want to cross

W also scored poorly on sentence recall, obtaining a standard score of 4 on the *Recalling Sentences* subtest of the CELF-R (UK). His responses were characterised by the omission of morphological markers, the omission of content words and the substitution of function words (see Table 5.29). Meaning was always maintained.

Table 5.29 Examples of W's error responses on the *Recalling Sentences* subtest of the CELF-R (UK)

Error Type	Target	Response
Omission	The train was followed by the car.	The train was *follow* by the car.
	Has the mouse been chased by the cat?	Has the mouse been *chase* by the cat?
	The big, brown dog chased the red ball.	The big, brown dog chased the __ ball.
Substitution	Wasn't the ice-cream bought by the girl?	Wasn't the ice-cream bought *from* the girl?
	The dog chased the ball and the cat didn't follow.	The dog chased the ball *but* the cat didn't follow.

LARSP provided the following insights into W's spontaneous language use:

- W demonstrated a preference for simple sentence forms; only 13 complex constructions were observed. At simple sentence level, W produced a wide range of phrase structures. His repertoire of clause structures was restricted;
- Phrasal expansions were noted, with the exception of subject expansion;
- W demonstrated a good grasp of function words;
- W showed command of a range of morphological markers;
- Six percent of utterances in the sample were unanalysed, mainly due to unintelligibility but also due to syntactic deviance.

W's preference for simple sentence forms was also apparent in narrative recall. On the Bus Story, he achieved an age equivalent score for subordinate clauses of 5;8. Tense errors and preposition errors were apparent in W's account. However, he included most of the key events and achieved an age equivalent information score of 7;10. A brief excerpt of the transcript follows:

> and then he goes along and he said (..) he was tired of going on the road so he jumping over the fence and went on the countryside

With regard to phonology, W produced 81% of the target words on the STAP correctly. The remainder of words were affected by the fronting of affricates and fricatives (e.g. 'th' ---> "f") and the voicing of alveolar plosives (e.g. 't' ---> "d").

5.36.3 Conversational functioning

Data from the analysis of conversational exchange structure are shown in Table 5.30. The majority of W's responses were extended or minimal verbal. All of his

Table 5.30 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
23%	32%	32%	5%	8%

continuations and the majority of his initiations were non-soliciting. A proportion of his utterances were not analysed either because they were incomplete or unintelligible, or problematic to code. In relation to Adams & Bishop's (1989) normative data, W's rate of initiations, follow-ups and unanalysed utterances was high.

W demonstrated some problems with turn-taking (see Table 5.31, below), producing both inadvertent overlaps and violating overlaps.

Table 5.31 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
1	7	4	0

The analysis of information transfer showed that of the 58 requests put to W by the researcher, 91% sought information and 9%, requests for clarification. In each case, the majority of W's responses were considered adequate (see Tables 5.32 and 5.33). The number of clarification requests made by the researcher was high (see Adams & Bishop, 1989).

Table 5.33 Adequacy of responses to the researcher's requests for Information (number of requests made)

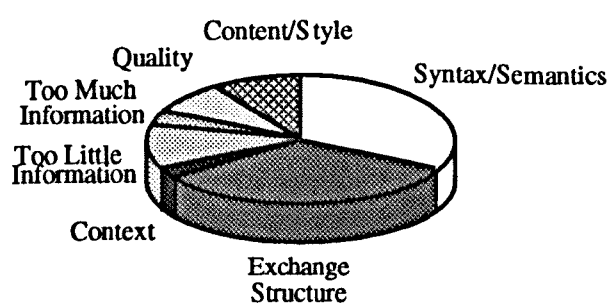
Confirmation (25)			Open (28)		
Adequate	Inadequate	Problem	Adequate	Inadequate	Problem
76%	24%	0%	71%	29%	0%

Table 5.34 Adequacy of responses to the researcher's Requests for clarification (number of requests made)

Specification (5)		
Adequate	Inadequate	Problem
69%	40%	0%

Overall, W received an percentage inadequacy score of 38%. A breakdown of the categories of inadequacy is shown in Figure 5.6.

Figure 5.6 Categories of conversational inadequacy



Codes were allocated from all categories, except 'problem' and 'other'. The greatest proportion was allocated from each of the categories of exchange structure and expressive syntax/semantics (32% and 34%, respectively). With regard to the former, W failed to respond and ignored the researcher's initiations. With regard to the latter, a variety of errors were observed. A further 11% of codes were allocated from the category of 'too little information', mainly due to W's failure to establish referents. Finally, a small proportion of codes was allocated from each of the categories of content/style, quality, too much information and context in comprehension. Excerpts from W's transcript are shown below.

A	have you ever been in a boat?/
C	[*nods*]/
A	yeah?/
	*where's ---/
C	*that's what we're doing tonight/
A	where's the envelope?/ [*to self*]
	what do you mean doing tonight?/
C	we go kayaking/
A	do you?/
C	mmm/
A	excellent!/
	who does that?/
	all of you or ---/
C	all (.) er (.) one (.) one (.) one is the /si/ (.)
	when it (.) in [names one of the school's boarding houses] is sick/
A	mmm-hmm/
C	not that k (.) ee (.) poorly/
	just poorly/
	but it's called [gives a child's name]/
A	mmm/
C	but (..) I know every step he's doing/
	he always goes up to see the nurse because he wants to get away
A	oh/
C	from school/
A	oh/
C	and he pretends he's ill/
A	so that he can ---/
C	so he can do no work and get all the fun/
	but he's not getting none the fun because if he's ill he can't go kayaking/
A	ah/
C	and if he can't go kayaking he can't do any good stuff/
	if that's (..) so ---/
A	yeah/
	so he's not going to be able to go kayaking tonight/
C	that's why he w (..) he wanted to get all the fun (..) first/

A so (..) you know that thing you were doing this morning in IT/
(2.32)
[child's name]/
C yeah/
A what (.) what had happened before I came in?/
'cause I came in right near the end/
(3.03)
I came in right near the end/
what did you do before?/
C well we had to collect all these keys/
A how did the (.) sorry (.) how did the story start?/
(7.67)
C well (.) this dragon came and turned the prince into a frog/
A mmm-hmm/
C then he put the princess into his dungeon/
A uh-huh/
C and (.) and we had to catch (.) and we had to get (.)all the keys/
so we had to get a silver key to go in a house/
we gotta go and get this key to go in this house/
and get a key into that/
key into that house/
A mmm-hmm/
C before we can get to (.) the bad guy's house/
A right/
C and do it/
A *and do what?/
C *and then --- /
A and do what?/
C you gotta get past all these guys and then go through the fire/
kill them/
A so each time it's something different you have to do/
C yeah/
and then there was trolls/
you have to get this (.) ten bags of gold/
A gosh/
how long had you been playing the game for then?/
C two weeks/
A oh right/
sounds like it went on forever/
C so if we played it twice it would take (.) a tri (.) a double fortnight/
A it would/
which is nearly a month/
C it is a month!/
A yeah/
sometimes a month's slightly longer than four weeks though/
C no but it could be four weeks/
A yeah/
it could be/
you're right/

5.36.4 Intellectual functioning

On the BAS (short form), W achieved an overall IQ score of 90. He scored above the mean on the *Similarities, Matrices* and *Speed of Information Processing*

subtests but performed poorly on the *Digit Recall* task. He was unable to consistently recall strings of four digits.

5.36.4 Social functioning

According to teacher/therapist ratings on the CARS, W demonstrated few abnormalities in social and/or behavioural functioning. Mild impairments were reported in adaptation to change and verbal communication and mild-moderate impairments were reported in relating to people and emotional response. All of the remaining behaviours were considered normal. His overall rating of 22.5 was well within normal limits.

5.36.6 Summary

A summary of W's profile is provided in Table 5.35

Table 5.35 Summary of W's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary				
Understanding Concepts				
Understanding Semantic Links				
Understanding Semantic Relationships				
Understanding Syntactic Structures				
Understanding Commands				
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding				
Sentence Formulation				
Sentence Assembly				
Sentence Recall				
Other	LARSP highlighted a prevalence of simple sentence forms; varied phrase level structures (across Stages II to IV) ; a restricted range of clause structures (also across Stages II to IV); and a good command of morphology. A number of developmental errors were observed. The Bus Story highlighted problems with tenses and prepositions. W scored 7;10 for information and 5;8 for subordinate clauses. On the STAP, he produced 81% of the target words correctly.			
Conversational Functioning				
Exchange Structure, turn-taking and information transfer : W produced a high rate of initiations and follow-ups; demonstrated a high rate of overlap (particularly inadvertent); and prompted a high rate of clarification requests from the researcher, which he was no less successful in responding to than requests for information. *Conversational Inadequacy* : W obtained a percentage inadequacy score of 38%. The majority of inadequacy codes were allocated from the categories of exchange structure, syntax/semantics and too little information.				
Intellectual Functioning	**Impaired**	**Poor**	**Average**	**Good**
Digit Recall				
Similarities				
Matrices				
Speed of Information Processing				
Social & Behavioural Functioning				
W's overall CARS rating was 22.5 (non-autistic). Adaptation to change and verbal communication were rated mildly impaired; relating to people and emotional response were rated as mildly-to-moderately impaired.				

5.37 Case 10 - P (CA 11;5)

5.37.1 Language functioning

P scored more than two standard deviations below the mean on three of the five language assessments administered (TROG, TWF and CELF-R (UK)). His sub-scale standard scores on the CELF-R (UK) suggested that expressive language functioning was more impaired than receptive language functioning. He scored 62 and 80, respectively.

5.37.11 Receptive functioning

Of the assessments in the receptive battery, P performed most poorly on the TROG, obtaining a standard score of 66. However, he tended to fail blocks by a narrow margin and only performed below chance on three ('post-modified subject', 'above/below' and 'not only but also'). He also performed poorly on the *Semantic Relationships* subtest of the CELF-R (UK), achieving a standard score of 5. He demonstrated particular difficulty understanding comparatives and passives on this task. In contrast, his comprehension of semantic links, vocabulary and concepts was within the normal range. However, in each case his score was below the mean. In addition, his understanding of concepts was patchy.

5.37.2 Expressive functioning

Of the assessments in the expressive battery, P performed most poorly on the TWF and the *Sentence Formulation* subtest of the CELF-R (UK). On the TWF, his overall standard score was below scale (that is, below 67), in spite of good comprehension of the vocabulary involved. He demonstrated most difficulty on the

Picture Naming: Verbs and the *Description Naming* subtests, on which he named 52% and 58% of the items correctly. On the naming of verbs, his errors were mainly semantic. Some examples of the errors that he made in description naming follow:

Stimulus (Target)	*Response*
What is a chart that shows the days, weeks and months of the year and is used to make appointments? (calendar)	the weather
What is the name of the part of your face below your mouth that is made of bone? (chin)	teeth

On the three remaining subtests, P named between 67% and 71% of the items correctly. Interestingly, P showed some awareness of his difficulties in recalling words. When trying to identify the category of 'planets', for instance, he said "forgot ... totally forgot ... I been to a lot of planetariums but forgot what you call it now".

On the *Sentence Formulation* subtest of the CELF-R (UK), P obtained a standard score of 3. He was able to generate simple sentences but when required to formulate an utterance using a coordinating or subordinating conjunction the sentence that he gave in response was often incomplete. Some examples are shown below, in which the stimulus word has been underlined.

<u>if</u> I went in the bus
<u>but</u> we didn't do anything
<u>or</u> I'll get this clean cabbage
<u>because</u> you can get knocked over
<u>although</u> I fell off my skateboard before

P also scored poorly on the *Sentence Assembly* subtest of the CELF-R (UK), giving only four correct answers and obtaining a standard score of 5.

LARSP provided the following insights into P's spontaneous expressive language use:

- P showed a preference for simple sentence forms; only five complex constructions were observed.

- A range of phrase and clause structures were used at the simple sentence level but the latter were restricted at Stage IV.

- P demonstrated a good functional grasp of pronouns, auxiliaries (other) and the copula, together with a strong command of morphology.

- In spite of the fact that P produced 95% of the target words on the STAP correctly, 8% of his spontaneous utterances were unanalysable on LARSP because of unintelligibility. A further 4% of utterances were unanalysed because they were deviant.

P's preference for simple sentence forms was also evident in narrative recall. On the Bus Story he achieved an age equivalent score for subordinate clauses of 4;7. His account was characterised by a tendency for unestablished reference and inappropriate and repetitive use of the verb 'to want'. He scored 5;7 for information. An excerpt from his transcript is shown below.

> There was a train beside him and they wanted to pull funny faces ... at each other. And the .. then they wanted to race. The train w .. went into a tunnel so the bus wanted to go on.

In addition, P scored poorly on the *Recalling Sentences* subtest of the CELF-R (UK), achieving a standard score of 5. His error rate increased with sentence length. The majority of his errors involved omission but substitution was also observed. Meaning was not always maintained.

5.37.3 Conversational functioning

Data from the analysis of exchange structure are shown in Table 5.36 Little over half of P's responses were minimal verbal and, with the exception of a few

Table 5.36 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
22%	39%	24%	6%	9%

response-initiations, the remainder of his responses were extended. Approximately half of P's initiations were soliciting; the remainder were soliciting. The majority of his continuations (91%) were non-soliciting. A proportion of P's utterances were not analysed, primarily because of unintelligibility. In relation to Adams & Bishop's (1989) normative data, the proportion of initiations, follow-ups and unanalysed utterances in P's sample was high.

Findings from the analysis of turn-taking are summarised in Table 5.37. As they demonstrate, P showed a tendency to produce both inadvertent and violating overlaps. Delayed responses were also evident but these were infrequent.

Table 5.37 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
2	4	4	0

The analysis of information transfer showed that of the 72 requests put to P by the researcher, 90% sought information and 10%, clarification. In comparison with Adams & Bishop's (1989) normative data, this rate of clarification requests is high. As demonstrated by Tables 5.38 and 5.39, the adequacy of P's responses varied as a function of request type; he produced more adequate responses to requests for information than to requests for clarification. Moreover, he was more successful in

responding to closed requests for information (request for information - confirmation) than open ones.

Table 5.38 Adequacy of responses to the researcher's Requests for information (number of requests made)

Confirmation (30)		Open (35)	
Adequate	Inadequate	Adequate	Inadequate
70%	30%	57%	43%

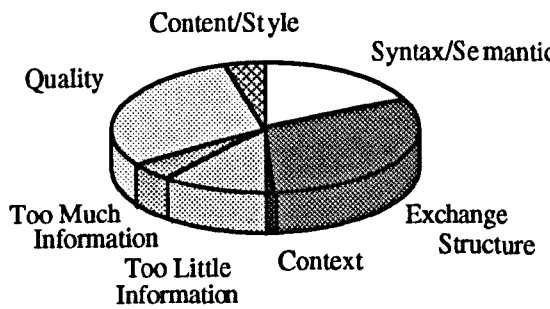
Table 5.39 Adequacy of responses to the researcher's Requests for clarification (number of requests made)

Confirmation (6)	
Adequate	Inadequate
33%	67%

* In addition, one request for specification was made and was met with an adequate response.

P achieved an overall percentage inadequacy score of 36%. A breakdown of the categories of inadequacy observed is illustrated in Figure 5.7, below.

Figure 5.7 Categories of conversational inadequacy



As the figure shows, codes were allocated from all of the categories except 'problem' and 'other'. Violations of exchange structure (marked mainly by P's repeated failure to respond) and quality (unintelligibility, inconsistency and non co-operation) accounted for the majority of codes. Expressive problems with syntax/semantics were also prevalent; 18% of codes were allocated from this category. Formulation difficulties were observed together with errors concerning prepositions, tense, verbs

and connectives. The tendency to provide too little information (failure to establish referents and inappropriate presupposition) was also evident and accounted for 10% of the allocated codes. Finally, a small proportion of codes were allocated from the remaining categories of too much information, content/style, context, problem and other. Some excerpts from P's transcript are shown below.

A what um (..) what did you do in the half term?/
C um (..) I got (..) got a new computer game for my (..) new computer/
A mmm-hmm/
new computer?/
C yup/
A wow/
when did you get that then?/
C for this Christmas/
thought I'd told you (..) about it/
A you didn (..) did you tell me?/
C yeah/
A what game did you get this time round?/
C Night (?2 sylls)/
it's spose (..) spose (..) supposed to be like (..) it's supposed to be like a game when you're in a dream/
A oh right/
C an (.) and (.) then he goes (.) and when he goes to the bosses (.) they're (.) the boss is a (?)/
A right/
that sounds good/
C /a/ /a/ /a/ /a/ and the (..) and the last level's supposed to be a nightmare/
A a nightmare?/
C but I haven't seen it before/
A ooh dear/
how many levels are there?/
C eight/
they're got (..) they've got two people/
A two people can play or ---/
C /n/ (..) no/
they've got two people (..) two people each/
four levels/
A oh right/
okay/
okay/
is it um --- /
C it's a girl and a b (..) the girl's got four levels
and the boy's got four levels/
A right/

C when do you have your days off?/
at the weekends?/
A yeah/
I have some days off at the weekend but I don't have ---/
*n (..) not (..) not always/
C *y.y.y.y.y you don't (..) don't normally go to work on the weekends/
A what pe (..) people don't/
C n (..) it's it's like going to like (..) (?2 sylls) and all that/
s (.) j (.) j (.) they don't stay at weekends/
A no they don't/

*most p ---/
C *it's it's only in the weekdays and the holidays/
A that's right/
C all it is is the weekends you w (..) don't work/
A most people don't work at the weekend/
but I do (...) *er ---/
C *'cause they (..) they have (..) don't have holiday/
they only have weekends off don't they/
A well some people have holidays but not like (..) long school holidays like you/

A have you ever played Street -Fighter?/
C Street-Fighter?/
yeah/
A I played that the other day/
it was quite funny/
(2.67)
I wasn't very good at it/
C mmm/
A kept getting beaten/
C (? 4sylls)/
A mmm?/
C waasifs (..) which one was it?/
was (..) Super Street-Fighter or Street Fighter normal one?/
A normal one I think/
what's the difference?/
C sup (..) super Street they have to have four (..) different people/
A fighting at the same time?/
C no/
they ha (..) they have four different (..) people/
A oh right/
C about four different fighters (?2 sylls)/
A got (..) I dont know /
I think ---/
what .. what we had to do is choose from about eight fighters and we chose two/
is that the old Street-fighter?/
C (9.32)
A and then *um (..) a ---/
C *s (..) si (..) no/
Streetfighter's got got got four diff (..) different characters in it/
A oh right/
I don't think it was that one/
it was quite an old game I played/

5.37.4 Intellectual functioning

As far as intellectual functioning is concerned, P obtained an overall IQ score on the BAS (short form) of 83. He performed within the normal range on the *Similarities, Matrices* and *Speed of Information Processing* subtests. He scored below normal limtis on the *Digit Recall* task, failing to consistently recall strings of more than

three digits. His score on the *Speed of Information Processing* subtest was above the mean.

5.37.5 Social functioning

Teacher/therapist observations and ratings on the CARS highlighted mild abnormalities in visual response and mild-moderate abnormalities in relating to people, emotional response, body use, activity level and intellectual response. Imitation, object use, adaptation to change, listening response, taste/touch/smell response/ fear/nervousness, verbal and non-verbal communication were all rated in the normal range. His overall score of 24.5 was within normal limits.

5.37.6 Summary

A summary of P's overall profile is shown in Table 5.40, overleaf.

Table 5.40 Summary of P's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Concepts			■	
Understanding Semantic Links			■	
Understanding Semantic Relationships		■		
Understanding Syntactic Structures	■			
Understanding Commands		■		
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding	■			
Sentence Formulation	■			
Sentence Assembly		■		
Sentence Recall		■		

Other	LARSP highlighted a prevalence of simple sentence forms; a varied range of clause structures at this level (Stages II-IV); a good command of function words; a range of phrase level constructions across Stages II to IV; a range of morphological markers; and a number of developmental errors and deviant forms. A proportion of P's utterances were unanalysable in spite of the fact that he produced 95% of the target words on the STAP without error. On the Bus Story, P scored 5;7 for information and 4;7 subordinate clauses.

Conversational Functioning

Exchange structure, turn-taking and information transfer : P produced a high rate of initiations (including soliciting ones) and follow-ups; demonstrated a tendencies for inadvertent and violating overlap; and prompted a high rate of clarification requests on the part of the researcher. He was less successful in responding to these than to requests for information.

Conversational Inadequacy : P received a percentage inadequacy score of 36%. His profile was dominated by violations of exchange structure (failure to respond) and violations of quality (unintelligibility, inconsistency and non co-operation). Problems with syntax/semantics and the tendency to provide too little information also interfered with conversational success.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall		■		
Similarities			■	
Matrices			■	
Speed of Information Processing				■

Social & Behavioural Functioning

P's overall CARS rating was 24.5 (non-autistic). Mild abnormalities were reported in visual response and mild-moderate abnormalities in relating to people, emotional response, body use, activity level and intellectual response.

5.38 Case 11 - G (11;11)

5.38.1 Language functioning

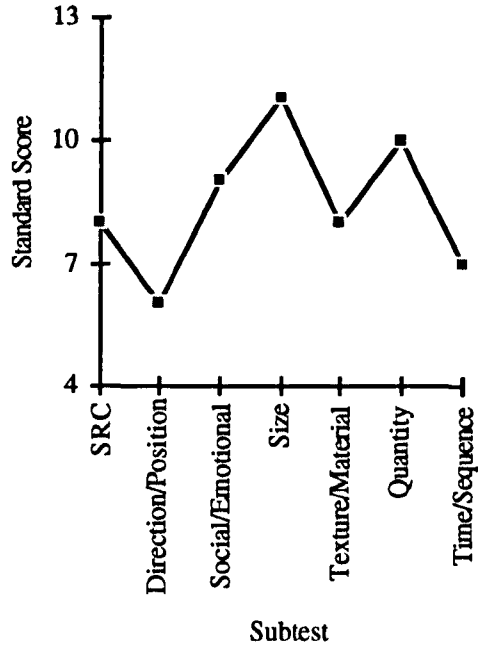
On all five of the standardised assessments of language functioning, G scored below the mean and on all but the Bracken, his performance fell outside the normal range. The severity and extent of his language impairment was highlighted by his respective scores of 67 and 64 on the receptive and expressive sub-scales of the CELF-R (UK).

5.38.11 Receptive functioning

Of the tasks in the receptive battery, G performed most poorly on the BPVS (vocabulary) and on the *Oral Directions* (commands) subtest of the CELF-R (UK). In both cases he scored more than two standard deviations below the mean. On the latter, his errors were specific to serial orientation; number and left-right orientation were largely unaffected. G's understanding of syntactic structures was also poor. On the TROG he achieved a standard score of 73 and performed at or below chance on items concerning abstract concepts or complex syntax. In contrast, G scored within normal limits on the *Word Classes* (semantic links) and *Semantic Relationships* subtests of the CELF-R (UK) and on the Bracken[8]. However, in each case his score was below the mean and clear gaps were apparent in his understanding. For example, on the *Semantic Relationships* task G demonstrated particular difficulty interpreting temporal relationships. G's performance profile on the Bracken was similarly spiky; he scored most poorly on the concepts of direction/position and time/sequence (see Figure 5.8).

8 Again, it is important to take note of the age advantage that the children had on this task.

Figure 5.8 Profile of performance on the Bracken



*SRC = School Readiness Composite

5.38.12 Expressive functioning

Of the assessments in the expressive battery, G performed most poorly on the TWF and the *Sentence Formulation* subtest of the CELF-R (UK). On the former, his standard score was below scale, even when pro-rated to take account of unknown words. He named less than 68% of known words correctly on of the subtests except the *Picture Naming: Nouns* subtest. On the *Description Naming* task his success rate fell to 45 %. The nature of his errors varied. Some examples of errors that he made on the *Description Naming* and *Sentence Completion* subtests follow:

Stimulus (target)	*Response*
What is the name of the part of your face below your mouth that is made of bone? (chin)	skull
What is a small platform with runners that people lay on and is used for sliding down a hill in the snow? (sledge)	steep
What is a chart that shows the days, weeks and months of the year and is used to make appointments? (calendar)	months
The man at the circus who makes people laugh is the circus (clown).	master

Stimulus (target)	*Response*
You measure your temperature with a (thermometer).	hot temperature thing
You cross the river by driving over the (bridge).	four by four

G also scored poorly on the *Sentence Formulation* subtest of the CELF-R (UK), obtaining a standard score of 3. His responses were characterised by the production of incomplete sentences, the omission of auxiliaries (or selection errors thereof), lexical selection errors, omission of morphological markers and, on occasion, the production of a semantically and/or syntactically nonsensical response. Some examples of his error responses are shown below.

when the girl was reading a book
the girl scrape the garden *and* the bird sat on the sunflowers
don't cross the road *because* you have an accident
the beef burgers even *either* the drinks
whatever the car can fix *until* tomorrow

LARSP provided the following insights into G's spontaneous expressive language:

- G showed a preponderance of simple sentence forms; just two complex structures were recorded.
- A range of phrase structures were seen across Stages II to IV; G demonstrated good functional use of pronouns, auxiliaries and the copula. No Stage IV clause structures were observed.
- A range of morphological markers were evident in G's sample.
- G did not tend to make errors but was inclined to produce structurally abnormal and zero responses.
- Five percent of G's utterances were unanalysable due to unintelligibility.

