

**THE NEUROPSYCHOLOGICAL PROFILES OF LEARNERS WITH  
ASPERGER SYNDROME**

by

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## **ABSTRACT**

A qualitative case study research design is used to investigate the results of a neuropsychological test battery, collated and used with four individual cases. A literature study consisting of research with respect to AS as well as neuropsychological assessments provides the theoretical framework from which existing theory is tested and expanded on. The cases are analysed individually and then by cross case analysis to ascertain any patterns of strength and weaknesses which could result in a “typical” profile of a learner with AS.

Findings conclude confusions with respect to diagnostic criteria for AS and a distinction of DSM-IV-TR criteria is used. The neuropsychological test battery includes questionnaires (personal history, Gilliam Asperger’s disorder scale, Conners’ parent and teacher questionnaire, Dunn’s sensory profile) interviews (parents, teachers), observations (classroom and playground) and formal testing (intelligence, motor functions, academic achievement, theory of mind and executive functions).

Findings from the literature show similarities between AS children and children with non verbal learning disabilities. Evidence of AS differing from individuals with high functioning autism is conclusive in all previous research using theory of mind tests.

Evidence from the literature shows many children had been given another diagnosis, typically ADHD, before being given the diagnosis of AS. Additional disorders such as anxiety and depression were also given. AS children had consistent difficulties with social interaction.

A typical neuropsychological profile of AS is not identified, but rather a “personality type” that is dominated by anxiety and individual “quirks” of personality which affects responses to the formal test battery – thereby influencing the scores obtained. Two

of the cases presented with an academic profile similar to that of a non verbal learning disability and one presented with similarities with a semantic pragmatic disorder. The thesis concludes with a proposed differentiating model of behavioural, communication and learning disorders in which AS is defined in terms of that originally described by Hans Asperger himself, and specifically treated within the education environment.

Key terms: Asperger syndrome, neuropsychological assessment, neuropsychological profile, attention deficit disorder, autism, high functioning autism, pervasive developmental disorders, personality disorder, non verbal learning disability.

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# **CHAPTER 1**

## **INTRODUCTORY ORIENTATION**

### **1.1 INTRODUCTION**

In this chapter, I will describe a group of children, whose challenging behaviour and specialised needs gave me the motivation and intent to study, research and provide meaningful intervention to them, their parents and their teachers. The group, labelled with the diagnostic term Asperger syndrome (AS), displays a set of behavioural characteristics which significantly affects the child's ability to socialise and communicate meaningfully.

### **1.2 AWARENESS OF THE PROBLEM AND STATEMENT OF THE PROBLEM**

My interest in this group of learners began after working in the field of Educational Psychology and being struck by a group of learners who presented with behavioural symptoms which were similar to those of attention deficit hyperactive disorder (ADHD). These learners however were "different". They noticeably did not respond to traditional therapeutic techniques to assist with difficulties with social skills, and were seemingly unable to change their mindset after attempts with psychotherapeutic techniques such as play therapy and psychotherapy. Teachers struggled with these learners. They did not respond to discipline measures adopted in the classroom setting and appeared to do "as they liked", often reacting aggressively when challenged by teachers or their peers. They typically struggled with handwriting and phonics, making reading and spelling problematic. Group work was problematic as these learners tended to do "their own thing", "in their own time". They generally played alone and tended to daydream a lot. This daydreaming was often diagnosed as ADHD – inattentive type, but the nature of their inattention was again "different". Their inattention seemed to be an intense focussed attention to an unknown internal stimulus and not an inability to sustain focussed attention as noted for ADHD. Furthermore, these learners struggled with changes in routine, often did not do

homework and generally did not manage when moving from one activity or classroom to the next. Many of these learners struggled with sensitivities, refusing to wear certain clothes, and generally disliking physical activities such as physical education and sports.

The above mentioned learners were clearly problematic in the schooling environment. Their parents were frustrated and worried. Many had been to several therapists and professionals where differing diagnoses had been given – and still the problems with the child remained. On analysis, the main problem appeared to be an inability to communicate effectively and not being able to “read” social cues. The learners themselves were bullied, verbalised wanting friends but did not seem to understand the subtleties of social interactions. Social cues seemed beyond their ability to comprehend.

I questioned the diagnostic categories given to many of these learners. Many of them, because of their social impairments and the nature of their attention difficulties, were given the diagnosis of ADHD. It seemed, on closer analysis, and taking their social difficulties into account that they had more in common with a diagnosis of autism, but at a much “higher” level of functioning. These learners were all in mainstream school and none had had a diagnosis within the autistic spectrum.

Whilst reading the related literature, a number of diagnostic categories seemed to fit many of the behavioural symptoms. Amongst these were semantic pragmatic disorder (SPD), non verbal learning disability (NLD), high functioning autism (HFA), deficits of attention, motor and perception (DAMP), ADHD and AS. The questions I asked concerning the characteristic overlapping symptoms and core deficits of each of these diagnostic categories led me to the research presented in this thesis.

I reasoned that to best help these learners, more understanding and knowledge needed to be gained about the actual way of thinking of the child. What is the neuropsychological profile of a child presenting with the behavioural symptoms noted above? If we understand the strengths and weaknesses at a neuropsychological level, we can start to assist the child, his parents and his teachers. It also became

apparent that more needs to be understood about the diagnostic category given to the child.

In my search for answers to assist these children, I read about the work of Hans Asperger. In his thesis, which was published in 1944, he described individual case studies of four children. These case studies had in common what he described as a “fundamental disturbance” which resulted in severe and characteristic difficulties in social integration (Asperger 1991:37). He described these children as having a personality disorder which required educational treatment which took into account their special difficulties. I noted that the children he was describing and the learners I was trying to help were very similar.

Asperger’s work, although published in 1944, remained within the German readership. Lorna Wing popularised his work after an English publication in 1981, in which she drew parallels between Asperger’s work and Leo Kanner’s work on autism (Mayes, Calhoun and Crites 2001:264). It was Lorna Wing who gave the name of Asperger syndrome to the type of child Asperger himself was describing. Since then, many researchers in the field of autism have contributed to the understanding of this group of individuals who are socially awkward, articulate, have communication difficulties and who often have interests and preoccupations which they pursue with intensity.

Although commonly known and referred to as Asperger syndrome (AS), it is defined in the *Diagnostic and Statistical Manual of mental Disorders, 4<sup>th</sup> edition, Text Revision* (DSM-IV-TR) as Asperger’s disorder (American Psychiatric Association 2000:80). It is to be noted that AS and Asperger’s disorder as defined in the DSM-IV-TR is to be used synonymously throughout this text. Asperger’s disorder is currently defined in the DSM-IV-TR under one of five categories of pervasive developmental disorders (PDD). PDD are characterised by severe impairment in several areas of development: reciprocal social interaction skills, communication skills, or the presence of stereotyped behaviour, interests and activities (American Psychiatric Association 2000:69). The other four categories under the umbrella term

of PDD are Autistic disorder, childhood disintegrative disorder, Rett's disorder and pervasive developmental disorder not otherwise specified (PDD-NOS).

Much debate has arisen and continues around the validity of AS as a diagnostic category in its own right. AS is recognised by most professionals in the field of autism as being part of an "autistic spectrum" and describes the individual with language skills, but difficulties with social interaction and communication, as well as ritualistic, stereotyped and repetitive interests and behaviour. Currently the term AS appears in most literature as synonymous with the term high functioning autism (HFA). To avoid entering into this debate and confusions with terminology, the term AS used throughout this thesis will be that as defined in the DSM-IV-TR as Asperger's disorder, a separate category of PDD.

The group of learners I have identified are diagnosed with AS (by definition in the DSM-IV-TR). I believe, however that there is much more to understand and "know" about these children. Only when a greater understanding at a neuropsychological level is attained, can one implement appropriate and effective intervention and treatment strategies for each child. If one examines Asperger's original work (Frith 1991:37-92), it is clear that Asperger believed in the treatment of these children using combined medical and educational intervention. Asperger conducted cognitive test batteries which included intelligence tests, but used the results qualitatively to try and understand the nature of the child's difficulties (Frith 1991:7). This led me to the decision to structure my thesis as case study research, detailing the neuropsychological profiles of learners with AS from a qualitative perspective.

Neuropsychology is a specialised field of psychology which focuses on how learning and behaviour are associated with the development of brain structure and systems. A neuropsychological assessment involves the intensive study of behaviour using standardized scales tests, questionnaires and interviews (Lezak, Howieson & Loring 2004:15). The assessment incorporates tests from different test batteries which aim to determine a child's functioning in areas of memory, attention, perception, coordination, language ability and executive skills.



To date there have been limited neuropsychological test batteries done on AS learners. A neuropsychological test battery which focuses on established patterns of deficit identified for AS learners will contribute to knowledge of the presenting disorder. Analysis of neuropsychological profiles of the AS learner will result in a more effective treatment plan for the AS learner.

The problem identified can be summarised as follows: Firstly the problem is in the nature of diagnosis and secondly in the traditional intervention given to those diagnosed. Diagnosis is made by professionals according to a set of behavioural symptoms, which are often overlapping with those that define other syndromes. The core deficits of the underlying disorder of AS is often not understood by each of the professionals who “treat” the child in isolation. There is a lack of knowledge and understanding at a professional level, causing confusion in parents and teachers and ineffective therapy from various therapeutic disciplines. A need to change the focus of diagnosis from presenting behavioural symptoms to identification of core deficits and understanding the way the learner “thinks” is necessary. Diagnosis needs to incorporate a neuropsychological profile for clarity between overlapping conditions. At present no neuropsychological test battery specific to AS exists. Understanding the difficulties of the learner from a neuropsychological level is essential for effective treatment. Once again, this requires a change in focus from treating the presenting behavioural symptoms to understanding the behaviour from “within”, thus making it possible to change the educational environment and educational strategies used with these learners.

These identified problems led to the formulation of the following research questions:

- What criteria should be used for diagnosis of AS?
- What is the neuropsychological profile of a learner with AS?
- Can patterns of neuropsychological strengths and weaknesses be identified from the results of a neuropsychological test battery?
- What do the scores of neuropsychological tests tell us about the underlying way of thinking by learners with AS?
- What is the educational or scholastic profile (reading, spelling, writing, comprehension and maths) of a child with AS?

- How does the scholastic profile relate to the neuropsychological profile?
- What is the most effective way of intervention for these learners?
- How are their parents and teachers best supported?

### **1.3 AIMS OF THE RESEARCH**

The research aims are:

- To conduct a literature study on AS which details the diagnosis, history, previous research specific to AS as defined by DSM-IV criteria, theories, overlapping symptoms with other disorders and educational intervention and treatment strategies currently being used.
- To collate a neuropsychological test battery (based on the literature study), specific for learners with AS. This will prove beneficial for future work in the field as it could be used in the process of diagnosis, in addition to analysis of presenting behavioural symptoms.
- To qualitatively investigate the neuropsychological results of the above neuropsychological assessment with identified learners with an existing diagnosis of AS. This will result in a neuropsychological profile of each learner (case study).
- To establish, by cross-case analysis of individual case studies, any patterns of neuropsychological strengths and weaknesses, as well as any additional, common patterns relating to behaviour, history and scholastic performance.

### **1.4 DELIMITATION OF THE RESEARCH**

To provide clarity and consistency, the following limitations have been set for the presenting thesis:

- The literature study will be restricted to articles and previous research done with AS that has used the diagnostic criteria of the DSM-IV for diagnosis.
- The case studies will be restricted to English speaking primary school learners within the Western Cape (South Africa).
- All cases will have an existing diagnosis of AS given by a professional (psychiatrist, paediatrician or psychologist) specialised in the field of PDD.

- The number of cases will be restricted to four.
- The test battery will not include any physical components or medical work-ups.
- The qualitative observations will be restricted to the cases within the schooling and testing environments.

## **1.5 ETHICAL CONSIDERATIONS**

All of the cases researched will have consent given by the parents or legal guardians to access the history of the learner (medical as well as scholastic). Permission from the parents will be given to conduct interviews with associated professionals (teachers and therapists) as well as observations within the schooling environment and permission to conduct the neuropsychological test battery.

The cases will not be referred to by name in this thesis or in any report resulting from this thesis. In this way the identity of the learners and their families will remain unknown to the readership.

## **1.6 RESEARCH METHOD**

The first research method used is a literature study. This literature study will comprise two chapters. The first chapter will focus on AS and related research and studies conducted with respect to AS. The second chapter will focus on neuropsychological assessment. The results from the literature study conducted on AS will be used to clarify the choice of tests used for the specific purpose of neuropsychological assessment of the AS learner.

The second research method is the implementation of a qualitative case study methodology. The decision to use a qualitative research method was based on two reasons. Firstly, there are a limited number of diagnosed cases with AS, making a quantitative study statistically insignificant. Secondly, a case study approach would be the most appropriate way of studying this topic. The individual's birth and medical history, parental history, scholastic history as well as socio-economic and emotional environment, all play an integral part in understanding the individual as a "whole".

These are all aspects which need to be taken into account alongside the focus of the study, being the investigation of the neuropsychological profile of the learner. A quantitative approach would be limiting to furthering the understanding of the individual as a whole.

The research method will be a collective case study. Fouché (2002:276) describes the collective case study as furthering the understanding of the population being studied, in this case the AS learner. The cases are chosen so that comparisons can be made between the cases and concepts in order to validate and extend existing theories. Four neuropsychological profiles of identified learners with AS will be detailed. These results will be analysed to establish patterns that may be present, and not for the purpose of generalisation (as in a quantitative study). Each case study will include the following:

- History (birth, personal, medical, scholastic).
- Diagnosis (of AS and any other disorders).
- Previous assessments and therapeutic interventions.
- Review of any neuropathology identified (in addition to AS).
- Behaviour during testing (qualitative results)
- Results and conclusions of the interviews, questionnaires qualitative observations and neuropsychological test battery conducted.
- Recommendations (including educational, psychological and emotional support and intervention to the learner, his parents and teachers).

## **1.7 CLARIFICATION OF CONCEPTS**

- Asperger syndrome: Asperger syndrome (AS) or Asperger's disorder is defined in the DSM-IV-TR (American Psychiatric Association 2000:80-84) in terms of specific criteria which includes qualitative impairments in social interaction; restricted repetitive and stereotyped behaviours, interests and activities; significant impairments in social and other important areas of functioning; no clinically significant delays in language and cognitive development and no clinically significant delays in age appropriate and self help skills. Despite being defined as Asperger's disorder in the DSM-IV-TR, it is commonly referred to as

Asperger syndrome. The differences in terminology are used interchangeably throughout this thesis, and will be abbreviated throughout the text as AS.

- Neuropsychological profile: A neuropsychological profile refers to the results obtained from a neuropsychological assessment.
- Neuropsychological assessment: A neuropsychological assessment involves a detailed study of behaviour by means of interviews, questionnaires and specific test batteries. The characteristic of neuropsychological assessment lies in the frame of reference that takes brain function as its point of departure.
- Treatment strategies: In this thesis the aim of the treatment strategies is to address the specific needs, educationally, behaviourally and socially of the AS learner. These strategies will be based on the interpretation of the results of the neuropsychological test battery.

## **1.8 RESEARCH PROGRAMME**

The thesis comprises seven chapters as outlined below. The chapter following this introduction is a theoretical chapter.

### Chapter 2: Literature Study - Asperger syndrome

The first of the literature studies will focus on AS. This chapter will include a history of AS, from the writings of Hans Asperger in 1944, to the current research on AS. Detailed views of the diagnosis of AS from different researchers will be presented. This leads to the DSM-IV-TR (2000) inclusion of AS as a diagnostic category. The prevalence of AS will be discussed. The literature will be studied for existing theories behind AS such as theory of mind. A number of studies with respect to neuropsychological profiles of AS have been done and the results of these will be highlighted. This will be followed by a section detailing previous research on overlapping symptoms of AS and a non verbal learning disability. Finally the work of researchers in the field of education and educational interventions will be incorporated to provide a framework for discussion of psycho-educational implications of the AS learner.

### Chapter 3: Literature Study – Neuropsychological assessment

The second literature study chapter will be detailing tests and questionnaires used in the neuropsychological assessment of AS. This chapter will involve a study of the existing neuropsychological tests with specific reference to areas identified from the literature study of AS. Different tests to study different areas of brain function will be highlighted. Amongst others, these will include tests for motor functions, visual motor integration, verbal functions, memory functions, executive functions, verbal and nonverbal intelligence and scholastic tests for academic functions. Specific tests for theories that were developed from the literature study specific for AS will also be detailed, including their underlying rationale for inclusion to be used as part of the neuropsychological test battery as detailed in chapter 4 on research methodology.

### Chapter 4: Research Methodology

In this chapter, details of the qualitative case study approach will be given. In order to study the AS learner in as much depth as possible, a case study research design was chosen. It was decided to further clarify the research as a collection of case studies of learners with AS. Analysis of results obtained from the neuropsychological assessment of the case studies will be used to make comparisons and see if a pattern of core strengths and weakness is present. A cross-case analysis of results will be used for conclusions relating to the neuropsychological profile of a learner with AS.

This chapter concludes with a specific test battery, collated from the results of Chapters 2 and 3. This test battery will be used to collect data from the case studies as described above. It should be noted that Lezak, Howieson and Loring (2004:14) point out the value of a neuropsychological test battery designed for use with particular disorders and specific deficit clusters for answering particular questions and meeting specific patient's needs.

## Chapter 5: Presentation of findings

This chapter will consist of the detailed write up of one of the four cases. The write-up of the other three cases will be included in an annexure to the thesis. The decision to present the findings in this manner is because of the repetitive nature of the presentation of findings of all four cases. The analysis of the findings is presented in a separate chapter, and therefore the reader of the thesis will be able to read the relevant findings of all four cases in a more meaningful way in Chapter 6. The reader may refer to the detailed write up of the cases, if required, by referring to the annexure. The presentation of findings will include all the data and results from interviews, case history, observations as well as the results of the neuropsychological test battery.

## Chapter 6: Analysis of findings, Summary and Recommendations

The first section of this chapter will summarise the findings of the four separate cases of AS learners. Recommendations will be made with respect to effective and appropriate treatment and intervention strategies for the learner, his parents and teachers.

The second section of this chapter will include a detailed analysis across the four cases and the results of the cross-case analysis of the neuropsychological profiles will be presented. The neuropsychological profiles will be compared with respect to strengths and deficit areas noted, and findings detailed. These results will be compared to results from previous research and further conclusions drawn with respect to the understanding of the AS learner.

## Chapter 7: Final Conclusions

The final chapter of the thesis will highlight the essential findings of the collective case studies. The implications of these findings are noted alongside a proposed model for distinguishing AS from other (related) disorders conclude the chapter.

## CHAPTER 2

### LITERATURE STUDY: ASPERGER SYNDROME

#### 2.1 INTRODUCTION

This chapter details the literature study on Asperger syndrome (AS). Starting with the history of AS, a discussion of the work of Hans Asperger (1906-1980) is presented. The influence of Lorna Wing, a British psychiatrist who introduced the term AS in 1981 is discussed (Wing 1981:115). Her influential paper which drew parallels between Asperger's work and the work of Kanner's "infantile autism" is detailed. Wing's contributions to the field are followed through this chapter including her most recent reflections published (Wing 2000:418) where she described herself in terms of opening "Pandora's box".

After the initial introduction of the term AS, a great deal of interest and research began in the field of autism. This research initially focussed on the issues of the diagnostic criteria of AS. This is detailed in section 2.3 which tracks the contributions made by researchers, resulting in the inclusion of AS as a subcategory of pervasive developmental disorders in the *Diagnostic and Statistical Manual*, 4<sup>th</sup> edition (DSM-IV, American Psychiatric Association 1994) and the *International Classification of Diseases*, 10<sup>th</sup> edition (ICD-10, World Health Organisation 1992). The latest text revision of the DSM-IV, the (DSM-IV-TR), published in 2000, includes a more detailed description of behavioural symptoms of AS. Debate continues around the diagnostic criteria and some researchers and clinicians from different parts of the world continue to use their own version of diagnostic criteria. It is common to refer to the "autistic spectrum" as a broad category which includes a range of impairments from the severe "Kanner autism" to high functioning autism (HFA), often synonymously referred to as AS (Attwood 2006:348; Kolb & Whishaw 2003:G2).

This tendency has impacted significantly on prevalence rates, discussed in section 2.4 of this chapter. It also significantly affects the analysis of results of previous research done on AS which follows within this chapter. To avoid confusion and



entering into the debate of HFA versus AS, this thesis only includes previous research conducted on AS when the research has been clear and specific regarding diagnostic criteria used. For this reason, DSM-IV (American Psychiatric Association: 1994) or ICD-10 (World Health Organisation: 1992) criteria have been used. This literature study has been restricted to studies which have used the same criteria. This is an important distinction, validating analysis of results with respect to previous research.

The literature study on previous research has been divided into sections. Section 2.5 details studies of AS with respect to neuropsychological assessments and section 2.6 details studies of AS with respect to overlapping symptoms with non verbal learning disabilities (NLD). Section 2.7 discusses studies conducted with respect to theories relating to autism and AS, namely theory of mind. The results from these studies will be combined with the literature study of Chapter 3 (neuropsychological assessment) which will result in the formulation of the test battery to be used in the present study, detailed in Chapter 4 (research methodology).

This chapter concludes with the results of the literature study with respect to educational intervention, strategies and management of children with AS.

## **2.2 HISTORY OF ASPERGER SYNDROME**

Hans Asperger was born in Vienna in 1906. He studied medicine and graduated from medical school in 1931. In 1938 he published an article, in German, which used the translated term “autistic psychopathy” to describe a cluster of behavioural difficulties observed in some of the children at his unit. This was followed up by a postgraduate thesis, published in 1944 and titled (translated) “Autistic Psychopathy in Childhood”. Attwood (2006:13) points out that a modern translation of the German psychological term “psychopathy” into English terminology would be “personality disorder”. The title of Asperger’s paper can thus be referred to as “Childhood Personality Disorder”. In this work he described four children, trying to understand and gain insight into their being (Frith 1991:5). In 1957 Hans Asperger became the director of the children’s hospital of the University of Innsbruck and in 1963 became

the director of a unit of special education at a children's hospital in Vienna. Asperger lived and worked in Austria until his death in 1980.

Hans Asperger is described by his daughter, Asperger-Felder, (2000: xii) as trying to adopt an intuitive approach to understanding children rather than an intellectual one. Asperger believed the path to understanding had to begin with the child himself. By observation he looked for parallels between physical constitution, emotional factors, motor activity, facial expressions, gestures, speech modulation (manner of speaking) and character traits. He believed close observation in this manner would lead to the assessment of the "innermost regions of the child". Asperger believed in pedagogical methods to identify the best developmental alternatives for the child.

Another Austrian clinician, Leo Kanner, born in Austria in 1894, studied medicine, and moved to the United States of America in 1924. In 1930 he set up America's first child psychiatry service within a paediatric hospital at the John Hopkins University school of medicine (Baron-Cohen & Klin 2006:1). Kanner described children with characteristics of social difficulties, repetitive behaviour, unusually narrow interests, and language and communication delays with a risk of general developmental delay and below average IQ. This subgroup described by Kanner became known as "classic autism", "Kanner-type autism" or "autistic disorder".

Both Asperger and Kanner described children with similar traits. Lorna Wing (1981:115-129), working at the institute of psychiatry in London, published a paper in which she described Hans Asperger's work to draw parallels between the children he described and those described by Kanner in 1944. It was this paper that popularised the work of Hans Asperger within the English speaking readership. Wing recommended that the term "Asperger syndrome" be used for children and adults who have autistic features but who talk grammatically and are not socially aloof (Mayes *et al* 2001:264). Wing's description of Asperger syndrome differed in some respects from Hans Asperger's original work. These differences will be detailed in the diagnosis section (section 2.3) of this chapter.

Wing's paper of 1981 (Wing 1981:115-129) presented evidence for regarding AS together with Kanner's syndrome as components of an autistic spectrum. Wing argued that the label AS was more useful than the label high functioning autism (HFA), as parents and professionals were more receptive to a condition called AS, which would give methods of management which were the same as those of HFA, and the connection to autism would be introduced to parents at a later stage. Wing stated her opinion that strict diagnostic criteria should be retained for autism, and that AS should be regarded as a subgroup within the autistic spectrum (Wing 1986:514).

After the publication of Wing's article, Frith (1991:37-92) translated and published Asperger's original paper into English. This publication widened the readership of Asperger's original work and many researchers in the field of autism began investigating the nature of these two conditions. One of the important issues to be studied and documented was in the problem and nature of diagnostic criteria for AS. This will be discussed in the following section.

### **2.3 DIAGNOSIS OF ASPERGER SYNDROME**

Lorna Wing published an article in which she gave an account of 34 cases (from 5 years to 35 years) that were personally examined and diagnosed by herself (Wing 1981:115). Wing's article describes Asperger's descriptions as well as giving her own modifications. The condition she described as Asperger syndrome (AS) sparked research and fuelled debate as to diagnostic criteria and diagnostic validity of AS that continues to date. This section of the literature study details the diagnostic criteria used by different researchers and clinicians from Wing's criteria to the latest conclusions published in the DSM-IV-TR (American Psychiatric Association 2000:80-84).

Wing described AS in terms of characteristics of speech, non verbal communication, social interaction, repetitive activities and resistance to change, motor coordination, skills and interests. These have been included in Table 2.1, which details the distinguishing characteristics of Asperger's "Childhood Personality Disorder" as

described by Asperger himself and the modifications made by Wing in what she defined as AS.

Table 2.1 Distinguishing characteristics as described by Asperger and modified by Wing (Wing 1981:116-119)

	Asperger's description	Modifications by Wing
Speech	<ul style="list-style-type: none"> <li>- speech at normal age</li> <li>- full command of grammar, but difficulty using pronouns</li> <li>- content abnormal (pedantic – lengthy disquisitions on favourite subject)</li> <li>- use of invented words at times</li> <li>- vocal intonation monotonous / droning / exaggerated</li> <li>- subtle jokes not understood</li> <li>- simple verbal humour may be appreciated</li> </ul>	<ul style="list-style-type: none"> <li>- babbling limited</li> <li>- slow to talk</li> <li>- content of speech impoverished – language gives the impression of being learned by rote</li> <li>- meanings of long / obscure words may be known, but not those of words used everyday</li> <li>- lacks common sense</li> <li>- comprehension of abstract or unfamiliar concepts is impaired</li> </ul>
Non verbal communication	<ul style="list-style-type: none"> <li>- little facial expression (except for strong emotions such as anger / misery)</li> <li>- gestures limited or large and clumsy</li> <li>- comprehension of other's gestures poor</li> <li>- at times earnestly gaze at mother's face as if searching for meaning which alludes them</li> </ul>	<ul style="list-style-type: none"> <li>- lack of urge to communicate as a toddler (such as smiling, gestures, bringing toys)</li> </ul>
Social interaction	<ul style="list-style-type: none"> <li>- impairment of two-way social interaction</li> <li>- lack of ability to understand and use the rules governing social behaviour</li> <li>- social behaviour is naïve and peculiar</li> <li>- does not have the intuitive knowledge to adapt approaches and responses to fit in with the needs and personality of others</li> </ul>	<ul style="list-style-type: none"> <li>- lack of normal interest in human company from birth</li> <li>- answers "yes" to any question to short cut conversation</li> <li>- does not take part appropriately in two way social interaction</li> <li>- not influenced by social experiences</li> </ul>

	Asperger's description	Modifications by Wing
Repetitive activities and resistance to change	<ul style="list-style-type: none"> <li>- enjoys spinning objects / watching them move</li> <li>- attached to particular possessions and unhappy when they are away from familiar places</li> </ul>	<ul style="list-style-type: none"> <li>- pretend play is repetitive in that the same theme is played over and over.</li> </ul>
Motor coordination	<ul style="list-style-type: none"> <li>- gross motor is clumsy / uncoordinated</li> <li>- posture / gait is odd</li> <li>- poor at motor skills of games / sports</li> <li>- poor ability to write and draw</li> <li>- stereotyped movements of body and limbs</li> </ul>	<ul style="list-style-type: none"> <li>- ill coordinated in posture, gait and gestures</li> </ul>
Skills and interests	<ul style="list-style-type: none"> <li>- excellent rote memories</li> <li>- intensely interested in 1 or 2 subjects</li> <li>- absorbs details of chosen field / absorbing facts but little meaning of facts learnt</li> </ul>	<ul style="list-style-type: none"> <li>- thought processes confined to narrow, pedantic, literal but logical chain of reasoning</li> <li>- special abilities based on rote memory – comprehension is poor</li> </ul>
Experiences at school	<ul style="list-style-type: none"> <li>- being bullied</li> <li>- becoming anxious and afraid</li> <li>- follows own interests regardless of teachers instructions and activities of the rest of the class</li> <li>- over-sensitive to criticism (especially in adolescence)</li> </ul>	
Epidemiology	<ul style="list-style-type: none"> <li>- more common in boys than girls – but no study with specific diagnostic criteria</li> </ul>	

Following from Wing's publication (Wing 1981:116-119), Tantam (1988) from the United Kingdom, Gillberg and Gillberg (1989) from Sweden and Szatmari, Bremner and Nagy (1989) from Canada published articles on their responses to the diagnostic criteria used for the term AS.

Tantam (1988:252) discussed his views of AS as a diagnostic entity, concluding that it was best to reserve AS as a descriptive term for autistic children who displayed certain characteristics. These were described as using language fluently but being

unable to make adjustments to fit different social contexts. Socially, they were described as wishing to be sociable but failing to make relationships with peers. Marked impairments of non verbal expressiveness which affects tone of voice, facial expression, gesture, gaze and posture were noted. They were reported to be conspicuously clumsy and develop idiosyncratic but engrossing interests.

Gillberg and Gillberg (1989) developed a set of diagnostic criteria for AS which were originally intended for research, and later these were elaborated and published as a set of diagnostic criteria for AS. These criteria are quoted by Attwood, as being the closest resemblance of the original descriptions of Asperger (Attwood 2006:36) and have been included in Table 2.2 below. A marked difference between these criteria however, is Gillberg’s inclusion of delayed speech development, as opposed to no speech developmental delays as originally described by Asperger himself.

Table 2.2 Diagnostic criteria for Asperger syndrome according to Gillberg and quoted by Attwood (2006:37)

1. Social impairment (extreme egocentricity) (at least two of the following)	<ul style="list-style-type: none"> <li>- inability to interact with peers</li> <li>- lack of desire to interact with peers</li> <li>- lack of appreciation of social cues</li> <li>- socially and emotionally inappropriate behaviour</li> </ul>
2. Narrow interest (at least one of the following)	<ul style="list-style-type: none"> <li>- exclusion of other activities</li> <li>- repetitive adherence</li> <li>- more rote than meaning</li> </ul>
3. Repetitive routines (at least one of the following)	<ul style="list-style-type: none"> <li>- on self, in aspects of life</li> <li>- on others</li> </ul>
4. Speech and language peculiarities (at least three of the following)	<ul style="list-style-type: none"> <li>- delayed development</li> <li>- superficially perfect expressive language</li> <li>- formal pedantic language</li> <li>- odd prosody, peculiar voice characteristics</li> <li>- impairments of comprehension including misinterpretations of literal and implied meanings</li> </ul>
5. Non verbal communication problems (at least one of the following)	<ul style="list-style-type: none"> <li>- limited use of gestures</li> <li>- clumsy / gauche body language</li> <li>- limited facial expression</li> <li>- inappropriate expression</li> <li>- peculiar, stiff gaze</li> </ul>
6. Motor clumsiness	<ul style="list-style-type: none"> <li>- Poor performance on neuro-developmental tests</li> </ul>

Another team of researchers, Szatmari *et al* (1989:554) studied a group of 28 “isolated and odd” children using the term AS and compared them with a group of high functioning autistic children. The results suggested robust differences between the groups on early history and outcome. They did have similar social impairments, deviant aspects of language development and a lack of imaginative play. They concluded that the disorders shared a common etiology, but differed primarily in severity. The differences however were considered sufficient to warrant the retention of the term AS. Their proposed criteria for AS, separating it from autistic disorder, is given in Table 2.3 below.

Table 2.3 Proposed diagnostic criteria for Asperger syndrome as presented by Szatmari *et al* (1989:558)

1. Solitary, as manifested by at least two of:	<ul style="list-style-type: none"> <li>- no close friends</li> <li>- avoids others</li> <li>- no interest in making friends</li> <li>- a loner</li> </ul>
2. Impaired social interaction as manifested by at least one of:	<ul style="list-style-type: none"> <li>- approaches others only to have own needs met</li> <li>- clumsy social approach</li> <li>- one-sided response to peers</li> <li>- difficulty sensing feelings of others</li> <li>- detached from feelings of others</li> </ul>
3. Impaired nonverbal communication as manifested by at least one of:	<ul style="list-style-type: none"> <li>- limited facial expression</li> <li>- unable to read emotion from facial expression of the child</li> <li>- unable to give messages with eyes</li> <li>- does not look at others</li> <li>- does not use hands to express oneself</li> <li>- gestures are large and clumsy</li> <li>- comes too close to others</li> </ul>
4. Odd speech as manifested by at least two of:	<ul style="list-style-type: none"> <li>- abnormalities in inflection</li> <li>- talks too much</li> <li>- talks too little</li> <li>- lack of cohesion to conversation</li> <li>- idiosyncratic use of words</li> <li>- repetitive patterns of speech</li> </ul>
5. Does not meet DSM-III-R criteria for autistic disorder	

For the results of research to be analysed, and theory from research to be built upon, it is imperative that the same diagnostic criteria is used when selecting subjects for research objectives. For this to happen, diagnostic criteria needs to be standardised throughout the world. Two diagnostic textbooks address this issue, one published by the World Health Organization (WHO), and the other published by the American Psychiatric Association (APA). In the DSM-IV (APA: 1994) and the ICD-10 (WHO: 1993), AS was added as a category of pervasive developmental disorders, thus achieving international uniformity (Minshew, Meyer and Dunn 2003:865). Peeters (1997:1) states the criteria to be used for diagnosis should be those defined by the medical profession, being the DSM-IV or the ICD-10 and stresses the importance of the correct diagnostic label being given to a child. The diagnosis determines the help the child is given, and therefore an argument for the right diagnostic label is a prerequisite for proper treatment (Peeters 1997:7).

Peeters and Gillberg (1995:32) quote the diagnostic criteria for AS as given by the ICD-10 (WHO 1993) as follows:

- A lack of any clinically significant general delay in spoken language, receptive language or cognitive development. Diagnosis requires that single words should have developed by 2 years of age or earlier and that communicative phrases be used by 3 years of age or earlier.
- Self help skills, adaptive behaviour and curiosity about the environment during the first three years should be at a level consistent with normal intellectual development.
- Motor milestones may be somewhat delayed and motor clumsiness is usual (although not a necessary feature). Isolated special skills, often related to abnormal preoccupations are common, but are not required for diagnosis.
- Qualitative impairment in reciprocal and social interaction (criteria for autism).
- Restricted, repetitive, and stereotyped patterns of behaviour, interests and activities (criteria for autism).

The diagnostic criteria from the text revised edition of the DSM-IV, the DSM-IV-TR (APA 2000:80) for AS have been chosen as the standard used for cases selected in this thesis. Details of these diagnostic criteria follow. AS is included under the



cluster of disorders referred to as pervasive developmental disorders (PDD). The disorders in this category (PDD) share the same “autistic like” behaviours. The DSM-IV-TR (2000) includes autistic disorder, AS, pervasive developmental disorder not otherwise specified (PDD-NOS), childhood disintegrative disorder and Rett’s disorder under the umbrella term PDD. Minshew *et al* (2003:864) summarise the differences between these by variations in severity relative to age and general level of function. AS is differentiated by an absence of abnormalities in language development. Rett’s disorder was included because of regression at presentation that also characterises 25% of cases of autism. Childhood disintegrative disorder refers to children experiencing neurological deterioration or regression between 2 and 12 years after the establishment of extensive language. The children, regressing at 2-3 years of age after developing extensive language are noted to be properly diagnosed as having childhood disintegrative disorder, and not autism.

The DSM-IV-TR criteria have been included in Table 2.4 at the conclusion of this section on diagnosis. This table includes the latest text revisions, and summarises the understanding of AS as published by the APA (APA 2000).

Following the publication of the DSM-IV and ICD-10 with the inclusion of AS as a separate category alongside autism, Schopler (1996:109), as editor of the journal of autism and developmental disorders, spoke out strongly against the inclusion of AS as a separate category, stating that for a disability to have its own classification, it should have a distinct causal mechanism and a particular course or intervention. Schopler stated that no such meaningful distinctions had been made or been established for AS and that AS is not significantly different from high functioning autism, and therefore should not have a separate label.

Other researchers and clinicians had different ideas. Szatmari (2000:405) states that both autism and AS share at a fundamental level, a primary disinterest in intersubjectivity – the world of other people and their place in it. Szatmari states that it is not useful to think of autism and AS as “on a continuum”, but it is more useful to provide the distinctions, believing there is enough variation in their outcome that is clinically useful to parents and clinicians to distinguish between them. Szatmari

(2000:411) claims it is more useful to assess the clinical usefulness of a separate diagnostic category than its validity, stating that the fundamental marker for the diagnostic category of AS is the onset of fluent language, which is an important prognostic marker. Simpson (2003:986) states that autism and AS are distinct. He argues that although sharing common difficulties in social relatedness and obsessiveness, they can be distinguished. Simpson (2003:986) compares the distinction of autism and AS to that between schizophrenia and schizoid personality disorder. A broad definition (as in autistic spectrum disorder), he argues, risks confusion and over diagnosis.

Wing (2000:418) reacted to the inclusion of AS in the DSM-IV by clarifying that her original purpose was to emphasise the strong possibility that the syndrome which she labelled AS was part of an autistic spectrum and that there were no clear boundaries between them. Wing (2000:418) stated that the inclusion of AS as a sub grouping of PDD in the DSM-IV was unsatisfactory. The reasons Wing states for this being unsatisfactory are:

- the criteria currently used for AS have moved a long way from Asperger's own descriptions
- the criteria are not easily implied in clinical practice
- the criteria have no external validity

Wing (2000:418) concludes that if a name was to be given to such a *new diagnostic construct* (as included in the DSM-IV) it should carry a name other than AS. Wing argues that the term AS is linked with autism. Wing (2000:424) argues that a child can begin his life with typical Kanner autism and grow into the pattern described by Asperger. Wing finally states the irony of having been responsible for using the term AS in her 1981 paper and, in 2000, strongly argues against its existence as a separate entity (Wing 2000:430).

Despite the publication of specific criteria in the DSM-IV, clinicians and researchers in the field appear to continue to create their own definitions for AS. This is apparent in the publication by Tantam (2000:373) who states the core syndrome of AS in terms of the inclusion of the following criteria:

- Impaired nonverbal communication

- Impaired speech and language
- Impaired intersubjectivity
- Idiosyncratic, stereotyped, asocial interests and activities
- Incoordination

Attwood (2006:42) states that early language delay is not an exclusion principle for AS and further states that it should actually be an inclusion criteria. Attwood (2006:42) claims that the focus during diagnostic assessment should be current language use (the pragmatic aspects of language) rather than the history of language development. He further criticises DSM-IV criteria for failure to make adequate reference to problems with sensory perception and integration, especially auditory sensitivity and hypersensitivity to light intensity, tactile experiences and aromas (Attwood 2006:43).

Klin, Pauls, Schultz and Volkmar (2005:222) summarise three different approaches which tend to be used in current research. These are modified DSM-IV or ICD-10 criteria, treating AS and high functioning autism interchangeably or using unique investigator-defined criteria. These different diagnostic approaches prevent the development of standardised instruments to be used for diagnosis and prevent cross-site collaboration of research. Klin *et al* (2005:222) further state that the DSM-IV definition is being ignored in clinical practice with the term AS being used as synonymous with high functioning autism or pervasive developmental delay – not otherwise specified (PDD-NOS). This is resulting in a rift between DSM-IV and research and clinical practice, confusing and alienating investigators, clinicians and parents.

The continued use of clinicians and researcher's own version of diagnostic criteria will continue to confuse and fuel debate regarding AS. Volkmar and Klin (2000:25) note that the definition of AS should be considered tentative and in need of empirical validation, and that improvements in the definition will be made as in the evolution of any diagnostic concept. Researchers, and clinicians, should be responsible in their uses of terms and labels, and should refer to international standardisations. If researchers' definitions differ from the international standardisations (which is the

natural process of research and evolutionary diagnostic concepts), they should state this clearly in their research. This point is echoed by Mayes *et al* (2001:265) who point out that definitions of AS continue to vary from person to person – even after the DSM-IV publication. Studies that have been done (and will be done) in the field require consideration of the particular researcher with respect to the definition they are using for AS, otherwise they are of limited help in clarification and generalisation of issues studied.

The text revision of the DSM-IV – the DSM-IV-TR (APA 2000:80) is the most recent text on the diagnosis of AS. A significant amount of additional information has been provided to differentiate AS from other pervasive developmental disorders, particularly with respect to contrasting it from Autistic Disorder. It is stated in the text that Asperger's disorder is also termed Asperger's syndrome. Table 2.4 gives the diagnostic criteria, as well as additional information provided by the text in the DSM-IV-TR. These diagnostic criteria, as separate from autism, have been used in the selection of case studies for this thesis.

Table 2.4 Diagnostic criteria for Asperger's disorder (AS) including the text revision of the DSM-IV-TR (APA 2000:80-84)

	DSM-IV diagnostic criteria	Text Revision
A	<p>Qualitative impairment in social interaction, as manifested by at least two of the following:</p> <ul style="list-style-type: none"> <li>- marked impairment in the use of multiple nonverbal behaviours such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction</li> <li>- failure to develop peer relationships appropriate to developmental level</li> <li>- a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (i.e. by lack of showing, bringing, or pointing out objects of interest to other people)</li> <li>- lack of social or emotional reciprocity</li> </ul>	<ul style="list-style-type: none"> <li>- Failure to develop peer relationships at age appropriate developmental level (and differs at different ages). Young children show a lack of interest in social interaction; older children show an interest and willingness to making friends, but lack understanding of conventions of social interaction.</li> <li>- Lack of social and emotional reciprocity (not actually participating in simple play/games).</li> <li>- Social deficit is typically manifested by eccentric and one-sided social approaches to others (pursuing conversation regardless of other's reaction) rather than social and emotional indifference.</li> </ul>
B	<ul style="list-style-type: none"> <li>- Restricted repetitive and stereotyped patterns of behaviour, interests, and activities as manifested by at least one of the following:</li> <li>- encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus</li> <li>- apparently inflexible adherence to specific, non-functional routines or rituals</li> <li>- stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements)</li> <li>- persistent preoccupation with parts of objects</li> </ul>	<ul style="list-style-type: none"> <li>- Restricted repetitive patterns of behaviour are primarily manifest in development of encompassing pre-occupations about circumscribed topic or interest about which the individual can amass a great deal of facts and information. These interests are pursued with great intensity and to the exclusion of other activities.</li> <li>- Social deficits and restricted patterns of interest, activities and behaviour are the source of considerable disability.</li> </ul>

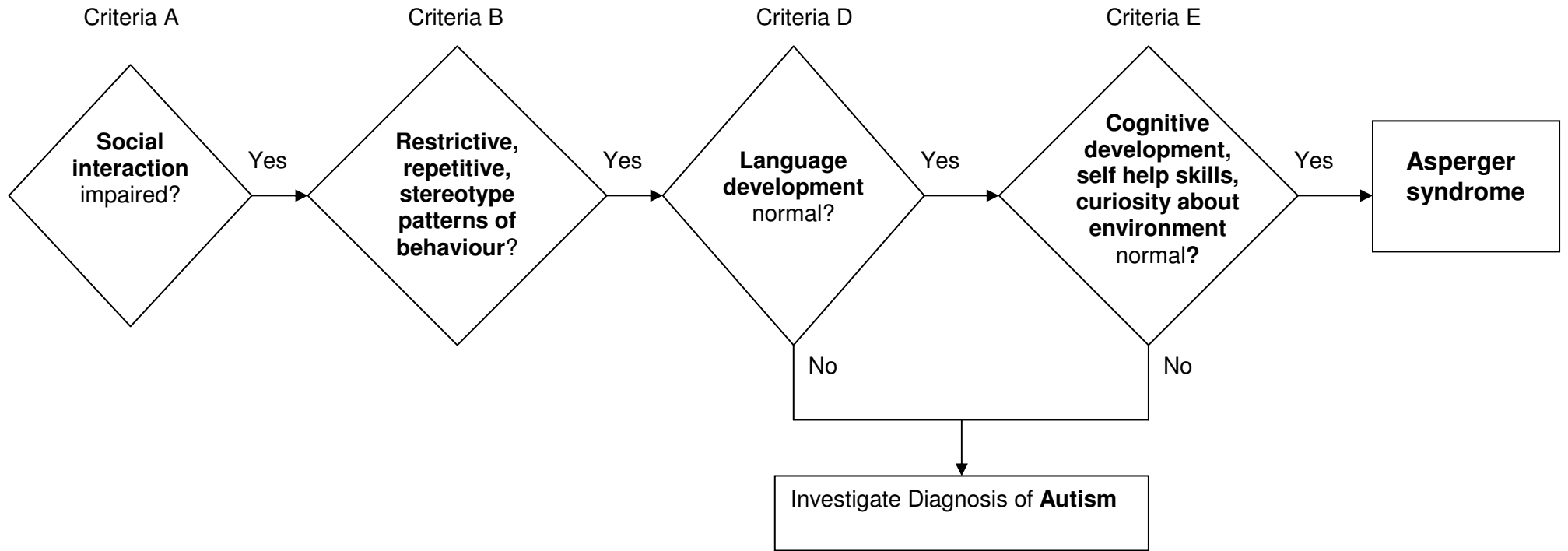
	DSM-IV diagnostic criteria	Text Revision
C	The disturbance causes clinically significant impairment in social, occupational, or other important areas of functioning.	<ul style="list-style-type: none"> <li>- Difficulties in communication may result from social dysfunction and the failure to appreciate and utilise conventional rules of conversation, failure to appreciate non verbal cues and limited capacities for self-monitoring.</li> </ul>
D	There is no clinically significant delay in language (e.g. single words used by 2 years, communication phrases used by 3 years).	<ul style="list-style-type: none"> <li>- Single non echoed words are used communicatively by age 2 years and spontaneous communicative phrases by age 3 years.</li> <li>- More subtle aspects of social communication (e.g. typical give-and-take in conversation) may be affected.</li> </ul>
E	There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behaviour (other than in social interaction), and curiosity about the environment in childhood.	<ul style="list-style-type: none"> <li>- During the first 3 years of life, added to the description of (E).</li> <li>- Concerns by parents are normally only voiced after about 3 years or when the child is exposed to a play group or pre-school where social difficulties become apparent.</li> <li>- Mental retardation is not usually observed.</li> <li>- Variability of cognitive functioning: often with strengths in areas of verbal ability (vocabulary and rote auditory memory) and weaknesses in non verbal ability (visual-motor and visual-spatial).</li> <li>- Motor clumsiness and awkwardness may be present but usually relatively mild.</li> </ul>
F	Criteria are not met for another specific pervasive developmental disorder or schizophrenia.	<ul style="list-style-type: none"> <li>- Diagnosis of AS and schizophrenia may co-exist if onset of AS clearly preceded onset of schizophrenia.</li> </ul>

	DSM-IV diagnostic criteria	Text Revision
Other		<ul style="list-style-type: none"> <li>- Symptoms of over activity and inattention are frequent in AS and many individuals with this condition receive a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) prior to diagnosis of AS.</li> <li>- School age children with good verbal abilities may mask the severity of the child's social dysfunction and may mislead caregivers and teachers (by attributing behavioural difficulties to wilfulness or stubbornness in the child).</li> <li>- Interest in formal social relationships may increase in adolescents as individuals learn ways of responding more adaptively to their difficulties (applying specific verbal rules in stressful situations).</li> <li>- Course is continuous and lifelong.</li> </ul>

It is clear from the above discussion on diagnosis of AS, that not all researchers are using the same diagnostic criteria for AS and this needs to be acknowledged before results from the literature study can be generalised. It is essential that literature based on AS be examined for precise diagnostic criteria used for samples in research. Without this, the research is not useful, as the results of the research may be providing results which are inherent in the sample. One of the areas where this is particularly noticeable and challenging, is in research concerning prevalence of AS. This is discussed in section 2.4 which follows.

The discussion of diagnosis of AS is concluded with the Figure 2.1 which relates to the DSM-IV-TR as described in Table 2.4. It illustrates the distinguishing criteria for diagnosis of AS as used in the selection of case studies for this thesis.

Figure 2.1 Schematic presentation of diagnostic criteria which separates diagnosis of autistic disorder from AS





## 2.4 PREVALENCE OF ASPERGER SYNDROME

Studies regarding the prevalence rates of AS are directly related to the diagnostic criteria used. Prevalence rates quoted should therefore be used with caution.

The first publications on the prevalence rates of AS were done by the research team from the University of Göteborg (Sweden). Gillberg and Gillberg (1989:631) reported estimated findings of prevalence rates of 10-26 per 10 000 children. These estimates were based on previous studies of children with deficits of attention, motor control and perception (DAMP) as well as previous findings of infantile autism. These findings were followed up by Ehlers and Gillberg (1993:137) who did a total population study of all school children (7-16 years of age) in the Göteborg borough. The male to female ratio was 4:1 and the prevalence rate 3,6 per 10 000 children. These results are to be used with caution as the diagnostic criteria used for the sample of AS were those of Gillberg (refer Table 2.2) and the study was completed before the DSM-IV publication.

Chakrabarti and Fombonne (2001:3093) surveyed 15 500 children in Staffordshire, England, aged between 2,5 years and 6,5 years with the aim of estimating prevalence of pervasive developmental disorders using DSM-IV criteria. Results concluded estimated prevalence of 62,6 per 10 000 (1:160) for children with PDD. Their survey differentiated between the pervasive developmental disorders and they clarify that 71,7% of the cases making up these figures were found in the mild end of the spectrum (pervasive developmental disorders – not otherwise specified and AS). Autistic disorders accounted for only 27% of the cases. This has important implications for intervention since the majority of these children (on the pervasive developmental delay spectrum) will require education in mainstream schools with the provision of individual support (Chakrabati & Fombonne 2001:3098). Fombonne (2003:365) more recently conducted an epidemiological survey of autism and other pervasive developmental disorders. In this update, he refers to the rate of AS specifically as not being well established with a conservative figure of 2,5 per 10 000 quoted.

A study of the prevalence rate of autistic spectrum disorders (ASD) was conducted by Webb, Morey, Thompsen, Butler, Barber and Fraser (2003:377). This study was however not AS specific, but studied the prevalence rate of autistic spectrum disorders (not differentiating between autism and AS). The study was extensive, using the autism spectrum screening questionnaire on 11 692 children (aged 7 to 11 years) in primary schools in Cardiff (Wales). Prevalence rates for autistic spectrum disorders were found to be 25 out of 10 000.

The increase in prevalence rates for autistic spectrum disorders have been recognised by clinicians and researchers in the field. Minshew *et al* (2003:863) refer to the increase in prevalence rates from the pre 1980's estimates of 4,5 per 10 000 for infantile autism to 60 per 10 000 for autistic disorder, AS and pervasive developmental disorder – not otherwise specified. Wing (2000:423) points out that the rise in prevalence rates of “autism” can be attributed to the fact that the earlier studies used Kanner's descriptions of autism (prior to 1981) and the later studies are wider, while still referring to autism as if all the criteria were the same. Prior (2003:81) reports that the increases in rates of autistic spectrum disorder are due to changes in views about autism. Prior (2003:81) states that AS and high functioning autism are the same condition, again, making it difficult to isolate AS specific studies.

Prevalence rates for pervasive developmental disorders of 1:160 (Chakrabati & Fombonne 2001:3093) are clearly very high and an effort should be made to clarify the disorder of AS. At this stage, no conclusive prevalence rates for AS specifically can be quoted.

One way of clarifying a disorder is to study the neurocognitive profiles of individuals with the disorder in an attempt to identify patterns of strengths and weaknesses. Studies with respect to neurocognitive profiles of children with AS have been conducted and these studies are discussed in the following section.

## **2.5 STUDIES WITH RESPECT TO ASPERGER SYNDROME**

Most of the research that has been done involving AS has been in the form of comparative studies involving AS. Of those researched, most have been a

comparison of AS and autism, including high functioning autism (Ozonoff, Rogers & Pennington (1991); Szatmari, Tuff, Allen, Finlayson & Bartolucci (1990), Manjiviona & Prior (1995), Klin, Volkmar, Sparrow, Cicchetti & Rourke (1995), and Klin, Pauls, Schultz & Volkmar (2005)). Ehlers, Nyden, Gillberg, Sandberg, Dahlgren, Hjelmquist and Oden (1997) did a comparison of AS, autism and deficits of attention, motor control and perception (DAMP) involving a comparative study of cognitive profiles of a hundred and twenty children. The criteria used to distinguish the AS group was that of Gillberg (refer Table 2.2) and six of the sample of forty AS children had delays in language development. One study (Gilchrist, Cox, Rutter, Green, Burton & Le Couteur 2001) compared AS, high functioning autism and conduct disorder. Miyahara, Tsujii, Hori, Nakanishi, Kageyama and Sugiyama (1997) compared AS with learning disability and Green, Baird, Barnett, Henderson, Huber and Henderson (2002) compared AS with specific developmental disorder of motor function. Happé, Booth, Charlton and Hughes (2006) examined profiles of executive function of two groups of children. One group had a diagnosis of attention deficit hyperactive disorder and the other group a diagnosis of autism spectrum disorder.

Of the above comparative studies only five specified and used the definition of AS as defined by the DSM-IV or ICD-10 (Gilchrist *et al*, Green *et al*, Manjiviona & Prior, Ozonoff *et al* and Klin *et al*). The rest of the studies adapted their definition by disregarding language criteria of AS, and included in their research samples individuals with a history of early language delays, or in the case of Happé *et al*, grouped high functioning autism and AS together and defined the group as autistic spectrum disorder. These results mostly conclude that AS, autism and high functioning autism do not show significant differentiation. It should however be noted, that by definition the groups they were comparing were not differentiated according to DSM-IV criteria, and therefore circular reasoning was affecting these results (the groups being compared were on the same variables used to distinguish between the groups).

Three studies used a research design involving only AS samples. Barnhill, Hagiwara, Myles and Simpson (2000) did an analysis of thirty seven cognitive profiles using the Wechsler intelligence scale for children (WISC). In this study however, no criteria for AS were described, making it unclear which diagnostic

criteria were used for their definition of AS. The research team, whose work will be detailed in the next section of studies involving non verbal learning disabilities, is Gunter, Ghaziuddin and Ellis (2002) who gave statistical results of eight individuals with AS, on an extensive neuropsychological test battery for right hemisphere functioning. A study was conducted by Church, Alisanki and Amanullah (2000:12) who addressed the issue of social, behavioural and academic experiences of 40 children between 3 and 15 years who had been given a diagnosis of AS as based on the DSM-IV. Of note was that of the sample, 67% experienced auditory sensitivities, 62% tactile sensitivities and 73% were described as clumsy. The study looked at differing issues within the different schooling periods which are summarised in Table 2.5 that follows. It is of interest to note the different diagnoses given at different stages of the child's schooling. The most common "other diagnosis" being ADHD which was later diagnosed as oppositional defiant disorder or conduct disorder as the children got older. Diagnostic confusion effects treatment and educational interventions. If these are not properly targeted more serious behaviour and emotional disorders emerge as the child gets older.

Table 2.5: Summary of different diagnoses and behavioural symptoms at different levels of schooling of a study of children with AS (Church *et al* 2000:12-20)

	Preschoolers (3 – 5 years)	Elementary school (5-11 years)	Middle School (12-14 years)	High school (14 – 17 years)
Social skills	Difficulty initiating, maintaining relationships, with other children Misread social cues, lacked spontaneity	64% diagnosed AS. Before this diagnosis, 92% had carried other diagnoses 20% had diagnosis ADHD and 15% had the diagnosis of autism. Social skills “stiff” no reciprocal relationships. The inability to take the perspective of another was the root of ineffective social communication. Two groups of social interaction were noted, either quiet, unassuming or exuberant, active, violated social boundaries “in your face”	Of these children, 38% had diagnosis of oppositional defiant disorder or conduct disorder. Defiant, manipulative, difficult. 46% seeing psychologists.  Recurring theme: inability to understand the depth and meaning of the emotional expression of others. Over-reacted & felt rejected. Odd body language, socially awkward, variable eye contact	Social skills inappropriate. Unable to see consequences of actions
Behavioural set	Strong need for routine & few rituals; tantrums when routine broken; repetitive stereotyped behaviour; collecting toys, lining up toys; parallel play	Rules based, became upset when rules violated. Self-talk (sometimes humming/drumming) but little spinning or repetitive, stereotyped. Need for sameness and specific order some obsessive compulsive behaviour appeared.	Failing to follow through with a plan resulted in anxiety, frustration, tantrums, verbal abuse	Need to know plans for day and be alerted to changes in activities. Transitions could be difficult

	Preschoolers (3 – 5 years)	Elementary school (5-11 years)	Middle School (12-14 years)	High school (14 – 17 years)
Sensory issues	67% had sensory issues	Motor clumsiness, 58% attended occupational therapy	30% had some tactile /auditory sensitivities but to no large degree	
Language skills	88% history of either normal or early language emergence. Hyper verbal in area of interest.	Pragmatic language problems. 96% receiving speech and language services. “Talking but not saying anything”. But could hold their own in topics of interest. Difficulty modulating voices		
Academically		Most excelled in maths and computer skills. Reading comprehension difficult unless material was factually based. Handwriting very difficult. Often very good readers and many did exceptionally well academically	Greatest problem was to motivate them to anything outside of their own area of interest.	Behavioural issues drive to specialised placement Doing advanced courses in physics and computers. All doing well at maths. English the most difficult subject – especially creative/analytical writing. Difficulty organising thoughts. Writing almost illegible. There was however one gifted artist and one gifted pianist

Most studies that have been conducted with AS are of a comparative nature and studies that included AS as defined by DSM-IV or ICD-10 are discussed below. After inclusion of AS in the DSM-IV as a subtype of pervasive developmental disorder, the research team of Szatmari, Archer, Fisman, Streiner and Wilson (1995:1662) published the results of a comparative study of 47 children with a diagnosis of autism and mean of 65,1 months and 21 children with a diagnosis of AS and mean age of 68,6 months. The groups were differentiated on the basis of delayed and deviant

language development. The research aimed at determining whether the two groups differed on variables that were relatively independent of the distinguishing criteria. Conclusions from this study indicate that AS as a group demonstrate robust differences across other pervasive developmental disorder symptoms, adaptive behaviours and cognitive measures of language competence. No differences existed on aspects of non verbal communication, non verbal cognition or motor development.

Ozonoff, South and Miller (2000:29) did a similar study comparing a group of 12 adolescents (mean age 13,9 years) with AS and a group of 23 adolescents (mean age 13,3 years) with a diagnosis of high functioning autism. Both groups were defined according to DSM-IV criteria. Results from the study found that mean verbal intelligence (VIQ) was 120 and higher than mean non verbal or performance intelligence (PIQ) of 107,8 in the AS group. Two cognitive tests could specifically differentiate between the AS and high functioning autistic group. These were the comprehension subtests of the WISC and the expressive scale of the clinical evaluation of language fundamentals which both favoured the AS group. The AS group also had better imaginative play and creative abilities. As a whole, the AS group generally demonstrated less severe symptoms than the autistic group. Ozonoff *et al* (2000:29) concluded that AS is on the same spectrum as other autistic syndromes and differ primarily in degree of impairment and argued against separate labels for AS and high functioning autism. The findings of Ozonoff *et al* (2000:29) were not consistent with Szatmari *et al* (1995:1662) as described above. It is noted that these two studies were conducted on different age groups, Szatmari *et al* (1995) in preschool children and Ozonoff *et al* (2000) in adolescent children.

