AN EXPLORATORY ANALYSIS OF DEVELOPMENTAL HISTORY AND BEHAVIOURAL CHARACTERISTICS OF CHILDREN WITH LEARNING DISABILITIES

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By

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C E R T I F I C A T E

Certified that this thesis entitled **"AN EXPLORATORY ANALYSIS OF DEVELOPMENTAL HISTORY AND BEHAVIOURAL CHARACTERISTICS OF CHILDREN WITH LEARNING DISABILITIES"** embodies the results of a piece of bonafide research work carried out as part fullfillment of requirements for the degree of **DOCTOR OF PHILOSOPHY IN PSYCHOLOGY** of the University of Calicut by **Ms. SREEDEVI V. G.** under my supervision and guidance and that no part of the thesis has been submitted for any other degree.

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DECLARATION

I, **SREEDEVI V. G**., hereby declare that this thesis entitled "**AN EXPLORATORY ANALYSIS OF DEVELOPMENTAL HISTORY AND BEHAVIOURAL CHARACTERISTICS OF CHILDREN WITH LEARNING DISABLITIES"** has not been submitted by me for any award of Degree, Diploma, Associateship, Fellowship, Title or Reocognition in this or in any other Institution. This work or any part of it has not been sent anywhere for publication or presentation purpose.

University of Calicut **SREEDEVI V. G.**

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CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

Chapter 1

Introduction

1.1 Concept of Learning Disability.
1.2 Statement of the problem
1.3 Objectives
1.4 Significance of the Study
1.5 Structure of the Report

“I cannot write properly. I find writing difficult and because of this I do badly in my exams and end up getting low marks. Although I understand what is being taught, I cannot write it down. I wish my parents, especially my father and my teachers could understand my problems. When they blame or scold me it really hurts”, said Deepu.

These words echo the sentiments of not just Deepu but several students like him. Deepu, is a 11 year old boy with severe writing problems studying in the sixth standard of a Malayalam medium school. The present thesis attempts to unearth the problems faced by Deepu and eleven other children in their studies. The purpose of the study is to explore the nature and characteristics of children who are described as ‘learning disabled.’

‘Learning Disability’ is a widely used term that has gained great importance in the current educational scenario. The term ‘learning disability’ emerged from a need to identify and segregate a group of children who were failing in school, but did not fit into the existing categories of exceptionality. Since this group of problem behaviour requires the services of professionals from a number of disciplines, there is often little agreement as to what exactly constitutes a learning disability. What exactly we mean by this term? It is to this question that we now turn.

1.1. CONCEPT OF LEARNING DISABILITY

Although the term ‘learning disability’ is commonly used in educational circles today, educators and much of the general public seem to be misinformed about its actual meaning and interpretation. Physicians are gradually gaining more knowledge about it, but sadly, they are also the source of incomplete information or misinformation. Why does such confusion exist? Are there any solid answers to the many questions that arise in this field? Is there hope for a more reliable information base with regard to learning disabilities? And most important, can we really help learning disabled students? These and many other queries will become apparent as we proceed to the exciting, confusing, and sometimes frustrating field of learning disabilities.

The systematic investigation of learning disabilities began around 1800 with Gall’s examination of adults who had sustained head injuries (Myers and Hammill, 1976). An English doctor, Pringle Morgan, reported the first case of dyslexia in England in November 1897. He described a 14 year old boy thus: bright and intelligent, but his great difficulty is the inability to learn to read. In 1917, James Hinshel Wood reported the first systematic clinical studies of specific reading disability. Following Hinshel Wood, the next important personality to report clinical studies of children with reading disabilities was Samuel Orton, an American child neurologist. He proposed that the difficulty was caused by delay, or failure in establishing dominance for language in the left hemisphere of the brain. He used the term 'Strephosymbolia' (Wong, 1991).

Other predecessors of learning disabilities more recent than Orton were Alfred Strauss, William Cruickshunk and Samuel Kirk. Alfred Strauss and Heinze Werner had considerable background relating to the effects of brain injury, and through collaborative efforts in the United States, developed a number of concepts that were most important to the field soon to be called 'learning disabilities' (LD). Their work with these students, whose characteristics included perceptual problems, figure ground difficulties and hyperactivity was the foundation of their findings on LD. Kephart, who worked with children with learning disabilities, believed that higher-order cognitive learning builds on a solid foundation of visuo-motor learning. Consequently, his educational approach focused heavily on visuo-motor co-ordination and motor learning (Wong, 1996).

Cruickshank (1981, cited by Wong, 1996) has suggested that the term LD is one of the most interesting accidents of our professional times. Throughout his life, Cruickshank mentioned that children and individuals with learning disabilities should be considered along a continnum of intelligence as one of the diagnostic criteria for learning disabilities.

Samuel Kirk's work with students, who might be presently referred to as learning disabled, began in the early 1930s. According to Kirk, the term 'learning disabilities' described children who have disorders in development of language, speech, reading and associated communication skills needed for social interaction. He further noted that he did not include as learning disabled those children whose primary handicap was generalised mental retardation or sensory impairment (blindness or deafness). Students with learning disabilities were sometimes provided educational programs prior to 1963, but this was accomplished in a variety of settings. They were at times called: (i) Hyperactive students, (ii) brain injured students, (iii) Strauss syndrome students, (iv) dyslexia students, (v) students with perceptual disorders ,(vi) students with perceptual motor disorders, (vii) minimal-brain dysfunction (MBD) students, (viii) dysgraphic students, (ix) aphasic students, or (x) neurologically impaired students (Kirk, 1970, cited by Kamphus and Hendry, 2000).

Kirk suggested a new label – ‘ learning disabilities’ (LD) - which soon became the fastest growing sub-area of special education. Parents were so impressed with the potential of this new term that they voted, in a convention, to organise the Association for Children with Learning Disabilities (ACLD, 1986). Thus, LD was born and became a very rapidly growing baby. ‘‘A learning disability refers to a retardation, disorder, or delayed development in one or more of the processes of speech, language, reading, writing, arithmetic or other school subjects resulting from a psychological handicap, caused by a possible cerebral dysfunction and/or emotional behavioural disturbances. It is not the result of mental retardation, sensory deprivation or cultural and instructional factors.’’ (Kirk, 1962 cited by Kamhaus and Hendry, 2000).

During the 1940s learning disorders were recognised in children with neurological dysfunction. One group of studies that focused on whether children with learning difficulties invariably had demonstrable brain damage concluded that brain disorder was minimal and introduced the term ‘minimal brain damage’. The minimal brain dysfunction syndrome included learning deficits, perceptual motor problems, poor co-ordination and over activity (Harris, 1995).

In the early 1960s, the difficulty that many children were having with learning began to attract serious attention. An increasing number of children were found unable to cope with schoolwork especially with reading, writing and mathematics. These children were otherwise bright, fairly articulate in their verbal expression and did not appear to have any form of mental retardation or sensory handicap. Educators and professionals began to take these learning difficulties seriously. Since its inception in the 1960s, the learning disability field has undergone quite dramatic changes in its conceptual viewpoints. Specifically, it has forsaken the so-called perceptual deficit hypothesis (Cruickshank, 1972, cited by Wong, 1996).

Federal Register (1977, cited by Nakra, 1998) states that ‘‘specific learning disability, means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculation. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicap or mental retardation, or emotional disturbance or of environmental, cultural or economic disadvantage.''

A recent interagency report of the US Congress (Interagency Committee on Learning Disabilities, 1987) identified at least four problems with the Federal definition.

i. It does not indicate clearly enough that learning disabilities are a heterogeneous group of disorders.

ii. It fails to recognise that learning disabilities frequently persist and manifest in adults as well as in children.

iii. It does not clearly specify that, whatever the cause of learning disabilities, the 'final common path' is inherent alterations in the way information is processed.

iv. It does not adequately recognise that persons with other handicap or environmental limitations may have a learning disability concurrently with these conditions.

The Federal Register definition excluded children who belonged in environmental, cultural or economically disadvantaged conditions and also mentally retarded children. On the contrary, in the UK, mentally retarded children are included in such definitions (Cram and Howell, 2005).

According to the National Joint Committee on Learning Disabilities, U.S.A (NJCLD, 1981) these disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. According to the

Learning Disabilities Association of Canada definition, Learning Disabilities may arise from generic variation, bio-chemical factors, events in the pre-to post-natal period, or any other subsequent events resulting in neurological impairment.

According to the ICD-10, F.81 classification, the term ‘Learning Disabilities’ refers to ‘Specific Developmental Disorders of Scholastic Skills’. Based on this, developmental disorders may be described as disorders in which the normal pattern of skill acquisition is disturbed from the early stage of development.

Inclusion of Learning Disorders in a manual of mental disorders remains controversial, as was noted in DSM-III-R (APA, 1987), but these disorders conform to the definition of mental illness by reflecting impairment in important areas of functioning for children. Most frequently, learning disorders interfere with a child’s functioning in the school setting, but they may also cause more general problems with the activities of daily living (Masten and Coatsworth, 1995).

The Public Law 94-142 definition (Education for all handicapped children, U.S.A, 1975) is in contrast to that of DSM-IV. The Public Law includes only children with normal intelligence, whereas the DSM-IV definition allows for mentally retarded children with uneven cognitive profiles. The DSM-IV definition excludes those whose learning problems are due to known neurological disorders (Harris, 1995). Several aspects of these definitions are controversial and difficult to operationalise. These aspects include:

* Exclusion criteria – learning difficulty is not a result of some other condition;
* IQ achievement discrepancy – there must be a discrepancy between so-called potential and achievement such that achievement is significantly lower than that would be predicted from IQ;
* Specificity – the learning problem is specific, generally confined to one or two cognitive areas.

The definitions of learning disabilities assume that:

i. A learning disability is not the result of an inadequate education.

ii. The individual does not have any sensory deficits such as hearing or visual impairments.

iii. The individual does not have any serious neurological disorders that may interfere with learning.

iv. The individual does not have major social or emotional difficulties that might interfere with learning (Kim Reid and Heresko, 1981).

Most definitions suggest that learning disabilities are permanent, affect a range of language and mathematics functions and are caused, at least in part, from problems within the central nervous system. In addition, definitions of LD have generally focused on two key identifying factors: Discrepancy and Exclusion.

1. Discrepancy means that a child with a learning disability exhibits a significant gap between aptitude and performance. In many places, a diagnosis of a learning disability depends on a very strict statistical measurement of this discrepancy between achievement and aptitude.

2. Exclusion means that a learning disability is not caused by some other handicapping condition such as physical impairment or social status (Kamphaus and Hendry, 2000).

Some experts have argued that the exclusionary element in definitions of LD has led to the under-identification or misdiagnosis of individuals who come from poor, minority, cultural, racial or ethnic backgrounds. They argue that the difficulties such children have in learning are more likely to be caused by their backgrounds and upbringing than to a potential learning disability, and that approaches to diagnosis that depend on aptitude/achievement discrepancies are also likely to under-represent such individuals. Another major area of controversy has to do with excluding social and behavioral disabilities from standard definitions of learning disabilities and to excluding ADHD from this general category.