Syntactic and semantic anomalies were also apparent in G's account of The Bus Story. Tense, preposition, concordance and lexical selection errors were noted and clausal constituents occasionally omitted, in addition to which symbolic noise was prominent in G's account. Yet many of the key events were included and some use of complex syntax observed and G achieved age equivalent scores for information and subordinate clauses of 6;1 and 7;0, respectively. Better facility for sentence construction was evident in G's responses on the *Sentence Assembly* subtest of the CELF-R (UK), for which he achieved a standard score of 8. On the STAP G produced 88% of the target words correctly.

5.38.3 Conversational functioning

The usual conversational sampling procedure was employed initially but, due to G's lack of response, an alternative approach was spontaneously adopted. As he had expressed an interest in making objects out of paper, it was decided to make paper fans and planes together. It was hoped that this might prove to be a more fruitful means of eliciting conversation and so provide a truer picture of G's conversational ability. The conversational analysis procedures were applied to the entire sample, the results of which follow.

Data from the analysis of exchange structure are shown in Table 5.41 The majority of G's responses were minimal verbal. All of his initiations and continuations were non-soliciting. The rate of initiations, follow-ups and unanalysed utterances was high (see Adams & Bishop, 1989). The high rate of unanalysed utterances was mainly due to unintelligibility.

Table 5.41 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
16%	45%	23%	7%	9%

Findings from the analysis of turn-taking are summarised in Table 5.42. As they indicate, G showed a tendency to produce violating overlaps.

Table 5.42 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
1	1	4	0

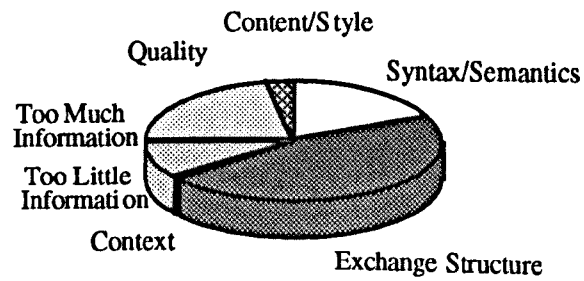
The analysis of information transfer showed that of the 86 requests put to G, 95% sought information and 5%, clarification. The adequacy of G's responses to the two types of request for information that were differentiated in the analysis procedure (confirmation and open) is indicated in Table 5.43. There was little difference between the two types of request; close to half of his responses were inadequate in each case. Only two requests were made for clarification, both of which sought confirmation. One was met with an adequate response and the other an inadequate one.

Table 5.43 Adequacy of responses to the researcher's Requests for information (number of requests made)

Confirmation (45)		Open (37)	
Adequate	Inadequate	Adequate	Inadequate
60%	40%	49%	51%

G obtained a percentage inadequacy score of 69%. A breakdown of the categories of inadequacy that were observed is shown in Figure 5.9.

Figure 5.9 Categories of conversational inadequacy



As Figure 5.9 demonstrates, G's conversational profile was dominated by violations of exchange structure. Violations of quality (marked by non co-operation and unintelligibility), problems with expressive syntax/semantics (primarily manifest in formulation difficulties and verb errors) and tendency to provide too little information (because of a failure to establish referents and a tendency for inappropriate presupposition) were also evident. In addition, a small proportion of codes were allocated from the categories of content/style (because of poor topic management), context and too much information. Excerpts from G's transcript are shown below.

A	I wonder which bit goes first?/
	(13.03)
	let's stick them on/
	(15.97)
	did you watch Star Trek yesterday?/
	(9.89)
	no?/
	are you not .. a fan of Star Trek?/
	(28.87)
	where do you live A?/
C	[gives house number and name of road]/
A	is that in (..) is that near school?/
C	no/
	in Sheffield/
A	oh right/
	Sheffield/
	I live in Sheffield too/
	(6.43)
	so (..) you went home for half term/
	(5.43)
	do you stay here or do you go home every night?/
C	I go home/
A	do you?/
	in a taxi?/
	(6.86)
	remember that boy's bedroom (...) is that what your bedroom looks like?/
	(6.77)
	ooh, have I done it wrong?/
	(14.63)
	do you have brothers and sisters?/
C	only one sister/
A	ah/
	is she older than you or younger?/
C	older/
A	oh right/
	I've got an older sister too/
	(6.21)
	how old is she?/
	(5.93)
	let's see *you're --/
C	* fourteen/
A	are you twelve yet?/

	when's your birthday?/
C	[gives birthday]/
A	so you are!/
	did you have a good time?/
	(3.44)
	I wonder what you did/
	(24.14)
	that one's got blu-tack on/ [talking to self about the picture pieces]
	(5.57)
	and that one/
	(11.01)
	so what do you like to do at home?/
	have you got a computer?/
C	um (...) I don't know/

A	what's your favourite thing at school?/
C	making paper cars/
A	you make paper cars?/
C	yeah/
A	excellent!/
	how do you make those?/
C	well (2.47) don't know/
	it's hard/
A	can you make them out of this?/
C	yeah/
	make everything out of (..) paper=/
	=even paper planes/
A	paper planes?/
	shall we make one in a minute?/
C	yeah/
A	that would be good, wouldn't it/
C	different kinds of paper planes *(1.41) I make/
A	* can you?/
	do you make them up?/
C	yeah/
A	wow/
	oh yeah, I remember now/
	you like cars too don't you/
C	yeah/
	(? Ford) cars/
A	do you prefer cars or planes?/
C	well anything/
A	any vehicles/
	have you been in an aeroplane?/
C	don't know/
	it's hard to (...)/
	(8.17)
	and also I just do fans/
A	you what?/
C	fans/
	I just done one at school/
	my old one/
A	friends?/
C	friends/
	yes/
	paper fans/
	china fans/
A	oh fans/

5.38.4 Intellectual functioning

On the short form BAS, G obtained an overall IQ score of 69.5, more than two standard deviations below the mean for his age. The *Matrices* subtest was the only subtest on which G performed within the normal range. On the remaining three (*Digit Recall, Similarities* and *Speed of Information Processing*) he scored below normal limits. On the *Digit Recall* task, G was unable to consistently recall strings of more than three digits.

5.38.5 Social functioning

Teacher/therapist ratings on the CARS indicated mild abnormalities in relating to people, verbal communication and activity levels; mild-moderate abnormalities in emotional response and body use; and moderate abnormalities in intellectual response. Imitation, object use, adaptation to change, visual response, listening response, taste/touch/smell response, fear/nervousness and non-verbal communication were all judged to within normal limits. His overall rating of 26.5 was within the normal range.

5.38.6 Summary

A summary of G's behavioural profile is shown in Table 5.44.

Table 5.44 Summary of G's overall profile

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary	■			
Understanding Concepts			■	
Understanding Semantic Links			■	
Understanding Semantic Relationships			■	
Understanding Syntactic Structures		■		
Understanding Commands	■			
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding	■			
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP highlighted a prevalence of simple sentence forms; a good command of function words; a range of phrase level constructions across Stages II to IV; an absence of clause constructions beyond Stage III; and some facility with morphology. Few errors were recorded but a high rate of structurally abnormal and zero responses was observed. LARSP also indicated a tendency for unintelligibility in spontaneous connected speech, despite good phonological functioning at single word level on the STAP (88% targets produced correctly). In G's account of The Bus Story errors of tense, preposition, concordance and lexical selection were apparent. He scored 6;1 and 7;0 for subordinate clauses and information, respectively.

Conversational Functioning

Exchange structure, turn-taking and information transfer : G produced high rates of initiations and follow-ups and demonstrated a tendency for violating overlap. The majority of requests put to him were for information; only 5% sought clarification. The adequacy of G's responses to information requests was low.

Conversational Inadequacy : G obtained a percentage inadequacy score of 67%. G's conversational profile was dominated by violations in exchange structure but violations of quality (marked by non co-operation and unintelligibility), problems with expressive syntax/semantics (most notably formulation difficulties) and the tendency to provide too little information were also apparent.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall	■			
Similarities			■	
Matrices			■	
Speed of Information Processing	■			

Social & Behavioural Functioning

Overall CARS rating of 26.5. Mild abnormalities were reported in relating to people, verbal communication and activity level; mild-moderate abnormalities were reported in emotional response and body use; and moderate abnormalities were reported in intellectual response.

5.39 Case 12 - A (11;7)

5.39.1 Language functioning

The battery of language assessments indicated age appropriate, and in some cases superior, language functioning. On three of the four assessments administered (TWF, BPVS and CELF-R (UK))[9] A's overall scores were well within normal limits; and on the fourth (the TROG), for which he achieved a standard score of 134, they were well above the normal range.

5.39.11 Receptive functioning

As far as receptive functioning is concerned, A's understanding of syntactic structures (TROG) and semantic relationships (CELF-R (UK)) was above age level. His receptive vocabulary (BPVS), understanding of semantic links (CELF-R (UK) and understanding of commands (CELF-R (UK) were all within normal limits.

5.39.1 Expressive functioning

A scored within normal limits on all of the expressive assessments that were administered. On the *Sentence Assembly* subtest of the CELF-R (UK) his score was above the mean. The LARSP indicated that A used a wide range of syntactic forms in his spontaneous connected speech. Clause and phrase structures were recorded across Stages I - VII. Errors were rare. However, 8% of his utterances were not analysed because they were stereotyped. A further 4% were not analysed because they were incomplete.

9 Due to constraints on time, the Bracken could not be administered.

On The Bus Story, A scored at ceiling (8;3) for information and for subordinate clauses. In addition, he named all of the target words on the STAP correctly. Nevertheless, some of the items on this task prompted interesting comments from A, ase shown below.

Target	*Comment*
smoke	That looks like little squiggles to me.
bus	It's a funny design of a bus.
television	Never seen a brown one before. They usually are black.
sock	Put a sock in it! [+ laughter]
nose	Rudolph the red nosed reindeer [sung]

5.39.3 Conversational functioning

Data from the analysis of exchange structure are detailed in Table 5.45. The

Table 5.45 Proportion of exchange structure codes

Initiation	Response	Continuation	Follow-Up	Unanalysed
17%	27%	37%	8%	11%

majority (91%) of A's responses were split almost equally between minimal non-verbal and extended responses. The majority of his initiations (73%) and all of his continuations were non-soliciting. A proportion of A's utterances were unanalysed, either because they were incomplete or because they were problematic to code. As in the majority of previous cases, the proportion of initiations, follow-ups and unanalysed utterances in A's sample was high in relation to Adams & Bishop's (1989) normative data.

Findings from the analysis of turn-taking are summarised in Table 5.46. As they suggest, A demonstrated a tendency to produce both inadvertent and violating

overlaps. The unusually high rate of adult interrupt reflects the researcher's attempts to distract A when he engaged in stereotyped sequences (see below).

Table 5.46 Allocation of turn-taking codes

Gap	Overlap		
	Inadvertent	Violating	Adult
0	5	3	6

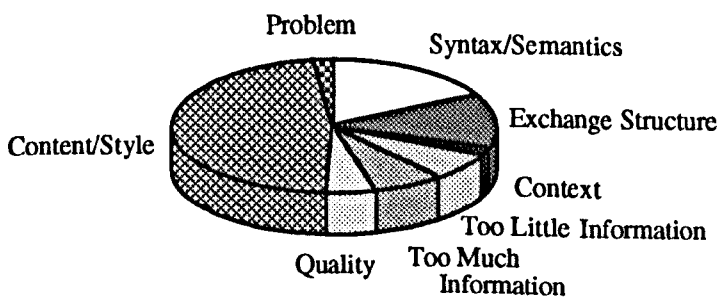
The analysis of information transfer indicated that, of the 50 requests put to A, 96% were for information and the remaining 4%, for clarification. In each case, the majority of A's responses were considered adequate. With regard to the two types of request for information that were differentiated in the analysis procedure, the proportion of adequate responses produced by A was less favourable for open requests than for requests for clarification, but in both cases the majority of his responses were adequate (see Table 5.47). Only two requests for clarification were made by the researcher; both were met with an adequate response.

Table 5.47 Adequacy of responses to the researcher's Requests for information (number of requests made)

Confirmation (21)		Open (27)	
Adequate	Inadequate	Adequate	Inadequate
81%	19%	67%	33%

A obtained a percentage inadequacy score of 22%. A profile of the categories of conversational inadequacy that were observed is given in Figure 5.9.

Figure 5.9 Categories of conversational inadequacy



As Figure 5.9 shows, codes were allocated from all of the categories except 'other'. The greatest proportion (48%) was allocated from the category of content/style. A range of anomalies were observed within this category but the use of stereotyped language, rigidity, and pedantic language dominated. Problems with topic (in the form of topic drift) and the tendency to ask inappropriate questions were also evident but were relatively infrequent (they accounted for 3% and 7% of the codes within this category, respectively). In addition, 17% of codes were allocated from the category of expressive syntax/semantics, mainly because of formulation difficulties but also as a result of errors involving connectives, verbs, discourse devices. A further 13% of codes were allocated in the category of violations of exchange structure. These concerned A's tendency to ignore the researcher's initiation. This was particularly pronounced when A engaged in stereotyped sequences. A small proportion of codes were allocated from each of the remaining categories. Excerpts from the transcript follow:

A so are you going (..) do you usually go on holiday?/
C well no-one usually goes on holiday do they/
A what do you mean?/
C well I don't (..)* (?don't usually)/
A * you don't usually go on holiday/
sometimes/
C yeah/
sometimes we go on holiday/
we don't (..) sometimes we don't leave England/
A right/
C or Britain/
A but you've been to The States haven't you?/
C mmm/
yeah/
The States/
A I remember you telling *me about that/
C *that was a very
expensive holiday/
A *was it?/
C *four (..) four thousand pound/
A goodness gracious me/
that's loads of money/
C and we spent over a hundred dollars/
A wow!/
C maybe even two hundred dollars there/
A when you were there?/
C yeah/
I bought (..) *I bought two star (..) I bought two er ---
A *you were very lucky to go on that holiday weren't you/
C yeah/

two Star Trek toys there/
A did you?/
what were they?/
C the USS Excelsia and The Enterprise off the original series/
A what, like models?/
C toys that make noises/
A oh right/
C you know those toys?/
those type of toys?/
A sort of//
yeah/
I think I've seen them/
C I'm (..) I'm looking for one of a Borg ship at the moment/
A right/
where do you (..) where can you buy them usually?/
C you (.) you can buy them in (..) in shops that sell them/

A I love the sea-side/
*I used to live near the sea-side/
C * oh I do like to be beside the sea-side/ [*sung*]
have you heard of that song?/
A I have/
C we sang it at Open Day/
A did you?/
C mmm/
A wow!/
have you ever been to the sea-side?/
C yeah/
oh I do like to be beside --- /
A where abouts did you go?/
C I've been to many beaches/
A have you?/
C I went to quite a few in America/
A wh (..) you were in Florida weren't you?/
C no/
California/
A oh that's right/
yeah/
California!
C that's a bi (..) funny bird/
A do you know what it is?/
C a sea-gull/
A yeah/
it's a big one/
C a big bird?!/
it looks more like an owl than a sea-gull/
A it i (..) it's got a very large wing-span hasn't it/
C wing span wing (..) wing span/ [*sung*]
R hey canoeing/!
I've done that/
A oh I do ---/ [*sung*]

A how do they manage that?/
C well the aliens have got protective force-fields around their ships/
A uh-huh
C which are most impenetrable/
A uh-huh/
C however
A yeah/

C they're impenetrable/
however they have thought of the idea of the computer virus/

5.39.4 Intellectual functioning

On the short form BAS, A achieved an overall IQ score of 102 and performed within normal limits on each subtest. His performance was poorest on the *Digit Recall* task, on which he scored in the eleventh percentile and was unable to consistently recall strings of more than three digits. Interestingly, he did not demonstrate any difficulties with the recall of sentences on the CELF-R (UK).

5.39.5 Social functioning

Teacher/therapist ratings on the CARS indicated mild impairments in relating to people, emotional response, body use, visual response, activity level and intellectual response. On all of the remaining items (imitation, object use, adaptation to change, listening response, taste/touch/smell response, fear/nervousness and verbal and non-verbal communication) A's behaviour was reported to be within normal limits. His overall rating of 24.5 was within the normal range.

5.39.6 Summary

A summary of A's overall profile is given in Table 5.48, overleaf.

Table 5.48 Summary of A's overall profile.

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Semantic Links				■
Understanding Semantic Relationships				■
Understanding Syntactic Structures				■
Understanding Commands				■
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding			■	
Sentence Formulation			■	
Sentence Assembly				■
Sentence Recall			■	
Other	LARSP indicated a good command of a wide range of clause and phrase structures across all seven stages. On the Bus Story, A performed at ceiling (8;3) for both information and subordinate clauses and on the STAP he produced all of the target words correctly.			
Conversational Functioning				
Exchange structure, turn-taking and information transfer : A produced a high rate of initiations and follow-up and demonstrated a tendency for inadvertent overlap in particular, but also for violating overlap. A high rate of adult interrupt was observed. Few requests for clarification were made by the researcher. *Conversational Inadequacy* : A received a percentage inadequacy score of 22%. His conversational profile was dominated by the production of utterances which were unusual in either their content or style. Problems with syntax/semantics (mainly formulation difficulties) were also evident, along with the tendency to violate the rules of conversational exchange. This was particularly apparent when A was using stereotyped sequences.				
Intellectual Functioning	**Impaired**	**Poor**	**Average**	**Good**
Digit Recall			■	
Similarities				■
Matrices				■
Speed of Information Processing				■
Social & Behavioural Functioning				
Overall CARS rating of 24.5 (non-autistic). Mild impairments were reported in relating to people, emotional response, body use, visual response, activity level and intellectual response.				

5.4 Overall summary profiles for the three pilot study participants

To assist the process of comparison in the summary and synthesis section that follows, summary profiles for the three pilot study children are shown below.

Table 5.49 Summary of D's overall profile.

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary		■		
Understanding Semantic Links			■	
Understanding Semantic Relationships			■	
Understanding Syntactic Structures			■	
Understanding Commands			■	
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding		■		
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			

Other	LARSP highlighted a preference of simple sentence forms; a dominance of Stage III constructions at clause level; a range of phrase structures across Stages I to IV; good facility with function words; and a strong command of morphology. On the Bus Story, D achieved an age equivalent score for both subordinate clauses and information of 7;10. On the STAP, he pronounced 96% of target words without error.

Conversational Functioning

Exchange structure, turn-taking and information transfer : D produced high rates of initiations and follow-ups; showed a slight tendency for violating overlap; and prompted a high rate of adult requests for clarification. More of his responses to these were judged adequate than his responses to requests for information.

Conversational Inadequacy : D achieved an overall inadequacy score of 17%. Expressive problems with syntax/semantics dominated his inadequate contributions together with violations of exchange structure but codes were allocated from all categories.

Intellectual Functioning	Impaired	Poor	Average	Good
Digit Recall				■
Similarities			■	
Matrices			■	
Speed of Information Processing				■

Social & Behavioural Functioning

Overall rating of 27 (non-autistic). Mild abnormalities were observed in relating to people, body use, adaptation to change, listening response and verbal communication; and mild-moderate abnormalities in emotional response, visual response and fear/nervousness.

Table 5.50 Summary of N's overall profile.

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Semantic Links		■		
Understanding Semantic Relationships	■			
Understanding Syntactic Structures		■		
Understanding Commands		■		
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding		■		
Sentence Formulation		■		
Sentence Assembly			■	
Sentence Recall			■	
Other	LARSP highlighted a predominance of simple sentence forms; a prevalence of stage III constructions at clause level; a range of phrase level constructions across stages I-IV; and good facility with function words. On the Bus Story, N scored 3;10 for subordinate clauses and 4;0 for information. On the STAP N produced 79% of the target words without error.			
Conversational Functioning				
Exchange structure, turn-taking and information transfer: N produced high rates of initiations; demonstrated a slight tendency for inadvertent overlap; and prompted a high rate of clarification requests from the researcher. He was as successful in responding to these as to responding to requests for information. *Conversational Inadequacy*: N obtained a percentage inadequacy score of 20%. The majority of his inadequate contributions were in the categories of exchange structure and expressive syntax/semantics. Violations of quality and too little information were also prominent in his profile but codes were allocated from all categories.				
Intellectual Functioning	**Impaired**	**Poor**	**Average**	**Good**
Digit Recall		■		
Similarities			■	
Matrices			■	
Speed of Information Processing			■	
Social & Behavioural Functioning				
Overall CARS rating of 34.5 (mildly-to-moderately autistic). Mild impairments were reported in body use, object use, listening response and verbal communication; mild-moderate impairments in relating to people, emotional response, taste/touch/smell, non-verbal communication and activity level; and moderate impairments in adaptation to change, visual response and fear/nervousness.				

Table 5.51 Summary of M's overall profile.

Receptive Language	Impaired	Poor	Average	Good
Receptive Vocabulary			■	
Understanding Semantic Links			■	
Understanding Semantic Relationships			■	
Understanding Syntactic Structures			■	
Understanding Commands		■		
Expressive Language	**Impaired**	**Poor**	**Average**	**Good**
Word Finding	■			
Sentence Formulation	■			
Sentence Assembly			■	
Sentence Recall	■			
Other	LARSP highlighted a prevalence of minor responses; a preference for simple sentence forms in major responses; a range of phrase level constructions across Stages I-IV; a good command of pronouns and auxiliaries; and a limited range of morphological markers. On the Bus Story M achieved age equivalent scores of 6;4 for information and 4;7 for subordinate clauses. On the STAP, he produced 93% of the target words correctly.			
Conversational Functioning[10]				
Exchange structure, turn-taking and information transfer : M rarely produced initiations and an unusually high rate of responses; he demonstrated few problems with turn-taking; and prompted a low rate of clarification requests on the part of the researcher. *Conversational Inadequacy* : M obtained an overall percentage inadequacy score of 42%. Violations of exchange structure and of quality accounted for 97% of allocated codes. The remaining 3% were allocated to the category of too little information.				
Intellectual Functioning	**Impaired**	**Poor**	**Average**	**Good**
Digit Recall		■		
Similarities			■	
Matrices				■
Speed of Information Processing				■
Social & Behavioural Functioning				
Overall CARS rating of 35.4 (mildly-to-moderately autistic). Mild abnormalities were noted in adaptation to change and listening response; mild-moderate abnormalities in relating to people, emotional response, body use, object use, fear/nervousness, verbal/non-verbal communication and activity level; and moderate abnormalities in visual response and taste/touch/smell response.				

10 Reduced sample

5.5 Summary and synthesis

This section is intended to draw together the findings from each of the case studies presented in this chapter along with the three presented in the last chapter, in an effort to help to clarify the issue of diagnostic criteria for SPD. For the sake of clarity, each 'level' of functioning will be discussed in turn. In order to enable comparisons to be made across performance on the various standardised assessments that were administered, the relevant percentile scores have been transformed into z-scores using the conversion tables provided by Beech & Harding (1990).

5.51 Linguistic functioning

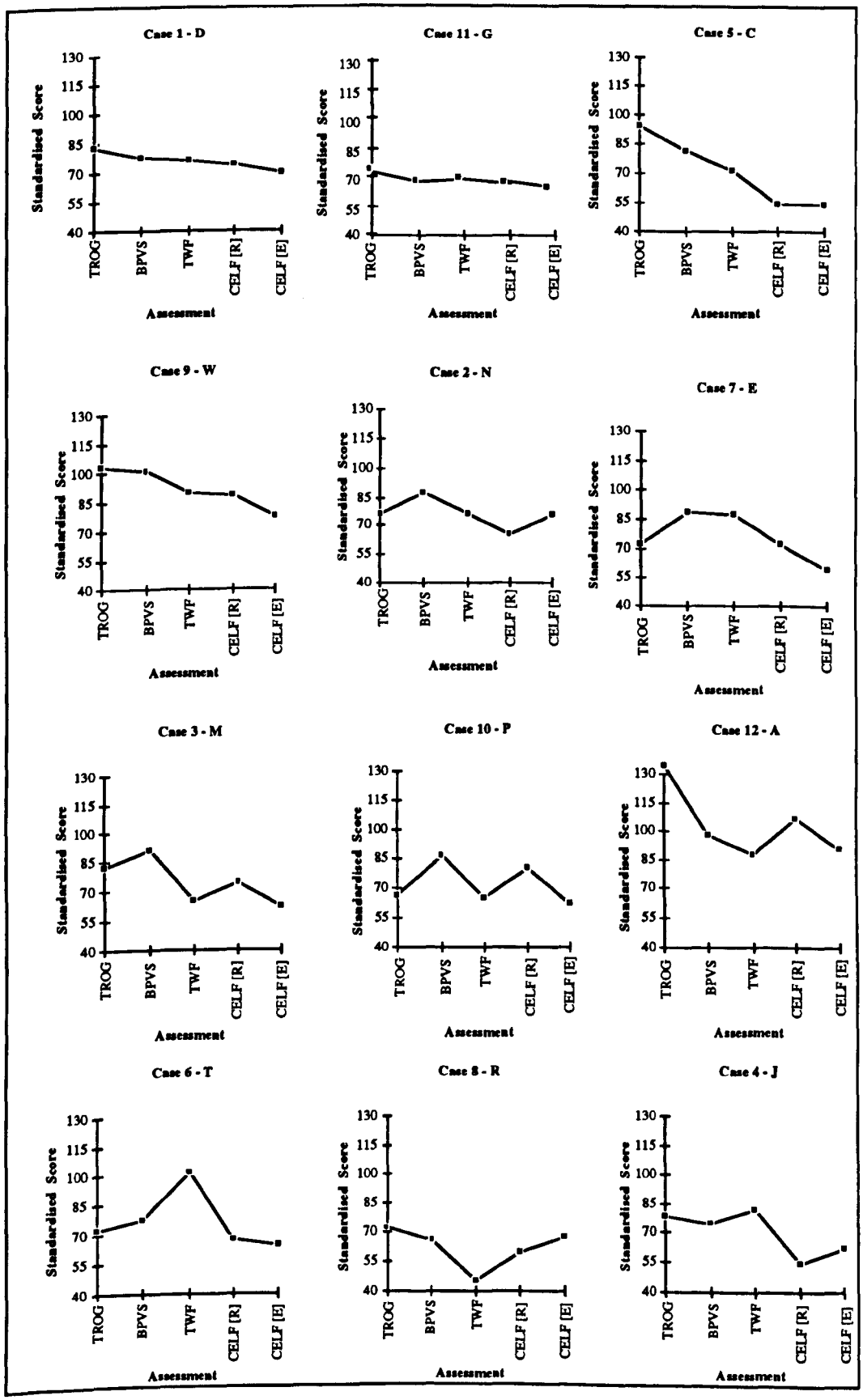
- A broad linguistic profile for each participant, based on the standard scores from the TROG, BPVS, TWF and the receptive and expressive sub-scale standard scores from the CELF-R (UK), is shown in Figure 5.10, overleaf. The Bracken was excluded because it was a potentially artificial performance peak, due to the aforementioned age advantage. The Friedman test indicated a significant similarity in the pattern of performance demonstrated by the participants across the tests [$p < .05$]. However, visual inspection of the data would suggest that some profiles are more similar than others. An attempt has been made to organise Figure 5.10 so as to reflect these parallels.