Another study conducted by Gilchrist *et al* (2001:227) compared three groups of adolescent boys with a diagnosis of AS (n=20), high functioning autism (n=13) and conduct disorder (n = 20), according to ICD-10 clinical criteria. Relationships between early speech development and other aspects of functioning in autistic disorders were compared as well as an investigation into early and current behaviour and IQ profiles of the groups. Measures used included the WISC-R and results concluded higher VIQ (mean 97,10) higher than PIQ (mean 87,35) for the AS group. These results of mean verbal IQ scores being higher than mean performance IQ scores correlate with the previous results of Ozonoff *et al* (2000). Further results of

the study by Gilchrist *et al* (2001:230) indicated that the conduct disorder group were clearly different from the AS and high functioning autistic groups. They found that eighty percent of the AS group met criteria for autism and that despite differences in speech development, the AS group showed similar behaviour manifestations by the age of adolescence as the high functioning autistic group. The AS group were rated as having early gross motor skills worse than the high functioning autistic group. In addition, overactivity was commonly reported in the AS group. In this sample of AS adolescents, the diagnosis of AS was made after five years and at least forty percent at age ten or later. Children had multiple professional contacts and a variety of diagnosis prior to that of AS.

The research team of Ghaziuddin, Weidmer-Mikhail, and Ghaziuddin (1998:279) investigated the occurrence of comorbid psychiatric conditions occurring with patients diagnosed with AS. They examined records and conducted psychiatric examination of 35 patients with AS (mean age 15.1 years) based on DSM-IV criteria. They concluded that fifty percent had a diagnosis of ADHD and state that children with a diagnosis of ADHD should be screened for AS. This concurs with overactivity being a common symptom found by Gilchrist *et al* (2001) above. The research of Ghaziuddin *et al* (1998) also noted that mean VIQ (105,9) was higher than mean PIQ (97,5) in their sample of AS children, concurring with previous research involving IQ scores.

Since the publication of the DSM-IV-TR, Klin *et al* (2005:231) examined differences of IQ profiles, comorbid symptoms, social and other psychiatric systems by comparing these amongst three groups, AS, autism and pervasive developmental disorder - not otherwise specified. Defining criteria used were from the DSM-IV-TR. Findings were that AS could be differentiated from autism on IQ profiles (VIQ – PIQ differential favouring AS). More generally defined social difficulties were found in AS. The pervasive developmental disorder – not otherwise specified group had higher levels of comorbid symptomology. The autism group was differentiated by more genetic liability.

Two studies specifically investigated motor coordination of AS. The first was done by Miyahara *et al* (1997:195) who compared motor coordination of children with AS and



children with learning disabilities in Japan. The AS group (n = 26) had a mean age of 10,08 years and the learning disabilities group (n = 16) had a mean age of 10,0 years. Criteria used to distinguish groups were the ICD-10. The movement assessment battery for children (Movement ABC-2) was used as the primary assessment tool. Conclusions of this study was that eighty five percent of AS children met criteria for specific developmental disorder of motor function (SDD-MF) and eighty eight percent of learning disability children met criteria for SDD-MF, concluding comorbidity in both groups.

In 2002, a comparative study of children with AS (n = 11) and children with SDD-MF (n = 9) were studied by Green *et al* (2002: 655). ICD – 10 criteria were used to diagnose the groups which consisted of children between 6 years 5 months and 10 years 6 months. The Movement ABC-2 was used as the assessment tool, and conclusions were that motor impairment was universal within the samples. IQ scores were also tested using the WISC-R and results of mean VIQ (107,00) higher than mean PIQ (91,55) was noted in the AS group.

This concurring result of poor motor coordination and motor impairment amongst AS children needs to be noted. Green *et al* (2002:666) points out that clumsiness is a relatively common accompaniment of many developmental disorders. Ghaziuddin, Tsai and Ghaziuddin (1992:651) pointed out the dangers of using the word “clumsiness” as a generalised term in the diagnostic criteria of AS. “Clumsiness”, if used, needs to be properly defined to be assessed. This was addressed by the above two studies which specified motor-coordination in terms of the Movement ABC-2 test battery.

In summary of the above discussion with respect to studies conducted to date with AS, it is noted that all studies which included IQ scores had results where mean VIQ scores were higher than mean PIQ scores. Motor coordination and motor impairment were also a common feature of the AS groups, as well as overactivity and ADHD symptoms. Results with respect to high functioning autism versus AS noted that differences existed in earlier stages, with fewer differences noted in adolescents. The results of these studies will be used in the compilation of the test battery (Chapter 4) used in this thesis. The chapter on neuropsychological assessment,

Chapter 3, will include details of test instruments used and results obtained from the studies discussed above.

A number of researchers have noted and studied the similarities between AS and the syndrome of non verbal learning disability (NLD). This area of research is potentially significant for an understanding of AS, and is included in the next section which details the syndrome of non verbal learning disability and the research done on the similarities between AS and NLD.

## **2.6 ASPERGER SYNDROME AND NON VERBAL LEARNING DISABILITY**

Research and literature studies have been conducted on the similarities that exist between non verbal learning disability (NLD) and AS. Rourke (1995:1) first described characteristics and dynamics of a syndrome he called NLD. He characterised primary, secondary and tertiary neuropsychological assets and deficits and described the effects of these neuropsychological assets and deficits in terms of academic as well socio-emotional and adaptational functioning.

The primary neuropsychological deficits of NLD as described by Rourke (1995:3) are tactile perception, visual perception (notable deficiencies in visual spatial organisational abilities), complex psychomotor skills, and poor and inappropriate attention to novel material. Secondary deficits are described as poor attention to tactile and visual input (except for material that is simple and repetitive) as well as limited physical exploration of the environment. Tertiary deficits include poor memory for tactile and visual input that is not readily coded in a verbal fashion. Poor memory for complex, meaningful and non verbal information is typical. This results in marked deficits in concept formation, problem solving, strategy generation, hypothesis testing and appreciation of informational feedback (Rourke 1995:4).

Speech and language deficits include little or no speech prosody and a lot of verbose, repetitive, straightforward speech that is rote in nature. Language is used as a principal means for relating socially and for information gathering. This reliance on verbal language as a primary means of communication is described by Matte and Bolaski (1998:39) as affecting the understanding of the use of body language,

learning from past experience and employing problem solving skills. This significantly affects social perception, social judgement and social interaction skills which becomes more prominent with age. Rourke (1995:6) notes that children who exhibit the syndrome are frequently perceived as hyperactive during childhood. Inclination of anxiety, depression and internalised forms of socio-emotional disturbance increases with advancing years and there is a tendency towards social withdrawal and social isolation in advancing years.

Academic deficits are noted as graphomotor difficulties in early school years (more difficulty with cursive writing than printing). Reading comprehension is much poorer than single word reading (decoding). Mechanical arithmetic is weak and mathematical reasoning remains poorly developed. A persistent difficulty in academic subjects involving problem solving and complex concept formation is prominent.

Primary neuropsychological strengths include simple motor, auditory perception and rote learning. This leads to secondary and tertiary assets of attention (for simple, repetitive verbal material) and memory (for rote learning). Speech and language include excellent phonemic hearing, blending and repetition of very well developed receptive language skills and rote verbal capacities with a high volume of speech output. Academically there are initial problems with visual-motor aspects of writing (graphomotor skills), but these do develop. Similarly there are initial problems with the development of visual-spatial analysis skills for reading, but these develop into excellent single word reading skills. Misspellings are phonetically accurate and memory for verbal and written material is good.

Rourke and Tsatsanis (1996:36) summarise the psycholinguistic dimensions of NLD which have been included in the following Table 2.6.

Table 2.6 Psycholinguistic dimensions of NLD (Rourke & Tsatsanis 1996:36-38)

<p>Language Content</p>	<p>This refers to what people talk about – ideas about objects and events in the world and the relations between them. It also refers to the manner in which meaning is attached to words and how words are used to convey meaning to another person (includes domains such as semantics and lexicon)</p> <p><u>Strengths:</u></p> <ul style="list-style-type: none"> <li>• High volume of speech output and well developed vocabulary and word-recognition skills</li> <li>• Strong verbal memory enabling good recall of facts and details</li> </ul> <p><u>Difficulties:</u></p> <ul style="list-style-type: none"> <li>• Linguistic output tends to be straightforward, repetitive and rote</li> <li>• Coping with semantic and conceptual characteristics</li> <li>• Connotative or metaphoric aspects of word meanings</li> <li>• Fail to appreciate humour, irony, idioms and metaphors</li> <li>• Do not make use of contextual cues</li> <li>• Ambiguity created because of literal and intended meanings of words</li> </ul>
<p>Language Use (Pragmatics)</p>	<p>This refers to functional and contextual aspects of language, including an appreciation of the rules of social discourse, and how language is modified to fit different situations.</p> <p><u>Difficulties:</u></p> <ul style="list-style-type: none"> <li>• Discourse is often rambling, marked by minimal structure, organization and cohesion, and tends to be tangential, repetitive and monotonous, straightforward in nature, containing little conceptual content.</li> <li>• Limited expression and comprehension of prosody.</li> <li>• Difficulty in adapting spontaneously to changing demands in social discourse (as primary deficit is an inability to deal with novelty).</li> <li>• Difficulty perceiving how a particular stored memory with respect to strategy or procedure may be applied to a particular situation.</li> <li>• Fail to attend to and interpret correctly nonverbal cues such as facial expression, gestures and emotional prosody.</li> <li>• Fail to relate and appreciate fully both the meanings and sentiment of an interchange.</li> </ul>

Rourke (1995:19) hypothesised that these children have deficient right hemisphere systems or insufficient access to initially intact right hemisphere systems. Right hemisphere white matter is crucial for the development and maintenance of its specific functions. A significant lesion confined to right cerebral hemisphere, or destruction or dysfunction of white matter that is required for intermodal integration could be the cause of the condition of NLD.

Weintraub and Mesulam (1983:468) reported that the integrity of the right hemisphere is essential for the emergence of interpersonal skills and communication competence. They believe that the deficiencies in interpersonal skills may be neurological (right hemisphere dysfunction) rather than emotional or social.

Because of the similarities between the presenting symptoms of NLD and AS, it was thought by some researchers that AS could be seen as “different” from high functioning autism in that the social and communication difficulties shown by AS children were due to right hemisphere dysfunction as opposed to autism and high functioning autism which seemed like a left hemisphere dysfunction and intact right hemisphere functioning (autistic children including high functioning autistic are known to be good at block designs and visual spatial tasks).

A number of researchers have investigated the similarities between the above symptoms of NLD and those of AS. Klin *et al* (1995:1127) did a comparative study of AS (n = 21, mean age of 16,11 years) with high functioning autism (n = 19, mean age 15.36). Diagnostic criteria for ICD-10 were used in the study. Mean IQ scores of AS group showed VIQ (108,95) higher than PIQ (85,14). Reviews of neuropsychological records were used to obtain neuropsychological assets and deficits. It was found that eleven areas discriminated between the two conditions and six items of NLD predictive of AS were found. These were deficits in fine motor skills, visual motor skills, visual motor integration, visual spatial perception, non verbal concept formation, gross motor skills and visual memory. The conclusion made by these researchers is that the characterisation of NLD is an adequate neuropsychological marker of AS, differentiating it from high functioning autism (Klin *et al* 1995:1136).

Ellis and Gunter (1999:192) followed this research with a published review of AS, emphasising the close association with right hemisphere dysfunction and AS. Right hemisphere dysfunction, AS and NLD are all associated with poor visual spatial skills, good verbal performance, gauche social behaviour and clumsiness (Ellis & Gunter 1999:192). Gunter *et al* (2002:263) published findings of a study of eight AS participants (between ages of 10 and 41) and eight controls with respect to patterns of assets and deficits seen in AS group. Results confirmed the similarity between

neuropsychological profiles of NLD and AS. This research concludes that AS can be captured by the NLD syndrome proposed by Rourke in that a pattern of visuospatial and non verbal deficits in the presence of intact verbal processing was found (Gunter *et al* 2002:275). In this study, mean IQ scores were again higher for verbal (VIQ – 111,37) than performance IQ (PIQ - 96,13).

The above results indicate the similarities of AS and NLD and need to be investigated further. This is potentially significant as a neuropsychological profile which is consistent with strengths and weaknesses, of the AS child, will clarify primary differences between autism and AS. It has been proposed that AS could be differentiated from high functioning autism in that AS could be accounted for by right hemisphere deficits and high functioning autism by left hemisphere deficits, speculating that these two disorders can be distinguished from each other in terms of their neuropsychological characterisation (Klin *et al* 1995:1136). The NLD model described by Rourke (1995:1-25) provides a theoretical framework which includes many of the major signs of AS. The NLD model thus has the potential to provide a comprehensive causal mechanism in AS. The test battery used for this thesis will take into account the results of the above researchers and will be included in Chapter 3.

In a comparative study of cognitive profiles of a hundred and twenty children with AS, autism and attention disorders done by Ehlers *et al* (1997:213) results clearly separated the autism group from the AS group by superior ability of the autism group in visuospatial function, reflecting in characteristic peak performance on the “block design” test of the WISC. Happé (1994:1461) concluded similar results after a comprehensive analysis of ten studies (from the years 1970 to 1993), which published scores on Wechsler subtests, and found a consistent peak of performance on the block design subtests for individuals with autism.

Another theory which has been studied in detail and has potential significance for differentiation of AS, is the “theory of mind” (ToM). The discussion that follows begins with a discussion with respect to theory of mind and autism. It has been included in this literature study because of the potential significance of a theory of mind (ToM) to AS specifically

## **2.7 THEORY OF MIND AND ASPERGER SYNDROME**

In studying the literature relating to AS, the concept of theory of mind (ToM) and its relevance to AS was noted. ToM is an influential theory that has been proposed to explain the differences in cognitive performances among individuals within the autistic spectrum (including AS). ToM is defined by Frith (1989:157) as the ability to predict relationships between external state of affairs and internal states of minds. This can also be described by the concept “mentalising”, where mentalising is seen as an automatic activity of the mind. When behaviour is observed, inferences are automatically drawn as to the causes and effects of that behaviour. Information from different sources, the results of seeing, remembering and telling are all pulled together in a coherent interpretation of what happened. Leslie (1987:422) in a paper on pretense and representation concludes that the ability to pretend and understand pretense in others is a precursor of a ToM and is termed metarepresentation. Metarepresentation is described by Meyer and Minshew (2002:154) as the ability to represent the mental states of others. They state that the key feature of social deficits is a lack of reciprocity, based on the inability to think, feel and view the world in a manner different from oneself. Other factors that effect social deficits are a poor capacity to read social cues, a poor ability to use and respond to communication gestures and a poor ability to establish peer relationships.

Theory of mind was first tested by an experiment in 1985 by Baron-Cohen, Leslie and Frith (Frith 1989:160-164). This has been termed the “Sally Anne” experiment, and tests the ability to take another person’s belief into account. This experiment was done on four groups of children, autistic, mentally retarded, Down ’s syndrome children and a control group, all of whom had mental ages of above three years. The test was conclusive in its results that the autistic group did not have this ability, and thus lacked ToM. This experiment was followed by another, the “Smartie box” test, and once again, the autistic children did not have the ability to experience what it means to have a have the ability to think what another person may be thinking. Perner, Frith, Leslie and Leekam (1989:698) concluded, after similar experiments conducted on autistic children, that, as a group, autistic children are grossly impaired in ToM. These experiments have made an influential impact on how researchers

theorise the way of thinking of the individual with autism. Ozonoff *et al* (1991:1115), in a study to differentiate between high functioning autism and AS (diagnostic criteria met draft ICD-10 criteria for AS) using ToM measures as described above, found that AS children performed significantly better than matched high functioning autistic children ToM tasks. This finding suggests that deficits in ToM may not be primary to individuals with AS and this ability in children with AS could be a major difference between autism and AS. Conclusions from research conducted by Dahlgren, Sandberg and Hjelmquist (2003:129) found that linguistic and communication skills are important precursors in the development of ToM.

The research team of Kaland, Moller-Nielsen, Callesen, Mortensen, Gottlieb and Smith (2002:519) assessed the ability of children and adolescents with AS (n= 21), diagnosed according to ICD-10 criteria, with a mean age of 15,72 years, on a new “advanced” test of theory of mind. Results from this research concluded that 20 of the 21 AS group passed the ToM tests, confirming the above conclusions with respect AS children having no difficulties with ToM tests. Furthermore, the AS group had VIQ mean scores (111,40), higher than PIQ mean scores (98,30), confirming previous research sighted with respect to VIQ scores greater than PIQ (refer to section 2.5 and 2.6). Kaland *et al* (2002:524) extended the ToM tests to new “advanced” test of ToM where AS participants answered questions based on twenty-six short stories of everyday life. The AS participants had significantly less success in inferring mental as opposed to physical states of the stories. A striking finding was that the AS person’s ability to interpret events literally when a mental state interpretation would have been more common. The AS participant was not lacking in the ability to attribute mental states, but did so differently, processing social events in idiosyncratic ways in contrast to spontaneous and intuitive interpretation of social events made by others.

Meyer and Minshew (2002:155) describe a theory that the cognitive deficit in autistic spectrum disorders is in abstract reasoning and can be described as a deficit in complex information processing. A deficit in abstract reasoning would limit the child’s ability to generate mental representations, and thereby restrict the ability to develop novel thoughts and behaviours, hypothetical thinking and flexible interactions with others and the environment. They conclude that individuals with AS have impaired



ability to integrate information into context and generate new ideas and concepts. The tendency to seek out the gestalt, impress meaning upon, or use context in processing experiences is diminished, leading to a piecemeal processing style that fails to take context into account.

Although the above discussion on ToM is central to the understanding of autism, it is of importance in studies with respect to AS. The above discussion of previous research is conclusive in that all autistic subjects lacked ToM whereas AS subjects were able to pass ToM tasks. This difference is potentially significant as a differentiating factor for AS, and is thus included in the body of literature.

The above theories with respect to “how the child with AS thinks” play an important part in developing appropriate treatment and educational interventions for the child with AS. The next and concluding section of this chapter will discuss treatment and educational interventions with respect to AS learners.

## **2.8 TREATMENT AND EDUCATIONAL INTERVENTIONS WITH RESPECT TO ASPERGER SYNDROME**

The researched literature is not only concerned with the theoretical nature of AS, but also on how to manage and “treat” the child with AS. This section will elaborate on interventions that have been recommended in the literature. Asperger (1991:47) detailed his views on the remedial intervention that should be given to the children he described as having “autistic psychopathy”. These include the following:

- All educational transactions should be done with the affect “turned off” – the teacher should never become angry nor must she aim to be loved – instead the teacher is to remain calm and collected and always in control.
- Instructions should be given in a cool and objective manner, without being intrusive.
- All negativistic talk should be cut short, and the teacher should continue calmly with task at hand.
- Announce any educational measures not as personal requests but as objective impersonal law.

- Teachers need to be aware that automatised learning – the setting up of routine thought processes proceeds only with the utmost difficulty, writing being especially difficult.
- Requests should not be directed at the learner personally, but verbally phrased in general, impersonal way, as an objective law.
- These children are “intelligent automata” – social adaptation has to proceed through the intellect, therefore the teacher needs to explain and enumerate social skills.
- An exact timetable should be set out for the whole day, in which the format from moment of rising, including every single occupation and duty is detailed.
- The child needs to be engaged in constant interaction. He cannot assimilate the ready-made knowledge and skills that others present to him – he is unable to build up “automatic programmes” through practice and habit.
- When teaching reading, use a whole word approach as the child is unable to understand the structure of a word in terms of its individual elements.

Wing (1981:125) describes the management of children she referred to as having AS, as responding best to regular, organised routine, recognising their difficulties in comprehension of abstract language, and making sure they were not teased and bullied. Counselling, it was felt, could be used for explanation, reassurance and discussion of fears and worries. A simple and concrete approach should be used, with psychoanalysis being unhelpful.

Since these publications, clinicians and teachers have published articles with respect to the treatment of children with AS within the classroom setting. Following are ideas as given by authors who have recently published articles in journals with respect to intervention strategies of learners with AS. In a paper published on instructional management for AS children in a mainstream educational setting, Marks, Shaw-Hegwer, Schrader, Longaker, Peters, Powers and Levine (2003:50), state that antecedent management strategies need to be used to develop a positive and responsive classroom setting that minimises the challenging behaviour that is often presented. One should therefore not focus on trying to address consequences of behaviour. Lesson preparation should be thorough and include presentation of

content in a controlled fashion. Structuring lessons around key ideas minimises ambiguity – the AS child cannot learn incidentally, and is easily attracted to all detail presented. Use graphic and visual organisers where possible. Preparing the child for changes in classroom routine and activities is essential for the child with AS. Teachers should be flexible and accept alternatives for completing classroom assignments and demonstrating what has been learned – such as using a keyboard for writing, audiotape or videotape an assignment.

Safran, Safran and Ellis (2003:154) have classified intervention strategies for children with AS in terms of the context of academics, behaviour and communication, (ABC), and named their model ABC intervention. When discussing academics, be aware of and use the child's special interests within the curriculum. The child's sensory needs need to be taken into account and graphic and visual supports used where needed. Modifying tasks and allowing for verbal feedback and computer aids is recommended. The child with AS has a need for organisation and routine and this needs to be accommodated with the use of daily schedules. Comprehension confusion can be managed with concise, concrete and specific explanations. Behavioural difficulties need to be assessed with respect to an understanding of socially inappropriate behaviour stemming from a lack of social understanding. Basic conversational skills can be taught, and an educator can be used as a "social translator" when difficult situations arise. A teacher needs to recognise signs of increasing anxiety in a child and then should intervene before a "meltdown" is experienced by the child.

Communication intervention strategies involve addressing difficulties with misreading social cues, and literal interpretation of language. Peer mentors can assist with building a bridge for social interaction and social stories and cartooning can be helpful to "teach" appropriate social skills. Attwood (2006:123) confirms the use of social stories as being a useful strategy to develop social skills. Social stories describe each person's knowledge, thoughts, beliefs and feelings relevant to the situation, and are developed for each individual child at a time when it is appropriate.

An essential component of intervention for children with AS is in social skills. Krasny, Williams, Provencal and Ozonoff (2003:120) specify that social skills training for AS

children should focus on breaking down the complex social behaviours into concrete steps and rules which can be memorised and practiced in a variety of settings. Abstract concepts should be made concrete and visual structure and predictable routines are thought to be essential. Generalisation should be encouraged by organising community outings. Daily practice and reinforcement in natural surroundings is believed to be more beneficial than weekly therapy in a “therapy room”. Attwood (2006:326) states that therapy must be based on a thorough understanding of the nature of AS, especially in the ability of the individual to understand and communicate his thoughts and feelings. The psychotherapist could be best seen as a means to understand and provide education about AS.

Klin and Volkmar (2000:341) believe that the treatment programme for a child should be based on a thorough understanding of the specific individual’s profile of skills and deficits in areas important for learning, communicating and relating to others, and for acquiring independent living skills. The ideal educational setting is one which provides for individual attention, an individualised approach and small work groups. Opportunities for social interaction and promotion of social relationships should be fairly structured and supervised. A willingness to adapt the curriculum content and provide flexible opportunities for success is needed. Additional teaching guidelines should be derived from the individual’s profile of neuropsychological assets and deficits. The main areas of neuropsychological focus as stated by Klin and Volkmar (2000:349) are motor, fine motor, visual-motor coordination including graphomotor skills, visual-spatial attention, perception, problem solving and memory skills, auditory/verbal attention, learning, reasoning, and memory, cross modal integration of information and executive functions. Specific intervention techniques should be aimed at remediation or circumventing the identified difficulties. This course of action will be used in this thesis, where individualised educational plans will be set up for each of the cases studied, based on the results of their neuropsychological profiles. This will be detailed in Chapter 6.

The next chapter, Chapter 3 details the literature study for neuropsychological assessment. This literature study will highlight the assessment procedure as well as the different tests used in a neuropsychological test battery. Specific tests that have been used in this chapter will be incorporated into the literature study to ensure that

tests specific to AS which have been previously researched will be included in the final test battery to be used in this thesis.

# CHAPTER 3

## LITERATURE STUDY: NEUROPSYCHOLOGICAL ASSESSMENT

### 3.1 HISTORY OF NEUROPSYCHOLOGICAL ASSESSMENT

The field of neuropsychological assessment began in neurology and psychiatry. The first neuropsychological tests were designed to identify people suffering from cerebral dysfunction which was attributed to brain pathology (Kolb & Wishaw 2003:752). O'Shea, Harel and Fein (2002:249) note that neuropsychological assessment of children began as a single-test approach to differentiate brain-damaged children from normally developing children.

From the early 1950's through to the early 1980's, batteries of tests were developed, each with a different focus. The emergence of cognitive neuroscience in the 1990's produced a dramatic change in the theoretical understanding of brain and cognition. It is now thought that circumscribed lesions in different cortical regions can produce discrete behavioural changes (Kolb & Wishaw 2003:755). It is reasoned that given a particular behavioural change, one should be able to predict the brain site or sites of the disturbance most likely to be causing the change. The approach of neuropsychology today is a functional organisational approach with the emphasis on specifying specific types of central nervous system dysfunction (O'Shea *et al* 2002:249).

Neuropsychological assessment is an integral part of the study of neuropsychology. The purposes of a neuropsychological assessment as described by O'Shea *et al* (2002:251) include the following:

- Defining the outcome of a known central nervous system insult or disorder.
- Investigating possible reasons for cognitive or behavioural difficulties.
- Obtaining a detailed profile of cognitive and behavioural strengths and weaknesses.

- Determining whether this profile is consistent with a suspected disorder or syndrome. In the case of this thesis this would be the disorder defined as Asperger syndrome as defined in the DSM-IV-TR (APA 2000:80).
- Characteristic aspects of the individual's learning style, such as approach to problem solving, preferred modality of information, response to reinforcers, flexibility, persistence and sustained attention.
- Using assessment data to help formulate effective treatment strategies or management plans.

Walsch (1994:408) states the importance a neuropsychological assessment can play in a differential diagnosis, and gaining knowledge of syndromes. Central to the concept of the syndrome is the sense of a unique cluster of symptoms and signs which occur together with sufficient frequency to suggest a particular underlying neurological process. The importance of a test battery of neurological measures which is designed to test a specific neuropsychological hypothesis is also emphasised by Mattis and Luck (2002:285).

In order to complete a neuropsychological assessment, certain procedures are followed; these are detailed in the following section.

### **3.2 PROCEDURES FOR NEUROPSYCHOLOGICAL ASSESSMENT**

Neuropsychological assessment involves the intense study of behaviour by means of interviews and scaled tests and questionnaires that provide relatively precise and sensitive measures of behaviour (Lezak *et al* 2004:15). Mattis and Luck (2002:281) emphasise that the data obtained from a neuropsychological test battery provides critical quantitative and qualitative information about an individual's level of cognitive, behavioural and social-emotional functioning. The neuropsychological assessment is designed to access multiple domains of cognitive abilities in order to identify patterns of performance that are associated with specific disorders. The procedures of a neuropsychological assessment as described by Mattis and Luck (2002:285) are the following:

- Clinical interview with parents and the child to determine the presenting problem. The detailed interview includes developmental history, medical history, past academic experience, family history and social and emotional functioning.
- Implementation of a test battery – to address the referral question.
- Scoring, analysis and interpretation of the test battery.
- Feedback to parents including specific recommendations and interventions.

Kolb and Whishaw (2003:755) list the following as components of a neuropsychological assessment:

- Intellectual and conceptual functions
- Memory functions
- Language functions
- Academic skills
- Self-control and motor functions

Mattis and Luck (2002:305), in addition to the above core test battery, include tests for attention and arousal as well as tests for executive processing. This is noted to be important because disorders diagnosed by DSM-IV criteria have common findings in individuals with executive skills deficits. It is of further importance that individuals with impaired pragmatic use of language tend to be associated with difficulties in social skills and judgement. Rourke (1995:109) specifically refers to the psychological assessment of individuals with AS. He states that in addition to an intellectual assessment which includes verbal and performance scores, a comprehensive neuropsychological assessment including measures of motor skills (coordination of large muscles, manipulative skills and visual-motor coordination), visual perceptual skills (gestalt perception, spatial orientation, parts-whole relationships, visual memory, facial recognition), concept formation (both verbal and nonverbal) and executive functions should be conducted.

This thesis is concerned with examining the neuropsychological profiles of learners with AS. As can be seen from the above discussion, an important aspect of neuropsychological assessment is in the differential diagnosis of syndromes. In



order for this to happen, one needs to incorporate the existing theory underlying AS and the tests available for assessment procedures. The literature study of the previous chapter on AS will be referred to in the following sections, thus building on the existing knowledge of research already conducted. This will be used as the basis for the neuropsychological test battery to be compiled for the data collection of this thesis.

### **3.3 QUESTIONNAIRES AND RATINGS SCALES WITH RESPECT TO ASPERGER SYNDROME**

The first step of a neuropsychological assessment is to obtain background information on the history of family, medical, academic achievement and behavioural symptoms. Personal history will be obtained from a questionnaire designed for that purpose (see Chapter 4).

There are researched behaviour symptoms noted with children with AS and these will be confirmed by giving questionnaires to the parents of the children with AS to ascertain any patterns of strengths and weaknesses within these measures. The following questionnaires will be used as part of the neuropsychological assessment: The Conners' parent and teachers rating scales, Dunn's sensory profile questionnaire and the Gilliam Asperger Disorder Scale (GADS).

#### **3.3.1 Diagnostic assessment scale**

The most commonly used assessment scale for autism in previous literature is the Autism diagnostic interview (ADI or ADI-R) or the Autism diagnostic observation schedule (ADOS or ADOS-G) (Szatmari *et al* (1995), Ozonoff *et al* (2000), Gilchrist *et al* (2001) and Green *et al* (2002). These diagnostic instruments were designed primarily for a diagnosis of autism, and not AS, and are therefore not sensitive to the characteristics of AS (Attwood 2006:39). Gilliam (2001) has designed an assessment scale for AS, the Gilliam Asperger Disorder Scale (GADS) and this will be used for this thesis. The GADS is completed by a parent or professional who knows the child and can be effectively used in the assessment process, documenting behavioural progress and in the setting of individualised educational plans. This

literature research has not come across any previous research specific to AS that has used this scale.

### **3.3.2 Asperger syndrome and attention deficit hyperactive disorder (ADHD)**

A number of researchers have noted the comorbid symptoms of ADHD amongst AS individuals. Ghaziuddin *et al* (1998:280) reported on the occurrence of psychiatric disorders in a series of 35 patients, mean age, 15,1 years, all with a diagnosis of AS, according to DSM-IV criteria. Depression and ADHD were the most common comorbid diagnoses, with depression being more common in adolescents and adults and ADHD most common in prepubertal children. Four out of five cases of AS children were found to have comorbid ADHD. Ghaziuddin *et al* (1998:281) state that children with a diagnosis of ADHD who present with social difficulties should be carefully screened for AS. Church *et al* (2000:12) described the experiences of 40 children with AS between the ages of 3 and 15 years with respect to social skills, behaviour, sensory issues and language skills. These descriptions were given with respect to preschool, elementary school, middle school and high school years. Of the AS children in elementary school, 92% had received a previous diagnosis before being given the diagnosis of AS. Of these, the most frequent diagnosis was for ADHD (20%).

The Conners' rating scale is a frequently used questionnaire to ascertain symptoms of ADHD, as well as other clusters of behaviour symptoms which are relevant to the AS child such as social problems. This has been described in the paragraph below and has been chosen as an instrument to be used in the case study research for this thesis.

#### *3.3.2.1 The Conners' rating scales-revised*

The Conners' rating scales is a set of measures that is one of the standard instruments for the assessment of ADHD and related problem behaviours in children and adolescents. The parent and teacher long versions contain a group of subscales that are used to derive a broad range of problem behaviours, cognitive problems, anxiety problems and social problems (Conners 1997:1). The parent ratings reveal

the child's behaviour at home and in other environments, whereas the teacher ratings provide an objective way to rate the child's behaviour in the classroom setting. The two scales complement each other. The long form of the Conners' rating scale identifies the following subscales which are represented in the results obtained from the questionnaire: oppositional, cognitive problems, hyperactivity, anxious-shy, perfectionism, social problems, psychosomatic, Conners' global index, restless-impulsive, emotional lability, ADHD index, DSM-IV symptoms, DSM-IV inattentive and DSM-IV hyperactive-impulsive (Conners:1997:12). Results are converted to standard scores and plotted onto a graph for ease of interpretation and comparisons of subscales. The Conners' rating scales have been extensively researched in terms of norms, reliability and validity (Conners 1997:4)

### **3.3.3 Asperger syndrome and sensory issues**

Atwood (2006:272) notes that children with AS can have one or several sensory systems that are affected in that everyday sensations are perceived as unbearably intense or apparently not perceived at all. The child with sensory sensitivity becomes hyper vigilant, tense and distractible in sensory stimulating environments. This is noted in the classroom or other busy public places, and fearful anticipation can cause anxiety. Sounds, lights, food textures, smell and gravitational insecurity are all sensory issues that can affect the child with AS. Church *et al* (2000:14) note 67% of the AS preschool children studied presented with sensory issues. In middle school this had reduced to 30 % where the AS adolescent rated tactile and auditory sensitivities as most problematic. Attwood (2006:273) notes that unusual sensory perception is considered as a confirmation of a diagnosis of AS, yet sensory perception is not included in either the DSM-IV-TR or the ICD-10. The sensory profile compiled by Dunn (1999:1) is a standard method for measuring a child's sensory processing abilities and the effect of sensory processing on functional performance in the daily life of the child. The sensory profile was designed to contribute to a comprehensive assessment of a child's sensory performance when combined with other observations, evaluations and reports to determine the child's diagnostic status and intervention planning. For this reason, the sensory profile will be used as part of the test battery for this thesis.

### 3.3.3.1 *The sensory profile*

The sensory profile is a judgement-based caregiver questionnaire (Dunn 1999:1). Each item describes children's responses to various sensory experiences, and the caregiver reports the frequency with which these behaviours occur. The scores obtained provide patterns of performance that are indicative of difficulties with sensory processing and performance. The sensory profile consists of 125 items grouped into the following sections:

- Sensory processing: auditory, visual, vestibular, touch, multisensory and oral sensory processing.
- Modulation: sensory processing related to endurance, modulation related to body position and movement, modulation of movement affecting activity level, modulation of sensory input affecting emotional responses, modulation of visual input affecting emotional responses and activity level.
- Behavioural and emotional responses: emotional/social responses, behavioural outcomes of sensory processing and thresholds for response.

Nine factors are identified from the responses to the items and these factors (sensory seeking, emotionally reactive, low endurance, oral sensory sensitivity, inattention/distractibility, poor registration, sensory sensitivity, sedentary and fine motor/perceptual) characterise the child's responsiveness to sensory input (Dunn 1999:2). The classification system that is used was derived from factor analysis, descriptive statistics and multivariate analysis of samples of children without disabilities (n=1 037) between the ages of 3 and 10 years across the United States. The sensory profile will be used in this thesis to provide additional information regarding sensory processing and sensory modulation of each case study,

Two research articles have been published with respect to studies done on AS children and sensory profiles. Myles, Hagiwara, Dunn, Rinner and Reese (2004:289) recommend that future research should be done to determine if specific sensory issues can serve as a marker to differentiate children with AS from autism. The results of previous research has been included in Table 3.1.

Table 3.1 Table of research results with respect to the sensory profiles of children with AS

Researcher(s)	Year	Media used	Sample and (mean) age	Research aim	Results (mean IQ's)
Dunn, Myles and Orr	2002	Sensory profile (Dunn)	n=42 age – 11,3 years	To identify sensory processing patterns of children with AS.	AS children were significantly different from “normal” population on 22 of the 23 items. The only item that was not different was modulation of visual input affecting emotional responses.
Myles <i>et al</i>	2004	Sensory profile (Dunn)	n=86 age-7,6 years	To compare children with AS and autism with respect to sensory profiles.	Distinctive differences noted between the groups in 2 areas: emotional/social responsiveness and emotionally reactive which were both higher in AS.

### 3.4 RESULTS OF PREVIOUS ASSESSMENTS CONDUCTED ON INDIVIDUALS WITH ASPERGER SYNDROME

This section will detail the literature study on specific assessment tools which were used in previous research with AS individuals. Much of this research was aimed at identifying and clarifying the neurocognitive profiles of an individual with AS.

#### 3.4.1 Intelligence

Wechsler (2002:2) defined the concept of intelligence as a multi-dimensional construct, and one that manifests in many forms. Weschsler considered intelligence as a global entity (because it characterises the individual’s behaviour as a whole) as well as an aggregate of specific abilities (because it is composed of elements or

abilities that are qualitatively different). Wechsler (2002:2) believed that intelligence should be measured by both verbal and performance tasks, each of which measured ability in a different way and which could be aggregated to form a general, global construct (known as the IQ score). The subtests that he selected and developed require abstract reasoning, perceptual skills, verbal skills and processing speed. Intellectual abilities are developed in different ways, and result in different profiles of cognitive strengths and weaknesses. Wechsler's test battery is known as the WISC and the most recent publication is the 3<sup>rd</sup> edition, the WISC-III published in 2002. The adult version of the test is the WAIS (from ages 16 – 74), and the children's version the WPPSI (from ages 3 years to 7 years 3 months). Mattis and Luck (2002:289) quote the WISC-III as the most widely used measure of verbal and nonverbal intellectual abilities, and state its use as an excellent screening test of cognitive abilities and verbal versus performance discrepancies.

Previous research which used the WISC-III or an earlier revised version, the WISC-R on samples of children with AS included Klin *et al* (1995), Ghaziuddin *et al* (1998), Ozonoff *et al* (2000), Miller and Ozonoff (2000), Gilchrist *et al* (2001), Green *et al* (2002), Kaland *et al* (2002), Griswold, Barnhill, Myles, Hagiwara and Simpson (2002), Gunter *et al* (2002) and Ghaziuddin and Mountain-Kimchi (2004). Table 3.2 summarises the results of the above researchers with respect to VIQ and PIQ.

Table 3.2 Summary of results from previous research involving individuals with AS and IQ scores

Researcher(s)	Year	Test used	Sample and (mean) age	Research aim	Results (mean IQ's)
Klin <i>et al</i>	1995	WISC-III	n=21 age - 16,11 years	Comparison HFA with AS with respect to items characterising NLD	VIQ - 108,95 PIQ - 85,14
Gillberg	1995			Theory – characteristic WISC-III subscale scores in AS (Gillberg 1995:315)	-Comprehension: often poor results -Vocabulary: excellent results -Arithmetic: sometimes poor results -Picture arrangement: poor results -Object assembly: poor results -Coding: poor results
Ghaziuddin <i>et al</i>	1998	WISC-R or WAIS	n=35 age range – 8–51 years	Report on AS and comorbid psychiatric conditions	VIQ - 105,9 PIQ – 97,5
Ozonoff <i>et al</i>	2000	WISC-III	n=12 age– 13,9 years	Comparison HFA with AS	VIQ – 120 PIQ – 107,9 Subtest highest scores: Information-14,6 Vocabulary-14,3 Similarities-13,0 Subtest lowest scores: Coding-7,7
Miller and Ozonoff	2000	WISC	n=14 age 10,14 years	Comparison HFA with AS	VIQ – 120,79 PIQ – 106,92
Gilchrist <i>et al</i>	2001	WISC-R or WAIS	n=20 age range – 11-19 years	Comparison HFA with AS and conduct disorder	VIQ – 97,10 PIQ – 87,35
Green <i>et al</i>	2002	WISC-R	n=11 age – 9,2 years	Comparison AS with SDD- MF	VIQ – 107,00 PIQ – 91,35

Researcher(s)	Year	Test used	Sample and (mean) age	Research aim	Results (mean IQ's)
Kaland <i>et al</i>	2002	WISC-III	n=21 age – 15,72 years	Assessment of ability of AS children with ToM tasks	VIQ – 111,4 PIQ – 98,3
Griswold <i>et al</i>	2002	WISC	n=21	Study of academic skills of children with AS	VIQ – 99,07 PIQ – 101,14
Gunter <i>et al</i>	2002	WISC or WAIS	n=8 age – 16,25 years	Patterns of NLD with AS individuals	VIQ – 111,37 PIQ – 96,13
Ghaziuddin and Mountain- Kimchi	2004	WISC or WAIS-R	n=22 age 12,4 years	Comparison AS with HFA on IQ scores	VIQ – 107,4 PIQ – 96,5 Subtest highest scores: Information-13 Similarities-12 Vocabulary-11,6 Subtest lowest scores: Coding-7,2

As can be seen from the above table, the mean VIQ scores of subjects with AS were consistently greater than the mean PIQ scores in all studies, except for the study of Griswold *et al* (2002) where the VIQ mean score was less (not significantly) than the PIQ mean score. A high VIQ relative to the PIQ seems to be typical of AS, however the discrepancy between VIQ and PIQ is not always significant, and conclusions with respect to a discrepancy of VIQ greater than PIQ as essential for a diagnosis of AS needs to be treated with caution.

In South Africa, the intelligence scale that is commonly used is the Senior South African Individual Scale (SSAIS) which was revised in 1991, as the SSAIS-R. It is standardised for children between 7 years and 16 years 11 months with Afrikaans or English as their mother tongue. The junior version of the test, the JSAIS is standardised for children from 3 years to 7 years 11 months. The SSAIS-R is a deviation IQ scale, and performance is indicated in terms of standard scores. The two primary mental abilities that are measured by the tests of the SSAIS-R are a verbal and a nonverbal factor, expressed in terms of VIQ and NVIQ (Van Eeden



1997:3). The tests that comprise the SSAIS-R include the following (Van Eeden 1997:4-11):

Verbal tests:

- Vocabulary – measures verbal learning ability, language development and language usage, long term memory and concept formation.
- Comprehension – knowledge of conventional standards of behaviour in social situations.
- Similarities – logical abstract reasoning and verbal concept formation, the ability to distinguish between essential and non essential information.
- Number problems – numerical reasoning, logical thought, and concentration.
- Story memory – short term auditory memory and ability to sustain attention.
- Memory for digits – (digits forward and digits backward) – short term memory for numbers, attention and concentration. Recall of digits backwards requires transforming stimulus material before recalling, testing mental control.

Non verbal tests:

- Pattern completion – logical thinking, visual perception, concept formation and concentration.
- Block designs – logical reasoning, perceptual organisation, spatial visualisation, orientation and abstract conceptualisation.
- Missing parts – ability to distinguish between essential and non essential information, visual concentration, organisation and memory.
- Form board – visual perception, organisation, concept formation, ability to see underlying relations between objects and visual-motor coordination.
- Coding – visual–associative learning ability, psychomotor speed, visual – motor integration and coordination, attention, concentration, motivation and short term memory.

The children that will be used in the case studies of this thesis will all be learners from the Western Cape, South Africa, with English as their mother tongue, and aged between 7 years and 16 years. The SSAIS-R will be administered as the choice of IQ assessment. There have not, to the authors knowledge been any studies done to date with AS children using the SSAIS-R.

### 3.4.2 Motor functions

Motor clumsiness and awkwardness are referred to in the DSM-IV-TR (APA 2000:84) as possibly being present in AS, but if present would normally be mild. Attwood (2006:17) refers to the fact that often young children with coordination and dexterity problems will be referred to an occupational therapist whilst at pre-school for an assessment and therapy. The assessment may confirm delays in movement skills, or a movement disorder, which is often diagnosed before the child is diagnosed with AS. The connection between movement difficulties and AS was researched in two different studies (refer Table 3.3). In this thesis two test batteries have been used to assess motor functions. The first one being the Movement assessment battery for children (Movement ABC-2) because of the previous use by researchers with respect to studies involving AS. The second test battery used was the Beery-Buktenica test to investigate fine motor skills of visual motor integration, visual perception and motor coordination.

#### 3.4.2.1 *Movement assessment battery*

The movement assessment battery for children (Movement ABC-2) has three components, manual dexterity, ball skills and balance. Manual dexterity consists of two manipulative tasks and one drawing or cutting task. Ball skills consist of one throwing and one catching task. Balance skills involves one static and two dynamic balance tasks. Performance on each subtest is assigned a score ranging from 0 to 5, the larger the score, the more severe the movement incoordination (Miyahara *et al* 1997:598).

Two research teams have used the Movement ABC-2 as an assessment tool with children identified as having AS to determine the extent of motor functions within this syndrome. Green *et al* (2002:655) specifically studied AS children in relation to children diagnosed with specific developmental disorder of motor function (SDD-MF) to ascertain if there were any differences between the groups. These results have been included in Table 3.3.

Table 3.3 Summary of results from previous research involving individuals with AS and Movement ABC-2 scores

Researcher(s)	Year	Sample (mean age)	Research aim	Results
Miyahara <i>et al</i>	1997	n=26 age – 10,08 years	Comparison of AS and children with learning disability, with respect to motor function.	AS group demonstrated high incidence of motor delay on the total test scores. 85% of AS children met criteria for SDD-MF
Green <i>et al</i>	2002	n-11 age – 9,2 years	Comparison of AS with SDD-MF	Motor impairment was universal in the group with AS.

These results are consistent in their findings that children with AS have difficulties with motor functions as tested on the Movement ABC-2.

#### 3.4.2.2 Beery-Buktenica developmental test of visual-motor integration

The developmental test of visual-motor integration (Beery VMI) is a developmental sequence of geometric forms that are copied with pencil and paper. It is designed to assess the extent to which an individual can integrate their visual and motor abilities or eye-hand coordination (Beery & Beery 2006:1). The Beery VMI has two supplemental standardised tests, the visual perceptual test and the motor coordination test (Beery & Beery 2006:15) Results obtained for these tests are converted to standardised norms, which are then easily comparable to other tests using standardised norms.

The literature study conducted, found one study that involved using the Beery VMI as part of a test battery in an attempt to differentiate autism from AS. This study was done by Szatmari *et al* (1995:1662). The AS sample involved 21 children of mean age 5, 7 years. The research article does not however elaborate on scores obtained from the Beery test.

### 3.4.3 Academic skills

Hagiwara (2001-2002) published a paper which described the academic assessment of children and youth with AS. This included a test battery of achievement, the Wechsler Individualised Achievement Test – WIAT. The WIAT includes tests of reading, mathematics, language and writing. In addition to this test battery, a test of language was recommended, these included the Test of Language Development Primary, Intermediate or Adult (TOLD-P:3, TOLD-I:3 or TOAL:3). Reading assessment of the child with AS was noted to include tests of comprehension. The need for a systematic assessment procedure designed specifically for students with AS was emphasised by Hagiwara (2001-2002:98). Griswold *et al* (2002:94) conducted a study of academic characteristics of children and youth with AS, diagnosed using DSM-IV criteria. Instruments used were the WIAT and the Test of Problem Solving Elementary and Adolescent (TOPS-R; TOPS-A). Results indicated lowest achievement scores in numerical operations, listening comprehension and written expression. Griswold *et al* (2002:98) note that students that participated in the study had a wide range of academic scores, making mean scores and comparisons difficult to interpret. The importance of working individually with the AS child using item analysis of skills and deficits is noted.

There have been a number of researchers that have shown the similarities between the syndrome of nonverbal learning disability (NLD) and AS (refer Chapter 2, section 2.6). Rourke and Tsatsanis (1996:33) present neuropsychological assets and deficits characteristic of NLD. Academic assets include word decoding and spelling. Academic weakness includes graphomotor skills (especially noticeable in the foundation phase), reading comprehension, mechanical arithmetic and mathematics. These research results are potentially significant for learners with AS, and therefore the academic tests conducted in this research need to take these results into account. There are two test batteries for academic achievement, the WIAT, which is generally used in conjunction with the WISC, and the Woodcock-Johnson which is used in conjunction with the Woodcock Johnson tests of cognitive abilities (Lezak *et al* 2004: 666-670).

The Woodcock-Johnson III (WJIII) tests of achievement are a comprehensive test battery that covers four specific academic areas: reading (three tests); oral language (four tests); mathematics (three tests) and written language (three tests). It has additional tests including phoneme and grapheme knowledge (Lezak *et al* 2004:666). The test battery was standardised using a norming sample of the United States population from age 24 months to age 90 years (McGrew & Woodcock 2001:17). Because of the extensive nature of this test battery, it was chosen as part of the neuropsychological test battery for this thesis. There are no updated academic tests available that are normed using a South African population. The WJIII will thus be used diagnostically in this thesis.

Sections 3.4.3.1 through to 3.4.3.4 describe the content of the WJIII tests of achievement. Appendix 8 of this thesis describes changes that have been made to some test items to make the items compatible with the South African learner.

#### *3.4.3.1 Reading*

##### a) Basic reading skills

- Test 1: Letter/word identification. This test measures the subject's word identification skills. The initial items require the subject to identify letters, and the remaining items require the subject to pronounce words correctly. The subject is not required to know the meaning of the word (Mather & Woodcock 2001;11).

##### b) Reading fluency

- Test 2: Reading fluency: This measures the subject's ability to quickly read simple sentences, decide if the statement is true, and then circle yes or no. The difficulty level of the sentences gradually increases. A time limit of three minutes is imposed (Mather & Woodcock 2001:11).

##### c) Reading comprehension

- Test 9: Passage comprehension: The initial passage comprehension items involve symbolic learning, or the ability to match a pictographic representation

of a word with an actual picture of the object. The next items are presented in a multiple-choice format and require the person to point to the picture represented by a phrase. The remaining items require the subject to read a short passage and identify a missing key word that makes sense in the context of the passage. The items become increasingly difficult (Mather & Woodcock 2001:13).

#### 3.4.3.2 *Oral Language*

##### a) Oral language and oral expression

- Test 3: Story recall: Story recall measures aspects of oral language including language development and meaningful memory. After listening to a story being read, the subject is asked to recall as many details as possible from the story (Mather & Woodcock 2001:12).

##### b) Listening comprehension

- Test 4: Understanding directions: Understanding directions requires the subject to listen to a sequence of instructions and then follow the directions by pointing to various objects in a coloured picture. The items gradually increase in linguistic complexity as the number of tasks to perform increases (Mather & Woodcock 2001:12).

#### 3.4.3.3 *Mathematics*

##### a) Calculation

- Test 5: Calculation: Calculation measures the ability to perform mechanical computations. The initial items require the subject to write single numbers. The remaining items require the person to perform addition, subtraction, multiplication, division and combinations of these basic operations. Geometric, trigonometric, logarithmic and calculus operations are also included. The calculations involve negative numbers, percents, decimals, fractions and whole numbers (Mather & Woodcock 2001:13).

#### b) Maths fluency

- Test 6: Maths fluency: This test measures the ability to solve simple addition, subtraction and multiplication facts quickly. The person is presented a series of simple arithmetic problems. The test has a time limit of three minutes (Mather & Woodcock 2001:13).

#### c) Maths reasoning

- Test 10: Applied problems test: Applied problems require the subject to analyse and solve maths problems. To solve the problem the subject must listen to the problem, recognise the procedure to be followed, and then perform the relatively simple calculations. Item difficulty increases with complex calculations (Mather & Woodcock 2001:13).

### 3.4.3.4 *Written language*

#### a) Spelling

- Test 7: Spelling: This test measures the ability to write orally presented words correctly. Initial items measure prewriting skills, progress to writing upper and lower case letters, and then items measure the subject's ability to spell words correctly. The items become increasingly more difficult (Mather & Woodcock 2001:13).

#### b) Writing fluency

- Test 8: Writing fluency: This measures skills in formulating and writing simple sentences quickly. Each sentence must relate to a given stimulus picture in the response booklet and include a given set of three words. The test has a seven minute time limit (Mather & Woodcock 2001:13).

#### c) Written expression

- Test 11. Written sample: Writing samples measures skill in writing responses to a variety of demands. The subject must produce written sentences that are evaluated with respect to the quality of expression. Item difficulty increases by increasing passage length, level of vocabulary, grammatical complexities, and

level of concept abstraction. The subject is not penalised for spelling or punctuation (Mather & Woodcock 2001:14).

Previous studies with respect to academic achievement and individuals with AS have not used the WJIII. The results of the literature study have been included in Table 3.4.

Table 3.4 Summary of previous research on academic skills with respect to individuals with AS

Researcher(s)	Year	Test used	Sample (mean age)	Research aim	Results
Rourke	1995			Theory of non verbal learning disability (refer section 2.6 in chapter 2).	Deficit areas: -reading comprehension -mechanical arithmetic -mathematics -graphomotor  Areas of strength: -word decoding -spelling -verbatim memory
Hagiwara	2001 - 2002			Academic assessment of children with AS	-Reading: solid mechanical reading skills but weak comprehension and application. -Mathematics: may have computational skills (learnt by rote) in the absence of numerical understanding



Researcher(s)	Year	Test used	Sample (mean age)	Research aim	Results
Griswold <i>et al</i>	2002	WIAT and TOPS-R/ TOPS-A	n=21 age – 10 years	Identifying academic skills of children and youth with AS	WIAT (mean standard scores) -Basic reading - 104 -Reading comprehension- 98,89 -Maths reasoning-96,9 -Computations- 89,81 -Listening comprehension- 89,86 -Oral expression- 111 -Spelling-97,76 -Written expression-90,36  TOPS-R/TOPS-A Mean standard score: 73,52 identifying weaknesses in making inferences based on abstract information.

### 3.4.4 Theory of mind

Gillberg (1995:93) notes that the most distinctive feature of AS is the inability to conceptualise the mental states of others. This inability has been referred to by Frith (1989:157) as a theory of mind (ToM). A lack of ToM explains the deficits in social skills, based on the inability to think, feel and view the world from another person's perspective. ToM deficit has played an important role in the development of the understanding of individuals with autism, and many researchers have used the classic ToM experiments to compare individuals with autism and AS (refer chapter 2, section 2.7). These results have been summarised in Table 3.5 and have significance in a test battery for AS learners. Dahlgren *et al* (2003:132) note that deficits in ToM may not be primary to individuals with AS and that this ability in AS

children could be one of the main differences between autism and AS. The classic ToM tests will be described below, and will be used as part of this test battery to gain an understanding of “how the AS mind thinks” in relation to these tasks.

#### *3.4.4.1 Test for theory of mind - “Sally and Anne” experiment (Dahlgren et al 2003:137)*

The tester sits in front of a child with two dolls, a basket, a box and a marble and tells the following story, asking questions to ascertain presence or absence of ToM.

There are two dolls, Sally and Anne. To test whether the child knows which doll is which, naming questions are asked. “Which one is Sally?” “Which one is Anne?” Sally then places a marble in the basket. She then leaves the scene, and Anne takes the marble and places it in the box. When Sally returns, ask the child the belief question: “Where will Sally look for the marble?” The child lacking ToM will answer in the box. To check if the child had both the knowledge of the real current location of the object and an accurate memory of the previous location the reality questions: “Where is the marble?” and “Where was the marble?” are asked.

#### *3.4.4.2 Test for theory of mind - “Smartie box” experiment (Perner et al 1989:692)*

The tester sits with the individual child, and shows him a Smartie box, and asks “What’s in here?”. The child answer’s “Smarties” or “sweets”. The tester opens the box and to the child’s surprise, a pencil is found, and the tester states: “No, it’s a pencil.” The tester puts the pencil back in the box and closing it asks the prompt questions: “What’s in here?” and “When I first asked you, what did you say?” Then the tester asks the child, “If I call in your friend, and he hasn’t seen this box, and I ask him “What’s in here?” what will your friend answer. A child lacking theory of mind will answer “a pencil”.

Table 3.5 summarises results of previous tests involving ToM tasks as described above.

Table 3 5 Summary of tests involving ToM and individuals with autism and AS

Researcher	Year	Test used	Sample (mean age)	Research aim	Results
Frith	1989	“Sally and Anne” experiment “Smartie box” experiment		To test ToM in autistic, Downs, syndrome and control group	All autistic children lacked ToM in both tests
Perner <i>et al</i>	1989	“Sally and Anne” and “Smartie box” experiments as well as additional tests for 2 <sup>nd</sup> order ToM	n=26 – diagnosis of autism mean age: 6,5 years	To test ToM on autistic children	All autistic children lacked ToM as tested on these tests
Ozonoff <i>et al</i>	1991	As for Perner <i>et al</i> (above)		To compare AS children (diagnosed with draft ICD-10 criteria) and autistic children on ToM tasks	AS children performed significantly better on ToM tasks
Dahlgren <i>et al</i>	2003	Sally and Anne and 2 <sup>nd</sup> order ToM task	n=21 – diagnosis of AS as per Gillberg's criteria	Comparison of DAMP, autism, AS and control group with respect to 1 <sup>st</sup> and 2 <sup>nd</sup> order ToM tasks	Linguistic and communication skills are important precursors in the development of ToM.  Results not included in this research because of diagnosis of AS not defined by DSM-IV or ICD-10

Researcher	Year	Test used	Sample (mean age)	Research aim	Results
Kaland <i>et al</i>	2002	Advanced test of ToM	n=21 age: 15,72 years	ToM tasks on AS individuals	Only one AS child did not pass the ToM tests, concluding AS display ToM

### 3.4.5 Executive functions

Jacobsen (2005:33) notes that learners with AS have poor executive functioning. Executive functions are described by Lezak *et al* (2004:611) as intrinsic to the ability to respond to novel situations and are the basis of cognitive, emotional and social skills. The executive functions can be conceptualised as having four components, volition, planning, purposive action and effective performance. Volition is the capacity for intentional behaviour. It requires the individual to formulate a goal, or an intention. Motivation then is an important prerequisite for volition. Planning involves the identification of organisation of steps and elements needed to carry out an intention or achieve a goal (Lezak *et al* 2004:614). To be successful in planning, the individual must be able to conceptualise changes from present circumstances. In addition, the conceiving of alternatives, as well as good impulse control, ability to sustain attention and reasonably good memory functions are necessary. Purposive action requires the individual to be able to initiate and maintain the sequences of complex tasks in an orderly and integrated manner. Effective performance is the individual's ability to monitor, self-correct, and regulate the intensity and tempo of the final product (Lezak *et al* 2004:635).

Jacobsen (2005:33) summarises executive functioning as the capacity to control one's own attentional focus. It enables the individual to recognise what is relevant and shift our attention, to remember and recall what is relevant. Attention, organisation and generalisation are thus all important factors in executive functioning. In much of the literature concerning executive functions, frontal lobe damage is implicated. The Wisconsin card sorting test (WCST) is a test instrument that can be used to test executive functions. Gillberg (1995:96) refers to the WCST as a useful test in the assessment of individuals with AS. It is noted that this test tests "frontal

lobe” or “executive function” and severe impairments were noted by Gillberg (1995:96) in individuals with AS.

#### *3.4.5.1 The Wisconsin card sorting test -64 Card Version (WCST-64)*

This test involves four stimulus cards and sixty four response cards. The four stimulus cards display one red triangle, two green stars, three yellow crosses and four blue circles respectively. These four stimulus cards reflect three stimulus parameters, colour, form and number. The response card deck consists of sixty four cards that also display figures of varying colours (red, blue, yellow or green), forms (crosses, circles, triangles or stars) and numbers of figures (one, two three or four). Each response card can be matched to a stimulus card on one or many combinations of the three stimulus parameters (Kongs, Thompson, Iverson & Heaton 2004:3). The test is based on the principle that the subject must deduce from the pattern of the examiner’s responses (“right” or “wrong”) to the subject’s placement of the cards, the parameter being tested, starting with colour. After ten consecutive correct placements, the examiner shifts the parameter to form and then to number. This sequence is continued until the subject has made six runs of ten consecutive placements (Lezak *et al* 2004:587). This test is normed for ages 6,5 years to 89 years, based on representative samples of children, adolescents and adults in the United States. Standard scores are used for interpretation of results (Kongs *et al* 2004:21).

Previous research by Gillberg (1995:96) concluded that the WCST would be a useful test in the assessment of individuals with AS, and thus has been included in the test battery for this thesis.

### **3.5 SUMMARY**

This chapter details the process of a neuropsychological assessment and includes tests that have been used in previous research which has been done with respect to AS. This research, combined with the theoretical research of chapter 2, concludes a test battery specific to the AS individual which will be used in this thesis. This neuropsychological assessment includes two parts.

The first includes data gathering with respect to family and medical history, behaviour, and sensory issues. This part of the data gathering takes the form of interviews, including semi structured interviews using questionnaires or rating scales. In some instances parents and teachers complete rating scales and questionnaires independently. These include the following and can be referenced in the appendix of this thesis.

- Personal history questionnaire (compiled specifically for this thesis)
- Conners parent and teacher rating scale (attention deficit hyperactive disorder and related symptoms)
- Gilliam Asperger's Disorder Scale (GADS - a diagnostic rating scale for AS)
- Dunn's sensory profile (sensory processing and related sensory issues)
- Qualitative observations and information obtained from interviews

The second part of the neuropsychological assessment includes formal testing with the child in a one-on-one clinical setting. The test battery includes the following neuropsychological assessments:

- Intelligence  
Test used: SSAIS-R  
Subtest scores of the test battery, to be included for detailed analysis.
- Motor functions  
Tests used:
  - Movement ABC-2 – (manual dexterity, ball and balance skills)
  - Beery-Buktenica (visual motor integration, visual perception and motor coordination)
- Academic skills  
Test used: Woodcock Johnson III
  - Reading (word reading, reading fluency and reading comprehension)
  - Oral language and oral expression
  - Mathematics (calculations and maths reasoning)
  - Written language (spelling, writing fluency and written expression)
- Theory of mind  
Tests used:

“Sally and Anne” experiment

“Smartie Box” test

- Executive functioning

Test used: Wisconsin card sorting test

The test descriptions, as well as the rationale for inclusion in this thesis are detailed in chapter 4, and the reader is referred to Table 4.1 and Table 4.2 in the research methodology chapter (Chapter 4).