Children and adults classified with learning disabilities (LD) are individuals of normal intelligence but they suffer from information processing difficulties. Several definitions refer to persons with LD as reflecting a heterogeneous group of individuals with intrinsic disorders that are manifested by specific difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. Most definitions assume that the learning disabilities of such individuals are:

- ❖ Not related to inadequate opportunities to learn;
- ❖ Not related to poor instruction;
- ❖ Not manifested in all aspects of learning;
- ❖ Not related to general intelligence, or significant physical or emotional disorders;

- Problems that have a neurological, constitutional and/or biological base.

Definitions, such as those proposed for learning disabilities, are offered to specify a particular type of condition or individual. Definitions of learning disabilities are frequently criticised because they almost universally state that neurological impairment is the presumed cause of the problem. However, even the most severe critics of the learning disabilities concept agree that at least a few children may have specific neurological impairment that interferes with school learning. The important question for these critics is: what percentage of school children currently identified as having Learning Disabilities are adequately described by current definitions? (Coles, 1987, cited by Wong, 1991).

Hammill (1981 cited by Wong, 1996), also noted that a variety of terms such as minimal brain dysfunction or injury, psycho-neurological learning disorders, dyslexia, or perceptual handicap, to name a few, have all been used to refer to the LD population. However, a number of investigators, including Wong (1991), have suggested that this definition is difficult to operationalise because it is vague and unspecific.

Wong (1991) and Keogh (1989) noted that in spite of this definition, and the rules and regulations for implementing Public Law 94-192 (Federal Register, 1977), special education categories still differ from country to country, state to state and even within states from district to district.

The lack of precision in evidence for this characterisation of the Learning Disabled reflects the confusion found in clinical and educational settings. The heterogeneity of disciplines concerned with the problem is precipitated by the heterogeneity of the symptomology presented. The disability may be specific to reading or generalised to all cognitive areas. It may be present with or without behavioural, social or motor problems. In short, Learning Disabilities are idiosyncratic and each case is symptom-specific.

Most of the definitions do not exclude speech problems. As the acquisition of spoken language is more fundamental than the learning to read, reading problems with and without normal speech acquisition have to be separately conceptualised and analysed.

The general trend in learning disability research is to locate the problem in the person rather than in the environment. This is attained by excluding the role of instructional factors and social backwardness. This is the frame of ‘victim blaming ideology’ that is more evident when the problem is attributed to a more or less permanent damage/deficit rather than to a temporary condition. The problem is neurological by definition rather than by finding. There are two ways to ignore the questions of instruction: one is to disregard instruction while doing diagnosis. The second is to reframe definition to mention instructional opportunities. The argument in the second version goes like this: some children succeed and some other fail in a class. The failure has to be attributed to the characteristics of children.

In spite of all the work and research, Silver (1998) concludes that a lack of a uniform definition and set of diagnostic criteria is one of the most crucial factors inhibiting current and future research efforts. This problem must be addressed before further epidemiological, clinical, basic and educational research can result in meaningful, generalisable findings. The continuing controversy and debate that surrounds the concept of learning disabilities is complicated by different disciplines and theoretical perspectives. These controversies are likely to continue in the years to come (Kamphaus and Hendry, 2000).

It is not easy to resolve the conceptual issues associated with the term ‘Learning Disability.’ So the present study attempts to undertake an in-depth analysis of a small sample of students who face serious difficulties in the activities of either reading or writing. The term ‘serious’ is used here in the sense that:

a) The difficulties in reading or writing have become a hindrance in carrying out other academic activities

b) The performance in reading or writing is much below the age-appropriate norms

c) The problems cannot be attributed to below average general intelligence - IQ is either average or above-average

d) The problems appear to be more fundamental and deep-rooted

The investigator does not take any position in the causative role played either by personal or environmental factors. The possible role of instructional or cultural factors is not attempted to be excluded. Further, the investigator does not assume that the problem is due to either structural or functional neurological impairment.

There exist two dominant theoretical explanations for the problems in reading and writing. One group of theorists argue that the primary problem is in the area of language. They use the term ‘language impairment’ to denote not only a disability in reading and/or writing, but also a disability in speech. They utilise linguistic explanations. For instance, Vellutino (1979, cited by Pennington and Welsh, 1995) writes:

> “Reading disability is basically a subtle language processing disorder – not a disorder of visual or spatial processing, as has been commonly assumed. In the vast majority of cases, the underlying deficit appears to be in phonological processing skills.”

Another group of theorists attempt to locate the underlying problem in the processes of visual perception and motor functions. We definitely know that if some children have delays or deficits in their visual processing abilities, such weakness could be a factor in their apparent difficulties in differentiating between similar-looking letters and words, especially in analysing and remembering the orthographic patterns in words and in processing letters and words at rapid rates in text. Wong (1991) summarises this theoretical position as follows:

> "A review of clinical reports suggests a common profile or pattern of difficulties in the reading and writing of many learning disabled individuals over time, a pattern that seems to support the importance of some type of visual component processes. Students who experience great difficulty in their written-language acquisition, irrespective of whether or not they manifest any sign of processing difficulties in their aural/oral language (indeed, some may have superior oral language abilities), often show the following characteristic set of problems as they are learning to read and write."

In reading

- a difficulty learning to recognise letters and numbers
- confusion between similar looking letters and words
- great difficulty recognising words "by sight"
- over-reliance on context for word recognition
- failure to analyse the internal structure of words
- slow word-by-word reading

In writing

- difficulty learning how to form letters
- confusion between similar-looking letters
- mirror-image writing
- difficulty in remembering 'how words look' to spell them
- phonetic spelling, based on the sounds in words"

In the present study, a distinction has been made between students who have reading/writing problems with or without speech problems. Students with speech problems are not included. Further, this study concentrates on the non-linguistic aspects associated with the problems in reading and writing.

The study also attempts to make an individualised exploration of each case, by classifying them participants as having reading and writing problems. The investigator attempts to do a separate analysis of these problems. Practically, such a distinction is very difficult as most students have problems in both reading and writing. So a decision regarding which is more primary and fundamental is necessary.

1.2. STATEMENT OF THE PROBLEM

The present study is entitled as "AN EXPLORATORY ANALYSIS OF THE DEVELOPMENTAL HISTORY AND BEHAVIOURAL CHARACTERISTICS OF CHILDREN WITH LEARNING DISABILITIES".

1.3. OBJECTIVES

The following broad objectives are formulated:

i. To identify a sample of students who have serious difficulties in either reading or writing, but not having problems in speech and listening;

ii. To conduct a detailed analysis of their issues and errors with respect to reading and writing, and to study their behavioural problems, if any;

iii. To identify and study the underlying difficulties in the areas of perceptual, intellectual and motor functions;

iv. To trace the developmental history of these identified underlying difficulties.

Being an exploratory study, hypotheses are not formulated.

1.4. SIGNIFICANCE OF THE STUDY

In Kerala, the area of learning disability is of very recent origin, having a history of just about ten years. Educational institutions like SCERT (State Council of Educational Research & Training) and DIET (District Institute of Education and Training) and Governmental projects like SSA (Sarva Shishya Abhiyan) have started giving due importance to the field. Several psychologists and educators offer their services to those children affected by LD. Even hospitals and special education centres have been set up for helping such children. One epidemiological survey shows that 10% of students of various age groups are learning disabled in the state of Kerala (Suresh& Sebastian, 2005). Researches have started looking at the problem of Learning Disability more closely. This research work is one of the initial attempts that have been made in the state to study this phenomenon.

Effective intervention can be designed only on the basis of thorough knowledge of different sets of factors related to the phenomenon. Hence, different research studies attempting to understand the underlying perceptual, cognitive, linguistic and motor mechanisms are essential. Further, reading and writing disabilities are not a homogenous category. Different varieties of reading disabilities exist. Generating a knowledge base on each variety is important. The present study is an attempt to understand some such varieties.

The investigator also opinioned that speech disability should be differentiated from reading/writing disability. Studies considering this differentiation seemed to be rare. Further, a deeper understanding regarding the non linguistic aspects is important. The present study attempts to fulfill these requirements.

The study also attempts to analyse the developmental history of the underlying mechanisms. This knowledge base, if extended and replicated, can lead to fruitful suggestions regarding early identification of children who may possibly become learning disabled. Intervention at this stage is highly important.

1.5. STRUCTURE OF THE REPORT

This thesis report is divided into five chapters. The first chapter introduces the subject. The second chapter provides a theoretical and empirical review of the reading and writing disabled children. The third chapter narrates the methods used in this research. Individual-level analysis and the inferences derived are presented in the fourth chapter. The final chapter summarises the methodology and findings of the study.

Chapter II

Review of Related Literature

2.1 Reading and writing: the normal processes and difficulties

2.2 Correlates of reading disability

2.3 Correlates of writing disability

2.4Othercorrelates of learing disabiled

2.5Concluding remarks

The present chapter gives a brief review of the research findings conducted on Reading and Writing disabilities. The first section of the chapter deals with the normal processes and difficulties associated with reading and writing, the second section dealt with correlates of reading disabilitiy, correlates of writing disability are deals in the third section. Where as a review on other correlates of learning disabled is attempted in the fourth section.

2.1. READING AND WRITING: THE NORMAL PROCESSES AND DIFFICULTIES

Reading and writing are primarily cultural skills, which are acquired as one becomes a member of the cultural community. It is not a naturally occurring event in any child's development. Rather, it is a culturally determined activity, and as such it is influenced by teaching method and child's personal experiences with printed letters (Seymor, 1992, cited by Hoien and Lundberg ,2000). Reading is a complex process. At a minimum, reading involves language, memory, thinking and intelligence, as well as perception. The ability to read has becom fundamental to our everyday lives. It is estimated that 800 million adults in different parts of the world are illiterate (Silverman, 1991, cited by Sternberg, 1996). This is not because of cognitive dysfunction, but because they have not grown up in a culture that is based on written language.

Thus if reading and writing are primarily a product of culture, we cannot expect there to be separate reading, or writing centers in the brain, created by biological evolution, like the speech or motor centers. Even so, learning to read and write is, of course, based on fundamental biological functions such as visual perception, memory functions, phonological function, and language comprehension (Mareschal, 2005).

2.1.1. Reading

Because of its complexity and the many successive stages of its development, Bond and Tinker (1979) considered that one simple definition of reading will not suffice. So they proceed to describe and define reading under a variety of headings: reading as a skill development, as a visual act, as a perceptual act, as a thinking process, and reading as related to cultural background. Reading processes involve both the acquisition of meaning intended by the writer and the reader's own contributions in the form of interpretation, evaluation and reflection of these meanings.

An individual must acquire considerable basic cognitive and perceptual linguistic skills in order to learn to read. First, it is necessary to learn to focus one's attention, to concentrate, to follow directions, and to understand the language spoken in daily life. Next, it is essential to develop auditory and visual memory with sequencing ability (Valett, 1996).

Gates (1949, cited by Bond and Tinker, 1979) defined reading as a complex organization of patterns of higher mental processes – that can and should embrace all types of thinking, evaluating, judging, imagining, reasoning and problem solving. Reading ability defined in this way is associated with skill in comprehending text.