- One respect in which there was little overall consistency across the group concerns the relationship between receptive and expressive functioning (see Table 5.52).

Table 5.52 The relationship between receptive (R) and expressive (E) functioning, as measured by the two sub-scale standard scores on the CELF-R (UK)

	R > E	R < E	R = E
Number of Participants	5	4	3

Figure 5.10 Performance profiles on the standardised language battery for all participants



This finding is anomalous with the suggestion that expressive skills characteristically outweigh receptive ones in this population (Rapin, 1982, Rapin & Allen 1987, 1988).

- The above points focus on the *pattern* of performance that was observed across the tests. It is also useful to consider *levels* of performance. To this end, overall performance levels across participants on the five standardised language assessments in the battery are shown in Table 5.50. Ten of the twelve participants scored in the poor or impaired range on more than two of the tests. Moreover, in those instances when they did score within normal limits it was generally on the lower side of the mean. The two remaining participants scored within or above normal limits on all five tests. Thus, linguistic deficits were common but not universal.

Table 5.50 Overall performance levels across the five standardised language assessments in the battery

Performance Level	*Below Normal Limits*			*Within or Above Normal Limits*
Number of Assessments (N=5)	*Three*	*Two*	*One*	*All*
Number of Participants (N=12)	5	5	0	2

- In an attempt to establish a clearer picture of overall strengths, weaknesses and universality, the proportions of participants that scored below, within, and above normal limits on each of the tasks in the receptive and expressive batteries are shown in Figures 5.10 and 5.11, respectively.

This exercise highlighted two respects in which the performance level across the participants was consistent; all twelve children performed within normal limits on the Bracken (concepts) and on the *Similarities* subtest of the BAS (categorisation). With respect to the former, however, it is important to note that none of the

Figure 5.10 Overall group performance levels
On the standardised expressive battery

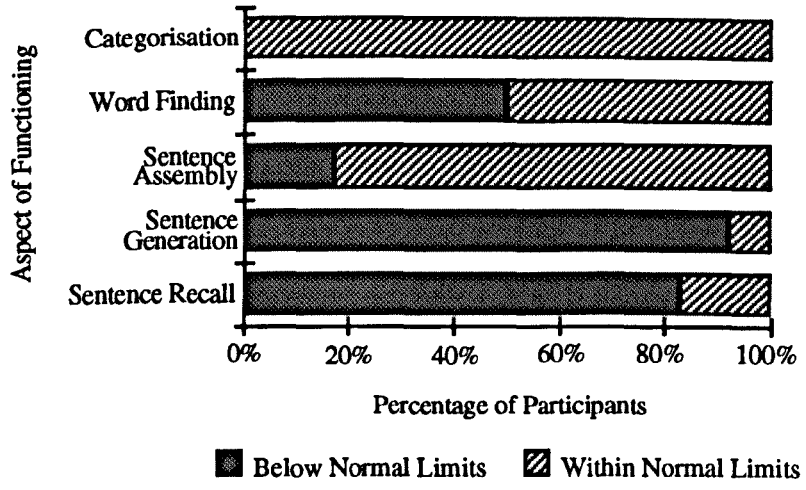
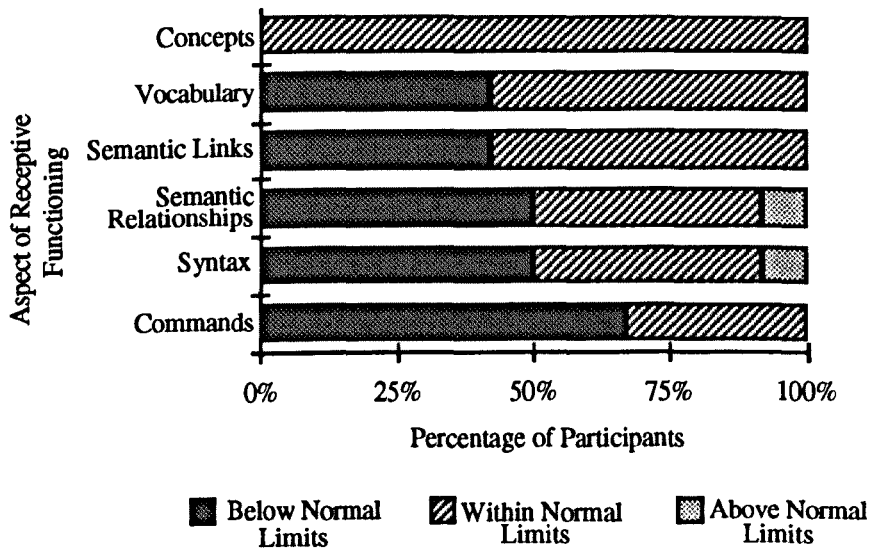


Figure 5.11 Overall group performance levels
On the receptive expressive battery



participants performed above the normal range in spite of their chronological age advantage on this task and that many showed spiky profiles. No other universals were apparent although expressive problems with sentence formulation and sentence recall were apparent in all but one case. Interestingly, these usually stood in contrast to age appropriate facility for the construction of sentences from

written chunks (sentence assembly). Problems understanding commands were common but not invariable. Scores on the majority of receptive tasks were variable but rarely above age level. Word-finding abilities were also variable.

- The group mean for the percentage of words named correctly on the STAP was 92%, with a range of 79% to 100%.

- Variable scores were obtained on The Bus Story. With two exceptions[1], none of the participants scored at ceiling (age equivalent of 8;3) on either scoring parameter in spite of their chronological age advantage. Excluding these exceptions, age equivalent information scores ranged between 3;9 and 7;10, with a mean of 5;7 and age equivalent scores for subordination ranged between 3;10 and 7;0, with a mean of 4;10.

- LARSP highlighted a preference for simple sentence forms in spontaneous connected speech, and a limited syntactic inventory, in all but one case (A). In addition, it indicated a good command of function words in all cases[2] and of morphology in most. Interestingly, the error count was generally low but in most cases a proportion of the sample was unanalysable due to syntactic deviance.

5.52 *Conversational functioning*

- With regard to the analysis of exchange structure, the Friedman test indicated a significant similarity across participants in the distribution of the various codes [$p<.001$] (see Table 5.51). High rates of initiations, follow-ups and unanalysed utterances were observed in relation to Adams & Bishop's (1989) normative data (see page 147). This is illustrated in Table 5.51, in which the findings from the present study are shown in italics.

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1 J scored at ceiling for subordinate clauses and A scored at ceiling on both parameters.

2 All but one participant showed a good command of pronouns, auxiliaries and copulas; T demonstrated a solid functional grasp of pronouns and copulas but tended to omit auxiliaries.

Table 5.51 Approximations of the distribution of exchange structure codes allocated in Adams & Bishop's Study (1989) and the distribution of exchange structure codes in the present study (shown in italics)

Group	Percentage of Codes Allocated to Each of the Exchange Structure Types				
	Initiation	Response	Continuation	Follow-Up	Unanalysed
SPD	12	56	23	4	4
SLI	9	64	18	3	3
12	3	75	16	2	3
10	5	65	19	1	3
8	4	67	20	1	4
6	8	65	21	2	3
5	7	76	10	1	4
4	7	74	9	4	2
SPD	*16*	*44*	*26*	*8*	*7*

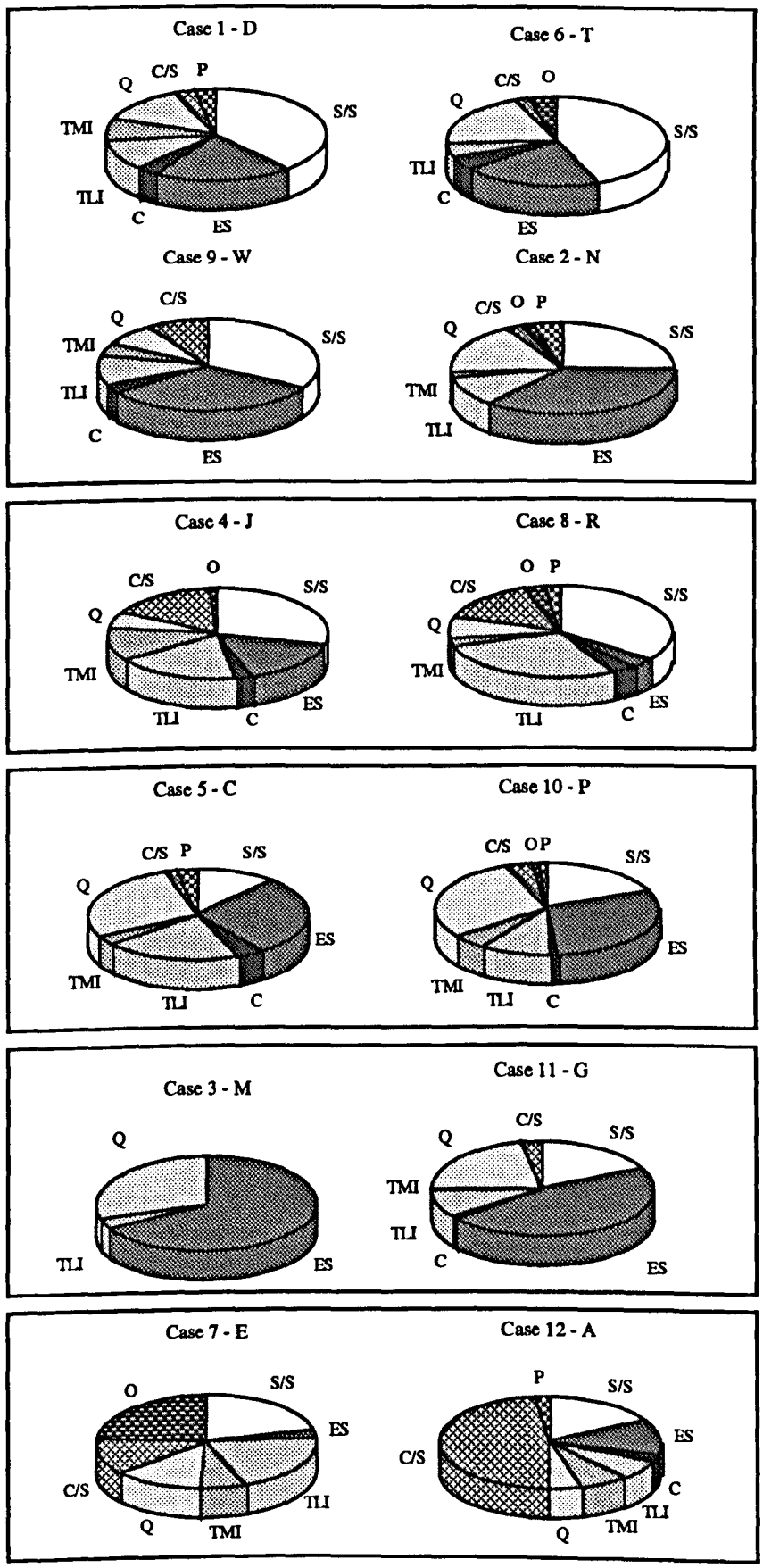
- The tendency to produce inadvertent or violating overlap was a characteristic of certain individuals rather than the group as a whole. Five participants (W,P,G,A,N) made more than four inadvertent overlaps and five made more than four violating overlaps (W,P,J,T and R).

- The proportion of requests for clarification made by the researcher varied between 4% to 28% of her total requests. In all but three cases (A, G and M), the *number* of such requests was high in relation to Adams & Bishop's normative data. In most cases, the ability to provide adequate responses to these was no more or less impaired than the ability to provide adequate responses to requests for information.

- Overall percentage inadequacy scores ranged from 17% to 69%. Profiles of inadequacy for each participant are shown in Figure 5.12. The Friedman test indicated a significant similarity across participants in the distribution of inadequacy codes [$p < .001$][3]. However, visual inspection of the data would suggest that some profiles are more similar than others and an attempt has been made to organise Figure 5.12 so as to reflect this.

3 Two participants were excluded from this analysis; G because of the different method of eliciting conversation that was used in his case and M because of the reduced sample size.

Figure 5.12 Profiles of conversational inadequacy for all participants

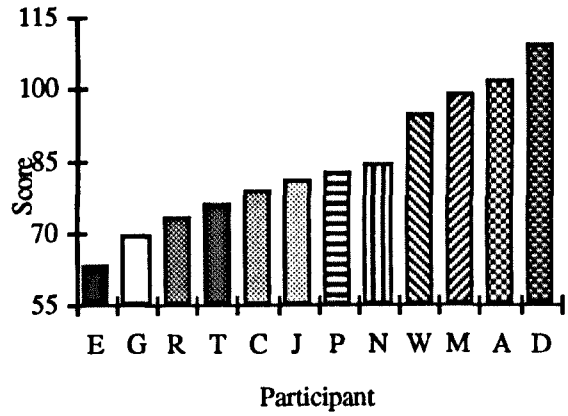


S/S = expressive syntax/semantics; ES = exchange structure; TLI = too little information; TMI = too much information; Q = quality; C/S = content/style; C = context; O = other; P = problem

5.53 *Intellectual functioning*

- The overall IQ scores for each participant are shown in Figure 5.13 below. As the Figure demonstrates, a wide range of scores (from 63.5 to 109.5) was observed.

Figure 5.13 Overall BAS (short form) IQ scores



- A profile of performance across the four BAS subtests for each participant is shown in Figure 5.14. The Friedman test indicated a significant similarity in the pattern of performance demonstrated by the participants across the subtests [$p < .05$]. The overall group performance levels for each subtest, presented in Figure 5.15, indicate that, whereas the majority of participants scored below normal limits on the *Digit Recall* subtest, all performed within normal limits on the *Similarities* subtests, as did the majority on the *Matrices* and *Speed of Information Processing* tasks.

Figure 5.15 Overall group performance levels on the BAS subtests.

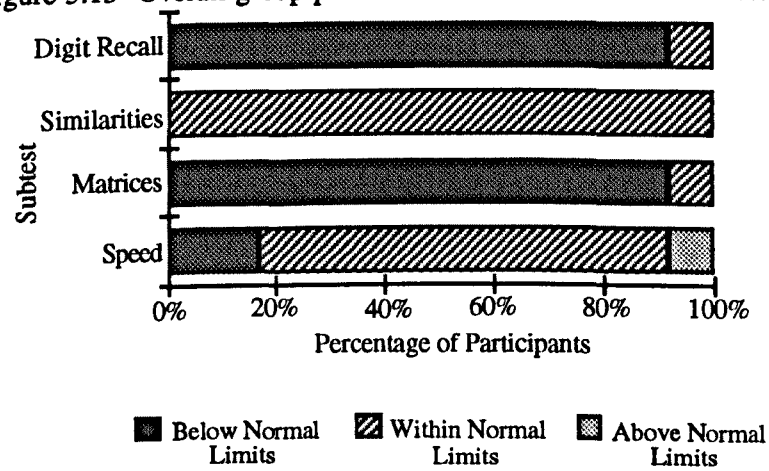
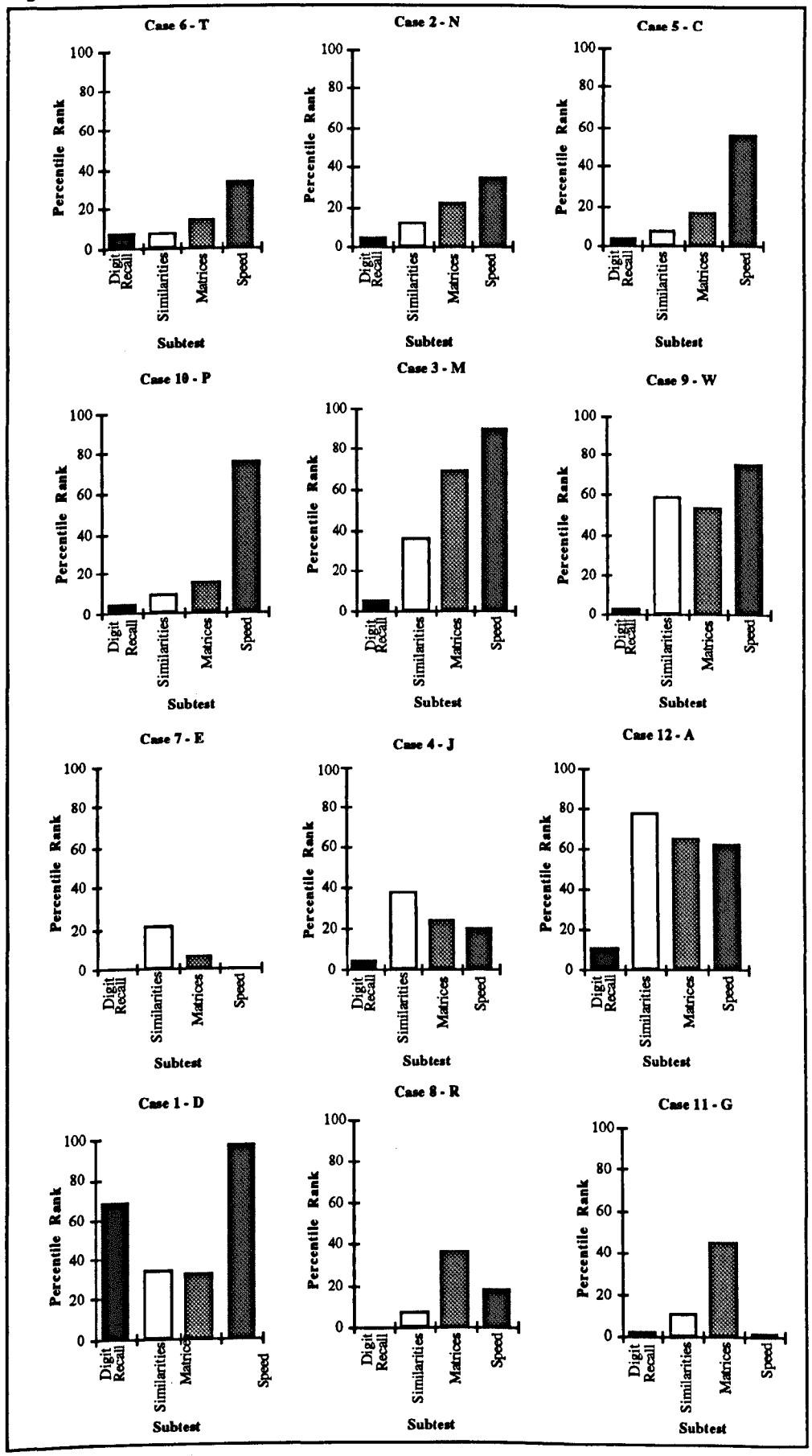


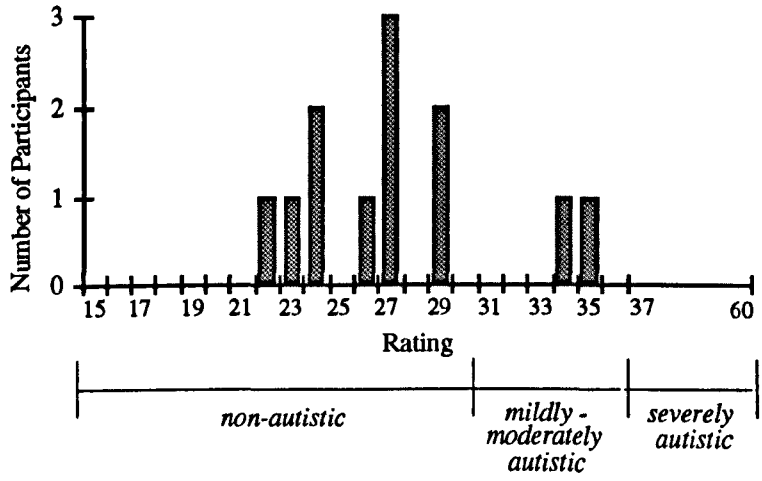
Figure 5.14 Performance profiles on the BAS for all participants



5.54 Social functioning

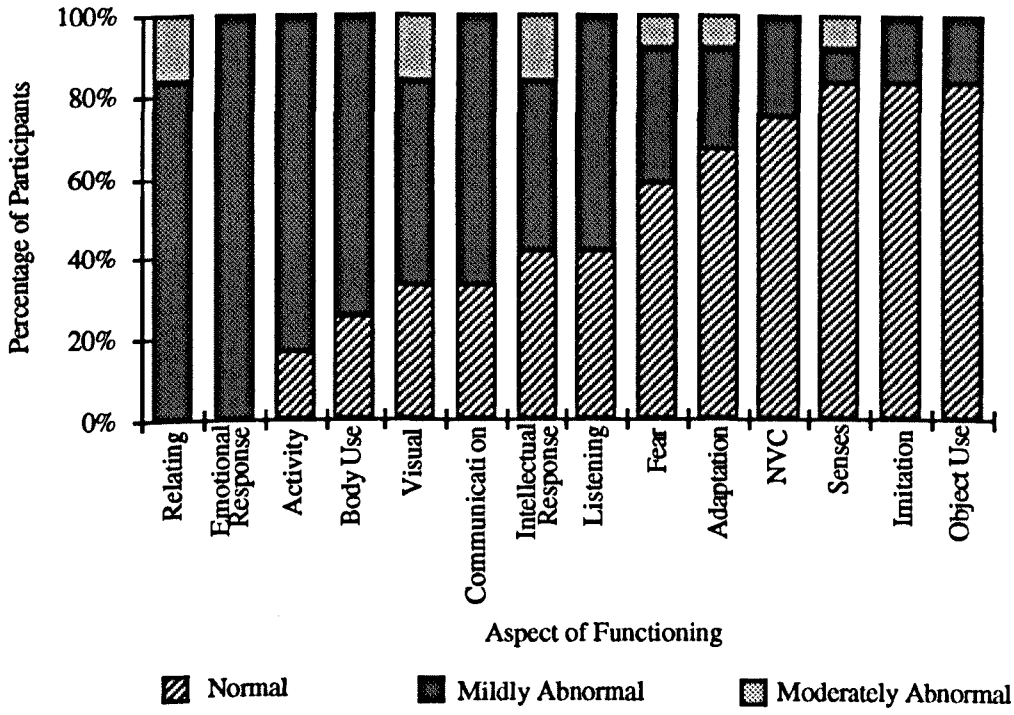
- At least some mild to moderate aberrations in social and behavioural functioning were reported in every case, yet in only two cases were these severe or extensive enough to amount to a rating of autism. Interestingly, however, in the remaining cases, the ratings did appear to cluster towards the autistic end of the normal range. The distribution of overall ratings on the CARS is shown in Figure 5.16.

Figure 5.16 Distribution of autism ratings on the CARS



- Inspection of the types of behaviours that were reported to be anomalous indicated universal deficits in relating to people and emotional response, and frequent problems with body use and activity. No common strengths were found, but problems with object use, imitation, taste/touch/smell, and non-verbal communication were infrequent (see Figure 5.17).