This thesis involves the collection of data obtained from all of the above tests with respect to individual cases. The data will be used both quantitatively (obtaining individual scores) and qualitatively to better understand how the learner with AS processes and interprets information across different domains. The data will be used to develop individualised educational and treatment plans for each learner. The expected outcomes of the above neuropsychological testing instruments for learners with AS will be detailed in the following chapter, Chapter 4 on research methodology.

## **CHAPTER 4**

### **RESEARCH METHODOLOGY**

#### **4.1 INTRODUCTION**

This research aims to qualitatively investigate the neuropsychological profiles of learners with a diagnosis of Asperger syndrome (AS). The research requires an in depth study of previous literature to establish existing knowledge with respect to the phenomenon of AS under study.

This chapter on research methodology begins by describing the differences between the nature of qualitative and quantitative research, and the reasons for a qualitative research method being chosen. The research design is then fully discussed in section 4.3. The literature study, which is a fundamental part of this research, is covered in Chapter 2 and 3. The research consists of four collective case studies which will be used to analyse and examine the results of the neuropsychological test battery administered.

The data obtained from each of the learners is described in case presentations and a cross-case analysis is done between the cases to investigate common patterns of neurocognitive strengths and weaknesses. These results serve to clarify the diagnosis of AS and highlight the “way of thinking” and specific behaviour of the AS learner. The results of the qualitative analysis are used to provide psycho-educational intervention strategies to assist learners, teachers and parents in managing specific areas of cognitive weaknesses and social and behavioural difficulties. The results of this analysis will also assist in providing guidelines for professionals which will help to address confusion with overlapping symptoms of other conditions such as high functioning autism or non verbal learning disability.



## 4.2 RESEARCH METHODS: QUALITATIVE AND QUANTITATIVE RESEARCH

There are two broad categories of research methodology, quantitative and qualitative. A study is classified as qualitative if the purpose of the study is primarily to describe a phenomenon or situation (Kumar 2005:12). Qualitative research is concerned with collecting and analysing information in as many forms as possible and is mainly non-numeric. The focus is on exploring multiple issues and gathers required information from fewer respondents. The aim of the qualitative study is to achieve detail and depth (Blaxter, Hughes & Tight 2001:64).

A study is classified as quantitative if the purpose is to quantify the variation or phenomenon or issue. This requires information to be gathered using quantitative variables and analysis is focussed on the magnitude of variation (Kumar 2005:12). Quantitative research is thus concerned with the collection and analysis of data in numeric form. It emphasises a relatively large scale and representative sets of data (Blaxter *et al* 201:64). Leedy and Ormrod (2001:101) described the essential difference between qualitative and quantitative research as quantitative research requiring large numbers of subjects and data which would be subjected to statistical analysis for predicting and explaining phenomena. Qualitative research, contrastingly, would lead to a detailed, interpretative approach of data obtained from a small sample (Leedy & Ormrod 2001:101).

The decision to use a qualitative research method for this thesis was made after the following considerations: The data required for analysis in this research is that of the results of a neuropsychological test battery. In order to obtain these results, the researcher interacts personally with the subject, in this case, the learner with AS, and results obtained during the testing process include test scores as well as qualitative observations of how the subject is behaving, interpreting and responding to the testing stimulus. In addition to the results of the neuropsychological test battery, further qualitative investigations are required for each subject (birth and medical history, history of scholastic performance, analysis of previous assessments and interventions). Observations of the subject in his educational setting as well as parental and teacher interviews complete the collection of data for analysis. An in depth study of each subject is undertaken, resulting in an exploratory and

interpretative analysis of the data. The nature of qualitative research is to select a few participants with which to best explore the phenomenon under investigation (Leedy & Ormrod 2001:102). In this thesis, the phenomenon under investigation is the learner with AS. A cross case analysis, after the discussion of individual cases, will determine any patterns of commonality or differences. This is used for further development of existing theory with respect to the AS learner.

### **4.3 RESEARCH DESIGN**

Within qualitative research, different research designs can be used. Two research designs within qualitative research were specifically examined to determine the appropriateness of each for this thesis. These are the case study design and the grounded theory study design. Both the case study and the grounded theory study design have the development of theory as a common aim. The purpose of collecting the data in this thesis is to analyse and compare data in order to ascertain possible patterns of strengths and weaknesses within the presenting neuropsychological profiles. The neuropsychological profile of AS learners is theorised as a result of this analysis.

The grounded theory study as a research design aims to develop theory from data collected in a natural setting. The method relies on continuous comparison of data and theory, beginning with data collection. It emphasises the emergence of theoretical categories solely from evidence and an incremental approach to data gathering and case selection (Eisenhardt 2002:8). The data is thus continually collected and analysed, the results of which determine ongoing and different data collection.

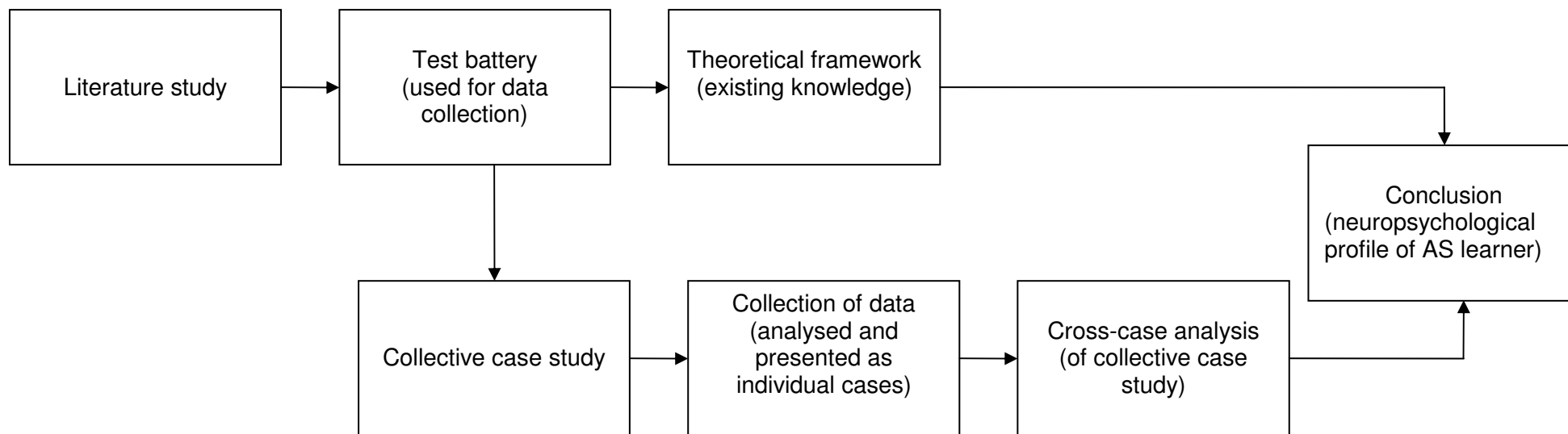
In this research, the data to be collected is researched from previous literature, and based on previous theory. The resulting theory (after analysis of data collected from the research) is thus an extension of existing theory, and not “grounded” in its entirety on the data being collected. This thesis aims at building on previous theory resulting from previous research and thus the grounded theory approach was discarded in favour of a case study design.

The case study design is an approach which is used to study a phenomenon through a thorough analysis of one or more cases. All data relevant to a case is collected and organised in terms of the case. It provides an opportunity for the intensive analysis of many specific details. The approach rests on the assumption that a case being studied is typical of cases of a certain type so that, through intensive analysis, generalisations may be made that will be applicable to other cases of the same type (Kumar 2005:113). The nature of this research is not to limit the study to one learner (or case) but to study a small number of neuropsychological profiles in order to make comparisons and build on existing theory of neurocognitive functioning of the AS learner. For this reason, a collective case study was chosen as the research design. A collective case study involves studying two or more cases in order to make comparisons, build theory and proposes generalisations (Leedy & Ormrod 2001:149). The proposed generalisations can be used as a basis for further study in the field of AS.

The research design for this thesis consists of two parts, the literature study and the case studies. The two parts are integrally linked. The literature study builds the theoretical framework which, in this thesis, has two functions: the first being the collation of the test battery specific to the AS learner, and the second being the theoretical framework from which the final conclusions, after cross-case analysis of the presented cases, will be made. Yin (2003:33) notes the importance of analytic generalisation of multiple cases in which previously developed theory is used as a template with which to compare the empirical results of the case study.

A collective case study which analyses four cases in order to investigate different patterns of theoretical replications will be used. Yin (2003:47) notes that if all the cases in the aggregate support the theoretical framework, then generalisations for new cases can be made. Every case stands on its own, and each case serves the specific purpose of data collection using multiple methods which are described within this chapter. Each individual is thus “embedded” within the collective case study. Final conclusions are drawn from the comparison and analysis of the results of the cross case analysis with the theoretical framework. The following flow diagram (Figure 4.1) illustrates the logic of the research design for this thesis.

Figure 4.1 Research design to determine the neuropsychological profiles of learners with Asperger syndrome



### 4.3.1 Literature study

As can be seen from the above flow diagram, the literature study results in the compilation of the test battery specific to AS. This test battery is an integral part of the research tools used for data collection. This in turn leads to the theoretical framework which will finally be integrated with the results of the cross case analysis of the collective case study in the final conclusions of the thesis.

The literature study is divided into two chapters. The first chapter involving the literature study is specific to AS. This chapter (Chapter 2) details the history of AS as well as the diagnostic criteria for AS. An important distinction that is followed throughout this thesis is the diagnostic criteria for AS as described by the DSM-IV-TR (APA 2000:80-84). Previous research with respect to AS, highlighted specific differences with respect to individuals with autism and individuals with AS. One of these differences was in response to theory of mind tasks (ToM). Findings by Ozonoff *et al* (1991:1115) suggested that deficits in ToM may not be primary to individuals with AS and that this ability in children with AS could be a major distinguishing characteristic between autism and AS. Autistic children as a group are described as being grossly impaired in ToM tasks (Perner *et al* 1989:698). Because of the potential significance of this, ToM tasks have been included in the test battery that follows.

Another main difference that was noted in this literature study, was the poorer response to tasks requiring right hemisphere functioning in individuals with AS. This correlated with research on the similarities between AS and Rourke's (1995:1) syndrome of non verbal learning disability (NLD). Klin *et al* (1995:1127) concluded after a comparative study of AS and NLD, that the characteristics of NLD are an adequate neuropsychological marker of AS, differentiating it from high functioning autism. These results are also considered potentially significant in providing a distinguishing profile of AS, and for this reason the scholastic tests of achievement, as well as other tests specific to right hemisphere functioning have been included in the following test battery which will be detailed in section 4.4 of this chapter.

The second literature study (Chapter 3) detailed literature with respect to the process of a neuropsychological assessment, as well as the descriptions of tests used in previous research. A number of research articles have been published regarding intellectual abilities as tested on an intelligence (IQ) test. Limited, but correlating research has been included involving assessment of motor functions, academic achievement and executive functioning. These tests have been included in the test battery which was collated for this thesis. The neuropsychological assessment involves the intense study of behaviour by means of interviewing, questionnaires, observations and scaled tests to provide precise and sensitive measures (Lezak *et al* 2004:15). This literature study was used to compile the neuropsychological test battery described in the collective case study that follows.

#### **4.3.2 Collective case study**

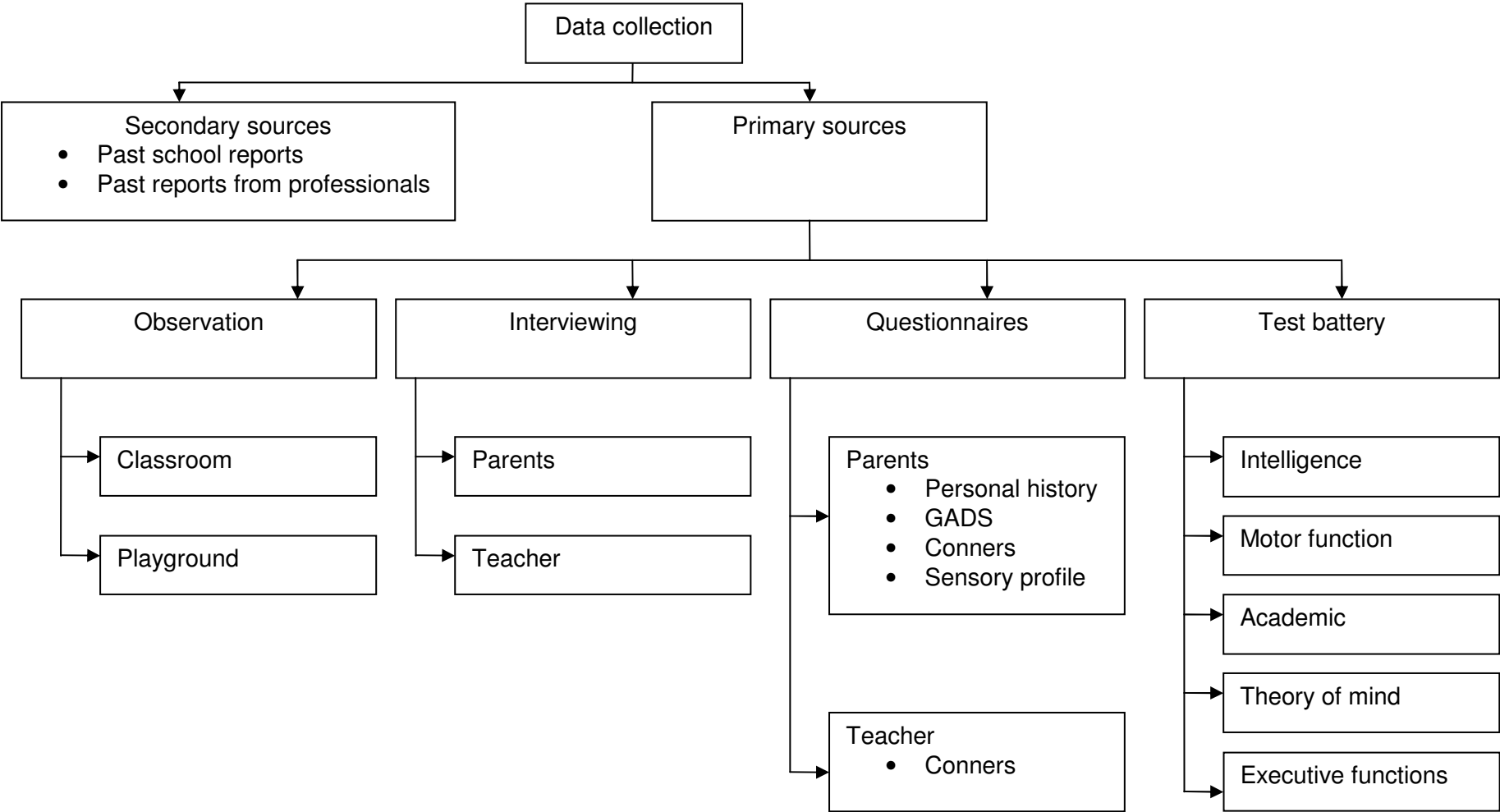
A collective case study research design was used to further the understanding of the AS learners being studied. A collective case study draws on several cases to illustrate a particular phenomenon or diagnostic category (Higgins 1996:61). Fouché (2002:276) notes that cases are chosen with the aim of making comparisons between cases and concepts in order to extend and validate theories.

The four cases chosen for study were done by purposive sampling. Strydom and Delport (2002:334) state that the purposeful selection of participants is a key decision in qualitative study. The researcher only uses subjects who will provide the best information to achieve the objectives of the study (Kumar 2005:179). All participants in the collective case study are learners with a diagnosis of AS, diagnosed by an independent professional specialised in this field. A specific criteria for participation in the research conducted is that the diagnosis meets the criteria for AS as described in the DSM-IV-TR (APA 2000:80). To further ensure validity of analysis of data, it was decided to limit studies to learners within the primary school phase (Grades 3-7), all being schooled in the Western Cape, South Africa.

To ensure construct and internal validity, multiple sources of data need to be collected and systematically analysed (Yin 2003:97). The analysis of the multiple sources of data involves the comparing of data in search of common themes which is

central to the aim of this thesis. The methods of data collection used in this research are divided into two sources, primary and secondary, as outlined in Figure 4.2 on the following page.

Figure 4.2 Methods of data collection





As can be seen from Figure 4.2, the data collected is divided into secondary and primary sources. At the initial parent interview, Figure 4.2 was presented to the parents in order to explain the extent and nature of the entire investigation. This ensured that the parent understood and was willing to contribute to the research process by giving permission for the investigation of the secondary and primary sources, as well as answering interviews and questionnaires in as much detail and with as much personal insight as possible. To ensure ethical considerations, cases were treated anonymously, and permission was given for the cases researched to be presented and discussed whilst remaining anonymous. All parents and teachers were given individual feedback on the results of their child's individual neuropsychological assessment. The primary aim and conclusions of the cross case analysis and resulting comparisons with the theoretical framework from the literature study were explained to the parents.

Secondary sources that were used for data collection were sourced from the parents, school or professionals that had previously worked with the learner. Data obtained from the primary sources are discussed below.

Observations were done in the natural setting, that is the school classroom and on the playground. The observation was as a "non participant". Non participant observation is described by Kumar (2005:120) as an observer that does not get involved in the activities of the group, but remains a passive observer. The observation was purposeful and systematic, with the focus being on the behaviours, responses and interactions of the learner with the teacher and his fellow learners. To ensure reliability, effort was made to avoid bias in observations by remaining as objective as possible whilst recording observations.

Interviewing was conducted in the form of an unstructured interview. The purpose of an unstructured interview is initially to relay the purpose and relevance of the study to the parent. Kumar (2005:123) highlights the strength of the unstructured interview in the freedom it provides in terms of content and structure. The sequence of the interview is thus determined by the flow of the interview.

Questionnaires were given to both parents and teachers. The parent questionnaires included a personal questionnaire (Appendix 1), as well as the Gilliam Asperger's disorder scale (Appendix 2), Conners' parent rating scale (Appendix 3) and the sensory profile of Dunn (Appendix 4). The teachers completed the Conners' teacher rating scale. Details of these questionnaires and rating scales are given in the following section, section 4.4 of this chapter. Results of these questionnaires were summarised and comparisons made between teacher and parent questionnaires where applicable. These results are written up in the final case presentation.

The test battery was conducted with the learner in a one-on-one testing situation, free from distractions. The test battery is extensive and took place over a period of three sessions, each of a hour and a half duration. The first session included the intelligence testing or IQ test battery (Appendix 5). The second session included the tests for motor functions (Appendix 6 and 7), ToM tasks (Appendix 9 and 10) and the test for executive functioning (Appendix 11). The final session included the tests of academic achievement (Appendix 8). These results were scored and analysed according to the standardised instructions of each test battery. These results are written up in each case, and the learner's neuropsychological profile resulted from the analysis of the results. All the above mentioned appendices can be referenced by the reader in the appendix section after the concluding chapter, Chapter 7.

The results obtained from the data collection are presented by individual case study. The data collected is further analysed, using cross case analysis to identify any patterns of strengths and weaknesses in the neuropsychological profiles. These results add information to existing theories of the AS learner. Yin (2003:33) notes the process of "analytic generalisation" used in multiple case studies where a previously developed theory is used as a template with which to compare the empirical results of the case study.

#### **4.4 DATA COLLECTION**

The data collected for analysis is aimed to satisfy the research question – "What is the neuropsychological profile of a learner with AS?" For the relevant data to be collected, a review of relevant literature for AS as well as relevant literature for

neuropsychological assessment was required. The literature study of AS reveals specific theories with respect to cognitive processing of learners with AS. These were specifically addressed and tested with corresponding neuropsychological assessment tests. In this way, a neuropsychological test battery, specific for AS learners was developed and the results of this specific test battery yielded the data used for analysis.

The methods used for the collection of data in each case study are outlined in Figure 4.2 above. These are now described in detail, given the underlying rationale for inclusion in the test battery, referring to previous literature studies of Chapters 2 and 3. Previous research results are summarised and are used when comparing results of the case studies with the existing theory.

The neuropsychological test battery is divided into two sections. The first section comprises the questionnaires and rating scales which were completed by the parents and teacher of the AS learner. The second section comprises the test battery with specific reference to the AS learner. Table 4.1 and 4.2 summarise the test battery that was used to compile a possible profile of learners with AS.

Table 4.1 Summary of questionnaires and rating scales included in the neuropsychological test battery

Domain assessed	Questionnaire or rating scale	Completion	Previous research results and rationale for inclusion in neuropsychological assessment
Personal history	Questionnaire compiled (refer Appendix 1)	Parent completion followed by informal parental interview if necessary to clarify details in questionnaire	
Asperger syndrome diagnostic criteria	Gilliam Asperger Disorder Rating Scale (GADS) (refer Appendix 2)	Parent completion	No previous research has been published using GADS. The Autism diagnostic interview (ADI) and the Autism diagnostic observation schedule (ADOS) are commonly used. The latter two are not however specific for AS.
Attention and hyperactive, impulsive, behavioural, anxiety and social problems	Conners' rating scales-revised (refer Appendix 3)	Parent and teacher complete different questionnaires which can be compared	Researchers have noted the comorbid symptoms of ADHD amongst AS individuals. Ghaziuddin <i>et al</i> (1998:281) state that all children with a diagnosis of ADHD should be screened for AS.
Sensory processing	Sensory profile – Dunn (refer Appendix 4)	Parent questionnaire	Attwood (2006:273) notes that unusual sensory perception is considered a confirmation of a diagnosis of AS, but is not included in the DSM-IV-TR for diagnosis. This should be further researched to ascertain whether specific sensory issues can serve as a marker for AS.

Table 4.2 Summary of tests included in the neuropsychological test battery

Domain tested	Previous tests used and results	Tests used for this test battery	Previous Theory
Intelligence (IQ)	Wechsler intelligence scales: WISC (children), WAIS (adults) Results: refer to Table 3.2 in Chapter 3	Senior South African Individual Scale – revised (SSAIS-R) Verbal subtests: - vocabulary - comprehension - similarities - number problems - story memory - memory for digits Non verbal tests: - pattern completion - block designs - missing parts - form board - coding  (refer Appendix 5)	<ul style="list-style-type: none"> <li>- Global verbal IQ scores greater than global performance IQ scores (Klin <i>et al</i>, 1995; Ghaziuddin <i>et al</i>, 1998; Ozonoff <i>et al</i>, 2000; Miller &amp; Ozonoff, 2000; Gilchrist <i>et al</i>. 2001; Green <i>et al</i>, 2002; Kaland <i>et al</i>, 2002; Gunter <i>et al</i>. 2002; Ghaziuddin &amp; Mountain-Kimchi, 2004)</li> <li>- Comprehension results poor (Gillberg, 1995)</li> <li>- Vocabulary results good (Gillberg, 1995; Ozonoff <i>et al</i>, 2000; Ghaziuddin &amp; Mountain-Kimchi, 2004)</li> <li>- Number problems results poor (Gillberg, 1995)</li> <li>- Coding results poor (Gillberg, 1995; Ozonoff <i>et al</i>, 2000; Ghaziuddin &amp; Mountain-Kimchi, 2004)</li> </ul>

All previous testing with respect to intelligence profiles and AS has been done using the WISC. No results using the SSAIS-R have been published. These results which make up the theoretical framework are thus based on the Wechsler intelligence scales. The SSAIS-R was chosen for this thesis as it is widely used within South Africa, and is standardised for children between 7 and 16 years 11 months with English or Afrikaans as mother tongue. The results of this test battery will provide the cognitive profile of each AS learner (case) studied.

Domain tested	Previous tests used and results	Tests used for this test battery	Previous theory
Motor functions	Movement ABC-2 Results: refer to Table 3.3 in Chapter 3	Movement ABC-2 - manual dexterity - ball skills - balance (refer Appendix 6)  Beery-Buktenica - visual motor integration - visual perception - motor coordination (refer Appendix 7)	Motor impairment of AS children high (Miyahara <i>et al</i> , 1997; Green <i>et al</i> , 2002)  Because of evidence of weak coding (refer Table 4.2) and weak graphomotor skills as for non verbal learning disability cases (Rourke, 1995) this test was included

The Movement ABC-2 is an assessment tool that provides objective, quantitative data on movement competence (Hendesron, Sugden & Barnett 2007:4). Motor functions pertaining to AS have been previously tested using the Movement ABC-2 as an assessment tool. Motor impairment was universal in previous research, and for this reason, the Movement ABC-2 was chosen as part of this test battery to further investigate motor functions of learners with AS.

Another test used for motor functioning is the Beery-Buktenica developmental test of visual-motor integration. This test consists of a developmental sequence of geometric forms to be copied with pencil and paper and is designed to assess the extent to which individuals can integrate their visual and motor abilities (Beery & Beery 2006:1). This test was previously used as part of a test battery in an attempt to differentiate autism from AS (Szatmari *et al*/ 1995:1662). No scores were quoted in their findings, and no conclusions with respect to this domain tested were given. It has been noted above that results of the coding subtest on an IQ test battery as well as graphomotor skills tend to score as deficit areas for children with AS. It was decided to use the Beery-Buktenica test to further investigate visual motor integration as an aspect of motor development for the AS child.

Domain tested	Previous tests used and results	Tests used for this test battery	Previous theory
Academic achievement	<p>Wechsler Individualised Achievement Test (WIAT)</p> <p>Tests of Language Development (TOLD)</p> <p>Test of Problem Solving (TOPS)</p>	<p>Woodcock Johnson-III:</p> <p>Reading</p> <ul style="list-style-type: none"> <li>- basic reading skills</li> <li>- reading fluency</li> <li>- reading comprehension</li> </ul> <p>Oral language</p> <ul style="list-style-type: none"> <li>- oral language and oral expression</li> <li>- listening comprehension</li> </ul> <p>Mathematics</p> <ul style="list-style-type: none"> <li>- calculation</li> <li>- maths fluency</li> <li>- maths reasoning</li> </ul> <p>Written language</p> <ul style="list-style-type: none"> <li>- spelling</li> <li>- writing fluency</li> <li>- written expression</li> </ul> <p>(refer Appendix 8)</p>	<p>Hagiwara (2001-2002:98) emphasised the need for systematic assessment procedures for children with AS. as no conclusive results were obtained with respect to the academic achievement of the AS child.</p> <p>Griswold <i>et al</i> (2002:98) in a study of academic characteristics of children with AS concluded lowest scores in numerical operations, listening comprehension and written expression. These researchers however note that a wide range of scores were obtained and conclusive results were difficult to obtain.</p> <p>Previous research with children with non verbal learning disability and AS (Rourke, 1995) indicate deficit areas in:</p> <ul style="list-style-type: none"> <li>- reading comprehension</li> <li>- mechanical arithmetic</li> <li>- graphomotor (writing)</li> </ul> <p>Strength of skills were noted in:</p> <ul style="list-style-type: none"> <li>- word decoding</li> <li>- spelling</li> <li>- verbatim memory</li> </ul>

The domain of academic achievement is an important one for this thesis dealing with the learner with AS. A test battery which has been collated to study academic areas comprehensively is the Woodcock-Johnson III (WJIII). The standard test battery results are divided into clusters of reading, oral language, maths and written language. These clusters of tests provide the basis for test interpretation (Mather & Woodcock 2001:1). This test, standardised in America, was chosen as it is easily administered and tests all aspects of scholastic “output” as summarised above. The wording of some test items has been

changed for the South African context, and these details can be seen in Appendix 8. These results are important for an understanding and implementation of the individualised education plan. If the AS learner is challenged by a particular pattern of deficits, unique to his “way of processing” stimuli, this needs to be understood. A typical neurological profile will assist in understanding the primary (and secondary) barrier’s to learning.

Previous research has not been consistent in the choice of academic tests administered, as there is a wide variety to choose from which restricts replication of results in continued research. Tests that are currently used in South Africa to test for academic achievement are not updated. This is a further reason for the WJIII to be selected.

Domain tested	Previous tests used and results	Tests used for this test battery	Previous theory
Theory of mind (ToM)	ToM tests described by Frith (1989:159) and used in previous research  (Refer Table 3.5)	Theory of mind test – “Sally and Anne” test (refer Appendix 9)  Theory of mind test – “Smartie box” test (refer Appendix 10)	Previous research, particularly with research to establish distinguishing differences between autism and AS, concludes that AS children do not have a problem with ToM tasks. It is thus important to include these tests as it may be an important neuropsychological distinction in the AS learner.

Theory of mind (ToM) is an important aspect in studies conducted by Frith (1989:157). ToM is used to explain deficits in social skills of individuals with a diagnosis of autism, based on the inability to think, feel and view the world from another’s perspective. Classic ToM tests, of which the above two are commonly known, have been developed and used extensively in research amongst individuals with autism as well AS.

Domain tested	Previous test used and results	Tests used for this test battery	Previous theory
Executive functions	Wisconsin card sorting test	Wisconsin card sorting test (WCST-64) (refer Appendix 11)	Severe impairments were noted with this test in AS individuals by Gillberg (1995:96).

Executive functions, which have the components of volition, planning, purposive action and effective performance are measured by the WCST (Lezak *et al* 2004:635). Low scores on executive function tasks implicate frontal lobe damage. Gillberg (1995:96) has referred to the WCST as useful in testing AS children, as severe deficits of executive functions were noted in research involving individuals with AS.



## 4.5 ANALYSIS OF DATA

Analysis of the data of case studies involves a detailed write up of each case. This allows the researcher to become intimately familiar with each case as a stand alone entity (Huberman & Miles 2002:17). The unique patterns of each case thus emerge before any generalised patterns are made across cases. Overall impressions, tentative themes, concepts and relationships are observed, and the second step is to use these in a cross-case analysis to compare systematically, the emergent themes from each case.

A cross-case analysis presents the data collected from the four different case studies using replication logic (Yin 2003:145). This implies that all four case studies were chosen because of specific criteria being met. The case studies, and ensuing evaluation, predicted that similar results would be found. If the results are found to be consistent, the findings can be presented with more confidence. A close fit between theory and analysed data is important to build on existing theory. New insights from data collected and systematically analysed will yield an empirically valid theory (Huberman & Miles 2002:20).

Each case focuses on the learner's neuropsychological profile as well as additional data obtained from the multiple methods as described in the research design above. Findings of the case study pertain to specific theoretical propositions within the defined unit of analysis. These findings are summarised by assembling tables, displaying the data from the individual cases and searching for patterns across them. This is presented in Chapter 5.

The purpose of the cross-case analysis is thus firstly to answer the original research question and summarise the neuropsychological profiles of learners with AS. Secondly, the cross case analysis compares results obtained from those previously researched and stated at the onset of the data collection. Thirdly, the analysis summarises common strengths and weaknesses, within the neuropsychological and educational profiles of learners with AS. The resulting summaries enable an individualised educational plan for an AS learner to be developed. Combining the

emergent theory to existing literature enhances the internal validity, generalisation and theoretical level of theory building from the case study research (Huberman & Miles 2002:26). This theory building thus presents new insights into the field of AS.

#### **4.6 SUMMARY: DESCRIPTION OF INVESTIGATION**

The completion of the literature study formed the bases of the theory required for the collation of the neuropsychological test battery that was used to collect the data for four individual cases.

Each case is focussed on a learner in the primary school phase (Grades 3-7) within the schooling system of the Western Cape (South Africa). Each case has a diagnosis of AS given by an independent professional who is specialised in the field. The researcher approached school principals and learning support staff in order to identify and make contact with the parents of such learners.

Once the cases were identified, contact was made with the parents of each learner, to explain and get permission for the learner to participate in the research process. The researcher initially met with the parents, and the parents completed the questionnaires and rating scales as described in Table 4.1 of the test battery. Teachers were asked to complete the appropriate rating scales for teachers. Parents were asked for past academic and scholastic records, and arrangements were made for classroom observation of each learner. This completed the first stage of data collection. Appointments were made for individual sessions of formal testing to complete the second section of the neuropsychological test battery. These sessions (three sessions of an hour and a half each) were completed by the researcher in a one-on-one testing situation. The formal tests were completed in accordance with testing procedures as described by the manuals of tests.

The findings of each individual case are written up separately (refer Chapter 5 and Annexure). These results are analysed (cross case analysis) as a collective sample to ascertain any patterns of strengths and weaknesses that may be present. The findings of these results are presented in Chapter 6. After the cross case analysis,

comments with respect to findings of previous research are made. Finally these results are examined and presented as the neuropsychological profile of a learner with AS. The data and conclusions made from this thesis will enlighten the understanding of the neuropsychological implications of the AS learner. Findings help clarify whether these learners are indeed part of the autistic spectrum or whether they have a unique neurocognitive pattern of strengths and weakness which separate them from the typical autistic child (as suggested by previous research specifically in the field of right hemisphere dysfunction). These findings have significant implications for appropriate educational intervention of the AS learner. Chapter 5 presents the findings of the data collection.

## CHAPTER 5

### PRESENTATION OF FINDINGS

#### 5.1 INTRODUCTION

This chapter includes the detailed results of one of the four case studies conducted. It was decided, due to the detailed nature and length of the write up of each case study, that only one detailed case study write up will be included in the body of the thesis. The remaining three case studies will be included in the annexure of this thesis for the reader to reference if required. All four case studies will be summarised and analysed in Chapter 6. The following case will describe in detail the biographical details as well as the results of the neuropsychological assessment conducted for the case referred to as C.I. Results of the questionnaires that were completed by the parent and teacher, as well as the classroom and playground observations of the case study will be detailed. The analysis and conclusions of the case, including the treatment plan and interventions will be included in Chapter 6.

#### 5.2 CASE STUDY 1 – referred to as C.I.

Personal details:

Birth date:	17 December 1993
Chronological age (at date of testing)	13 years 10 months
School:	Private school in Cape Town
Grade:	7
Sex:	Male

Home circumstances:

C.I. is from a stable home environment. His family unit consists of his father and mother (married) and a younger brother. His father is a fitter and turner with a matriculation certificate and an N6 in mechanical engineering. His mother is a secretary with a highest qualification of grade 12.

C.I.'s father described himself as a perfectionist, organised person who likes routine. He is additionally described as quiet and socially reserved, a "private" person. He did not experience academic problems at school. C.I.'s mother described herself as quiet and reserved and did not have any behavioural or social difficulties at school. C.I.'s mother described her cousins as having a diagnosis of attention deficit disorder (ADHD) and Asperger syndrome (AS).

C.I.'s younger brother has a diagnosis of ADHD. He is described as being very fidgety and struggles to sit still, getting anxious quickly. He is described as being disorganised, the opposite of C.I. who is very organised, planned and detailed. The two siblings fight a lot.

#### Birth and medical history:

C.I.'s mother described her pregnancy as good. The birth however was described as traumatic. C.I. was born at full term by vacuum delivery. He was asphyxiated at birth with an Apgar score of 4. It was reported that he responded well to face mask oxygen and was placed in the intensive care nursery. C.I.'s birth weight was 4,04 kg. He developed high fevers and convulsions after a day and a lumbar puncture revealed bacterial meningitis. His condition improved with treatment but in the fourth day C.I. developed pneumonia. After continued treatment in the intensive care unit, his condition stabilised and he was dismissed from hospital after brain scans revealed no abnormalities.

Developmental milestones were recorded as normal: sitting at 6 months, crawling at 11 months and walking at 14 months. His first words were at 2 years and sentences were at 3 years. C.I.'s mother reported that he had convulsions at 15 months which "set him back" about 4 months, delaying his speech and motor development.

C.I. is described as a good, non fussy eater, but dislikes using a knife and a fork. His sleeping habits are described as being good as he has a rigid routine which he adheres to. He has had numerous ear infections and has had grommets inserted. His eyesight and hearing have been tested and there are no problems in either of

these areas, his eyesight being described as “excellent”. He has had his adenoids removed and is described as a very allergic child.

In February 2001, C.I. was diagnosed as having ADHD by a paediatrician and he was prescribed Ritalin. It is of note that C.I.’s mother did not agree with the school’s assessment of his attention problems – making a note that “his attention span at home was very good, it was only at school that he was having a problem and that he always completed tasks at home, it is only at school that he took a long time”.

C.I.’s first psycho-educational assessment was done in March 2001, during his repeat grade 1 year – by a counselling psychologist. Results concluded average IQ in global, verbal and non verbal subscales as tested on the JSAIS. It was further concluded that he presented with learning disabilities and it was recommended that he attend a specialised school for children with learning difficulties. C.I had been attending occupational therapy from May 1998 to December 2000 to address difficulties with poor motor skills and spatial perceptual problems.

C.I. was given a diagnosis of AS by the school psychologist while attending a specialised school between grades one and six. His present psychiatrist has confirmed a diagnosis of AS along with an additional diagnosis of dysthymia and obsessive anxiety, secondary to AS (September 2006) and is currently taking Zoloft daily which has been prescribed by his psychiatrist to assist with his underlying stress and anxiety.

#### Scholastic history:

C. I initially attended a mainstream government primary school and repeated grade 1 due to an inability to concentrate and finish tasks. He attended a specialised remedial school from 2001 – 2006. Whilst at this remedial school, he attended occupational therapy for 2 years and speech and language therapy for 4 years. Despite this school being a specialised school for learners with learning difficulties, he struggled socially. This resulted in him being bullied on the play ground and on the school bus. He changed schools and is currently at a small private school for

children who “learn differently”. In 2007 he attended group therapy sessions for social skills development. See section 5.2.4 for detailed school records.

C.I.’s parents detail their main area of concern for their son as being:

- Lack of social interaction
- Emotional instability
- High frustration levels
- Lack of awareness of people and their surroundings

### **5.2.1 Results: Questionnaires**

The questionnaires which were completed consisted of the Conners’ questionnaire, the Gilliam Asperger disorder scale (GADS) and the Dunn sensory profile.

#### *5.2.1.1 Conners’ parent and teacher questionnaire*

The Conners’ rating scale is used for the assessment of ADHD and related behaviour in children. The parents and teacher of C.I. were given the parent and teacher Conners’ rating scales respectively. The results were compared to ascertain behavioural symptoms that were significant in C.I.’s case.

Items from the Conners’ teacher questionnaire scoring a “very frequent, very often” response were:

- Appears to be unaccepted by the group
- Is a perfectionist
- Is one of the last to be picked for teams and games
- Everything must be just so
- Fails to finish things he starts
- Has no friends
- Timid, easily frightened
- Does not know how to make friends
- Seems over-focused on details
- Has poor social skills

- Shy, withdrawn

Items from the parent questionnaire scoring a “very frequent, very often” response were:

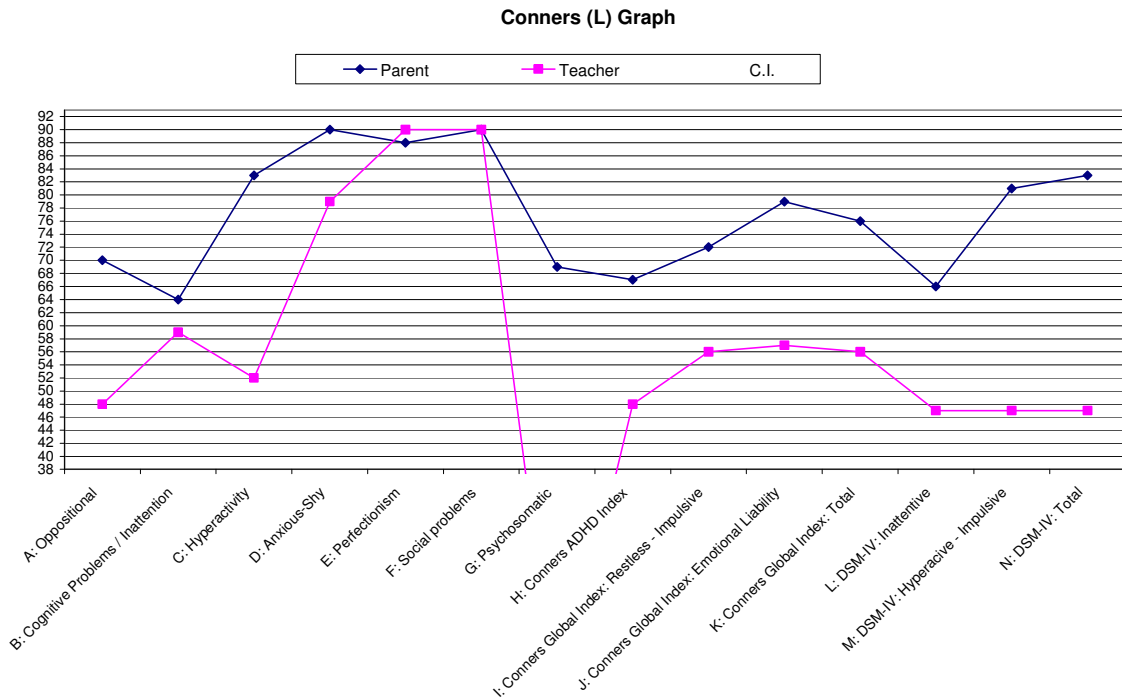
- Everything must be just so
- Has no friends
- Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort
- Keeps checking things over again and again
- Loses friends quickly
- Loses temper
- Needs close supervision to get through assignments
- Afraid of new situations
- Fussy about cleanliness
- Does not know how to make friends
- Things must be done the same way every time
- Has a lot of fears
- Has rituals that he must go through
- Has sloppy handwriting
- Has difficulty playing in leisure activities quietly
- Blames others for his mistakes or behaviour
- Gets upset if someone else rearranges his things
- Clings to parents or other adults
- Demands must be met immediately - easily frustrated
- Only attends if it is something he is very interested in
- Easily distracted by extraneous stimuli

The results from the teacher and parent questionnaires were combined and are presented in Graph 5.1. Significantly high scores in the clusters of anxious/shy, perfectionism and social problems were rated in both the teacher’s rating and the parent’s rating. In addition to these high scores, the parent questionnaire also rated high scores in hyperactivity and DSM-IV – total scores for ADHD. These scores however were not rated highly by the teacher. C.I.’s main areas of behavioural



concern in both school and home environments relate to perfectionisms, social problems and anxiety.

Graph 5.1 Conners' graph showing results from both parent and teacher long form questionnaires



The horizontal axis shows the different subscales which are represented from the results obtained from the questionnaire. The vertical axis shows the *T*-scores or standard scores that were calculated from the raw scores obtained. The *T*-score obtained thus allows each obtained score to be compared to the same reference value. *T*-scores of above 66, indicate significant problems. *T*-scores of 45-55 indicate average scores, and *T*-scores of less than 35 indicate no area of concern (Conners 1997:44).

In the case of C.I. high scores on anxiety, perfectionism and social problems are the correlating behavioural symptoms of a significant degree of severity as scored by his teacher and parents. His parents further rate significant problems relating to the subscales of oppositional behaviour, hyperactivity, Conners' index of restless and impulsive behaviour, Conners' index of emotional liability (indicating individual more prone to emotional responses than are typical), Conners' global index and DSM-IV

hyperactive impulsive and DSM-IV total (indicating DSM-IV criteria for combined inattention and hyperactive-impulsive type ADHD).

#### 5.2.1.2 Gilliam Asperger's disorder scale (GADS)

The GADS subscale scores for C.I. according to percentile rank (indicating percentage of scores in the normative group that scored lower than C.I.) were:

- Social interaction – 84 percentile rank (score on social interaction was higher than 84% of other children, meaning that C.I. has more social difficulties than a large percentage of other children)
- Pragmatic skills – 84 percentile rank
- Cognitive patterns – 63 percentile rank
- Restricted patterns of behaviour – 50 percentile rank

The Asperger's disorder quotient was calculated as 112. A quotient of more than 80 is considered to be significant in making a diagnosis of Asperger's disorder highly probable on the GADS (Gilliam 2001:17).

Behaviours that were scored as "frequently observed" by C.I.'s parents were:

Social interaction subscale:

- Has difficulty cooperating in a group
- Has difficulty playing with other children
- Needs an excessive amount of reassurance if things are changed or go wrong
- Lacks subtlety in expression of emotion
- Requires specific instructions to begin tasks
- Expresses feelings of frustration and anger inappropriately
- Becomes frustrated quickly when unsure of what is required

Cognitive patterns subscale:

- Displays superior knowledge or skill in specific subjects or activities
- Attaches very concrete meanings to words
- Shows excellent memory

Pragmatic skills subscale:

- Has difficulty identifying when someone is teasing
- Has difficulty understanding when he is being ridiculed, put down or made fun of
- Has difficulty understanding what causes people to dislike him
- Fails to predict probable consequences in social events
- When confused, doesn't ask for clarification but switches to a familiar topic

#### 5.2.1.3 *Dunn's sensory profile*

The sensory profile of Dunn (1999:1) provides a standard method to measure a child's responses to sensory processing abilities and then to profile the effect of the child's sensory processing on functional performance in the daily life of the child. The sensory profile caregiver questionnaire was given to both the teacher and the parents of C.I. The results of the teacher's questionnaire were not included as she was unable to complete all the questions as she did not feel that she knew him well enough to make comment to his sensory responses.

The following areas are highlighted by C.I.'s parents as being how he responds to the stimulus "always – 100% of the time" and therefore seen as significant.

- Vestibular processing – rocks unconsciously (when he goes to bed)
- Touch processing – has difficulty standing in line or close to other people
- Multisensory processing – hangs on people, furniture or objects even in familiar situations
- Modulations of movement affecting activity level – becomes overly excitable during movement activity
- Modulation of sensory input affecting emotional responses – rigid rituals in personal hygiene; is overly affectionate with others; doesn't perceive body language or facial expressions
- Emotional/social responses – is sensitive to criticisms; has definite fears
- Seems anxious; displays excessive emotional outbursts when unsuccessful at task; has difficulty making friends
- Behavioural outcomes of sensory processing – has difficulty tolerating changes in plans and expectations; has difficulties tolerating changes in routines

The results from the items answered in the questionnaire are grouped into three main sections for analysis. These sections are sensory processing, modulation and behavioural and emotional responses (Dunn 1999:1). The sensory processing section indicates the child's responses to the basic sensory systems including: auditory processing, visual processing, vestibular processing, touch processing, multisensory processing and oral sensory processing. Of these sensory systems C.I.'s scores rated as having a definite difference (as compared to the norm) in the areas of auditory processing, vestibular processing and touch processing.

The modulation section reflects the child's regulation of neural messages through facilitation or inhibition of various types of responses. The five areas of sensory modulation assessed included sensory processing related to endurance/tone, modulation of movement related to body position and movement, modulation of movement affecting activity level, modulation of sensory input affecting emotional responses and modulation of visual input affecting emotional responses and activity level. C.I.'s scores reflected definite difficulties with sensory processing related to tone, modulation of sensory input reflecting emotional responses and modulation of visual input.

The third section of behavioural and emotional responses reflects the child's behavioural outcomes of sensory processing which is broken down into the section of emotional / social responses, behavioural outcomes of sensory processing and items indicating thresholds for response. Of these, C.I. scored a definite difficulty with emotional and social responses as well as behavioural outcomes of sensory processing.

### **5.2.2 Results: Neuropsychological test battery**

The testing sessions took place at the school of C.I. He presented as confident in the testing situation and settled in easily, chatting throughout the testing sessions. As C.I. got more familiar with the researcher, his chatting become more and more elaborate, characterised by detail which was not always relevant (recounting a

weekend visit to friends, and describing in great detail the layout of the kitchen, and the rooms, as if this detail was more important to him than the socialising aspect of the visit).

An important point to note during the testing sessions of the neuropsychological test battery was C.I.'s "need" to continue working on all testing stimuli until completion, despite many of the tests not designed for this (with discontinuation rules after a certain number of failed attempts).

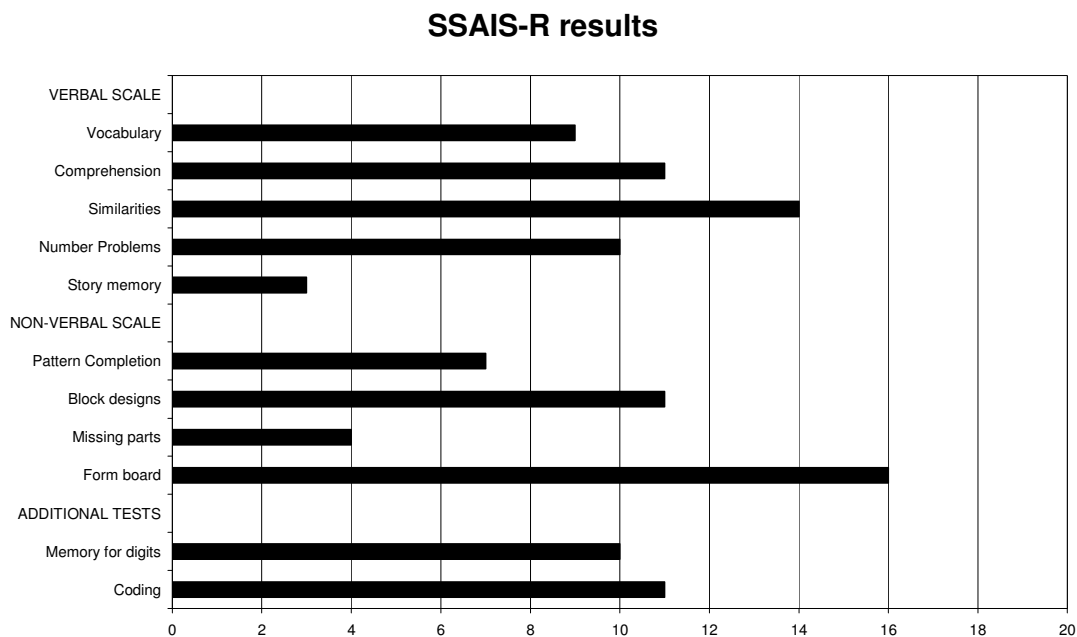
#### *5.2.2.1 Intelligence (IQ)*

The Senior South African Individual Scale – revised (SSAIS-R) was administered and Graph 5.2 gives the results obtained by C.I. The IQ scores obtained from the SSAIS-R are scaled scores. An IQ of 100 is the average, with an IQ of between 85 and 115 being within 1 standard deviation (Van Eeden 1997:46). C.I.'s scaled scores fall into the average range and were the following:

- verbal scale: VIQ - 97
- non-verbal scale: NVIQ - 97
- full scale: GIQ - 97

Individual scores for each of the subtests are noted in Graph 5.2 below. The horizontal axis on the graph gives scaled scores, with a score of 10 being the mean. The vertical axis describes the different subtests that comprise the SSAIS-R. The subtests have been arranged on the vertical axis in sections of verbal scale (vocabulary, comprehension, similarities, number problems and story memory) and non verbal scale (pattern completion, block designs, missing parts and form board).

Graph 5.2 Results of subtest scores of the SSAIS-R obtained by C.I.



Findings of the SSAIS-R are:

C.I. has high scores in the subtests of form board and similarities implying cognitive areas of strength in these areas. C.I.'s highest score was in form board which measures visual perception, organisation, visual concept formation and visual motor coordination. He also scored in the above average range in the similarities subtest which measures verbal, logical, abstract argument, concept formations and long term memory. The ability to distinguish between essential and superficial similarities is an additional factor influencing this test.

C. I. scored in the average range in the subtests of comprehension, block designs, coding, number problems, memory for digits and vocabulary. The comprehension subtest of this test battery should not be confused with "comprehension" of reading and answering comprehension questions of a written text as tested in a scholastic battery. In the test battery of the SSAIS-R, comprehension measures knowledge and understanding of conventional behaviour as well as the ability to use social situations in a meaningful way. The block designs subtest measures the ability to analyse, assemble and copy abstract 2D patterns. C. I. demonstrated an average ability in the coding test which is a pencil and paper task measuring visual-associative learning ability, psychomotor speed, visual motor integration and coordination.

Attention, concentration, motivation and short term memory also influence overall performance on this test. C. I. scored in the average range for both number problems and memory for digits. Number problems measures numerical reasoning ability, abstract thought and mental alertness. Memory for digits measures auditory short term memory and is an indicator of memory for complex information. Attention and concentration are important factors in both of these subtests. The final subtest that scored in the average range was vocabulary which is a measure of verbal learning ability. It is an indication of language development and language usage. Long term memory and concept formation is implicated in this subtest.

Areas of weakness that were noted in C.I.'s cognitive profile were pattern completion, missing parts and story memory. Pattern completion is a non-verbal instrument used for measuring underlying logical thought. C.I. demonstrated weak skills in the area of accurate visual observation and concept formation. The missing parts subtest measures reality contact, knowledge and comprehension of known situations. It requires the ability to distinguish between essential and non-essential information that is presented visually. C.I.'s lowest ability on this test was in story memory which tests short term, logical memory ability for verbal information.

It is important that the results of this test are used diagnostically. C.I.'s results were severely influenced by the nature of the testing stimuli, and his "internal way of thinking". He approached the test battery with a "right or wrong" policy – if he did not know an answer, he would not "risk" or attempt a solution. He was always very aware of doing things correctly and took time to process "input", as though he was "sorting" through a complex filing system of information in his brain – to match the information with an appropriate response. This was noted in the similarities test, where his answers were precise and to the point. In the missing parts test, where the one picture presented has three men walking down a street with one of them with half a jacket missing, he picked up on the lined symmetry of the buildings and commented that it must be something to do with the one man missing a walking stick or cane (which he perceived should have been parallel to one of the lines in the drawing). His mind automatically noticed the symmetry – he then picked up on the jacket and commented that there was also "something funny" about the jacket and

then verbally debated for at least 5 minutes as to what was missing, and then finally decided to “go with both” and said “something wrong with the cane and the jacket”.

C.I. was very good at managing visual information and readily saw the patterns of the block designs test, but became “stuck” on making all aspects of the block designs symmetrical – and would clearly have become very anxious if this was not respected and this internal need of his “satisfied” by allowing him the time to do this. (Despite allowing him time to finish the designs, the designs were not scored if they were completed over the allowed time limit as stipulated in the test instructions). He clearly looked for order and predictability within presenting stimulus and this negatively affected his missing parts test, where he became lost in the detail of the pictures, and was unable to “see the concept” being tested. He would not “move on” with a task unless it was “finished and solved”. During the coding test which had a time limit imposed, he “had to complete” the test, not being comfortable that some were not completed – but then spent some time “rationalising” the “evenness” of the number of uncompleted items – but satisfied himself (internal anxiety) by completing the task.

C.I. struggled with tasks requiring sustained attention to verbal information such as the story memory test (possibly also getting lost in the detail, and not following the concept of the story line).

#### 5.2.2.2 *Motor functions*

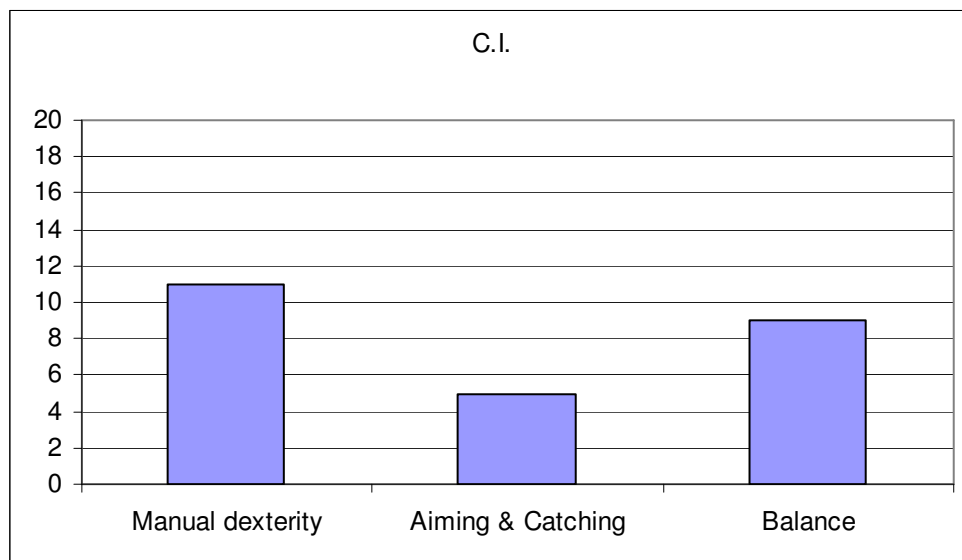
Motor functions were tested with two different tests, firstly the Movement ABC-2 which tests skills in manual dexterity, ball skills and balance. The second test battery used to test motor functions was the Beery-Buktenica test of visual motor integration, which also includes subtests of visual perception and motor coordination.

Results from the Movement ABC-2 are presented in Graph 5.3. The scores on the vertical axis of the graph are given in terms of standard scores. Standard scores are a normalised transformation of a distribution of raw scores and have a given mean and a standard deviation. The mean of this test battery is 10 with a standard deviation of 3. On this scale, approximately two thirds of children have scores



between 7 and 13 (Henderson *et al* 2007:84). C.I.'s scores for manual dexterity and balance thus fall into the average range, whilst his score for aiming and catching is a weakness.

Graph 5.3 Graph of motor functions as determined from the Movement ABC-2 results of C.I.



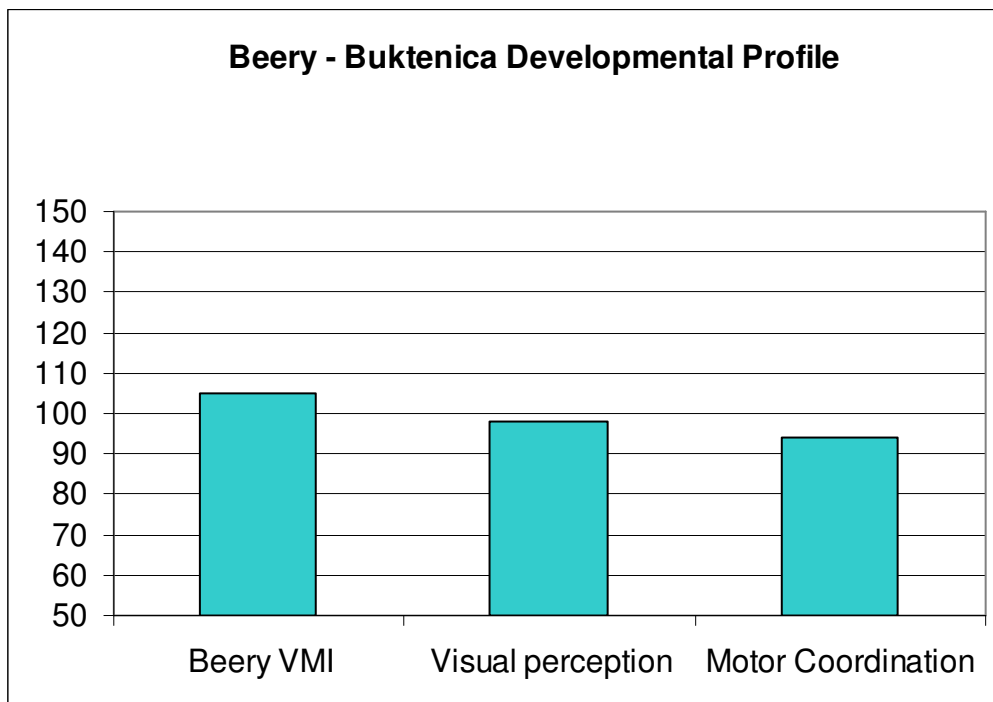
Qualitative observations with respect to the Movement ABC–2 test battery are: The first manual dexterity test was done very systematically with C.I. managing the test equally efficiently with both his right and left hand. During the second manual dexterity test C.I. starting asking “what if?” questions showing some form of anxiety. “What if I drop one of the bolts?” His obsession with even numbers surfaced when he commented on the time taken as good “because it was an even number”. The drawing trail of the third manual dexterity test was done with very careful fine motor control.

During the aiming and catching tasks, C.I.'s initial standing posture was poor, but he soon compensated for this and commented that it was easier and better to bend down when catching the ball. His performance with his right hand was better than his left. It is most probable that a lack of practise in this skill caused these results as opposed to a “neurological deficit”.