Hoien and Lundberg (2000) suggested four stages in reading development;

1. Psuedo-reading : Children at this stage of reading development do not really look at letters as letters. Sometimes they do not seem to be aware of letters at all, but use the contextual clues and 'read' the environment. Occasionally it looks like a child is reading when he or she is really 'reading' the environment, not the writing itself.

2. The logographic–visual stage: The logographic reading strategy can best be characterized as learning to associate the visual traits of a word with its name. By using this strategy, the child is also able to recognize many words even though he or she has not yet learned any letters. But as time goes by and the child needs to learn more and more words, this strategy proves unsuccessful.

3. The alphabetic – phonemic stage: The hall mark of the alphabetic-phonemic stage is that the reader has broken the alphabetic code. Phonemic awareness refers to the ability to mentally divide a spoken word into its constituent phonems. Some researchers claim that phonemic awareness is necessary in order for the child to achieve good phonological reading ability. Even though the alphabetic –phonemic stage is the core of the reading development process, the alphabetic-phonomic strategy makes great demands on the reader's attention. When using this strategy, the reader's attention is necessarily focused on the structure of the word, so the reader gradually learns how the word is spelled, which in turn makes it easier to decode it next time.

4. The orthographic-morphemic stage: Orthographic-morphemic reading happens very fast. Researchers do believe that good readers at this stage read words as whole units, without any mental work being done on the word's sequence of letters. Readers at this stage still have a long way to go before they have acquired a fully developed reading ability.

It is widely noted some children spend more time at a particular stage than others, and that a particular stage can be more important for one child than for another. Some children seem to jump over a particular stage, and Hoien and Lundberg (2000) often found children at a mixed stage of development. They mainly use the technique typical of one stage, but also rely on the techniques of an earlier stage in special circumstances. When children begin to learn to read, they are very dependent on contextual clues and this diminishes as the child develops. There are several theoretical perspectives as to how reading ability develops through time (Ehri, 1992).

Reading ability is a complex skill that builds on a number of decoding and comprehension processes. Decoding allows the reader to recognize and pronounce the word, and thereby access its meaning. Comprehension refers to those higher cognitive processes that make it possible for the reader to extract the meaning of the text, to think about it, and to draw conclusion from it.

Decoding and comprehension are therefore the two main sub processes that good reading ability builds on, and both are necessary (Hoien and Lunberg, 2000). Research has conclusively shown that accurate and automatic word decoding is a necessary prerequisite for good reading ability (Adams, 1990).

There are several different strategies that readers use to decode words, depending on whether the word appears in isolation, or in context. If the word is seen alone, there are two main strategies to choose from- the orthographic strategy and the phonological strategy. The orthographic and phonological strategies are more important for good reading than contextual cues.

The orthographic strategy allows the reader to decode the word immediately, that is, to go directly from the word's orthographic representation to the word's sound and meaning. In order to do this, the reader should have seen the word, a number of times before, so that he or she has established an orthographic identity for the word in the long-term memory. 'Orthographic identity' means an inner, abstract representation of the word's spelling (Share and Stanovich, 1999, cited by Hoien and Lundberg, 2000). The orthographic strategy is what skilled readers generally use.

But when the reader is confronted with an unfamiliar word, or an experimentally devised unknown word, then he or she needs to use the phonological strategy. When one reads phonologically, he/she, decodes the word by breaking it down into letters or short segments of letters. These letter segments are first recoded into sound individually and then the sounds are blended together to create a smooth string of sounds. This string of sounds is the raw material used for recognizing the word (Ethri, 1992).

When learning to read, novice readers must come to master two basic kinds of processes. Lexical processes and comprehension processes. Lexical processes are used to identify letters and words; they also activate relevant information in memory about these words. Most psychologists who study reading believe that lexical access is an interactive process, combining information from multiple levels of processing, such as the features of letters, the letters themselves, and words comprising the letters (Morton and Marshall 1979).

Rumelhart and James (1982, cited by Sternberg, 1996) distinguish among three levels of processing following visual input: the feature level, the letter level, and the word level. The model assumes that information at each level is represented separately in memory and that information passes from one level to another directionally. In other words, processing is both bottom-up (starting with sensory data and working up to higher levels of cognitive processing) and top-down (starting with high-level cognition operating on prior knowledge and experiences related to a given context). The interactive view implies that not only do we use the sensorial perceptible features of letters, say to help us identify words, but we also use the features we already know about word to help us identify letters. For this reason, the model is referred to as interactive. Top down or bottom-up processing for both lexical and comprehension processes operate simultaneously and interactively.

Hoien and Lundberg (2000) observe that the perceptual process actually consists of two sub processes that work with the information in very different ways, the holistic process and the analytical process. The holistic process works on the form of the stimulus. It is fast, its work is done in 50 milliseconds. The analytic process, works more slowly, taking about 200 milliseconds to do its job. This analytic process is important to one's ability to discriminate between words that have roughly the same shape.

There are in particular four factors that can affect the balance between the holistic and analytic processes. These are (i) the reader's cognitive style (ii) emotional problems, (iii) attention deficits and (iv) teaching methods (Taylor and Taylor, 1983, cited by Hoien and Lundberg, 2003).

Myklebust (1971) stated that reading is a symbol system twice removed from the realities which they represent. That is, the child first integrates non verbal experiences directly. Next he acquires auditory, then later a visual verbal system which represents both the experience and the auditory symbol. The acquisition of each symbol system requires a number of integrities. If a child has difficulty in integrating meaningful experience, or learning through either the visual or auditory modality, a disturbance of reading can be expected. Reading difficulty may also be expected when the child has difficulty to spell.

As with reading, there are several different strategies one can use to spell words, of the two most important are the phonological and the orthographic strategies. An automatic word decoding at the orthographic stage frees the reader's cognitive resources so that he or she can deal with the semantic and syntactical structures that make the text meaningful. This ultimately allows reading to become a kind of extremely steered thinking (Spear-Swerling and Sternberg, 1994).

Automatic processes involve no conscious control. That is, for the most part, automatic processes occur outside the conscious awareness, demand little or no effort or even intention, are performed as parallel processes. Psychobiological findings and other cognitive research seem to indicate that much of human cognition involves parallel processing.

Posner and Snyder (1975, cited by Sternberg, 1996) have suggested three characteristics of automatic processes: they are concealed from consciousness, are unintentional, and consume few attention resources. An alternative explanation, called instance theory has been proposed by Gordan Ogan (1988, cited by Sternberg, 1996) who has suggested that automatism occurs because we gradually accumulate knowledge about specific responses to specific stimuli. Most automatic processes govern relatively easy tasks, and more difficult tasks require controlled processing, although with sufficient practice, even extremely complex tasks, for example reading and writing can become automatic (Sternberg, 1996).

A skill is usually deemed automatic when it is rapid, does not make great demands on processing capacity, takes place beyond conscious control, and when it includes parallel processing (Fluwcett and Nicolson, 1994, cited by Hoien and Lundberg 2000). Automatic word decoding is characterized as the correct and rapid reading of words. Dyslexia is the opposite; poorly automated word decoding is most clearly seen during the reading of words in isolation. Research has conclusively shown that accurate and automatic word decoding is a necessary pre-requisite for good reading ability. Reading disabilities may result from inadequate automatization[1] (Adams, 1990).

Sternberg and Wagner (1982, cited by Gearheart, 1985) state that many reading disabled students must devote conscious attention to tasks that have become automatic for others. This automatization failure, according to Sternberg and Wagner, applies to all levels (components) of information processing: the higher order executive process that control cognitive functioning (meta components), the lower order process that carry out command from and provide feed back to the meta components (called performance components), and the learning components that are responsible for acquisition, retention, and transfer of information about new tasks, problem solving, and so forth.

Reading disability is a condition in which reading is significantly below expectancy for both age and intelligence and also disparate with the learner's cultural, linguistic and educational experience (Harris and Sipay, 1980,cited by Tallal and Miller1994). In order to characterize children of normal (or high) intelligence who show significant reading and / or writing

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[1] **Automatization:** A form of learning in which a skill or procedure becomes automatic and virtually unconscious. Most people experience same degree of automatic skills, such as driving a car, forming letters, spelling common words accurately, and performing simple arithmetic equations. Individuals with learning disabilities may have difficulty with automatic skills, taking longer to develop automaticity with such basic skills as spelling, decoding and hand writing, and requiring more repetition, practice and reinforcement.

difficulties, terms such as dyslexia, word blindness or special reading and writing deficit have been put forth (Hoien and Lundberg, 2000).

The Greek prefix ‘dys’ means ‘difficulty’ or ‘hard’ and ‘lexia’ refers to ‘words’. The term dyslexia is generally used for describing significant and persistent reading difficulties. The first scientific reports of dyslexia among school students were recorded about 100 years ago. The English paediatrician Morgan was the first to describe childhood dyslexia. He coined the term word blindness in 1896, (cited by Hoien and Lundberg, 2000). Dyslexia, a term coined by Rudolf Berlin Stuttgart, Germany in 1887, is probably the most widely used term to describe a child who is unable to read.

Other words frequently used for Dyslexia are severe reading disabilities, primary reading disabilities, specific reading disabilities and word blindness (Nakra, 1998). There are some errors ‘specific’ to dyslexic readers: omissions, additions, substitutions, repetitions or regressions, reversals, word by word or letter by letter reading and sound blending. Children with reading disorder have significant difficulty with word recognition, and reading comprehension. When reading out loud they omit, add or distort the pronunciation of words to an extent unusual for their age (Davison and Neale, 2001). Reading disorder is characterised by specific and significant impairment in the development of reading skills, the inability to recognise words, slow and inaccurate reading, poor reading, guessing difficult words, missing out words, repeating the same sentences, confusing similar words while reading and slow reading (Harris, 1995).

Reading disorder is generally described as the difficulty in learning to read, despite conventional instruction, adequate intelligence and socio cultural opportunity. It depends upon fundamental cognitive disabilities, which are frequently of constitutional origin. As we can see, this definition does not speak us to what characterizes dyslexia, beyond the difficulty in achieving normal reading ability. We get more information about what dyslexia is not, and the definition is mainly concerned with the criteria for exclusion. Reading disability is the condition we have when there is a clear discrepancy between the people's reading ability and other intellectual ability (Hoien and Lundberg, 2000). Developmental dyslexia is a neuro functional disorder characterized by an unexpected difficulty in learning to read and write despite adequate intelligence, motivation and education (Nopola-Hemmi *et al.*, 2001).

According to the Diagnostic and Statistical Manual of Mental Disorder (DSM 1V-TR) reading disability is best characterised as follows.

A. Reading achievement, as measured by individually administered standardized tests of reading accuracy or comprehension, is substantially below that expected given the person's chronological age, measured intelligence, and age appropriate education.

B. The disturbance in criterion A significantly interferes with academic achievement or activities of daily living that requires reading skills.

C. If a sensory deficit is present, the reading difficulties are in excess of those usually associated with it.

One way of categorizing reading problems is in terms of reading retardation and reading backwardness. Reading retardation refers to a substantial discrepancy. In research studies, reading retardation may be operationalised using criteria, such as two standard deviation below average expected score. Snowling *et al.*, (1988) found that children with reading disorder may have severe phonetic spelling problems along with difficulty in reading irregular words and in distinguishing between written components (Yule and Rutter, 1985).