Figure 5.17 Overall ratings on the CARS items



5.6 Conclusion

In this chapter profiles of nine children identified by their speech and language therapist as having SPD were presented. In relation to the aim of clarifying diagnostic criteria, comparisons were then made across the profiles. The three profiles obtained in the pilot study were also included in this process. A number of common features emerged. Significant associations were found across participants in the pattern of performance across the standardised language assessments in the battery, in the categories of conversational inadequacy observed and in the IQ profiles that were obtained. As far as the latter is concerned, impaired digit recall was observed in all but one case. With regard to social functioning, deficiencies in emotional response and relating to people were universal. Problems with the structural aspects of were prevalent; all but two of the participants achieved overall standard scores below normal limits on two or more of the five language assessments administered. As far as expressive functioning is concerned, problems with sentence recall and sentence

generation were the most widespread but word-finding difficulties were also common. Categorisation skills (*Similarities* subtest of the BAS) were a relative strength in each of the profiles but in no case were they above normal limits. Phonological functioning was also relatively intact. Grammatical analysis of the spontaneous language samples yielded a particularly interesting set of results. The majority of participants demonstrated a good grasp of function words and morphology, all showed a limited syntactic inventory and a preference for simple sentence forms in spontaneous connected speech. More variability was evident in respect of receptive deficits, although the majority of participants performed poorly on the understanding of commands.

The theoretical and clinical implications of the findings will be discussed in Chapter 7, together with those from Phase 2 of the study, as described in the next chapter.

Chapter Six

Phase 2: The investigation of underlying psychological mechanisms

6.1 Introduction

This chapter concerns the second phase of the study. That is, the investigation of underlying psychological mechanisms. Four mechanisms were studied - executive function, central coherence, world knowledge and theory of mind - with the following research questions in mind:

1. How do the psychological profiles of children labelled as presenting with SPD relate to those of children with SLI, children without difficulties and to children with autism as reported in the literature?
2. How unitary are the psychological profiles shown by children with SPD?
3. Are there any links between psychological and behavioural profiles in cases of SPD?

It is important to emphasise the preliminary nature of this phase of the research. It was intended as a process of exploration rather than hypothesis testing and, as such, few prior predictions were made.

6.2 Overview of methodology

6.21 Participants

Each of the above research questions involved a different, but overlapping, set of participants:

1. Between group comparison

Three groups of ten children were included in the between group comparison. The first, described as the *SPD group*, consisted of ten of the twelve children who participated in Phase One[1]. The second group (the *SLI group*) comprised children diagnosed by their speech and language therapists as presenting with specific language impairment (SLI). Their language disorders were principally phonological and/or syntactic in nature[2] and were not considered to involve primary deficits in the semantic and pragmatic domains. All were attending schools which catered specifically for children with SLI. The third group (the *normal group*) consisted of younger normally developing children. All were in mainstream schools, scored within one standard deviation of the mean on the *Test for the Reception of Grammar* (TROG) (Bishop, 1982), were not receiving speech and language therapy or any other form of special educational support and were considered by their teachers to be of normal intelligence. All thirty participants were monolingual English speakers.

The clinical and normally developing control groups were matched with the experimental group (SPD group) for language ability, according to their item score on the Test for the Reception of Grammar (TROG) (Bishop, 1982)[3,4]. Unfortunately, it was not possible to control for gender. A summary of participant details is presented in Table 6.1.

The Kruskal-Wallis test showed that there was no significant difference between the groups on the TROG (chi-square = 0.395, df = 2, p = .821). However, there was a significant difference between the groups in chronological age (chi-square = 11.712, df = 2, p <.01). A Mann-Whitney Test showed

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1 Two children from the original sample (E and G) were excluded because their scores on the non-verbal subtests of the BAS indicated that they were low ability. Including them might make any findings of impairment difficult to interpret.
2 Three members of the SLI group presented with concomitant dysarthria or dyspraxia.
3 Although it would have been preferable, time constraints precluded the use of more than one language measure for the purpose of matching.
4 TROG scores for the three pilot study participants were updated for this purpose.

Table 6.1 Participant details

Group	N	Sex* (m :f)		Age years;months	TROG item score	TROG blocks passed
SPD	10	10:0	Mean	11;5	71.7	15.5
			SD	0;6	5.5	2.9
			Range	(10;8 - 12;1)	63 - 80	11 - 20
SLI	10	7:3	Mean	11;3	68.8	15.5
			SD	1;1	2.9	1.1
			Range	(9;9 - 12;8)	63 - 72	14 - 17
Normal	10	6:4	Mean	8;6	70.7	14.9
			SD	2;1	6.4	2.7
			Range	(5;8 - 11;0)	58 - 80	10 - 19

significant differences between both clinical groups and normally developing controls (SLI vs. normals - $U = 16$, $p < 0.01$, 2-tailed: SPD versus normals $U = 6.5$, $p < .001$, 2-tailed). No difference was found between the clinical groups ($U = 64$, $p = .970$, 2-tailed).

2. The investigation of commonalities

All twelve participants from Phase One were involved in the investigation of commonalities.

3. The exploration of links between behavioural and psychological profiles

The exploration of links between behavioural and psychological profiles focused on the nine children who participated in the main part of Phase One (see page 159). The three children who took part in the pilot study were excluded because of the time lag that occurred between the pilot and the start of Phase Two. However, because the modified version of the conversational sampling and analysis procedure was administered to these participants within six months of Phase Two, some exploration of links between their conversational and psychological profiles was possible.

7.22 *Materials*

A summary of the tasks used is shown in Table 6.2. Detailed descriptions are given in later sections.

Table 6.2 Summary of tasks

Aspect of Functioning	Tasks
Theory Of Mind	The Milk Carton Task Deception and Sabotage Peter's Birthday Puppy
Executive Function	The Tower of London Intra/Extra-Dimensional Shift Task (IDED Task) Modified Card Sorting Task (MCST) Design Fluency
Central Coherence	Block Design Children's Embedded Figures Test (CEFT) Optical Illusions
World Knowledge	Event Recall *Everyday Events* *Novel Event* Event Recognition *Everyday Events*

7.23 *Procedure*

The tasks were administered, individually, to all twelve SPD participants and the ten members of each of the control groups. This was done across four sessions which took place, a week apart, in the participant's school. The manner and order in which the tasks were presented was governed by the aim of investigating novel event recall. Rather than devise a specific task for this purpose, the sessions themselves, together, comprised the novel event. For this reason a high degree of consistency was maintained across sessions. The tasks were grouped in terms of common themes (see Table 6.23) and each session was made up of one task from each group.

Table 6.3 Common "themes" across the tasks.

Theme	Tasks
Problem-solving	*Intra/Extra-Dimensional Shift Task (IDED)* *Tower of London (ToL)* *Modified Card Sorting Task (MCST)* *Children's Embedded Figures Test (CEFT)*
Talking and listening	*Event Recall*
Drawing	*Optical Illusions* *Design Fluency*
Story	*Event Recognition*
Miscellaneous	*Block Design* *The Milk Carton Task* *Deception and Sabotage* *Peter's Birthday Puppy*

Each task was intended to represent an *act* within the event and was verbally marked using a standard script which highlighted the identified theme. Thus, the IDED task, the ToL, the MCST and CEFT were all introduced with, *"I want you to help me to solve a problem/some problems"* ; the event recall tasks, *"we're going to do some talking and listening"*; the miscellaneous tasks, *"we're going to play a game"* ; the optical illusions and design fluency tasks, *"we're going to do some drawing"* ; and the event recognition tasks with, *"I'm going to tell you a story"*. The order of presentation of each 'act' was held constant from week to week, as follows:

1. Problem solving task
2. Talking and listening
3. Miscellaneous
4. *Break*
5. Drawing
6. Story listening

Each session was punctuated with a short break to prevent fatigue. So that this formed a salient act within the 'novel event', the clinical groups were given a drink and a

biscuit and their normally developing counterparts, time to look at a selection of comics[5]. The content of each session is summarised in Table 6.4.

Table 6.4 Summary of session content

Session 1	Session 2
Id/Ed Shift Task	Tower Of London
Script Recall - Practice + Event 1*	Script Recall - Event 2
Block Design	Milk Carton Task
Break	Break
Drawing	Optical Illusions
Script Recognition - Practice	Script Recognition - Event 1
Session 3	**Session 4**
Modified Card Sorting Task	Embedded Figures
Script Recall - Event 3	Script Recall - Re-Recall Of Event 1
Deception & Sabotage	Birthday Puppy
Break	Break
Design Fluency	Drawing
Script Recognition - Event 2	Script Recognition - Event 3

*Each participant had to recall three different events across the four sessions (see page 299).

The procedures and findings for each of the four underlying mechanisms are presented in turn, below.

6.3 The investigation of theory of mind ability

6.31 Introduction

Three tasks were included in the investigation of theory of mind: the milk carton task (Baron-Cohen, 1991), deception and sabotage (Sodian & Frith, 1992) and Peter's birthday puppy (Tager-Flusberg & Sullivan, 1994).

5 This discrepancy was not intended but was forced by school rules.

6.32 Task details

6.32.1 The milk carton task (Baron-Cohen, 1991)

Baron-Cohen's (1991) version of the milk carton task concerns the participant's awareness of his own false belief. In this study it was modified (on the basis of the smarties task (Perner, Frith, Leslie, & Leekam, 1989)) to tap understanding of another person's ignorance and 'other' false belief as well.

The task was preceded by a control task which closely paralleled the main task but did not involve belief. The participant was shown a red box, the lid of which was removed to reveal a small blue wooden block inside. The lid was replaced and the participant was asked *"What was inside the box?"*. The researcher then said, *"Let's take the green brick out and put a yellow one in"*. The lid was again replaced and the participant was asked, *"Now, what's in the box?"*, followed by, *"When I first showed you the box, before we opened it, what was inside then?"*. If a prompt was required the researcher asked, *"Was there a yellow brick or a green brick?"*. The main task was presented to all participants who answered each of these questions correctly, as follows.

The researcher pointed to a milk carton which was positioned on the table next to her coffee cup and asked, *"What is this?"* [reality prompt] then, *"What do you think is inside?"* [confirmation question 1]. The carton was opened to show that it contained a ball and not milk. The child was asked, *"Now what do you think is inside?"* [confirmation question 2] and then, *"When I first asked you, before we opened the carton, what did you think was inside?"* [own belief question]. The carton was then placed back out of arms reach and the participant was told, *"[Name of a peer] is coming to see me in a minute. He has not seen this carton before. Does he know what is inside?"* [ignorance question] and, *"When I show it to [friend's name] - just like this"* [pointing to the now closed carton] *"what will [friend's name] think is*

inside?" [other belief question]. Two reality checks followed, *"Is that what is really in the carton?"* [reality check 1] and *"What is really in the carton?"* [reality check 2]. Finally, the participant was asked, *"Do you remember, when I first showed you the carton and asked you what was inside, what did you say?"* [memory check]. Correct responses are shown in Table 6.4.

Table 6.4 Correct responses on the modified milk carton task

Question	Correct response
Reality prompt *What is this?*	a milk carton
Confirmation question 1 *What do you think is inside?*	milk
Confirmation question 2 *Now what do you think is inside?*	a ball
Own false belief *When I first showed you the carton, what did you think was inside?*	milk
Other ignorance *Does X know what is inside?*	no
Other false belief *What will X think is inside?*	milk
Reality check 1 *Is that what is really in the carton?*	no
Reality check 2 *What is really in the carton?*	a ball
Memory check *When I first showed you the carton, I asked you what was inside. What did you say"?*	milk

6.32.2 Deception and sabotage (Sodian & Frith, 1992)

In this test of first order deception, the participant has to prevent a puppet protagonist from obtaining a hidden sweet by (i) manipulating the puppet's belief (deception) and (ii) by manipulating the puppet's behaviour (sabotage).

The participant was told that he was going to play a game in which he could win smarties. A small box and padlock were placed in front of him and two glove puppets - a cat and a crocodile[6] - were introduced. The child was told that the cat was

6 In the original study a fox and rabbit puppet were used.

a nice friend who gave smarties to children when he found them but that the crocodile was a nasty smarties eater who took smarties away to eat for himself. This was then illustrated using the props. The child was told, *"To win lots of smarties, you have to help the nice smartie friend to find them,"* (pointing at the cat) *"but don't let the nasty smartie eater get them"* (pointing at the crocodile). The task proceeded in two stages - a one-box stage and a two-boxes stage.

One box stage

In the *sabotage condition* the participant was told to hide a smartie in the box and was shown that the box could be locked. The friend/eater then appeared. On the friend's trial the puppet said, *"I am the nice smartie friend. When I find a smartie, I give you another one".* The researcher then said, *"Help him find the smartie"* before asking the test question, *"Do you want to lock the box or do you want to leave it open?"* On the eater's trial, the child was reminded *"I am the nasty smartie eater. When I find a smartie I eat it up".* He was told by the researcher not to let the nasty smartie eater find the smartie before being asked the test question, *"Do you want to lock the box or do you want to leave it open?".* Finally, a justification question was asked, *"Why did you say that?".*

In the *deception condition* the child was told that, although the padlock was in place, there was no key so it could not be locked. The box was positioned so that the puppet protagonist could not see whether or not the padlock was closed. Again the participant was instructed to hide a smartie in the box. The "friend"/"eater" appeared from beneath the table and said, *"I am the nice smartie friend/nasty smartie eater. When I find a smartie I give you one/eat it all up. Is this box locked or open? I can't see it from here. If it's locked I won't bother to make the long walk."* The researcher asked, *"What do you want to say? Do you want to say it is locked or do you want to say it is open? Think carefully. Help the friend to find the smartie/Don't let the eater find the smartie."* If the participant lied to the eater, he was allowed to keep the

smartie; if he told the truth the smartie was found and kept by the eater. If he told the truth to the friend, he was given the smartie that was found in the box.

Two boxes task

In the *sabotage condition,* two boxes were placed in front of the participant and the researcher demonstrated that both could be locked. The participant was asked to place the smartie in one of the boxes. The eater/friend appeared and was introduced, as in the sabotage trial. The participant was reminded to help the friend but not the eater and asked, *"What do you want to do? Do you want to lock this* (empty) *box or do you want to lock that* (full) *box?"* .

In the *deception condition* neither box was padlocked. The participant was, again, asked to hide a smartie in one of the boxes. The eater/friend appeared and asked the participant, "Where is the smartie?". The researcher then asked," *Where do you want to point? Do you want to point to this box or do you want to point to that box?"* and reminded the participant that he should help the friend and not the eater.

Each participant was participated in both stages in each of the two conditions. The one-box stage always preceded the two-boxes stage but the order of conditions, appearance of friend/eater, and the order of options in the test question were counterbalanced across participants.

6.32.3 Peter's birthday puppy (Tager-Flusberg & Sullivan, 1994)

Like the standard ice-cream van task described in Chapter 2, this task concerns the participant's understanding of second order ignorance and belief. It was selected because of its simplified format; it is shorter in length and involves fewer characters, props, locations and episodes than the ice-cream van task. In addition, the test questions are asked after the relevant episodes have occurred in the text (rather than altogether, at the end of the story) and do not contain embedded propositions.

The participant was seated next to the researcher and a open-fronted two-storey model of a kitchen and basement, containing relevant toy furnishings and props, was placed in front of him. Miniature dolls of a woman and a boy were introduced and the researcher then told the story of Peter's birthday puppy (see Figure 6.1) while simultaneously acting it out with the props. During the story the participant was asked a series of questions (also shown in Figure 6.1).

Figure 6.1 Transcript for the birthday puppy task*

Tonight it's Peter's birthday and Mum is surprising him with a puppy. She has hidden the puppy in the cellar[7]. Peter says, "Mum, I really hope you get me a puppy for my birthday." Remember, Mum wants to surprise Peter with a puppy. So, instead of telling Peter she got him a puppy, Mum says, "Sorry Peter, I did not get you a puppy for your birthday. I got you a really great toy instead."

- Reality control question
  What did Mum really get Peter for his birthday? (a puppy)

Now, Peter says to Mum, "I'm going outside to play". On his way outside, Peter goes down to the cellar to fetch his roller skates. In the cellar, Peter finds the birthday puppy! Peter says to himself, "Wow, Mum didn't get me a toy, she really got me a puppy for my birthday. " Mum does NOT see Peter go down to the cellar and find the birthday puppy.

- First order ignorance question
  Does Peter know that Mum got him a puppy for his birthday? (yes)

- Linguistic control question
  Does Mum know that Peter saw the birthday puppy in the cellar? (no)

Now, the telephone rings, ding-a-ling! Peter's grandmother calls to find out what time the birthday party is. Grandma asks Mum on the phone, "Does Peter know what you really got him for his birthday?"

- Second order ignorance question
  What does Mum say to Grandma? (no)

Now remember, Mum does not know that Peter saw what she got him for his birthday. Then, Grandma says to Mum, "What does Peter think you got him for his birthday?"

- Second order false belief question
  What does Mum say to Grandma (a toy)

- Justification question
  Why does Mum say that? (because she doesn't know that Peter saw the birthday puppy in the cellar)

* The story and questions were recited verbatim.

7 The word 'basement' appeared in the original text but was replaced in this study with the word 'cellar'.

6.33 Results

6.33.1 The milk carton task

All thirty participants succeeded on the control task and so took part in the milk carton task. All of the participants also passed the reality prompts, reality checks and the confirmation question. The memory check was passed by all ten children in the SPD group and nine children in the SLI and normally developing control groups. Both children who failed responded with *ball.* Findings from the test questions are shown in Table 6.5.

Table 6.5 Number of participants passing the test questions (error responses are shown in parentheses)

Question	SPD	SLI	Controls
Own false belief *When I first showed you the carton, what did you think was inside?*	9 (*don't know*)	9 (*ball or a brick*)	10
Other Ignorance *Does X know what is inside?*	9 (*yes*)	10	10
Other false belief *What will X think is inside?*	10	9 (*a brick*)	9 (*a ball*)

Nine out of ten participants from each group passed each of the test questions. In the SPD group, the two failed responses were given by different children. In the SLI group, one participant failed both the own and other false belief questions. Both she and the normally developing participant who also failed the other false belief question failed the memory check as well. Caution is therefore required in the interpretation of their error responses to the test question.

6.33.2 Deception & Sabotage

The task was scored in terms of the proportion of participants who passed each condition. Correct responses had to be given on both trials (nasty smartie eater and

nice smartie friend) for a pass to be credited. Responses to the justification question were only referred to when errors were made on the test question. A summary of correct responses, taken directly from the original paper, is shown in Table 6.6 and the results are summarised in Table 6.7.

Table 6.6 Summary of correct responses on the deception and sabotage task (Sodian & Frith, 1992)

Stage	Deception		Sabotage	
	Eater	*Friend*	*Eater*	*Friend*
One Box	lie	tell truth	lock box	leave box open
Two Boxes	point to empty box	point to full box	lock full box	lock empty box

Table 6.7 Number of participants passing the deception and sabotage task

Group	N	Number of Participants Passing			
		One Box		Two Boxes	
		Sabotage	*Deception*	*Sabotage*	*Deception*
SPD	10	6	7	10	9
SLI	10	10	10	9	10
Normal	10	10	10	10	10

The majority of errors were made at the one-box stage of this task and all but one at this level were made by the children in the SPD group. Four participants from this group, together with one from the normal control group, failed the one-box sabotage condition. That is, they prevented the nice friend from finding the smartie by locking the box or they allowed the nasty eater to get it by leaving the box unlocked. In each case, the justification that they gave for their response indicated a poor understanding of the task; either they locked the box in the 'friend' trial "in case the 'eater' returned" or they confused the puppets' roles. Two of the SPD children who failed in the sabotage condition also failed in the deception condition, along with a third member of their group. Again, their justifications suggested generalised task confusion; they told the 'friend' that the box was locked because they believed that it truly was, but offered to search for the key. No participant failed both trials in either condition.

In order to prevent the same misunderstandings from interfering with performance at the second stage, two impromptu changes were made to the instructions. First, it was made clear that the smartie could only be sought by the puppet that was on the researcher's hand; and second, the participant was required to demonstrate that he could differentiate between the puppets and their roles before the test began. These changes were maintained as standard, at both stages, in all subsequent administrations. In addition, in the one-box deception condition it was made clear that, although the padlock was in place, it was not locked.

Only two errors were made at the two boxes stage of the task, one by an SPD participant in the deception condition and one by a participant from the SLI group in the sabotage condition. In justification, the SPD participant recognised his mistake and explained that he had forgotten the true location of the smartie; the SLI participant said that she had not wanted the eater to find the smartie. The improvement in the performance of the SPD group supports the suggestion that their difficulties at the previous stage were caused by poor understanding of the task. For this reason, no statistical analysis of the findings was undertaken.

6.33.1 Peter's birthday puppy

With the exception of responses to the justification question, which were only referred to in cases of failure, responses to all questions were scored on a pass/fail basis. Pass rates are shown in Table 6.8. Participants who failed the reality question (one from each of the clinical groups) were excluded from the analysis of all remaining questions. Those who failed the linguistic control question (again, one from each of the clinical groups) were excluded from the analysis of the two second order questions. The largest between group performance differential (between the normal and SLI groups on the 2nd-order false-belief question) was subject to statistical analysis. The result was not significant [Fisher Exact Probability Test, p=0.184].

Table 6.8 Percentage of participants who passed the control and test questions.

Group	Reality	1st Order Ignorance	Linguistic Control	2nd Order Ignorance	2nd Order False Belief
SPD	90	89	100	67	67
SLI	90	89	89	75	38
Normal	100	100	100	90	80

A summary of response patterns shown by the individuals who failed one or more questions is shown in Table 6.9. Correct responses (see page 264) are marked with a tick; 'typical' error responses are marked with a cross (see key); cases in which responses were not credited because of failure on the previous check question are marked with a dash; and unexpected responses are written in full.

Table 6.9 Overview of error responses made on the birthday puppy task.

Group (Participant)		Reality Check	1st order Ignorance	Linguistic Check	2nd order Ignorance	2nd order False Belief
normal	(1)	√	√	√	puppy	x
	(2)	√	√	√	√	x
SLI	(1)	x	---	---	---	---
	(2)	√	x	√	√	√
	(3)	√	√	x	---	---
	(4)	√	√	√	yeah, I have	he's got a toy
	(5)	√	√	√	I got him a puppy	x
	(6)	√	√	√	√	x
	(7)	√	√	√	√	x
	(8)	√	√	√	√	I haven't bought you a puppy
SPD	(1)	x	---	---	---	---
	(2)	√	x	√	x	√
	(3)	√	√	√	√	x
	(4)	√	√	√	x	x
	(6)	√	√	√	puppy	x

Key of 'typical' error responses

Question	Error Response
reality check	a toy (is what Mum got Peter for his birthday)
1st-order ignorance	no (Peter doesn't know that mum got him a puppy)
linguistic check	yes (Mum does know that Peter saw the puppy)
2nd-order ignorance	yes (Peter knows what I got him (*said by Mum*))
2nd-order false-belief	a puppy (is what Peter thinks Mum got him)

A striking proportion of 'unusual' errors was made. On the 2nd-order ignorance question only two of the six children who failed (both members of the SPD group) did so typically. That is, by wrongly inferring that Peter's mother knew that Peter knew that she had got him a puppy for his birthday. The four remaining 'failers' responded to the same yes/no question with a statement, usually 'puppy'. This would imply a misunderstanding of the test question or poor understanding of the task . Two 'unusual' errors were also made in response to the 2nd-order false belief question, "What does Peter think you got him for his birthday?". Both were made by members of the SLI group and were, again, indicative of generalised task confusion. The children's responses to the justification question were examined in these cases but were ambiguous.

6.33.4 Summary of results

The main results from the investigation of theory of mind are summarised below:

The milk carton task

- The majority of participants were successful on this task. One participant from the SPD group failed the own false belief question and another, the ignorance question; one participant from the SLI group failed both own and other false belief questions, together with the memory check; and one participant from the normal group failed the other false belief question.

Deception and sabotage

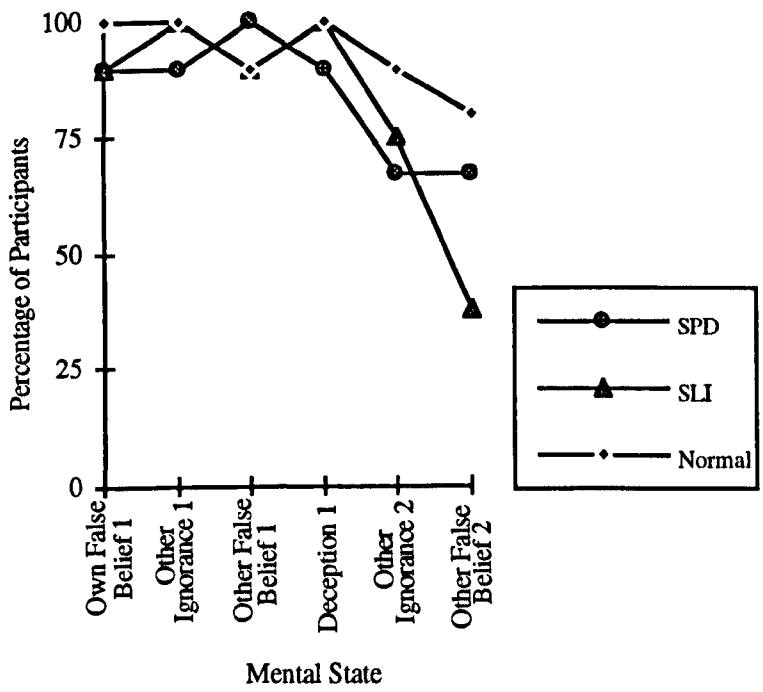
- A considerable proportion of the SPD group failed at the one-box stage because of problems understanding the task. In view of this minor changes were made to clarify the procedure and pass rates reached ceiling for both of the other groups. At the two-boxes stage, 90 to 100 percent of participants passed in all three groups. Again, those errors that were made appeared to result from generalised task confusion.