The first task on the balance board was characterised by C.I. not holding his head and eyes steady, resulting in him swaying to keep balance. Other balance tasks tested did not indicate any difficulties.

The results of the second test battery for motor functions, the Beery-Buktenica developmental test for visual-motor integration is presented in Graph 5.4. This test consists of three subtests: The first is the visual motor integration (VMI) test which consists of a developmental sequence of geometric forms which are copied with a pencil on paper. The additional tests test visual perception and motor coordination. Scores obtained are converted to standard scores which are represented in the graph below on the vertical axis. The standard score mean is 100 with a standard deviation of 15 (Beery & Beery 2006:89).

Graph 5.4 Graph of results of C.I.'s performance on the Beery-Buktenica developmental tests



C.I.'s test results conclude that visual perception and visual motor integration are at an age appropriate level, with motor coordination being slightly lower, but still in the "average range".

Qualitative observations of C.I. whilst performing this test conclude very slow and particular ways of approaching the VMI task. C.I. tried to get the figure he was drawing to be exactly the same “thickness” as the presenting figure. He had to be encouraged not to “colour” the lines to get the same thickness. It was clear that he was taking the instruction “copy what you see at the top of each page” literally. He would fuss and perseverant on an item if he perceived it to be skew and not exact. At one point he commented, “I hate things being skew”, indicating his inherent drive for order, which permeates what he is involved with.

During the motor coordination task, C.I. was constantly commenting on the detail of the test, verbalising all the changes in presentation from “black dots” to smaller lines to no dots, commenting that now he could not end at a “black dot”. He was very aware of the timed component, having asked about this before he started. Because of his anxiety and “need to finish” tasks, a mental note was made by the tester that the time limit had ended after item 27 (of a maximum number of 30). C.I. completed the 30 items and then announced that he had completed up to 27 in the 5 minute time period. After being asked how he knew that 5 minutes had passed, he commented that he had been “counting in his head”. This is clarification of the enormous amount of “extra” thinking that he is going through with every task, focussing on detail, order and evenness, which will distract from the actual task and hence the scores obtained should be interpreted with caution. Lowered scores are not necessarily a “deficit” in C.I.’s case, but more a case of “cluttered, obsessive and literal thinking”.

#### *5.2.2.3 Academic achievement*

Academic achievement was tested using the Woodcock-Johnson III (WJIII) tests of academic achievement. This test battery covers the four academic areas of reading, oral language, mathematics and written language. C.I.’s results are presented in tabular form in Table 5.1. Scores obtained by C.I. are given in terms of age. This is to be interpreted as his ability in the domain tested as being typical of a child at that equivalent age. The results are thus compared to his chronological age at the time of

testing which was 13 years and 10 months. In this way C.I.'s academic strengths and weaknesses can be profiled.

Table 5.1 Table of C.I.'s results for scholastic achievement as tested on the WJIII tests of achievement

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing
Reading	Letter/word identification	14 yrs 6 months	C.I. demonstrated good word decoding skills. He was able to explain "in detail" his method to work out unfamiliar words "take 3 letters, then pronounce them, then another 3 letters, and pronounce them until you do all the letters". His reading fluency however was slow, possibly due to his being caught up with "analysing" what he was reading.
	Reading fluency	9 yrs 1 months	
	Passage comprehension	10 yrs 3 months	
Oral Language	Understanding directions	8 yrs 9 months	C.I. struggled with sustaining attention to the sequenced nature of this complex verbal test.  Low scores on story recall and delayed story recall confirm weak ability to remember verbal information.
	Story recall	6 years 11 months	
	Delayed story recall	< 7 years	

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing
Mathematics	Calculation	12 yrs 4 months	Once again, it is noted that C.I.'s reasoning skills are age appropriate; his fluency skills are however delayed. He is distracted by the page presentation, wanting to "order" and structure his "output" so that the finished product (jn the maths fluency test) was symmetrical and "even".
	Maths fluency	10 yrs 9 months	
	Applied problems	13 yrs	
Written language	Spelling	9 yrs 5 month	Of note was C.I.'s internal distraction that he was "only starting" on number 15 (of the spelling test) and his need to complete a symmetrical number of spelling words – again, this thought pattern being more dominant than the concept being tested.  C.I.'s written "output" was very difficult to read, his writing being immaturely formed and lacking visual spatial planning on the page. In the written samples test he would often miss the point of the instruction, not being able to "hone in" on the concept behind the instruction". Refer Figure 5.1
	Writing fluency	13 yrs 2 months	
	Written samples	11 yrs	

An area of weakness noted in this test battery was C.I.'s handwriting. His writing was very "messy" and difficult to read with words flowing into one another and scratched out words. His responses to some of the writing samples test are given, illustrating his lengthy answers which are often "off the point" of the question. The questions that were asked are given below for reference when referring to the answers given in Figure 5.1.

Question 19: Write a sentence that tells about a boy finding a lost his dog. Use the words "who found the" in the middle of your sentence.

Question 20: Write a good sentence that tells what a snake looks like.

Question 21: Finish this conversation.


Question 22: The second sentence is missing from this paragraph. Write a good sentence that will fit.

Question 23: The information printed on the left will be included in a report on insects. Write a main topic sentence for the report.

Question 24: Write a good sentence that tells about the picture and uses the word "however".

Figure 5.1 Sample illustrating C.I.'s responses to the written sample test illustrating his handwriting as well as his detail in answering the testing stimulus


19. who found the *really finely*  
 the boy had lost his dog,  
 who found the dog dad

20.  a snake is slippery and  
 has no hands or feet  
 give green and ~~strong~~ <sup>strong</sup> to you  
 & ~~the~~ brown with a ~~head~~ <sup>head</sup> around ~~its~~ <sup>its</sup> face

21. "What will my salary be?" I asked the boss. "Well," he replied, "I am not sure." Then pausing,  
 he asked, *How hard have you prepared to work  
 for me?*

22. (1) When doing the laundry, always separate the light clothes from the dark clothes.  
 (2) *If you don't you'll end up  
 with a mess like the one  
 up next to* (3) My white tennis shorts were covered with blue spots!

23. mosquitoes butterflies  
 bees ladybugs  
 black flies beetles  
*The being discovered some  
 insects called mosquitoes, bees,  
 ladybugs, black flies, beetles  
 but no the rest of the bees*

24.  *I disturbed the nest home  
 quickly hurry I've got to  
 get admission! Sold out!!!  
 However could this happen to  
 me, and especially how*

21

#### 5.2.2.4 *Theory of mind (ToM)*

The tests of theory of mind are used to determine the ability of an individual to predict relationships between external state of affairs and internal state of mind. It is the ability to think, feel and view the world from another's perspective. The two theory of mind tests that were used in this test battery are described below, including C.I.'s responses to them.

C.I. had no difficulty with the "Sally and Anne" test (refer Appendix 9) tested, answering the question of where Sally would look for the marble without hesitation, and correctly answering Sally would look for the marble "in the basket".

C.I. similarly had no difficulties with the "Smarties box" test (refer Appendix 10), answering that the friend would think there were Smarties in the box. During this test the box was shaken whilst giving the instruction and C.I. immediately picked up that the "sound" of the contents was an object and not Smarties. It is evident that C.I. is "hyper alert" to all stimuli around him, and he picks up on detail, focuses on that, and often this is at the expense of the topic being discussed.

Both tests for ToM tests indicating "neurotypical" thought processing with respect to ToM tasks.

#### 5.2.2.5 *Executive functions*

The executive functions are described as having components of intentional behaviour, planning (organisation of steps to achieve a goal), purposeful action and effective performance. The ability to conceive alternatives, impulse control, memory and an ability to sustain attention are all components of executive functioning that are tested in the Wisconsin card sorting test (WCST-64) that was used in this test battery. The test is based on the principle that the subject must deduce from the examiner's responses the pattern of the presenting cards which are "sorted" according to stimulus parameters of colour, form and number. The only response



from the examiner is “right” or “wrong” to the placement of the cards (refer Appendix 11).

Results from the WCST-64 are presented in Table 5.2 and indicate average scores with no apparent deficits in executive functioning ability.

Table 5.2 Results from the WCST– 64 showing responses of C.I.

Total number of errors	Average
Perseverative responses	Average
Perseverative errors	Average
Non perseverative errors	Mild impairment
Conceptual level responses	Average

C.I. managed this test well, clearly perceiving the changes in category from colour to form. He had a few perseveration errors when the category changed from form to number. It was evident during the testing that C.I. was involved and had understood the nature of the test and was focussed at working out the logic of the responses. C.I. did not demonstrate any difficulties in executive functions as tested on this test.

### **5.2.3 Results: Classroom and playground observations and interviews with teachers**

C.I.’s teacher noted the following observations with respect to his behaviour within the classroom setting:

- He is “obsessed” with ordering. He will make sure anything that is on the walls (such as names or posters), is always “straight and symmetrical” and will make a point at the end of the school day to be the last one out of the class and “straighten out” all the desks and chairs.
- He is always the last child in the classroom at the end of a break, or the last one left in class to go out to break or an activity.
- He dislikes people “crowding him” and initially there was a problem with him getting very verbal and aggressive with the other learners in the class when they came around his desk in the morning. He will not go to his desk if other learners are around it. The teacher now watches for this and makes sure his “space” is

never crowded. Since then there have been no more emotional outbursts from him in the classroom.

- He is unable to make a choice and when given a choice to make will simply not answer.
- He struggles to answer questions in class, taking a long time to process information and this gets the other learners in the class frustrated. The teacher is aware of this and does not ask him any questions in class to avoid the seeming embarrassing silence and the other learners comments.
- He does not socialise at all with the other learners at break, and will stay in class if allowed to. His teacher, again perceptively aware of this, has given him a “job” to do at break (to make sure all the lunch wrappings are placed in a bin which he is in charge of). This seems to make a difference as he has a “purpose” at break time.

Classroom observation revealed the following points of relevance:

- C.I. is in a class of eleven learners, ten boys and one girl. The school that he attends is a small private school, following the curriculum as set out by the department of education. The school is registered with the Education Department of the Western Cape. The school has a maximum of 12 learners in a class and is set in a friendly and homely environment in which the learners are allowed more expression within an environment which is more tolerant of learner’s differences.
- C.I. sits at the back of the classroom in one of the corners. From this point it is clear that he is observing the classroom environment keenly, and is aware of all the classroom “banter” despite not joining in. This point was further illustrated in a separate occasion when one of the sessions he lingered in the classroom before coming out for the testing session, and when asked about why he had seemed reluctant to leave the classroom he commented that he was following the conversation amongst the group in the class and wanted to know the outcome. It was clear that despite not actively participating in the group he feels very much a part of the class.
- During classroom lessons he was very “good”, listening attentively to all instructions by the teacher – it is clear that he does not break rules.

- During the observation of a maths lesson, he did not participate at all, not putting his hand up to answer questions, but watching everything that was happening. The lesson included the class having to write a note on one of the rules of exponents, and he became very absorbed about how this was to be done in his book. He was very slow at copying from the board and was at least two or three steps “behind” the pace and flow of the classroom. Part of the reason for his slowness was in the exact (and irrelevant) way he was copying from the board. The teacher had used different colours when explaining the maths concept, and he was being very particular to copy exactly every colour, clearly becoming lost in the detail, and not “getting” the main concept down. He did not do any of the maths sums as examples, but waited for the teacher to provide the answers.
- When looking through his maths book, it was very noticeable that his focus is in orientation of symmetry and order and not content. His pages are set out with “ruled” blocks into which he will later “fit” in the sums. His teacher further noted that if given a worksheet with instructions to do a specific number of examples from the worksheet (such as questions 1 – 10 of a 20 question worksheet), he is unable to stop at question 10 – but needs to complete the whole worksheet.
- This need for order and symmetry in his books was also noted in his Afrikaans book, where he decided one day to make his writing smaller and neater. He recopied his entire days work twice. The first time he was not satisfied with the outcome, and the second time was satisfied, particularly because it filled exactly one page! (It is noted that his handwriting mostly is very large and untidy, but when he decided to change this he was able to).
- C.I.’s pencil case was “perfectly” set out – with all stationary having it’s precise place.
- C.I. does well at art, and it his art teacher notes that all his art work is done from a geometric base, either circles or lines or squares. His work is characterised by detail, sequence and symmetry (see Figure 5.2).
- On the playground, C.I. stands by himself and keeps away from his peers. If a teacher is on the playground he may talk to the teacher.
- The school had a market day, and he chose to set up his stall all by itself directly opposite everyone else’s, in the middle of the field in the heat of the day (all the other stalls were under the shade of trees on the periphery of the field). He sold

his sweets happily to buyers (mostly of who felt sorry for him). It is noted however that C.I. seemed happy with this arrangement and was in fact enjoying himself in his own “isolated” way.

Figure 5.2 C.I.’s art work indicating symmetry of design



#### **5.2.4 Results: School records**

Table 5.3 provides a summary of C.I.’s school records and progress as taken from an analysis of his school reports.

Table 5.3 Summary of analysis of school reports of C.I.

Year	Grade	School	Comments given by the teacher on the report card	Therapies attended
2000	1	Mainstream local government school	A quiet, friendly boy with a happy disposition. He seems unsure of himself at times.	Occupational therapy from May 1998 – Dec 2000
2001	1 (repeat)	Mainstream local government school	Literacy, Numeracy and Life Skills not mastered	Diagnosis of ADD and Ritalin prescribed. Psycho-educational assessment revealed average IQ and learning disabilities and an application to a specialised remedial school recommended.
2001	1 (June)	Remedial school (government)	Summary of strengths noted were high intellectual potential, hard working, good sentence construction, number concept and creativity. Summary of weaknesses include oral skills, aspects of social skills, erratic behaviour with peers, slow processing skills and uncooperative at times.	Occupational therapy and speech therapy within school setting
2002	2	Remedial school (government)	Good progress in all learning areas.	Occupational therapy and speech therapy within the school setting
2003	3	Remedial school (government)	Strong skills in literacy and numeracy noted	Speech therapy within the school setting
2004	4	Remedial school (government)	Good academic skills in first semester, but marks declining in second semester. It was noted that he requires encouragement to respond and participate in class activities.	Speech therapy within school setting
2005	5	Remedial school (government)	Work produced is good, but he struggles to express himself.	

Year	Grade	School	Comments given by the teacher on the report card	Therapies attended
2006	6	Remedial school (government)	Marks ranging from highest score in maths (67%) to lowest score Afrikaans (48%).	
2007	7	Private school for children who learn differently	English – 62% Afrikaans – 35% Maths – 70% Natural science – 36% History – 59% Geography – 53% Life orientation- 52% EMS – 64% Technology – 63% Art – 60% Handwriting problematic; weak in group work, and self-regulation. Strengths include showing respect for others as well as accepting responsibility.	Group therapy – social skills training

### 5.2.5 Results: Telephonic interview with group therapist to assist with social skills

A telephonic interview was held with the group therapist to ascertain her perceptions of C.I. with respect to his interaction within the therapeutic group situation targeting social skills training of nine children (five girls and four boys). The therapy was scheduled for 15 weeks, once a week for an hour. At the time of the interview, C.I. had only two sessions remaining. The following points were made:

- Initially “painfully” shy – sat on the edge of the group
- Is very quiet and “listens” rather than contributing to group
- His processing appears very slow
- He has “funny idiosyncrasies” such as having to either be first or last
- Therapist was not sure whether his difficulties were anxiety or cognitively related
- Therapist had sometimes wondered if he was “selectively mute”
- Therapist had opinion that C.I. relied on his mother, and struggled with the natural environment

- When given a “feeling wheel” to fill out, he was able to do this – on paper – noting the following points about himself. He worries a lot, struggles to make friends, struggles with schoolwork, hides his true feeling and struggles to express himself
- Seemed to want to “hang” back after the session when he would chat with the therapist

When the researcher asked C.I. about his experiences of the group therapy sessions, he commented that he didn’t really know, and when asked if they helped him with social skills, he commented again that he didn’t know and it would be best that his mother be asked the question.

### **5.2.6 Results: Interview with parents**

An informative, informal interview was conducted with C.I.’s parents. It became apparent through the interview that C.I.’s father could recognise much of “himself” in the way C.I. approaches life’s challenges. C.I.’s father commented that he remembers himself as a child being very concerned about neatness and things being “right”. He gave an example of walking over the soccer field, and stopping every few steps to “clean the dust off his shoes”. C.I.’s father noted that C.I. needs to have order and predictability in his daily routine, explaining that if, in the morning, you try and hasten him on to get ready for school, and something happens to throw something “out of synch” there are major problems with rippled effects. When this happens, the parents have learnt that one needs to stop what is causing the problem, and leave C.I. He will then “back track” a few steps, and get into “*his* rhythm again” and then things will start coming right. C.I. goes back to where he is comfortable “It’s almost like his brain is sequenced”, and he has to work at his pace according to his own sequence. C.I. takes things literally, and this especially affects his interpretation of time, causing stress in the family unit. If the family is, say, leaving the house at 8:00 o’clock for a particular reason, C.I. cannot leave before or after that time. He will know how many minutes and seconds until the family needs to leave the house. This causes a strain on the family as there is no scope for flexibility, and a “quick” change of plans. Things have to be done in “C.I.’s time” as he is not able to adapt to others people’s agendas. His father interpreted this as though he likes to control his

environment. If things are done on the spur of the moment this causes a problem for C.I. as he then “loses control”.

Another area of C.I.’s behaviour that is of concern to his parents is his inability to socialise. C.I.’s father reflected that when he was growing up he also remembers not being “social”. C.I.’s father said that as a child he was a very serious person and when he was younger he remembers perceiving situations as personal and interpreting anything that happened at a personal level. C.I.’s father commented that he believes that this is what C.I. is doing. He mentioned that if you say something to C.I. in a joking manner, C.I. will take it as a personal insult. It is of interest that C.I.’s father and mother both went to the same church youth group as teenagers. C.I.’s mother said that she (and the group) remembers thinking that C.I.’s father was a “stuck up snob” because he never mixed with them. C.I.’s father on the other hand, explained that he wasn’t a “snob” but felt “comfortable to be left alone”. He did not remember feeling isolated from the group. He did however comment that he remembers becoming stressed when he was “made a spectacle of” – such as people making fun of him for the clothes he wore or something similar. C.I.’s father reflected that in the school environment, he did feel socially insecure. When he became good at playing the guitar, he was incorporated into a social group, but only in the role of “guitar player”, not contributing much as far as “social” chit chat was concerned.

C.I.’s father, on reflecting his personal experiences on a social level, said that to help his son socially it would be a good idea to find out “what he was good at” and encourage this as it may help to facilitate social interaction. C.I.’s mother mentioned C.I. had a good voice and that perhaps a choir could be started at his school. C.I.’s father agrees that C.I. appears to love music and recalled that when C.I. was young, he would put music up loudly and sit and rock. C.I. also has an interest in wires and plugs, always wanting to know how these work. C.I.’s father felt that it may be an idea to combine music with his “intuitive” feel for fixing electrical appliances and do sound engineering – this might, he felt, become a good career for C.I. one day. Another area of skill that C.I.’s mother commented on was C.I.’s artistic skill. She believes that this could also be harnessed to his advantage. A problem however that C.I. faces according to his mother is that he needs to practise to perfect a skill. C.I.’s



mother commented that C.I. does not follow through with practise, as he wants to be “perfect” the first time.

Both C.I.’s parents note that anxiety is problematic for C.I. Once again C.I.’s father reflected on his personal experiences, noting that the time he spent in the army was very difficult for him at a personal level. He described himself as feeling “threatened by the environment to the n’tth degree”. This was because there was no place or “comfort zone” that he could escape to in what he personally perceived a “very threatening environment”. For this reason C.I.’s father believes that his son would not cope in a “social” group such as scouts. His father does however caution against protecting C.I. too much because he does have to grow up and deal with reality.

Sports and ball skills were discussed, and C.I.’s mother noted that he does not play ball games and sport. The most probable reason she thought of his not playing sport was because of the rules of the game. C.I. she said, “does not like to lose”, and therefore to be caught out or bowled out in cricket is a negative experience for him. She also commented that he does not have the stamina for physical activity. It is difficult to motivate him to cycle and be active outdoors – C.I. prefers to be indoors watching television or playing on the computer.

C.I.’s parents described disciplining him problematic. They discussed that once you have set a rule in the house, you cannot change it, and all members of the family have to obey the same rule (including the parents). If “time out” is used as a discipline strategy, it is important that specific instructions are given, such as “at 8 o’clock you have to go to your room for 15 minutes”. This C.I. will do, to the second, but it does not work if you stand over him and carry on with verbal chastisement. The discipline strategy that works best for the family is to take away television watching privileges.

C.I.’s mother commented that she believes that C.I. has an underlying anxiety, which causes his obsessive behaviours. She commented that when he is writing a test, this affects him because if he gets stuck on a question he will stay with it, becoming anxious because he cannot answer the question which results in him not finishing the

paper. Other restricting behaviours that C.I.'s mother notes is that he will not wear new shoes unless he has "grown out" of the old ones. C. I. will also not use a new pencil unless the old one has "completely finished and cannot sharpen it any more".

In speaking about schooling, C.I.'s father said that schooling had a large role to play in the treatment of the child with AS. C.I.'s father again reflected on his own school experiences when he commented about a good teacher that he remembered was one who could motivate and get the best out of you, without feeling threatened. He felt if the classroom environment was not a threatening one, it was easier as a student "to get involved as a person". C.I.'s father commented that it would be best that C.I. learns to use his brain "in its entirety" instead of being secure in only certain things, such as focussing on symmetry. C.I.'s father perceives C.I. to be somebody who will be good at information technology, being an analytical thinker. When C.I. was asked one day what he wanted as a "special gift" he asked for a fan, "because of the wires, plugs, and the way it works". C.I.'s father felt that it is important that C.I. is encouraged with his strengths, and to encourage him to give him hope for the future. C.I.'s father said that C.I.'s teachers and they, as parents, must "train him" out of his obsessive thought patterns but cautions against losing "his way of thinking" in its entirety as this is a positive trait which will make him different to others in the workplace. C.I.'s father commented that a slow, steady, thorough, analytical thinker will produce work of a high and predictable standard (as his father can relate to in his personal experience at work). C.I.'s father reflects that he, himself is a "stressful" person and if he does a job, he does it to the best of his ability, and if it's not right, he is not happy – "because it must be right"! He concludes that this can be an asset, as his "boss" is happy that despite him being slow, his boss knows that he will "right". C.I.'s father explained that he is able to solve a few problems on different levels, and even though it "can hold you back", it is also a great asset to what you can bring to the workplace with respect to problem solving. C.I.'s father commented that C.I.'s thinking on many levels must make his life a challenge, but can also be seen as strength. C.I.'s father further noted that C.I.'s mind wanders and he seems to have a lot of free associations and a lot of imagination. C.I.'s father again recalled that he remembers having a vivid imagination as a child himself.

C.I.'s father commented that he perceived many similarities between himself and his son, and queried the role of genetics in AS. C.I.'s mother said that there appeared to be some "genetic" behavioural traits from her side of the family as well explaining that when C.I. was young, at about 2 years old, he would rock in his cot, and bang his head against the wall. C.I.'s mother now realises that C.I.'s brother also does this, as well as all family members (on mother's side) used to rock to go to sleep. C.I.'s mother mentioned that her sister (as an adult) still rocks herself to sleep.

The discussion concluded with reflection of the parents feelings on the diagnosis of C.I. Both parents felt very relieved as they had always worried about his birth, and how that may be affecting him. When they knew that C.I.'s problems had a name, AS, they could go forwards because after "putting a name to his behaviours" they felt they could learn to manage it. C.I.'s mother however commented that more needs to be known about AS as C.I. went to occupational therapy and speech therapy for years and it didn't make any difference to him, as he could always speak and write and was co-ordinated. None of these therapists "picked up" on the fact that he was "thinking" about things differently.

This concludes the presentation of C.I. as a case study. A detailed analysis of these findings is presented in Chapter 6.

### **5.3 PRESENTATION OF FURTHER THREE CASE STUDIES**

As noted in the introductory paragraph to this chapter, it was decided that, for the ease of the reader and the nature of the repetitiveness of the format of the presentation of findings, the presentation of findings of the further three cases will be found in the annexure of this thesis. The findings of all four cases are summarised and analysed in Chapter 6. The analysed findings are used and presented in the cross case analysis to provide conclusions to this thesis.

## **CHAPTER 6**

### **ANALYSIS OF FINDINGS, SUMMARY AND RECOMMENDATIONS**

#### **6.1 INTRODUCTION**

In this chapter, each case will be summarised and analysed with respect to the findings that were presented in Chapter 5 for the case study C.I. and the findings presented in the annexure for the case studies of S.P., L.K. and M.D. After the analysis of each case, section 6.6 through to section 6.15 will be presented in which a cross case analysis will be conducted in order to clarify any patterns of similarity and areas of difference between the cases. Patterns of strengths and weaknesses from the neuropsychological test battery will be identified and discussed.

#### **6.2 CASE STUDY 1 – referred to as C.I.**

Birth date: 17 December 1993

Chronological age (at date of testing): 13 years and 10 months)

Grade: 7

Sex: Male

##### **6.2.1. Home circumstances and family traits**

C.I.'s parents are married, and have a harmonious relationship. C.I. is the first born son and he has a younger brother with a diagnosis of ADHD. C.I.'s father reflected that when he was young, he felt threatened in situations where he was not in control and felt socially insecure in the school environment. C.I.'s mother noted that she has a quiet and reserved personality but does not have any problems socially. C.I.'s mother has a cousin diagnosed with ADHD, and a cousin diagnosed with AS.

##### **6.2.2 Birth and medical history**

C. I.'s birth was described as traumatic. He was deprived of oxygen at birth and placed in the intensive care unit. He developed high fevers and convulsions after a

day as a result of bacterial meningitis. His speech and language development was “set back” after he had further convulsions at 15 months old. Anderson, Northan, Hendy and Wrennall (2001:89) note that children who are survivors of some forms of meningitis and encephalitis may be at significant risk for specific memory impairments due to the involvement of the midline structure including the hippocampus.

C.I. has a history of different diagnoses and therapeutic intervention. C.I. received an initial diagnosis of ADHD at 8 years old and Ritalin was prescribed. A further diagnosis of a learning disability was given to C.I. by a counselling psychologist when he was in grade 1. He was referred to a specialised remedial school during his repeated grade 1 year. A diagnosis of AS was given by the school psychologist while at his remedial school. This diagnosis was confirmed by a psychiatrist in September 2006, along with a secondary diagnosis of dysthymia and obsessive anxiety. Zoloft was prescribed and C.I. is presently taking this medication to assist with anxiety. C. I. had extensive occupational therapy, initially with a private occupational therapist from 4 ½ years old until 7 years old. When he attended the remedial school, he attended occupational therapy within the school setting for 2 years in grade 1 and 2. C.I. attended speech and language therapy within the school setting of his remedial school from grade 1 through to grade 4. C.I.’s most recent intervention has been a social skills group therapy course.

### **6.2.3 Results: Questionnaires**

The Conners’ parent and teacher rating scales were completed and C.I.’s parents rated anxiety, social problems and perfectionism as significant behavioural difficulties on the Conners’ questionnaire. The teacher’s rating correlated with this, with the teacher also noting anxiety, social problems and perfectionism as most problematic within the schooling environment. C.I.’s parents also noted hyperactivity, DSM-IV hyperactive impulsive and DSM-IV symptoms as problematic. These were however not noted by his teacher.

The results from the Gilliam Asperger disorder scale concluded an Asperger disorder quotient of 112, making a diagnosis of AS highly probable. The most significant difficulties for C.I. were noted in social interaction and pragmatic skills, both of which scored in the 84<sup>th</sup> percentile. Results from the sensory profile of Dunn confirmed difficulties with emotional and social responses, in addition to behavioural responses with respect to sensory processing. The most significant difference (compared to the norm) for C.I. was in sensory processing related to endurance and tone. Definite differences were also noted with auditory processing, vestibular and touch processing. From a neuroscience perspective, Dunn (1999:11) describes that modulation of sensory input is critical to the function of the central nervous system. Modulation is described as the ability of the central nervous system to monitor and regulate information to ensure the generation of appropriate responses.

#### **6.2.4 Results: Neuropsychological test battery**

Results from the SSAIS-R concluded scores in the average range for verbal (97), non verbal (97) and full scale (97) IQ. Areas of strength included tests of form board and similarities. The form board tests visual perception, visual organisation and visual concept formation. It tests the ability to see underlying relations between objects as well as visual-motor coordination. The similarities test is a verbal test that tests logical abstract reasoning and verbal concept formation.

Areas of weakness included tests of story memory, missing parts and pattern completion. The story memory test is a test for short term auditory memory, and the ability to sustain attention. The missing parts test tests the ability to distinguish between essential and non essential information that is presented visually. On analysis, these two weaknesses are linked. Neurologically, Sylwester (1995:92) describes the short term memory process as a temporary, synchronised firing of neural patterns that emerge between related networks in the thalamus and the cortex. The more rapidly firing networks become foreground (attention) information and the less active neural networks become background (context). Therefore, if the brain is unable to rapidly combine related bits of foreground information into larger units, the whole is not perceived but only “parts” of the whole, the brain not being

able to conceptualise efficiently. Pattern completion is a test that requires logical thinking, visual perception and concept formation.

C.I. was very aware of “being right” and took a long time to process information – especially noticeable in the similarities subtest. This will affect him in the classroom as he will need to be given time to manage and process any instruction or question given by the teacher – a slow response from him is to be interpreted as a complex reasoning and sorting process to come up with an exact answer. This way of processing information by focussing on detail will also negatively affect his performance within the classroom as time spent on unnecessary detail and ordering stimulus distracts from the concept being taught, explained and tested. This way of thinking will also affect social interactions.

Gross motor functions (as tested by the Movement ABC-2) scored below average on aiming and catching. The other scores of manual dexterity and balance were age appropriate. No difficulties were noted on the Beery-Buktenica test for visual motor integration, visual perception and motor coordination.

Results from the academic tests of achievement conclude areas of strength in letter and word identification (8 months ahead of age level). Other areas of strength included applied problems (tested at 13 years ) and writing fluency (tested at 13 years 2 months). Areas of weakness included understanding directions (5 years below chronological age), reading fluency and spelling (4 ½ years below chronological age), passage comprehension and maths fluency (3 years below age level).

It is of interest that the comments at the end of his grade 1 year at the remedial school (2001) reveal similar strengths and weakness which have not changed (despite all the interventions that have happened between then and the current assessment). Strengths noted by his grade 1 teacher included high intellectual potential, hard working, good sentence construction, number concept and creativity. Weaknesses noted were oral skills, some aspects of social skills, erratic behaviour with peers, slow processing skills and seems “uncooperative” at times. This implies

that his difficulties are “rooted” internally – how he thinks and it is a futile exercise to try and change or “fix” him with traditional therapies such as occupational therapy, speech therapy and social skills training.

The academic profile of C.I. is very similar to the profile of a non verbal learning disability as described by Rourke (1995:3). Previous research with respect to the similarities that exist between AS and non verbal learning disabilities were noted by Rourke and Tsatsanis (1996:36), Klin *et al* (1995:1127), Ellis and Gunter (1999:102) and Gunter *et al* (2002:263).

A non verbal learning disability is described as having primary, secondary and tertiary deficits: Primary deficits include difficulties with tactile perception, visual perception, difficulties in visual spatial organisational abilities, difficulties with complex psychomotor skills and poor and inappropriate attention to novel material. Secondary deficits include poor attention to tactile and visual input as well as a limited exploration of the environment. Tertiary deficits include poor memory for tactile and visual input that is not coded in a verbal manner as well as marked deficits in concept formation, problem solving, strategy generation and hypothesis testing (Rourke 1995:3). Results from the sensory profile of C.I. showed scores that rated as significantly different to the norm in areas of auditory processing, vestibular processing and touch processing. Scores in sensory processing relating to tone as well as modulation of sensory input reflecting emotional and visual input were also rated as significantly different from the norm.

Difficulties noted within C.I.’s SSAIS-R test battery include pattern completion that requires logical thinking, visual perception and concept formation. Short term auditory memory and the ability to sustain attention to verbal information was weak. This was also noted in the academic test battery where he scored very much below his chronological age (13 years 10 months) in all of the oral language tests. These were notably understanding direction (scoring at 8 years and 9 months), story recall (scoring at 6 years and 11 months) and delayed story recall (scoring at less than 7 years). C.I. had difficulties in the ability to distinguish between essential and non essential information that was presented visually, limiting visual concept formation as



tested in the missing parts test of the SSAIS-R. His answers to this test battery reflected an inappropriate attention to novel material presented. This inappropriate attention seems to be rooted in a “compulsion” to order his world, focussing on symmetry in presenting visual material.

Academic deficits within the profile of a non verbal learning disability include graphomotor difficulties; C.I.’s handwriting is very clearly an area of weakness for him. Reading comprehension is reported to be much weaker than single word reading skills. In the case of C.I. his single word reading tests at 14 years and 6 months, whilst his reading comprehension scored at 10 years and 3 months. Mechanical arithmetic as well as maths processing is reported to be weak in a non verbal learning disability. C.I.’s maths fluency tests scored at 10 years 9 months, but his calculation and applied maths problems scored higher and did not present as a difficulty. Spelling errors are also a noted difficulty in the non verbal learning disability child, and C.I.’s spelling tested at significantly below age level at 9 years and 5 months, his spelling errors being characteristically “phonetic” in nature. An example of this is the misspelling of adventure spelled *advencher*, and cough spelled *coff*.

The non verbal learning disability child is noted to have problems with the pragmatics of language which affects them socially (Rourke and Tsatsanis 1993:38). Pragmatic skills and social skills both scored as the most difficult areas as scored on the GADS questionnaire. It is noted that C.I. has difficulties with language content in that he struggles with connotative aspects of word meanings, does not make use of contextual cues and struggles with ambiguity which is created between literal and intended meanings of words. These difficulties reflect in difficulties with social situations in that C.I. has difficulty in adapting spontaneously to changing demands in social discourse. He struggles to interpret non verbal cues and fails to relate and appreciate fully the meanings and sentiment of social interchange.

Results from this test battery highlight that C.I.’s main problem within the classroom is his inability to grasp the concept being taught or tested. This may be stemming

from a non verbal learning disability as described above but can be compounded by his internal need to first have everything ordered and presented in symmetry.

The need for “order and symmetry” was very noticeable in his maths book, where the page is first planned, before the “sums” are done. His priority seems to be to order his lifeworld, make it predictable and symmetrical, and then try and fit in the academic content. This takes a lot of time, and distracts from the academic content, which he has the cognitive ability to manage. This could also be a “defence” mechanism to give him a sense of control in an academic world which demands comprehension and meaning to verbal and written text.

C. I. had no difficulties with the theory of mind tests presented. This concludes that he does indeed have the ability to reason what another person may be thinking. His results from the test for executive functioning also reflected a good ability to perceive the changes being made in the different categories. Executive functions are described by Anderson *et al* (2001:92) as the central executive component of the information processing system. This component directs attention, monitors activity and co-ordinates and integrates information and activity. It is noted in C.I.’s case that he is “overly ordered” in his thought processes, thereby not exhibiting any of the features of a child with an executive dysfunction.

### **6.2.5 Conclusions**

C.I.’s main areas of behavioural difficulty are rooted in his obsessive type behaviours which is resulting in anxiety. He likes having things ordered and sequenced, and this takes up a lot of his “thinking brain” at the expense of his schoolwork. He lacks understanding of the “hidden curriculum” and cannot interpret social cues easily. This is not something that is easily taught (his group therapy sessions for social interaction were not successful as he perceived himself as not having a need for this). He, in fact does not seem to mind that he is alone on the playground, choosing himself to stay away from social interaction. He does however participate in his own way – following the general conversations and “goings on in the classroom” as an “observer”. He clearly takes an interest in the goings on around him, and clearly

feels a part of the classroom activities - even though this may not always be apparent.

Results from the neuropsychological test battery conclude marked similarities with a profile of a non verbal learning disability (NLD). It is noted that children with a NLD are frequently perceived as hyperactive in childhood and as they get older have an inclination towards anxiety and depression with a tendency towards social withdrawal and social isolation. A non verbal leaning disability is different to an “autistic spectrum disorder”, difficulties being more in the area of a “learning disability” with an introverted personality, rather than a pervasive developmental disorder. Rourke (1995:19) hypothesises that the child with NLD has a deficient right hemisphere system, or an insufficient access to an intact right hemisphere due to destruction or dysfunction of white matter that is required for intermodal integration.

#### **6.2.6 Intervention with respect to C.I.’s individualised educational plan (IEP)**

The analysis of C.I. as a case of a child with AS concludes that he is processing information differently and presenting as a child with a learning disability that is rooted in inefficient visual spatial functioning and reasoning. He is presenting with internal anxiety, and has an “obsessive” need for orderliness, predictability and routine. It is imperative that his schooling environment is one in which he feels safe. He should have his own “space” in the classroom that other children do not encroach on. C.I. should not be criticised by his teacher. It is important that he is not forced into ‘social situations’ as he perceives himself to be a part of the class, but will become involved on his own terms.

He has weak concept formation which results in difficulties with language processing and comprehension including verbal interactions, written language and social interactions. The following points are important in assisting C.I. with this difficulty:

- C.I.’s parents need to understand that he sometimes fails to understand directions. Instructions may need to be repeated whenever communication is especially important.

- C.I. may sometimes not fully comprehend what he is expected to do for homework, and a good communication system between his teacher and the parents is important.
- Every opportunity should be used to discuss the “main idea” of a story or a television programme, movie or social situation that is experienced in the home environment. This will assist with concept formation.
- When C.I. has to learn for a test, the use of “mind maps” would help in focussing on key ideas and how these link together.
- In the classroom a concept being taught might need to be repeated, but in simple terms, and using just enough language to stick to the facts that need to be understood or relayed.
- C.I. would benefit from specific tutoring in understanding abstract language such as figures of speech, proverbs and metaphors.
- Note taking and copying from the board is difficult for C.I. as he processes information slowly. His teacher can provide printed notes for him, which will help him to use his time more effectively. It was noted that C.I. was focussing on irrelevant detail in copying from the board (using exact colours and spacing). The time saved in giving him printed notes can be more effectively used in his identifying the key points or key concepts in the written text.
- C.I.’s slow processing speed is causing anxiety and stress during exams and tests. This can be alleviated either by giving him “extra time” or by letting him do fewer questions in the test (and the remaining questions as a homework assignment).
- C.I.’s teacher can mediate him through his obsessiveness within the classroom setting. This can be done by showing him how unnecessary it is that his books are symmetrical (for example). The teacher would need to be alert to “how he is processing the instructions given to the class” in order to mediate him at the point of where he is going off at a tangent and missing the point of the exercise.
- Teachers of C.I. need to understand and respect “how he thinks”. He should be allowed to behave in ways that are important to him (such as always being last in line, his need to straighten up the class and predictability of daily schedule).
- C.I. can be given activities at school which “feed his need to order things” such as library monitor or class order monitor. It would help if he is mediated through

academic and written tasks, and then is given an outlet which his need for order and symmetry is released (such as projects and drawings involving subjects that are mathematical or astronomic).

- His art work is noted to be very good – especially his pencil sketches where he will choose a geometric theme to construct his drawing. An art group could be encouraged and his participation in such a group would give him opportunities to practise social interactions in a non threatening environment.

C.I. presented as an adolescent who was not unhappy in his schooling and home environment. He was intellectually able, and managed his own life world with a structure and routine which gave him security in his life world. C.I.'s presenting social difficulties are seen as more problematic by his parents and teachers than by himself. It should be cautioned that adults do not "force" their perceived ideas of correct social relationships onto another individual whose personality is happier in being an "observer" rather than a "participator" in social situations. C.I.'s results from this test battery show a profile with strengths and weakness which are similar to those of a NLD.

### **6.3 CASE STUDY 2 – referred to as S.P.**

Birth date: 30 August 1996

Chronological age (at date of testing): 11 years and 4 months)

Grade: 6

Sex: Male

#### **6.3.1 Home circumstances and family traits**

S.P. is from a stable home with both parents involved in the upbringing of their children. The family is close knit, with S.P. being the first born son. S.P. has two younger siblings, a sister and a brother. S.P.'s parents have their own family business and share their time between the business and their children. S.P.'s father reports that he had learning difficulties which manifested in high school. Neither parent had difficulties socially. Neither parent struggles with obsessive type behaviours or perfectionist tendencies. S.P.'s siblings have no reported difficulties.

### 6.3.2 Birth and medical history

S.P.'s mother had a difficult pregnancy and threatened miscarriage several times. S.P. was born at 35 weeks via caesarean section. His developmental milestones were met within normal limits and his early childhood appeared developmentally sound. At 2 ½ years, he was hospitalised with encephalitis. It is noted (Andersen *et al* 2001:89) that children who survive some forms of encephalitis may be at risk for memory impairments.

S.P.'s initial involvement with a professional was with a psychologist for "anxious behaviour" whilst at preschool. He was tested for school readiness and it was recommended that he attend "specialised schooling" because of a low average tested cognitive potential. He was referred to an occupational therapist and occupational therapy was done for a period of 8 months. In grade 2, he was assessed by another clinical psychologist who diagnosed him with ADHD, Tourette's syndrome and bipolar disorder. Specific problems were noted with respect to abstract thinking, language comprehension, reading comprehension, problem solving, reasoning and visual integration. These problems were noted to be associated with right hemisphere "dysfunctioning". Rourke, van der Vlugt and Rourke (2002:162-164) note that right hemisphere dysfunction is associated with a non verbal learning disability (NLD). New learning of any sort, especially in complex or novel situations is difficult for children with NLD. When faced with complex learning a material that is new, the child will fall back on the use of an over learned procedure without regard for the uniqueness of the new task. The child with a NLD will struggle to learn new and complex tasks if left alone. This difficulty is noted by S.P.'s mother and is one of her most difficult aspects of dealing with S.P. She spends many hours a day, trying to teach him what he needs to learn for school, and described in the parent interview that "it is as if the gap between what is new and understanding the concept is too big".

S.P. was given Ritalin and then Concerta to address attention and concentration difficulties associated with his diagnosis of ADHD. This medication did not have a positive effect, and S.P.'s mother reflected that he became very emotional. These

medications were stopped and he underwent neurofeedback sessions, which had no effect on his scholastic performance and overall functioning.

### **6.3.3 Results: Questionnaires**

The results of the parent and teachers Connors' questionnaire concluded that the main areas of concern for S.P.'s parents were in the categories of anxious, shy and social problems, with perfectionism also being problematic. The teachers questionnaire also had these three categories as the areas of difficulty, but the teacher did not rate them as highly. During the parent interview it was evident that S.P.'s mother spends a lot of time with him at home, sometimes up to five hours doing homework and preparing him for what is required at school. This is causing severe strain on his mother as she feels that she cannot sustain this, and is very worried about S.P.'s ability to manage in the world on his own one day. She also feels that her other children are being neglected because S.P. takes so much of her time. It is clear that the teacher does not know or understand the extent of the "work that goes on behind the scenes". S.P. is in a very large government school, with 35 children in the class, and five classes per grade. S.P. is very aware of "doing things correctly" and hates to be wrong – he therefore follows rules and is not a problem to the teacher. The teacher was surprised at his playground behaviour as she was not aware of this aspect of him, having never observed him out of the classroom setting. She did not realise the extent of his "social isolation" and his inability to read social cues. It is of note that the results from the GADS questionnaire as completed by S.P.'s parents do not rate social interaction as problematic. S.P. is very sheltered in his home environment and his siblings have learnt how to interact with him. The family is "self sufficient" with little time to socialise other than amongst themselves and within the extended family where S.P. is incorporated as a family member. At school, S.P. himself is not unhappy with his having "no friends" and he perceives himself to be part of the class, and his "games at break" are done in his own way. When the researcher asked him about his friends, S.P. commented that he could not remember their names, but remembered their faces. It was clear that there was no "relationship" between his "friends" but they he saw "friends" more of a "category" of belonging according to a concept such as class, or grade.

The most important factor that the teacher felt made S.P. “at risk” was his inability to grasp new concepts, and to not get the “point” or main concept of what was being taught or spoken about. S.P.’s teacher described him as being “hyperfocussed” on detail – and missing the main point. It was noted that when new work was introduced that “special attention” was given to S.P. as he became very anxious when anything new was introduced, or classroom routine changed. Academically her main concerns were with comprehension; he tended to rely on “rote” learning and often did not answer test questions appropriately. To understand maths concepts was particularly challenging for S.P. Behaviourally, her only concern was with S.P.’s “talking non-stop” about a topic which interested him, this regardless of whether the topic was relevant or not. This behaviour, she noted, reflected in the other learners in the class finding him tiresome. Results from the GADS parent questionnaire confirm that S.P. attaches very concrete meanings to words, and shows an intense or obsessive interest in certain subjects, which he will, if allowed, talk excessively on.

S.P.’s parents rate inattentiveness as a factor that is problematic. The results of the sensory profile do not conclude difficulties that are of a sensory nature. There were however noted problems with respect to modulation of sensory input affecting activity level (sedentary) and emotional responses. In the feedback session it was evident that S.P.’s parents, particularly his mother, holds a feeling that S.P.’s difficulties are somehow “her fault”, and stem from the encephalitis he had when he was 2 ½ years old. It appears that S.P.’s mother is overcompensating for his difficulties (sometimes spending up to five hours on homework) making him more and more reliant on her to support and carry him through life. It is important to note that S.P. has expressed verbally to his mother feelings of inferiority, “being stupid”, asking what is wrong with him. He has definite fears and anxieties which are problematic and at times are so overpowering that he develops “nervous” tics and twitches. S.P.’s parents have learnt to interpret these as signs of an underlying problem and if the source is not dealt with, his anxiety will escalate and he has, at times talked about “just wanting to die” which is very scary to his parents.



#### **6.3.4 Results: Neuropsychological test battery**

The results from the SSAIS-R conclude results for S.P. in the high average range for full scale IQ (110) and non verbal scale (115) and in the average range for verbal scale (104). S.P.'s highest score was in form board, which indicates advanced skills in visual perception and visual organisation. It is of interest that S.P.'s parents note that he has a very good visual memory, and will remember visual detail and is good at directions and finding his way to places. S.P. answered the test battery in a "precise" way. He did not spend any "time" in processing or giving thought to problems which he could not instantaneously answer. This came across as an "impulsive" approach to the questions, but in S.P.'s case it was a case of not being able to "immerse" himself in the question, as he could not perceive the concept being tested. This way of processing information was again noted in the WCST-64 which was included in the test battery to test executive functioning. S.P. was not able to change his thinking pattern in this test, giving answers that were perseverative in nature. This inflexible way of thinking and tendency to give a "learnt" response to a question rather than engage in "abstract thinking" was also noted in the WJIII tests of achievement. In the written samples test, question 17 asks "Write a good sentence that tells why it is dangerous to dive into a pool when you do not know how deep it is". S.P.'s response, "you first have to find out how deep the pool is and where is the shallow and deep end", illustrates that he has not understood the concept, but answers in a "learnt" manner which he has associated with an aspect of the question. This "way of thinking" is again reflected in his response to the comprehension subtest question (from the SSAIS-R), when asked "Why should you keep a promise?" he answered "It means don't tell anyone else".

S.P.'s lowest scores on the SSAIS-R was for memory for digits, requiring the ability to receive information correctly, recall, order and vocalise it correctly. When repeating digits in reverse order, it requires more complex thinking. His coding test was also weak, signifying weak visual motor integration, psychomotor speed and visual associative learning ability (short term memory). Weak skills in manual dexterity were confirmed on the Movement ABC-2 test, where S.P. scored a scaled score of 6 (mean of 10). S.P. struggled with the drawing trail task, having difficulty with

changing directionality and graphomotor function. Graphomotor dysfunction is described by Levine (2002:180) as requiring motor memory and a highly precise sequence of finger muscle movement. These difficulties were confirmed in the Beery-Buktenica test where S.P. struggled again with the visual motor integration and motor coordination aspects of the test, struggling to “get his hand” to change direction while drawing complex designs. The manual dexterity test from the Movement ABC-2 test battery similarly confirms S.P.’s difficulties with fine motor movements.

Despite S.P.’s high results in the SSAIS-R, indicating high levels of cognitive reasoning, his scores on the academic test battery did not reflect this level of “output”. His scholastic records reflect “erratic” performance from grade 1 with comprehension and maths concepts being particular areas of concern. His assessment from grade 4 reflects this ‘erratic” performance with English marks ranging from 90% (speaking) to 50% (writing) and 55% (reading and thinking). In the WJIII test of achievement his letter/word identification scored at 10 years 8 months, whilst his passage comprehension only scored 8 years 8 months (his chronological age is 11 years 4 months). Memory tests were also erratic, with memory for story (short term and delayed) scoring in advance of his years, >21 years and 15 years 9 months respectively, but his memory for sequenced information (understanding directions) scored at 9 years 7 months. This confirms results from the memory for digits test as mentioned earlier.

Results from S.P.’s maths tests on the WJIII also showed erratic performance, with the calculation test scoring highest (12 years 4 months). It is noted that he had rote learnt the methods for division and multiplication, and applying them correctly managed the calculation part of the test well. Maths fluency however was delayed (9 years 10 months) his speed being negatively affected by having to work everything out on his fingers. In the applied problems test, he once again never gave any time to “process information” to get a logical solution. In the written language aspect of the WJIII, S.P. again demonstrated his reliance on “rules” in the way he approached his spelling. He used his hands to work out directionality of b/d and also used the “e”rule incorrectly (was/wase). He tended to write phonetically (how the word sounds

(e.g. difference: *dfrance*). S.P. struggled with his written output with his writing fluency test scoring at 9 years. He struggled with writing and changed between printing and cursive during writing. He tried very hard to write as neatly as he could, and to give the best performance he could. S.P. presented with a degree of performance anxiety, wanting to always have things “right”. Sylwester (1995:38) notes that stress can provoke high cortisol levels in the brain. These high cortisol levels can lead to the destruction of neurons in the hippocampus associated with learning and memory. Short term related elevation of cortisol in the hippocampus can lead to an inability to distinguish between important and unimportant elements of an event.

S.P. clearly struggles with critical thinking and problem solving. His responses to questions are characterised by “impulsivity” and perseverative responses which imply an inability to execute executive functioning. Sylwester (1995:53) notes that critical thinking and problem solving are a function of the frontal lobes. The frontal lobes are responsible for effective processing of ambiguities, metaphors, abstractions and patterns. It is further noted by Sylwester (1995:98) that the frontal lobes are involved in the various processes that constitute logic and maths. Emotional self-regulation is noted to be a function of the prefrontal cortex (Wolfe 2001:42). In S.P.’s case modulation of sensory input affecting emotional responses was a problematic area as noted in the GADS questionnaire by his parents. Some of S.P.’s behaviours noted in this respect were sensitive to criticisms, has definite fears, seems anxious and displays excessive emotional outbursts when unsuccessful at task.

S.P. did not have any difficulties with the theory of mind tests. These results confirm that S.P. is able to think and view the world from another’s perspective. His teacher however noted that S.P. does not display any emotion within the classroom. He is always “smiling” no matter what the tone or mood of the classroom is. It appears that S.P. understands ToM from a cognitive perspective, but perhaps is unable to translate this into social situations – causing inappropriate responses from a social perspective. S.P.’s lack of social skills and social understanding of games on the playground confirm an underlying deficit in the area of social functioning.

### 6.3.5 Conclusions

Results from S.P.'s profile conclude his "way of thinking" is dominated by an adherence to rules, routines, and learnt associations. The resulting observed behaviours of S.P. are anxiety related, when the world changes and expectations are changed or not met. (His first therapeutic intervention was in the form of play therapy, and since then he had a diagnosis of Tourette's syndrome and bipolar disorder, before receiving a diagnosis of AS). It is noted that once his parents received the diagnosis of AS and began to understand "his way of thinking" it made managing him much easier.

S.P.'s difficulties at school are consistent with a NLD profile in some respects. Despite his overall VIQ being lower than his NVIQ, his primary barriers to effective "school output" are in the following points which are consistent with the core difficulties of a NLD.

- Visual-spatial – difficulty with visual spatial organisation, perception and imaging
- Cognitive processing – difficulty understanding connections between and among independent factors and relating these to the whole – difficulty in understanding the big picture
- Language – difficulties in understanding nuances of language and multiple meanings of words
- Motor – lack of small-motor skills related to handwriting
- Social – deficits in social understanding
- Behavioural – rigid behaviour, difficulty with novelty and transition
- Emotional – at risk for anxiety disorder

In contrast to these difficulties, the following strengths of S.P. are noted, which are also consistent with a NLD.

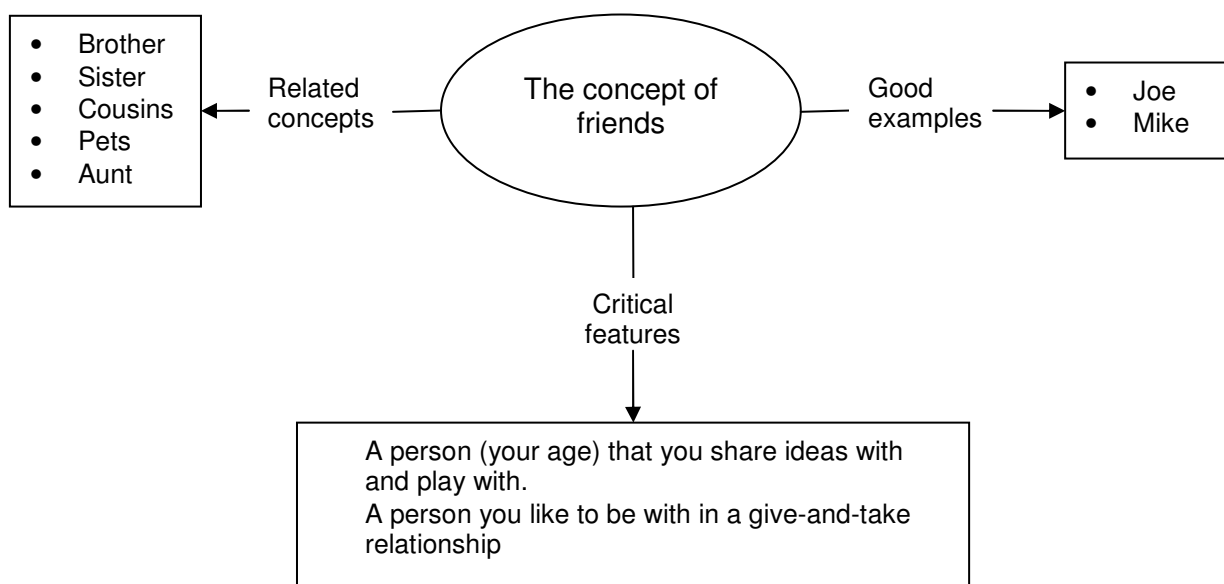
- Good auditory retention and verbal learning capabilities
- Advanced store of factual information
- Good word reading, difficulties with reading fluency and comprehension

The combination of the above strengths and weaknesses are noted to result in difficulties with maths number concepts and organisation of mathematical information. Difficulties from a language point of view will be an inability to develop a theme or point of view, draw conclusions and make inferences from the written text. Rourke *et al* (2002:159) describe the psychosocial and adaptive deficiencies that results from a child with a NLD. The child has extreme difficulty in adapting to novel and complex situations. An over-reliance on rote-learnt responses results in inappropriate behaviours and deficits in social perception, social judgement and social interaction skills. The child with a NLD often develops “internalised” forms of psychopathology and is at risk for anxiety, depression and associated forms of psychosocial disturbance.

### **6.3.6 Intervention with respect to S.P.’s individualised educational plan (IEP)**

A dominant difficulty with S.P. is in his inability to “grasp the concept” or meaning of a topic, situation or academic task. One strategy to help with this is described by Levine (2002:196) as concept mapping. It is clear that S.P. relies on learnt strategies to navigate in his world, and if he is given a method to deal with and manage new concepts, this will result in more independent thinking and less reliance on his parents to explain everything to him. It is clear that S.P. has a good memory, and needs to be taught “concept formation”. This is done by taking the key concept (e.g. the concept of friends) and then mapping out three different aspects from this: good examples; related concepts, and critical features. This kind of concept mapping can be used for social difficulties as described below in Figure 6.1.

Figure 6.1 Concept map illustrating how the concept of friends can be explained to S.P.



Socially, S.P. is holding his own in the playground and his schooling environment. A few issues of “bullying” in previous grades have been dealt with quickly and appropriately by the school personnel. S.P. is however “at risk” for being “picked on” and it is important that the aspect of potential bullying is monitored. Peer groups and “social skills” become very important in the pre-adolescent and adolescent ages. A strategy that can be used to assist S.P. through this period is to find a “mentor” within the school system who will assist him with social situations that cross his path. This is difficult for a child to be expected to do, and often a “leader” amongst the peer group can be asked to support in specific ways (such as school excursions or camps and outings). A teacher, counsellor or psychologist can also provide long term “mentoring” and advocacy for him. If S.P.’s behaviours are understood, it removes judgement by others of his (at times) inappropriate behaviour.

S.P. tends to “talk obsessively about a subject” and it is important to manage this appropriately. At school, his teacher can limit the conversation by setting limits, such as “you can tell me three more things and then it is time to work”. S.P.’s interest can be channelled into developing conversational knowledge and appropriate responses to the topic. Agree on a “code word” amongst peers that will signal to S.P. that he

needs to stop talking on that subject as his peers have “had enough”. Praise S.P for attempts at appropriate conversation that is not “long winded”.

S.P. is comfortable with rules and routines, and when these are broken or changed, it creates a great deal of frustration for him. It is therefore important that when a “rule is made” by parents or teachers that careful thought is given to the wording and situation surrounding the rule. It is important that S.P. begins to learn that there can be a degree of flexibility with certain “rules”. (E.g. the rule - “no playing in the classroom at break” becomes problematic for S.P. if learners play in the classroom at break when it is raining). It is important to explain to S.P. when routines are changed, both at home and at school. If S.P. is prepared for the change, he will “manage“ it better, thereby lessening his anxiety.

#### **6.4 CASE STUDY 3 – referred to as L.K.**

Birth date: 17 June 1998

Chronological age (at date of testing): 9 years and 8 months)

Grade: 3

Sex: Male

##### **6.4.1 Home circumstances and family traits**

L.K. is the oldest son of his parents who are in a stable relationship. L.K.’s mother describes herself as being very “ordered and precise” and can get anxious when things are not “going right”. She mentioned at the parent interview that she had a nervous breakdown in the middle of last year. A large contributing factor to this was the difficulties and frustrations she was experiencing with L.K.’s teacher at school. The school did not seem to understand the extent of L.K.’s problem, and only focussed on his “below average” skills, not recognising the “strengths” of L.K. eventually making the decision for L.K. to repeat the grade at the end of 2007.

L.K. has a younger brother, who has a diagnosis of ADHD. The brother’s do not play with each other, L.K. preferring to do his “own thing” and disliking any intrusion into

his space. L.K.'s father is described as having characteristics of ADHD, although has never been diagnosed as having any "disorder".

#### **6.4.2 Birth and medical history**

L.K. was born three weeks early via caesarean section due to a ruptured placenta. There were no complications after his birth, and his developmental milestones were all met within normal limits. His language development was described as being normal. L.K. has not had any serious childhood illnesses, and his hearing and eyesight are not problematic. He is described by his mother as a "fussy eater" and at present refuses to eat meat.

L.K.'s first assessment was done in pre-school by an occupational therapist because of concerns with weak drawings and low muscle tone. He attended occupational therapy whilst at pre-school. In grade 1, he was diagnosed with ADHD and Ritalin was prescribed. Since then he has remained on medication, and is currently on Concerta to address difficulties with concentration. He attended a series of neurofeedback sessions in his grade three year.

#### **6.4.3 Results: Questionnaires**

Results of the Conners' parent questionnaire rated psychosomatic symptoms as very problematic. The teacher's questionnaire does not have this category reflected, however the teacher questionnaire rated social problems and perfectionism as the most difficult areas affecting L.K. L.K.'s mother notes his emotional reactions which are a reflection of his not managing within the schooling environment. L.K.'s parents also note high levels of inattentive symptoms on their questionnaire, whereas the teacher rates anxiety as more problematic than inattentiveness. It is possible that the reason for the teacher not noting inattentiveness as problematic is a result of the effectiveness of the medication that he is taking whilst at school.