The key symptoms in dyslexia are difficulties in learning to read and spell, often with relatively better performance in arithmetic. Parents and teachers may also report slow reading or writing speed, letter and number reversals, problems in memorizing, basic mathematical facts, and unusual reading and spelling errors. Some of these impairments may be correlated with reading disability but not necessarily directly related to the core phonological disorder.

These correlated deficits involve impairments in language processes such as articulation, naming, and verbal short- and long-term memory. Finally, reading disabled individuals may demonstrate problems in reading comprehension, mathematical, as well as letter reversals. These characteristics are generally considered to be secondary symptoms of disorder.

The early 1990s witnessed a resurgence of direct instruction intervention studies, primarily influenced by reading research, which suggested that a primary focus of intervention should be directed to phonological skills. The fact was that because a large majority of learning disabled children suffer problems in reading, some of these children's reading problems are exacerbated because of lack of systematic instruction in processes related to phonological awareness (the ability to hear and manipulate sounds in words and understand the sound structure of language (Siegel and Smith, 2005).

Siegel and Smith’s (2005) research indicates that children with reading disabilities show a remarkable homogeneity in cognitive profile. That is, they found that when reading disabilities are defined in terms of word recognition skills, that all children with reading problems have deficits in phonological processing. Their work and similar work of others find three critical processes in the analysis of reading disabilities: those related to phonological processing, ability to understand grammatical structure, and working memory (combination of transient memory and long-term memory).

2.1.2 Writing

Writing is a highly complex process and according to Myklebust (1971), it is one of the highest forms of language, hence the last to be learned. It is a form of expressive language, a visual symbol system for conveying thoughts, feelings and ideas. The fine discrimination, integration, memory and co-ordination of hand, mind, and eye required for the act of writing are infinitely complex. In the normal child these processes develop in an orderly pattern so that by the time a child is approximately six years of age, he or she is ready to begin to write. The child would have developed the visual and auditory discriminations required for reading and visual-motor integration necessary for forming letters and at least to a point, acquired the cognitive and language functions necessary for selecting and organizing words into simple sentences.

Written language allows one to communicate with others, to express ideas and feelings, and share knowledge. In school, the quality of written expression demonstrates that the child has mastered concepts and measures of academic learning in test (Argye *et al*., 2005).

Learning to write is not a mechanical, lower-level reflex response, but a thinking process, entailing activity of the cortical nerve areas (Webster, 2004). Smooth motor co-ordination of eyes and hands, control of arms, and finger muscles are acquired in the process of learning to write and are needed for legible results (Demonent *et al*., 2004).

As with reading, there are several different strategies one can use to spell words, of the two most important, are the phonological and the orthographic strategies. When one use the phonological strategy he/she should break the word down in to its constituent phonemes, which we then encode in graphemes. This encodings is done on the basis of the phoneme-grapheme correspondence rules. The orthographic representation of the sound of the word is remembered, and then retrieved when needed (Hoien and Lundberg, 2000). Spelling requires more auditory and visual discrimination, memory, sequentialization, analysis and synthesis and integration simultaneously than perhaps any other skill. It is evident that the majority of children with writing disabilities have deficits in spelling.

The handwriting development literature (as cited by Pennington and Welsh, 1995) has indicated that by the time a child reaches third grade, his or her handwriting has become more automatic, organized, and readily available as a tool to facilitate the development of ideas. Thus a deficiency in these qualities at this age may be a sign of a problem.

The problem is manifested in the inadequate performance of handwriting among children who are of at least average intelligence and who have not been identified as having any obvious neurological problems. Some students with dysgraphia may also have trouble writing numbers or other non letters symbols, but others may be perfectly capable of number writing (Gearheart, 1985)

Difficulty in handwriting, sometimes referred to as dysgraphia may reflect many other underlying deficits. Dysgraphia, latin form for “problem with writing”, is the term we use for those who have a major problem with penmanship. Writing difficulties may be linked to problems in other areas of language functioning, or may be limited to the production of written language.

Compared to the amount of research done on reading, surprisingly little work has been done on the psychology of how we write. And most of the work done on the writing process has been limited to spelling (Moats, 1996).

Individuals with writing disorders typically have problems in several areas of writing, such as sentence structure, punctuation, spelling, or generating ideas and language in written form. There are a number of factors that are related to written language disorders. Some of these listed by Myklebust (1965, cited by Wallace, 1975) include: (1) spoken language disturbances (2) auditory process problems (e.g., discrimination, memory and blending), (3) visual process problems (discrimination, memory, sequencing), (4) word analysis deficits, including problems with phonetics, and syllabication, (5) speech articulation problems and other deviations.

According to the Diagnostic and Statistical Manual of Mental Disorder (DSM-1V TR), writing disorder is characterised as follows.

A. Writing skills, as measured by individually administered standardized tests (or functional assessments of writing skills), are substantially below those expected given the person's chronological age, measured intelligence, and age appropriate education.

B. The disturbance in criterion A significantly interferes with academic achievement or activities of daily living that require the composition of written texts.

C. If a sensory deficit is present, the difficulties in writing skills are in excess of those usually associated with it.

Jones and Christensen, 1999; Berninger and Graham, 1998, cited by Castano (2002) have proposed that the act of handwriting among children with difficulties can interfere with the simultaneous execution of composition. It is found that when letter production is not fully automatic, the act of handwriting makes increased demands on memory and attention resources, which in turn, constrain the higher level cognitive processes required for composition. Additionally Bishop *et al*., (2004) suggested that if handwriting is very slow, children may forget the ideas and plans held in memory before they succeed in transferring them to paper.

The three major areas of written expression in which children generally have problems are: (1) handwriting, (2) spellings, and (3) concepts and other technical aspects associated with written expression. Usually these are interlinked problems and it is expected that a child having difficulties in any one of these areas will experience a spill-over in the others too (Nakra, 1998).

The absence of prewriting skills is a major reason why children fail to write correctly. The development of legible handwriting involves a certain number of specific skills (Johnson and Myklebust, 1967).

In the normal course of development, a child develops sufficient muscle control before the second year to grasp crayons or other writing tools and to produce random scribbles. With time, the child is able to hold a pencil with three fingers and by age five he has the fine motor control necessary for prewriting activities. He is also able to attend to visual stimuli and discriminate between features like size, shape, and spatial orientation. Early problems with writing, for example, reversing letters (*d* is written as *b*), letter size, problems with spelling, and incorrect movements are gradually self-corrected as the child grows older. However, for some individuals, this normal course of development is delayed or disordered. Motor development and coordination may be slow.

Kimmell (1979, cited by Nakra, 1996) suggests that children who have not had the experience of squeezing, twisting, and manipulating objects may find it difficult to control a crayon or pencil. Fine motor coordination is a very essential prerequisite for writing. Children lacking fine motor control tend to hold the writing tool very tightly or too loosely. This may develop into a writing disability when the child enters school and so needs to be corrected as early as possible.

Understanding of spatial concepts such as *up, down, top* and *bottom* are important for correct letter formation and spacing of words. Many children have a poor sense of directionality and confuse the strokes (Nakra, 1998). Writing problems may occur due to the underlying difficulties in the areas of perceptual, finemotor, linguistic or cognitive domains.

In recent years, Kaminsky and Powers (1981 cited by Nakra, 1998) identified four problems that may lead to poor writing:

i. Disorders of visual perception - the inability to recall how a letter looks.

ii. Failure to integrate the visual image of a letter with the correct motor response.

iii. Poor efficiency and control of the intrinsic muscles in the hand.

iv. Faulty motor memory related to the storage of motor information in the brain.

2.2. CORRELATES OF READING DISABILITY

Research has shown that a general poor reading ability is often caused by difficulty in decoding words rapidly and accurately. It is also important to know about the different perceptual and linguistic processes taking place concurrently with the different decoding strategies (Siegel, 1993, cited by Hoien and Lund Berg, 2000).

There are three approaches for analyzing problems of the dyslexic individual. The first is to identify the reading problems without regard to its underlying causes. The second approach is to describe and analyze the dyslexic in a variety of different ways, cataloguing various symptoms. The third approach is to use neuropsychological assessment procedure, derived from research on adult brain damaged patients to evaluate brain cognitive function in the disabled reader (Kolb and Whishaw, 1996).

Neuropsychological studies have provided considerable evidence that the main mechanism leading to reading disability is phonological in nature, namely a basic defect in segmenting and manipulating the phoneme constituents of speech. A case has also been made for impairment in brain visual mechanisms of reading as a possible contributing factor (Habib, 2000).

2.2.1. Linguistic Correlates

The specificity and nature of the underlying neuropsychological deficit in reading disability help us think about divisions within both the language and reading systems. Not all the components of the complex information processing system involved in reading are equally impaired in dyslexia. Reading involves: (a) visual perceptual processes to recognize letters, (b) word recognition and (c) comprehension processes. Research has shown that the locus of difficulty in dyslexia is in word recognition (Pennington and Welsh, 1995).

Das *et al.*, (1994) tested the hypothesis that children with dyslexia identified by word decoding deficit will be poor in specific cognitive processes that require successive processing and rapid articulation, irrespective of their high or average non verbal IQ. Results of the study confirmed the hypothesis.

Griffiths' (1991) study about dyslexic group revealed that dyslexic children have word finding difficulties. Evidence for dyslexia related difficulties was found only at the word form level of access. Dual process theorists have argued that word recognition can be accomplished either by direct access or through phonological coding. Of these two means of word recognition, developmental dyslexia appears to interfere mainly with phonological coding.

Deficits in phonological coding are characteristics of the vast majority of developmental dyslexics (Olson, 1985, cited by Pennington and Welsh, 1995). The Phonological Processing Deficit (PPD) hypothesis remains the most influential theory to explain why some children fail to acquire appropriate reading skills. However, current research suggests that there may be other deficits operating and that the phonological processing deficit may be one manifestation of a deeper underlying anatomical syndrome that originates in the cerebellar or vestibular areas of the brain (Debbie, 2003).

These deficits are found when dyslexics are compared to younger normal readers matched for real word reading skill, and thus are unlikely to be just a consequence of dyslexia. Instead, a phonological coding deficit appears to be the proximal cause of dyslexia, at least in most cases (Fletcher, 2002).

Blomert and Mitterer (2004) Followed 163 boys from kindergarten through 4th grade. Three kindergarten tasks (giving sounds associated with letters, rapid naming of numbers, and finger localization) differentiated dyslexics from normal readers with 98% correct classification. Results confirm the role played by phonological processing tasks in predicting dyslexia.

Further evidence for the centrality of phonological coding to word recognition has been provided by behavior genetics analysis of components word recognition processes. Rack and Falker (1989, cited by Rourke and Furest, 1995) analyzed the heritability of phonological versus orthographic coding deficits in single-word reading in the dyslexia. Quite strikingly, they found significant heritability for phonological coding deficits measured by oral non word reading speed of accuracy. In contrast, a measure of orthographic coding deficits, skill in single-word reading was not found to be heritable. Moreover, the contribution of phonological coding deficits, to the heritability of reading disability (RD) in the study of twins was substantial, whereas the contribution of orthographic coding was essentially zero.