Peter's birthday puppy

- Pass rates were high in all groups for the reality check, linguistic control and first-order ignorance questions (89% to 100%). All groups were less successful at the second-order level. This fall in pass rates was most pronounced in the two clinical groups and especially in the SLI group. However, error analysis suggested that, in spite of correct responses to the reality and linguistic control questions, poor understanding of the test questions may have contributed to the fail rate in the SLI group.

A summary of the groups' performance across the three tasks is shown in Figure 6.4.

Figure 6.2 Proportion of participants that passed each of the mental state questions



6.4 The investigation of executive functions

6.41 Introduction

Four tests of executive function were administered: the Tower of London (ToL) (Hughes, et al., 1994), the Intra-Dimensional Extra-Dimensional Set Shifting Task (IDED task) (Hughes, et al., 1994), the Modified Card Sorting Task (MCST)

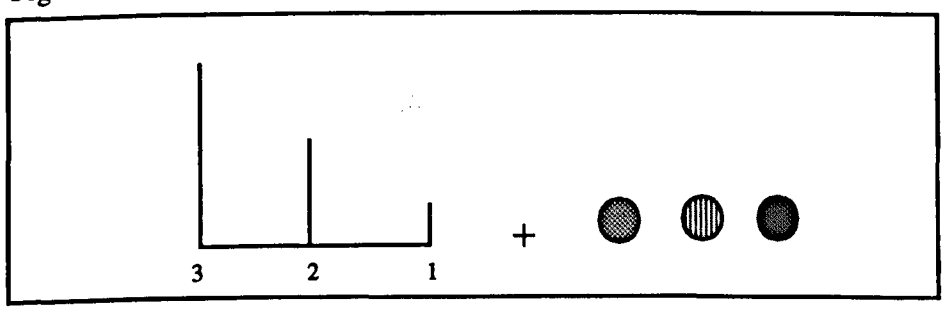
(Nelson, 1976) and a Design Fluency task (Jones-Gotman & Milner, 1977). The ToL concerns planning ability, the MCST and the IDED task concern the ability to shift attentional set and the Design Fluency task concerns generativity.

6.42 Task details

6.42.1 The Tower of London (Hughes, et al., 1994)

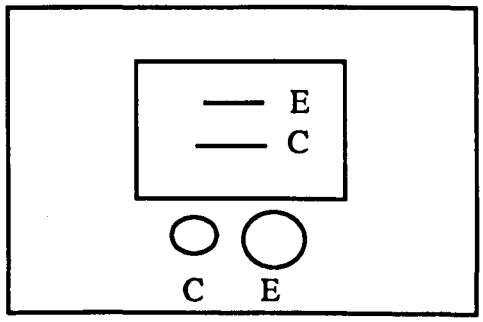
The manual version of the Tower of London (ToL) task used in this study was based on the computerised version included in the Cambridge Neuropsychological Automated Test Battery (CANTAB) (CeNeS Ltd.). The participant was presented with a rectangular wooden block from which three pegs projected, which decreased evenly in height from left to right. He was also given three different coloured circular discs (see Figure 6.3). The researcher then produced an identical set of materials which she declared as her own.

Figure 6.3 Materials used in the Tower of London task



The position of the blocks relative to the participant and researcher is shown in Figure 6.4.

Figure 6.4 Relative positions of the materials, participant and researcher

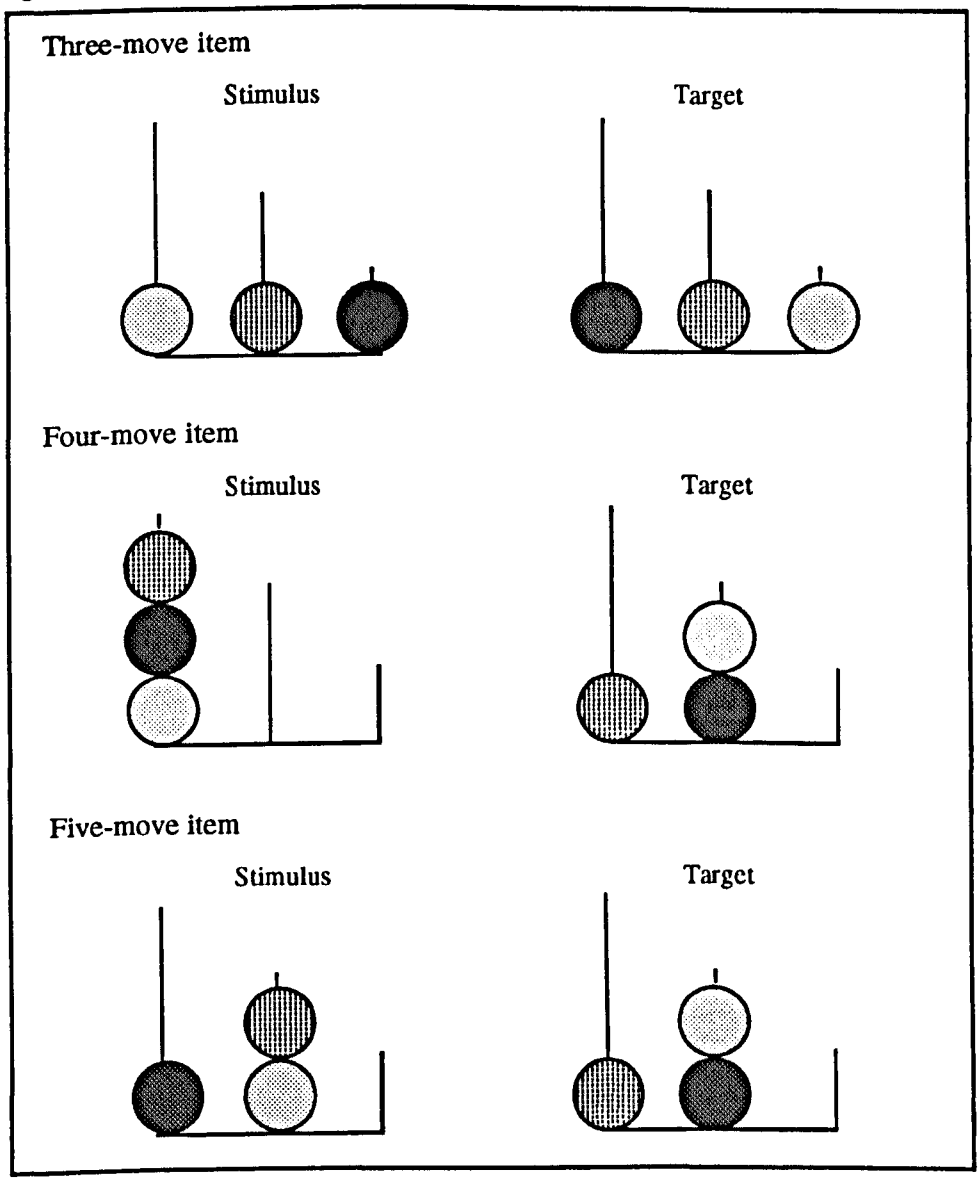


The child was told, *"I want you to help me to solve some problems. I am going to show you some patterns with these rings and you have to try to make the same pattern with yours. Okay?"*. Clarification or elaboration was provided, as necessary. He was then told, *"There is a rule that you must remember. You can put three rings on the long peg* (point), *but you can only put two rings on the middle peg* (point) *and one ring on the little peg* (point)". The task began with a set of five 1-move training items. Assistance was given on these items, as required. Five 2-move items followed, in which the goal configuration of the discs could only be reached in a minimum of two moves. The same instructions were given as for the 1-move items. In addition, the participant was told that, when there was more than one disc on a peg only the top one could be moved and that only one disc could be moved at a time. He was also urged to think about how to solve the whole problem before making his first move. Assistance was given on the first item, as necessary to ensure success, but no help was provided on the remaining items. Sets of five 3-, 4-, and 5-move items proceeded in the same way (see Figure 6.5, overleaf, for examples). Any attempt to make an "illegal" move was corrected by the researcher. The number of moves taken to solve each trial was recorded.

6.42.2 Modified Card Sorting Task

A modified version of the Wisconsin Card Sorting Task (Heaton et al., 1993), devised by Nelson (1976), was used in this study. The basic format of the task was the same as in the original version that was outlined in Chapter 2, but all cards that shared more than one attribute with one or other of the stimulus cards were removed so that no ambiguous sorts could be made. Four stimulus cards were placed in front of the participant. The first depicted one red triangle; the second, two green stars; the third, three yellow crosses; and the fourth, four blue circles. The participant was given forty-eight response cards, each of which

Figure 6.5 Examples of 3-, 4- and 5-move items on the ToL task



shared one attribute with three of the stimulus cards (for example, it was the same colour as the first, the same shape as the second and the same number as the third) but had nothing in common with the fourth. The order of cards within the pack was pseudo randomised so that no two consecutive response cards were the same and was held constant across participants. The child was told," *I want you to help me to solve a problem. I want you to turn over each of your cards* (point to the deck of response cards) *and match it to one of my cards* (points to the four key stimulus cards). *I cannot tell you how it matches the card but I can tell you if it is right or wrong.*" The researcher then showed the child a 'paddle' on one side of which the word 'yes' was

printed and on the other, the word 'no'. She explained that, if the child got it right he would be shown the 'yes' and if he got it wrong he would be shown the 'no'. The sorting principle was changed without warning after ten consecutive correct responses, from colour to shape. The same criterion was set for the final change in sorting principle from, shape to number. The task was discontinued when all three categories had been completed or all 48 stimulus cards exhausted.

6.42.1 Intra-Dimensional/Extra-Dimensional Shift Task (Hughes, et al., 1994)

A manual version of the Intra-Dimensional/Extra-Dimensional Shift Task (or 'the IDED task'), based on the computerised procedure included in the CANTAB (CeNeS Ltd), was administered. The child was told, *" I am going to show you two patterns. One pattern is right and the other pattern is wrong. You must point to the one you think is right. There is a rule that you can follow to make sure that you get it right. Sometimes I will change the rule but I won't change it very often. On your first go you will not know which pattern is right so you will have to guess. I will tell you after each go if you are right or wrong".* The participant was then shown the 'yes/no paddle' and told, *"If you are right I will show you the 'yes' on this card. If you are wrong I will show you the 'no'"* . If necessary, elaboration or repetition was given at this stage.

The stimuli 'patterns' were drawn on white cards of approximately 7x5 cm in size. On each trial two stimulus cards were placed in front of the participant. Their position (left-right) was randomised across trials but held constant across participants. The order of presentation of stimulus cards was counter-balanced; in each group order was pseudo-randomised so that the same pairings did not appear in runs of more than three consecutive trials. The criterion for progressing from one stage to the next was six consecutive correct responses within thirty-five trials. If criterion was not reached the task was discontinued. The task proceeded in the following step-wise format (see Figure 6.6):

1. *Simple Discrimination* (SD)
The participant had to choose between two black geometric shapes.

2. *Simple Discrimination - Reversed* (SDR)
The participant had to choose between the same two shapes but the target was reversed.

3. *Compound Discrimination (Separate)* (CS)
A second dimension of 'line' was introduced. On each of the stimulus cards, one of two red lines was presented together with one of the two existing shapes. The line and shape were separate. The target dimension remained shape. The combinations of line and shape were systematically varied, in this and all later stages, to ensure that criterion could only be reached by responding to the target.

4. *Compound Discrimination (Separate) - Reversed* (CDS - R)
As for (3) but the target shape was reversed.

5. *Compound Discrimination (Superimposed)* (CDSI)
From this stage on, the lines were superimposed on the shapes. The target dimension remained shape.

6. *Compound Discrimination (Superimposed) - Reversed* (CDSI-R)
As for (5) but the target shape was reversed.

7. *Intra-Dimensional Shift* (IDS)
This is the first of the two key stages. In it, the participant was presented with new exemplars for both dimensions. That is, the shapes and lines were changed. However, the target dimension remained shape.

8. *Intra-Dimensional Shift - Reversed* (IDS)

As for (7) but the target shape was reversed.

9. *Extra-Dimensional Shift* (EDS)
This is the second of the two crucial transfer stages. New exemplars were introduced *and* the target dimension was changed from shape to line. Thus the participant had to shift attentional set from the previously reinforced target dimension and determine, on the basis of feedback from the researcher, which of the two lines was correct.

Figure 6.6 Outline of stimuli and targets for each stage of the IDED task.

Stage	Stimuli		Target
Simple Discrimination (SD)			
Simple Discrimination - Reversed (SD-R)			
Compound Discrimination - Separate (CDS)			
Compound Discrimination - Separate - Reversed (CDS-R)			
Compound Discrimination - Superimposed (CDSI)			
Compound Discrimination - Superimposed - Reversed (CDSI-R)			
Intra-Dimensional Shift (IDS)			
Intra-Dimensional Shift - Reversed (IDS-R)			
Extra-Dimensional Shift (EDS)			

6.42.4 Design fluency (Jones-Gotman & Milner, 1977)

This task was intended to provide a measure of generativity. In the first (the *free* condition), participants were given a piece of A4 paper divided into 24 squares and told, *"We are going to do some drawing now. I want you to see how many different patterns you can make in five minutes. You must make them up from your head. You must not draw things that I will be able to name or anything that looks like a real object. You must not scribble because scribbles look the same".* The participant was then shown two examples of acceptable designs and two of unacceptable designs and, to check that he had understood the instructions, was asked to explain why latter would not be allowed. Elaboration or repetition was provided at this stage, as necessary. In the *fixed* condition, which was always presented second, the participant was told, *"Now I want you to make some more patterns but this time you must only use four lines. A circle* [the researcher drew a circle to demonstrate] *counts as one line and so does a curve* [the researcher drew a curve]*but this would count as two lines* [the researcher drew an angle]. *Okay?"* Clarification was given at this point, if required. The participant was reminded, *"Like last time, you must not make designs that look like something real or something that I can name. Remember, scribbling is not allowed because scribbles look the same. So. Make as many different designs as you can in four minutes. Remember to use only four lines".*

In both conditions, timing began as soon as the participant started his first design. He was warned at the first violation of each of the 'rules', as below, but no prompts were given thereafter:

1. Drawing a real of nameable object
   "I can name that. It is a .... Remember, you are not allowed to draw things that I can name."

2. Scribbling
   "Remember, scribbling is not allowed."

3. Making drawings too similar
   "Remember, you are to make as many different drawings as you can."

4. Making drawings too elaborate (and so reducing output)
   "Remember, you are to make as many different drawings as you can."

Each participant's designs were scored by the researcher, in addition to which the responses of five members from each group were scored by an independent rater who was blind to group membership. Each design was classified as unacceptable, perseverative or acceptable, according to the following criteria:

Unacceptable

- a design which was recognisable as a real object and/or could be named;
- a scribble
- a design which was made up of more than four lines (only applied in the fixed condition).

Perseverative

- a design which was a reversal or re-orientation of a previous one;
- a design that differed from a previously generated one in only a few details

Acceptable

- a design which did not meet any of the above criteria.

6.43 Results

The findings from the four tasks are presented in turn. Since the assumptions of parametric statistics (homogeneity of variance and normality) were not met in any case, non-parametric procedures have been used in the analysis of the results. Given that no predictions were made about performance levels *a priori*, the probability values that are reported with regard to tests of differences are two-tailed, unless stated otherwise.

6.43.1 The Tower of London task

Two measures of performance were considered: the mean number of extra moves taken and the number of participants solving at least half of the problems perfectly. The former was intended to give an indication of overall performance efficiency and the latter, to provide some information about individual performances.

Extra moves

Hughes et al. (1994) prescribed a maximum number of moves for each trial, beyond which no further disc transfers were permitted. For the 2-, 3-and 4-move items this was set at twice the minimum number of moves plus one. For the 5-move items it was set at twice the minimum number of moves plus two. In the present study, the same criteria were used for scoring purposes but participants were not prevented from making additional moves. Any moves made beyond criteria were discounted and the maximum score was credited.

The 2- and 3-move items were grouped together to form an "easy set" and the 4- and 5-move items were grouped to form a "difficult set" (Hughes, et al., 1994). This grouping reflects the difference in the amount of planning required to complete the task to criterion; items in the "easy set" involved little in the way of planning because (a) there was usually more than one solution and (b) the 'solution path' was short.

Preliminary inspection of the data threw up an interesting measurement problem. That is, there were a number of trials in the difficult set when participants from the normal control group withdrew their co-operation before reaching the maximum number of moves and before reaching a solution. Five of the ten participants did so on at least one occasion. Examples are given in Table 6.10.

Table 6.10 Examples of cases in which a participant withdrew co-operation prior to reaching maximum extra moves or reaching a solution.

Case	Mean Number of Extra Moves							
	4 Move Items				5 Move Items			
	1	2	3	4	1	2	3	4
1	3	0	0	2	0	2	---	0
2	4	0	0	0	0	0	---	---
3	0	2	0	---	2	6	0	0
4	0	0	---	0	0	0	0	---
5	1	0	0	---	6	2	0	---

--- premature withdrawal of co-operation

This raised the question of how best to deal with the missing data. There were a number of options, each leading to a somewhat different pattern of estimated scores. The various options which were considered, and different from the possibilities for estimated scores are outlined in Appendix IV. In the event, the option which yielded the most conservative estimated scores was selected, so as not to introduce a bias in favour of the control group. Utilising these estimated scores, the mean number of extra moves taken by each group are shown in Table 6.17.

Table 6.17 Mean number of extra moves taken, by group, for each set.

Group	N	Easy Set				Difficult Set			
		x	median	*SD*	range	x	median	*SD*	range
SPD	10	5.1	4.0	4.1	0-13	17.4	18.0	10.4	3-36
SLI	10	2.6	1.5	2.7	0-8	15.5	19.5	10.4	1-29
Normal	10	3.7	4.0	2.3	1-9	11.4	12.5	6.6	1-21

The Wilcoxon test confirmed that all three groups made significantly more extra moves in the difficult set than in the easy set [SPD: $z = -2.50$, $p < .02$; SLI: $z = -2.70$, $p < .01$; normal: $z = -2.40$, $p < .02$]. As the figures in Table 6.17 show, the SPD group made more extra moves than both other groups in both the easy and difficult set but the Kruskal-Wallis statistic revealed that the effect was not significant

at either level [chi-square=3.89, df=2, p=0.158 for the easy set; chi-square = 2.45, df=2, p=0.29 for the difficult set]. The probability values obtained from subsequent pair-wise comparisons using the Mann-Whitney test are shown in Table 6.18. None were significant.

Table 6.18 Probability values for the mean number of extra moves

Set	SPD vs. Normal	SPD vs. SLI	SLI vs. Normal
Easy	p=0.238	p=0.086	p=0.229
Difficult	p=0.104	p=0.792	p=0.289

It is possible that replacing the missing values with the arbitrary maximum inflated the score obtained by the normal group in the difficult set, thereby masking an effect. To explore this possibility the relevant scores were replaced with mean scores for those items which had been completed in the difficult set (option 3) and the overall means re-calculated (see Table 6.19).

Table 6.19 Mean number of extra moves made by each group in the difficult set (modified values are highlighted by shading).

Group	N	Difficult Set			
		x	median	*SD*	range
SPD	10	17.4	18.0	10.4	3-36
SLI	10	15.6	19.5	10.4	1-30
Normal	10	7.3	8.5	5.3	0-16

On the basis of the revised scores, the Mann-Whitney test indicated that the SPD group made significantly more extra moves than the normal group [U=2, p< .01]. The SLI group also made more extra moves than the controls but the difference was not significant.

Proportion of participants passing the planning criterion

The proportion of participants from each group who passed the planning criterion (that is, reached the correct solution path for at least half of the trials) is shown in Table 6.20. Whereas all thirty participants passed the planning criterion in the easy set, fewer participants from each group did so in the difficult set. The between-group difference in pass rates at this level was negligible.

Table 6.20 Number of participants passing the planning criterion

Group	N	Number of Participants Passing	
		easy set	*difficult set*
SPD	10	10	7
SLI	10	10	7
Normal	10	10	8

6.43.3 The Modified Card Sorting Task

The mean number of categories completed, by group, is shown in Table 6.22 and the mean percentage of perseverative errors in Table 6.23. In this context perseveration refers to the tendency to persist in responding to a stimulus dimension that is incorrect. The perseverative principle was established when the first incorrect sort was made. If more than three consecutive responses were made to the incorrect stimulus dimension, the perseverative principle changed accordingly. Two children were excluded from the analysis. In one case this was due to administrative error and in the other because the task was stopped prematurely since the participant had failed to produce any correct responses in twenty-eight trials and was becoming visibly distressed.

Table 6.22 Number of children in each group who completed 0, 1, 2 or 3 categories.

		Number of Categories Completed			
Group	N	0	1	2	3
SPD	8	0	1	6	1
SLI	10	0	2	6	2
Normal	10	2	1	6	1

Table 6.23 Percentage of perseverative errors made by each group.

		Percentage of Perseverative Errors			
Group	N	mean	median	SD	range
SPD	8	45.5	51.0	14.93	17-62
SLI	10	47.7	53.0	13.46	18-60
Normal	10	62.7	65.0	26.09	14-98

Except for the fact that two members of the normal group failed to complete any categories, there was no difference between the groups in the numbers of categories completed. The figures in Table 6.23 suggest that perseverative errors were more prevalent in the normal group than either of the clinical groups. However, the normal group mean was inflated by two scores of 98%. When these were excluded the mean dropped to 53.9 (SD 20.73) and no significant group effect was found [Kruskal-Wallis, chi-square = 2.519, p = .284] .

6.43.2 The IDED task

The results were analysed in terms of overall completion rates and trials to criterion (TTC).

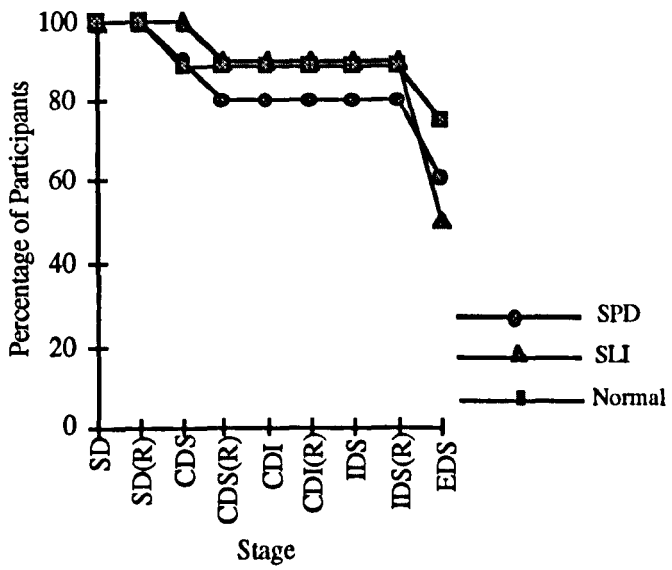
Overall completion rates

The proportion of participants from each group successfully completing each stage of the ID/ED task is profiled in Figure 6.7. One participant from the normally

developing control group was excluded from the analysis because of administrative error.

Only the largest performance differential (between the SLI and normal groups at the EDS stage) was subject to statistical analysis. The Fisher Exact test indicated that it was not significant [p=0.790]. Thus it can be inferred that there were no significant differences in the proportion of successful participants in each group at any stage of the task. All three groups showed a fall in success rates between the IDS and EDS stage but in no case was this significant [Fisher Exact, p=0.576, for largest performance differential]. It is nevertheless interesting to note that this tendency was most marked in both clinical groups and that, of these, the SLI group was the most affected.

Figure 6.7 Proportion of participants passing each stage of the IDED task



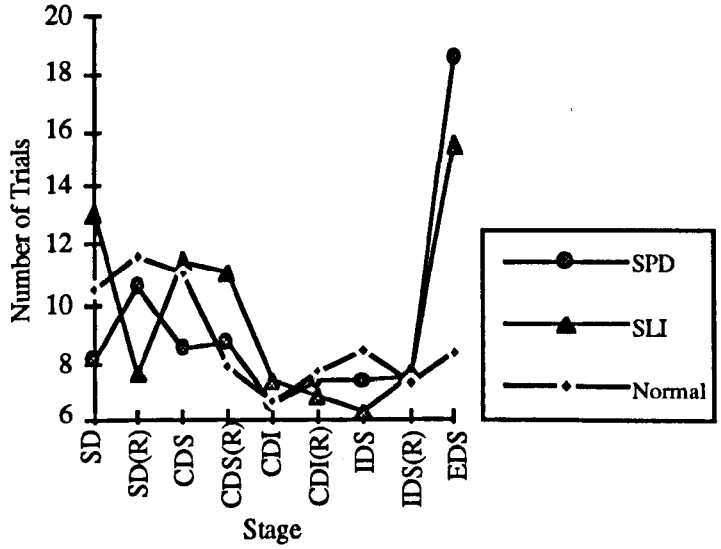
SD = simple discrimination; ; CDS = compound discrimination - separate; CDI = compound discrimination - superimposed; IDS = intra-dimensional shift; EDS = extra-dimensional shift ; (R) = reversed .