L.K. displays a superior knowledge in visual spatial constructions, and tends to collect "rubbish", such as pieces of metal, wood, paper, cardboard and sticks, which



he uses in his “constructions and buildings” which take up most of the space in his bedroom. He is reported to have an excellent memory. His noted difficulties are with attaching very concrete meaning to words, and having difficulty with social conventions which reflects in his difficulties with playing with other children and cooperating in group situations. It is to be noted that during the playground observation, L.K., despite being in his own, was not distressed by this. His mother notes that he was the target of bullying in his grade 2 year, and feels that if he is not “forced” into a group, he is more able to handle himself. L.K. seems oblivious to the “humanness” of other people, and his mother notes that when he observed a physically disabled child in a wheel chair, he did not comment on the child but verbalised to his mother that the child’s “wheels squeak”. It was further noted in response to Dunn’s sensory profile that L.K. does not perceive body language and facial expressions of other’s. L.K. presents with sensory difficulties in that he dislikes the feel of certain clothing and textures.

#### **6.4.4 Results: Neuropsychological test battery**

L.K.’s scores on the SSAIS-R reflect a very significant difference between his verbal scores (VIQ - 86) and his non verbal scores (NVIQ: 134). Within the verbal scale he scored in the above average range for vocabulary (15) and all his other scores were significantly lower with comprehension scoring only 5. L.K.’s academic achievement test results confirmed a “discrepancy” between reading performance and comprehension, with word reading scoring 1 year and 10 months below age level, but comprehension scoring 2 years and 5 months below age level. L.K.’s story memory as tested on the SSAIS-R scored a 8 (below average) and his story recall on the WJIII scored at 3 years and 1 month below age level, his memory for sequenced directions, also scoring low, at 2 years 1 month below age level. It is important to note that L.K. struggled with the “processing”: of the verbal tasks, not being able to give meaning in a “neurotypical way”. This was particularly noticeable in his answers to the comprehension subtest of the SSAIS-R. His answers reflected a “literal” way of processing verbal information, and a “learned response” or association to words and situations he has previously experienced. In response to the comprehension

question “Why should you stay at home when you have an infectious illness?” L.K. replied “This is a silly question – because I go to school – I am never absent”.

L.K. was very distracted by his external surroundings, but this was only observed when he was doing the verbal tests from the neuropsychological test battery. His distractibility had an “obsessive” quality to it in that L.K. would “hone in on something” and then “busy” himself with that one thought or activity at the exclusion of all else. An example of this was that L.K. noticed some “toy glasses” consisting of various coloured lenses, and while doing the verbal tests, he busied himself with putting glasses on all of the toys in sight.. If he had been “denied” the opportunity to follow through with his plans, he would have become anxious, as this activity was clearly “all encompassing” and he simply had to follow through with it to completion. It is further noted that during the classroom observation he alternated between “picking at his skin obsessively” or “coughing” (interpreted as an involuntary tic) associated with a build up of anxiety.

L.K. scored in the very superior range for the non verbal scale of the SSAIS-R. His highest scores were in pattern completion and block designs. These two tests reflect superior visual perception, visual concept formation, visual spatial reasoning and logical thinking. Results from the WJIII tests of achievement reflect L.K.’s reliance on his advanced visual processing skills to “master” reading and spelling. L.K.’s word reading was characterised by reading by “visual approximation” and a limited use of phonemic structure of words (“sentence” was read as ‘scientist’). L.K.’s reliance on a “visual memory of the word was clear during his spelling test, when he would initially write a word, and then look at it, process it again, and then often rewrite to his “visual image” he had recalled (the word when, was initially written as wen, and then changed to when). He was able to write words that were in his “visual memory bank” such as “house and garage” as he had just learned words to do with building at school. He did not have any phonetic strategy to ‘work” out the spelling of unfamiliar words. “Rewards” spelled as “*rawods*” and “adventure” was spelled “*atvetch*”.

L.K. struggled notably with the written samples subtest of the WJIII. In this subtest, he scored at 3 years and 4 months below age level. This test requires a written

response to a specific question. L.K. was clearly not “processing the verbal content” of the question. His answers reflected very limited understanding of what was required. He answered most of the questions with only one word, not writing a sentence, which was a part of the instruction. Question 17 of the written samples test asks “Write a good sentence that tells why it is dangerous to dive into a pool when you do not know how deep it is”. L.K. simply wrote in response: one word: “sine” (refer Figure 2.1 in Annexure). When asked what he meant by that he replied “You must read the sign”. L.K. is clearly having a great deal of difficulty with processing and giving meaning to the “verbal world” around him which is negatively affecting his ability to express himself within the academic context as well as in his communicative abilities and social interactions.

Results from the motor functions tests resulted in scores that were in the above average range for visual perception and visual motor integration, again confirming dominant right hemisphere neuropsychological processing. L.K. was very “precise” in the way he approached the Beery VMI test, wanting to “draw” the lines of the designs in the same thickness, ‘colouring the lines’ to make them “broader” than the pencil line. L.K. did the motor coordination test slowly and precisely, showing the ability to manage the coordination aspect of the test. It was noted that L.K. interpreted the test instructions literally. In the motor coordination test, the first lot of examples had “dots” to connect in order to guide the child through the task. When examples were presented without the dots, L.K. simply put his pen down, commenting “there are no more dots which means I don’t have to do anymore”. L.K.’s school books did not reflect the same degree of motor control in his writing. It appeared that when he had to “write” ideas and spelling, there was too much “competing” information and his written output deteriorated. It is further noted that in a school task which involved drawing symmetrical designs, L.K. was able to manage as one of the “best” in the class (refer Figure 2.2 in Annexure).

The balance test on the Movement ABC-2 scored in the average range. Skills of manual dexterity and aiming and catching scored in the below average range. L.K. worked out in the aiming and catching test that it would be easier to move the target against a wall, and then throw the bag into the wall, and it would then ‘fall’ onto the

required target area. L.K.'s mind is "constantly" working, making plans and trying to "work out" how to do things.

L.K. did not have any difficulties with the theory of mind tests. He did however struggle with the WCST-64. as he tended to perseverate with his thinking. Initially L.K. was very quick to "pick up" a pattern, and commented "it changes after every 10", but he then got stuck within his own faulty thinking, and perseverated with the rest of the cards, becoming more and more frustrated with observed heightened anxiety. He was not able to take "control" of his negative thought pattern, resulting in a weak score, despite a very perceptive initial start to the test.

#### **6.4.5 Conclusions**

L.K.'s difficulties at school are noted to be rooted in an auditory and linguistic impairment.. Rourke *et al* (2002:195) describe the neurodevelopmental dynamics of a basic phonological processing disability in terms of the following primary, secondary and tertiary deficits. Primary deficits include auditory processing or phonological processing, resulting in secondary deficits of auditory and verbal attention which result in tertiary deficits in auditory and verbal memory. These deficits result in poor phonology, verbal reception, verbal repetition, verbal storage and verbal output. Academic deficits that result, include weak graphomotor skills, word decoding and reading comprehension. Primary neuropsychological assets on the other hand include visual perception and tactile perception which results in secondary assets of tactile attention and visual attention, with resulting tertiary assets of tactile memory, visual memory, visual concept formation and problem solving. Strong skills in mathematics and science are resulting academic assets. L.K.'s maths scores in the WJIII tests of academic achievement were below age level, but reflect his best scores (in relation to reading and language scores).

L.K. is an affectionate and loving child who tries hard to please. He tends to cry easily when he becomes overwhelmed. Despite this emotional side to him, he struggles to "read" emotions in others, and does not seem to "connect" with the "humanness" of another person. This affects L.K.'s social interactions and he does

not have any friends at school, and is “alone” at break, just wandering around the periphery of the playground. He does not display any intent on communication with his peers. At home he also prefers his own company, preferring to play in his room by himself with his Lego and other building constructions which hold a special interest for him and are described as being advanced.

L.K. follows classroom routine, but struggles when things are changed. When there is a build up of anxiety, L.K. develops a “cough” which is of a “barking” nature – and is seen as a form of a tic. He also tends to “pick” at imaginary sores on his skin. These behaviours are not apparent when his environment is not stressed. L.K.’s mother is very concerned about his “days at school” as she feels that without understanding by his teachers, L.K. will lose self esteem and confidence. She believes in his strengths, and that one day L.K. will find his way in the world, without having to conform to unyielding assessment criteria which are largely language based.

#### **6.4.6 Intervention with respect to L.K.’s individualised education plan (IEP)**

The most important aspect of intervention for L.K. is to “understand him” and realise that his mind’s thinking is dominated by his literal interpretations of language and over dominant visual perceptual and visual abstract reasoning. He finds it very difficult to attend to the “verbal world” and this affects his levels of attention when he has to manage verbal input. He becomes overwhelmed within the classroom and cannot keep up with the pace of the classroom, causing anxiety which is manifesting as obsessive type behaviour, identified in L.K.’s case as “picking” at his skin and “coughing”. It is therefore important that L.K.’s school environment is made as stress free as possible with as many visual prompts and visual learning as possible. If L.K. can see something being demonstrated it is more likely to hold his attention and he will give it more meaning.

L.K.’s cognitive profile is clearly very dominant in visual perception, visual concept formation and visual logical reasoning. It would be advisable in L.K.’s case to utilise these strengths and to place a greater emphasis on the “whole word” approach to the

instruction of reading and spelling. Use a “drill and practise” approach to “over learn” words. The use of flashcards and words written on cards to teach grammatical structure would be an appropriate strategy for L.K. to recognise and learn how words are put together to form grammatically meaningful sentences. When L.K. has to learn “factual” information it would also be advisable for this to be redone in a visual way (such as mind mapping) in order for him to best understand how all the concepts fit together, and to assist him in remembering the detail of a subject. It may be necessary to employ a tutor who will assist in the above recommendations when doing his homework. He needs a consistent and reliable teaching method to reinforce and “learn” and rehearse basic concepts and skills in a drill and practise fashion. School placement in a specialised learning environment where his profile is understood is recommended.

When giving L.K. verbal instructions it is important that care is taken to assure that you have his attention. In a school situation, use his name to get his attention when needed. Keep verbal instructions as simple and to the point as possible. It is important to be aware of possible misinterpretations of instructions that may be interpreted in more than one way, and to spend time (one-on-one) with L.K. to make sure he understands what needs to be done in the classroom. L.K. struggles to process changes of activities and instructions that happen quickly (such as the scurry before the bell rings at the end of the day). This leads to L.K. not having his homework written down correctly. It would help L.K. if he had a classroom buddy assigned to him to help him with this activities.

A useful strategy for the teacher would be to use his interest in Lego and constructions as a “reward” for when a more difficult language or written task is to be done. In this way his interests can be used as motivator. Another aspect of this is to use his special interest to build up his language and comprehension skills to get him to read and write about the topic that is both his interest and his talent.

Finally, it is important to note that L.K. struggles with changes in his routine and changes and introduction of novel and new material may cause severe stress which results in anxiety. If L.K. is placed in his own desk, preferable a little away from the

other children, he will find it easier to “keep control” as his “space” at least is predictable and ordered. It will also make it easier for the teacher to explain concepts to him, and prepare him for a change of activity which is coming up, before a general instruction is given to the class.

## **6.5 CASE STUDY 4 – referred to as M.D.**

Birth date: 12 October 1997

Chronological age (at date of testing): 10 years and 4 months)

Grade: 4

Sex: Male

### **6.5.1 Home circumstances and family traits**

M.D. is the first born son of a married couple who are in a stable relationship. Both parents are religious and the family follow their religion and traditions closely. There are no reported personality or behavioural oddities within the family. M.D.’s mother reports however that she had learning difficulties at school and her brother had dyslexia. M.D. has a younger brother who does not appear to have any difficulties.

### **6.5.2 Birth and medical history**

M.D. was born after a difficult pregnancy and birth. At 26 weeks M.D.’s mother nearly miscarried because of placenta previa. M.D. however was carried to full term but labour was prolonged and difficult resulting in an emergency caesarean section being performed. M.D. had to be resuscitated at birth, as there was a knot in the umbilical cord. His Apgar score was 1/10.

M.D.’s physical developmental milestones were all met within the average range. He has had a history of ear infections as a child, his hearing has been checked and no problems have been noted with his hearing. M.D.’s first assessment was done by an occupational therapist when he was four years old, (May 2002) and he attended occupational therapy from then until December 2005. When M.D. was three years old he attended speech therapy for 3 months and then again in his preschool year

until the end of his grade 3 year. He has also attended a social skills training group. M.D. was given a diagnosis of AS by a psychologist when he was 5 years old, and this diagnosis was confirmed by another psychologist at the end of his grade 2 year. In his grade 3 year he was taken to a psychiatrist where he was given an additional diagnosis of anxiety and depression and is currently on medication for this (25mg Zolyft daily).

### **6.5.3 Results: Questionnaires**

Results from the parent's questionnaire show the greatest areas of concern being psychosomatic and social problems. The teacher's questionnaire confirms these difficulties with her highest rating being in social problems and emotional lability. M.D. was not rated as having any attention difficulties by either his parents or his teacher. It is noted that M.D. has a facilitator at school who makes sure that he follows through with all his tasks. Social problems are also rated as the most problematic on the GADS questionnaire, as well as needing excessive reassurance when things go wrong. Results from the Dunn's sensory profile confirm difficulties with emotional reactivity.

### **6.5.4 Results: Neuropsychological test battery**

Results from the SSAIS-R reflect a significant difference between M.D.'s verbal scores (VIQ - 77 - borderline range) and his non verbal scores (NVIQ - 114 - above average range). It is important to interpret these scores with caution as M.D. was "manipulating" the testing sessions. When M.D. struggled with a task, rather than showing this, he would try to move on to the next task. He may have scored higher on many of the tests if this had not been the case and he had been able to engage and think about a solution. It does however show that M.D. is much more competent with his visual and non verbal reasoning. He approached many of the verbal tasks from a "visual" perspective – such as looking for a "pattern" when answering the vocabulary test, instead of focusing on the word and trying to find a root word to assist in the meaning of the word. M.D. really battled with the comprehension subtest, clearly showing that he struggles with giving meaning and attaching the



correct concept to the spoken word. When asked the question “ Why is an accused person put on trial in court”? M.D. answered “so that we can figure out where the white lines / yellow lines must go” clearly focussing on the word court, and associating it with a tennis court. M.D. struggled to express himself, evident in the missing parts subtest of the SSAIS-R, when shown a picture with an elephant (whose trunk is missing), M.D. asked me to “pretend he was an elephant” and then proceeded to demonstrate with his body, using his arms, to illustrate that the trunk was missing. M.D. appeared to “lose attention” during verbal tasks, at which time he would become very “fiddly” and this behaviour could be interpreted as “attention deficit disorder symptoms” – however it should be cautioned in M.D.’s case that his difficulties with verbal processing, affecting his concept formation, are causing him to “shut down”. This relates to the observation that his facilitator made with respect to him “working and engaging in a task – when he wants to”. When the stimulus material is visual and he understands and knows what he has to do, there is no problem with his “output”. The results from his executive functioning tests (WCST-64) scored in the superior range, and confirm that M.D. has advanced planning skills, and these he is using to his advantage in manipulating his environment to “manage his deficits and shortcomings”.

Results from the WJIII tests of academic achievement conclude significantly low scores in the oral language tests. These tests include understanding directions, story memory and delayed story memory. M.D. scored three years and four months below his chronological age in the “understanding directions” subtest. This test requires the ability to listen to a sequenced instruction, and then recall this by pointing to items in a picture in the correct sequence. The story memory test requires the ability to listen to a paragraph and then recall as many facts as possible from the story. M.D. was not able to do this test at all. He would simply “carry on with the story” making up his own ideas. An example of this was with the paragraph 5 which reads: “Rick got some glow in the dark stars for his sixth birthday. He wanted to put them on his bedroom ceiling”. When asked for him to repeat what he could remember, he answered “maybe you could use the rocks for some project; or you could wash them and put them into piles. He was not able to do the next story memory paragraph either, despite the instructions to recall being given again. This test was

subsequently not scored. His story memory test in the SSAIS-R was also a low score (3), confirming difficulties with short term memory for verbal information.

Results from the reading tests in the WJIII reflected very weak comprehension skills, confirming a weak verbal concept formation. His word reading tested at a year and six months below age level. He was not using a “phonetic” approach to sound out unfamiliar words, but relying on a visual memory of the word for recognition. This reliance on visual memory was confirmed in his spelling test, where he could spell “learnt” words well, but was clearly not using a “sounding out” approach to break down the word.

M.D.’s scores on the maths fluency test was more than three years in advance of his age. This test was highly predictable with no verbal “input”. Results from the other two maths tests reflected below age level performance. M.D. however “tired” at the verbal nature of the applied problems test and it was difficult to keep him focussed and motivated on the task. M.D. was unsure of some of the calculation examples in the calculation subtest as the “setting” out of the sum was different to what he was used to – and he resisted a different format. This resistant to a different setting out was noted in the classroom observation, when during a maths lesson, M.D. refused to do a division sum in the format the teacher wanted, but insisted on presenting the division sum in fraction form. M.D. was mathematically correct in his reasoning, but was unable to manage the division sum in the different form as set out by his teacher. A ‘battle of wills’ between the teacher and M.D. ensued, resulting in M.D. having a “meltdown”. The facilitator tried to intervene, but neither the teacher nor M.D. were able to change their reasoning.

The results from the motor functions tests did not show any deficit areas in either gross motor functioning (balance, aiming and catching and manual dexterity) or visual motor integration. His manipulative behaviour however was evidenced in his “trying” to change the tasks to execute them “his” way.

M.D. did not have any difficulties with the theory of mind tests. M.D. demonstrated very good skills in the executive functioning test, being able to perceive the changes in the category sequence with precision.

### **6.5.5 Conclusions**

During the testing sessions, it was noted that M.D. was “difficult” to engage with. He was very quick to “read” the testing situation. If he did not enjoy a particular task, or it was becoming too “repetitive” he would change his behaviour to being non compliant or would manipulate the results to “end” the task. He definitely wanted to be “in control” and manipulated the situation to get what he wanted. It was noted and confirmed by his facilitator that if M.D. does not have difficulty with a task, he will be able to complete the task well. If however he is not interested in a task, he will “fight” the situation. It is noted that his executive functioning tested as very advanced, confirming that he is able to plan, execute and manage novel situations well.

It is noted that M.D. does not struggle with all languages, despite his verbal IQ score being in the borderline range. It is reported that M.D. has always enjoyed Hebrew, and this may be because it is “learnt” from scratch, and the Hebrew writing is symbolic, visual and predictable. He is able to learn how the language works, it is different and predictable. This is not the case for English and Afrikaans. It is noted that M.D. refused to participate in any Afrikaans for the whole of his grade 3 year, but in grade 4 has made an effort and is doing well. One of the reasons given by M.D. for his non participation in Afrikaans last year, was that the words were too similar to English, and an example was given for the word wind – used both in English and Afrikaans with the same meaning, but pronounced differently. M.D. was not able to process this and could not “separate” the two languages enough for him to manage to study both.

M.D.’s greatest area of difficulty is his inability to manage his emotions and to deal with disappointments and “life” situations in which he is not the best, or the first, or the winner. This is confirmed by his facilitator who notes the fact the M.D. always needs to “win” as being an “obsession”. This is so problematic that he has been

removed from the “house point” system as he throws a tantrum if his house does not win. He will have to leave assembly if an announcement is made with respect to house points, as he cannot deal with not being “first”. He also has been removed from all aspects of competitive sport, but still participates in cricket and tennis training. This one difficulty may be the root cause of his difficulties socially, as he is not able to play to the rules of any game. He will “change” the rules and spoil a game. It may be that M.D. spoils the game intentionally – and the game would have continued if he was in control and the game was going his way, on his terms, and if he was winning. He becomes aggressive to other children when things do not go his way; this has given him a “name” and lessens the chances of other children playing with him for fear of “getting into trouble”.

Cognitively and educationally, M.D.’s areas of weakness are in short term memory and the meaning (pragmatics) of language. Bishop (2000:262) describes the term “Semantic-Pragmatic Disorder” (SPD) as a term given to children who have a relatively good mastery of language in terms of grammar and phonology, but struggle with comprehension and use of language. It is further noted that children with a SPD differ qualitatively from other language impaired children in that SPD children have associated social and behavioural abnormalities similar to children with autism. M.D. presents with a very “manipulative” personality, and a neurocognitive profile that is typical of a SPD. His case study does not indicate any restricted, stereotyped patterns of behaviour, nor any insistence to rituals, or obsessive behaviours. M.D.’s difficulties with social skills are perhaps rooted in his personality, as well as his difficulties with understanding the ‘pragmatics of language’ and the social nuances of language.

#### **6.5.6 Intervention with respect to M.D.’s individualised education plane (IEP)**

M.D. needs to learn that he cannot always be first, and that life is not about winning and losing. This is a life skill that he needs to learn, and as he grows older will manage disappointments better. He cannot be shielded from this reality, and needs to learn how to deal with “not being the centre of the universe” now. His parents need to be assisted with this, as it is possible that because of the trauma surrounding

his birth, M.D. may have been brought up in a very protected way. His present diagnosis of AS is also perhaps being used as an additional way to “protect” him from himself, and his facilitator is making it easy for him in the classroom, so that he never has to be responsible for his own mistakes.

M.D.’s facilitator does not go with him onto the playground, but this is where she is most needed. M.D. needs to learn how games are being played, and she could play a very important role in spending time with him, not forcing participation, but observing with him, and describing how the “social games” and “hidden curriculum” on the playground works. M.D. has a very sharp mind, and he can be “taught” the way things work socially and emotionally. Once M.D. understands the “social rules” he should be engaged with a peer in games involving two people such as board games like checkers or chess, as well as physical games such as tennis. He should experience a mind shift that the purpose of the game is to participate and that the reality is that there will always be a winner and a loser. Once he understands this, he could assigned a “play buddy” for the day who could assist him to manage himself in the playground. M.D. tries to participate and interact with his peers, but he is not successful.

Educationally, M.D. has difficulties with short term memory for verbal information, as well as understanding the pragmatics of language. He struggles to get started on a task because of his not understanding the instructions. This results in a build up of anxiety. Levine (2001:69) notes short term memory problems results from an inability to accurately interpret information that comes into the brain. In the case of M.D. this weakness is in the linguistic system, and he struggles to process information that is conveyed through the spoken or written text. To assist with this difficulty the following strategies can be used by the teacher:

- Use strategies such as “visualising” when verbal instructions are given
- Repeat instructions “under the breath” to assist in memory retention
- Keep instructions short and too the point
- Keep lists and schedules of items that are required to be done – write down all homework assignments

- The teacher can teach the skill of paraphrasing whereby M.D. would need to write down essential information when instructions are given.

It is important to be consistent and firm with M.D. He functions well within boundaries and if given specific instructions in a predictable and consistent environment he will manage much better. It is important to understand M.D.'s "way of thinking" and accept alternative, but correct ways of solving problems, both academically and socially.

## **6.6 CROSS CASE ANALYSIS: Home circumstances, birth and medical history, scholastic history and previous assessments, diagnoses and interventions**

Table 6.1 details the cross case analysis compiled from information provided from the personal questionnaire as completed by the parents of each presented case. Refer to Appendix 1 for details of the questionnaire completed.

All four of the case studies presented were male. They were all the first born children. All of the case studies were from families that were intact, in that the parents were in a stable relationship, and there were no "family stresses" which may have contributed to difficulties with emotion, social or academic functioning. All four of the cases have a history of "possible related difficulties" which run in the family. In one case, the father had similar social isolation and perfectionist tendencies, another case the father presented with undiagnosed ADHD. In two of the cases, the younger brother has a diagnosis of ADHD. In two of the cases the mother had learning difficulties at school.

Two of the cases were similar in their medical history in that they had traumatic births, resulting in both children suffering from asphyxiation at birth, and being placed in ICU. Two of the cases had difficulties during pregnancy, with threatened miscarriages during the pregnancy. Another similarity between two cases was convulsions due to bacterial meningitis (at a day after birth and at 15 months old), and another case which had convulsions due to encephalitis (at 2 ½ years).

Anderson *et al* (2001:89) note that children who are survivors of some form of meningitis and encephalitis may be at risk for memory impairments. In the cases presented in this thesis, results from the neuropsychological test battery conclude that C.I. presented with weaknesses in memory, but this was not the case for S.P. who presented with memory as strength.

All four of the cases were first “assessed” when they were in pre-school. All four cases were initially assessed by an occupational therapist, and all four cases received occupational therapy when they were in preschool. Three of the four cases were given a “first diagnosis” of ADHD. Additional diagnoses received include dysthymia (a mood disorder that falls within the depression spectrum) and obsessive anxiety, Tourette syndrome and bipolar disorder; depression and anxiety. Two of the four cases are currently using Zolyft (to treat anxiety and depression). One case is currently taking Concerta (after initially being prescribed Ritalin), and the other case was previously taking Concerta, (also after initially being prescribed Ritalin). AS was the first diagnosis in only one of the cases (diagnosed at five years old). In the other cases, AS was given as a diagnosis only after the other diagnoses described above. These results are similar to those of previous research conducted by Church *et al* (2000:12) who found in a study of forty children between three and fifteen years, with a diagnosis of AS, that 92% of the children in elementary school had received a different diagnosis before their AS diagnosis. Of these diagnoses, the most common one was ADHD, followed by autism, and other social problems. When the children were in middle school, 38% received additional diagnoses of oppositional defiant disorder or conduct disorder, and 46% of them were seeing a psychologist for behavioural issues. Failure to be able to follow through with a plan, led to anxiety, frustration and tantrums (refer Table 2.5 in Chapter 2).

Two of the four cases had undergone sessions of neurofeedback. Two of the four cases had undergone “social skills” training, and two of the four cases had attended speech therapy. The parents concluded that none of these therapies had managed to “change” their children, as they were still presenting with social difficulties, anxiety and erratic academic and classroom behaviour. These results conclude that many professionals treat the child’s presenting symptoms in isolation, resulting in the child

doing isolated therapies and interventions which are not necessarily targeting the underlying problem. This problem highlights the necessity for a comprehensive neuropsychological test battery to be conducted with children who are presenting with delays within the schooling (and pre-school) environment. Children who present with social problems as well as anxiety need to be managed with particular caution.

All of the parents were concerned about their children's ability to manage in the mainstream setting without losing self-esteem. One of the cases had been placed in a specialised school for learning disabilities after repeating grade 1. Another case (after failing grade 3) has made an application to a specialised school. The remaining two cases are concerned about the children's ability to remain in mainstream education, one being in a private institution, and the other in a government school. All of the parents noted social misunderstandings and were concerned with their children's underlying anxiety, no matter what the school placement. The common problem of anxiety is a manifestation that the children presented in the case study are not managing within the environments that they are in. This is clearly manifesting in a build up of anxiety and has resulted in two of the four cases being placed on medication by a psychiatrist to treat dysthymia and obsessive anxiety (Case C.I.) and depression and anxiety (Case M.D.). A third case was seeing a clinical psychologist at preschool for "anxious behaviour".

Developmental (motor) milestones were all reported by the parents to have been met within the normal limits. No problems with eyesight were noted by any of the cases and all cases presented as right handed. Three of the cases noted a history of childhood ear infections and in one case, grommets were inserted.



Table 6.1 Summary of history across cases

	Family set up	History – difficulties within family	Birth & pregnancy	Develop- mental miles- tones	Serious illnesses	Hearing & eyesight	Previous diagnosis	Schools attended	Therapies attended	Main concerns as parent
Case C.I.  Male Age: 13 yrs 10 mths Grade: 7	Parents married – good relationship amongst family  C.I. is oldest (has a younger brother)	Younger brother with diagnosis ADHD.  Father had difficulties as a child with social skills and perfectionism.  Mother quiet and reserved. Mother’s cousins have diagnosis of ADHD and AS.	Good pregnancy. Birth traumatic. C.I asphyxiated at birth (Apgar score 4) and placed in intensive care unit	Sat – 6 months Crawled – 11 months Walked – 14 months  Words – 2 years; sentences by 3 years	Bacterial meningitis a day after birth.  Convulsions at 15 months old	History of ear infections Grom- mets inserted  No problems noted with eyesight	ADHD (2001)  AS confirmed psychiatrist 2006 with secondary diagnosis dysthymia and obsessive anxiety, medication Zoloft	Gr 1 – mainstream government school.  Repeat gr 1 – transfer to specialised remedial school (gr 1-6)  Changed to private specialised school (gr 7)	OT (4 ½ yrs -7 yrs) and OT (grade 1 and 2)  Speech therapy (grade 1–4)  Social skills training (grade 7)	Lack of social inter- action; emotional instability; high frustration levels; lack of awareness of people and their surroundings
Case – S.P.  Male Age: 11 yrs 4 mths Grade: 5	Parents married, good family bond  S.P. is oldest (has a younger sister and brother)	Father is one of 6 children, 3 of which were not “academically strong” – including father Mother not academically strong. Both mother and father matriculated.	Difficult pregnancy – mom hospitalised several times threatening miscarriage.  Caeserean birth at 35 weeks -No complications at birth	Sat – 6 months Crawled – 8 months Walked – 13 months  Words – 10 months Sentences 14 months	At 2 ½ years hospitalised for encephalitis post chicken pox.	Ear infections as a baby (twice).  No problems with eyesight	Anxious behaviour as a preschool child.  ADHD (2003) (Ritalin & Concerta prescribed) Tourette’s syndrome & bipolar disorder (2004) AS (2006)	Mainstream government school (grade 1- present)	Play therapy in preschool for anxious behaviour.  O.T. (grade R)  Neuro- feedback	Misunder- standing situations; fears and anxieties; low self- esteem; thinking complicat- ed; can’t cope with change

	Family set up	History – difficulties within family	Birth & pregnancy	Developmental milestones	Serious illnesses	Hearing & eyesight	Previous diagnosis	Schools attended	Therapies attended	Main concerns as parent
Case – L.K. Male Age:9 yrs 8mths Grade 3	Parents married – good family relationship  L.K. Is oldest (has a younger brother)	Younger brother has a diagnosis of ADHD  Father has ADHD characteristics	L.K. born 3 weeks early due to ruptured placenta. No complications	Developmental milestones – normal  Language development - normal	None	No ear infections  No problems eyesight	ADHD (2005) (Ritalin, currently on Concerta)  AS (2007)	Mainstream government school (grade 1-3) Repeating grade 3 – application for transfer to specialised school	O.T. (preschool )  Neuro-feedback	Ability to “survive” the schooling system; thinks differently; loss of self-esteem
Case – M. D Male Age 10 yrs 4 mths Grade 4	Parents married – good relationship  M.D. is oldest (has a younger brother)	Mother had learning difficulties at school. Mother’s brother diagnosed with dyslexia	Mother had a difficulty pregnancy, nearly miscarried at 28 weeks.  Labour difficult and prolonged – emergency caesarean. At birth a knot in the umbilical cord and needed resuscitation at birth. (Apgar score 1)	Sat – 4 months Crawled – 9 ½ months Walked – 12 months	None	Ear infections as a child  No problems eyesight	AS at 5 years old  AS confirmed (2006)  Depression and anxiety (Zolyft prescribed)	Private mainstream school	O.T. (from 4 years to end grade 1)  Speech and language therapy (at 3 years) & later grade R – end grade 3)  Social skills (grade 3)	Ability to remain in main-stream environment; lack of understanding on behalf of teachers and peers; not accepted in the social group

## **6.7 CROSS CASE ANALYSIS: Conners' parent and teacher questionnaire**

The Conners' rating scale is one of the standard instruments used for the assessment of ADHD and related problem behaviours in children and adolescents. The Conners' rating scale (long version) for parents and teachers was used in this thesis to ascertain any pattern of behavioural symptoms specific to AS. The long version questionnaires contain subscales of a broad range of behaviours, cognitive problems, anxiety problems and social problems (Conners 1997:1). Previous research has identified that AS is often a second diagnosis after ADHD (Refer preceding Table 6.2). Ghaziuddin *et al* (1998:281) also note the comorbid symptoms of ADHD and AS and state that all children with ADHD should be screened for AS.

The Conners' parent rating scale consists of eighty items and the teachers rating scale consists of 59 items (refer Appendix 3). The parent and teacher have to rate behaviours in terms of "never happening", "occasionally happening", "often happening" and "very frequently happening". Table 6.2 and Table 6.3 give the cross case analysis of responses in the "very frequently happening" category from the parent and teacher respectively. From the eighty items of the parent questionnaire, only three items were rated the same and only across three cases. These items were: avoids, expresses reluctance about, has difficulties engaging in tasks requiring sustained mental effort; needs close supervision to get through assignments and afraid of new situations. Of the 59 Items of the teacher questionnaire, two items were rated as very frequently happening across all four cases. These were the following: has poor social skills and is one of the last to be picked for teams and games. Two additional items were rated consistently against three cases, these being: does not know how to make friends and seems over focused on details.

Table 6.2 Analysis of Conners' parent questionnaire across cases

Behavioural symptom scoring a "very frequent, very often" response	Case C.I.	Case S.P.	Case L.K.	Case M.D.
Everything must be just so	x	x		
Has no friends	x	x		
Avoids, expresses reluctance about, has difficulties engaging in tasks requiring sustained mental effort	x	x	x	
Keeps checking things over again and again	x			
Loses friends quickly	x			
Loses temper	x			
Needs close supervision to get through assignments	x	x	x	
Afraid of new situations	x	x		x
Fussy about cleanliness	x			
Does not know how to make friends	x	x		
Things must be done the same way every time	x	x		
Has a lot of fears	x	x		
Has rituals that he must go through	x			
Has sloppy handwriting	x		x	
Has difficulty playing in leisure activities quietly	x			
Blames others for his mistakes or behaviour	x			
Gets upset if someone else rearranges his things	x	x		
Clings to parents or other adults	x			
Demands must be met immediately – easily frustrated	x			
Only attends if it is something he is very interested in	x	x		
Easily distracted by extraneous stimuli	x			
Difficulty doing or completing homework		x	x	
Difficulties sustaining attention in tasks or play activities		x		
Fails to complete assignments		x		
Afraid of people		x		
Has trouble concentrating in class		x	x	
Does not seem to listen to what has been said to him		x	x	
Excitable, impulsive		x		
Never gets invited to friends houses		x		x
Inattentive, easily distracted		x		
Makes careless mistakes in school work		x		
Has rituals that he must go through		x		
Distractibility or attention span a problem		x		
Cannot grasp arithmetic		x		
Afraid of the dark		x		
Sets very high goals for self		x		
Fidgets with hands or feet or squirms in seat		x	x	
Touchy or easily annoyed by others		x	x	
Fidgeting		x		
Feels inferior to others		x		
Mood changes quickly and drastically		x		
Easily frustrated in efforts		x		
Easily distracted by extraneous stimuli		x	x	
Has difficulties organizing tasks and activities			x	
Restless in the "squirmy" sense			x	
Headaches			x	
Talks excessively			x	
Fails to give close attention to details, makes careless mistakes			x	
Interrupts or intrudes on others			x	
Messy or disorganized at home or school			x	
Gets upset if someone rearranges his things			x	
Seems tired or slowed down all the time			x	
Has trouble concentrating in class			x	

Table 6.3 Analysis of Conners' teacher questionnaire across cases

Behavioural symptom scoring a "very frequent, very often" response	Case C.I.	Case S.P.	Case L.K.	Case M.D.
Appears to be unaccepted by the group	x		x	
Is a perfectionist	x			
Avoids, expresses reluctance about, has difficulties engaging in tasks requiring sustained mental effort			x	
Is one of the last to be picked for teams and games	x	x	x	x
Fails to finish things he starts	x			
Is an emotional child			x	x
Everything must be just so			x	x
Has no friends	x			
Timid, easily frightened	x			
Does not know how to make friends	x		x	x
Seems over-focused on details	x	x	x	
Has poor social skills	x	x	x	x
Shy, withdrawn	x			
Restless or overactive			x	
Does not seem to listen to what is being said to him			x	x
Keeps checking things over and over again			x	
Inattentive, easily distracted			x	x
Has difficulty organizing tasks or activities			x	
Has difficulty sustaining attention in tasks and play activities			x	
Fidgeting			x	
Fidgets with hands or feet or squirms in seat			x	
Demands must be met immediately (easily frustrated)			x	x
Short attention span			x	
Distractibility or attention span a problem			x	
Things must be done the same way every time			x	
Does not follow through with instructions and fails to finish school work			x	
Easily distracted by extraneous stimuli			x	x
Restless in the "squirmy" sense				x
Feelings easily hurt				x
Fails to give close attention to details or makes careless mistakes in schoolwork				x
Has difficulty waiting his turn				x
Sensitive to criticism				x
Blurts out answers to questions before the questions have been completed				x
Short attention span				x
Only pays attention to things that he is really interested in				x
Mood changes quickly and drastically				x
Interrupts or intrudes on others				x

In order to interpret the overall rating of the Conners' questionnaire, the responses of the parent and teacher are scored and then these scores are added together to get raw scores. These raw scores are converted to *T*-scores for the purpose of comparative interpretation. The *T*-score is thus a standard score (between 1 and 100) which has been calculated from the raw scores such that each subscale will have the same mean (50) and standard deviation (10) (Conners 1997:43). *T*-scores

thus allow each obtained score to be compared to the same reference value. *T*-scores are used to determine how a child compares in that subscale to a normative sample, which in the case of the Conners' questionnaire, is a sample of boys of the same age with "neurotypical" functioning.

An interpretive guideline is provided by Conners, (Conners 1997:44) and is used for comparison of subscale scores to identify areas of strength and concern. The guideline for interpretation is given in Table 6.4.

Table 6.4 Interpretive guidelines for *T*-scores (Conners 1997:44)

<i>T</i> - score	Guideline
70+	Markedly atypical (significant problem)
66-70	Moderately atypical (significant problem)
61-55	Mildly atypical (possible significant problem)
56-60	Slightly atypical (borderline – should raise concern)
45-55	Average (typical score – should not raise concern)
40-44	Slightly atypical (not a concern)
35-39	Mildly atypical (not a concern)
30-34	Moderately atypical (not a concern)

Table 6.5 gives the results of the cross case analysis of the areas of greatest and least concern as rated by the parent and teacher. These results clearly indicate that "social problems" is the main subscale that is the greatest area of concern, rated across all cases by the teacher and three of the four cases by the parent. The *T*-scores rated as markedly atypical – indicative of a significant problem. Another subscale of a significant problem was "perfectionism", rated as significant by teachers' of three of the cases and one parent. "Anxious-shy" was rated by two parents, and "psychosomatic" by the other two parents as significantly problematic.

The lowest rating (not raising concern) was given as inattentive by two teachers and two parents. Oppositional behaviour was also not noted as not raising concern by two teachers and three parents. Hyperactivity was noted as not an area of concern by two teachers of the four cases.

Table 6.5 Summary of subscale scores indicating areas of concern and strength across cases of both the Conners' teacher and parent questionnaire. *T* – scores are given in brackets within the table

	Case C.I.		Case S.P.		Case L.K.		Case M.D.	
	Teacher	Parent	Teacher	Parent	Teacher	Parent	Teacher	Parent
Highest subscale ( <i>T</i> -score)	Social problems (90)	Social problems (90)	Social problems (74)	Social problems (90)	Social Problems (90)		Social problems (87)	Social problems (81)
	Perfectionism (90)	Perfectionism (89)	Perfectionism (79)		Perfectionism (87)		Conners' Emotional lability (88)	
		Anxious-shy (90)		Anxious-shy (90)		Psycho-somatic (90)		Psycho-somatic (90)
Lowest subscale ( <i>T</i> -score)	DSM-IV: total (47)	Cognitive problems / inattention (64)	Oppositional (45)	Oppositional (48)	Oppositional (48)	Oppositional (59)	Cognitive problems / inattentive (51)	Oppositional (55)
	DSM-IV: hyperactive-impulsive (47)		Hyperactivity (49)	Psycho-somatic (43)				Cognitive problems / inattention (56)
	DSM-IV: Inattentive (47)							

These results are of great interest and are potentially significant. It is noted that three of the four cases presented had a first diagnosis of ADHD, but the results from the Conners questionnaire do not indicate significant symptoms of ADHD, and in fact in two of the cases rate hyperactive, impulsive and inattentive symptoms as the lowest scores. Another behavioural area of no concern was in oppositional behaviour which reflects in the cases as being ‘aware of rules’ and trying to do what is required within the classroom. All four of the cases are presenting with significant social problems as well as perfectionism (wanting things ordered and predictable). These are all typical behaviour of a child with AS and the Conners questionnaire, if scored and interpreted appropriately may be very useful as a ‘distinguishing’ instrument between children with ADHD and AS. A learner with AS, will “become inattentive” in the classroom. The nature of the inattentiveness however is more due to a “hyperfocus” on detail, into which the child gets absorbed, resulting in him not paying attention to the relevant subject matter being presented. This is particularly noticeable when the tasks are verbal in nature. It is also noted that all four cases presented with the characteristic that they need specific instructions to begin tasks. (refer Table 6.6 below). This difficulty in interpreting language and starting with tasks that are unfamiliar and new are characteristics of AS, which may “come across” in the classroom as daydreaming and inattentiveness, but in the case of the AS mind, this “inattentiveness” is due to a difficulty with pragmatics and a fear of the unknown.

#### **6.8 CROSS CASE ANALYSIS: Gilliam Asperger’s disorder scale (GADS) parent questionnaire**

The GADS is a behavioural rating scale that helps identify a person with AS. The GADS comprises four subscales: social, restricted patterns of behaviour, cognitive patterns and pragmatic skills (refer Appendix 2). The parent responses are scored and then raw scores are converted to percentile ranks for interpretation. The percentile rank is described as the cumulative percentage of a raw score. The percentile rank indicates the percentage of the normative group whose scores are equal to or lower than the raw score. In the case of the GADS the normative group was a sample of AS individuals between 3 and 22 years. The subjects percentile



rank is thus compared to a group of subjects with AS. A subject without AS will therefore have a lower score than the normative group, and a subject with a high percentile ranking will have more characteristics of AS (Gilliam 2001:16). The Asperger's disorder quotient is calculated from the sum of the scaled scores of the four different subscales of the GADS. It has a mean of 100 with a standard deviation of 15 (Gilliam 2001:23). A score of greater than 80 on the Asperger's disorder quotient is described as a high probability of having AS. Table 6.6 gives the scores obtained of the cases described in this according to percentile rank.

Analysis of the cases concludes that all cases have a Asperger's disorder quotient of above 80. There were no other patterns of dominant areas of strengths of difficulty, with only two of the cases (C.I. and L.K.) having significantly high difficulties with pragmatic skills (the ability to understand and use; language in a social context). All four cases had different subscales that were their lowest score. This concludes no typical pattern of behaviours from any of the cases. If one however examines particular responses from the parent, (refer Table 6.7), the following behavioural characteristics were evident as "frequently observed" in all of the cases: needs an excessive amount of reassurance if things are changed or go wrong; requires specific instructions to begin a task; becomes frustrated quickly when unsure of what is required. These behavioural characteristics confirm difficulties with self confidence and a high degree of underlying fear and anxiety for the unknown. Other "frequently observed" behaviours which were evident across three cases included: difficulty with understanding what causes people to dislike him; fails to predict possible consequences in social events and when confused does not ask for clarification but switches to a familiar topic.

Table 6.6 Summary of GADS subscale scores across the four cases

	Social interaction (% ile rank)	Restricted patterns (% ile rank)	Cognitive patterns (% ile rank)	Pragmatic skills (% ile rank)	Asperger's disorder quotient
Case C.I.	84	50	63	84	112
Case S.P.	37	63	75	63	105
Case L.K.	50	75	63	91	112
Case M.D.	63	37	25	16	92

Table 6.7 Summary of behaviour assessed by parents on the GADS as being “frequently observed” presented across cases

Behavioural symptom	Case C.I.	Case S.P.	Case L.K.	Case M.D.
Has difficulty cooperating in a group	x		x	x
Is inattentive to social/environmental stimuli				
Has difficulty playing with other children	x			x
Seems unaware of social conventions or codes of conduct			x	
Needs an excessive amount of reassurance if things are changed or go wrong	x	x	x	x
Lacks subtlety in expression of emotion	x	x		
Requires specific instructions to begin tasks	x	x	x	x
Fails to predict probable consequences in social events				
Expresses feelings of frustration and anger inappropriately	x	x		
Becomes frustrated quickly when unsure of what is required	x	x	x	x
Has preoccupation with specific subjects or objects that is abnormal in intensity and focus		x	x	
Requires extensive directions from others		x		x
Talks about a single subject excessively		x		
Uses exceptionally precise or pedantic speech		x		
Displays superior knowledge or skill in specific subjects or activities	x		x	
Attaches very concrete meanings to words	x	x		
Shows excellent memory	x	x	x	x
Shows an intense, obsessive interest in certain intellectual subjects		x	x	
Has difficulty understanding slang expressions		x	x	
Has difficulty identifying when someone is teasing	x		x	
Has difficulty understanding jokes or humour			x	
Has difficulty understanding when he is being ridicules, put down or made fun of	x		x	
Has difficulty understanding what causes people to dislike him	x	x	x	
Fails to predict probable consequences in social events	x		x	x
When confused, doesn't ask for clarification but switches to a familiar topic	x	x	x	
Displays clumsy and uncoordinated gross motor movements			x	

No previous research has been published using the GADS as a diagnostic tool for AS. The literature study conducted made reference to both the Autistic diagnostic interview (ADI) and the Autism diagnostic observation schedule (ADOS) both of which are not specific to AS. The results from the above case studies reflect different “profiles” of each learner with respect to the four subscales on the GADS, although all met the diagnosis of AS as given by the Asperger’s disorder quotient. This questionnaire is useful if combined with the Conners’ questionnaire, when results of social problems and anxiety are high. The GADS will assist in rating behavioural symptoms which are indicative of an AS diagnosis. Future research

needs to be done in collating a questionnaire which combines the social problems, the psychosomatic symptoms, perfectionism and anxiety with pragmatics of language and ritualistic and obsessive type behaviours. There are many ‘outward similarities’ between children diagnosed with ADHD and AS but the child’s “inner processing” is different, and if mismanaged will result in unnecessary anxiety and frustrated behaviours.

## **6.9 CROSS CASE ANALYSIS: Dunn’s sensory profile**

Previous research in the field of AS has noted sensory difficulties amongst children with AS (Church *et al* 2000:12; Attwood 2006:273). The Sensory profile of Dunn (1999;2) is used extensively amongst occupational therapists and researchers as a tool for linking performance strengths and barriers with the child’s sensory processing patterns. It consists of 125 items which are grouped into three categories: sensory processing, modulation and behaviour and response (refer Appendix 4). From a sensory integrative perspective, learning occurs when a child receives accurate sensory information, processes it and uses it to organize behaviour.

Dunn (1999:11) describes modulation from a neuroscience perspective as the ability of the central nervous system to monitor and regulate information for the generation of appropriate responses. Modulation regulates habituation (when the central nervous system recognises stimuli and decreases transmission among the cells) and sensitisation (when CNS perceives sensations which are harmful and unfamiliar and generates a heightened response).

Table 6.8 gives the results of the cross case analysis of responses to the caregiver questionnaire which was completed in each case by the parents. The results do not show any behavioural characteristics common to all four cases, but there are characteristics which were common in three cases: is sensitive to criticism, displays excessive emotional outbursts when unsuccessful at a task, difficulty tolerating changes in plans and expectations, difficulty tolerating changes in routines. These results conclude that the AS cases in this study do not present with sensory issues regarding sensory processing including auditory, visual, vestibular, touch and oral,

but rather emotional and social responses that indicate difficulties in psychosocial coping strategies when changes occur in their environments.

Table 6.8 Analysis of Dunn’s sensory profile across cases

Behavioural symptom scoring a “always – 100% of the time” response	Case C.I.	Case S.P	Case L.K.	Case M.D.
Rocks unconsciously	x			
Has trouble completing tasks when the radio is on		x		x
Is distracted or has trouble functioning if there is a lot of noise around		x		x
Can’t work with background noise				x
Becomes frustrated when trying to find objects in competing backgrounds		x		
Has difficulty standing in line or close to other people	x			
Prefers long-sleeved clothing when it is warm or short sleeves when it is cold			x	
Becomes irritated by shoes or socks			x	
Hangs on people, furniture or objects even in familiar situations	x			
Becomes overly excitable during movement activity	x	x		
Shows strong preference for certain smells		x		
Shows strong preference for certain tastes		x		
Craves certain foods		x		
Rigid rituals in personal hygiene	x			
is overly affectionate with others	x			
Doesn’t perceive body language or facial expressions	x		x	
Is sensitive to criticisms	x	x	x	
Prefers quiet, sedentary play		x		
Seeks sedentary play options		x		
Prefers sedentary activities		x		
Has definite fears	x	x		
Seems anxious	x	x		
Displays excessive emotional outbursts when unsuccessful at a task	x	x	x	
Poor frustration tolerance			x	
Cries easily			x	
Needs more protection from life than other children		x		
Has difficulty making friends	x	x		
Doesn’t notice when people come into a room		x		
Looks away from tasks to notice all actions in the room			x	
Seems oblivious within an active environment			x	
Walks on toes			x	
Leaves clothing twisted on body			x	
Has fears that interfere with daily routine		x		
Has trouble staying between the lines when coloring or when writing			x	
Has difficulty tolerating changes in plans and expectations,	x	x	x	
Has difficulty tolerating changes in routines	x	x	x	
Uses inefficient ways of doing things		x	x	
Has difficulties changing in routines	x			

The raw scores obtained from the caregiver questionnaire are further analysed by plotting the scores obtained on a scaled continuum. In Table 6.9 all four cases were significantly affected by modulation of sensory processing related to endurance – the inability of the learner’s to sustain performance, as well as modulation of sensory input affecting emotional responses – the learner’s inability to use body senses to

generate emotional responses. Behavioural and emotional responses were also common across all four cases, indicating the learner’s difficulty with psychosocial strategies as well as difficulty in tolerating changes in plans and expectations.

Table 6.9 Analysis of Dunn’s sensory profile with respect to categories

Categories scoring a “definite difference” (scoring two standard deviations below the mean for children without disabilities)	Case C.I.	Case S.P	Case L.K.	Case M.D.
Sensory processing: auditory processing	x		x	x
Sensory processing: vestibular processing	x			x
Sensory processing: touch processing	x		x	
Sensory processing: oral sensory processing		x		x
Sensory processing: multisensory processing			x	
Sensory processing: visual processing				x
Modulation: sensory processing related to endurance/tone	x	x	x	x
Modulation: modulation of sensory input affecting emotional responses	x	x	x	x
Modulation: modulation of visual input affecting emotional responses and activity level	x		x	x
Modulation: modulation of movement affecting activity level		x		
Behaviour and emotional responses: emotional/social responses	x	x	x	x
Behaviour and emotional responses: behavioural outcomes of sensory processing	x	x	x	x
Behaviour and emotional responses: items indicating thresholds for response			x	

## 6.10 CROSS CASE ANALYSIS: Intellectual profile

A number of researchers have conducted studies with respect to intellectual functioning in individuals with AS. None of this research has been conducted in South Africa, and the Weschler intelligence scale for children (WISC) has been used in previous research which was conducted in other parts of the world. In South Africa, the Senior South African Individual Scale – Revised (SSAIS-R) is commonly used as a test battery to determine intelligence quotient (IQ), and for this reason it was chosen as the IQ test for this thesis. The two test batteries are similar in their subtests which make up the test battery, and the concept of verbal IQ (VIQ) and nonverbal or performance IQ (NVIQ or PIQ) is equivalent in both tests. Results from previous research done using the WISC can thus be compared with the results of this thesis. Previous research has shown that mean IQ scores of AS individuals showed VIQ greater than PIQ. (Refer Table 3.2 in Chapter 3). There was only one study where the VIQ score was lower than the PIQ. The discrepancy between VIQ and PIQ was not always significant.

In the case studies presented in this thesis, one case presented with VIQ = NVIQ, and the other three cases presented with VIQ less than NVIQ. Two of the cases presented with very significant differences between VIQ and NVIQ (refer Table 6.10). These results therefore contradict previous findings as discussed in the literature study. Gillberg (1995:315) notes that the comprehension subscore on the WISC-R is often poor with vocabulary being excellent. Results from the cross case analysis (Table 6.10) confirm lowest scores of comprehension in three of the four cases. In this case study, high scores however were obtained by three of the four cases in form board (and not vocabulary as in Gillberg's study). Vocabulary results are noted to be good; and coding results noted to be poor in studies by Gillberg (1995), Ozonoff *et al* (2000) and Ghaziuddin *et al* (2004). None of the cases in this thesis had high vocabulary scores, and coding was only a weak score in one of the cases. The results of this case study with respect to IQ profiles are not consistent with previous findings on the WISC.

Table 6.10 Summary of SSAIS-R subtest scores indicating areas of strength and weakness across cases

	Case C.I.		Case S.P.		Case L.K.		Case M.D.	
VIQ	97		104		86		77	
NVIQ	97		115		134		114	
GIQ	97		110		109		95	
VIQ<NVIQ			by 11 points		by 48 points		by 37 points	
	Highest scores	Lowest scores	Highest scores	Lowest scores	Highest scores	Lowest scores	Highest scores	Lowest scores
Subtest	Form board (16)	Story memory (3)	Form board (16)	Coding (8) Memory for digits (8)	Block design (19) Pattern completion (19)	Similarities (4)	Block design (14) Pattern completion (14)	Story memory (3) Comprehension (3)
	Similarities (14)	Missing parts (4)	Block designs (12) Pattern completion (12) Story memory (12)	Missing parts (9) Comprehension (9)	Vocabulary (15)	Comprehension (5)	Form board (13)	Vocabulary (6)

Conclusions from the case analysis with respect to strengths and weaknesses in the cognitive profile do not give any consistent pattern of strengths and weaknesses. Each child is presenting with an individual intellectual profile. It is noted that each case presented with a different “dominant way of thinking” and personality which may have affected the scores obtained. C.I. for example answered the neuropsychological test battery “obsessed by visual patterns and order”. M.D. manipulated the testing battery according to his perceived ability to do the task or not. L.K.’s thinking was dominated by visual processing. S.P.’s thinking was dominated by anxiety and fear of failure to perform.

The findings from the presenting case studies are not consistent with previous research done with respect to mean VIQ scores being greater than mean PIQ. The only area of consistency with previous research was with the comprehension subtests scores which were low across three of the current cases, and a noted pattern from previous research. The cross case analysis in this thesis also does not conclude any specific patterns of strength and weakness. Two conclusions can be drawn from this: The first is that IQ profiles cannot be used as discriminatory marker for a diagnosis of AS. The second conclusion is that the SSAIS-R differs from the WISC and it cannot be assumed that the two tests are alike, and thus can be compared. In order to investigate this further, the WISC tests should be used as an IQ test, in which case it can be compared with previous research. It has been shown in the above cases, that scores were being influenced by different “dominant thought patterns” amongst cases and the IQ test battery should thus be used qualitatively and as part of an extensive test battery for the purpose of a greater understanding of the learner’s functioning.

### **6.11 CROSS CASE ANALYSIS: Motor functions**

Motor functions were tested in the presenting cases with the use of two tests. The first test battery used was the Movement ABC-2. This test battery has been used in previous research (refer Table 3.3 in Chapter 3). The results of previous research conducted concluded that the AS group tested had a high incidence of motor delay and motor impairment. The second test battery used was the Beery-Buktenica test



for visual motor integration (VMI), visual perception and motor coordination. The literature study found one research project which used the Beery VMI as part of a test battery in an attempt to differentiate autism from AS. No conclusive findings were made (Szatmari *et al* 1995:1662). Conclusions from the results of the finding of the presenting cases in this thesis are given below.

### **6.11.1 Movement ABC-2 results**

The Movement ABC-2 is a test battery designed with a view to assess the overall motor functioning of the child. It includes items grouped under three headings: manual dexterity, aiming and catching and balance (Hendersen *et al* 2007:114-116). In the manual dexterity tests three aspects of function were tested. These included speed and sureness of movement of each hand, the coordination of the two hands for the performance of a single operation and hand-eye coordination. In the aiming and catching tests, the two components tested are accuracy of receiving a moving object projected either by the assessor or the child and the accuracy of aiming at a target. The third group of tests administered are for balance and the three aspects of balance that are distinguished are static balance, dynamic balance involving slow accurate movement and dynamic balance involving fast, explosive movement such as hopping and jumping.

The norms of the Movement ABC-2 test were calculated from a sample of children without any disabilities. The raw score obtained from the test battery is converted to standard score. The standard score has a range from 1-20 with a mean of 10 and a standard deviation of 3 (Hendersen *et al* 2007:131).

The results of the Movement ABC-2 scores across cases as given in Table 6.11 do not conclude consistent findings. Areas of delay (below a score of 7) were found in three cases, but each of the areas of delay were in different tested areas. Thus no pattern of strength or weakness could be found in the presented cases.

Table 6.11 Movement ABC-2 scores (given in standard scores) across cases

Case	Hand dominance	Manual dexterity	Aiming and catching	Balance
C.I.	Right	11	5	9
S.P.	Right	6	12	6
L.K.	Right	7	7	10
M.D.	Right	9	11	17

Qualitative observations of the aiming and catching subtest are significant in that all four cases did not have difficulties with the test – despite the quantitative results above not showing this. (C.I.’s low score reflected a lack of “practice” in this area – towards the end of the test his performance was better, and L.K. was more focused on “working out” an alternative method of getting the bean bag onto the target thus negatively affecting his results). It is noted that none of the cases presented as clumsy or uncoordinated. None of the parents or teachers had commented on gross motor functions as being an area of concern for them.

### 6.11.2 Beery-Buktenica developmental test results

The Beery-Buktenica developmental test for visual motor integration consists of three subtests, the visual motor integration test (VMI), the visual perception tests and the test for motor coordination. Raw scores obtained from the tests are converted to standard scores. In the case of the Beery-Buktenica test, the standard score mean is 100, with a standard deviation of 15 (Beery & Beery 2006:89). All of the cases presented with no delays in any of the subtests of this test battery. Table 6.12 summarises the results across the cases presented in this thesis.

Table 6.12 Beery-Buktenica developmental profile across cases

Case	Beery VMI	Visual perception	Motor coordination
C.I.	105	98	94
S.P.	92	110	92
L.K.	121	114	97
M.D.	101	99	90

Qualitative observations in the VMI subtest are significant in that two of the cases, C.I. and L.K., fixated on the instruction given at the beginning of the test – “to copy

what you see at the top of the page “literally. Both spent time trying to “colour” the lines they had drawn to be “exactly” the same thickness as the presenting drawing. In the motor coordination subtest – the initial instruction was given to “draw a line between the dots” and halfway through the test the dots are removed as the designs are getting smaller. S.P., L.K.. and C.I. struggled with this, not being able to carry on after the “dot” stimulus was removed as they had taken the instruction literally – showing no flexibility of thought to complete the exercise, all three got “stuck” when the stimulus changed within the presenting test.

These results show that both the Movement ABC-2 and the Beery-Buktenica used for testing motor functions indicated no consistent significant delays in any of the cases studied. These results are conflicting with previous research as described in Chapter 3 (Table 3.3). The qualitative observations do however conclude a “literal and inflexible way of thinking.

## **6.12 CROSS CASE ANALYSIS: Academic achievement**

Academic achievement in learners with AS has been previously researched with no conclusive descriptions of academic achievement for a child with AS (Hagiwara 2001:98). Griswold *et al* (2002:94) concluded in their study that children with AS had low scores in numerical operations, listening comprehension and written expression. A wide range of scores however was obtained and therefore no conclusive results could be obtained with respect to a typical profile of a child with AS. In this thesis (refer Table 6.13), low achievement scores were noted across three cases with story recall, understanding directions, passage comprehension and writing fluency. These results confirm the trend noted in previous research, except for the low scores in numerical operations. Calculation and maths fluency were noted to be areas of strength in two of the present cases. Letter / word identification was noted as an area of strength in two of the cases. These results confirm results from previous research in that a wide range of scores between cases was obtained, but the fact that similar trends in low story recall, passage comprehension and writing fluency are found is potentially significant for further research. It is further noted that previous research with respect to the similarities between children with AS and those with a

non verbal learning disability (Rourke 1995) is potentially significant and warrants further investigation. Two of the cases presented in this study have been noted to have a similar profile to a NLD (refer case C.I., and S.P).