Research and clinical experience tell us that dyslexics have a higher rate of spoken language problems (Tallal and Miller, 1994) including early articulation disorders, name-finding problems, and problems remembering verbal sequences.

These spoken language symptoms of dyslexia are easily understood if dyslexia is conceptualized as a phonological processing disorder, they are harder to explain on a visual or other theory of dyslexia. They can be analyzed further; either as primary or secondary. Recent research indicates that even the seemingly narrow domain of phonological processing skills have different relations to reading skill and disability (Blomert, 2004).

Problems in verbal short term memory and name retrieval appear to be correlated and/or secondary symptoms, whereas problems in phoneme awareness appear to be primary (Bowey and Ryan, 1992, cited by Rourke and Furest, 1995). Development of spoken language skill is important for later reading development. Behavior genetic analyses are consistent with the view that the heritable spoken language precursor to dyslexia is a deficit in phoneme awareness, which causes the heritable written language deficit in phonological coding (Those genes influencing dylexia may also affect other components of early language development).

A study by Bradely and Bryant (1983) was unique in that it combined a longitudinal study with a training study, thus allowing a test of both the direction and specificity of the causal relation between phoneme awareness skills and reading outcome. The results revealed that, a broad sample of normal children showed evidence of some degree of phoneme awareness before age four, and that early phoneme awareness skill was significantly supported by a specific, causal relation between pre-school phoneme awareness and later reading skill.

Bradley and Bryant's (1981) study on a broad sample of normal children showed evidence of some degree of phoneme awareness before age four, and that early phoneme awareness skill was significantly related to later reading (but not arithmetic) skill. In addition, early knowledge of nursery rhymes predicted later phoneme awareness skill.

Mann and Ditunno (1990) included all four phonological processing skills (phoneme perception, phoneme awareness, verbal memory and naming speed) in a longitudinal study with two cohorts. Phoneme perception was not predictive. Phoneme awareness accounted for a very large portion of unique variance in reading outcome, whereas the contributions of verbal short term memory and naming speed were much smaller.

It is also important to mention that there is evidence that naming speed may contribute to individual differences in component reading processes separated from those influenced by phoneme awareness. Both Bower (1997) and Lovett (1987) found that accuracy in reading comprehension was related to both phonological coding and word recognition. Even though the largest contributor to individual differences in overall reading skill appears to be phoneme awareness, other phonological processes may influence particular component reading processes. Some of these, like naming speed, may be especially important for the development of automaticity in reading.

Semrud-Clikman *et al.*, (2000) studied 71 children in three groups (reading disabilities, ADHD without reading disabilities and normal controls) and they were compared on their ability to rapidly name colours, letters, numbers, and objects (RAN task) and alternating letters/numbers and letters/numbers/ colours (RAS tasks). Children with reading disabilities were found to be slower on letter and number naming tasks and made more errors on all tasks than controls.

Accuracy-disabled subjects had failed to achieve reliable age-appropriate word recognition skills. Rate-disabled readers were age-appropriate in word recognition accuracy but deficient in reading speed. All aspects of the reading systems of accuracy-disabled subjects proved deficient, and these children were less able to learn new sound-symbol associations in a task stimulating initial reading acquisition. The rate-disabled subjects exhibited a basic deficit in word recognition speed, compromised accuracy when reading in context, and compromised spelling when competing visual pattern. Multidimensional oral language impairment was found to accompany the accuracy disability, while the rate disability appeared restricted to language in its visible form and the naming of visual representations. A visual naming speed impairment was associated with both profiles of deficient reading skill (Lovett, 1987).

Felton and Wood (1989) studied the cognitive deficits in reading disability and attention deficit disorder. The paper presents data from three studies (a cross – sectional study of school – referred children, a test –retest study of subtypes of reading disabilities, and a study of a large, random sample of first graders) that focus on specifying the cognitive deficits associated with reading difficulties and separating them from those associated with attention deficits. The cognitive deficits associated with difficulty in reading were consistent across samples, developmental levels, definitions, and subtypes of reading disabilities. Poor readers were significantly impaired on measures of naming and phonological awareness.

Dyslexic's problem with word recognition is caused by a deficit in the use of phonological codes to recognize words. Over and over when we read, we must translate printed letter strings into word pronunciations. To do this, we must understand that the alphabet is a code for phonemes, the individual speech sounds in the language, and we must be able to use that code quickly and automatically so that we can concentrate on the meaning of what we read (Liberman and Liberman, 1990, cited by Rourke and Furest, 1995). The difficulty that dyslexics have with 'phonetic', the ability to sound out words, makes reading much slower and less automatic, and destructs considerably comprehension. Likewise, poor ‘phonitic’ ability makes spelling considerably less accurate and automatic. We do not simply memorize the spelling of words if so, each new word would be completely novel, with no transfer of information from the words already known. Instead, what we already know about the regularities and exceptions of phonological codes in our language helps us learn and remember the spelling of a new word. Reading and spelling are very closely related and both use the same kinds of codes, but in different directions. When we read, we go from letters to phonological representations of letters.

Studies of cognitive and linguistic processes in dyslexia have clearly identified word recognition as the locus of difficulty, which is caused by a deficit in the phonological coding of written language (usually measured by non -word reading). Underlying the deficit in phonological coding is a spoken language deficit in the specific skill of phoneme segmentation.

Across languages and socio-economic levels, poor readers have problems with phoneme segmentation skills. Some of these problems are caused by biological variations, some by deficient early stimulation, and some by simply not reading. In this regard, phoneme segmentation is a special language skill because it is not necessary for spoken language.

Both structural and physiological studies point to posterior left hemisphere structures, particularly the planum temporale, as being important in the brain mechanisms underlying dyslexia (Galaburda, 1995).

The most direct evidence of structural differences in dyslexic brains has been provided by the studies conducted by Galaburda and colleagues at Harward Medical School (Galaburda, 1994). Several autopsies on brains of dyslexic individuals have been conducted by this group. The most consistent finding is symmetry of the planum temporale in all cases. Galaburda (1994) have found symmetrical planum temporale ectopias in areas around the sylvian fissure especially on the left side of the brain and smaller size of the nerve cells in the auditory thalamus in dyslexic brains, which are unusual in normal brain. The planum temporale isolates superior posterior surface of the temporal lobe. In the left hemisphere, it is part of Wernicke's area, which is involved in phonological processing. This neuropathic logical result is consistent with the extensive cognitive research on dyslexia, which has found that it is essentially a phonological processing problem. Planum symmetry was significantly associated with phonological coding deficits within the dyslexic group (Larsen, *et al,*, 1990 cited by Tallal and Miller, 1994).

Dalby (1998) studied about the temporal lobe asymmetry and dyslexics. Positron emission tomography (PET) scans showed that for the dyslexics only, a subset of the brain regions normally involved in phonological processing was activated.

Cerebellar symmetry was observed in the dyslexics but there was significant asymmetry (right gray matter >left gray matter) in controls. The degree of cerebellar symmetry was correlated with the severity of dyslexics' phonological decoding deficit. Those with more symmetric cerebellum made more errors on a nonsense word reading measure of phonological decoding ability. Left cerebellar metabolite rate was shown to correlate significantly with the degree of cerebellar asymmetry in controls. This relationship was absent in developmental dyslexics (Race and Harasty, 2006).

Children with developmental dyslexia and dysgraphia do not have hemianopias or scotomas, symptoms that would certainly occur in a large percentage of brain damaged adults with dyslexia. Further, EEG and CT scan studies have not demonstrated structural damage. Abnormal EEG, similar to those correlated with known brain damage, are not consistently correlated with learning disabilities. It has been proposed that learning disabilities may result from malfunction of some portion of the cerebral cortex rather than from direct damage. One view of the brain dysfunction hypothesis holds that the dysfunction results from defective arousal mechanisms (Kolb and Wishaw, 1996).

Galaburda's (1994) findings in autopsy studies, neuro imaging, and neurophysiology indicate that dyslexia is accompanied by fundamental changes in brain anatomy and physiology, involving several anatomical and physiological stages in the processing stream, which can be attributed to anomalies in prenatal and immediately postnatal brain development. It is suggested that the disorder of language, which is the cardinal findings in dyslexic subjects, results from early perceptual anomalies that interfere with the establishment of normal cognitive- linguistic structures, coupled with primarily disordered cognitive processing associated with developmental anomalies of cortical structure and brain asymmetry.

Abnormal hemispheric lateralization for speech processing has been suggested to underlie the language and reading deficits present in many language and reading disabled individuals (Geschwind and Galaburda, 1985).

Galaburda and Livingstone (1993) hypothesized that the disordered left hemisphere's specialized processing of very rapid acoustic change, may lead to deficits in speech perception and subsequently impair language and reading development.

Pugh *et al.,* (2000) conducted functional neuro imaging studies of reading and reading disability. Converging evidence suggests that fluent word identification in reading is related to the functional integrity of two consolidated left hemisphere (LH) posterior system: a dorsal (temporo-parietal) circuit and a ventral (occipito-temporal) circuit. This posterior system is functionally disrupted in developmental dyslexia.

Some recent studies have shown abnormal symmetries in the temporal or parietal lobes of people with reading disorder (Sadock and Kaplan, 1999). Pugh *et al.,* (2000) proposed a neurobiological account suggesting that for normally developing readers, the dorsal circuit predominates at first, and is associated with analytical processing necessary for learning to integrate orthographic features with phonological and lexical-semantic features of printed words. The ventral circuit constitutes a fast, late-developing, word identification system which underlies fluent word recognition in skilled readers.

Fawcett and Nicolson (1999) investigated performance of dyslexic children on cerebellar and cognitive tests. The dyslexic children showed highly significant impairments of the cerebellar tests, with deficits on postural stability and muscle tone comparable in magnitude with their reading and spelling deficits. The findings provide further evidence of the generality of cerebellar impairment in dyslexia.

Leavell (1994) examined the relationship between cerebral laterality and neuropsychological functions (particularly phonemic analysis) in 20 reading disabled (RD) and 20 non-reading disabled (NRD) 8-12 year old boys. RD children display similar patterns of general hemispheric specialization as NRD children, but have problems with specific, and predominantly left-hemispheric, cognitive processes which are critical to reading.

Dyslexia seems to be related to a lack of planum temporale (PT) asymmetry that is accompanied by functional differences to control subjects in both left and right hemispheric temporal regions during language tasks. It appears that cortical auditory (language) processing is organized differently in dyslexic subjects than in controls. This might be the consequence of a more symmetrical PT organization, which in turn might be the result of maturational delay (Paul and Isabella, 2006).

2.2.2. Perceptual Correlates

Perception is the term applied to the process of recognizing and interpreting sensory information, or the intellect's ability to extract meaning from the data received by the senses. It is a cognitive process that involves identification, organization and translation of sensory data in to meaningful usable information. Perceptual process includes discrimination, co- ordination and sequencing. Persons with reading and writing disabilities may experience difficulties in any of the areas of discrimination, coordination and sequencial perceptual processing. For this reason, perception probably has been the most heavily researched area in learning problem. Children with perceptual disturbances exhibit a wide variety of difficulties (Raymond, 1998).