Trials to criterion

The mean number of trials to criterion was calculated, by group, for completed trials. The results for each stage are summarised in Figure 6.8. Some variability in

performance was apparent during the preliminary stages of the task in which the requisite skills for the transfer stages (such as discrimination learning and rule reversal) were being established. These were no longer apparent by the compound discrimination stage.

Figure 6.8 Mean number of trials to criterion for each stage of the IDED task



There was clearly no difference between the groups at the IDS stage. However, there was a difference between the two clinical groups and the normal group in mean TTC at the EDS stage. This finding was not analysed statistically because of the small number of participants involved. In addition, this sharp increase in TTC shown by the two clinical groups was a characteristic of particular individuals and, in neither case, common to all of those who passed the EDS stage (see Table 6.21).

Table 6.21 Individual TTC's for those members of the clinical groups who passed the EDS stage (shading is used to highlight those cases in which there was a sharp increase in TTC between the IDS and EDS stages).

	SPD		SLI	
	IDS	EDS	IDS	EDS
1	6	6	6	9
2	6	8	6	10
3	6	25	6	16
4	6	34	6	19
5	14	30	6	23
6	7	8	—	—

6.43.4 Design fluency

Overall inter-rater agreement rates of 88% were achieved in both conditions. The level of agreement across cases ranged from 83% to 93% in the free condition and between 81% and 95% in the fixed condition. Findings from each condition are presented in turn. One SLI participant was excluded from the analysis altogether because it was clear from her responses that she had not understood what was required of her in either condition. One SPD participant was excluded from the analysis of the fixed condition because he withdrew his co-operation before time. One participant from the normal group was not tested in the fixed condition for reasons of time.

Free condition

The mean number of designs produced by each group ('total output') is shown in Table 6.24. The means for the SPD and normal groups are inflated by outliers (of 53 and 60, respectively). A Kruskal-Wallis test (outliers excluded) confirmed that there was no overall group effect [chi-square = 0.722, df=2, p=0.697].

Table 6.24 Mean number of designs produced by each group in the free condition

		Total Output			
Group	N	mean	median	SD	range
SPD	10	26.3	23.5	10.55	8-60
SLI	9	23.0	23.0	15.46	13-32
Normal	10	23.1	20.0	11.73	14-53

The proportion of novel designs produced was high in all three groups (see Table 6.25, overleaf). As the figures in Table 6.25 show, there was no difference between the groups in this regard.

Table 6.25 Percentage of novel designs produced by each group in the free condition.

Group	N	Percentage of Novel Designs mean	median	SD	range
SPD	10	82.9	90.6	22.60	25-100
SLI	9	85.8	90.6	15.10	52-100
Normal	10	84.6	91.5	19.30	35-100

Since the percentage of novel designs produced was generally high, error analysis has been restricted to those cases in which the proportion of novel output was less than 80% of total output (see Table 6.26).

Table 6.26 The proportion of acceptable and perseverative designs produced by participants with low novel output.

Case	SPD			SLI			Normal		
	N	U	P	N	U	P	N	U	P
1	25%	75%	—	53%	26%	21%	36%	—	64%
2	68%	—	32%	77%	—	23%	69%	31%	—
3	77%	—	23%	78%	13%	9%			

N=novel designs; U=unacceptable designs; P=perseverative designs

Fixed condition

Mean total output for each group is shown in Table 6.27. It is clear from the table that there was no difference between the groups (nor the two conditions) in this respect.

Table 6.27 Mean number of designs produced by each group in the fixed condition

Group	N	Total Output mean	median	SD	range
SPD	9	19.8	17.0	9.30	12-41
SLI	9	23.0	22.0	12.10	7-40
Normal	9	23.1	20.0	10.0	12-41

The mean proportion of novel designs for each group is shown in Table 6.28. In each case it was lower in this condition than in the free condition.

Table 6.28. Mean percentage of novel designs produced by each group in the fixed condition.

		Novel Output			
Group	N	mean	median	SD	range
SPD	9	55.0	64.3	22.11	24-83
SLI	9	37.7	23.1	36.17	0-100
Normal	9	69.1	77.0	25.90	25-100

Given the high level of variability in scores within each group it is more informative to consider the proportion of participants that generated high or low novel output. Novel output exceeded 80% of total output in 11% of cases in the SPD group, 20% of cases in the SLI group and 44% of cases in the normal control group.

Error analysis indicated that, in all groups, unacceptable designs (see page 278) were more prevalent than perseverative designs. However, the SLI group produced significantly more designs of this kind than either of the other groups [Mann-Whitney: SPD vs. SLI, $U= 7$, $p <.02$: normal vs. SLI, $U=4$, $p < .01$]. The SPD and normal groups did not differ in this respect [Mann-Whitney, $U=16.5$, $p = .306$]. The mean proportion of unacceptable designs produced by each group is shown in Table 6.29. As the range of scores show, the tendency to produce unacceptable designs was specific to certain individuals regardless of group membership.

Table 6.29 Proportion of unacceptable responses produced by each group in the fixed condition.

		Percentage of Unacceptable Designs			
Group	N	mean	median	SD	range
SPD	9	22.79	18.8	20.81	0-71
SLI	9	51	45.5	34.44	0-100
Normal	9	20.46	11.1	23.51	0-75

Perseverative designs were most prevalent in the SPD group (see Table 6.30). However, no significant group effect was found [Kruskal-Wallis, chi-square = 2.60,

df = 2. p = .273]. Again, the tendency to produce perseverative designs was characteristic of individuals in all groups (see Table 6.31).

Table 6.30 Percentage of perseverative designs produced by each group in the fixed condition.

Group	N	Percentage of Perseverative Designs			
		mean	median	SD	range
SPD	9	23.77	23.50	21.81	0-67
SLI	9	11.26	12.45	12.45	0-36
Normal	9	10.9	4.30	15.23	0-44

Table 6.31 Number of perseverative designs produced by those participants in each group who made such responses.

Case	SPD	SLI	Normal
1	6	5	4
2	9	9	7
3	24	10	18
4	24	18	25
5	31	23	43
6	44	36	
7	67		

6.43.5 Summary of Results

The Tower of London

- There were no significant differences between the groups in the mean number of extra moves made in the easy set.
- All three groups made significantly more extra moves in the difficult set than in the easy set.
- Between-group comparison of the findings from the difficult set was complicated by the fact that some children in the normal control group withdrew their co-operation before reaching a solution and before reaching the arbitrary maximum number of extra moves. The missing data were dealt with in two ways. In the first instance they were replaced with the arbitrary maximum and in the second, with

the mean number of extra moves made by the relevant participant in the difficult set. In both cases a group effect was observed, the two clinical groups making more extra moves than the normal group, but the difference was only significant in the second instance and only in the case of SPD. The difference between the two clinical groups was not significant.

- There were no group differences in the number of participants passing the planning criterion.

The IDED Task

- No significant differences were found between the groups in the proportion of participants who passed at any stage of the task. However, there was a trend for fewer participants from both clinical groups to pass at the EDS stage. Surprisingly, this tendency was most pronounced in the SLI group.

- Unlike those members from the normal group who passed the EDS stage, a proportion of the SPD and SLI participants who passed showed a sharp increase in TTC at this stage.

The MCST

- There was no difference between the groups in the number of categories completed or the proportion of perseverative errors made.

Design Fluency

- In the free condition, novel output was high in all groups.

- Novel output was lower in the fixed condition in all groups, but within-group variability was apparent. In this condition, the SLI group produced significantly more unacceptable designs than either of the other groups. The SPD group produced more perseverative designs than the other groups but the difference just failed to reach significance. Qualitative analysis indicated that the tendency to produce unacceptable or perseverative designs was characteristic of certain individuals regardless of group membership.

6.5 The investigation of central coherence

6.51 Introduction

Central coherence was described in section 3.3 in relation to autism research. The idea that autism stems from a weak drive for coherence has been prompted by cumulative observations of unexpected peaks in the 'autistic profile', such as good performance on the Block Design task and on the Children's Embedded Figures Test. Most of the studies described in section 3.3 were concerned with demonstrating how those peaks could be explained in central coherence terms. To do this, the relevant tasks were presented in two conditions. In the first instance, they were administered in their standard form. This was done to verify superiority of performance relative to controls. Second , the materials were manipulated so that any advantage that the autistic group could derive from a propensity for piecemeal processing would be removed. For instance, on the Block Design task, the designs were pre-segmented (Shah & Firth, 1993); and on Happé's illusions task, the part of the illusion to be judged was accentuated (Happé, 1996).

It has been suggested that children with SPD share this tendency for piecemeal processing but hard evidence is lacking. This part of the present study was intended to address this shortcoming by establishing whether clear and consistent signs of weak central coherence can be determined in cases of SPD. The three tasks selected for this purpose were the Children's Embedded Figures Test (Witkin, et al., 1983), the Block Design subtest of the WISC-R (Wechsler, 1974) and Happé's optical illusions task (Happé, 1996). As the aim was simply to determine symptoms of weak central coherence at this stage each was administered in its standard form.

6.52 Task details

6.52.1 Children's Embedded Figures Test (CEFT)

The CEFT was administered according to the manual (Witkin, et al., 1983). A summary of the procedure is presented here. First, the participant was shown a small triangular cardboard form. The researcher highlighted the similarity between the shape of the form and a tent and explained that the black line along its horizontal plane specified its orientation. Following a series of training items the participant was shown a set of eleven two-dimensional complex figures, into each of which a triangle (identical in size and orientation to the cardboard form) was embedded. On each trial the participant was instructed to *"find the tent"*. If the participant passed the last five of the eleven items a second shape was introduced; if he failed any of these items, the test was discontinued. The second shape resembled a house. The same procedure was followed as for the 'tent items' (including training items).

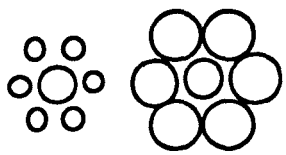
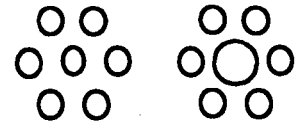
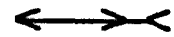
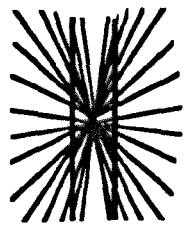
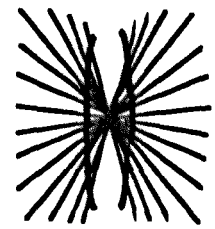
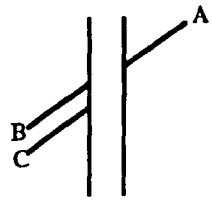
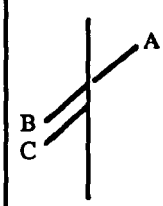
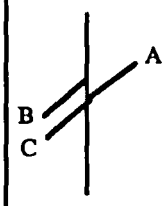
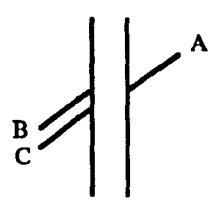
6.52.2 Block Design

The Block Design subtest of the Wechsler Intelligence Scale for Children - Revised (WISC-R) (Wechsler, 1974) was also administered in accordance with the test manual. The participant was given a set of blocks in which one side of each block was painted red and another white. The remaining sides were painted half red and half white in a diagonal split. Following a number of training items, the participant was presented with twelve test items, each of which required him to construct a design on the top surface of the blocks to match a two-dimensional design printed on laminated card. The first nine trials involved four blocks and the remaining three, nine blocks. On each trial the participant was shown a different design and told, *"Now make one like this. Try to work as quickly as you can. Tell me when you have finished."* The task was discontinued after two consecutive failures.

6.52.3 Optical illusions

Five of the six well-known illusions adopted by Happé (1996)[8] were used in this modified version of the illusions task (see Table 6.32).

Table 6.32 The five illusory figures and associated control figures

Illusion	Illusory figure	Control figures		
Ponzo				
Titchener Circles				
Muller-Lyer				
Hering				
Poggendorf				

The figures were printed individually in a small booklet of approximately 10 x 7 cm in size. For each illusion, three control figures were included to ensure that the participant had sufficient language to understand the test questions and was willing and able to make the judgements about line length, orientation and size. The order in

8 The Kanisza triangle was excluded because of problems determining suitable control figures.

which they appeared was counter-balanced across participants. In each group order was pseudo-randomised so that related figures did not appear consecutively. The participant was presented with the booklet and a pencil and told, *"Now, we're going to do some drawing"*. He was then asked to make a judgement about the figure on each page. Standard questions were used for this purpose (see Table 6.33). For those items that involved a same/different judgement, the participant was asked to illustrate his decision by marking the longer/shorter line or bigger/smaller form with a pencil. The order of alternatives in the test questions was counter-balanced across participants.

Table 6.33 Judgement questions used in the illusions task

Illusion	Question
Ponzo	Are these lines the same length or a different length? Which one is longer/shorter?
Titchener Circles	Are these circles the same size or a different size? Which one is smaller/bigger?
Muller-Lyer Figures	Are these lines the same length or a different length? Which ones are longer/shorter?
Hering	Are these lines straight or curved?
Poggendorf	Does line A join up with line B or line C?

6.53 Results

The findings from the three 'central coherence tasks' are presented below. Preliminary descriptive analysis indicated that the assumptions of parametric statistics were not met so non-parametric procedures were used in the analysis of the results. Given the investigative nature of the study, few strong predictions were made about performance levels. The probability values that are reported with regard to tests of differences are two-tailed, unless stated otherwise.

6.53.1 The Children's Embedded Figures Test (CEFT)

Since developmental research has shown that disembedding performance increases with age (Witkin, et al., 1971), and the normal group in this study were significantly younger than the two clinical groups, direct comparison of the raw scores obtained by each group on the CEFT was not appropriate. Instead, the data were analysed in terms of the number of participants from each group who scored below, within, or above the normal range in relation to the normative data provided in the manual. Scores were judged to be within normal limits (WNL) if they fell within one and a half standard deviations of the mean, below normal limits (BNL) if they fell more than one and a half standard deviations below the mean and above normal limits (ANL) if they were more than one and a half standard deviations above the mean. The findings are shown in Table 6.34.

Table 6.34 Number of participants in each group who scored below, within and above normal limits on the Children's Embedded Figures Test

Group	N	Number of participants BNL	WNL	ANL
SPD	10	2	8	0
SLI	10	5	5	0
Normal	10	2	7	1

Analysis of the largest performance differential indicated that there were no significant differences between the groups in the distribution of scores [Fisher Exact, SLI vs. SPD, p=0.34].

6.53.2 Block Design

Findings from the Block Design task were analysed in the same way (see Table 6.35). It is clear from Table 6.35 that there was no difference between groups in the distribution of scores.

Table 6.35 Number of participants scoring below, within and above normal limits on the Block Design task.

Group	N	Number of Participants BNL	WNL	ANL
SPD	10	1	9	0
SLI	10	2	8	0
Normal	10	1	8	1

6.53.4 Optical illusions

The mean number of illusions by which each group was fooled is shown in Table 6.37. Participants who failed one or more of the control items have been excluded.

Table 6.37 Mean number of illusions by which each group was fooled (max=5).

Group	N	Raw Score mean	median	SD	range
SPD	8	2.8	2.5	0.89	2-4
SLI	8	3.5	3.5	0.93	2-5
Normal	9	2.1	2.0	0.78	1-3

The Kruskal-Wallis test indicated a significant overall group effect [chi-square = 7.65, df=2, $p < .05$]; the SLI group were fooled by more illusions than the SPD group who, in turn, were fooled by more than the normal controls. Pair-wise comparisons, using the Mann-Whitney test, highlighted significant differences between all three combinations [SPD vs. SLI: U=18, $p < .02$; SPD vs. normal: U=23, $p < .02$; SLI vs. normal: U=9.5, $p < .01$]. In addition, significantly more of the SLI participants succumbed to the illusions than the SPD or normal participants [Fisher Exact, one-tailed, $p < .05$]. Ninety percent of the SLI group was fooled by three or more illusions in contrast to 40% of the two other groups.

The low scores shown by the normal group were unexpected, both in the context of gestalt theory (Koffka, 1935) and the findings from Happé's study[9]. A possible explanation for this is that the inclusion of the extra control figures benefited them by alerting them to the illusory quality of the target figures. Further analysis of the data highlighted order effects which support this suggestion (see Table 6.38). However, it is unclear why the clinical groups did not show the same advantage.

Table 6.38: Proportion of participants in each group succumbing to each illusion as presented in order 1 and 2 (shading is used to draw attention to possible order effects

Illusion*	SPD		SLI		Normal	
	Order 1	2	1	2	1	2
Titchener Circles	20%	60%	25%	50%	25%	0%
Ponzo	20%	20%	20%	80%	0%	20%
Hering	80%	20%	100%	100%	20%	60%
Poggendorf	20%	80%	60%	80%	60%	80%
Muller-Lyer	100%	100%	100%	100%	100%	100%

6.53.5 Summary of results

Children's Embedded Figures Test

- The majority of participants in the SPD and normal control groups scored within normal limits, relative to age equivalent standardisation norms.
- One participant from the normal control group performed above normal limits; no participants from either clinical group did.
- Half of the SLI group performed within normal limits; the remainder scored below.

9 In Happé's study (Happé, 1996) the normal control group (mean age 7;9) were fooled by a mean of 4.09 illusions (out of a maximum of 6) and 95.2% of them succumbed to three or more.

Block Design

- The majority of participants in all groups performed within normal limits.
- One participant from the normal control group performed above normal limits; no participants from either clinical group did.

Optical illusions

- A significant group effect was found for the mean number of illusions by which participants were fooled (SLI > SPD > normal controls).
- A significantly greater proportion of the SLI group succumbed to three or more illusions than either of the other two groups (90% versus 40%, respectively).

6.6 The investigation of world knowledge

6.61 Introduction

Given the difficulties that children with this label show in making inferences in a story context (Bishop & Adams, 1992) and in making deductions about pictorially presented problem situations (McTear, 1989), it has been suggested that SPD might stem from impaired 'world knowledge' or knowledge of events (Bishop & Adams, 1992; McTear, 1989) (see section 3.4). However, there has been no direct investigation of event knowledge in this population. This part of the present study aimed to rectify this shortcoming. Recall and recognition tasks were used to establish whether the children had knowledge of familiar everyday events and of a novel event.

6.62 Task details

6.62.1 Event recall

This standard procedure (Nelson, 1986) was used to assess the children's knowledge of familiar everyday events and of a novel event.

Familiar events

In each of the first three sessions, the participant's ability to recall one of three familiar school events was examined. These were dinner, assembly and PE. School events were selected because it was certain that all of the participants had experience of them. These particular events were selected because they were thought to be similar across schools. The order in which the events were recalled was counter-balanced across participants.

In each case, the researcher introduced the task by saying, *"Now we're going to do some talking and listening. I am going to tell you about something first. Then it will be your turn. I am going to tell you what happens when people go to McDonalds/shopping/to the cinema. I will try to remember everything. I will try very hard not to leave anything out".* This was done to show the participant what was required. The researcher then said, *"This time I want you to tell me about something. I want you to tell me what happens when it's dinner-time / assembly / PE in school. Try to remember everything. Try not to leave anything out".* In view of the lack of co-operation shown by several of the SPD group during some of the more open ended procedures in Phase 1 of the study, a reward system was used. Prior to beginning his turn the child was presented with a picture of a familiar cartoon character drawn either in dot-to-dot form or hidden behind a piece of card which contained a number of flaps. He was told that each time he offered a piece of information he could join two dots or

open one of the flaps[10]. Neutral probes (such as "What else happens?", "Tell me some more", and "Can you think of anything else?") were given, as necessary, until the participant indicated that he had no more to say. The account was audio-recorded and later transcribed.

In the fourth session, each participant was required to re-recall the event that he had recalled during the first session. This was done to maintain the prescribed session structure (see page 259). For reasons of time, these data were not analysed but it is recognised that they would allow for the examination of the consistency of recall at a later date.

Novel Event

As mentioned, the researcher's visits comprised the novel event. The procedure for data collection was the same as above, except that it was not the researcher but the child's teacher or speech and language therapist who collected the data[11]. The teacher/therapist was provided with a written script for this purpose which she was asked to read verbatim. Instructions were given about the nature and frequency of prompts allowed. Having recounted an event (as above) the teacher/therapist asked, *"what happens when Ruth visits?"*. This session took place approximately two weeks after the researcher's final session. The account was audio-recorded by the teacher/therapist and later transcribed by the researcher.

10 The number of dots and flaps was the same. Each week a different character was presented - form of the reward was alternated from week to week.
11 The researcher was not present.

6.62.2 Event recognition

This procedure, based loosely on Oakhill (1982), was used in the assessment of familiar event knowledge to complement the recall procedure, which relies heavily on expressive language. Each session the researcher said *"Now its time for a story. You have to listen carefully because when I have finished I will ask you about it."* The child was then told a short story[12] about a trip to McDonalds/ dinner/PE/assembly, in which each sentence described an act within that event. At the end of the story the researcher made fifteen statements. Five of these were lifted directly from the story text (*'actual statements'*), five were not in the text but were relevant to the event (*'inferred statements'*) and five neither appeared in the story nor were relevant to the event (*'distractor statements'*). The order in which the statements were presented was counter-balanced across participants; in each group order was pseudo-randomised so that potentially related statements were not presented consecutively. The child had to indicate whether or not each statement had appeared in the story, using the 'yes/no paddle' (see page 274). The actual and distractor statements were included to provide evidence as to whether or not the children understood the task/story. The inferred statements were included to provide insight into whether or not the child had background knowledge of the event, the rationale being that these could only be accepted at a significantly higher rate than the distractor statements if the child possessed some sort of mental representation of that event. It was predicted that more of the actual statements would be accepted than the distractor statements, regardless of group. Given the preliminary nature of the investigation no strong predictions were made about rates of acceptance of the inferred statements in either clinical group. However, it was predicted that the normal group would accept more of these than the distractor statements.

All of the participants were told the McDonalds story in the first session as this was intended for training purposes only. The order of presentation of the three

12 Story length was constant.

remaining stories was counter-balanced across participants. In each case, the story event was consistent with that which had been the focus of recall in the previous session (see page 259). The PE story and relevant stimulus statements are shown in Figure 6.12 and the dinner and assembly stories, in Appendix V.

Figure 6.9 The PE story and stimulus questions

PE story

It was time for PE. The children put their reading books away and got ready to go. They played lots of different games in PE. It was raining outside so they were going to stay inside that day. Their teacher told them that they were going to play on the apparatus. Luke loved PE. His favourite activity was football. He liked the apparatus too. The teacher told them what to do on each piece of apparatus. They had to do climbing and balancing. Soon PE ended and it was time for English. The children went back to their classroom.

Actual statements

Luke's favourite game was football.
The children put their reading books away.
They played on the apparatus.
They played lots of different games in PE.
They had to do climbing and balancing.

Inferred statements

They lined up by the door until the teacher said they could go.
The children went to the hall.
They changed into their PE kits.
They helped to put the apparatus away.
When PE had finished, the children put their clothes on again.

Distractor statements

The children got their history books out.
The children stayed in the classroom.
They put their coats on.
The children went out to the playground.
The children had a drink.

6.63 Results

The findings are discussed in the following order: familiar event recall, familiar event recognition and novel event recall. The *dinner* event was excluded from the analysis of both the recall and recognition tasks because of unanticipated variability in its content from one school to the next and from one age-group to the next. Non-parametric statistics have, again, been used as the requisite assumptions of parametric tests were not met.

6.63.1 Familiar event recall

Each transcript was scored in terms of the number of novel, relevant and instructive pieces of information that it contained about the event in question. Broadly, each piece of new information about who or what the event involved and when and where it took place was credited with a point. Information that was not central or specific to the event was not scored. Further details of the scoring procedure are given in Appendix V. Three PE and three assembly transcripts were selected at random for each group and scored by a second rater who was blind to both the purpose of the investigation and to participant grouping. Spearman's correlation co-efficients were calculated indicated high inter-rater reliability [Assembly: 0.971, $p<0.001$; and PE: 0.908, $p<0.001$]. It was clear from preliminary analysis that there was negligible difference between the results in the two conditions. In view of this the data has been collapsed to form a single data set. Mean information scores for each group are shown in Table 6.32.

Table 6.32 Mean information scores for each group for assembly and PE recall, combined.

		Information Scores			
Group	N	mean	median	SD	range
SPD	10	12.0	11.5	2.55	8.0-15.5
SLI	10	9.0	8.8	3.40	2.5-15.5
Normal	10	14.4	15.2	6.76	3.5-25.0

A significant overall group effect was found [Kruskal-Wallis, chi-square = 6.087, df = 2, p <.05]. Pair-wise analysis showed that the normal group achieved significantly higher information scores than the SLI group [Mann-Whitney U=13, p<.05] but not the SPD group [U=33, p=.326]. The difference between the two clinical groups (the SPD group achieved higher information scores) just failed to reach significance [U=18, p=.053].