Table 6.13 Summary of academic achievement (WJIII) scores indicating areas of strength and weakness across cases

Case C.I.		Case S.P.		Case L.K.		Case M.D.	
Highest achievement	Lowest achievement	Highest achievement	Lowest achievement	Highest achievement	Lowest achievement	Highest achievement	Lowest achievement
Letter / word identification	Story recall (& delayed story recall)	Story recall (& delayed recall)	Written samples	Calculation	Written samples	Maths fluency	Story recall
Writing fluency	Understanding directions	Calculation	Passage comprehension	Maths fluency	Story recall	Writing fluency	Understanding directions
Applied problems	Reading fluency	Letter-word identification	Writing fluency	Spelling	Writing fluency	Reading fluency	Passage comprehension

### **6.13 CROSS CASE ANALYSIS: Theory of mind**

The two theory of mind (ToM) tasks that were used in this test, the "Sally and Anne" test and the "Smartie box" test (refer Appendix 9 and 10) were included in this test because of the potential significance of the results. Previous comparative research has been done between groups of AS and autistic children in attempts to differentiate between AS and autism. Frith (1989:157) has described and used the concept of ToM to explain deficits in social skills amongst autistic people. An autistic child is described (in terms of ToM dysfunction) to be unable to think, feel and view the world from another's perspective. This view is a widely held fundamental theory of the autistic child's way of thinking (Peeters 1997: 83) and is seen as a "marker" for autism.

Table 3.5 in Chapter 3 details studies that have been done with respect to ToM tests. These studies conclude that autistic children do not pass ToM tests, whilst AS children perform significantly better on these tasks.

The cross case analysis of ToM tasks conclude that all the cases in this research did not have any difficulty with ToM tasks. This confirms previous research in the area and is potentially significant as a "fundamental difference" between autism and AS.

### **6.14 CROSS CASE ANALYSIS: Executive functions**

Executive functions include the ability to plan, have purposive action and effective performance and are important in responding to novel situations on the basis of cognitive, emotional and social skills (Lezak *et al* 2004:611). Executive functioning is described to require organisational strategies in response to internal and external cues and is executed in the frontal lobes (Kolb & Whishaw 2003:395, Rourke *et al* 2002:282).

The WCST-64 is used as an assessment tool for executive functioning and is particularly sensitive to perseverative thinking and abstract reasoning. The results of the cases presented in this thesis are given in Table 6.14. The results reflect varied

responses between cases. One case was particularly good at this test, whilst another was weak across all areas. The other two cases had results which ranged between average and mild impairment. The classifications given in the table are associated with the following percentile rank range:

Average – 30 to 67 percentile rank range

Mild impairment – 6 to 15 percentile rank range

Above average – greater than 68 percentile rank

Table 6.14 Across case summary of executive functioning using the WCST-64

	C.I.	S.P.	L.K.	M.D.
Perseverative responses	average	Mild impairment	Mild impairment	Above average
Persevertaive errors	average	Mild impairment	Mild impairment	Above average
Non perserverative errors	Mild impairment	average	Mild impairment	Above average
Conceptual level responses	average	Mild impairment	Mild impairment	Above average

These results conclude no pattern across the cases. This is in contradiction to Gillberg (1995:96) who refers to the WCST-64 as a useful tool to assess AS, as children with AS show severe impairments in the WCST-64. Qualitative observations from this test however are significant. Two of the cases, C.I. and L.K. initially did very well on this test. Both had no problems perceiving that “something was changing after every 10”, but both C.I. and L.K. got “stuck” in a perseverative thought pattern – which negatively affected the results as shown in Table 6.14.

Table 6.15 summarises the essential findings of the cross case analysis. Following this summary, the final chapter, Chapter 7 will be presented. This chapter will conclude relevant findings, relate these to the existing theory of AS and detail future research required in the field.

Table 6.15: Summary of findings of the cross case analysis

Area	Previous research	Case study findings	Comments
History	<p>Church <i>et al</i> (2000:12) found in a study of forty children between three and fifteen years, with a diagnosis of AS, that 92% of the children in elementary school had received a different diagnosis before their AS diagnosis. Of these diagnoses, the most common one was ADHD, followed by autism, and other social problems.</p>	<ul style="list-style-type: none"> <li>• All 4 cases 1<sup>st</sup> born children – all male</li> <li>• All 4 cases – families intact</li> <li>• All 4 cases history of difficulties within the family, either socially, emotionally or academically</li> <li>• 2 cases had severe convulsions due to bacterial meningitis and encephalitis (both cases associated with convulsions and hospitalisation)</li> <li>• 2 cases has traumatic birth, both asphyxiated at birth (both placed in ICU)</li> <li>• All 4 cases referred for 1<sup>st</sup> assessment when at pre-school</li> <li>• All 4 had 1<sup>st</sup> assessment by an occupational therapist</li> <li>• 3 of the 4 cases had a 1<sup>st</sup> diagnosis of ADHD</li> <li>• Additional diagnosis of dysthymia, Tourette’s syndrome, depression and bipolar disorder</li> <li>• All 4 cases did not participate in any sport at school</li> <li>• 3 of the cases were noted as getting “stuck on detail”, hated change, and when routines were broken, a negative, ripple effect was noted throughout the day</li> <li>• Parents of all 4 cases were mainly concerned with presenting anxiety in their children and their ability to manage socially.</li> </ul>	<p>Since all 4 cases are male, and all 4 cases have “trends in the family” of similar presenting social, emotional and learning problems, it would appear that there is a genetic link to the condition of AS.</p> <p>It is concluded that young children with presenting ADHD symptoms with additional social and anxious type behaviour should be assessed for AS. The diagnosis of AS is often missed, and the child is thus not treated and managed effectively.</p> <p>It was noted by all the parents of the 4 cases that they did not participate in sport at school, not because they had motor difficulties, but because they did not understand the rules of the game. Two cases, M.D. and C.I. were noted to “hate losing” and therefore did not play team sports.</p>



Area	Previous research	Case study findings	Comments
Conners' parent and teacher rating questionnaire	None	<p>Teacher's questionnaire rated the following as significant symptoms across cases:</p> <ul style="list-style-type: none"> <li>• has poor social skills</li> <li>• is one of the last to be picked for teams</li> <li>• does not know how to make friends</li> <li>• seems over focused on details.</li> </ul> <p>Parents 's questionnaire rate the following as significant symptoms across cases</p> <ul style="list-style-type: none"> <li>• avoids, expresses reluctance about, has difficulties engaging in tasks requiring sustained mental effort</li> <li>• needs close supervision to get through assignments</li> <li>• afraid of new situations.</li> </ul> <p>Subscales of social problems were rated as highest for all 4 teachers and 3 parents. Perfectionism was rated as highly problematic by 3 teachers and 1 parent, whilst anxiety and psychosomatic were rated as high by 2 parents respectively. The lowest rating was in oppositional and inattentive behaviour, reflecting no concern in these areas</p>	<p>These findings are significant, in that 3 of the 4 cases had a first diagnosis of ADHD, yet the ADHD symptoms are not significant on the Conners' questionnaire. The most problematic symptoms however were with social problems, perfectionism anxiety and psychosomatic. Oppositional behaviour was rated as the least problematic subscale, along with (to a lesser degree) inattentiveness.</p> <p>A child with AS could at times be described as "inattentive" but this is due to a "hyperfocus" on detail, into which the child gets absorbed, resulting in him "switching off" to other stimuli. This is particularly noticeable with verbal tasks. The AS child has a tendency to interpret language literally. This reflects in difficulties with starting tasks that are unfamiliar, which may show in the classroom as daydreaming and inattentiveness. In the case of the AS mind, this "inattentiveness" is due to a difficulty with pragmatics and a fear of the unknown.</p> <p>It is concluded that all children with a diagnosis of ADHD, presenting with anxiety and social skills difficulties should be assessed for AS.</p>

Area	Previous research	Case study findings	Comments
GADS	None	Behavioural characteristics evident as “frequently observed” by parents of all 4 cases include: <ul style="list-style-type: none"> <li>• needs an excessive amount of reassurance if things are changed or go wrong</li> <li>• requires specific instructions to begin a task;</li> <li>• becomes frustrated quickly when unsure of what is required.</li> <li>• difficulty with understanding what causes people to dislike him</li> <li>• fails to predict possible consequences in social events</li> <li>• when confused does not ask for clarification but switches to a familiar topic.</li> </ul>	<p>These behavioural characteristics confirm difficulties with self confidence and a high degree of underlying fear and anxiety for the unknown.</p> <p>These behavioural characteristics correlate with the symptoms described and seen on the Conners’ questionnaire and the history questionnaire completed by the parents.</p>
Dunn’s sensory profile	<p>Dunn <i>et al</i> (2002) identified AS children as “significantly different” to the normal population across all sensory responses except for visual input affecting emotional responses.</p> <p>Myles <i>et al</i> (2004) compared AS children with autistic children and found distinctive difference between the two in that AS children scored higher in emotional/social responsiveness and were emotionally reactive.</p>	<p>There were no characteristics common to all 4 cases, but common in 3 cases were the following:</p> <ul style="list-style-type: none"> <li>• sensitive to criticism</li> <li>• displays excessive emotional outbursts when unsuccessful at a task</li> <li>• difficulty tolerating changes in plans and expectations</li> <li>• difficulty tolerating changes in routines</li> </ul> <p>All four cases were significantly affected by</p> <ul style="list-style-type: none"> <li>• modulation of sensory processing related to endurance</li> <li>• modulation of sensory input affecting emotional responses</li> </ul>	<p>AS cases in this study did not present with sensory issues regarding sensory processing including auditory, visual, vestibular, touch and oral, but rather emotional and social responses that indicate difficulties in psychosocial coping strategies when changes occur in their environments.</p> <p>These results confirm studies of Myles <i>et al</i> (2004) in that the AS cases in this study also scored high in emotional and social responses. These results however do not conclude difficulties with sensory processing as concluded by the study of Dunn <i>et al</i> (2002).</p>

Area	Previous research	Case study findings	Comments
Intelligence (IQ)	<p>Differences in mean verbal IQ (VIQ) and mean performance or non verbal IQ (PIQ) were found to be VIQ &gt; PIQ as tested on the WISC in samples of AS children (Klin <i>et al</i> 1995, Ghaziuddin <i>et al</i> 1998; Ozonoff <i>et al</i> 2000, Miller &amp; Ozonoff 2000, Gilchrist 2001, Green <i>et al</i> 2002, Kalnad <i>et al</i> 2002, Gunter <i>et al</i> 2002, Ghaziuddin <i>et al</i> 2004). These differences however were not always significant.</p> <p>Griswold <i>et al</i> (2002) found VIQ &lt; PIQ</p> <p>Gillberg (1995) noted subtest performances that were poor included comprehension, arithmetic, picture arrangement, object assembly and coding. Poor results in coding were also noted by Ozonoff <i>et al</i> (2000) and Ghaziuddin <i>et al</i> (2004). Good results in vocabulary were noted by Gillberg (1995), Ozonoff <i>et al</i> (2000) and Ghaziuddin <i>et al</i> (2004). Other areas of good results noted by these researchers include information and similarities.</p>	<p>This study used the SSAIS-R as a measure of intellectual potential.</p> <p>Of the four cases in this study:</p> <ul style="list-style-type: none"> <li>• 1 case presented with VIQ = PIQ,</li> <li>• 3 cases presented with VIQ &lt; PIQ. Two of the cases presented with very significant differences between VIQ and PIQ</li> </ul> <p>Subtest scores resulted in the following conclusions:</p> <ul style="list-style-type: none"> <li>• 3 of the 4 cases scored lowest in comprehension</li> <li>• 3 of the 4 cases scored highest in form board</li> <li>• Coding was only weak in 1 case</li> </ul>	<p>The results of this case study with respect to IQ profiles are not consistent with previous findings on the WISC.</p> <p>This can be due to the following reasons:</p> <ol style="list-style-type: none"> <li>1) The WISC and the SSAIS-R are too dissimilar to draw comparisons between the two.</li> <li>2) An IQ tests battery does not give a “typical” set of responses unique to an AS learner and therefore is not an instrument that can be used as a marker for AS.</li> </ol>

Area	Previous research	Case study findings	Comments
Motor functions	<p>Gross motor functions were assessed using the Movement ABC-2 by researchers Miyahara <i>et al</i> (1997) and Green <i>et al</i> (2002) with concluding results that motor impairment was universal amongst AS individuals.</p> <p>No previous research results using the Beery-Buktenica test for fine motor and visual motor integration with AS learners has been published</p>	<p>The Movement ABC-2 scores across cases did not conclude consistent findings. Areas of delay were found in 3 cases, but each of the areas of delay was in different tested areas. Thus no pattern of strength or weakness could be found in the presented cases.</p> <p>The Beery-Buktenica test concluded no area of delays in visual motor integration, visual perception or motor coordination in the 4 cases studied.</p>	<p>These results were not consistent with previous findings of universal impairment of motor functions amongst AS children. It is noted that none of the cases in this study presented as clumsy or uncoordinated. Furthermore, none of the parents or teachers had commented on gross motor functions as being an area of concern for them.</p> <p>There were no areas of difficulty in the Beery-Buktenica test in all 4 of the cases. This may be potentially significant, and should be researched further. It is noted that all of the cases had attended occupational therapy at pre-school, and this may be contributing to these positive scores. At the same time however, it is noted that 2 of the 4 cases presented with very weak handwriting in their school books and 1 case presented with very low coding scores on the SSAIS-R. The positive tests from the Beery-Buktenica could thus be significant in that there is no “neurological” deficit in motor functions, but the combination of demands in the classroom environment may lead to stresses which “come across” as weak fine motor skills.</p>

Area	Previous research	Case study findings	Comments
Academic achievement	<p>Hagiwara (2001-2002) concluded no conclusive description of academic functioning that characterised a child with AS. Wechsler Individualised achievement tests (WIAT) and tests of language development (TOLD) were used.</p> <p>Griswold <i>et al</i> (2002) confirmed inconclusive patterns of academic functioning amongst AS children, although lowest scores were noted in numerical operations, listening comprehension and written expression.</p>	<p>In this thesis the WJIII tests of academic achievement were used and a wide range of results were obtained. The following results are however noted as potentially significant.</p> <ul style="list-style-type: none"> <li>• Low scores across 3 of the 4 cases in story recall, understanding directions, passage comprehension and writing fluency.</li> <li>• Calculation and maths fluency were noted to be areas of strength in 2 of the present cases.</li> <li>• Letter / word identification was noted as area of strength in 2 of the cases.</li> </ul>	<p>These results confirm previous research where a wide range of scores between cases were obtained, but the fact that similar trends in low story recall, passage comprehension and writing fluency were found are potentially significant for further research.</p> <p>The results from the 4 cases studied do not reflect any characteristic pattern of ‘typical’ academic functioning of the AS learner. This confirms the results obtained in the IQ testing, and points to the possibility that the AS learner does not have a typical neuropsychological profile. The cases reflect different ‘obsessive /anxious thought patterns’ as well as different personalities that characterise each individual, affecting intellectual and academic scores.</p> <p>Each AS learner needs to be treated as an ‘individual’ with the results of his neuropsychological test battery used for a unique intervention and educational plan. Previous research on the similarities between children with AS and those with a non verbal learning disability (Rourke 1995) is significant and warrants further investigation</p>

Area	Previous research	Case study findings	Comments
Theory of mind (ToM)	<p>Previous research conducted using the “Sally and Anne” and the “Smartie Box” test have been used in many comparative studies involving AS and autistic children.</p> <p>Previous research confirms that autistic individuals lack a ToM (Frith 1989, Perner <i>et al</i> 1989). Research that conclude that AS individuals pass on ToM tests include (Ozonoff <i>et al</i> 1991, Kaland <i>et al</i> 2002)</p>	All of the 4 cases passed the ToM tests with no hesitation.	These results confirm previous results which appear conclusive that AS individuals do not have difficulties with ToM. It has been noted by Dahlgren <i>et al</i> (2003) that deficits in ToM may not be primary in AS and this ability in AS children could be one of the main differences between autism and AS.
Executive functioning	Gillberg (1995) concluded that AS children had severe deficits in executive functions as tested on the WCST-64. Lezak <i>et al</i> (2004:635) conclude that frontal lobe damage is implicated with a low performance on executive functioning.	<p>The results from this study conclude the following:</p> <ul style="list-style-type: none"> <li>• 1 case had very good performance across all domains tested</li> <li>• 1 case had mild impairment across all domains tested</li> <li>• 2 cases had varied results, but it was noted from qualitative observations that both cases initially perceived the changes occurring in the test, but got “stuck” in a preservative thought pattern which reflected in low scores, both cases initially displayed good executive functioning.</li> </ul> <p>Quantitative conclusions from this case study do not reflect characteristic performance involving executive functioning.</p>	The results of this case study contradict that as stated by previous research. Qualitative results imply good executive functioning ability as tested on the WCST-64.

## **CHAPTER 7**

### **CONCLUSIONS**

#### **7.1 INTRODUCTION**

This thesis aimed at investigating the neuropsychological profiles of learners with AS. I reasoned that if one could clarify the characteristics or strengths and weaknesses of the neuropsychological profile of an AS learner, a greater understanding of the way the AS learner thinks would result in the development of a psycho-educational intervention plan which would positively affect the learner, his teachers and his parents. An aim of this thesis was thus to clarify the diagnosis and detail the neuropsychological profile of the learner with AS.

The neuropsychological assessment required an extensive study of the learner. This included a thorough investigation of the history of the learner including birth and medical history, early childhood development and parental interviews. The learner then completed a test battery, the results of which were analysed. In order to formulate a test battery which would test specific characteristics of the AS learner, an extensive literature study was conducted to collate an appropriate and meaningful test battery.

This research was conducted as a qualitative study, using four case studies whose neuropsychological profiles were analysed independently and then as a cross – case analysis to ascertain common patterns of strengths and weaknesses in learners with a diagnosis of AS. The findings, limitations, contributions, recommendations and implications of this study are discussed in conclusion to this thesis.

#### **7.2 FINDINGS FROM THE LITERATURE**

The term AS was first used by Wing (1981:115). Wing described Hans Asperger's work with children and compared it to that of Leo Kanner's work with autistic children. After Wing's paper was published in 1981, many researchers and professionals

coined the term AS, and used it to describe a variety of conditions similar to “high functioning autism” and other pervasive developmental disorders. The DSM-IV included AS as a fifth category of pervasive developmental disorders in its 1994 publication. This inclusion sparked much debate about the diagnostic criteria for AS. Many researchers and professionals use different criteria to diagnose AS, which influences the results of research conducted. The DSM-IV-TR specifically quotes no significant delay in language as a criterion for AS (APA 2000:80). Attwood (2006:37) quotes the diagnostic criteria of AS as having speech and language peculiarities such as delayed speech development. If one uses these criteria, a different group of children with language delays are included into research groups. Many researchers are quoting a “spectrum of autistic disorders” and are moving away from specific differences between diagnostic categories. One of the significant influences of this is in research quoted for prevalence rates. Only one study done by Chakrabati and Fombonne (2001:3093) quoted prevalence rate of 1:160 for pervasive developmental disorders. Of this quoted statistic, autistic disorders accounted for only 27% of the cases and 71,7 % of the cases made up the category of pervasive developmental disorders not otherwise specified. There was no literature quoted on research of prevalence rates for AS specifically.

Another problem with respect to diagnosis is the fact that many symptoms of AS overlap with other disorders, resulting in learners with AS receiving more than one diagnosis. Research conducted by Church *et al* (2002:12-20) concluded that in a group of learners 5-11 years of age, 92% were given another diagnosis before the AS diagnosis (20% with ADHD and 15% with autism). Ghaziuddin *et al* (1998:279) concluded 50% of AS children had a diagnosis of ADHD. The Conners’ parent and teacher rating scales were completed in this thesis to further investigate any specific defining criteria relating to ADHD and AS.

A theory which has been well researched within the field of autism is that of theory of mind (ToM) and it is has been concluded that individuals with autism have difficulty with ToM tasks (Frith 1989:160-164, Perner *et al* 1989:698). Research involving children with AS however concluded opposite results, in that AS children performed well in ToM tasks (Ozonoff *et al* 1991:111; Kaland *et al* 2002:519). ToM tasks were



included in this test battery to clarify these results as this was seen as a potentially significant discriminating ability of AS learners.

Similarities between AS and a non verbal ability (NLD) have been reported (Klin *et al* 1995:1127, Ellis & Gunter 1999:192 and Gunter *et al* 2002:263). Academic deficits noted in NLD are weak graphomotor ability, poor reading comprehension despite good word reading, weak mechanical arithmetic and weak mathematical reasoning, difficulty in academic subjects involving problem solving and complex concept formation. The WJIII tests of academic achievement were included in this test battery to further research academic strengths and weaknesses. Rourke (1995:6) noted that children with NLD were frequently perceived as hyperactive during childhood and had an inclination of anxiety, depression and internalised forms of social-emotional disturbance with a tendency towards social withdrawal in later years. These behavioural descriptions were similar to the findings of Church *et al* (2002:12-20) and are considered potentially significant.

The most extensive research in the field of AS has been in research involving intelligence test batteries to ascertain distinguishing patterns of cognitive strengths and weaknesses between AS and high functioning autism. All these studies used the Wechsler intelligence scale for children (WISC), and all the studies concluded verbal intelligence scales (VIQ) as higher than performance intelligence scales (PIQ) (Klin *et al* 1995, Ozonoff *et al* 2000, Miller & Ozonoff 2000, Gilchrist *et al* 2001, Ghaziuddin & Mountain-Kimchi 2004). This pattern of VIQ being higher than PIQ in AS individuals was considered as another potentially significant marker for AS. The SSAIS-R is an intelligence test battery used in South Africa and was chosen as part of the neuropsychological test battery to ascertain any cognitive patterns between cases.

Attwood (2006:272) notes that individuals with AS have sensory sensitivities, and considers unusual sensory perceptions as a confirmation of AS, yet sensory issues are not included in the DSM-IV as part of the diagnostic criteria for AS. Researchers Dunn *et al* (2002) and Myles *et al* (2004) have used Dunn's sensory profile in research involving AS and found that AS differed from the "normal" population in their

sensory processing. The Dunn sensory profile was used in this thesis to further examine the sensory profile of the learner with AS.

Another factor considered by Attwood (2006:17) as an important feature of AS is clumsiness and movement difficulties. Miyahara *et al* (1997) and Green *et al* (2002) used the Movement ABC-2 to study aspects of motor development in AS children. Their findings were similar in that the AS children demonstrated motor impairment. The Movement ABC-2 was used in this test battery to further assess this ability in AS learners. In addition to this test battery, the Beery-Buktenica test for visual motor integration, visual perception and motor coordination was used in this test battery. These results give further insight into visual motor integration abilities of AS learners.

A final aspect of neuropsychological functioning was found in the literature relating to learners with AS having poor executive functioning (Gillberg 1995, Jacobsen 2005). Gillberg (1995:96) noted that the Wisconsin card sorting test (WCST-64) is a useful test instrument used to test executive functions and therefore its use has potential in differentiating individuals with AS.

### **7.3 FINDINGS FROM THE RESEARCH**

The findings of the four cases were initially presented and analysed individually. The findings of these cases are summarised in Table 7.1.below.

Table 7.1 Findings of individual cases with respect to qualitative observations, individualised characteristics and intervention strategies

Case	Qualitative observations	Individualised characteristics	Intervention strategies
C.I.	<ul style="list-style-type: none"> <li>• Obsessive behaviours results in anxiety</li> <li>• Lacks understanding of social cues</li> <li>• Socially isolates himself</li> </ul>	<ul style="list-style-type: none"> <li>• Results from neuropsychological test battery conclude marked similarities with NLD</li> <li>• Weak concept formation resulting in difficulties with language processing and comprehension</li> <li>• Slow processing speed of verbal and non verbal stimulus</li> </ul>	<ul style="list-style-type: none"> <li>• Have own “space” in classroom environment</li> <li>• Focus on concept formation (extracting keywords, mind maps)</li> <li>• Keep language simple and instructions specific</li> <li>• Prepare C.I. for change within any routine</li> <li>• Understand and compensate for slow processing speed (allow extra time on exams)</li> <li>• Mediate C.I. when “obsessive behaviors” become restructuring to his functioning</li> </ul>
S.P.	<ul style="list-style-type: none"> <li>• Anxious behaviours resulting when his routine is changed</li> <li>• Adherence to rules</li> <li>• Plays alongside others, not interpreting social cues and therefore socially isolated</li> </ul>	<ul style="list-style-type: none"> <li>• Neuropsychological profile consistent with NLD in some respects: difficulties spatial organisation and perception, difficulty in understanding concepts, difficulties with nuances of language, difficulties math’s concepts</li> </ul>	<ul style="list-style-type: none"> <li>• Teach concept mapping to learn to deal with and manage new concepts</li> <li>• Provide a peer group mentor for difficult social situations such as outings or camps</li> <li>• Manage his “obsessive” talking: about a subject by limiting time on a topic</li> </ul>

Case	Qualitative observations	Individualised characteristics	Intervention strategies
L.K.	<ul style="list-style-type: none"> <li>• Anxiety buildup within classroom causing “involuntary cough”</li> <li>• Cries easily when overwhelmed</li> <li>• Does not play or voluntarily interact with other children</li> </ul>	<ul style="list-style-type: none"> <li>• Academic difficulties rooted in auditory and linguistic impairment</li> <li>• Advanced visual spatial skills</li> </ul>	<ul style="list-style-type: none"> <li>• Understand his literal interpretations of language and dominant visual abstract reasoning skills.</li> <li>• Teach reading and spelling from a “visual” memory perspective</li> <li>• Use visual techniques such as mind maps to assist in assimilation of verbal knowledge</li> <li>• Let S.P. have his own “space” in the classroom , a little away from others</li> </ul>
M.D.	<ul style="list-style-type: none"> <li>• Quick to “read” a situation, and “manipulate” the situation to avoid his loss of control</li> <li>• Personality type that is dominant - resulting in weak social interactions</li> </ul>	<ul style="list-style-type: none"> <li>• Inability to manage his emotions</li> <li>• “Obsessed” with winning or being first</li> <li>• Difficulties with short term memory and pragmatics of language</li> <li>• Neuropsychological profile concludes similarities with a “semantic pragmatic disorder” – good mastery of language in terms of grammar and phonology but struggles with comprehension of language</li> <li>• No rituals or obsessive behaviors noted – difficulties with pragmatics of language and social nuances of language</li> </ul>	<ul style="list-style-type: none"> <li>• Train and coach through social difficulties of wanting to dominate all situations</li> <li>• Rehearse instructions given in a visual manner</li> <li>• Keep schedules and lists to assist in memory task</li> <li>• Paraphrase work and instructions to essential key points.</li> </ul>

Table 6.15 presented in Chapter 6 should be referred to as a conclusive summary of the cross case analysis of this thesis.

#### **7.4 LIMITATIONS OF THE STUDY**

- The main limitation of this study was in the number of cases studied. Results that were concluded cannot be generalised.
- Qualitative observations of behaviour were limited to observations in the schooling environment (playground and classroom). Recorded behaviour within the home environment was a result of information given by the parents which was not necessarily objective.
- The study used the SSAIS-R as a test for intelligence subtests. This test is not used in other parts of the world, and thus the findings of this test cannot be directly correlated with previous research done using the WISC.

#### **7.5 CONTRIBUTIONS MADE BY THE STUDY**

This study has contributed to the existing body of knowledge with respect to AS. The results of the literature study have highlighted the necessity for a more purposeful use of diagnostic criteria for more meaningful research amongst studies done within the field of pervasive developmental disorders. This was particularly evident in the areas of diagnosis and prevalence of AS.

A neuropsychological test battery was collated to identify specific strengths and weaknesses of the AS learner. This case study noted the following inclusions of such a test battery to be significant.

- **Conners' parent and teacher questionnaire:**  
All AS learners had most significant problems in social, perfectionism, anxiety and psychosomatic. Oppositional behaviour was rated the least problematic.
- **Dunn's sensory profile:**  
Conclusive findings from the sensory profile questionnaire also included social and emotional problems, and no conclusive sensory processing difficulties.
- **Intelligence test battery:**

Findings of this study concluded three of the four cases scored lowest in the subtests of comprehension and highest scores were achieved on the form board. VIQ tested equal to NVIQ in one case, and the other three cases VIQ tested lower than NVIQ. These results directly contradict the research previously done using the WISC which concluded VIQ higher than PIQ (or NVIQ).

- Motor functions test battery:

No delays in visual motor integration, visual perception or motor coordination as tested on the Beery– Buktenica were noted in this study. No consistent finding in delays in motor functions was noted in the Movement ABC-2 test battery. These results with respect to the motor skills are contradictory to previous results obtained from the Movement ABC-2.

Furthermore teachers and parents did not observe or comment on gross motor functions or clumsiness as being areas that were problematic.

- Academic achievement:

Low scores in story recall, passage comprehension and writing fluency were consistent with previous research. No characteristic patterns of strengths and weaknesses across cases were concluded. This correlates with previous research.

- Theory of mind

All cases had no difficulties with ToM tasks – confirming previous research in this area. The tests for ToM conclude a fundamental difference in the performance between AS and autistic individuals.

- Executive functioning

No conclusive findings across the cases were noted. Qualitatively however it was noted that three of the four cases were able to initially quickly and accurately perceive the “changes” occurring in the responses. Perseverative and inflexible thinking affected quantitative results negatively.

- Findings from previous research was confirmed with respect to the similarity between AS and Rourke’s (1995:3) non verbal learning disability in two of the cases of this thesis. Both cases did not have VIQ > NVIQ, but difficulties with respect to pragmatics of language, cognitive processing, visual spatial difficulties, weak graphomotor skills, deficits in social understanding, difficulties with rigid behaviour and difficulty with novel situations and transitions as well as emotional

(anxious behaviour) did occur. Strengths included across these two cases were good recall of learnt facts and good word reading. It is noted that both these two cases had been hospitalised with serious convulsions because of bacterial meningitis in one case and encephalitis in the other case.

The performance of the AS cases studied reflects different personalities and the characteristics of each individual affected the results obtained on the neuropsychological test battery conducted. No typical neuropsychological profile of a learner with AS could thus be concluded from this research. The IQ profile as well as the academic profile was not consistent across cases. Consistencies noted however were in a “personality type”. This was reflective in “perfectionism”, “anxiety” “emotional lability” and “social difficulties”.

## **7.6 RECOMMENDATIONS FOR FURTHER RESEARCH**

- Further qualitative studies using the test battery collated for this research on learners with AS diagnosed using the DSM-IV-TR criteria.
- Further quantitative studies that aim to clarify different distinguishing profiles of learners with AS diagnosed with no clinically significant delays in language (as in DSM-IV criteria) and learners with AS in which this factor has not been strictly observed.
- Further quantitative and qualitative studies aimed at specific differentiating neuropsychological profiles between subgroups of pervasive developmental disorders as categorised on the DSM-IV. The subgroups, despite sharing overlapping symptoms should be understood as to particular differentiating neuropsychological profiles. This will prove to create greater understanding and more targeted and specific treatment and intervention.
- Development of a questionnaire which will include both the criteria of ADHD (as on the Conners’ rating scale), AS (as on the GADS) and sensory difficulties (as on the Dunn’s questionnaires). This will allow for more detail of differentiations between symptoms as noted by teachers and caregivers.
- Further research with respect to the similarities between AS and a non verbal learning disability. Rourke (1995:19) hypothesises that a non verbal learning

disability has an underlying causal deficient right hemisphere system or insufficient access to an intact right hemisphere due to a destruction or dysfunction of white matter that is required for intermodal integration. This is an interesting observation as it may relate to individuals with AS and should be further researched.

## **7.7 IMPLICATIONS OF THE STUDY**

- Results from this study confirm that inattentive symptoms among AS may be stemming from an underlying fear of the unknown, or an inability to understand what is required (poor pragmatic skills). The learner with AS may be “hyper focussed” on a particular detail of a presenting stimulus, but miss the concept, thereby appearing “inattentive”. “Hyperactive” or “impulsive outbursts” may similarly be misread as symptoms of ADHD, but the learner with AS may exhibit “tantrums” or “meltdowns” because of a build up of anxiety and an inability to express himself in a socially appropriate manner. If only the ADHD symptoms are noted, without further investigations, the learner’s needs will not be addressed and treatment will be unsuccessful. It is therefore important that an effort is made to distinguish and understand presenting symptoms of a learner, and not simply identify the learner to be on a “broad range of a spectrum of disorders that are similar in presentation”.
- Findings from this study note ADHD was a common first diagnosis, yet despite this, results from the Conners’ parent and teacher questionnaire did not reflect inattentive and hyperactive DSM-IV symptoms. Symptoms on the Conners’ questionnaire concluded difficulties with social problems, perfectionism psychosomatic and anxiety. Oppositional behaviour was noted as the least problematic. It is noted that the AS child likes rules and routines and therefore “follows” rules as it makes him feel safe. There are some researchers that note that ADHD and AS should be on a continuous spectrum (along with autism) because of their similar features (Kennedy 2002:xv; Blakemore-Brown, L. 2002:16). Attwood (2007: 16) notes however that ADHD and AS are not mutually exclusive. Barkley (2006:195) notes that autistic spectrum disorders (including



AS) may create a phenocopy of “faux ADHD”, and the prevalence of children with pervasive developmental delays among children with ADHD has not been identified.

- Results of the case studies conclude a distinctive *personality* profile (dominated by anxiety, adherence to routine and social difficulties). Asperger’s original paper published in 1944, and then translated by Frith (1991:5) refers to the title of Asperger’s thesis (translated) as “Childhood personality disorder”. The conclusions from this thesis confirm a distinctive personality profile, but no distinctive neuropsychological profile across IQ tests, academic tests or executive functioning. All cases presented in this thesis have average global IQ scores, normal developmental milestones, no distinguishing difficulties with motor functions and no difficulties with ToM tests.
- These results are potentially significant and it is concluded that the AS label and its association with autism may be a premature conclusion based on insufficient conclusive research. The term AS has become very popular and the prevalence of autism has increased dramatically since the term was popularised in 1981. Research done by Gillberg and Gillberg (1989:631) note prevalence rates of 10-26 per 10 000 children and Chakrabati and Fombonne (2001:3093) conclude prevalence of 1 per 160 children. This rise in prevalence rates has come about, due to the widening of the diagnosis of autism, and not necessarily by a higher incidence of ‘classical autism’.
- Researchers are not conclusive in their findings with respect to AS and autism being on the same spectrum, despite this notion being increasingly written about and published in many recent books by authors who are not necessarily researchers in the field. There is a danger in “over diagnosing” this condition. It takes away the “severity” and distinctiveness of a child with “classic autism” and makes a “psychoses” of a child presenting with a personality disorder, with learning difficulties. The above conclusions are reflected by Levine (2002:242) who states that terms like AS (commonly applied nowadays to children with social

gaps and strong areas of interest) are needlessly pathological in their connotation.

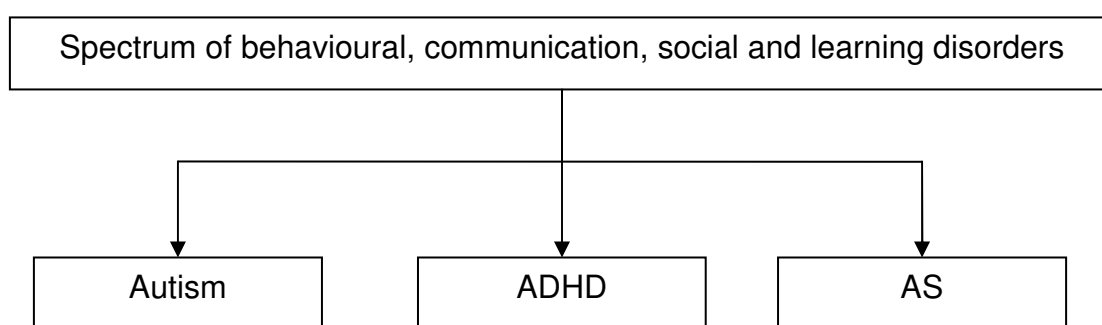
## 7.8 CONCLUSION

Wing (1981) first used and popularised the term AS and introduced the concept of autism and AS being on the same continuum. The term AS then became synonymous with high functioning autism (HFA), as AS was a more “useful label” than HFA. In 1986, Wing noted in a paper that strict diagnostic criteria should be retained for autism, and that AS should be regarded as a subgroup within the autistic spectrum. In 1994 the DSM-IV published AS as a separate entity under the category of pervasive developmental disorder (PDD). Wing (2000:418) reacted to this by clarifying that to include AS as a subcategory grouping of PDD was unsatisfactory, and that the original intention of the term AS was that it was to be linked with autism. Wing stated that the criteria for AS had moved a long way from Asperger’s own original descriptions, and that if such a *new diagnostic construct* is included in the DSM-IV it should carry a name *other than AS*. Wing concluded in (2000:430) the irony of having been responsible for using the term AS in her 1981 paper, she argues against its existence as a separate entity. Wing thus recognises the existence of a *new diagnostic category* which is more in line with Asperger’s original work – unfortunately the term AS has become popularised and linked with high functioning autism – to “soften” the diagnosis by giving a “more acceptable label”. This action has created confusion amongst the readership, practitioners, parents and teachers of AS children. It is my belief that the term AS should be retained for the “personality disorder” or “autistic psychopathy” that Asperger described, which is reflected in the DSM-IV-TR diagnosis criteria for AS. AS should be “separated” from the more disabling and rare condition of “classic autism”. In this way the classic autistic learners will be given the specialised services they need, and the AS learner can be managed within the mainstream education system.

The literature has noted overlapping symptoms of ADHD, autism and AS, but in my belief that each of these are distinctive, and it would be wrong to break down the defining characteristics of each and to “treat” them all as one continuum of disorder.

The proposed model is thus presented in Figure 7.1 below and describes a spectrum of behavioural, communication, social and learning disorders as three distinguishable entities. The model is a differentiating one (which already exists as defined by the DSM-IV-TR). The results of this thesis further define the differentiating characteristics, implying that the three “disorders” described below are fundamentally different at a neuropsychological level.

Figure 7.1: Proposed differentiating model of a spectrum of behavioural, communication and social and learning disorders



#### Autism

- Is defined by diagnostic criteria as given in the DSM-IV-TR (severe delays in language acquisition).
- Theory of mind deficit is a distinguishing characteristic.
- Sensory issues relating sensory processing are severely negatively affected (this affecting much self stimulating behaviours).
- Differences between verbal IQ scores (low) and nonverbal IQ scores (normal or high) are typically found (De Long 2003:741).

#### ADHD

- Is defined by diagnostic criteria as given in the DSM-IV-TR.
- Inattentive symptoms are results of “daydreaming” or “associative - free thinking”.
- Hyperactive, distractible and impulsive behaviour are a result of poor impulse control.

- Weak executive functioning is manifested in difficulties with organisation, sustaining attention, monitoring and regulating behaviour to complete a given task.

## AS

- Is defined by diagnostic criteria as given in the DSM-IV –TR (no significant delays in language, cognitive development, development of age appropriate self-help skill, adaptive behaviour or curiosity about the environment).
- Theory of mind is not problematic.
- Sensory issues relate to emotional responses to stimuli and not to “hyper or hypo” integration of sensory stimuli.
- Social difficulties are observed - prefers to play “alone” both at school and in the home environment.
- There are no difficulties with gross motor coordination, but non-participation in sporting activities due to an inability to understand the rules of the game or an inability to “lose”.
- Verbal skills that are typically high, but non verbal, social and visual spatial skills are deficient. This pattern is similar to children who have a NLD who present with weak visual spatial reasoning and strong verbal skills. The AS learner could be presenting with a specific personality type, and a specific learning disorder affecting right hemisphere functioning. This hypothesis needs to be further investigated.
- Focusing on detail is common, resulting in a loss of sense of the overall plan, therefore appearing “inattentive” when given instructions.
- A literal and inflexible way of thinking is dominant, leading to “meltdowns” when changes in routine or environment is made.
- Executive functioning is good with respect to the components of intentional behaviour, planning and organisation of steps to achieve a goal. The problem arises for the AS learner when he does not have the ability to conceive alternatives, which then reflects in failure in of the task
- Similar personality traits appear within the family, indicating a genetic link.
- The term AS should be used as originally described by Asperger (within an educational setting).

Finally, it can be concluded that each AS learner needs to be treated as a “unique individual”, presenting with a defining personality type which results in anxiety and a need for ‘routine and a predictable environment”. The results of the learners neuropsychological test battery should be used for a unique intervention and educational plan, specific to the AS learner’s unique profile. The functioning of the AS learner is consistently found to be based in a *personality type* and this should be addressed by creating educational environments which are flexible and understanding.

The AS learner can be identified educationally as “at risk” because of his fragile personality dominated by anxiety and fear of the unknown. The AS learner also presents with a difficulty with pragmatics of language which interferes with effective social skills and comprehension. The AS learner needs to be understood, and adaptations made within the environments, both educationally at home. Negative behavioural symptoms occur only when the AS learner is “forced” into situations in which he is not comfortable – it is therefore recommended that effort be made to understand and assist each individual in a flexible and understanding manner. The AS learner cannot change his way of thinking and relating to the world, the world needs to accept and allow for individual differences within the educational setting.

## BIBLIOGRAPHY

- American Psychiatric Association. 1994. ***Diagnostic and statistical manual of mental disorders. 4<sup>th</sup> Edition.*** Washington: American Psychiatric Association.
- American Psychiatric Association. 2000. ***Diagnostic and statistical manual of mental disorders. 4th Edition. Text Revision.*** Washington: American Psychiatric Association.
- Anderson, V., Northan,E., Hendy, J. & Wrennall, J. 2001. ***Developmental neuropsychology.*** East Sussex: Psychology Press.
- Asperger, H. 1991. ***Autism and Asperger syndrome,*** edited by U. Frith. Cambridge: Cambridge University Press.
- Asperger-Felder, M. 2000. ***Asperger syndrome,*** edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Attwood, T. 2006. ***The complete guide to Asperger's syndrome.*** London: Jessica Kingsley.
- Barnhill, G., Hagiwara, T., Myles, B., & Simpson, R. 2000. Asperger syndrome: a study of the cognitive profiles of 37 children and adolescents. ***Focus on autism and other developmental disabilities,*** 15(3):146-153.
- Barkley, R. 2006. ***Attention-deficit hyperactivity disorder.*** 3<sup>rd</sup> edition. New York: Guilford press.
- Baron-Cohen, S. & Klin, A. 2006. What's so special about Asperger syndrome? ***Brain and cognition,*** 61(1):1-4.

- Beery, K. & Beery, N. 2006. **Beery VMI: administration, scoring and teaching manual**. 5<sup>th</sup> edition. Minneapolis: NCS Pearson.
- Bishop, D.V.M. 2000. What's so special about Asperger syndrome? **Asperger syndrome**, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Blakemore-Brown, L. 2002. **Reweaving the autistic tapestry**. London: Jessica Kingsley.
- Blaxter, L., Hughes, C. & Tight, M. 2001. **How to research**. 2<sup>nd</sup> edition. Berkshire: McGraw Hill.
- Chakrabarti, S. & Fombonne, E. 2001. Pervasive developmental disorders in preschool children. **Journal of the American medical association**, 285(24):3093-3099.
- Church, C., Alisanski, S. & Amanullah, S. 2000. The social, behavioural and academic experiences of children with Asperger syndrome. **Focus on autism and other developmental disabilities**, 15(1):12-20.
- Conners, C. K. 1997. **Conners' rating scales-revised : User's manual**. New York: Multi-Health systems.
- Dahlgren, S., Sandberg, A. & Hjelmquist, E. 2003. The non-specificity of theory of mind deficits: Evidence from children with communicative disabilities. **European journal of cognitive psychology**, 15(1):129-155.
- De Long, G.R. 2003. **Handbook of neuropsychology, 2<sup>nd</sup> edition**, edited by S. Segalowitz & I. Rapin. Amsterdam: Elsevier.
- Dunn, W. 1999. **User's manual: Sensory profile**. San Antonio: Psychological corporation.

- Dunn, W., Myles, B.S., & Orr, S. 2002. Sensory processing issues associated with Asperger syndrome: a preliminary investigation. ***The American journal of occupational therapy***, 56(1):97-102.
- Ehlers, S. & Gillberg, C. 1993. The epidemiology of Asperger syndrome. A total population study. ***Journal of child psychology and psychiatry***, 34(8):1327-1350.
- Ehlers, S., Nyden, A., Gillberg, C., Sandberg, A., Dahlgren, S., Hjelmquist, E. & Oden, A. 1997. Asperger syndrome, autism and attention disorders: A comparative study of the cognitive profiles of 120 children. ***Child psychology and psychiatry***, 38(2):207-217.
- Eisenhardt, K.M. 2002. ***The qualitative researcher's companion***, edited by M. Huberman & M. Miles. Thousand Oaks: Sage.
- Ellis, H. & Gunter, H. 1999. Asperger syndrome: a simple matter of white matter? ***Trends in cognitive science***, 3(5):192-200.
- Fombonne, E. 2003. Epidemiological surveys of autism and other PDD. ***Journal of autism and developmental disorders***, 33(4):365-382.
- Fouché, C.B. 2002. ***Research at grass roots***, edited by A.S. Vos. Pretoria: Van Schaik.
- Frith, U. 1989. ***Autism: explaining the enigma***. Basil Blackwell: Oxford.
- Frith, U. 1991. ***Autism and Asperger syndrome***. Cambridge: Cambridge University Press.



- Ghaziuddin, M., Tsai, L. & Ghaziuddin, N. 1992. Brief report: A reappraisal of clumsiness as a diagnostic feature of Asperger syndrome. ***Journal of autism and developmental disorders***, 22(4):651-656.
- Ghaziuddin, M., Weidmer-Mikhail, E. & Ghaziuddin, N. 1998. Comorbidity of Asperger syndrome: a preliminary report. ***Journal of intellectual disability research***, 42(4):279-283.
- Ghaziuddin, M. & Mountain-Kimchi, K. 2004. Defining the intellectual profile of Asperger syndrome: comparison with high functioning autism. ***Journal of autism and developmental disorders***, 34(3):279-284.
- Gilchrist, A., Cox, A., Rutter, M., Green, J., Burton, D. & Le Couteur, A. 2001. Development and current functioning in adolescents with Asperger syndrome: a comparative study. ***Journal of child psychology and psychiatry***, 42(2):227-240.
- Gillberg, C. 1995. ***Clinical and child neuropsychology***. Cambridge: Cambridge University Press.
- Gillberg, C. & Gillberg C. 1989. Asperger syndrome – some epidemiological considerations: a research note. ***Journal of child psychology and psychiatry***, 30(4):631-638.
- Gilliam, J. E. 2001. ***Gilliam Asperger's disorder scale: Examiner's manual***. Austin: Pro-Ed.
- Green, D., Baird, G., Barnett, A., Henderson, L., Huber, J. & Henderson, S. 2002. The severity and nature of motor impairment in Asperger's syndrome: a comparison with specific developmental disorder of motor function. ***Journal of child psychology and psychiatry***, 43(5):655-668.

- Griswold, D., Barnhill, G., Myles, B., Hagiwara, T. & Simpson, R. 2002. Asperger syndrome and academic achievement. ***Focus on autism and other developmental disabilities***, 17(2):94-102.
- Gunter, H., Ghaziuddin, M. & Ellis, H. 2002. Asperger syndrome: test of right hemisphere functioning and interhemispheric communication. ***Journal of autism and developmental disorders***, 32(4):263-281.
- Hagiwara, T. 2001-2002. Academic assessment of children and youth with Asperger syndrome, pervasive developmental disorder-not otherwise specified, and high-functioning autism. ***Assessment for effective intervention***, 27(1&2):89-100.
- Happé, F. 1994. Wechsler IQ profile and theory of mind in autism: a research note. ***Journal of child psychology and psychiatry and allied disciplines***, 35(8):1461-1471.
- Happé, F., Booth, R., Charlton, R. & Hughes, C. 2006. Executive function deficits in autism spectrum disorders and attention-deficit/hyperactive disorder: examining profiles across domains and ages. ***Brain and cognition***, 61(1):25-39.
- Henderson, S., Sugden, D. & Barnett, A. 2007. ***Movement assessment battery for children-2, examiners manual***. 2<sup>nd</sup> edition. London: Harcourt Assessment.
- Higgins, R. 1996. ***A handbook for those writing a dissertation***. London: Jessica Kingsley.
- Huberman, A. M. & Miles, M.B. 2002. ***The qualitative researcher's companion***. Thousand Oaks: Sage.

- Jacobson, P. 2005. ***Understanding how Asperger children and adolescents think and learn.*** London: Jessica Kingsley.
- Kaland, N., Moller-Nielsen, A., Callesen, K., Mortensen, E., Gottlieb, D. & Smith, L. 2002. A new “advanced” test of theory of mind: evidence from children and adolescents with Asperger syndrome. ***Journal of child psychology and psychiatry***, 43(4):517-528.
- Kennedy, D.M. 2002. ***The ADHD autism connection.*** Colorado Springs: Waterbrook Press.
- Klin, A. & Volkmar, F. 2000. Treatment and intervention guidelines for individuals with Asperger syndrome. ***Asperger syndrome***, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Klin, A., Volkmar, F., Sparrow, S., Cicchetti, D. & Rourke, B. 1995. Validity and neuropsychological characterisation of Asperger syndrome: convergence with nonverbal learning disabilities syndrome. ***Journal of child psychology and psychiatry***, 36(7):1127-1140.
- Klin, A., Pauls, D., Schultz, R. & Volkmar, F. 2005. Three diagnostic approaches to Asperger syndrome: implications for research. ***Journal of autism and developmental disorder***, 35(2):221-234.
- Kolb, B. & Wishaw, I. 2003. ***Fundamentals of human neuropsychology.*** 5<sup>th</sup> edition. New York: Worth.
- Kongs, S.K., Thompson, L.L., Iverson, G. L. & Heaton, R.K. 2004. ***Professional manual: Wisconsin card sorting Test-64 card version.*** Lutz: Psychological Assessment Resources.

- Krasny, L., Williams, B., Provencal, S. & Ozonoff, S. 2003. Social skills interventions for the autism spectrum: essential ingredients and a model curriculum. *Child and adolescent psychiatric clinics*, 12(1):107-122.
- Kumar, R. 2005. *Research methodology*. 2<sup>nd</sup> edition. London: Sage.
- Leedy, P.D. & Ormrod, J.E. 2001. *Practical research: planning and design*. 7<sup>th</sup> edition. New Jersey: Merrill Practice Hall.
- Leslie, A. 1987. Pretense and representation: the origins of "Theory of Mind". *Psychological review*, 94(4):412-426.
- Levine, M. 2002. *A mind at a time*. London: Simon & Schuster.
- Lezak, M., Howieson, D. & Loring, D. 2004. *Neuropsychological assessment*. New York: Oxford University Press.
- Manjiviona, J. & Prior, M. 1995. Comparison of Asperger syndrome and high-functioning autistic children on a test of motor impairment. *Journal of autism and developmental disorders*, 25(1): 23-39.
- Marks, S., Shaw-Hegwer, J., Schrader, C., Longaker, T., Peters, I., Powers, F. & Levine, M. 2003. Instructional management tips for teachers of students with autism spectrum disorders. *Teaching exceptional children*, 35(4):50-55.
- Mather, N. & Woodcock, R.W. 2001. *Examiners manual Woodcock-Johnson III tests of achievement*. Itasca: Riverside.
- Matte, R. & Bolaski, J. 1998. Nonverbal learning disabilities. *Intervention in school and clinic*, 34(1):39-42.

- Mattis, S. & Luck, D.Z. 2002. Neuropsychological assessment of school-aged children. **Handbook of neuropsychology 2<sup>nd</sup> edition, volume 8, part 1**, edited by S. Segalowitz & I. Rapin. Amsterdam: Elsevier Science.
- Mayes, S. D., Calhoun, S.L. & Crites, D. 2001. Does DSM-IV Asperger's disorder exist? **Journal of abnormal child psychology**, 29(3):263- 271.
- McGrew, K.S. & Woodcock, R.W. 2001. **Technical manual: Woodcock-Johnson III**. Itasca: Riverside Publishing.
- Meyer, J. & Minshew, N. 2002. An update on neurocognitive profiles in Asperger's syndrome and high-functioning autism. **Focus on autism and other developmental disabilities**, 17(3):152-160.
- Miller, J. & Ozonoff, S. 2000. The external validity of Asperger disorder: lack of evidence from the domain of neuropsychology. **Journal of abnormal psychology**, 109(2):227-238.
- Minshew, N., Meyer, J. & Dunn, M. 2003. Autism spectrum disorders. **Handbook of neuropsychology 2<sup>nd</sup> edition, volume 8, part II**, edited by S. Segalowitz & I. Rapin. Amsterdam: Elsevier Science.
- Miyahara, M., Tsujii, M., Hori, M., Nakanishi, K., Kageyama, H. & Sugiyama, T. 1997. Brief report: motor incoordination in children with Asperger syndrome and learning disabilities. **Journal of autism and developmental disorders**, 27(5):595-603.
- Myles, B.S., Hagiwara, T., Dunn, W., Rinner, L. & Reese, M. 2004. Sensory issues in children with Asperger syndrome and autism. **Education and training in developmental disabilities**, 39(4):283-290.

- O'Shea, A., Harel, B. & Fein, D. 2002. Neuropsychological assessment of the preschool child. ***Handbook of neuropsychology 2<sup>nd</sup> edition, volume 8, part 1***, edited by S.Segalowitz & I. Rapin. Amsterdam: Elsevier Science.
- Ozonoff, S., Rogers, S. & Pennington, B. 1991. Asperger's syndrome: evidence of an empirical distinction from high-functioning autism. ***Journal of child psychology and psychiatry and allied disciplines***, 32:1107-1122.
- Ozonoff, S., South, M. & Miller, J. 2000. DSM-IV defined Asperger syndrome: cognitive, behavioural and early history differentiation from high-functioning autism. ***Autism***, 4(1):29-46.
- Peeters, T. 1997. ***Autism: from theoretical understanding to educational intervention***. London: Whurr.
- Peeters, T. & Gillberg, C. 1995. ***Autism: medical and educational aspects***. London: Whurr.
- Perner, J., Frith, U., Leslie, A. & Leekam, S. 1989. Exploration of the autistic child's theory of mind: knowledge, belief and communication. ***Child development***, 60:689-700.
- Prior, M. 2003. Is there an increase in the prevalence of autism spectrum disorders? ***Journal of paediatrics and child health***, 39(2):81-82.
- Ramberg, C., Ehlers, S., Nyden, A., Johansson, M. & Gillberg, C. 1996. Language and pragmatic functions in school-age children on the autism spectrum. ***European journal of disorders of communication***, 31(4): 387-413.
- Rourke, B. 1995. Introduction: The NLD syndrome and the white matter model. ***Syndrome of nonverbal learning disabilities***, edited by B. Rourke. New York: Guilford.

- Rourke, B. & Tsatsanis, K. 1996. Syndrome of nonverbal learning disabilities: psycholinguistic assets and deficits. *Topics in language disorders*, 16(2):30-44.
- Rourke, B., van der Vlugt, H. & Rourke, S. 2002. *Practice of child-clinical neuropsychology*. Lisse: Swets & Zeitlinger.
- Safran, S., Safran, J. & Ellis, K. 2003. Intervention ABCs for children with Asperger syndrome. *Topics in language disorders*, 23(2):154-165.
- Schopler, E. 1996. Are autism and Asperger syndrome different labels or different disabilities? *Journal of autism and developmental disorders*, 26(1):109-110.
- Simpson, D. 2003. Autistic spectrum disorder is not as certain as implied. *British medical journal*, (326):986.
- Strydom, H. & Delport, C. S. L. 2002. *Research at grass roots*, edited by A.S. Vos. Pretoria: Van Schaik.
- Sylwester, R. 1995. *A celebration of neurons: an educators guide to the human brain*. Alexandria: Association for supervision and curriculum development.
- Szatmari, P. 2000. Perspectives on the classification of Asperger syndrome. *Asperger syndrome*, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Szatmari, P., Archer, L., Fisman, S., Streiner, D. & Wilson, F. 1995. Asperger's syndrome and autism: differences in behaviour, cognition and adaptive functioning. *Journal of the American academy of child and adolescent psychiatry*, 34:1662-1671.

- Szatmari, P., Bremner, R., & Nagy, J. 1989. Asperger's syndrome: A review of clinical features. *Canadian journal of psychiatry*, 34:554-560.
- Szatmari, P., Tuff, L., Allen, M., Finlayson, A. & Bartolucci, G. 1990. Asperger's syndrome and autism: neurocognitive aspects. *Journal of the American academy of child and adolescent psychiatry*, 29(1):130-136.
- Tantam, D. 1988. Annotation: Asperger's syndrome. *Journal of child psychology and psychiatry*, 29(3):245-255.
- Tantam, D. 2000. Adolescence and adulthood of individuals with Asperger syndrome. *Asperger syndrome*, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Van Eeden, R. 1997. *Manual for the Senior South African Individual Scale-Revised (SSAIS-R), part 1*. Pretoria: Human Sciences Research Council:
- Volkmar, R & Klin, A. 2000. Diagnostic issues in Asperger syndrome. *Asperger syndrome*, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Walsch, A.O. 1994. *Neuropsychology: a clinical approach*. New York: Churchill Livingstone.
- Webb, E., Morey, J., Thompsen, W., Butler, C., Barber, M. & Fraser, W.I. 2003. Prevalence of autistic spectrum disorder in children attending mainstream schools in a Welsh education authority. *Developmental medicine and child neurology*, 45(6):377-384.
- Wechsler, D. 2002. *Wechsler adult intelligence scale, 3<sup>rd</sup> edition: technical manual*. Harcourt: Psychological Corporation.
- Weintraub, S. & Mesulam, M. 1983. Developmental learning disabilities of the right hemisphere. *Archives of neurology*, 40:463-468.



- Wing, L. 1981. Asperger's syndrome: a clinical account. *Psychological medicine*, 11:115-129.
- Wing, L. 1986. Classification of Asperger's syndrome. *Journal of autism and developmental disorders*, 16(4):513-515.
- Wing, L. 2000. Past and future of research on Asperger syndrome. *Asperger syndrome*, edited by A. Klin, F. Volkmar & S. Sparrow. New York: Guilford.
- Wolfe, P. 2001. *Brain matters*. Alexandria. Association for supervision and curriculum development.
- World Health Organisation. 1993. *The ICD-10 classification of mental and behavioural disorders: diagnostic criteria for research*. Geneva: World Health Organisation.
- Yin, R.K. 2003. *Case study research: design and methods*. 3<sup>rd</sup> edition. Thousand Oaks: Sage.

## APPENDIX 1

### PERSONAL PARTICULARS OF THE CHILD

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Surname	
First name	
Sex (male or female)	
Date of birth	
Age	
School	
Present school grade	
Home language	

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#### **Home circumstances:**

Marital status: \_\_\_\_\_

	Father	Mother
Name		
Contact details (phone/cell number)		
Occupation		
Highest educational qualification		

	Father	Mother
History of learning or behavioural/social difficulties within the family? (grandparents, siblings, cousins)		
Details of siblings of client: Include age and any history of learning or behavioural or social difficulties.		

**Birth and medical history:**

Details of pregnancy and birth	
Birth weight	
Developmental milestones:	Sat at: _____ Crawled at: _____ Walked at: _____

	<p>First words at: _____</p> <p>First sentences at: _____</p> <p>Language development:</p>
Feeding habits	
Sleeping habits	
Serious illnesses	
Serious head injuries?	
Periods of unconscious?	
Accidents or traumatic experiences?	
Ear infections?	
Has hearing been tested? (please give details of results)	
Eye diseases?	
Has eyesight been tested? (please give details of results)	
Other:	

Previous medical diagnosis? (such as ADHD/epilepsy)	Doctor and year of diagnosis	Medication prescribed?	Current medication?

**Scholastic history:**

School readiness and age of admittance to school	
Period at pre-primary	
Number of schools attended. (please give details)	
Grades repeated? (please give details)	
Scholastic records (please attach ant reports)	
Extra murals / interests and hobbies	

Previous assessments: (Attach any reports):

Assessment	Year of assessment?	Therapeutic intervention?	Period of intervention?	Currently in therapy?
Occupational therapy				
Physiotherapy				
Speech & Language				
Remedial				
Psychologist				
Psychiatrist				
Paediatrician				
Other				

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**Presenting problem:**

Please detail your main areas of concern as a parent.

## **APPENDIX 2**

### **GILLIAM ASPERGER'S DISORDER SCALE (GADS)**

**(Gilliam 2001:6-11)**

The GADS is a behavioural rating scale that helps identify persons who have Asperger's syndrome (AS). The scale is easily completed by parents and is completed in approximately five to ten minutes. The GADS is appropriate for persons between three years and twenty two years. The GADS comprises four subscales and a parent interview form that is completed by parents. Each subscale is composed of items described by behaviours that characterise AS. Each item is rated according to the frequency of occurrence. This rating is described as never observed, seldom observed, sometimes observed and frequently observed,

The social interaction subscale consists of ten items. Items on this subscale describe social interactive behaviours, expression of communicative intent and cognitive and emotional behaviours.