The notion of perceptional processing disorders as a correlate of learning disabilities became an important idea in the early development of the field of learning disabilities. The concept is based on the premise that children learn in different ways. Some learn best by listening (auditory), some by looking (visual), some by touching (tactile), and some by performing an action (kinaesthetic) (Lokanadha *et al.,* 2000).

In the early days of the learning disabilities field, there was widespread speculation that perceptual deficits caused learning disabilities that were then manifested in the child's enormous difficulties in learning to read. Children's difficulties in learning to read and write are compounded and exacerbated by visual perceptual problems, or by their slow processing of visual information (Willams 1991, cited by Wong, 1996).

Perceptual deficits or perceptual handicaps refer to an individual's deficits in interpreting or making sense out of visual information despite intact vision and visual systems. Visual deficit include difficulties in accurate form perception or shape discrimination, perception of letters or figures in certain spatial orientation (problems here result in reversals of letters or numbers), visual closure and figure-ground discrimination (Halliahan and Kauffman, 1976, cited by Wong, 1996).

Visual perception is an interpretation of a visual sensation and visual stimuli with memories of past experiences. A number of educational studies have investigated the relationship of visual perception to the reading and writing process. One of the early examinations of this relationship was a study by Wallace (1975). He administered a series of eight tests to 135 children in grades three through eight. The reported results suggested that specific visual perceptual abilities are correlates of reading ability.

Transient visual system deficits found in a large majority of reading-impaired individuals have been discussed almost exclusively within the context of integrating visual fixations and eye movements during the reading process. Malinsky and Daphna (2004) studied about visual discrimination and visual memory functioning in dyslexia. The results taken together suggest that visual discrimination and memory deficits characterized high functioning young adult dyslexic individuals.

Sireteanu (2005) investigated the performance of children with developmental dyslexia on a visual line bisection task. Dyslexic children did not show the overestimation of the left visual field (pseudoneglect) characteristic of normal adult vision. These results suggest that children with developmental dyslexia present selective deficits in visual attention, probably involving neural structures located in the right posterior parietal cortex.

Case studies by Valdois (2003) describe, one case that conforms to the pattern of phonological dyslexia: he exhibits a poor performance in pseudo-word reading and spelling, produces phonologically inaccurate misspellings but reads most exceptional words accurately. Case No. 2 in contrast, is poor in reading and spelling of exceptional words but is quite good at pseudo word spelling, suggesting that he suffers from surface dyslexia and dysgraphia. Case No. 1 demonstrated poor phonemic awareness skills but good visual processing abilities, while Case No. 2 showed the reverse pattern with severe difficulties in the visual attention tasks but good phonemic awareness. The findings further show that phonological and visual processing deficits can dissociate in developmental dyslexia.

Facoetti (2003_b) investigated the gradient of visual attention in 21 children, 11 children with specific reading disorder (SRD) and 10 children with normal reading skills. Normally reading children showed a normal symmetric distribution. In contrast, children with specific reading disorder showed an anomalous and asymmetric distribution. Effect of reaction time was observed when the stimulus was projected in the left visual field, where as no effect was observable when the stimulus was projected in the right visual field. Findings reveal the possible relation between this anomalous spatial distribution of visual attention and dyslexia (Facoetti, 2001).

Eight and eleven years old reading-disabled children were compared in two experiments with controls matched on intelligence and age. The evidence indicates that the development of visual information processing in reading-disabled children is similar to that in controls but occurs at a slower rate (Lovegrov and Brown, 1978)

Raymond and Sorensen (1998) investigated motion sensitivity in a group of dyslexic children. Their results suggested that dyslexic children have poor perceptual integration, rather than poor low-level motion detection.

Facoetti (2003_a) studied the role of visuo spatial attention in developmental dyslexia. Shifting of visual attention induced peripheral cues was studied in 24 children with specific reading disorder (SRD) or dyslexia and was compared with that of 19 normal readers by means of a covert – orienting paradigm. As compared to normal readers, in SRD children the inhibition effect was absent.

Brannan and Julie (1988) conducted two experiments comparing visual processing in normal and reading-disabled children. Subjects were asked to detect the temporal order of two brief stimuli or to sort cards containing bracket stimuli that did or did not produce perceptual grouping effects. Poor readers required more time to make accurate temporal order judgments and showed stronger perceptual grouping effects. For both good and poor readers, the amount of time necessary to make a correct temporal order judgment decreased, and perceptual grouping effects became weaker with age.

Individuals with a developmental reading impairment appear best differentiated from non impaired control subjects on tasks that emphasize processing in the transient as compared with the 'sustained' visual processing system. Visual processing deficit present in reading impaired subjects, compared with controls may represent a selective deficit in the transient visual processing system (Tallal and Miller, 1995).

Tallal and colleagues (1973) conducted a series of experiments comparing information processing performance for auditory, visual and cross-modal (visual and auditory) perception in language-impaired and control subjects. Results indicated that specific language impairment subjects had more errors in processing rapidly presented for auditory, visual and cross-modal information.

Experimental evidence from the language-impaired and control subjects on tasks designed to examine perceptual processing in somatosensory perception have reported that language- impaired subjects show significant deficits in the abilities to discriminate simultaneously presented tactile information, and to produce rapid alternating and sequential movements (Johnstein *et al*., 1981, cited by Pennington and Welsh, 1995).

Speech perception and the discrimination of brief auditory cues in reading disabled children were studied by Reed (1989). The results suggest a perceptual deficit in some reading disabled children which interferes with the processing of phonological information.

Bretherton and Holmes (2003) analyzed the relationship between auditory temporal processing, phonemic awareness, and reading disability. He investigated the relationship between auditory temporal processing of non speech sounds and phonological awareness ability in children with a reading disability, aged 6-12 years, using Tallal's tone-order judgment task. Results suggested that an auditory temporal deficit as a possible contributory factor to poor phonemic awareness skills. The presence of a tone-order deficit relate to performance on the order processing of speech sounds, to poorer phonological awareness or to more severe reading difficulties.

Walker (2002) investigated the temporal processing abilities of school students with diagnosed reading disorders. Significant correlations were found between reading ability measures and temporal processing abilities, specifically in word recognition and duration pattern processing, suggesting a relationship between lower level auditory temporal processing skills and decoding efficiency.

The role of auditory temporal processing in reading and spelling was investigated in 15 spelling disabled and 14 control children (grades 5-6). Subjects were asked to determine whether they heard one noise with no gap, or two noises with a gap between them. In addition, a word reading list and a spelling ability measure were administered to the subjects. There was no evidence for the popular hypothesis of auditory temporal processing deficit underlying dyslexia (Koerne, 1998).

Wittion (1998) showed in his study that dyslexic individuals are less sensitive both to particular rate of auditory frequency modulation (2Hz and 40 Hz but not 240 Hz) and to dynamic visual-motion stimuli. The results further implicated those neuronal mechanisms that are specialised for detecting stimulus timing and change as being dysfunctional in many dyslexic individuals.

The auditory temporal deficit hypothesis predicts that children with specific reading disability (RD) will exhibit a deficit in the perception of auditory temporal cues in non speech stimuli. The pattern of results did not indicate a pervasive deficit in auditory temporal function in children with reading disability (Breier, 2003).

The extent of these deficits in reading impaired subjects has also been shown to be significantly related to their reading comprehension and non word reading (decoding) abilities (Tallal, 1980). Importantly, measures of rapid temporal processing failed to differentiate reading-impaired children without concomitant oral language deficits (including phonics skills) from control children (Tallal and Stack, 1982, cited by, Tallal and Miller, 1995).

The study of Tallal and Miller (1994) demonstrated that individuals with a developmental language impairment show specific deficits in the rapid processing of information. The nature and developmental courses of these temporal processing deficits are directly related to an individual's deficits in the perception and production of speech stimuli.

At present, studies conducted by several independent laboratories have shown that individuals who have developmental language impairment demonstrate a disruption in rapid auditory temporal processing. (Tallal, 1980, cited by Tallal and Miller, 1995).

The hypothesis of a general temporal processing deficit in dyslexia was tested by Van Ingelghem and Van Wieringen (2001). As many as 70% of the dyslexia readers had significantly higher thresholds than controls for both auditory and visual temporal processing: the evidence tends to support the hypothesis of a general temporal processing deficit in children with dyslexia.

2.3.CORRELATES OF WRITING DISABILITY

Very early in life the normal child learns to make visual motor associations. As scribble on a paper, children find that they can produce particular visual patterns by moving their arms in a certain way; they discover that they can make a different picture by changing the direction of their movement. Children like what they see and try to remember what they did in order to produce it. They retain both visual and kinesthetic images so that they can copy many kinds of figures. As child matures he/she perceives how complex lines and figures fit together and learns to draw and write. In learning to make these associations, the child also learns to transfuse information from one system to another. When child sees a figure, he/she knows what movements to make in order to copy it and knows that if he/she makes a series of movements in a certain sequence, specific visual patterns can be produced. Dysgraphic children cannot make these associations or profit from similar experiences, therefore, they cannot write (Johnson and Myklebust, 1967).

Sandler's (1992) study investigated patterns of neuro developmental dysfunction in children with writing disorders (WD). Records of children, aged 9 to 15 years, referred to a school problems clinic were examined using teacher questionnaire information, including ratings of writing legibility, mechanics rate, linguistic sophistication, and spelling, 99 cases of WD were found. Sixty three children without writing disorder served as clinic controls. A cluster analysis revealed four discrete subtypes of WD and two non-WD control clusters. The four WD cluster were found to have different patterns of writing and reading characteristics. Neuro developmental tests discriminated among the clusters and an examination of neuro developmental performance characteristics among the clusters showed different patterns of strengths and weaknesses. An empirically derived sub types of writing disorder is proposed-writing disorder with fine motor and linguistic deficits, writing disorder with visual-spatial deficits, writing disorder with attention and memory deficits, and writing disorder with sequencing deficits. These sub types, if confirmed in a population study, may have important diagnostic and therapeutic implications.

2.3.1. Correlates of Fine Motor Function

Human learning begins with motor learning. As children move, they learn. An understanding of the dynamics of learning necessarily involves an understanding of movement and motor development. There is a natural sequence of developmental motor stages. The acquisition of motor skills at each stage of the sequence provides the foundation for learning at the next stage.

In the motor learning process, several input channels of sensation or perception are integrated with each other and correlated with motor activity, which in turn provides feed back information to correct the perceptions. Getman (1985) believes that higher level intellectual abilities develop from lower level motor systems. Many visual perceptual theorists stressed movement –oriented teaching method because they believed that movement is essential to early learning. Piaget and Inhelder (1975) suggested that infants who are delayed in their sense of touch, balance, and reflexes will have particular difficulty in organising information that is gathered through their sensorimotor exploration (crawling, mouthing, touching) and this in turn will adversely affect their perceptual sense of space and time as well as sensory ability.