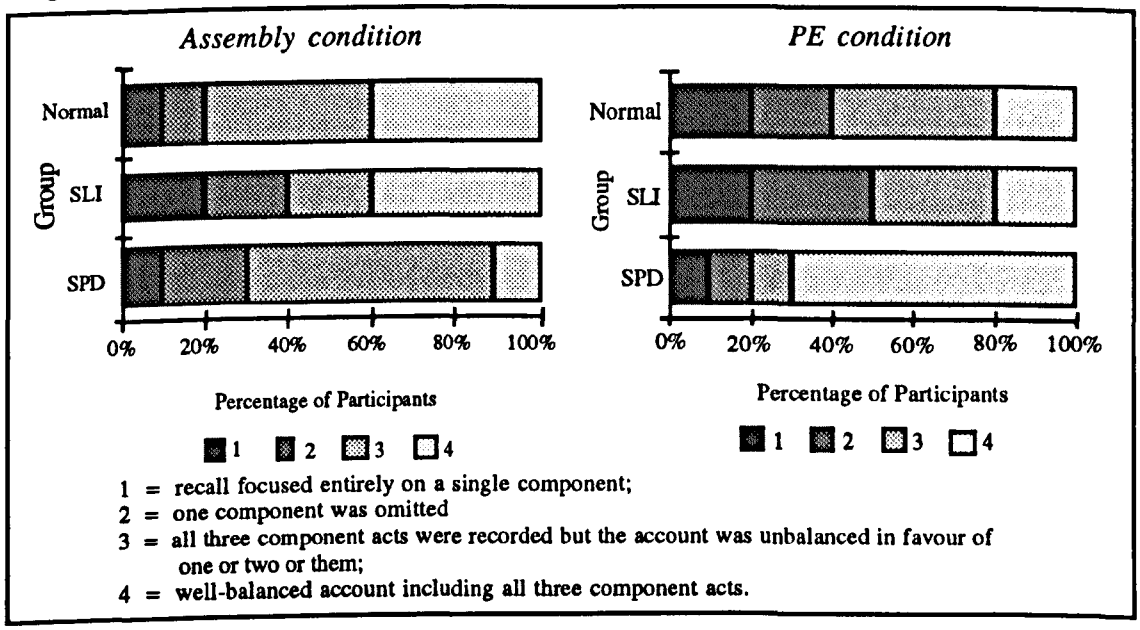
Although there was no difference in the amount of information recalled by the SPD and normal groups, visual inspection of the data suggested that there may be a difference between them in the focus of recall. It appeared that, unlike the normal group who tended to provide a schematic overview of the event from start to finish, there was a trend for those from the SPD group to focus entirely on the main act (that is, the act of PE or assembly). If the assumption that the child's mental representation of an event is translated in recall stands (Nelson, 1986), there is a possibility that the experimental group only had a partial mental representation of the events. To explore this possibility, a second measure - which concerned the amount of the event that was recalled - was introduced. For this purpose, both events were arbitrarily divided into the three component acts of 'entering', 'doing' and 'exiting' (see Appendix V for details). Each account was then awarded an 'organisation rating', according to the criteria shown in Table 6.33. Further details of the scoring procedure are also provided in Appendix V.

Table 6.33. Summary of organisation scores for event recall.

Score	Description
4	A well-balanced account which includes all three component acts.
3	The account includes all three component acts but is un-balanced in favour of one or two of them.
2	One component is omitted
1	Recall focuses on a single component; the remaining two are omitted.

Each transcript was scored by the researcher. In addition, nine were scored by a second rater, as before. The level of inter-rater agreement was acceptable for both events [Assembly, 0.746, p<.02; PE, 0.774, p<.01] . The frequency of organisation scores, by group and condition, are shown in Figure 6.10. The findings indicate that the tendency for partial recall was specific to particular individuals and was not characteristic of any one group.

Figure 6.10 Frequency of organisation scores for each group, in both conditions



6.63.2 Event recognition

As for familiar event recall, the findings from the two conditions have been collapsed and presented as a single data set. One SLI participant was excluded from the analysis because he accepted less than three statements in each condition and, of these, only one was an actual statement which would suggest poor understanding of the task. No important order effects were observed. The mean number of actual, inferred and distractor items accepted by each of the groups are shown in Tables 6.34 to 6.36, respectively.

Table 6.34 Mean number of actual statements accepted by each group for the PE and assembly conditions combined.

		Number of Statements Accepted			
Group	N	mean	median	SD	range
SPD	10	4.3	4.3	0.63	3.0-5.0
SLI	9	4.4	4.5	0.53	3.5-5.0
Normal	10	4.6	4.8	0.50	3.5-5.0

Table 6.35 Mean number of inferred statements accepted by each group for the PE and assembly conditions combined.

		Number of Statements Accepted			
Group	N	mean	median	SD	range
SPD	10	3.0	3.3	1.28	1.0-5.0
SLI	9	2.6	2.5	1.61	0.0-5.0
Normal	10	1.6	1.5	1.14	0.0-3.5

Table 6.36 Mean number of distractor statements accepted by each group for the PE and assembly conditions combined.

		Number of Statements Accepted			
Group	N	mean	median	SD	range
SPD	10	0.3	0.0	0.43	0.0-1.0
SLI	9	0.9	0.5	0.85	0.0-2.5
Normal	10	0.4	0.0	0.35	0.0-2.0

There was no overall group effect for the number of actual and distractor statements accepted [Kruskal-Wallis, chi-square=2.143, df=2, p=.323: chi-square = 2.944, df=2, p=.230, respectively]. An effect was observed for the inferred statements but this just failed to reach significance [Kruskal-Wallis, chi-square=5.8743, df=2, p=0.053]. Both clinical groups accepted more of the inferred statements than the normal group but the difference was only significant in the case of the SPD group [U=15, p<.02]. There was no difference between the clinical groups in this respect [U=22.5, p=.187].

There was a consistent pattern in acceptance levels across the three statement types. All three groups accepted significantly more of the actual statements than inferred statements and significantly more inferred statements than distractor statements (see Table 6.37). As no predictions were made about the rate of acceptance of the inferred statements as compared with actual and distractor statements in the case of the two clinical groups, the probability values that are reported for these comparisons are two tailed. However, it was predicted that, in all groups, the actual statements would be accepted at a greater rate than the distractor statements and that the normal group would accept more of inferred than distractor statements. Thus, the relevant probability values in Table 6.37 are one-tailed.

Table 6.37 Significance levels for the analysis of the difference between the acceptance levels for each statement type.

	Actual vs. Inferred	Actual vs. Distractor	Inferred vs. Distractor
SPD	.024	.003	.005
SLI	.018	.006	.018
Normal	.004	.004	.018

6.63.3 Novel Event Recall

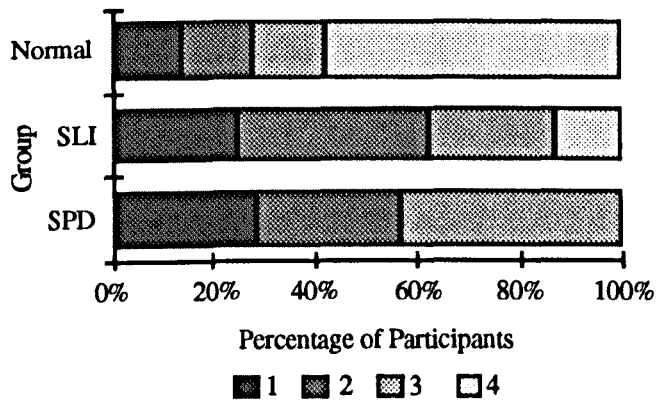
Unfortunately, data is not available for all of the participants; in several cases it was not collected by the teachers/therapists for reasons of time. As for everyday event recall, each account was given an information score and an organisation score. Mean information scores are shown in Table 6.38 and the frequency of organisation scores, in Figure 6.11.

Table 6.38 Mean information scores, by group, for novel event recall.

Group	N	Information Scores mean	median	SD	range
SPD	7	6.1	7.0	2.30	2-9
SLI	8	5.6	6.0	1.77	3-8
Normal	7	5.6	5.0	3.05	1-10

There was no observable group difference in information scores. As the ranges in Table 6.38 show, there was considerable within group variability in each case. All groups reported fewer main acts in their recall of the novel event than they did the two everyday events. The distribution of organisation scores indicated that more of the normal participants produced balanced accounts (that is, achieved ratings of 3 and 4) than those from the two clinical groups, in which children tended to focus on specific details rather than provide a schematic overview of the whole event.

Figure 6.11 Frequency of organisation scores in each group for novel event recall



1 = recall focused entirely on a single component;
2 = one component was omitted
3 = all three component acts were recorded but the account was unbalanced in favour of one or two or them;
4 = well-balanced account including all three component acts.

6.63.4 Summary of Results

Familiar Everyday Event Recall

- The normal group achieved significantly higher information scores than either of the other groups but the difference was only significant in the case of the SLI group. There was no difference between the two clinical groups.
- The organisation ratings indicated that, for both events, the majority of participants in all groups gave accounts which contained the three main component acts.

Familiar Everyday Event Recognition

- All groups accepted significantly more actual statements than inferred statements and more inferred statements than distractor statements.
- There was no group effect for the number of actual or distractor statements accepted. The two clinical groups showed a trend to accept more inferred statements than the normal group but this just failed to reach significance. There was no difference between the clinical groups in this respect.

Novel Event Recall

- There was no observable difference between the groups in terms of mean information scores. Within-group variability was apparent in all groups.
- Unlike participants from the normal group who tended to provide a schematic overview of the whole event (and so achieve high organisation scores) those from the two clinical groups tended to focus on specific activities within it.

6.7 Overall Summary and Synopsis

In this section the main findings from Phase 2 will be drawn together in the context of the research questions presented at the outset. That is, how do the psychological profiles of children labelled as presenting with SPD relate to those of children with SLI, children without difficulties, and children with autism as reported in the literature?; how unitary are the psychological profiles of children with SPD?; and are there any clear links between psychological and behavioural profiles in cases of SPD? With regard to the second question, no reference will be made to autism until the next chapter.

6.71 How do the psychological profiles of children labelled as presenting with SPD relate to those of children with SLI and children without difficulties?

A comparative summary of the psychological profiles obtained for the SPD and normal groups is shown in Table 6.39, and for the SPD and SLI groups in Table 6.40. As the first of the tables shows, there was a trend for the SPD group to perform more poorly with regard to second order theory of mind and executive function. There was no difference between the two groups in their scores on the two standard tasks associated with central coherence (embedded figures and block design); and the SPD group performed significantly better overall than controls on the illusions task. In addition, the investigation of world knowledge highlighted an interesting (non-significant) discrepancy between the two groups, the SPD group accepting significantly more of the inferred items on the event recognition task. There was no observable difference in event recall. Interestingly, as the second of the two tables shows, there were few differences between the two clinical groups, the only two being that the SLI group produced significantly more unacceptable designs on the Design Fluency task and succumbed to significantly more of the optical illusions than the SPD group.

Table 6.39 Comparative summary of the SPD and normal group profiles.

Psychological Mechanism	Task	Group Difference	Summary of Findings
Theory of Mind	First Order	No	There was no difference in the number of participants who failed at the first order level. One participant from each group did so.
	Second Order	Yes*	More of the SPD participants (4/9†) failed at second order level than controls (2/10).
Executive Function	Tower of London	Yes**	The SPD group made significantly more extra moves in the difficult set, when the less conservative approach to dealing with missing values was followed. The effect was still evident when the more conservative measure was adopted but no longer reached significance. There was no difference in the mean number of extra moves made in the easy set.
	IDED Task	No/Yes*	There was no significant difference in pass rate at any stage of the task. However, there was a trend for more of the SPD group to fail at the EDS stage and, for those who did pass, to show a higher number of trials to criterion.
	MCST	No	There was no difference in the number of categories completed or the proportion of perseverative errors made.
	Design Fluency	Yes*	There were no difference in the free condition. In the fixed condition the SPD group showed a (non-significant) trend to produce fewer novel designs and to make more perseverative errors.
Central Coherence	CEFT	No	The majority of participants in both groups scored within normal limits. Whereas no participants from the SPD group scored above normal limits one from the normal group did so.
	Block Design	No	The majority of participants in both groups scored within normal limits. Whereas no participants from the SPD group scored above normal limits one from the normal group did so.
	Optical Illusions	Yes**/No	Although the mean number of illusions by which the SPD group were fooled was significantly higher than in the normal group, there was no difference in the number of participants who succumbed to three or more of the five illusions.
World Knowledge	Familiar Event Recall	No	The normal group achieved higher information scores but the difference was not significant. There was no observable difference in organisation scores.
	Familiar Event Recognition	Yes*	There was no difference in the number of actual or distractor statements accepted but the SPD group showed a trend (that just failed to reach significance) to accept more inferred statements.
	Novel Event Recall	No/Yes*	There was no observable difference in information scores but, whereas participants from the normal group tended to provide a schematic overview of the whole event, those from the SPD group tended to report specific activities.

† One SPD participant was excluded because he failed the reality check ** significant differences ($p<.05$) *non-significant trends

Table 6.40 Comparative summary of the SPD and SLI group profiles

Psychological Mechanism	Task	Group Difference	Summary of Findings
Theory of Mind	First Order	No	There was no difference in the number of participants who failed at the first order level. One participant from each group did so.
	Second Order	No	More of the SLI group (6/8†) failed at second order level than the SPD group (4/9). However, qualitative analysis of the error responses suggested that the performance of the SLI group was influenced by comprehension difficulties.
Executive Function	Tower of London	No	There was no difference between the groups in the mean number of extra moves made in either set.
	IDED Task	No	There was no significant difference between the groups in the number of participants who passed at any stage of the task. However, the tendency for fewer participants to pass at the EDS stage that was seen in the SPD group was even more pronounced in the SLI group. Also like the SPD group, and unlike the normal controls, there was a trend for those SLI participants who did pass to show a marked increase in trials to criterion.
	MCST	No	There was no difference in the number of categories completed or the proportion of perseverative errors made.
	Design Fluency	Yes*/No	There was no difference in performance in the free condition; novel output was consistently high. In the fixed condition, the SLI group generated significantly more unacceptable designs than the SPD group. In contrast, the SPD group showed a trend for perseverative designs. However, neither tendency was group specific.
Central Coherence	CEFT	No	There was a tendency for poorer performance in the SLI group. Whereas the majority of SPD participants scored within normal limits and the remainder below, the SLI participants were distributed equally between these categories.
	Block Design	No	The majority of participants in both groups scored within normal limits. No participant from either group scored above normal limits.
	Optical Illusions	Yes**	The SLI group was fooled by significantly more of the illusions than the SPD group. The tendency to be fooled was also more prevalent in this group; 90% of the SLI participants succumbed to three or more of the illusions in contrast to 40% of the SPD group.
World Knowledge	Familiar Event Recall	No	There was no difference between the groups in information or organisation scores.
	Familiar Event Recognition	No	There was no difference between the groups in the number of actual, inferred or distractor statements accepted. Both groups showed a non-significant trend to accept more inferred statements than the normal group.
	Novel Event Recall	No	No differences were observed in information or organisation scores.

† One participant was excluded because he failed the reality check and another because she failed the linguistic control question.

** significant differences ($p<.05$) * non-significant trends

6.72 How unitary are the psychological profiles of children with SPD?

A summary of each individual's psychological profile is presented in Table 6.41. Explanatory information relating to the table follows:

Theory of mind

- At both levels performance is rated as unimpaired if all test questions were passed.
- Cases in which a child failed the control questions are marked with a dash.

Executive function

- Planning ability: measured on the basis of the mean number of extra moves made in the difficult set of the Tower of London task. Rated as unimpaired if the child made no more extra moves than the highest scoring control child when missing values were replaced with the arbitrary maximum (see Appendix IV). Cases in which the number of extra moves made was low (fewer than 3) are marked in bold.
- Flexibility: based on performance on the IDED task. Cases in which the participant passed the EDS stage with little/no increase in TTC are marked as unimpaired and those in which the participant failed at that stage or showed a marked TTC as impaired. Failures prior to the EDS stage are marked with a dash.
- Generativity: based on scores obtained in the fixed condition of the design fluency task. Cases in which the proportion of novel output was in line with that shown by the normal group are rated as unimpaired. High rates of perseverative and unacceptable output are also indicated in the table.

Central Coherence

- Block Design (Blocks) and the Children's Embedded Figures Test (Figures): performance is rated as unimpaired if it fell within normal limits and impaired if it fell below.
- Illusions: high and low rates of succumbing are marked according to the criteria specified in the key.

World Knowledge

- The measure of world knowledge relates to the number of inferred items accepted in the recognition task (see key).

As the table shows, there was considerable within group variability in most aspects of the SPD group's performance.

Table 6.41 Individual psychological profiles for participants in the SPD group.

Participant	Theory of Mind		Executive Functions			Central Coherence			World Knowledge
	1st Order	*2nd Order*	*Planning*	*Flexibility*	*Generativity*	*Blocks*	*Figures*	*Illusions*	
D	√	√	√	√	√	√	x	—	—
N	√	√	√	√	u/p	√	√	h	h
M	√	x	x	—	√	√	√	l	—
J	x	x	√	x	p	√	√	h	h
C	√	x	√	x	√	x	√	—	—
T	√	x	√	x	√	√	x	—	l
R	√	√	x	x	√	√	√	h	—
W	√	√	√	√	√	√	√	—	l
P	√	√	√	—	u	√	√	h	l
A	√	√	√	x	√	√	√	—	l
G	√	—	x	—	*	x	√	l	h
E	√	√	x	—	*	x	√	h	—

√ = unimpaired p = high rate of perseverative designs x = impaired u = high rate of unacceptable designs

* = missing data — = failed control question / failed to reach IDS stage / average for illusions and world knowledge

h = succumbed more than three illusions/ accepted more than three inferred statements

l = succumbed to one or none of the illusions/ accepted one or none of the inferred statements

Table 6.42 Individual profiles of performance on the standardised language assessments for participants in the SPD group.

	Linguistic Functioning										Intellectual Functioning					Conversational Functioning	Social Functioning
Participant	Receptive Measures						Expressive Functioning										
	Vocabulary	Concepts	Semantic Links	Semantic Relations	Syntax	Commands	Word Finding	Sentence Formulation	Sentence Assembly	Sentence Recall	Digit	Similarities	Matrices	Speed	IQ	Percentage Inadequacy Score	Overall CARS rating
D	x	√	√	√	√	√	x	x	√	x	x	√	√	√	109.5	17%	27
N	√	√	x	x	x	x	x	x	√	√	x	√	√	√	85	20%	**34.5**
M	√	√	√	√	√	x	x	x	√	x	x	√	√	√	99	42%	**35.5**
J	x	√	x	x	√	x	√	x	√	x	x	√	√	√	81	37%	27
C	√	√	x	x	√	x	√	x	x	x	x	√	√	√	79	56%	29
T	x	√	√	x	x	x	√	x	√	x	x	√	√	√	76	22%	23
R	x	√	x	x	x	x	x	x	√	x	x	√	√	√	73.5	35%	27.5
W	√	√	√	√	√	√	√	x	√	x	x	√	√	√	90	38%	22.5
P	√	√	√	x	x	x	x	x	x	x	x	√	√	√	83	36%	24.5
A	√	√	√	√	√	√	√	√	√	√	√	√	√	√	102	22%	24.5
G	x	√	√	√	x	x	x	x	√	x	x	√	√	x	69.5	67%	26.5
E	√	√	x	√	x	√	√	x	√	x	x	√	x	x	63.5	24%	29

√ = above normal limits √ = within normal limits x = poor x = impaired (see page 104)

autism ratings shown in bold fell in the mild-to-moderate autistic range (31-36), the remainder were in the normal range (15-30)

6.73 Are there any clear links between the psychological and behavioural profiles obtained for the children with SPD?

For reasons of time, statistical analysis of the potential relationship between psychological and behavioural profiles was not undertaken. However, visual inspection of the data from Phase One and Two did not indicate any obvious links (see Tables 6.41 and 6.42). For example, there was neither clear nor specific overlap in the behavioural profiles of the four children who failed the second order theory of mind task (M, J, C, T). Similarly, there was neither clear nor specific overlap in the behavioural profiles of the five children (J, C, T, R, A) who showed a tendency for a lack of cognitive flexibility on the IDED task.

6.8 Conclusion

In this chapter, Phase Two of the study was described. This phase was concerned with the investigation of underlying psychological mechanisms in SPD. The following mechanisms were explored: theory of mind, executive function, central coherence and world knowledge. The primary aim for exploring the psychological underpinnings of SPD was to help clarify why these children behave as they do. However, since impaired theory of mind, executive dysfunction and weak central coherence have all been proposed as explanatory theories of autism a secondary aim was to further inform the boundaries debate. For this purpose it was necessary to establish (i) whether or not children with SPD show the same pattern of psychological strengths and weaknesses as children with autism, in relation to normal development, as regard theory of mind, executive function and central coherence; and (ii) whether any similarities or differences that exist between the underlying psychological mechanisms in autism and SPD extend to SLI.

Psychological profiles were obtained for those SPD children who participated in Phase One of the study. The overall SPD group profile was then compared with the profile obtained for a group of children with SLI and a group of normally developing controls, both matched for language age. No direct comparison was made with children with autism. Instead, the findings from the SPD group in the present study are compared to well-established findings in the literature on autism, in relation to normal development, in the next chapter. There were few significant differences between the SPD and language-matched normal control group, although the SPD group did show some trends to perform more poorly on the second order theory of mind tasks and on several of the executive function tasks. In addition, there were strong parallels between the psychological profiles obtained for the SPD and SLI groups, regarding theory of mind, executive function and central coherence.

As mentioned above, world knowledge was also explored. This was done in view of the suggestion that SPD stems from impaired world knowledge (see Chapters Two and Three). For this purpose two tasks were used; event recall and event recognition. There were no differences between the groups in their ability to describe everyday events. However, on the event recognition task, the two clinical groups showed a tendency to accept more of the inferred statements than the normal control group. This tendency was more pronounced in the SPD group. The implications of the findings from the investigation of world knowledge are discussed, together with those from the investigation of theory of mind, executive function and central coherence, in the next chapter.

Chapter Seven
Concluding Discussion

7.1 Introduction

In this chapter the findings from both phases of the study will be discussed in the context of the issues raised in the early chapters of this thesis. For the sake of clarity, each phase will be discussed separately. The main clinical implications of the findings will be considered in the final section.

7.2 Phase One: The behavioural characterisation of SPD

The aim of Phase One was to clarify the issue of diagnostic criteria for semantic-pragmatic disorder (SPD). As indicated in Chapter One there is still much confusion about the definition of SPD in spite of the numerous attempts that have been made to characterise it in the years since it was first described (Rapin, 1982). There is unanimous agreement that pragmatic/conversational impairment is central, in addition to which there is general consensus that language processing is affected. However, whether or not these are necessarily associated with semantic deficits is open to question (Bishop, 1998; Botting & Conti-Ramsden, 1999). The status of structural language development and social functioning is also uncertain; reports have been inconsistent and systematic investigation in these domains is lacking. It is not clear whether discrepancies between the findings from one study and the next reflect genuine differences between the children concerned or are a product of extraneous factors, such as age or methodological approach.

In this study, an attempt was made to eliminate confounding factors by combining single case and within group comparison methodologies and by studying children of a similar age. Using the same procedures in each case, comprehensive behavioural profiles were obtained for twelve children, of between nine and twelve

years of age, identified by speech and language therapists as presenting with SPD. The profiles, which included information about linguistic, conversational, social and intellectual functioning, were then compared to see whether any common features emerged.

7.21 How unitary were the profiles?

Apart from conversational impairment, four other features were universal. These were:

- age appropriate categorisation skills
- a good command of function words
- relatively intact phonological development
- mild/moderate abnormalities in relating to people

Other behaviours were frequent but were not invariable. Eleven of the twelve participants:

- scored poorly on sentence formulation
- scored below age level on narrative recall in the Bus Story
- scored below age level on digit recall in the BAS
- demonstrated a preference for simple sentence forms in spontaneous connected speech and in narrative recall

Ten of the twelve participants:

- scored poorly on sentence recall

Nine of the twelve participants:

- showed abnormal verbal communication, activity and body use, according to the CARS
- showed normal non-verbal communication skills, taste/touch/smell response, imitation and object use, according to the CARS.

These findings suggest that, in spite of previous reports of heterogeneity, commonalities do exist and that, as such, SPD *does* constitute a definable clinical entity. This is consistent with the results of Conti-Ramsden et al's recent cohort studies (Conti-Ramsden, Crutchley, & Botting, 1997; Conti-Ramsden & Botting, 1999). If the universality criterion is accepted, then the top list of bullet points might be considered positive defining features. However, in each case in which a behaviour was shown by eleven of the twelve participants it was the same child who behaved differently. As such, it would seem reasonable to suggest (i) that a different diagnostic label might be more appropriate for this child (see page 327) and (ii) that impaired sentence formulation skills, impaired narrative recall, impaired digit recall and preference for simple syntax might also be positive defining features.