The restricted patterns of behaviour subscale consist of eight items. Items describe restricted and stereotyped patterns of behaviour that are characteristic of AS.

The cognitive patterns subscale consists of seven items, evaluating speech, language and cognitive skills

The pragmatic skills subtest consists of seven items concentrated with the ability of the subject to understand and use language in a social context.

The parent interview form establishes information on early childhood development.

Raw scores obtained from the above four subscales, are converted to standard scores. For the GADS subscales, the mean standard score distribution has been set at 10, and the standard deviation at 3. The larger the standard score, the more severe the behaviour it represents.

The Asperger's disorder quotient is generated from the GADS. This quotient, having a mean of 100, and a standard deviation of 15, is a reliable standard score of the GADS. (Gilliam 2001:17).

## **APPENDIX 3**

### **CONNERS' RATING SCALES-REVISED**

**(Conners 1997:1-13)**

The Conners' rating scales are used for the assessment of attention-deficit/hyperactive disorder (ADHD) and related behaviours in children and adolescents. The questionnaires are suitable instruments for reporting on individuals between three and seventeen years.

The Conners' rating scales which will be used in this thesis are the Conners' parent rating scale-revised, long version (CPRS-R:L) and the Conners' teacher rating scale-revised, long version (CTRS-R:L). These rating scales evaluate problem behaviours by obtaining and combining reports from parents and teachers to assist with diagnosis and treatment of individuals with behaviour problems. The parent rating scale consists of eighty items and the teachers rating scale consists of fifty nine items. Each item is rated according to how much of a problem the behaviour has been in the past month. The rating is in terms of the behaviour never happening, occasionally happening, often happening and very frequently happening. The rating scales can be completed in approximately twenty minutes.

The CPRS-R:L consists of the following fourteen subscales:

Oppositional (10 items), cognitive problems/inattention (12 items), hyperactivity (9 items), anxious-shy (8 items), perfectionism (7 items), social problems (5 items), psychosomatic (6 items), Conners' global index (10 items), restless-impulsive (7 items), emotional lability (3 items), ADHD index (12 items), DSM-IV symptoms subscales (18 items), DSM-IV inattentive (9 items) and DSM-IV hyperactive-impulsive (9 items) (Conners 1997:12).

The CTRS-R:L consists of the following thirteen subscales:

Oppositional (6 items), cognitive problems/inattention (7 items), hyperactivity (7 items), anxious-shy (6 items), perfectionism (6 items), social problems (5 items),



Conners' global index (10 items), restless-impulsive (6 items), emotional lability (4 items), ADHD index (12 items), DSM-IV symptoms subscales (18 items), DSM-IV inattentive (9 items) and DSM-IV hyperactive-impulsive (9 items) (Conners 1997:13).

The Conners' rating scale is mainly used for the assessment of ADHD but also contains subscales for the assessment of conduct problems, cognitive problems, family problems, emotional problems, anger control problems and anxiety problems. Results obtained from the rating scales are easily transferred onto profile sheets which are available for males and females, and allow the conversion of raw scores to standard scores.

## **APPENDIX 4**

### **SENSORY PROFILE**

**(Dunn: 1999:14-15)**

The sensory profile provides a standard method for professionals to measure a child's sensory processing abilities and to profile the effect of sensory processing on functional performance. The profile is most appropriate for children between the ages of five and ten years and is completed by the parent of the child. The time taken to complete the questionnaire is approximately twenty minutes. The sensory profile is a judgement-based questionnaire which describes behaviours by reporting the frequency of which they occur (always, frequently, occasionally, seldom or never). The sensory profile consists of 125 items grouped into three main sections sensory processing, modulation and behavioural and emotional responses.

The sensory processing category is further divided into six item categories as follows (Dunn: 1999: 14-15)

- Auditory processing – the items included in the auditory section measures the child's responses to things heard
- Visual processing – the items measure the child's responses to things seen
- Vestibular processing – this measures the child's responses to movement
- Touch processing – this measures the child's responses to stimuli that touch the skin
- Multisensory processing – the items measure the child's responses to activities that contain a combined sensory experience
- Oral sensory processing – this measures the child's responses to touch and taste stimuli to the mouth.

The behaviour and response category is divided into the following three item categories:

- Emotional/social responses – items in this section indicate the child's psychosocial coping strategies

- Behavioural outcomes of sensory processing – items in this section indicate the child's ability to performance demands (e.g. has difficulty tolerating changes in plans and expectations)
- Items indicating thresholds for response – this includes items that indicate the child's level of modulation (e.g. jumps from one activity to another)

The modulation category is further divided into five item categories as follows:

- Sensory processing related to endurance / tone – this section measures the child's ability to sustain performance (e.g. poor endurance / tires easily)
- Modulation related to body position and movement – items measure the child's ability to move effectively
- Modulation of movement affecting activity level – this measures the child's demonstration of activeness (e.g. spends most of the day in sedentary play)
- Modulation of sensory input affecting emotional responses - items measure the child's ability to use body senses to generate emotional responses (e.g. rigid rituals in personal hygiene)
- Modulations of visual input affecting emotional responses and activity level – items measures the child's ability to use visual cues to establish contact with others

Results from the caregiver questionnaire are recorded onto the summary score sheet. A factor grid is completed which in turn is transferred to a factor summary sheet which serves to reveal patterns related to the child's responsiveness to stimuli in the environments.

## **APPENDIX 5**

### **SENIOR SOUTH AFRICAN INDIVIDUAL SCALE-REVISED (SSAIS-R) (Van Eeden 1991:4-11)**

The SSAIS-R is a point scale or deviation intelligence quotient (IQ) scale. Performance is indicated in terms of standard scores. The SSAIS-R is used to obtain a differential picture of cognitive abilities. It is standardised for the use amongst South African English speaking children between the years of seven and seventeen years. The average time to administer the SSAIS-R is ninety minutes. The two primary mental abilities that are measured by the SSAIS-R are verbal and non-verbal. The following describes the underlying rationale for each subtest that makes up the SSAIS-R (Van Eeden 1991:4-11).

**Test 1 - Vocabulary:** The test consists of five cards with four pictures on each card. The testee is asked to indicate the picture which is most relevant to a given word. There are ten stimulus words for each card, making a total of fifty words. This test measures language development and language usage. Long term memory and concept formation are also factors in this test.

**Test 2 - Comprehension:** The testee is asked fifteen questions that are relevant to situations in everyday life. Scoring is based on qualitative differentiation of responses. Knowledge of conventional behaviour in a variety of social situations is assessed. The ability to understand and use this information in a meaningful and emotionally relevant way is evaluated.

**Test 3 - Similarities:** The test consists of fifteen items in which the testee is required to indicate the similarity between two concepts. Correct responses are evaluated on the basis of levels of reasoning, namely abstract, functional and concrete. Logical, abstract reasoning, verbal concept formation and long term memory play a role in the performance of this test. The ability to distinguish between essential and superficial similarities is important.

Test 4 - Number problems: The test consists of twenty verbally formulated arithmetical problems. Eleven of the items are presented only verbally, whereas the other nine items are also presented on cards. The test measures numerical reasoning, logical reasoning, abstract thought and mental alertness. Productive concentration is important to succeed in the test.

Test 5 - Story memory: The test consists of a short story that is read to the testee. The testee is asked to repeat whatever he can remember about the story. There are forty three facts in the story. This test measures short-term auditory memory. The ability of the testee to pay attention to a relatively simple situation is measured.

Test 6 - Pattern completion: Each item consists of three figures from which the testee has to deduce a pattern in order to draw the fourth figure. The test consists of four practice examples which are taken into account when scoring, and a further fifteen items. This test is non-verbal measure of the processes underlying logical thinking. Accurate visual perception, concept formation and concentration are important to succeed in the test.

Test 7 - Block designs: Plastic cubes/blocks are used to copy patterns from an example. The test consists of fifteen items of which the first three are used as practice examples. Four blocks are used for the first seven items and nine blocks are used for the remaining items. The test measures non-verbal intelligence and non-verbal problem solving skills. The testee has to solve problems in spatial relations by using logical thinking. Shapes have to be observed and analysed by reducing a whole design into its component parts and then reassembling them in an identical design. Non verbal concept formation, including perceptual organisation, spatial visualisation, spatial orientation and abstract conceptualisation is measured. Concentration and visual-motor coordination are important.

Test 8 - Missing parts: The test consists of twenty pictures, each of which has an essential part missing. The testee is asked to indicate verbally or by pointing, what is missing in the picture. The first two items are used as practice examples. The test measures contact with reality. Knowledge and comprehension of familiar situations,

the ability to distinguish between essential and non-essential visual information and the ability to see the whole in relation to its parts is measured in this test.

Test 9 – Form board: The test consists of a board with six figures, each of which is constructed out of three or four loose parts with a distinguishing colour for each figure. The parts are placed in predetermined positions in the lid before the testee begins the test. The test measures visual perception, visual organisation, visual concept formation and the ability to see the underlying relations between objects. Visual-motor coordination, where the motor activity is directed by visual perception and sensory-motor feedback is important.

Test 10 – Memory for digits: The test consists of two sections, namely digits forward and digits backward. The tester reads out a series of digits and the testee has to repeat the digits in the same sequence in the first section of the test, and in the reversed order in the second section of the test. The first section has eight items in the test, with two digit series in each item. The second section has seven items with two digit series in each item. The second section has two practise examples that are not taken into account with scoring. The test measures auditory short-term memories for numbers, but does not necessarily indicate memory for complex information. The repetition of numbers in reversed order is more complex. The testee in this case has to store the information for longer and transform the stimulus material before recalling it.

Test 11 - Coding: Digits from one to nine, each with an accompanying symbol are given in a key. Each item of the tests consists of a digit and the testee has to write down the accompanying symbol for that digit. The test consists of seven practice examples which are not taken into account when scoring, followed by ninety one items. The testee has to learn an unfamiliar task, and implement what has been learned. Visual-associative learning ability is measured, along with psychomotor speed and visual-motor integration and coordination. Attention, concentration, motivation and short-term memory play an important role in this test.

## APPENDIX 6

### MOVEMENT ASSESSMENT BATTERY FOR CHILDREN–2 (Henderson, Sugden & Barnett: 2007:23-75)

The movement assessment battery for children–2 (Movement ABC-2) comprises three components. These components include a standardised test, a checklist and a manual describing the ecological approach to intervention for children with movement difficulties. For the purposes of this thesis, the standardised test battery was used. This test involves the child directly and requires a child to perform a series of motor tasks in a strictly specified way. In addition it provides qualitative information on how the child approaches and performs the tasks. The task is divided into three age bands. These age bands are three to six years; seven to ten years and eleven to sixteen years. Within each age band, eight tasks are grouped together under three headings, manual dexterity, aiming and catching and balance. Formal administration of these tasks takes approximately thirty minutes.

For every item, standard scores are provided for each year group between four and sixteen. For each of the three components, manual dexterity, aiming and catching and balance, the total score, age-adjusted standard scores and percentiles are provided (Henderson *et al* 2007:4).

The following table summarises the tasks given within each age band, and within each component tested according to descriptions in the examiner's manual (Hendersen *et al* 2007: 23-75).

Age Band	Component	Tasks
3-6 years	Manual dexterity	<ul style="list-style-type: none"> <li>• Posting coins</li> <li>• Threading beads</li> <li>• Drawing trail</li> </ul>
	Aiming and catching	<ul style="list-style-type: none"> <li>• Catching a bean bag</li> <li>• Throwing beanbag onto mat</li> </ul>
	Balance	<ul style="list-style-type: none"> <li>• One-leg balance</li> <li>• Walking heels raised</li> <li>• Jumping on mats</li> </ul>
7-10 years	Manual dexterity	<ul style="list-style-type: none"> <li>• Placing pegs</li> <li>• Threading lace</li> <li>• Drawing trail</li> </ul>
	Aiming and catching	<ul style="list-style-type: none"> <li>• Catching with two hands</li> <li>• Throwing beanbag onto mat</li> </ul>
	Balance	<ul style="list-style-type: none"> <li>• One-board balance</li> <li>• Walking heel-to-toe forwards</li> <li>• Hopping on mats</li> </ul>
11-16 years	Manual dexterity	<ul style="list-style-type: none"> <li>• Turning pegs</li> <li>• Triangle with nuts and bolts</li> <li>• Drawing trail</li> </ul>
	Aiming and catching	<ul style="list-style-type: none"> <li>• Catching with one hand</li> <li>• Throwing at wall target</li> </ul>
	Balance	<ul style="list-style-type: none"> <li>• Two board balance</li> <li>• Walking toe-to-heel backwards</li> <li>• Zig-zag hopping</li> </ul>



## **APPENDIX 7**

### **BEERY-BUKTENICA DEVELOPMENTAL TEST FOR VISUAL-MOTOR INTEGRATION**

**(Beery & Beery 2006:15)**

The Beery-Buktenica developmental test for visual-motor integration (Beery VMI) comprises three standardised tests. These are the Beery VMI, test for visual perception and test for motor coordination.

The Beery VMI is a developmental sequence of geometric forms to be copied with paper and pencil. The full form covers ages between two and eighteen and consists of thirty items. This is administered in approximately fifteen minutes. The Beery VMI assesses the extent to which individuals can integrate their visual and motor abilities.

The visual perception test consists of thirty items, one geometric form that is exactly the same as each stimulus is to be chosen from among others that are not exactly the same as the stimulus. A time period of three minutes is given to do this task. This task, being only a visual perceptual task, requires that the child simply point to the choice, thus not using motor requirements.

The motor coordination test requires that the testee traces stimulus forms with a pencil without going outside double-lined paths. Visual perceptual demands have been reduced by providing examples, starting dots and paths as strong visual guides for motor performance. The visual motor task has a time limit of five minutes and consists of thirty items (Beery & Beery 2006:15)

## **APPENDIX 8**

### **WOODCOCK-JOHNSON-III TESTS OF ACHIEVEMENT (WJIII) (Mather & Woodcock 2001:11-14)**

The Woodcock-Johnson-III tests of achievement (WJ-III) provide a comprehensive set of individually administered, norm referenced tests for measuring academic achievement. The WJ-III comprises two batteries, the standard test battery (consisting of twelve tests) and the extended battery (consisting of ten tests) (Mather & Woodcock 2001:2). For the purposes of this thesis the standard test battery will be used and the tests are described below. The subject is given a subject response booklet in which the subject responds to items requiring written responses and calculations. The examiner uses a test record book in which the subject's responses are recorded. The time taken to administer the test battery is approximately sixty minutes. All scores are converted to standard scores or percentile ranks.

Test 1 - Letter-word identification: The initial items require the individual to identify letters, and the remaining items require the subject to read and pronounce printed words correctly. The subject does not need to know the meaning of the word. The items become increasingly difficult.

Test 2 - Reading fluency: The reading fluency measures the ability of the subject to quickly read simple sentences, decide if the statement is true, and then circle yes or no in the response booklet. The difficulty level increases. A time limit of three minutes is imposed.

Test 3 - Story recall: The task requires the subject to recall increasingly complex stories that are presented. After listening to a passage the individual is asked to recall as many details of the story as possible. The following changes were made for the South Africa context:

Item 6, 9 and 10 – changed feet to metres; miles to kilometres (South Africa using metric system).

Test 4 - Understanding directions: This test is an oral language measure. The task requires the person to listen to a sequence of instructions and then follow the directions by pointing to various objects in a coloured picture. The items gradually increase in linguistic complexity as the number of tasks to perform increases.

Test 5 - Calculation: This test measures the ability to perform mathematical computations. Initial items require the individual to write single numbers, and remaining items requires the subject to perform addition, subtraction, multiplication, division and combinations of these operations as well as geometric, trigonometric, logarithmic and calculus operations.

Test 6 - Maths fluency: Maths fluency measures the ability to solve simple addition, subtraction and multiplications facts quickly. The test has a time limit of three minutes.

Test 7 - Spelling: Spelling measures the ability to write orally presented words correctly. The initial items measure prewriting skills such as drawing lines and writing letters. The next set of items requires the subject to write upper case and lower case letters. The remaining items measure the person's ability to spell words correctly.

Test 8 - Writing fluency: Writing fluency measures the subject's skill in formulating and writing simple sentences quickly. Each sentence is related to a given stimulus picture in the subjects response booklet and included a given set of three words. The test has a seven minute limit.

Test 9 – Passage comprehension:

The initial passage comprehension items involve symbolic learning. The next items are presented in a multiple-choice format and require the person to point to the picture represented by the phrase. The remaining items require the person to read a short passage and identify a missing key word that makes sense in the context of that message. The items become increasingly difficult.

Test 10 - Applied problems: This test requires the person to analyse and solve maths problems. To solve the problems the person must listen to the problem, recognise the procedure to be followed, and perform the calculations. Item difficulty increases with complex calculations.

Note: The following test items have been changed to make them appropriate to the South African child.

Item 16, 24, 25, 27, 29, 31, 33, 35, 36, 52 and 57: Adding and manipulation of money – changed to South African coinage.

Item 30 and 37: Terminology for volume changed from gallons to litres (from American to metric system used in South Africa).

Item 38, 39, 40, 41, 42, 43, 45, 48, 50, 51, 53, 54, 58, 61, 62 and 63: Terminology changed for length measurement from inches to metres (imperial to metric system used in South Africa).

Item 47 and 50: Terminology for weights changed from pounds to kilograms (imperial to metric system used in South Africa).

Test 11 - Writing samples: Writing samples measures skill in writing responses to a variety of demands. The subject must produce written sentences that are evaluated with respect to the quality of expression. Item difficulty increases by increasing passage length, level of vocabulary, grammatical complexities and level of concept abstraction.

Test 12: - Story-recall – delayed: these test measures aspects of language development and meaningful memory using previously presented stories of test 3. The task requires the individual to recall, after thirty or more minutes on the same day, the story elements presented in test 3.

## **APPENDIX 9**

### **TEST FOR THEORY OF MIND - “Sally and Anne” experiment (Frith 1989:161)**

The tester sits in front of a child with two dolls, a basket, a box and a marble and tells the following story, asking questions to ascertain presence or absence of theory of mind (ToM).

There are two dolls, Sally and Anne. To test whether the child knows which doll is which, naming questions are asked. “Which one is Sally?” “Which one is Anne?” Sally has a marble and puts it into the basket. She then leaves the scene, and Anne takes the marble and places it in a box. When Sally returns, ask the child the belief question: “Where will Sally look for the marble?” The child lacking ToM will answer in the box.

## **APPENDIX 10**

### **TEST FOR THEORY OF MIND - “Smartie box” experiment (Perner, Frith, Leslie & Leekam 1989:692)**

The tester sits with the individual child, and shows him a Smarties box, and asks: “What’s in here?” The child answers: “Smarties” or “sweets”. The tester opens the box and to the child’s surprise, a pencil is found, and the tester states: “No, it’s a pencil.” The tester puts the pencil back in the box and closing it asks the prompt questions: “What’s in here?” and “When I first asked you, what did you say?” Then the tester asks the child, “If I call in your friend, and he hasn’t seen this box, and I ask him “What’s in here? What will your friend answer?” A child lacking theory of mind will answer, “a pencil”.

## **APPENDIX 11**

### **WISCONSON CARD SORTING TEST-64 CARD VERSION (WCST-64)**

**(Kongs, Thompson, Iverson & Heaton 2004:3)**

This test involves four stimulus cards and sixty-four response cards. The four stimulus cards display one red triangle, two green stars, three yellow crosses and four blue squares. The four stimulus cards reflect three stimulus parameters, colour, form and number. The response card deck consists of sixty four cards that display figures of varying colours (red, blue, yellow or green), forms (crosses, circles, triangles or stars) and numbers of figures (one, two three or four). Each response card can be matched to a stimulus card on one or more combinations of the three stimulus parameters. The test is based on the principle that the subjects must deduce from the pattern of the examiner's responses "right" or "wrong" to the subjects placement of the cards, the parameter being tested starting with colour. After ten consecutive correct placements the examiner shifts the parameter to form and then to number. The sequence is continued until the subject has made six rounds of ten consecutive placements.

## **ANNEXURE**

- |   |                                    |          |
|---|------------------------------------|----------|
| 1 | CASE STUDY 2 – referred to as S.P. | page 245 |
| 2 | CASE STUDY 3 – referred to as L.K. | page 271 |
| 3 | CASE STUDY 4 referred to as M.D.   | page 292 |



## **1 CASE STUDY 2 – referred to as S.P.**

Personal details:

Birth date	30 August 1996
Chronological age (at date of testing)	11 years 4 months
School:	Mainstream primary school in Cape Town
Grade:	6
Sex:	Male

Home circumstances:

S.P. is the first child of three children. His parents are married and run their own family business. The parents have created a strong family bond between themselves and their children and S.P. is secure in his family environment. Both S.P.'s mother and father have their highest academic qualification as a matriculation.

Birth and medical history:

S.P. was born via caesarean section at thirty-five weeks. During the pregnancy S.P.'s mother was hospitalised several times due to threatened miscarriages. There were no complications after his birth. S.P. was described as a colicky baby and his motor development was normal (sat at 6 months, crawled at 8 months and walked at 13 months). His speech development was described as good (first words at 10 months and first sentences at 14 months).

At age 2 ½ years S.P. had chicken pox and directly after this was hospitalised with encephalitis.

He has his eyesight tested yearly, and had no problems in this area. He had ear infections (twice) as a baby, but with no complications. He has had his hearing tests and does not have any problems with his hearing.

S.P. was first referred to a clinical psychologist whilst in his grade R year at a government pre-primary school. He attended play therapy (on and off) for a period of

8 months because of presenting “anxious” behaviour. The psychologist had tested him as having a low-average potential and recommended specialised schooling for him. A referral to an occupational therapist was also recommended because of concerns with respect to his delayed fine motor skills. He also presented with difficulties in concentration. An occupational therapist did an assessment in May 2002, and difficulties in postural control, tactile perception, bilateral integration, crossing the midline, gross and fine motor coordination, visual motor integration and body concept was found. Occupational therapy (OT) was recommended to address these delays. S.P.’s parents did not see any differences in his functioning after OT was terminated after a period of 8 months.

S.P. was assessed by another clinical psychologist in August 2004 – when he was in his grade 2 year at his primary school as he had difficulties with behaviours and was struggling to cope scholastically. It was noted in this assessment that he had a history of attention and concentration problems, motor tics, obsessive behaviour, rages and mood swings. This test battery concluded with a summary of noted problems which included levels of abstract thinking, language comprehension, reading comprehension, problem solving and reasoning and visual integration. These skills were noted to be linked to simultaneous processing which is associated with the right hemisphere, implying right hemisphere “dysfunctioning”. His strengths were recorded as visual and auditory sequencing which would give him a “strength” of oral verbal expression. Results from this assessment concluded with recommendations of a trial period of Ritalin to address his concentration problems, and an EEG to explore the possibilities of seizures. S.P. did have Ritalin for a period of four weeks, but his parents stopped this after he reacted negatively to the medication – his mom describing him as being an “emotional mess” whilst on Ritalin. The medication was changed to Concerta, and he seemed better on that, but had severe headaches when taking Concerta. When the Concerta was finished, after two months, his parents did not continue with it, as no differences were observed by his teachers. He has not had medication since. S.P. attended neurofeedback sessions after this assessment. His parents did not report any changed differences in his behaviour after these sessions.

Scholastic history:

S.P. has always been at the same government primary school. His grade 1 and 2 teachers assessed him as a slow and erratic learner. S.P.'s grade 3 teacher commented that "it was almost as if something would trigger a little switch in his head at times which would make him bomb out". S.P. attended extra remedial classes within the school day for the duration of his grade 2 and 3 years.

S.P had a good teacher at the beginning of grade 4 who "understood him" and his mother reports that he felt safe in her class and couldn't wait to go to school everyday. This teacher left after the first term, which caused a great deal of stress for him. In grade 5, S.P.'s teacher noted that he tried his best. An area of concern that was noted was that he often did not understand verbal or written instructions. Reading and comprehension were described as his weakest learning areas.

S.P.' s mother noted that his performance in the classroom is very much affected by the personality and teaching style of the teacher. She observed that in grade 1 and 2 he had teachers that tended to "scream" and S.P. developed nervous twitches. In grade 3 he was placed with a teacher who was more "gentle" and gave a lot of feedback with his parents throughout the year. This turned out to be a good year. His next grade he had a change of teacher during the year and this created great deal of stress for him. Grade 5 again was a "good year as his teacher seemed to "understand" him..

Section 1.3 following presents a detailed summary of the analysis of S.P.'s school records.

### **1.1 Results: Questionnaires**

The questionnaires that were completed as part of this test battery included the Conners' questionnaire for parents and teachers, the Gilliam Asperger disorder scale (GADS) and the Dunn sensory profile. The results of these questionnaires are presented below.

### *1.1.1 Conners' parent and teacher questionnaire*

Items from the Conners' teacher questionnaire scoring a "very frequent, very often" response was the following:

- Is one of the last to be picked for teams and games
- Seems over focused on details
- Has poor social skills

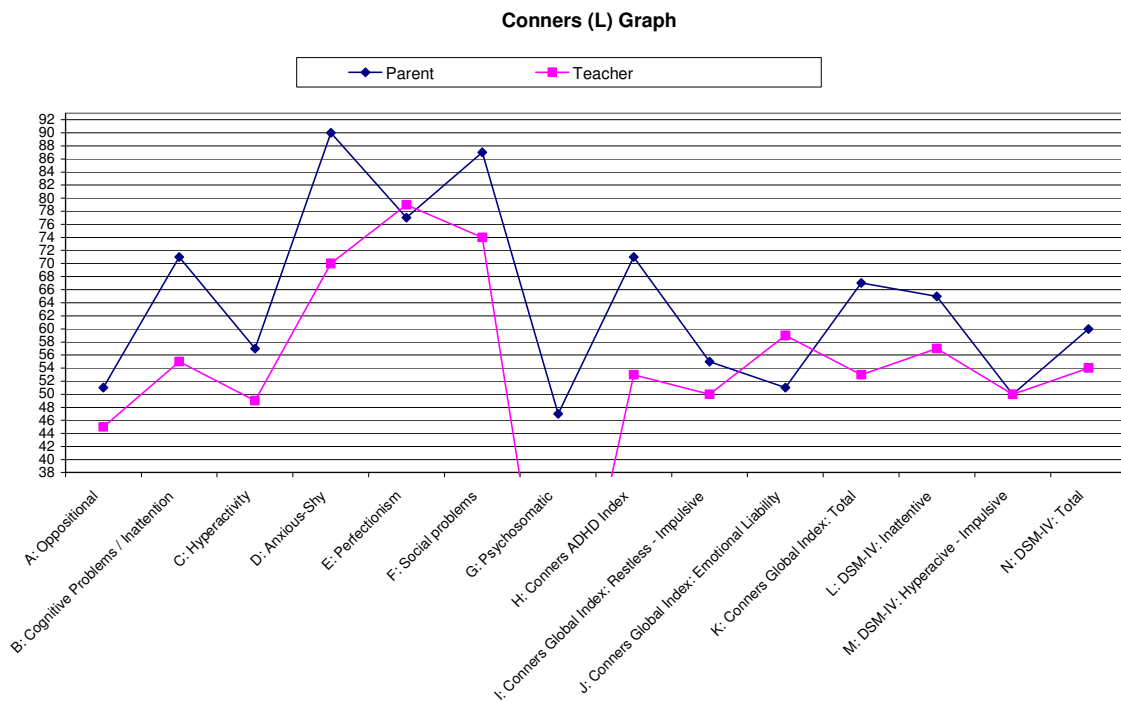
Items from the Conners' parent questionnaire scoring a "very frequent, very often" response was the following:

- Difficulty doing or completing homework
- Everything must be just so
- Has no friends
- Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort
- Difficulties sustaining attention in tasks or play activities
- Fails to complete assignments
- Afraid of people
- Has trouble concentrating in class
- Does not seem to listen to what has been said to him
- Needs close supervision to get through assignments
- Afraid of new situations
- Does not know how to make friends
- Excitable, impulsive
- Things must be done the same way every time
- Never gets invited to friends houses
- Inattentive, easily distracted
- Makes careless mistakes in schoolwork
- Has a lot of fears
- Has rituals that he must go through
- Distractibility or attention span a problem
- Cannot grasp arithmetic

- Afraid of the dark
- Sets very high goals for self
- Fidgets with hands or feet or squirms in seat
- Touchy or easily annoyed by others
- Fidgeting
- Gets upset if someone rearranges his things
- Only attends if it is something he is very interested in
- Feels inferior to others
- Mood changes quickly and drastically
- Easily frustrated in efforts
- Easily distracted by extraneous stimuli

The results of the parent and teacher's questionnaire are combined and presented in the Graph 1.1. The teacher observed the most difficult areas of functioning for S.P. was in perfectionism, anxiety and social problems. His parents also note these as the highest areas of problematic behavioural symptoms, but with anxiety and social problems being more problematic. These behaviours correlate, although his parents rate the difficulties as higher than his teacher. His teacher does not rate inattentive symptoms as problematic, whereas his parents rate inattentive symptoms as being more problematic.

Graph 1.1 Conners' graph showing results for S.P. from both the parent and teacher Conners' questionnaire



The horizontal axis describes the different subscales that are represented in the Conners' questionnaire. The vertical axis reflects the T-scores or standard scores that were calculated from the raw scores obtained when analysing the responses to the questionnaires. According to Conners (1997:44) T-scores of above 66 indicate significant problems. T-scores of 45-55 indicate average scores and T scores of less than 35 indicate no area of concern.

### 1.1.2 Gilliam Asperger's disorder scale (GADS)

The GADS subscale scores for S.P. are given in percentile rank. The percentile rank indicates the percentage of scores in the normative group that scored lower than S.P. A score on the 37 %ile rank (in S.P.'s case for social interaction) thus indicates that S.P. has more social difficulties than 37% of children his age – which is not that significant a problem. S.P.'s results are given below.

- Social interaction – 37 percentile rank
- Restricted patterns of behaviour – 63 percentile rank
- Cognitive patterns – 75 percentile rank

- Pragmatic skills – 63 percentile rank

S.P.'s main area of difficulty as rated by his parents from this subscale is in cognitive problems, followed by pragmatic skills and restricted patterns of behaviour. The GADS works out an Asperger disorder quotient, which in S.P.'s case was 105 (the threshold being 80), making a diagnosis of Asperger's disorder highly probable on the GADS.

Behaviours that scored as "frequently observed" by S.P.'s parents were the following:

Social interaction subscale:

- Needs an excessive amount of reassurance if things are changed or go wrong
- Lacks subtlety in expression of emotion
- Requires specific instructions to begin tasks
- Expresses feelings of frustration and anger inappropriately
- Becomes frustrated quickly when unsure of what is required

Restricted patterns of behaviour subscale

- Has preoccupation with specific subjects or objects that is abnormal in intensity and focus
- Requires extensive directions from others

Cognitive patterns subscale:

- Talks about a single subject excessively
- Uses exceptionally precise or pedantic speech
- Attaches very concrete meanings to words
- Shows excellent memory
- Shows an intense, obsessive interest in certain intellectual subjects

Pragmatic skills subscale:

- Has difficulty understanding slang expressions
- Has difficulty understanding what causes people to dislike him
- When confused, doesn't ask for clarification but switches to a familiar topic

### *1.1.3 Dunn's sensory profile*

The sensory profile caregiver questionnaire was answered by S.P.'s parents. The questionnaire measures a child's responses to sensory processing and the profiled scores are used to measure the effect of the child's sensory processing on performance in the child's daily life.

The following areas are highlighted as being how he responds to the stimulus "always – 100% of the time" and is therefore noted as significant.

- Auditory processing – has trouble completing tasks when the radio is on; is distracted if there is a lot of noise around
- Visual processing – becomes frustrated when trying to find objects in competing backgrounds
- Sensory processing – shows strong preference for sweet smells, sweet taste and craves sweet foods and popcorn
- Modulation of movement – prefers quiet sedentary play and becomes overly excitable during movement activity
- Modulation of sensory input affecting emotional responses – needs more protection from life than other children; doesn't notice when people come into the room
- Emotional and social responses – is sensitive to criticisms; has definite fears; seems anxious; displays excessive emotional outbursts when unsuccessful at a task; expresses feeling like a failure; has difficulty making friends; has fears that interfere with daily routine
- Behavioural outcomes of sensory processing – uses inefficient ways of doing things; has difficulty tolerating changes in plans and expectations; difficulties tolerating changes in routines.

There are three sections used for analysis of results from the items answered in the questionnaire. These sections are sensory processing, modulation and behavioural and emotional responses (Dunn 1999:1). In S.P.'s case, the only sensory system that scored a definitive difference to the norm was in oral sensory processing. The



other basic sensory systems including vestibular processing touch processing and multisensory processing all scored as being typical responses.

Of the five sensory modulation areas, S.P. had difficulties with sensory processing related to endurance/tone, modulation of movement affecting activity level and modulation of sensory input affecting emotional responses. Areas that were scored as not problematic included modulation of movement related to body and modulation of visual input affecting emotional responses and activity level.

The final section of behavioural and emotional responses resulted in assessed difficulties in the areas of emotional and social responses as well as behavioural outcomes of sensory processing.

## **1.2 Results: Neuropsychological test battery**

The neuropsychological test battery includes tests of intelligence, motor functions, academic achievement, theory of mind, perceptual functions and executive functions. The first set of results to be presented is the results of the SSAIS-R test battery, measuring scores of intellectual potential.

### *1.2.1 Intelligence (IQ)*

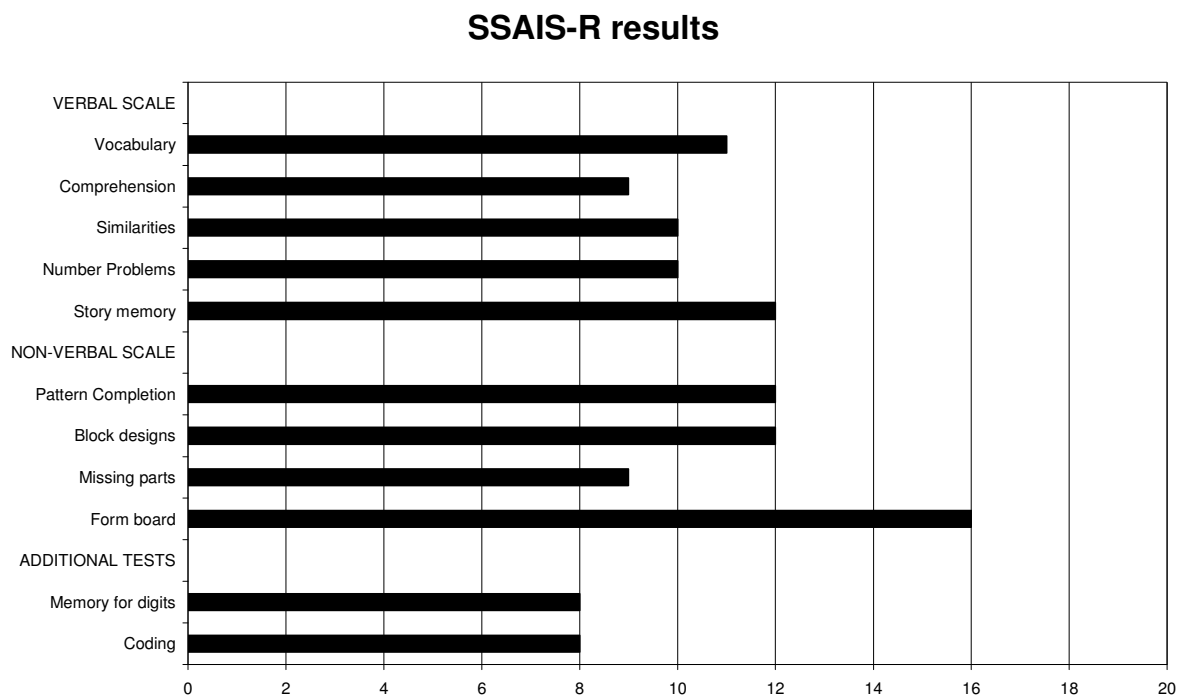
The results obtained by S.P. on the Senior South African Individual Scale – revised (SSAIS-R) are presented in the following Graph 1.2. The test items from the test battery are listed on the vertical axis and the results of the subtests are listed on the horizontal axis. The results given on the horizontal axis are converted to scaled scores (between 1 and 20) with 10 being an average score. The test items are given on the vertical axis and divided into verbal scale ((vocabulary, comprehension, similarities, number problems and story memory) and non verbal scale (pattern completion, block designs, missing parts and form board.)

S.P.'s IQ scores were obtained from the SSAIS-R. These scores are also presented scaled scores, with an IQ of 100 being the average. Statistically the “average” range

for IQ is between 85 and 115 within a measure of one standard deviation. S.P.'s scaled scores fall into the average range for verbal ability and the above average range for nonverbal and global ability. S.P.'s scores were the following:

- verbal scale: 104
- non-verbal scale: 115
- full scale: 110

Graph 1.2 Results of subtest scores of SSAIS-R for S.P.



S.P.'s highest score was in form board, indicating advanced skills in visual perception, visual organisation and visual concept formation. This skill was again noted in the pattern completion test as well as the block design test which required the ability to analyse, copy and assemble abstract two dimensional patterns. It was noted in this subtest that S.P. really enjoyed the testing stimulus, describing it as "cool". During the answering of the test he had lots of internal dialogue with himself, talking himself through the solution. He did not give up on any of the tasks, wanting to complete the task and "get it right". He also presented with strengths in the area of short term memory for verbal information (story memory),

S.P. scored in the average range for vocabulary which measures verbal learning ability. This subtest is an indication of language development and requires long term memory. S.P. answered this test impulsively. If he did not know an answer immediately he would “guess” without trying to work out the meaning of the word from the visual cards presented. In the similarities test, his score was in the average range. This verbal test measures logical, abstract argument and the ability to distinguish between essential and superficial similarities. S.P. initially answered these questions concisely and to the point. Half way through the questions he “got stuck” and after this he was not able to get himself back on track to his previous performance, and when asked for a response to the two stimulus words given, he would just answer “they are the same” for all the remaining questions. S.P. scored in the average range for numerical reasoning ability. He once again however demonstrated an inability to “stay” with a problem in order to process and reason with the presenting stimulus in order to get an answer. He would answer all questions quickly and spontaneously, without any “thought processing”.

Results from the comprehension subtest and the missing parts subtest both scored a scaled score of 9, the lower end of the “average” range. The comprehension subtest which measures knowledge and understanding of conventional behaviour as well as the ability to use social satiations in a meaningful way, was answered by S.P. in a very “long winded” way. His answers went into a lot of unnecessary verbal detail, expanding on his own story or example with irrelevant detail. He tended to answer questions as though he had been taught a response and missing the concept. For example, in answering the question “Why should you keep a promise?” he answered “it means don’t tell anyone else”. The missing parts subtest measures the ability to distinguish between essential and non essential information presented as a visual stimulus. His low score on this test confirms an attention to irrelevant detail.

An area that tested in the below average range was memory for digits which is an indicator of memory for complex information. It requires the ability to order and recall a sequenced set of numbers. S.P.’s other area of tested weakness was in coding, measuring visual associative learning. S.P.’s results from the coding subtest

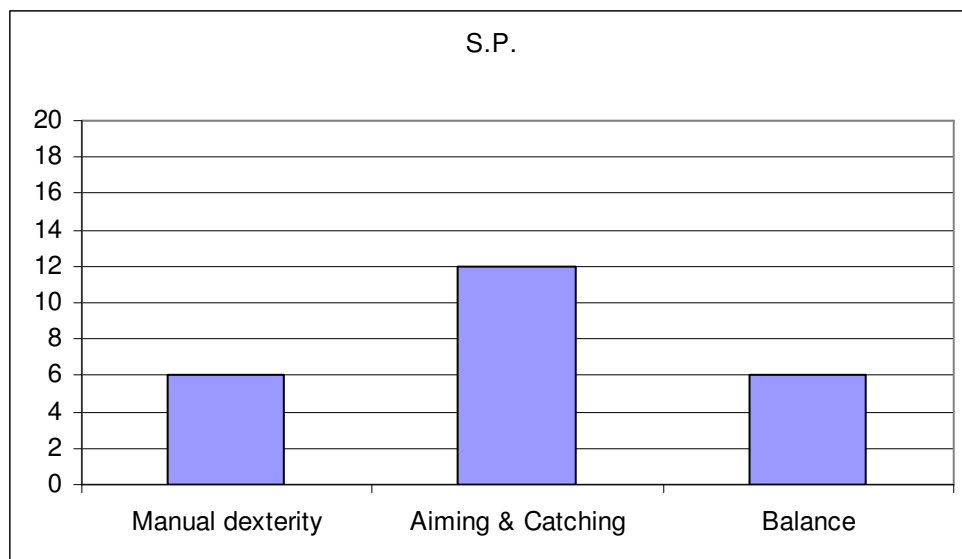
concludes that he has weak skills in visual motor integration as well as visual motor coordination.

### 1.2.2 Motor functions

In this section of the test battery, two different tests were used. The first set of results presented are those of the Movement ABC-2. This is an assessment tool that measures manual dexterity, ball skills and balance. These skills are noted on the horizontal axis of the following Graph 1.3. The results that are scored are converted to a scaled score which is between 1 and 20, and this score is represented on the vertical axis of the same graph. An average score is 10 with a standard deviation of 3. On this scale approximately two thirds of children have scores between 7 and 13 (Henderson *et al* 2007:84).

S.P. scored in the below average range for manual dexterity and balance. His aiming and catching score was in the average range.

Graph 1.3 Graph of motor functions for S.P. as determined from the Movement ABC-2 results



Qualitative observations of S.P. while executing the various tasks from the test battery are now discussed. During the manual dexterity tests, S.P. demonstrated good focussed attention with good sitting posture. He struggled initially with the

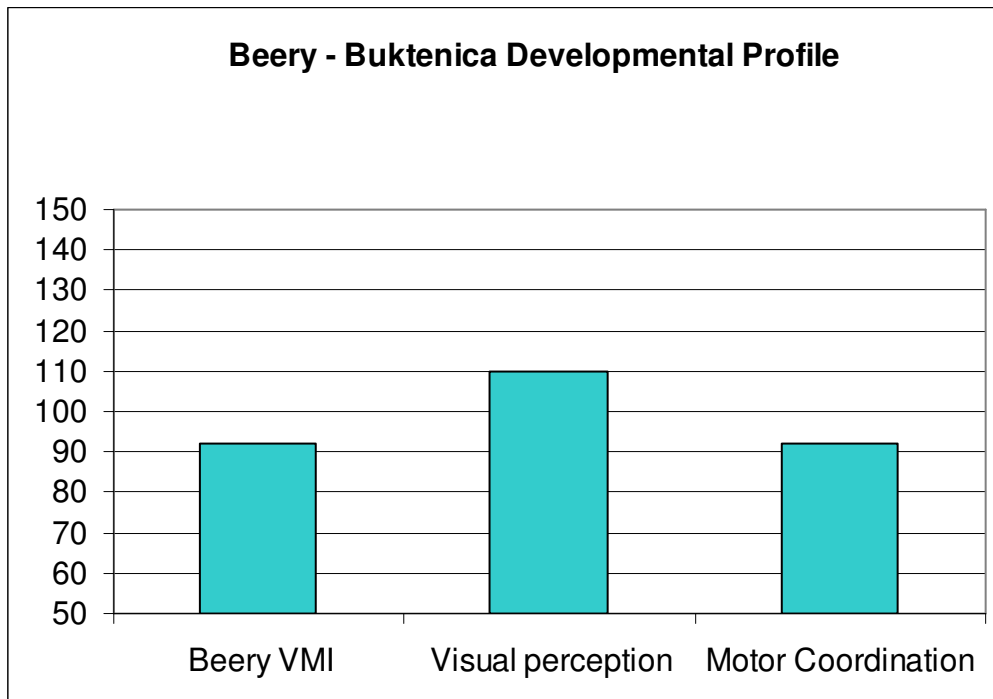
“triangle and bolts” test, commenting that “building is hard”. On the second trial however he did much better. During the drawing trail, he struggled to change direction with his pen, lifting his pen, to change direction which interrupted a smooth flow of the pen. He tended to try and turn the page, rather than change direction, finding this task difficult.

In the aiming and catching section of the test, S.P. initially struggled with the task, describing himself as “such a clutz”. With practise however, he did better than he had anticipated, which resulted in him feeling very satisfied with himself. When the task changed to throwing the ball onto a target on the wall, he commented “I don’t like throwing on a target”, but again did well on this task after his practised examples.

S.P. struggled with the balance tasks, but was able to do one step hopping well with both his dominant (right leg) and non-dominant leg. S.P. is right handed, and demonstrated a good pencil grip when executing pencil and paper tasks.

The second aspect of motor functions that were tested in this neuropsychological test battery was the tests of motor integration as tested on the Beery-Buktenica developmental tests. These results are included in Graph 1.4. The Beery-Buktenica developmental test for visual motor integration consists of three subtests. These include the visual motor integration (VMI) test which consists of a developmental sequence of geometric forms which are copied with a pencil on paper. The additional tests include tasks of visual perception and motor coordination. These tasks are represented in Graph 1.4 below on the horizontal axis. Scores obtained during the testing session are converted to standard scores which are represented in the graph below on the vertical axis. The standard score mean is 100 with a standard deviation of 15 (Beery & Beery 2006:89).

Graph 1.4 Graph of Beery-Buktenica developmental tasks representing scores obtained by S.P.



Qualitative observations of S.P. while doing the test for VMI concluded that S.P. wanted to rotate the page to complete the more complex drawing which required a “change of direction”. S.P. found it difficult to “get his hand” to change direction to draw the more complex designs.

Both the visual perception test and the motor coordination tests were well done. S.P. demonstrated good focussed attention while doing these tasks. The motor coordination test was done with a lot of internal dialogue. S.P. had to “talk” himself through the task, especially when the stimulus material changed from no “dots” within the figures to guide him. It is of note that the initial instruction includes mention of drawing from one dot to another. It is clear that S.P. listens to the “rule” and when this changes has difficulty shifting his thought pattern.

### 1.2.3 Academic achievement

The test battery that was used to determine academic achievement was the Woodcock-Johnson (WJIII). This test is divided into results of reading, oral language,

maths and written language. The results of the WJIII tests of academic achievement are given in Table 1.1. The scores shown are in age. This means that the performance on a specific test was typical of a child of that age equivalent. S.P.'s chronological age at the time of testing was 11 years and 4 months. These results are thus to be interpreted as comparing S.P.'s performance to that of his chronological age.

Table 1.1 Table of S.P.'s results for scholastic achievement as tested on the WJIII tests of academic achievement

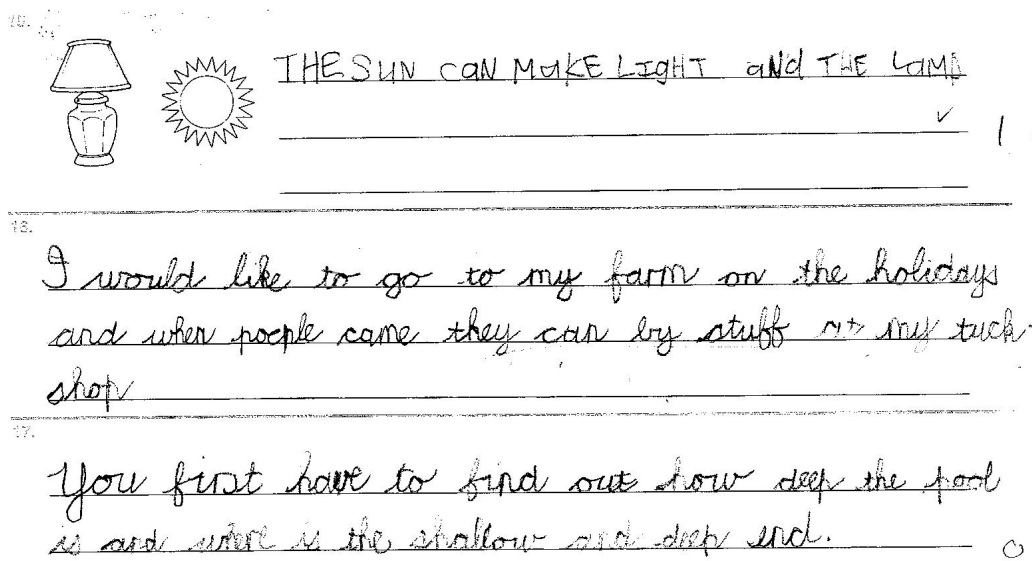
Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Reading	Letter/word identification	10 yrs 8 months	S.P. approached this task in a hurried manner. He did not use any word decoding strategy to assist with reading unfamiliar words, just guessing at words which he did not know by sight.
	Reading fluency	9 yrs 9 months	
	Passage comprehension	8 yrs 8 months	S.P. struggled with this aspect of the test battery, answering by his own associations and not getting the "concept" (see examples discussed in the paragraph following this table).

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Oral Language	Understanding directions	9 yrs 7 months	S.P. struggled to remember the sequences of the instructions – as though there was too much verbal information, which was “competing” for attention
	Story recall	advanced (>21 years)	S.P. was very good with remembering the facts presented in the story recall and delayed recall test.
	Delayed story recall	advanced (15 yrs 9 months)	
Mathematics	Calculation	12 yrs 4 months	S.P. was good at long division, clearly following the memorised “steps” he had learnt. He was unable to do fractions.
	Maths fluency	9 yrs 10 months	S.P. did not always notice the operation (+/-) which affected his results. He worked all his answers out on his fingers.
	Applied problems	10 yrs 5 mths	S.P. once again did not display any “thought processing” to answer more difficult questions.



Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Written language	Spelling	9 yrs 2 month	S.P. had difficulty with spatial direction of b/d and worked this out with his hands - a pre-learnt method. He struggled with the "rules of spelling", especially confusing vowel sounds (was/wase; difference/dfrance).
	Writing fluency	9 yrs	Much time was taken up with S.P. trying to be neat. His writing was printed, with a mixture between capitals and small letters.
	Written samples	8 yrs 2 months	During this test, S.P. mixed his writing from writing in capitals to writing in cursive, which he did much better (see Figure 1.1). His errors were characterised by mixing tenses and not answering the question. His responses were often changed to a behaviour – what to do in a related situation – again illustrating learnt behaviour rather than understood behaviour.

Figure 1.1 Examples of S.P.'s answers to the written samples test from the WJIII



Qualitative observations of this testing battery conclude that S.P.'s primary concern was in following the instructions and answering in the "best way" he could. Care was taken with his presentation and his writing. His responses were characterised by a "learnt" method or behaviour, his area of difficulty being in "thinking through, or reasoning" with facts presented to him. He would answer impulsively, without thinking through an answer, clearly not "getting" the main idea of the question or getting the concept of what was being asked. His advanced memory ability is allowing for some scores to be good (such as certain calculation items). All tasks requiring a timed component (fluency tests) he scored at below his age level. S.P. presents with a degree of performance anxiety. This affects his overall ability to function as he 'obsesses' about things having to be right".

#### 1.2.4 Theory of mind

The theory of mind (ToM) tests that were conducted in this test battery test the subjects ability to think, feel and view the world from another person's perspective. This ability has important implications for social interactions and communicative intent. In the case of S.P, both the ToM tests which were presented to him, he answered correctly.

The first test was the “Sally and Anne test” as described in Appendix 9. S.P. was initially confused with what was required. When I repeated the question, he answered correctly. S.P. answered the “Smartie box” question described in Appendix 10 without difficulty.

### 1.2.5 Executive functions

Intentional behaviour, planning and organising steps to achieve a goal, purposeful action and effective performance are described as “executive functions”. The ability to conceive alternatives, impulse control, memory and an ability to sustain attention are all components of executive functioning that are tested in the Wisconsin card sorting test -64 (WCST-64) that was used in this test battery. The test is based on the principle that the subject must deduce from the examiner’s responses the pattern of the presenting cards which are “sorted” according to stimulus parameters of colour, form and number. The only response from the examiner is “right” or “wrong” to the placement of the cards.

S.P. did not manage this test well. He struggled to change his “thought pattern” and was not able to “think independently” to reason the pattern of responses. Table 1.2 gives the results obtained by S.P. His errors were characterised by perseveration responses.

Table 1.2 Results of S.P. for the WCST-64

Total number of errors	Mild impairment
Perseverative responses	Mild impairment
Perseverative errors	Mild impairment
Non perseverative errors	Average
Conceptual level responses	Mild impairment

S.P. struggled to “change” his thinking pattern in this test. He tended to get stuck on one category (such as form), perseverating in his responses. Eventually when he did understand that the first category being tested was colour, he again “got stuck” on this, when the category changed. His responses reflect a “rote” response without a flexibility of thinking.

### 1.3 Results: School records

Table 1.3 presents a summary of an analysis of S.P.'s school records. S.P. has always been at the same mainstream government school since grade 1.

Table 1.3 Summary of analysis of school records of S.P.

Year	Grade	Comments given by the teacher on the report card and general classroom observation records	School marks achieved	Therapies attended
2003	1	Both parents always attended parent meetings. Problems with daydreaming and understanding maths concepts. His word reading and phonics were good but he struggled with reading fluency. He also presented with difficulties with forming letters.		
2004	2	S.P. was put on a trial period of Ritalin after an assessment by a clinical psychologist. The teacher reported no difference in his behaviour while on the medication.  It was noted in his file that one day when there was a substitute teacher; he did no work in his book the whole day.  S.P. was noted to be a "talkative" child.	S.P. progressed to grade 3, but was assessed as "only partially satisfying" the requirements for maths, as well as language structure and usage, thinking and reasoning (problem solving) and writing skills including creative writing	Remedial maths teaching at the school. It is reported that he can learn "by rote" but does not understand maths concepts.
2005	3	S.P. was described as being polite and trying very hard, but producing erratic work. His teacher noted that he did not have confidence to try new work. His maths concepts were noted to be particularly weak.  Self-esteem was noted to be low, and he would often sit in class and not do any work if he got "stuck" as though he could not move on or do any independent problem solving.	S.P. progressed to grade 4, but again was assessed as "only partially satisfying" requirements for maths with particular difficulties in word problems and measurement. His English listening skills, reasoning and thinking and language structure and usage were also weak.	S.P. continued to attend remedial classes for maths within the school day.

Year	Grade	Comments given by the teacher on the report card and general classroom observation records	School marks achieved	Therapies attended
2006	4		<p>S.P. school marks were erratic</p> <p>English marks: Speaking – 90% Writing – 50% Reading and thinking - 55%</p> <p>Maths – 10% Economic management sciences (EMS) – 20% Life Orientation (LO) – 20% Natural sciences - 75% Technology – 80%</p>	
2007	5	<p>S.P.'s maths, language and reasoning skills are weak. He finds comprehending and written work very difficult. The “hard work” of his parents was acknowledged.</p> <p>His teacher notes the following detail of his behaviour and classroom functioning: he does not always grasp a situation or get the point of a story; he is “hyper focussed on the detail and misses the big picture; poor social skills, other children find him tiresome; gives up easily; needs special attention when new work is explained as he tends to become anxious.; social cues are not always interpreted correctly; he will talk non stop if allowed to – but this is often irrelevant to the topic being discussed.</p>	<p>School marks at the end of term 4 of grade 5 are the following:</p> <p>English – 51% Afrikaans – 55% Maths – 50% Natural sciences – 54% Social sciences – 46% Technology – 81% EMS – 56% Arts and culture – 64% LO. – 64%</p>	

It is of note that S.P.'s maths abilities always presented as his greatest area of weakness and his English skills (particularly “speaking:” was his greatest skills (see grade 4 results). The consistent comments from his teachers have been that his marks are “erratic”.

#### **1.4 Results: Classroom and playground observation**

In an interview with S.P.'s teacher the following issues were highlighted. He always tried very hard in class and was not a behavioural problem. He did well with classroom routine and did his schoolwork at an acceptable level. A concern for his teacher was that he often did not understand verbal and written instructions resulting in low comprehension scores. S.P.'s teacher noted that he cannot do tasks that are new or novel and needed a lot of assistance when new tasks or concepts were introduced. She described him as being "hyperfocussed" on things, explaining that S.P. sees and focuses on the small details, often missing the 'big picture' or concept being presented. He tended to talk a lot on a topic unless stopped by the teacher.

When asked about S.P.'s social and emotional responses to events, she noted that S.P. never showed any emotion to things that happen in the classroom. He appeared happy and was always smiling – no matter what the situation, mood or tone of the class was. She noted that he did not have any particular friend, "being" alongside his peers but not really interacting with any particular friend.

When observing S.P. on the playground it was evident that he did not "play" with any group or any particular friend. He moved around by himself, (standing on the periphery of groups, against the fence or against the wall of the building), observing and when he felt comfortable, he would "join in a game" – without any communication with the other children playing the game. It is clear S.P. does not understand the social nature of the games played on the playground, as he participates, and then moves on when something happens in the game which changes the direction of who is "on" or "out". Between games, S.P. would move around the edges of the playground, with his hands in his pockets. It is important to note that he did not appear unhappy, and was "playing" and participating in his own way.

### **1.5 Results: Other qualitative notes and responses to one-on-one interactions with S.P during the testing sessions**

S.P. expressed that he always likes to be organised, and gets very nervous when “things” change. If given the opportunity, S.P. is very verbal. His conversation is very precise with a lot of added detail such as the exact time of events that happened, as well as irrelevant detail. When talking about his favourite teacher, he described the exact date and time when she announced to the class that she was leaving the school. When talking about the animals on his farm he spoke in detail about his sheep, what she looked like, down to her eyelashes. He was able to give (in very descriptive detail) the exact directions to his farm, describing all the turnings, trees and boulders along the way.

S.P.’s responses to being asked what the “worst thing” about school was, he described the worst thing for him was to be given homework, as “my mom and dad get angry about the work I do”. Of interest, was his response to being asked, the day before his new term (after the long summer holidays), if he was looking forward to going back to school to see his friends – he commented that he had “forgotten what their faces looked like – and forgotten their names” - clearly his concept of a friend is not rooted in a mutual relationship. He had had no contact with any “friends” during the school holidays, and this did not seem to affect him “socially and emotionally”.

### **1.6 Results: Interview with S.P’s parents**

S.P.’s mother described how she remembered S.P. as a child playing for hours with cars or fridge magnets, putting them in rows. This appeared to make him happy, and he did not really “play” with his cars in any other way. S.P was described by his parents as “always has been a perfectionist”. He would “go into a chemist and straighten the sunglasses stand”, “line up the products on the shelf at the Spar”, his “cars were lined up and sorted by size and colour”.

A main concern raised by S.P.’s mother was his difficulties with grasping school work. She noted that initially she had thought that S.P. was lazy, choosing “not to think”,

especially when work became complex. S.P.'s mother became very frustrated with his inability to remember "facts" such as tables and spelling. Having rehearsed perfectly the previous night, the following morning it was as if he had never done his homework. S.P.'s mother notes that he struggles particularly with maths concepts – not being able to generalise. An example of this is when he was doing "sums" in grade 2. He was working out: "2 apples + 3 apples is 5 apples (having physically counted the apples). When asked after this "2 carrots + 3 carrots – S.P. was not able to understand this was also 5 carrots – S.P. becoming so frustrated because "apples and carrots are not the same".

S.P.'s father notes that he has a fear of getting into trouble, and getting things "wrong". This results in him being told something once – and he never transgresses. His mother reflected that at the beginning of his new school year in January, the teacher introduced a "black book" system where three entries in the black book meant the learner would get detention. This caused tremendous stress for him – as he is "never in trouble" and could not think of anything else, perseverating on the fact that he must "stay out of the black book". This thought pattern "took over" his thinking at the expense of anything else happening in the classroom.

S.P.'s parents described him as not being good at sports as he is "not being able to "understand" the complexities of team sports such as rugby and cricket". He is never "picked" for teams and is always last in athletics. As a result of this he does not participate in any school sports.