General motor development includes those abilities usually associated with locomotion or mobility. Development of these abilities tends to receive priority attention from all perceptual-motor theorists. These include: creeping, walking, running, jumping, skipping, and hopping (Kephart, 1968, cited by Wallace, 1975).

Lerner (1976) emphasizes the importance of movement games in helping students with learning problems. She believes that gross movement activities can provide a sensory experience that will enhance general classroom learning. Movement and motor experiences are crucial to human development and most theories of human development recognize the significance of such experiences for child growth.

A hierarchical theorist, Kephart (1960, cited by KimReid and Heresko, 1981) believed that on the basis of adequate school learning was the successful development of four patterns of motoric ability (1) balance and maintenance of posture, (2) locomotion, (3) contact or motor activities, (4) receipt and propulsion. Balance and the maintenance of posture reflect the ability of the child to be able to orient and maintain position in space.

Rabergner (2003) examined the relationship of reading disability (RD) and attention deficit hyper activity disorder (ADHD) to balancing problems. Balancing problems are taken as sign of a cerebellar deficit and were found to be associated with dyslexia.

Kephart (1968, cited by Wallace, 1975) suggested that some reading and writing disabled children find it difficult to learn motor patterns. Although dyslexic children do not have gross motor involvements, many have minor disturbances including inferior locomotor coordination, balance, and manual dexterity. Some cannot ride bicycles because of balance problems; others cannot construct simple models because they cannot manipulate small pieces of material. When motor tests are administered, they fall below average, particularly on tests of locomotor co-ordination.

When confronted with movement uncertainty, reading and writing disabled children showed significant increases in reaction time and movement time over a 4.6meter run (Brunt, 1982). Children with developmental co-ordination disorder (DCD) have difficulty in learning and performing age-appropriate perceptual-motor skills in the absence of diagnosable neurological disorders. Jogmans (2003) examined the consequences of the co morbidity of DCD and learning disabled for the severity and pattern of perceptual- motor dysfunction. Compared to children with DCD without learning disability, children with co morbid DCD and learning disability performed lower on a standardised assessment of perceptual-motor ability. Furthermore, it appeared that children with combined DCD and learning disabled have particular difficulty performing manual and balance tasks but not ball-skill tasks, they have difficulty in gross motor and fine motor skills.

According to Rosenblum (2004), one cause of difficulty in hand writing could be the delayed development of fine motor skills that characterize many dyslexic children. Student with handwriting problems may be unable to execute efficiently the motor movements required to write or to copy written letters or forms; they may be unable to transfer the input of visual information to the output of fine motor movement; or they may be poor in other visual-motor functions and in activities requiring motor and spatial judgments.

Fine motor deficit usually prove to be a divesting problem for the young child. Merely holding the pencil properly may be a very difficult task for some writing disabled children. As the child progress, he may be unable to copy from chalk board; trace stencils colour with in an outline or print various letters (Sovik and Arntzen, 1992).

The reading and writing disabled children with fine motor deficits will often have trouble in cutting and pasting different shapes, or stringing beads. Wallace (1975) says that these children are slow in learning to tie shoes, button coats, manage zippers, and use scissors. Fitting puzzles together may also be difficult for these children.

Nakra (1998) suggests that children who didn’t have the experience of squeezing, twisting, and manipulating objects may find it difficult to control a crayon or pencil. Fine motor co ordination is a very essential prerequisite for writing. Children lacking fine motor control may develop a writing disability and need to be corrected as early as possible.

2.3.2. Correlates of Visual-Motor Integration

Learning to write requires adequate maturity for accurate perception of the symbol patterns. Writing form memory demands the retention of visual kinesthetic images of forms, not present to the senses, for future recall. The capacity for graphic representation, such as writing requires, depends on the motor function of the eye and its co-ordination with eye movements (Horn and Packward, 1985).

Writing disabilities frequently result from deficits in visual memory. With this type of involvement the person can speak, read and copy but cannot revisualize words or letters. However, the disturbance is in the visual process rather than in the auditory. Revisualisation deficits can also affect numbers, but writing is more interfered, because of the complex number of words and the sequences of letters to be remembered. These children can copy, but in contrast, they have lack of ability to write letters from dictation. They can give letters, names and sounds when they see them. But they cannot revisualise the letters from the auditory presentation.

Smits-Englesman (2003) found that the writing of poor hand writers tend to lack continuity within letter sequences and show a wide variability in the orientation of individually written letter segments. Further, the results of a study carried out by Smits-Englesman, indicated that children with poor handwriting made more spatial errors than proficient writers, leading them to conclude that poor handwriting may stem from a problem in spatial control. Longitudinal research performed on children with handwriting difficulties support the view that children with dysgraphic handwriting fail to obey spatial constraints, and that their handwriting lack consistency.

Quite often a person with visual perceptual problems has motor problems as well. This is referred to as a visual – motor disability. If the brain receives information that has been improperly perceived, then the brain processes and records it incorrectly and it may misinform the muscles which in turn may result in eye-hand co-ordination difficulty. The children who have eye hand co-ordination difficulty cannot copy from the board fast enough and rarely finish class work. In order to copy from the board, one has to first look at the word (visual perception) then retain it in visual working memory and finally write it on the paper. Dysgraphic children may have some any defects in the above mentioned processes. (Dockerell and Shane, 1993).

Fine motor sub skills frequently mentioned with regard to disabled readers and writers, require the child to coordinate vision with movements of the body. Many writing, copying and tracing disturbance are due to eye-hand coordination problems (Wallace, 1975).

Dysgraphia is a disorder resulting from a disturbance in visual-motor integration (VMI). The child with this type of involvement has neither a visual nor a motor defect, but he cannot transduce visual information to the motor system. The child sees what he/she wants to write, but cannot ideate the motor plan. As a result, child is unable to write or copy letters, words and numbers. It is the ability to copy which differentiates dysgraphia from other disorders of writing. Dysgraphia is a type of apraxia affecting the visual-motor system (Dockrell and Shane, 1993).

Perceptual-motor match is the establishment of relationships between purely perceptual elements (which lead to the development of a body of perceptual information) and motor information. As long as the two types of information are not correlated, speed and accuracy of learning are greatly retarded. Kilpatrick (1996) use the development of eye-hand coordination as an example of perceptual-motor match.

Visual motor integration skills were shown to be related to the ability to copy letters legibly. Findings also support the conclusion that there is no significant difference in letter writing legibility between students who use paper with or without lines (Turkington and Joseph, 2004). Nonverbal visual-motor functions also are often disturbed in the dysgraphic child. The cannot transduce visual information to the motor system or imitate what is seen; therefore, may be unable to tie the shoes, open a bottle, or follow a sequence of movements in a game (Smith-Englesman, 2003).

The Developmental Test of Visual-Motor Integration (VMI) is widely used in psycho educational assessments to measure visual-motor skills in children. In addition, its relationship to reading, mathematics, and overall achievement has been widely studied, yet little is reported in the literature about the relationship between visual motor skills and written expression (Aiello-Cloutiee, 1993).

Among various perceptual-motor tests, only VMI was significant in predicting the accuracy of the performance of handwriting on which Aiello-Cloutiee (1993) conducted a study . In his study, among 59 children (aged 10 years), consisting of 19 clumsy children, 22 no clumsy dysgraphic children, and 18 ‘normal’ children. The test result revealed that handwriting was significantly related to visuo- motor integration and visual form perception.

The high writing problem group scored significantly lower on visual perception, visual-motor integration, fine motor coordination, and cognitive planning in comparison with classroom controls. Poor quality of handwriting of children with high writing disabled group seems particularly related to deficiency in visuo-motor integration (Volman, 2006).

2.4. OTHER CORRELATES OF LEARING DISABILED

Since late 1970s cognitive approaches have received more attention and acceptance in the field of learning disabilities (Mercer, 1987). Cognitive processes are complex and interrelated processes that are associated with comprehending, remembering, and making sense of our experiences. Cognition involves the creative and constructive process that is necessary to integrate and relate new information with existing knowledge (Gearheart, 1985).

Major tenets of the cognitive approach (Mercer, 1987) include:

i The learner relates new information to existing knowledge to construct meaning and modify knowledge.

ii The learner is actively involved in learning and is responsible for his/her own learning.

iii The organization and the integration of new information are critical processes in learning and memory.

iv Learning is holistic (i.e. the whole is greater than the sum of its parts), thus teaching should focus on the whole.

Maturational lag theory gives a clear picture about the cognitive approaches in learning process. It helps to determine the type of cognitive approach that should be used in learning process. Bender (1957, cited by Mercer, 1987) popularized the maturational lag theory to explain learning problems. According to this theory, each person has a perfect timetable for development. Each individual’s various mental processes are mature at different rates. Proponents of this theory hypothesize that learning disabled students lag behind their normally-achieving peers because of different timing. According to this theory, the problems in learning are created when children are asked to perform tasks before they are ready.

Since the maturational lag theory suggests that immaturity leads to learning problems, it is reasonable to expect that at given grade level, the younger children would experience more learning difficulties than the older children. The majority of research on Piaget's theory has been done with normal children. Research on the application of Piagetian theory (1967, Cited by Anderson *et al*., 2002) to learning disabilities is very sparse. The limited research that exists suggests that learning disabled children progress through developmental stages in the same order as normally achieving children, but with some delay.

Many theorists recognize the importance of basic cognitive processes that function in an interrelated manner to achieve learning. Some theorists and researchers concentrate on studying one of the specific processes. Learning disabilities fall into four broad categories based on the four stages of information processing used in learning: Input, Integration, Storage and Output.

Input – This is the information perceived through the senses, such as visual and auditory perception. Difficulties with visual perception can cause problems with recognizing the shape, position and size of items seen. There can be problems with sequencing, which can relate to deficits with processing time intervals or temporal perception.

Integration – This is the stage during which perceived input is interpreted, categorized, placed in a sequence, or related to previous learning. Students with problems in these areas may be unable to tell a story in the correct sequence, unable to memorize sequence of information such as the days of the week.

Storage- Problems with memory can occur with short- term or working memory, or with long- term memory. Most memory difficulties occur in the area of short–term memory, which can make it difficult to learn new material without many more repetition than is usual.

Output-Information comes out of brain through words, that is language output, or through muscle activity such as gesturing, writing or drawing. Difficulties in any of these processes could make problems in learning process.

Baker and Lelend (1997) examined the cognitive abilities of 60 pairs of reading disabled twins aged between 6 and 16 years. Principal component analysis of nine cognitive tests yielded three readily interpretable composites of cognitive abilities in reading symbol-processing, speed, and sequential memory. Scores on these three cognitive composites were significantly lower for the disabled reader than for normal readers. Multivariate analysis of variance indicated that reading-disabled children manifested deficits on measures of academic achievement, symbolic processing speed and spatial reasoning abilities at both ages.

A learning disabled child typically shows, hyperactivity, perceptual motor impairment, emotional liability, general co-ordination deficit and disorder of attention. Attention deficit is frequent among learning disabled (Nakara, 1998).

The role of attention in the processing of pictures and words was investigated for a group of 10 normally achieving children and for groups of learning disability subtypes that were defined by deficient performance on tests of reading and spelling. The result suggested that the word naming deficiency for group of reading disability is not due to selective attention deficit but due to specific linguistic deficit that develops at a later stage of processing (Greenham, 2003).