There is growing interest in the status of structural language development in SPD at present. This has been prompted by mounting evidence that grammatical development may be more impaired than originally thought, at least in a proportion of cases (e.g. Jones, 1986; Sahlen & Nettelbladt, 1993). To date the analysis of syntactic functioning has generally been restricted to the assessment of receptive language, using standardised assessment procedures such as the TROG. The present study included various measures of expressive syntax in the assessment battery. Overall, the findings support the suggestion that syntactic comprehension is impaired in a proportion of cases, with half of the group performing below normal limits on the TROG. Moreover, they indicate a highly consistent expressive profile. Although none of the children made grammatical errors (such as the omissions of function words), all but one showed a clear preference for simple sentence forms in their spontaneous conversational speech and in their elicited narrative utterances (the Bus Story). In addition, difficulty constructing complex syntactic structures was apparent on the *Sentence Formulation* and *Sentence Assembly* subtests of the CELF-R (UK)[1] in the majority of cases. However, it should be noted that, on the first of these tasks, it was often

1 Difficulties assembling complex structures were observed on the *Sentence Assembly* task in spite of the fact that most of the children achieved overall average scores.

difficult to discern whether the children's errors stemmed from a syntactic deficit in forming the relevant constructions or a semantic deficit in understanding the conjunction that they had been instructed to use. Performance may also have been influenced by the generative nature of the task.

Not only was the presence of conversational impairment universal but there was also a significant association across participants with regard to the type of conversational anomalies observed. Problems with expressive syntax/semantics and violations of exchange structure were most prevalent. Violations of quality and the tendency to provide too little information were also common. However, agreement was not absolute. Two cases (E and A), in particular, stood out as different from the rest (see page 248). Moreover, overall percentage inadequacy scores were wide-ranging.

It is interesting that there were not only similarities across the profiles in respect of language and communicative functioning but also in respect of social and cognitive functioning. The CARS indicated consistent, and relatively specific, deficits in emotional response and relating to people. In addition, it highlighted a number of common strengths, including non-verbal communication, imitation and body use. However, these were not invariable. It is surprising that verbal communication was not highlighted as a consistent deficit, in view of the fact that communicative impairment is central to the notion of SPD. This anomaly may be due to the fact that the examples provided for the rater on the communication item of the CARS concern communicative deficits that relate to autism, such as echolalia and mutism. These do not appear to typify SPD (see below). As far as cognitive functioning is concerned, all except one child performed poorly on the digit recall task and, in the majority of cases, speed of information processing was a relative strength.

7.22 How do the findings compare with those of previous studies?

The findings from this study are consistent with the general consensus that conversational difficulties are a critical feature and that phonological development is relatively unimpaired in SPD. However, there are also a few respects in which the present findings are inconsistent with existing accounts.

In the first place, linguistic deficits were more widespread in this than in previous studies. In their recent analysis of ten children with SPD, Botting & Conti-Ramsden (1999) found that half of the group performed below normal limits on one or more of the five language assessments administered (see page 47). In contrast, in this study, ten of the twelve participants performed below normal limits on *at least* two of the five standardised language measures employed (see page 244), in spite of the fact that the children in this study were older than those in Botting & Conti-Ramsden's (Botting & Conti-Ramsden, 1999). Moreover, in this study, in most instances in which a child performed within normal limits his score was below the mean. Similarly, while some researchers have reported intact expressive syntax (McTear, 1985; Conti-Ramsden & Gunn, 1986; Leinonen & Letts, 1997b), these children consistently showed limited use of complex syntax, both in narrative recall and in their spontaneous speech. In addition, they demonstrated difficulty in formulating such constructions on the *Sentence Assembly* task.

There are several possible explanations for the prevalence of linguistic deficits in this case. First, since the children were selected on the basis of clinical opinion alone, it is possible that the selectors considered linguistic deficits to be a characteristic feature of SPD. However, given that five speech and language therapists were involved in the selection process, and that the potential for linguistic involvement has only recently been recognised in the SPD literature, this explanation seems unlikely. Second, it is possible that more language deficits were found because the assessments used in this study were more sensitive. The fact that the Test of Word Finding highlighted word-

finding difficulties that would not have been indicated had the object naming task used by Conti-Ramsden, et al. (1997) been administered supports this suggestion (see below). It is also interesting to note that, unlike the children in Conti-Ramsden et al's study who were selected from Language Units, all but one of those who took part in this study attended a specialist language school which, perhaps, cater for children with more severe and persistent language deficits. This position is consistent with the suggestion that there is a continuum of linguistic through to social impairments (Bishop, 1998). Had checklist data been available for the children in the present study it would have been interesting to compare it with the checklist data for the children in Botting & Conti-Ramsden's study (1999).

In the second place, there were a number of differences between the conversational profile yielded in this study and that obtained by Bishop & Adams (1989). In comparison with the findings from the present study, in Bishop & Adams' study the tendencies to provide too little and/or too much information and to make errors in the category of content/style were more pronounced. In addition violations of exchange structure were relatively rare. Some of these inconsistencies may have resulted from differences in the sampling procedures used in each case. For instance, more violations of exchange structure may have occurred in the present study as compared with Adams & Bishop's study, as a result of the fact that the children were participating in a task while engaging in conversation (see page 142). Similarly, the fact that a visual referent was present at all times may help to explain why the tendency to provide too little information was less pronounced. However, it is difficult to see how the remaining discrepancies might be interpreted in terms of differences in sampling procedure.

In the third place, in addition to structural language and conversational difficulties, there were some inconsistencies between the findings of the present study and findings reported in the literature with regard to cognitive ability. Poor digit recall and good categorisation skills emerged as common features in this study but, using the

same tasks, Shields et al found the reverse (see page 71). It is possible that the difference in categorisation skills was a function of chronological age, since the SPD children in this study were older than those in Shields et al's study (mean age 10;7 as opposed to 8;10). However, it is difficult to see how this explanation would extend to the disparity in digit recall (in which case it was the younger group who achieved higher scores) unless performance had fallen in relation to age norms because it had plateaued in real terms. The fact that a proportion of Shields et al's subjects later went on to be re-diagnosed as cases of Asperger's Disorder (Shields, personal communication) is likely to have been important.

These inconsistencies cast doubt on the reliability of several of the 'positive defining features' listed above (see page 319), most notably poor digit recall, good categorisation ability and limited syntactic development beyond simple sentence level. More research is needed to determine the prevalence of these features in further cases of SPD. In addition, the findings concerning function words, social functioning and narrative recall need to be replicated before generalisations can be made.

7.23 Terminology

As mentioned earlier in this thesis, several researchers have recently suggested that the term semantic-pragmatic disorder should be dropped in favour of 'pragmatic language impairment' because of a lack of evidence for universal semantic involvement. At first glance, the findings from this study support this proposal since semantic deficits do not feature among the 'positive defining behaviours' listed above, even when the less stringent criterion is applied. Indeed, receptive vocabulary, understanding of semantic relationships, appreciation of semantic links and word finding abilities were impaired in no more than half of the group.

However, closer inspection of the data indicated several reasons for caution in abandoning the concept of semantic involvement in SPD at this stage. First, when individual performances were considered, semantic deficits were more widespread than the above analysis would suggest. All except two children performed below normal limits on at least one of these measures and, in many instances, their scores were in the impaired range. Second, the assertion that the word semantic should be omitted rests almost entirely on the fact that word-finding difficulties have not been found in every case. There are two problems with this. Firstly, the assessment of word-finding ability has been largely restricted to the naming of nouns. In this study, the ability to name nouns represented a peak in the word-finding profile in the majority of cases in contrast to which other aspects of word-finding ability were notably impaired. Whereas eight of the participants named more than 75% of the nouns correctly only five of the participants named 75% of the verbs correctly. Description naming was similarly impaired. Secondly, as those who proposed this change in terminology concede, it neglects the possibility that relational semantics may be impaired. This point becomes particularly pertinent when one considers the role played by verbs in semantics at that level (see Bishop, 1987, p 123, for an overview).

These findings indicate a need to pursue the investigation of semantic abilities in this group, using more comprehensive measures and extending the focus of investigation to include relational semantics. With regard to the latter, the sentence comprehension and semantic and syntactic bootstrapping tasks used by Tager-Flusberg (1981) and Van der Lely and colleagues (Van der Lely & Dewart, 1986; Van der Lely & Harris, 1990; Van der Lely, 1994) would be an interesting starting point. Not only would they provide direct insight into the children's understanding of meaning relations but they would also help to elucidate the formulation errors made at the interface between syntax and semantics at complex sentence level (see above). Moreover, since clear differences have been found in the way in which children with SLI (Van der Lely & Dewart, 1986; Van der Lely & Harris, 1990; Van der Lely, 1994) and autism

(Tager-Flusberg, 1981) perform on these tasks, administering them to children with SPD would further inform the boundaries debate (see below).

7.24 Boundaries

As indicated in Chapter Two there has been much discussion about the boundaries of SPD with specific language impairment (SLI), Asperger's disorder and autistic disorder. In this short section, the findings from the first phase of this study will be considered in the context of this debate.

None of the children fit neatly into the category of proto-typical SLI, given that they made few grammatical errors and demonstrated relatively intact phonological development. Nevertheless, in all but two cases, other aspects of language functioning were impaired. This may place them in one or other of the taxonomic categories of SLI that have been suggested by Rapin & Allen (1996) or by Conti-Ramsden et al (1997). If the children in the present study do not fall clearly into the broad category of SLI, might they then fall into the broad category of autism? The CARS scores would suggest not, at least in the majority of cases. Only two children received overall CARS ratings in the (mild to moderate) autistic range. Although the remainder did show some social deficits (scores clustered around autism end of the normal range, with a mean of 27.5 and a cut-off of 30) these were neither pervasive nor severe enough to result in an overall autism rating. For the most part, the deficits that were observed were restricted to the categories of responding to people, emotional response, body use and activity level. Many of the other social/behavioural deficits associated with autism, such as impaired non-verbal communication or difficulty adapting to change, were uncommon in the SPD group. In addition, there were several respects in which the language profiles shown by children in this study differed from that generally associated with autism. For instance, they did not make pronoun errors and were not echolalic (e.g. Fay, 1980; Frith, 1989).

A diagnosis of Asperger's disorder would also be inappropriate in eleven of the twelve cases, on account of structural language impairment. However, it would seem appropriate for the twelth child (A), since he demonstrated age appropriate (and occasionally superior) language abilities, presented with a unique conversational profile and appeared to show a restricted range of interests.

Thus, it would appear that SPD does not fit neatly into any of the existing categories with which it has been equated. Nevertheless, it does seem to share some of the features of SLI and some of the features of autism. It might, then, be more appropriate to conceptualise SPD as a subtype of both conditions. However, this suggestion prompts two concerns. First, it is unhelpful to the practitioner faced with the task of diagnosis and/or classification because SLI and autism are viewed as two discrete entities in the authoritative diagnostic manuals (DSM-IV, American Psychiatric Association, 1994; ICD-10, World Health Organisation, 1993). Second, the suggestion that SPD overlaps with SLI rests solely on the observation that language deficits in SPD appear to be more prevalent than originally thought. It must also be shown that they are primary for this premise to hold (see page 52 for further discussion on this point).

As indicated in Chapter Two, several researchers (Bishop, 1998; Botting & Conti-Ramsden, 1999) have recently suggested that it might be more appropriate to re-classify SPD as Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) (American Psychiatric Association, 1994) on two counts. First, that deficits extend beyond language and into the social domain; and second, that the social deficits that they do show are neither extensive nor severe enough to warrant a diagnosis of autism. This suggestion seems reasonable, at least on the basis of current knowledge about SPD. However, as it has been pointed out, the PDD-NOS label may be too broad to inform clinical/educational practice (Bishop, 1998; Botting & Conti-Ramsden, 1999). There is clearly a need for further research to verify this position. In particular, there is a need for direct behavioural comparisons between children with autistic

disorder, SLI and SPD. The issue of boundaries will be picked up again in the discussion section which relates to Phase Two of the study.

7.25 Exceptional Cases

It has already been suggested that one of the children in the group might be more appropriately diagnosed as having Asperger's disorder. A further two children (A and E) differed from the majority on account of their low non-verbal IQ. The fact that they were included in the sample suggests that intellectual functioning may not be taken into account when SPD is employed as a diagnostic label by speech and language therapists. This raises questions about whether SPD and low ability can be seen to co-occur or whether they should be viewed as mutually exclusive. A similar question has been raised by Bishop (1997) in connection with the diagnosis of SLI. The issue of the relationship between language impairment and non-verbal IQ has also been discussed by Leonard (1998). Issues surrounding the relationship between language impairment and non-verbal functioning have not been considered in the literature on SPD but will, at some time in the future, clearly need to be considered.

7.26 Measurement issues

Finally, the conversational analysis procedure raised several important questions about the definition of conversational impairment. First, should it be characterised in terms of the proportion of inadequate contributions that are made? For this to be possible, reliable normative data would have to be available. Furthermore, adopting this approach would fail to take account of the possibility that some anomalous behaviours may be more damaging to conversational success than others, even if they occur relatively infrequently. In this study, for instance, the author found inconsistency and topic shift particularly detrimental because they left her uncertain of the validity and relevance of all of the child's subsequent contributions.

Might, then, the proportion of adult requests for clarification provide a more useful index of conversational impairment? Given that these are made when conversation breaks down, it would follow that they should provide a sensitive indicator of conversational failure. However, there are two problems with this suggestion. First, in practice, conversational breakdown does not always prompt a clarification request; and second, there were several cases in this study when the percentage of clarification requests made was disproportionate to the participant's inadequacy score. This was particularly true of cases in which conversation was characterised by a high rate of non-responsiveness. For example, M achieved a conversational inadequacy score of 42%, yet only 4% of the requests that the researcher made of him sought clarification. There is no simple answer to the question of how to gauge conversational impairment. However, it is clear that the issue needs to be addressed before the concept of conversational impairment can be seen as a truly meaningful index for clinical use.

The conversational analysis procedures raised a second, more specific, measurement issue. That is, the classification of inadequate contributions extended to non-responses, thus failing to distinguish between two potentially different problems. In the future, it might be more instructive to modify the procedures so that non-responses and inadequate contributions are considered separately. Non-responses could be included within the analysis of turn-taking.

7.3 Phase Two: The investigation of underlying psychological mechanisms

The aim of the second phase of the study was to provide preliminary evidence concerning possible underlying psychological mechanisms in SPD. The primary motivation for this was that it is only by understanding why these children behave as they do, rather than simply how they behave, that appropriate and effective approaches

to therapeutic and educational management can be developed. The secondary motivation was to explore the boundaries issue, especially in relation to the boundary with autism, by utilising some of the theories in the literature on causal factors underlying autism. It was also considered important to investigate whether any differences or commonalities between the mechanisms underlying autism and SPD extended to SLI. For this reason, a comparison group of children with SLI was included at this stage.

Four mechanisms were explored: theory of mind, executive function, central coherence and world knowledge. The first three of these derive from the literature on autism. The fourth derives from the literature on SPD. The findings concerning theory of mind, executive function and central coherence will be discussed separately from the findings concerning world knowledge.

7.31 Theory of mind, executive function and central coherence

The findings from the investigation of these mechanisms will, initially, be discussed in the context of the boundaries debate. In the first place, the findings from the SPD group in this study will be considered in relation to well-established findings in the literature on autism. In the second place, the findings from the SPD group in this study will be considered in relation to the findings from the group with SLI. Attention will then be paid to the issue of universality, in relation to SPD (see above).

7.31.1 Boundaries

As demonstrated in Chapters Two and Three, numerous studies have indicated that children with autism demonstrate striking and persistent deficits in theory of mind and executive functioning. In addition, several studies have indicated that they possess a weak drive for central coherence, manifest in superior performance on tasks which benefit from a propensity for local rather than global processing.

In this study, there were few significant differences between the performance of the SPD group and normal controls. This would suggest that the SPD children in this study did not show comparable deficits in theory of mind and executive dysfunction as children with autism. It would also suggest that they did not show comparable strengths on 'central coherence tasks'. However, the interpretation of the findings is complicated by the fact that, because the groups were matched for *language* age, the SPD group was significantly older than the normal controls. Thus, it is possible that any difficulties that the SPD group may have had on these tasks were masked by their age advantage. For this reason the findings must be treated with caution. This need for caution is underlined by the fact that, in spite of their age advantage, there was a trend for the SPD group to perform more poorly on the theory of mind and executive function tasks. A second group of normal controls matched for chronological age could be included in future investigations to overcome this problem. Alternatively, groups could be matched for chronological age alone and the effects of language (and other factors such as low non-verbal IQ) partialled out using statistical regression.

There is another problem for interpretation which relates directly to the negative findings from the theory of mind tasks in the present study. That is, a proportion of children with autism have consistently been shown to pass these tasks, especially when language and processing demands are reduced. As a result, it is difficult to exclude children with SPD from a diagnosis of autism on the basis of the fact that they also passed these tasks. It may be more fruitful to use Happé's Strange Stories task in future investigations of theory of mind in SPD, especially in relation to the issue of differential diagnosis. This is because individuals with autism who pass standard second order tasks have been found to fail the Strange Stories task (Happé, 1994a).

The issue of age was less important for the interpretation of the results from the central coherence tasks since two of the three tasks (Block Design and the Children's Embedded Figures Test) were scored in relation to age equivalent standardisation data. The fact that none of the SPD participants scored above normal limits on either task

would suggest that they do not share the same propensity for local processing as children with autism, at least at the perceptual level. The finding that the SPD group succumbed to significantly more of the illusions than controls on the third task supports this position.

However, these findings are not compatible with the observation made in the first phase of the study that some of the children showed a tendency to respond to part of a question or test stimulus rather than the whole, as in the examples below.

Stimulus	Response
What floats in the sky, may be full of rain, and is grey or white? (cloud)	*sea-gull*
In a lamp you screw in a light (bulb)	*with a screw-driver*
What is the name of the part of your face below your mouth that is made of bone? (chin)	*teeth*

It is not clear whether these responses result from short-term memory deficits, language processing limitations, comprehension deficits, or whether they result from the fact that the tendency for gestalt processing that these children show at the perceptual level does not extend to verbal material. It would be interesting to pursue the question of processing preferences for verbal stimuli, using Snowling & Frith's (1983) or Happé's (1997) homograph task.

To summarise, the findings from the investigation of theory of mind, executive function and central coherence suggest that there are not only differences between SPD and autism at the behavioural level (see section 7.1, above) but also at the psychological level. Even if executive functioning and theory of mind ability are impaired in SPD (and this remains to be determined) the findings from this study would suggest that they are less affected than in autism, in which the deficits may persist into adulthood. Similarly, although it is still possible that children with SPD demonstrate a tendency for

piecemeal processing of verbal material, a preference for local processing over global processing is not apparent at such a low level as in autism.

Further research is needed to follow up the finding that the children with SPD showed a trend to perform more poorly than the younger normal controls on the theory of mind and executive function tasks needs to be followed up and the possibility that they may show developmental delay in these mechanisms needs to be explored. In addition, the finding that the SPD children in this study did not show signs of weak central coherence at the perceptual level needs to be replicated before any generalisations can be made.

In contrast, the study highlighted strong parallels between the psychological profiles of the SPD and SLI groups. Only two significant differences were found. That is, the SLI group succumbed to significantly more of the optical illusions than the SPD group and produced significantly more unacceptable designs than the SPD group in the fixed condition of the Design Fluency task. There were no significant differences between the two clinical groups on any of the other measures. Thus, in those cases when the SPD group showed a trend to perform more poorly than the normal controls (on the second order theory of mind task and on the various executive function tasks) the SLI group also performed more poorly than the normal controls. Moreover, in the case of theory of mind the deficit was even more pronounced in the SLI group. This finding not only raises questions about the specificity of these deficits to SPD but also about the specificity of language impairment in SLI (see above). In addition, this prompts broader questions about the suitability of the more categorical sub-types approach to the classification of SLI, SPD and autism and suggests that a dimensional approach may be more appropriate. This contradicts the suggestion made earlier in relation to the findings from Phase One (see page 327). Furthermore, these findings also demonstrate the need to include other SLI comparison groups in future studies of SPD.

However, differences in the nature of the errors made by participants in the SPD and SLI groups suggest that there may be qualitative differences between the two groups. Moreover, several of the errors that were made by participants in the SLI group were indicative of poor task understanding or poor comprehension of the test questions (see pages 268 and page 288). It is therefore questionable whether their poor performance was due to fundamental deficits in the underlying psychological mechanisms concerned. Further research is needed to clarify this issue. The fact that the SLI group made errors which related to task understanding highlights the difficulties involved in matching for language age; as Loeb & Leonard point out, "in certain respects, the language of SLI children does not match that of [normally developing] children at any point in development" (Loeb & Leonard, 1991, p340; also see Plante et al., 1993, for a review of matching issues). This finding also calls into question the reliability of linguistic control questions used in tasks such as Peter's Birthday Puppy (see page 264).

7.31.2 How unitary were the SPD groups psychological profiles ?

Within the SPD group there was some variability in performance across the various tasks in the psychological battery (see page 314). For example, just as four participants failed the second order theory of mind task, seven passed. Similarly, whereas five of the eight children who reached the critical extra-dimensional shift stage of the IDED task (see page 274) failed or showed an increase in trials to criterion, the remaining three children passed. This makes it difficult to characterise children with SPD in terms of underlying psychological mechanisms. Interestingly, the individual differences observed in respect of the children's psychological profiles did not appear to map onto the differences that were observed in respect of their behavioural profiles (see above). The reasons for this discrepancy are unclear and warrant further investigation.

7.32 World Knowledge

As detailed in Chapters Two and Three, aside from the boundaries debate, it has been suggested that SPD might stem from some kind of an impairment in world knowledge. Whether this deficit relates to a lack of knowledge of events or from an impairment in the ability to apply knowledge of events in drawing inferences has been a matter for debate. In view of the fact that there has been no systematic investigation of these suggestions, the present study aimed to address the question of whether or not children with SPD possess knowledge of familiar everyday events. It also set out to explore whether children with SPD develop knowledge of a novel event, in this case the researcher's visits. The results concerning familiar event knowledge and novel event knowledge will be discussed separately.

Two complementary procedures were employed in the investigation of familiar event knowledge: (i) recall and (ii) recognition. In each case, the findings suggest that the children with SPD who took part in the study, did possess knowledge of familiar everyday events. In this case, PE and assembly. On the recall task there was no statistically significant difference between the SPD and normal groups in their information scores, nor any observable difference in their organisation scores. On the recognition task, children in the SPD group accepted significantly more of the inferred statements than distractor statements (as did participants from each of the other groups). It is difficult to explain why this might have happened had children not had recourse to background knowledge of that particular event.

Although the above findings imply that the children with SPD who took part in this study did possess knowledge of familiar everyday events, the matter of whether or not they lack the ability to apply that knowledge remains open to question. Interestingly, the SPD group accepted the inferred statements at a higher rate than the normal group in the event recognition task. It is possible that this was due to superior memory for the text on the part of the normal group, yet the SPD group did not accept

fewer of the actual statements than the normal controls. This discrepancy may, then, signify qualitative differences between the two groups in the way in which they apply world knowledge in the comprehension process. Further investigation of this possibility is required. It would be interesting to see how these children would perform on a related task in which they were required to make the relevant inferences rather than to simply accept or reject them. Bishop & Adam's (1992) inferential comprehension tasks (see page 36) could be modified for this purpose, so that the stories used and the inferences that were assessed were the same as in the recognition task.

The children's knowledge of the novel event (the researcher's visits) was also investigated using the recall procedure. The findings suggest that the SPD group had developed some kind of mental representation of the researcher's visits as there was no observable difference between the SPD group and the normal group in their information and organisation scores on this task. However, these findings should be interpreted with caution because of the small number of participants involved (see page 307). It would have been more instructive had this procedure been complemented by a recognition task, as in the investigation of familiar event knowledge. Due to oversight this was not done.

7.4 Measurement issues

The issue of matching has already been addressed and so will not be discussed further in this section. However, there were two other measurement issues relating to Phase Two of the study which require specific comment. The first concerns the problem of missing values on the Tower of London task (see page 280). This occurred when participants from the normal group withdrew their co-operation from a trial before reaching the maximum number of moves. It would not seem possible to prevent this from happening. However, recording the position of the discs at the point at which

co-operation was withdrawn would help to determine the suitability of the various alternatives for dealing with the missing values (see Appendix V), at least in those instances in which it is clear that the maximum number of moves would not have been exceeded had the participant persevered.

The second issue concerns the fact that an error was made in the administration of the Modified Card Sorting Task (Nelson, 1976). That is, the number of trials to criterion was not reduced from its standard ten (Heaton et al., 1993) to six, as Nelson (1976) suggests. This means that there were fewer 'free' trials available to the child[2] and may account for the fact that few participants in any group sorted to all three categories. However, it should not have affected the process of between group comparison because the same procedure was administered in every case.

7.5 Clinical implications

It would seem logical to end this thesis where it began and consider the clinical implications of the findings from the study as a whole. Many issues arose but the following are considered the most pertinent. The findings from Phase One of the present study support long-standing clinical intuition, and recent research findings, that SPD does constitute a definable clinical entity. However, there is still a lack of agreement about what the defining features are and for this reason assumptions should not be made about how a child with this label might present. Moreover, this emphasises the need for comprehensive assessment in each individual case. This should entail systematic and comprehensive investigation of linguistic, conversational, social and intellectual functioning. In addition, it follows that when the SPD label is applied it should be accompanied by a detailed description. Similarly, all aspects of impairment should be recognised in the development of an intervention plan. Finally,

2 Recall that the number of stimulus items in this task is already reduced to forty-eight from the standard sixty-four (Heaton et al., 1993).

this study indicated that the children with SPD may have more problems with recall than previously anticipated, since the majority of the SPD group in this study performed poorly on digit, sentence and narrative recall. These findings require substantiation but may have implications for the choice of therapeutic approach.

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