S.P.'s father notes that he has specific "rituals" which he adheres to in the morning (such as waiting to hear the gate open - his signal that the domestic helper has arrived for work) as a cue to have breakfast. One morning she did not arrive – resulting in his routine being broken and therefore missing breakfast, resulting in a chain reaction of "negativity" before school. His order for dressing needs to be adhered to. S.P. first puts on his underpants then shirt then school longs, and so on until he is dressed, but the sequence of dressing is noted by his mother as always the same. One morning his shirt was not ironed and his mother "made him" put on his school longs while waiting for his shirt to be ironed. He completely "lost it" and



was not able to function at all that day, being completely “disorientated”. His parents conclude that he just cannot handle change. S.P.’s parents note that he also has a tendency to have “obsessive” thought patterns. S.P. went through a stage where he was obsessed with new movies – he would go through the newspaper and then wanted to see all the new releases before the weekend was out. This “phase” has passed, but he tends to go through “obsessive” thought patterns like this at different times. S.P. has his own room which he keeps “squeaky” clean, and knows where “everything” is in his room.

A frustration experienced by S.P.’s parents is his difficulty with communication. He is described as tending to tell a long elaborate story in a lot of detail and missing the “point”. S.P. struggles to convey the concept or essence of the “story”. An example cited by S.P.’s mother is that he spent fifteen minutes describing, over a family dinner, the “rules” of the two different ways one can play a specific game at school “Running Red Rover”. After explaining explicitly these two different options, he stated at the end of the detailed description, that he was playing the game at break. His parents and family were astounded that the entire communicative message was that he had played the game at break – but it had taken fifteen minutes of detailed explanation to get to that point!

S.P.’s parents main concern regarding S.P. is that he does not know how to deal with day-to-day life. He does not understand situations or when new information (school work) is explained to him. When explaining something to him, great care has to be taken as he often misinterprets the explanation, focussing on the wrong thing. He is very fearful of the dark, and is afraid of “getting into trouble”. He is very polite with very good manners, and cannot understand why he is different, and will often verbalise that he is stupid. As parents, there is a concern that S.P. takes so much attention that their other two children “lose out” on their parents time. S.P.’s parents report that he spends up to five hours a day (way too much) on homework and feels that the world is cruel and unfair. S.P.’s mother describes the gap between S.P. learning new work and actually understanding it is very big. His thinking is complicated although not incorrect. He struggles with “exceptions” to a rule. S.P.’s father believes S.P. is not stupid, he asks interesting questions, and excels in things

he enjoys, disregarding that which he does not like. S.P.'s parents concluded the interview summing up that "he appears nervous every moment of the day".

## 2 CASE STUDY 3 – referred to as L.K.

### Personal details:

Birth date	17 June 1998
Chronological age (at date of testing)	9 years 8 months
School:	Mainstream primary school in Cape Town
Grade:	3
Sex:	Male

### Home circumstances:

L. K. is the eldest son of his parents who are married and have a stable family life. He has a younger brother who is in grade 1 and has a diagnosis of ADHD. Both parents matriculated, and L.K.'s mother has a degree in education and is a lecturer. L.K.'s father is an operations manager.

### Birth and medical history:

L.K. was born three weeks early by caesarean due to ruptured placenta. There were no complications at birth and L.K.'s birth weight was 3.060kg. His developmental milestones were all met within the average limits. His language development was described as normal.

L.K. has had no serious childhood illnesses and no difficulties with ear infections. His hearing has been tested at age six and there were no problems noted with his hearing. His eyesight has not been tested but there is no reason for concern with regards his eyesight. His sleeping habits are described as good. L.K.'s eating habits are described as 'fussy' and "very health conscious" and at present is not eating red meat. L.K.'s hobbies are described by his mother as "collecting junk" and "building anything". His interests are described as planets, science, buildings and machines.

L. K.'s first assessment was by an occupational therapist when he was five years old at pre-school. He attended occupational therapy for a year because of concerns with low muscle tone, poor vestibular processing and weak drawings. L.K. was diagnosed with ADHD by a paediatrician when he was in grade 1 and given Ritalin.

He is currently on Concerta 36 mg daily, which is being monitored by a paediatrician. L.K. completed a series of neurofeedback sessions (September 2007). There were no observable changes in his behaviour after these sessions.

Scholastic history:

L.K. attended nursery school from two years old. He attended a pre-primary school for his grade 0 and grade R years. He attended a mainstream government school from grade 1 to grade 3. He was unable to meet the promotion requirements for grade 3, and is currently repeating his grade 3 year at the same mainstream school. He was assessed by an educational psychologist at this time, and a diagnosis of Asperger syndrome was made. An application to a specialised remedial school was then made for him.

L.K.'s parents main concern for their son is that he will be able to "survive" the educational system. They understand, since his diagnosis of AS, that he "thinks differently" and they comment that L.K. has special talents that he will one day be able to contribute to society in a positive way. Their concern is that he loses self-esteem and confidence because of difficulties with "meeting" the education department's assessment criteria.

## **2.1 Results: Questionnaires**

### *2.1.1 Conners' parent and teacher questionnaires*

Items from the Conners' teacher questionnaire scoring a "very frequent, very often" response was the following:

- Appears to be unaccepted by the group
- Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort
- Is one of the last to be picked for teams or games
- Is an emotional child
- Everything must be just so
- Restless or overactive

- Does not seem to listen to what is being said to him
- Keeps checking things over and over
- Inattentive, easily distracted
- Has difficulty organising tasks or activities
- Has difficulty sustaining attention in tasks and play activities
- Does not know how to make friends
- Seems over-focused on details
- Fidgeting
- Has poor social skills
- Fidgets with hands or feet or squirms in seat
- Demands must be met immediately – easily frustrated
- Short attention span
- Distractibility or attention span a problem
- Things must be done the same way every time
- Does not follow through with instructions and fails to finish school work
- Easily distracted by extraneous stimuli

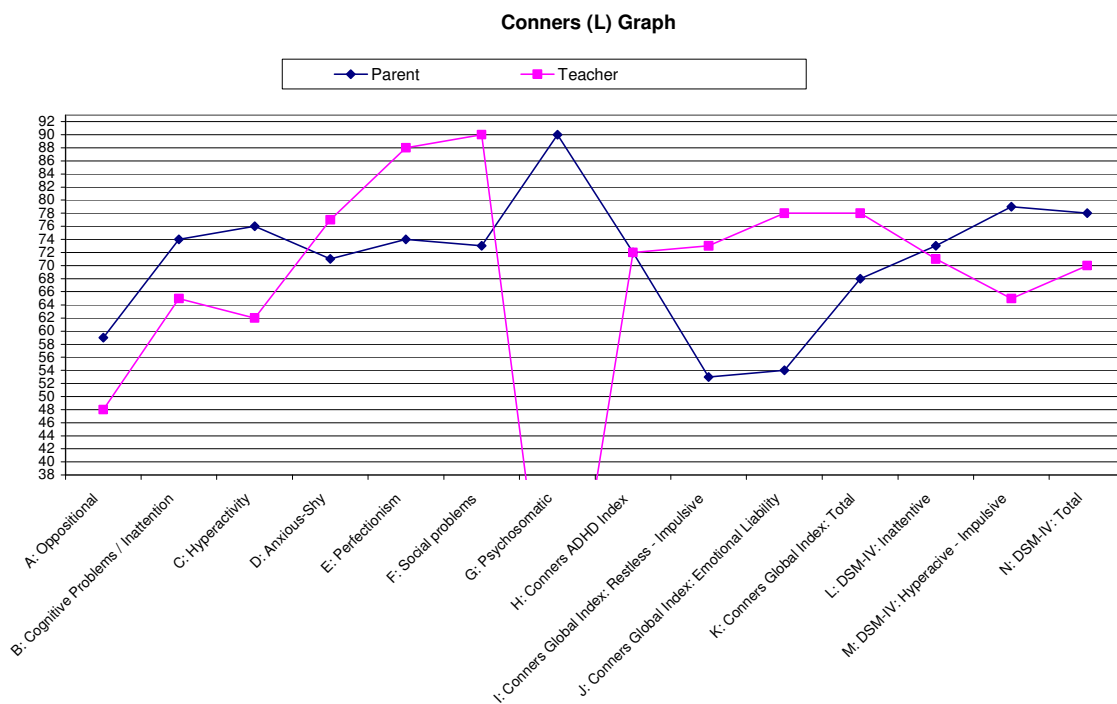
Items from the Conners' parent questionnaire scoring a "very frequent, very often" response was the following:

- Difficulty doing or completing homework
- Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort
- Has trouble concentrating in class
- Does not seem to listen to what is being said to him
- Needs close supervision to get through assignments
- Has difficulties organising tasks and activities
- Restless in the "squirmy" sense
- Headaches
- Talks excessively
- Fails to give close attention to details or makes careless mistakes in schoolwork or other activities
- Interrupts or intrudes on others

- Fidgets with hands or feet or squirms in seat
- Touchy or easily annoyed by others
- Has sloppy handwriting
- Messy or disorganised at home or school
- Gets upset if someone rearranges his things
- Seems tired or slowed down all the time
- Easily distracted by extraneous stimuli

The results from the Conners' teacher and parent questionnaire have been included in Graph 2.1.

Graph 2.1 Conners' graph showing results from both parents and teachers questionnaire for L.K.



The horizontal axis describes the different subscales which are represented in the Conners' questionnaire. The vertical axis describes the T-scores that were calculated from the raw scores. T scores of above 66 indicate significant problems in that area.

The results for L.K. do not show corresponding results of the parent and teacher questionnaire. The teacher identifies problematic areas as social and perfectionism (very highly problematic) and anxiety and emotional lability as significantly problematic. L.K.'s parents rate psychosomatic symptoms as the most highly problematic, followed by DSM-IV hyperactive-impulsive symptoms.

### *2.1.2 Gilliam Asperger's disorder scale (GADS)*

The GADS subscale scores for L.K. according to percentile rank are as follows:

- Cognitive patterns – 63 percentile rank
- Social interaction – 50 percentile rank
- Pragmatic skills – 91 percentile rank
- Restricted patterns of behaviour – 75 percentile rank

The Asperger Disorder quotient was 112, making a diagnosis of Asperger's disorder highly probable (>80) on the GADS.

Behaviours that were scored as "frequently observed" were the following:

Cognitive patterns subscale:

- Displays superior knowledge or skill in specific subjects or activities
- Has difficulty in understanding jokes or humour
- Shows an intense, obsessive interest in certain intellectual subjects
- Shows excellent memory

Social interaction subscale:

- Has difficulty cooperating in a group
- Seems unaware of social conventions or codes of conduct
- Needs an excessive amount of reassurance if things are changed or go wrong
- Requires specific instructions to begin tasks
- Becomes frustrated quickly when unsure of what is required

Pragmatic skills subscale:

- Fails to predict probable consequences in social events

- Has difficulty understanding slang expressions
- Has difficulty understanding when someone is teasing
- Has difficulty understanding when he or she is being ridiculed, put down, or made fun of
- Has difficulty understanding what causes people to dislike him
- When confused, doesn't ask for clarification but switches to a familiar topic

Restricted patterns of behaviour subscale:

- Has preoccupation with specific subjects or objects that is abnormal in intensity or focus
- Displays clumsy and uncoordinated gross motor movements

### *2.1.3 Dunn's sensory profile*

The following areas are highlighted as being how L.K. responds to particular stimulus "always – 100% of the time" and therefore are seen as significant.

- Touch processing – prefers long sleeved clothing when it is warm or short sleeves when it is cold; becomes irritated by shoes or socks
- Multisensory processing – looks away from tasks to notice all actions in the room; seems oblivious within an active environment; walks on toes; leaves clothing twisted on body
- Modulation of sensory input affecting emotional responses – doesn't perceive body language or facial expressions

The results of the analysis of the three sections of sensory processing, modulation and behaviour and emotional responses include indicate definite deviations from the normal population in the areas of auditory processing, touch processing and multisensory processing. Modulation difficulties were noted in the areas of sensory processing related to tone and endurance, modulation of sensory input affecting emotional responses and modulation of visual input affecting emotional responses. Behaviour and emotional responses that were noted as problematic included emotional and social responses and behavioural outcomes of sensory processing.



## 2.2 Results: Neuropsychological test battery

### 2.2.1 Intelligence (IQ)

The results of L.K.'s SSAIS-R concludes a significant discrepancy between verbal and non verbal scores. The scores are as follows:

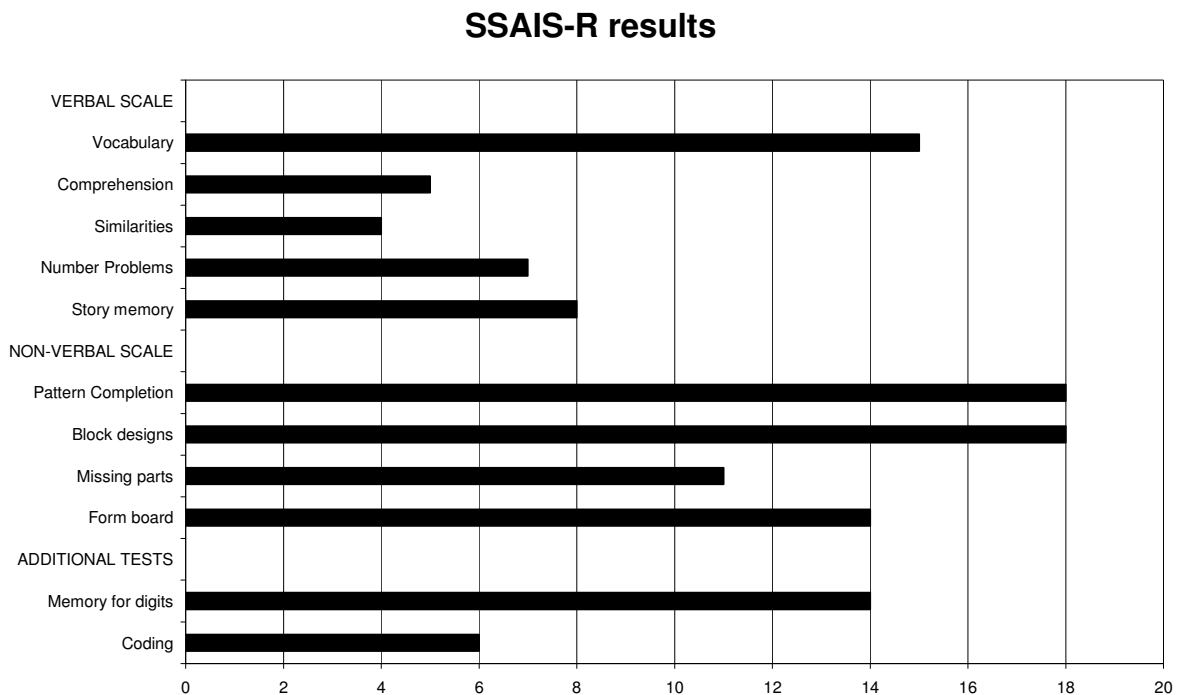
Verbal scale: 86

Non verbal scale: 134

Global scale: 109

The results of all the subtests are given in Graph 2.2. The test items from the test battery are listed on the vertical axis and the results of the subtests are listed on the horizontal axis. The results given on the horizontal axis are converted to scaled scores (between 1 and 20) with 10 being an average score. The test items are given on the vertical axis and divided into verbal scale ((vocabulary, comprehension, similarities, number problems and story memory) and non verbal scale (pattern completion, block designs, missing parts and form board.)

Graph 2.2 Results of the SSAIS-R for L.K.



L.K.'s results are very "scattered" with scores in the very superior range and scores that are very weak. Strong areas of cognitive function in the case of L.K. are in pattern completion and block designs. L.K. demonstrates very superior logical thinking, visual perception visual, abstract concept formation and spatial orientation. His vocabulary was also advanced, measuring a strong verbal learning ability, long term memory and concept formation. L.K.'s weak areas tested with verbal tasks of comprehension, similarities, number problems, coding and story memory. Results from the comprehension test, which tests for knowledge of conventional behaviour were significant. L.K. struggled to "process" the questions being asked in a "neurotypical way". His answers reflected a "literal" processing of information and a "learned" response or association with a word or combination of words in the questions. In response to the question "Why should you stay at home when you have an infectious illness"? L K responded "This is a silly question – because I go to school – I'm never absent". In response to the question "Why should you rather give money to a welfare organisation than to a street beggar"? L.K. responded "If you give money to a street beggar he won't be poor anymore – this is funny question". In the similarities tests which test logical abstract reasoning, verbal concept formation and the ability to distinguish between essential and non essential information, L.K. struggled with finding the common similarity between two items, insisting that the items being asked were different, and not the same. In response to the question of how a piano and guitar are similar, he responded "they both play different music". In the number problems test, testing numerical reasoning and logical thought, L.K.'s difficulty with verbal concept formation was again noted. When asked "Sally's mass is twice as much as that of her brother. Her brother's mass is 20 kilograms. What is Sally's mass"? L.K. reasoned "twice as much – means two back so that must be 18". Another example of "confused thought and verbal reasoning" was in the missing parts subtests in which L.K. had to say what the essential item missing from the given picture was. In the 12<sup>th</sup> picture, a teapot with it's lid is missing. L.K. immediately spotted this from a visual perspective but reasoned "it can't be the lid, because the smoke is coming out".

During the verbal tests L.K. was very distracted by his surroundings. This was not the case when he was involved with non verbal tasks. It was as though he was not

able to meaningfully engage with the “verbal” world and at this time would become “obsessed” with some thought process. He was not distracted generally but seemed to “hone in on something” and would then be “obsessive” about this one aspect. For example he collected all the sunglasses from the toys available in the testing room, and arranged these in his own systematic way on various other toys and apparatus in the room. This activity became “at the exclusion of all else” and he was only able to re-engage when this was finished to his satisfaction. Another example of L.K.’s distractibility, and associative thinking, was during the session he heard a toilet flushing down the passage. He immediately asked “what is that noise”? When told it was the toilet flushing, he commented that “it’s getting louder, it seems like it’s walking – when something gets louder and louder it’s as though it is coming towards you”. He is clearly responded to all stimulus around him, and trying to give meaning to all stimulus, not being able to attend to the ‘essential’ and relevant stimulus for the situation. There must be a lot of “competing stimulus” in L.K.’s mind, causing confusion and difficulties with verbal comprehension and concept formation.

### *2.2.2 Motor functions*

In this section of the testing battery, the Movement ABC-2 and the Beery-Buktenica test was used. The first set of results presented are those of the Movement ABC-2. This measures manual dexterity, ball skills and balance which are noted on the horizontal axis of Graph 2.3. The results that are scored are converted to a scaled score which is between 1 and 20, and this score is represented on the vertical axis of the same graph. L.K. scores below average on the scores for manual dexterity and aiming and catching, but in the average range for balance.

Graph 2.3 Graph of motor functions for S.P. as determined from the Movement ABC-2 results

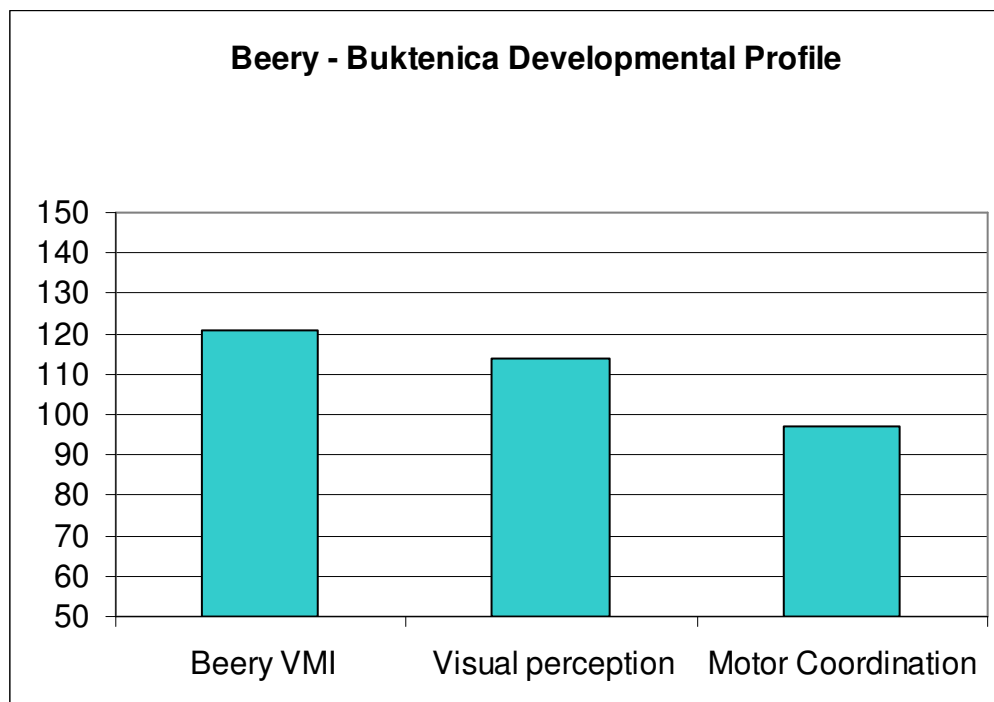


Qualitative observations of L.K. during the drawing trail test showed that he really struggled to change directionality with his hand. He tended to want to keep his hand in the same position and move the paper to follow the path required in the drawing trail test. He needed to lift his pen to change direction and was not able to follow the line with a continuous flowing movement.

In the aiming and catch test, L.K. worked out that if you move the target mat against a wall, you could throw the bean bag onto the wall and it would “fall” perfectly into the red target dot. L.K. appears to have an “overactive mind” which is always trying to work out how to do things.

The second aspect of motor functions that were tested in this test battery was the Beery-Buktenica developmental tests of visual motor integration, visual perception and motor coordination. These results are included in Graph 2.4. The developmental areas are represented on the horizontal axis. Scores obtained during the testing session are converted to standard scores which are represented in the graph below on the vertical axis.

Graph 2.4 Graph of Beery-Buktenica developmental tasks representing scores obtained by L.K.



L.K. is right handed, and did all the above tasks on the Beery-Buktenica test with a good pencil grip. It was noted that he takes instructions literally. On the first test for visual motor integration, L.K. tried to make the lines exactly the same, by colouring them in to get the same “thickness”. His sitting posture was very “lopsided” on the chair. He was highly distracted while doing this task and was very talkative, wanting to know what was on the next page. He was distracted by a “sore” on his hand and was constantly picking at his skin. On the motor coordination test, when the time was up, he wanted to finish, not being able to stop before the task was finished. When the appearance of the designs in the motor coordination test changed to “no dots” to guide him, L.K. simply put down his pen and said “there are no more dots so that means I don’t have to do any more”.

### 2.2.3 Academic achievement

The Woodcock-Johnson (WJIII) test was used to determine academic achievement. This test is divided into four areas, reading, oral language, maths and written language. The results of the WJIII tests of academic achievement are given in Table

2.1. The scores that are given in this table are in age equivalent of L.K.'s performance. L.K's chronological age at the time of testing was 9 years and 8 months. These results are to be interpreted by comparing L.K.'s aged performance to that of his chronological age.

Table 2.1 Table of L.K.'s results for scholastic achievement as tested on the WJIII tests of academic achievement

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Reading	Letter/word identification	7 yrs 10 months	L.K. read by "visual approximation" and not by using "sound parts" (eg sentence he read as science). This inaccuracy of word reading affected his reading fluency and comprehension negatively.
	Reading fluency	7yrs 8 months	
	Passage comprehension	7 yrs 3months	
Oral Language	Understanding directions	7 yrs 7 months	L.K. struggled with short term memory for sequenced information that was required for a good performance on the understanding directions test. Story recall results reflect weak short term memory for verbal information.
	Story recall	6 yrs 1 month	
	Delayed story recall	Not done (time delay between tests too great)	

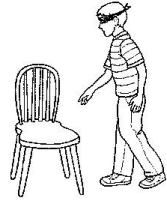
Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Mathematics	Calculation	8 yrs 4 months	L.K. worked through the calculations test slowly and carefully. He was not able to do multiplication and division sums.
	Maths fluency	8 yrs 3 months	Once again it was noted that L.K. worked slowly and systematically through the examples. He made one error of subtracting instead of adding.
	Applied problems	9 yrs	This test was the best performance in the test battery. It was noted however that L.K.'s reasoning was very longwinded and he "talked aloud to himself" while working through the problems.

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Written language	Spelling	8 yrs 3 months	It was clear during the spelling test, that L.K. would spell a word and then “picture” it and correct according to ‘visual” sense rather than a phonetic one. If he did not know a word from a ‘visual memory” pint of view – he had no frame of reference, and left the word misspelled. (eg. wen he changed to when; early was written aril; with no attempt to change it. He could write house as he recalled this from his lesson at school a day previously.
	Writing fluency	7 yrs 2 months	L.K. struggled with the ability to do this task quickly.
	Written samples	6 yrs 4 months	Examples of L.K.’s written samples are given below (Figure 2.1). He did not answer the prompt questions, often only writing a single word which expressed the idea that he was thinking.



Figure 2.1 Examples of L.K.'s written samples test illustrating the difficulty he has of expressing himself adequately

12.



fell

13.

(1) Place one cup of flour in a small bowl.

(2) and stare four 10 mins

(3) Beat eggs and flour slightly.

14.



lite

15.

Swim

16.

sine (You must read the sign)

### 2.2.4 Theory of mind

The theory of mind (ToM) tests that were conducted in this test battery included the "Sally and Anne test" as well as the "Smartie box test". These tests test the ability to view the world from another person's perspective.

L.K. had no difficulties with either of these tests implying that he does not have problems with seeing the world from another's person's perspective.

### 2.2.5 Executive functions

Executive functioning was tested using the Wisconsin card sorting tests (WCST-64). This test uses the principle that the subject needs to deduce the pattern of the presenting cards by the examiner's responses. The pattern of the presenting cards changes from parameters of colour, form and number. The ability to conceive alternatives, impulse control, memory and an ability to sustain attention are all components of this test and executive functioning.

L.K. initially managed this test very well, picking up very quickly and verbally commenting that the "cards are changing every 10". However, he got "stuck" in a perseverating thought pattern between colour and form, not managing to 'expand his thinking' that another category such as number may also be a factor. Because of this he was not getting his responses correct after the initial 25 cards presented. This led him to become quite frustrated towards the end of the testing where he clearly started to "guess". His results are given in Table 2.2 and fall into the mild impairment range for all the categories, this despite an initial very perceptive approach to the test.

Table 2.2 Results of WCST-64 for L.K.

Total number of errors	Mild impairment
Perseverative responses	Mild impairment
Perseverative errors	Mild impairment
Non perseverative errors	Mild impairment
Conceptual level responses	Mild impairment

### 2.3 Results: School records

A summary of L.K.'s school results are given in Table 2.3 below. L.K. has always attended the same mainstream government school. He failed at the end of 2007, and is thus repeating grade 3 in 2008. An application to a specialised remedial school has been made for L.K.

Table 2.3 Summary of analysis of school records of L.K.

Year	Grade	Comments given by the teacher on the report card and general classroom observation records	School marks achieved	Therapies attended
2005	1	L.K. struggles to follow instructions. It appears that he doesn't listen and gets confused at times. Teacher noted that he appears "naughty" and does not maintain eye contact with her. He draws in fine detail, but his work is messy. It was noted that he appears to be in his own world and has difficulty explaining himself when trying to communicate.	The following areas were rated as only partially satisfying the requirements for the grade: Listening skills; communication skills; word recognition, reading fluency, phonics, writing, problem solving, social and personal development technology	Diagnosis of ADHD and given Ritalin.
2006	2	L.Kk's drawings show insight and detail. His concentration fluctuates. He can be aloof but has a loving nature. Gross and fine motor problems. He demonstrates compulsive behaviour at times and gets irritated with his shorts being "tucked in". He tries hard and puts pressure on himself to work carefully and neatly.	Areas rated a "2" as only partially satisfying the requirements of the grade include: Listening skills, communication skills, reading fluency, reading comprehension, phonics, spelling, creative writing, 2 <sup>nd</sup> language, word problems, physical development and movement.	Medication changed from Ritalin to Concerta
2007	3	Insecure and little confidence. Work is erratic. His reading is very weak. His creative writing is a problem as he never knows what to write, and then will daydream the time away. His work can be neat but most often is not. Instructions always have to be given more than once.  He tends to panic when the routine changes or something new is introduced.	Liam did not meet the requirements for promotion at the end of grade 3, receiving a "1", not satisfying the requirements for the grade in the areas of word recognition, reading fluency, writing, , problem solving, 2 <sup>nd</sup> language, the ability to complete a task, data handling, numbers, relationships and operations	Attends extra reading at school. Private neurofeedback sessions. The teacher noted that he has been on Ritalin since the beginning of the year. This did not seem to have a positive effect on his school work.

## 2.4 Results: Classroom and playground observation

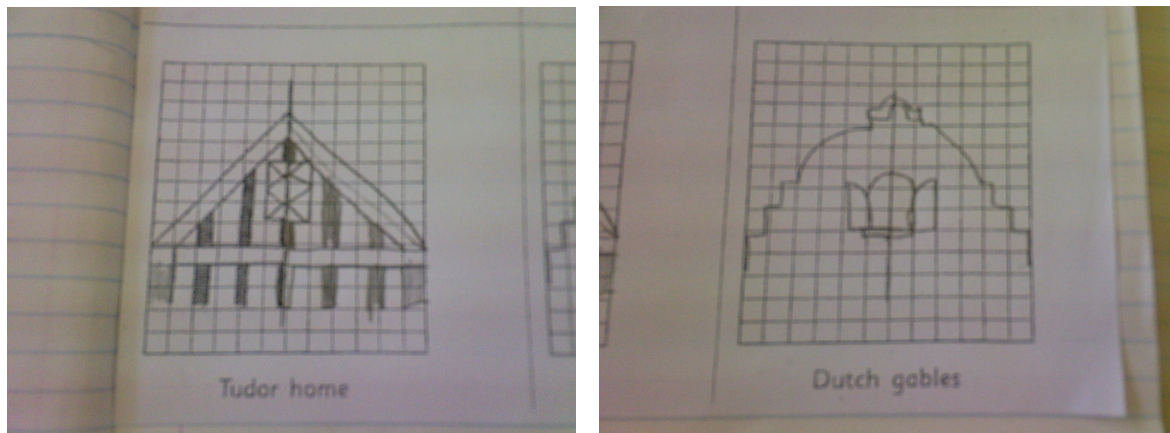
During the classroom observation, the children were all taken to the front of the carpet where they listened to the lesson and the instructions of the task that they were to do. L.K. did not participate at all during the lesson, and spent his time “picking at a sore” on his hand. This activity became all consuming. At one stage he stopped this and then got up “out of the blue” went to his desk and straightened his ruler in his pencil case. It is noted that his pencil case was very orderly, and the fact that he “knew that the ruler was misplaced” must have been occupying his mind to the point where he could not control the impulse to “fix it”. Once this was done he was visibly more relaxed on the carpet. He sat at the back of all the children and to one side, not participating with them at all.

During a writing lesson, he was sitting at his desk and would put up his hand to answer questions that the teacher was asking, but when asked for the answer he did not know what to say. He did not follow the correct sequence of patterns and colours that was required by the teacher during the writing task but “busied” himself in his way.

In one lesson that was observed, the class had to complete the designs illustrating different types of architecture. The class was given a worksheet with half the design, and they had to complete the mirror image. L.K. was very excited about this exclaiming that “this is easy”. It is of note that he completed this task first in the class and his work was the best in the class. Examples of this are given below in Figure 2.2.

L. K has a “tic” which is in the form of an involuntary cough, and this was noted many times during the classroom observation. This “tic” becomes more noticeable the more anxious he becomes.

Figure 2 2 Examples of L.K.'s worksheet illustrating his superior abilities with visual tasks



Whilst observing L.K. on the playground, he did not “play” with any group or child. He simply walked around, eating his lunch, keeping to the periphery of the playground. He made no attempt to join in a conversation with any other child, and the other children left him alone. It is noted that his mother reported that he had been the target of bullies in his grade 2 year. The school had sorted this out effectively, and in the current observation of him on the playground it appeared that he was “content” to be left alone and to wander around as he felt fit.

## 2.5 Results: Interview with L.K.'s teacher

The teacher noted that L.K. is constantly “fiddling”. He tends to “pick” at sores or blemishes on his skin. He would often respond to a question or a comprehension tasks irrelevantly, as though he has given no meaning to the input given at the beginning of a lesson. He has no communicative interaction with his peers. At break, if allowed to he would prefer to stay in the classroom. He tended to have an “involuntary cough” and this he does during the school day, often when he is under pressure. This “cough” was noted by his last years’ teacher, particularly at the end of the year. He would often try and participate in the classroom discussion by putting up his hand, but then did not know the answer or said something which was not significant. At times however the teacher was surprised by his answer which could be very insightful.

The teacher said that L.K.'s work was erratic, and at times he could produce good work showing insight. A main problem was that he could not keep up with the pace of the work and needed constant guidance. The teacher noted that he sometimes showed signs of an obsessive compulsive disorder in that he could not stop when he was doing something, as though he needed to bring closure to whatever it was that was occupying his mind before he could move on.

## **2.6 Results: Interview with L.K.'s parents**

L.K. has always tended to be a loner and does not have any real friends. He does not play with his younger brother. His parents have put the children into separate rooms which are working better for them as a family. L.K. spends most of his time building very complex Lego buildings and cities. He collects "junk" – pieces of paper, stones and odd bits and pieces, which he stores in "special places" to be used in his constructions at a later stage. L.K. will struggle to fall asleep if things are not "ordered in his room". He will need to get up and straighten things or make sure the posters are in line. L.K.'s mother reports that she understands this as she is like that and will get out of bed to straighten the curtain or picture on the wall if it is "skew".

L.K. does not seem to "read" another person's situation, and will not tend to focus on the "humanness" of a person. An example cited by his mother was when they saw a child with a wheel chair at a shopping centre – and he commented – "look mom, that girl's wheel's squeak". Despite this he is a loving and caring person, trying hard to please, and becoming tearful when things get too much for him. He often gets "stuck" on a small detail that has "gone wrong" and this can have a ripple effect causing his entire day to become worse, and him getting more and more out of control. L.K. manages better with routine, and struggles when things change. He takes things literally, and the family have learnt that they cannot use sarcasm or humour with him, as this makes him confused and he will end up crying, instead of "laughing with the crowd".

Homework is a huge problem in the household as he takes long to complete homework and labours over reading. His mom often struggles with understanding

exactly what needs to be done for homework as L.K cannot recall any details or relevance of what needs to be done. His homework is often written down in a “messy” way off the board and is often not completely written down. It was noted by L.K.’s parents that he does not participate in any sport at school. This they felt was not due to any gross motor or motor coordination problems, but due to the fact that he did not understand the intent or rules of the sport.

Both L.K.’s parents consider him to be “special” with talents and insight with certain things that “surprise them”. His non verbal abilities are very good and he “expresses” himself in this medium at an advanced level. They are not concerned for his ultimate future as they believe: when he leaves school he will find his “niche” where he can utilise his talents. They are however very frustrated and worried that he is not understood in the schooling environment. School requires a high level of verbal ability and the ability to “fit in” which he clearly struggles to do. They support an application to a specialised schooling environment that will be “less judgmental” and more understanding of his needs.

### 3 CASE STUDY 4 – referred to as M.D.

Personal details:

Birth date	12 October 1997
Chronological age (at date of testing)	10 years 4 months
School:	Private primary school in Cape Town
Grade:	4
Sex:	Male

Home circumstances:

M.D. is the first born son of a married couple. They have another son who has just started grade 1 this year. M.D.'s father is an electrical engineer, with a degree in electrical engineering. His mother is a sales representative, and holds a diploma in tourism. Both parents are Jewish, and the family follow the religion and traditions at home. M.D.'s mother does not work in the afternoons or the school holidays. She fetches M.D. and his brother from school, after which she is involved with their homework.

M.D.'s mother reports that she had learning difficulties as a child and her brother was diagnosed with dyslexia.

Birth and medical history:

M.D.'s mother reports that she had a difficult pregnancy and at 28 weeks she nearly miscarried after a placenta previa. M.D. was however carried to full term, and after a difficult and prolonged labour, was given an emergency caesarean. At birth there was a knot in the umbilical cord and M.D. had to be resuscitated at birth. He had an Apgar score of 1/10.

M.D.'s mother reports that his physical developmental milestones were all met within the average range. He was reported to have many ear infections as a child. His hearing has been tested and there are no problems noted. His eyesight was checked at the school during a routine screening and no difficulties were noted. His feeding and sleeping habits are reported to be poor.



M.D. was first assessed by an occupational therapist when he was 4 years old and began occupational therapy from May 2002 until December 2005 (the end of his grade 1 year). He has attended speech and language therapy, initially when he was 3 years old (for a period of 6 months) and then again in his preschool year, until the end of his grade 3 year. He has attended a social skills training group (whilst in grade 3).

He was first assessed by a psychologist when he was 5 years old, and given a diagnosis of Asperger syndrome. He was reassessed by another psychologist in November 2006, at the end of his grade 2 year when the diagnosis of AS was confirmed. In May 2007 (grade 3) he was seen by a child psychiatrist and given a diagnosis of depression and anxiety, and he was prescribed medication. He is presently taking 25mg of Zolyft daily.

He participates in extra curricula activities of cricket (non competitive), xylophone, tennis and computers.

M.D.'s parents main concern for their son is his ability to remain in a mainstream schooling environment. They are also concerned that his teachers and his fellow students do not understand him and do not accept him as "one of the group".

Scholastic history:

M.D. attended pre-school from 3 years old. He started school in the year he turned 7, and has been at the same school since. He has always managed to maintain an acceptable academic standard. Difficulties however have been noted from grade 1 with M.D.'s ability to manage within a group and his general social and emotional functioning. Table 3.1 summarises comments and academic achievement of M.D from his term 4 school reports from grade 1.

Table 3.1 Summary of M.D.'s progress at school as reported in his school reports

Grade	Academic performance	Comments
1 (term 4)	Coped well with Hebrew and Jewish studies as well as English reading which was commented on as a strength. M.D. also coped well with the mechanical aspects of the maths programme.	M.D. was referred to as an endearing child with a different learning style. It was noted that he was "challenged" socially as well as academically.
2 (term 4)	Fine progress was made in Hebrew and English reading. M.D. manages quickly and accurately with mechanical aspects of maths, but struggled with problem solving. Handwriting was referred to as being "rushed" and untidy.	M.D. was described as an enthusiastic learner who gives of his best. His difficulties with socialising and emotional stresses were noted as being problematic.
3 (term 4)	Hebrew and English reading were again noted as areas of achievement for M.D. M.D. grasped maths concepts quickly and was able to work undependably on most tasks. It was reported that M.D. coped well with changing his writing from print to cursive.	M.D. was commended on the academic progress made during the year.
4 (term 1)	The following academic achievements are noted for M.D. A scale of 1-5 is used as a rating for achievement with a "4" rating as good and a "3" as satisfactory.  M.D. received a "4" for Hebrew, Jewish studies, Afrikaans, Maths and natural and social studies. He received a "3" for English.	It was noted that M.D. coped well with the increased demands made on each subject. On occasion, M.D. has been overwhelmed, but it is reported that he recovers his composure quicker than in the past.

### 3.1 Results: Questionnaires

#### 3.1.1 Connors' parent and teacher questionnaire

Items from the Connors' teacher questionnaire scoring a "very frequent, very often" response was the following:

- Restless in the "squirmy" sense
- Feelings easily hurt
- Fails to give close attention to details or makes careless mistakes in schoolwork
- Is one of the last to be picked for teams or games
- Is an emotional child
- Everything must be just so

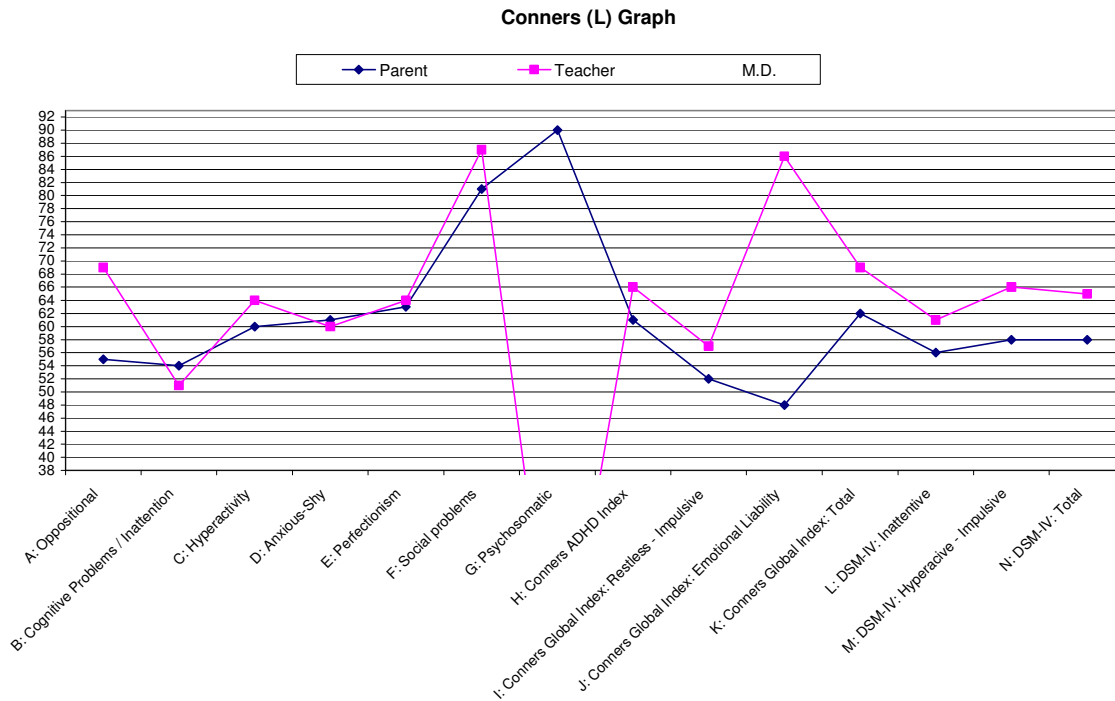
- Does not seem to listen to what is being said to him
- Inattentive, easily distracted
- Has difficulty waiting his turn
- Does not know how to make friends
- Sensitive to criticism
- Has poor social skills
- Demands must be met, easily frustrated
- Blurts out answers to questions before the questions have been completed
- Short attention span
- Only pays attention to things that he is really interested in
- Mood changes quickly and drastically
- Interrupts or intrudes on others
- Easily distracted by extraneous stimuli

Items from the Conners' parent questionnaire scoring a "very frequent, very often" response was the following:

- Has trouble concentrating in class
- Afraid of new situations
- Does not get invited to friends houses

Results from the combined parent and teacher questionnaire have been included in Graph 3.1.

Graph 3.1 Conners' graph showing results from both the parent and teacher questionnaire for M.D.



It is of note that the teacher and parent rate social problems as a main area of difficulty for M.D. His parents rates psychosomatic as an area of concern, and the teacher notes a high degree of emotional liability. There are no significantly high behavioural scores which would be indicative of an attention deficit disorder. It is noted however that M.D. does have a facilitator at school and she makes sure that he follows through on all instructions given by the teacher and completes all class work.

### 3.1.2 Gilliam Asperger's disorder scale (GADS)

The GADS subscale scores for M.D. are given in percentile rank as follows

- Social interaction – 63 percentile rank
- Restricted patterns of behaviour – 37 percentile rank
- Cognitive patterns – 25 percentile rank
- Pragmatic skills – 16 percentile rank

M.D's main area of difficulty as rated by his parents is in social interactions. The other subscales were not significantly rated as problematic. The GADS works out an Asperger disorder quotient, which in M.D's case was 92 (the threshold being 80), making a diagnosis of Asperger's disorder probable on the GADS.

Behaviours that scored as "frequently observed" by M.D.'s parents were the following:

Social interaction subscale:

- Has difficulty cooperating in a group
- Has difficulty playing with other children
- Needs an excessive amount of reassurance if things are changed or go wrong
- Requires specific instructions to begin tasks
- Becomes frustrated quickly when unsure of what is required

Restricted patterns of behaviour subscale

- Requires extensive directions from others

Cognitive patterns subscale:

- Shows excellent memory

Pragmatic skills subscale:

- Fails to predict probable consequences in social events

### *3.1.3 Dunn's sensory profile*

The sensory profile caregiver questionnaire was answered by M.D.'s parents. The only areas that was rated as responding to the stimulus "always – 100% of the time" was in the item of auditory processing where it was reported that he has trouble completing tasks when the radios is on; is distracted or has trouble functioning if there is a lot of noise around; can't work with background noise.

The factor summary indicated the following as problematic for M.D:

- Emotionally reactive

- Low endurance/tone
- Oral sensory sensitive
- Inattentive/distractible
- Poor registration

In the area of sensory processing M.D. struggles with auditory processing, visual processing, vestibular and oral sensory processing. In the modulation section, he struggled with sensory processing related to endurance or tone and modulation of sensory input affecting emotional responses. In the last section of behaviour and emotional responses, it was noted that M.D. struggled with emotional social responses and behaviour outcomes of sensory processing.

### **3.2 Results: neuropsychological test battery**

Throughout the neuropsychological test battery, M.D. was difficult to control. If you “read him correctly” and kept him stimulated and focussed, with lots of external motivation, he would “perform” but I got the impression that he is a “master manipulator” of a situation, and likes to “pull the strings” so that all those around him will dance to his tune. When he tired of a task, or thought it not fun – he would comment that this is boring, or try and change the task to “his way” of doing it. He definitely liked to have the last say. M.D. responded well to firm and consistent “handling”.

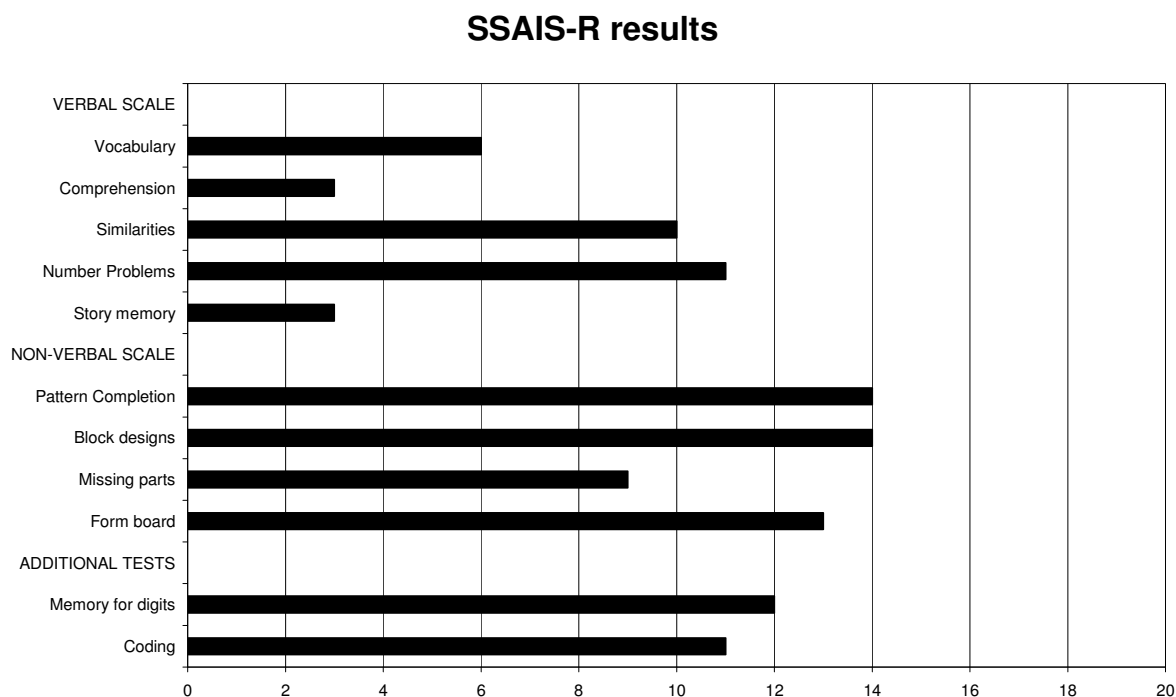
#### *3.2.1 Intelligence (IQ)*

The results from the SSAIS-R conclude a significant inter-test scatter. There is a vast discrepancy between his non verbal and verbal; scaled scores. His scores are as follows:

Verbal scale:	77
Non verbal scale:	114
Full scale:	95

The Graph 3.2 details M.D.’s individual scores on the SSAIS-R.

Graph 3.2 Graph detailing subtest scores of M.D. in the SSAIS-R test



During the vocabulary subtest, M.D. was not focussing on the verbal aspect of the test, but appeared to be “finding” a pattern of responses. This resulted in him “guessing” at the word – not engaging with the verbal nature of the test. Results from the comprehension test concluded that M.D. does not listen to the instructions to give meaning, or from the concept of what is being said. He instead focuses on a particular word from the question and takes this word out of context, associating it with something else which is not related to the question. An example of this was when asked, “Why is an accused person put on trial in court”? He answered “so that we can figure out where the white lines / yellow lines must go”, clearly associating the word court with a tennis court. When asked “Why should we rather give money to a welfare organisation than a street beggar”? M.D. answered “so they can have more rides” , relating to word “fare” and associating it with a “fun fair”.

M.D.’s difficulties with expressive language were again noted in the missing parts subtest. In the one question, the elephants trunk is missing, and M.D. asked me to “pretend he was an elephant” and then he proceeded to show me with his arms the trunk that was missing. M.D. became very “fiddly” during the story memory and

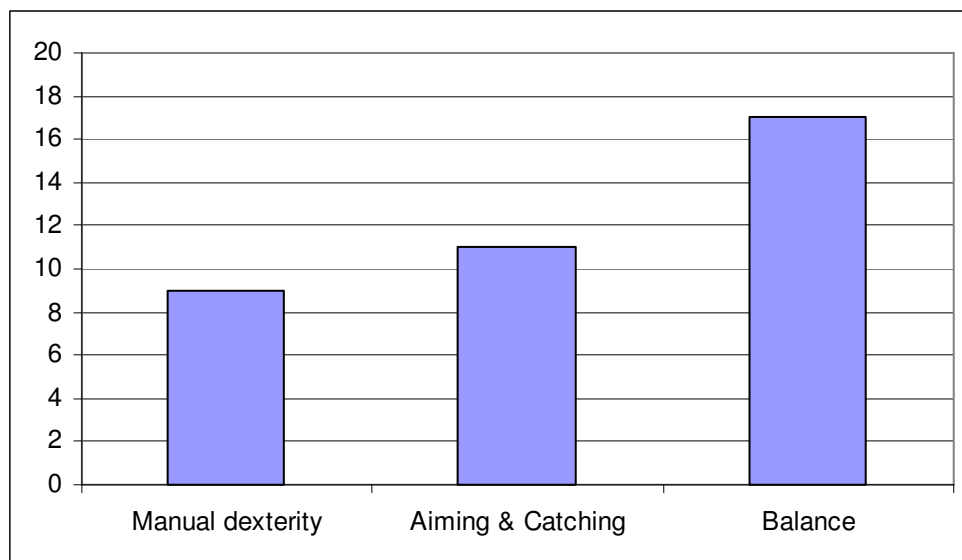
memory for digits subtests. These two tests are only verbal in nature and therefore are quite “taxing” for M.D. On the non verbal tests, M.D. performed considerably better. His ability to manage the block designs test was impressive and he solved the designs in very quick times.

### 3.2.2 Motor functions

The two tests that were conducted in this section were the Movement ABC-2 and the Beery-Buktenica developmental tests.

Results from the Movement ABC-2 show average scores for manual dexterity and aiming and catching and above average scores for balance. M. D. did not have any difficulties with this test battery as can be seen from the results displayed in Graph 3.3.

Graph 3.3 Graph of motor functions for M.D. as determined from the Movement ABC-2 results

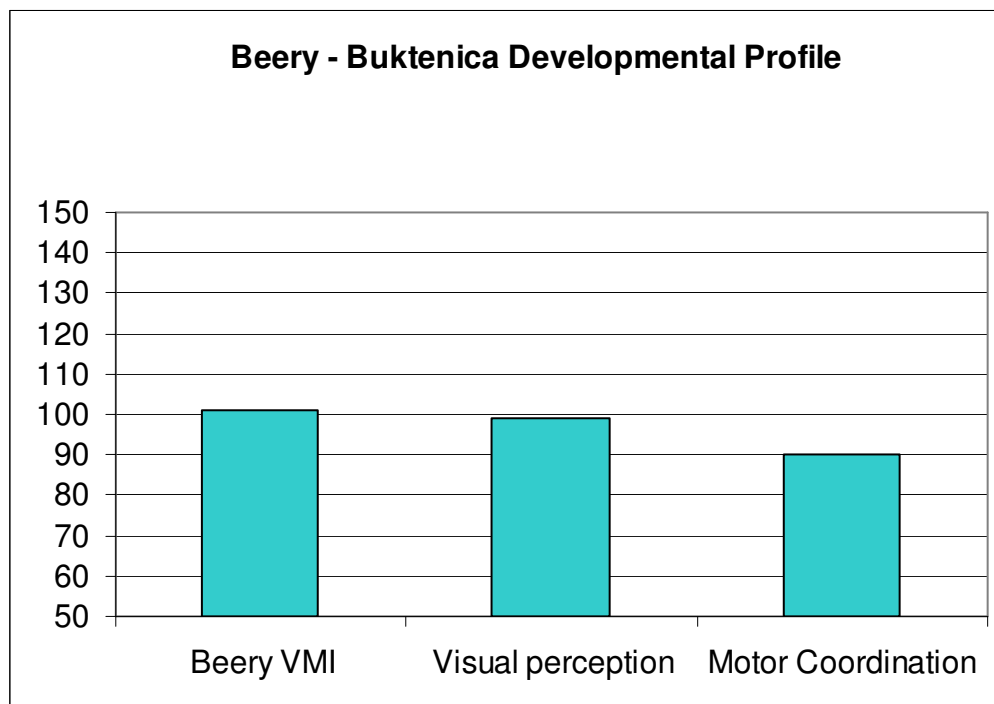


M.D. showed very good motor coordination in the aiming and catching test. The times he did not manage to catch the bean bag was because he was “trying to be clever” and throwing in a “silly way”.



The results of the Beery-Buktenica test for visual motor integration, visual perception and motor coordination also scored in the average range with no difficulties noted in this area. The results are given in Graph 3.4.

Graph 3.4 Graph of Beery-Buktenica developmental tasks representing scores obtained by M.D.



### 3.2.3 Academic achievement

The results of the WJIII obtained by M.D. are given in Table 3.2. The results are given in term age. These need to be compared with his chronological age at the time of testing which was 10 years and 4 months.

Table 3.2 Results of scores of M.D. on the subtests of the WJIII tests of academic achievement

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Reading	Letter/word identification	8 yrs 10 months	M.D. did not use a “phonetic” method to sound out unfamiliar words but relied on a visual memory (e.g. experience – expensive)o  M.D. tired of this task and wanted to “spice things up”by writing the answers on the board instead of just saying them. It was difficult to keep him focused on this verbal task.
	Reading fluency	10yrs 1 months	
	Passage comprehension	7 yrs 9 months	
Oral Language	Understanding directions	9 yrs 8 months	M.D. was able to do this task when the instructions were not complex. He uses his visual strength to compensate for his difficulties with auditory processing.  M.D. was not able to recall the passage, but instead turned this task into “finishing the story” with his own extrapolated ideas. Delayed story recall was thus not tested.
	Story recall	no score	
	Delayed story recall	not tested	

Learning area	Learning aspect	Age level of achievement	Qualitative observations during testing.
Mathematics	Calculation	8yrs 8 months	M.D. may have performed better if the presentation of the test was in a more recognised form.
	Maths fluency	13yrs 4 months	Advanced levels of memory for basic computational skills were noted.
	Applied problems	9 yrs 5 months	Once again, M.D. tired of this task and wanted to do something else – his results may have been better if he had kept motivated.
Written language	Spelling	9 yrs 5 months	M.D. was able to spell words at an age appropriate level. It was clear that he has a “visual” memory of the word, as he does not use a “phonetic method” to spell.
	Writing fluency	10 yrs 4 months	M.D. did this task well, planning his work, by leaving out questions he found difficult in order to get the most number down in the time limit.
	Written samples	10 yrs 1 month	Good responses were noted for the written samples test.

### 3.2.4 Theory of mind

M. D. did not have any difficulties with either of the two tests administered for theory of mind.

### 3.2.5 Executive functions

Results from the Wisconsin card sorting test showed excellent executive functioning ability. M.D. was able to follow the changes in presentation of cards and category sequence with advanced levels of perception. Table 3.3 below gives the results obtained by M.D.

Table 3.3 Results of WCST-64 for M.D.

Total number of errors	Above average
Perseverative responses	Above average
Perseverative errors	Above average
Non perseverative errors	Above average
Conceptual level responses	Above average

## 3.3 Results: Classroom and playground observation

During the observation of a maths lesson it was noted that M.D. has no “impulse control”. He was shouting out comments “I don’t know” when the teacher was going through the instructions. The facilitator would speak to him quietly and then go through all the instructions with him when the teacher had finished her explanation. He could not sit still on his chair, but rather was “skew” on the chair. M.D. got visibly anxious when he could not do a sum, and then his facilitator would need to intervene to ensure that anxiety did not build up.

In the maths lesson the concept of division was being taught, and the class had to write the sums as division sums. M.D. was not able to do this, insisting that “12 divided by 3” was written as “12 over 3” in fraction form. This caused a problem as a battle of wills ensued. M.D. and the teacher were both inflexible in their way of thinking, and M.D. simple refused to do the sums the “teacher’s way”. Despite this

one observed problem, maths is seen as M.D.'s favourite subject and the one he does best in.

In the English lesson, the task for the day was to order words in alphabetical order. He enjoyed this activity, as he enjoyed the predictability and order. He was one of the first to complete the task, without any assistance from the facilitator. When he was finished with the task, he used the rest of the time "tidying" his pencil case, talking quietly to himself as he did this.

In his social studies lesson, again he did extremely well, being one of the first to finish the task. This task involved plotting co-ordinates on graph paper. There was no ambiguity in the task and he managed very well.

During the playground observation, M.D. was initially by himself, and then wandered around to the cricket nets where children were practising. He was not involved with the group, and he wandered off to the tennis courts where he 'ran around' the court, again not involved with any of the groups or play/game that was happening among the other children. His facilitator commented that he never actually plays with other children, but rather alongside them. When he gets angry with other children he will lash out and hit his peers and this causes problems. His facilitator says that the other children "know he does this" and therefore will keep away from him to avoid trouble.

A meeting was called for all the boys in his grade and the learning support teacher to try and sort out why the other children excluded M.D. from their games. Comments from the boys included "he makes his own rules", "he does the opposite of the rules", "when play gets rough he complains to the teacher and the game gets stopped", he refuses to "go out" if he has to "go out" in a game.

### **3.4 Results: Interview with M.D.'s facilitator**

M.D. has had a facilitator since the 3<sup>rd</sup> term of last year. It is reported that "things" at school are much better as he gets his work done. The facilitator says that M.D.'s

performance at school is largely dependent on his mood. If he is in a good mood, he will finish his work, if not he will simply refuse to do it, and if pressurised to do the work he may land up having a melt down.

M.D.'s facilitator explained that last year he simply refused to do Afrikaans. He explained that it was too confusing "and did not make sense". He could not understand how a word could be written the same, and yet pronounced differently in two languages such as wind (English) / wind (Afrikaans). In M.D.'s eyes it had to be one or the other. It is of note that this problem is not apparent in his other language that he learns (Hebrew) in which he functions very well without his facilitator.

The main problem as perceived by the facilitator is M.D.'s obsession with winning. The school has a system of "house points" and all the scores they get academically and sporting and cultural go towards their overall house points. M.D. gets so involved with this and when his house is not winning, he will throw a tantrum, and do all he can to be first. The facilitator believes this to be an obsession.

### **3.5 Results: Interview with parents**

M.D.'s parents report that he is very set in his ways and is rigid about many things at home. He likes to have his life in a 'routine' and spends many hours watching DVD's and playing computer games. He struggles to get on with his younger brother and there is no meaningful interaction between them. M.D. does not have many friends, and when his mother arranges for a friend, he will "be around them for a while" but then leave them on their own, while he goes and does something on his own in his own room, leaving the friend with nothing to do. M.D. struggles with the concept of "losing" and cannot stand to "lose" or have his "team" lose. If this happens he will have a "melt down" crying and running out of the room. As a result of this M.D. does not participate in any competitive sport.

M.D.'s parents report that he has routines and rituals at home such as lining up all his teddy bears, and assigning personalities for each of them. He rewinds parts of his favourite videos repetitively and mimics the exact words and actions to himself. He

also is reported to obsess about certain things, and struggles to “let a topic go” if he is talking about it. He struggles when the rules of others are imposed on him. This is particularly the case in social games, when he will get very flustered and not manage to accept and abide by the “social rules or rules of the game”.