In a study, the Test of Every day Attention (TEA) was used to assess visual selective attention, attention switching, sustained attention, and auditory/ verbal working memory in students with reading and writing disability and matched controls. The study supports the idea of differential attention deficits in the learning disabled, and suggests individual patterns of strengths and weaknesses (Sterr–Annette 2004).

Willcutt (2001) compared the cognitive deficits in reading disability and attention deficit hyperactivity disorder. Results revealed that ADHD was associated with inhibition deficits, where as RD was associated with significant deficits on measures of phoneme awareness (PA) and verbal working memory.

Lazar and Wayne (1998) studied three groups of children –ADHD with LD, LD only and Attention Deficit Hyper Activity disorder only on tests of attention –inhibition, working memory and problem solving. The groups of children with learning disability only, performed better than other groups.

Visser and Troy (2004) compared the magnitude of the Attention Blink (AB) in children with developmental dyslexia to reading-matched and age-matched control groups. In Experiment 1, when two targets were presented in the same spatial location, the AB deficit was similar in the reading-matched and dyslexic groups, but greater in the dyslexic group than in age-matched controls. In Experiment 2, when targets were presented in different spatial locations, performance in the dyslexic group was worse than the age-matched controls and marginally worse than the reading-matched controls. Taken together, the results argue for developmental delays in the ability of children with dyslexia to allocate attention to rapidly-sequential stimuli, as well as some evidence for difficulties that are unique to this group.

Reading and writing requires both auditory and visual memory, and so, impairment in the ability to retain information in either modality can cause difficulty. The child with auditory memory problems may be unable to remember letter sounds or to put sounds together to make words. The inability to sequentialize has been observed in many children with reading disabilities (Johnson and Myklebust, 1967).

Such children fail to remember the sequence of letters or sounds within words where by they misread or misspell words. They also might have difficulty learning a series, and are unable to follow specific patterns or remember the order of letters in words. Reading involves not only the differentiation of letters but the patterning of letters with in a word. Long after a child having fluency in reading, but problems in sequentialization, may become evident in spelling (Johnson and Myklebust, 1967).

Agarwal *et al.*, (2003) study result indicated that, learning disabled children had impaired perceptual maturity and conceptual grasp as observed on MISIC (Indian modification of WISC), Bender Gestalt test and piagetian test. On WISC, learning disabled children scored highest in verbal conceptualization (similarities, vocabulary, comprehension), followed by spatial (picture completion, object assembly, block design) and sequencing (arithmetic, digit span, coding) abilities in sub categories. These children on Bender Gestalt test made more errors particularly distortions (distortion of parts, in correct number of dots, shape of design lost etc).

In addition to the frequently occurring perceptual, cognitive, linguistic, and neurological dysfunction, the reading and writing disabled frequently show signs of social and emotional problems as well. It is not unusual for the learning disabled adult or child to have a poor self-image, self-concept, and self-esteem.

According to DSM –IV, these children may show symptoms of under achievement, oppositional defiant disorder, phobic anxiety disorder, and social anxiety disorder of childhood, and develop dislike for school.

Learning disabled children have both social and academic problems. Their social disabilities are initially attributed to persistent school failure, and other behavioral pattern associated with attention difficult disorder that provided disapproval from peers and teachers (Denckala, 1996).

Fleming (2002) examined the effect of social influences in the lives of an ethnically diverse sample of 5^{th} through 8^{th} grade students with and without learning disabilities. Similarities and differences in students perception of school, family and peer group contexts were examined. Results show that having a learning disability was associated with consistent, most negative, effects on social relations across the contexts of student's lives, regardless of gender, race, grade and socioeconomic status.

Smart (1996) tested hypothesis concerned with the temporal and casual connections between Reading Disability and Behavior problems. Children with both either and, neither kinds of problems were followed up over two years. While reading disabilities remained stable over time there was greater variability in behavior problems status. Their data did not support the claim that reading problems lead to the development of behavioral problems in children who were co morbid had the worst outcome at follow-up, suggesting that behavior problems may exacerbate reading delay. Rourke and Furest (1995) suggested that negative consequences of having a learning disability such as frustration, anxiety or peer rejection due to continued academic failure or a cognitive deficit that perpetually disrupts psycho- social functioning. It is clear that some children with learning disability display significant maladjustment.

2.5. CONCLUDING REMARKS

The conceptual issues mentioned in the first chapter regarding learning disability become a serious hindrance in understanding the results of studies conducted in the area. The definition of LD in each study may be different. Further, most of the studies do not seem to make the distinction between speech disability and reading disability.

Two different theoretical explanations do emerge from the studies. First view focuses on linguistic aspects and the second concentrates on perceptual aspects as they explain reading disability. When we control speech problems, the linguistic components narrow down. Most of the language related factors are associated with spoken language. The remaining linguistic factors are associated either with phonological segmentation and other spelling – related abilities or with visual-verbal integration In relation to perception, different visual and auditory components are empirically found to be associated with reading disability.

With respect to writing, fine motor components and visual motor integration components do gain prominence. When speech and reading are controlled, language factors do not seem to affect writing.

Different cognitive functions other than those mentioned above may also become contributing factors. Two important variables emerged from the review are attention and memory.

Many behaviour problems may become correlated with reading and writing problems. These behaviours may be ‘self-fulfilling’ in that learning problems may instigate those behaviours and, in turn, those behaviours may affect the quality of further learning. Intervention programmes should consider the methods of breaking this vicious circle.

With this background, the investigator attempts to undertake the exploratory case analysis. The methodology utilised for the study is described in the next chapter.

Chapter – III

Methodology

3.1 Research Design
3.2 Sample of the study
3.3 Details of the Tools
3.4 Data collection and Analysis

The present study is an attempt to trace the developmental history of dyslexic children whose development of spoken language is more or less normal. This chapter describes the design of the study with a detailed explanation of the stages of the study, sample selection procedures, data collection tools and methods of data analysis.

3.1. Research Design

An exploratory design with a case study approach is followed.

3.2. Sample of the study

Judgment sampling is used. Selection of an adequate sample was one of the most labourious jobs in the study. The difficulty arose primarily because of the prevailing confusion regarding the definition of learning disability.

The researcher selected one hundred and twenty four children for the preliminary sample. These children were diagnosed as learning disabled by a team of experts consisting of Neurologist, Pediatrician, Physiotherapist, Psychologist, Linguist and Speech Pathologist working in a institute specialised in neuroscience. The institution followed DSM –IV criteria for diagnosis.

Out of the 124 children, 30 were short-listed on the basis of the following criteria:

A. Among the selected group children who have normal spoken language development, were selected.

B. Participants with any organic impairment and more than one disability were eliminated. In the case of students with reading and writing problems, they were selected if one problem was more dominant and fundamental. The children who have difficulties in Arithmetic were excluded.

Psychological tests were administered to the 30 children and their academic and developmental history was collected from their parents. After that a further screening was done, which reduced the number of children to 12. The end sample of 12 was finalised after eliminating the children whose academic history, personal history and reported problems did not match the results of psychological tests.

The final sample consisted of nine boys and three girls with an age range of 7-12 years. All the children had an IQ of more than 90 and came from families of above average socio-economic status. Five children belonged to the reading disordered group and seven children belonged to the writing disordered group.

Details regarding the final sample are given in Table 3.1.

Table 3.1

Sampling break-up

Sl No	Se	Ag	Clas	Major Problem	Medium of	School –

.	x	e	s	Reading/Writing	Instruction	Aided/Unaided
1	F	10	5	Reading	English	Unaided
2	M	7	2	Reading	English	Unaided
3	M	7	2	Reading	English	Unaided
4	M	9	4	Reading	English	Unaided
5	F	8	2	Reading	English	Unaided
6	M	9	4	Writing	English	Unaided
7	F	8	4	Writing	English	Unaided
8	M	7	2	Writing	English	Unaided
9	M	11	6	Writing	Malayalam	Unaided
10	M	9	4	Writing	English	Unaided
11	M	9	4	Writing	English	Unaided
12	M	11	6	Writing	English	Unaided

In the written account the names of these subjects were changed in order to maintain confidentiality. Information regarding present problems, academic history and developmental history were collected from the parents using unstructured interviews.

3.3. DETAILS OF THE TOOLS

Psychometric information regarding Intelligence, and Memory were collected using standardised tests. Quick Neurological Screening Test (QNST) and Symptomology Checklist of Learning Disabilities were used for collecting information regarding perceptual, conceptual and neurological problems.

In the areas of difficulty identified from these tests, more in-depth information was collected by using self-developed tasks. The detailed information regarding these tools is presented below.

3.3.1. Malin's Intelligence Scale for Indian Children (MISIC)

Malin's Intelligence Scale for Indian Children (MISIC) is the Indian adaptation of WISC (Malin, 1959). The original Wechsler Intelligence Scale for Children is an individual intelligence test for children from the ages of 5 to 15. The Indian adaptation covers only ten years from 6 to 15.

The scale comprises eleven sub-tests divided into verbal and performance groups as follows:

	Verbal Tests		**The Performance Tests**
1	Information	7	Picture Completion
2	Comprehension	8	Block Design
3	Arithmetic	9	Object Assembly
4	Similarities	10	Coding
5	Vocabulary	11	Mazes
6	Digit Span		

Scoring:

Scoring was done as per the manual. After obtaining raw scores for each sub-test, they were transformed to standardised IQ scores. Further, verbal IQ, performance IQ, and total IQ were computed. The scores for the subtests were combined and grouped as suggested by Bannatyne & Alex (1968) in four categories - (i) Spatial ability, (ii) Verbal conceptualisation ability, (iii) Sequencing ability and (iv) Acquired knowledge.

Spatial score – Average IQ score of three subtests (Picture Completion, Block Design, and Object Assembly). This category requires the ability to manipulate objects directly or symbolically in multidimensional space.

Verbal conceptualisation score – Average IQ scores of three subtests (Comprehension, Similarities and Vocabulary). This category requires abilities more closely related to language functioning.

Sequencing score – Average IQ scores of three sub tests (Digit Span, Picture Arrangement and Coding). This category requires the ability to retain sequences of auditory and visual stimuli in short-term memory storage.

Acquired knowledge – Average IQ scores of three sub-tests (Information, Arithmetic and Vocabulary). This category requires abilities more closely related to learning process.

The Indian adaptation established its reliability with the test-retest method and yielded a product moment correlation coefficient of 0.91 for the full scale IQ results. The Indian adaptation has established concurrent as well as congruent validity.

3.3.2. Test of Memory for Children

For assessing memory, a test developed by (Uma *et al*., 2002) was used.

The test of memory for children consists of 12 sub-tests, namely:

1. Personal Information.

2. Mental Control

3. Sentence Repetition

4. Logical Memory

    (a) Story Recall immediate

    (b) Story Recall delayed

5. Word Recall meaningful

6. Digit Span

    (a) Digit forward

    (b) Digit backward

7. Word Recall non-meaningful

8. Delayed Response Learning

9. Picture Recall

10. BVRT

11. Paired Associate Learning.

12. Cattell's Retentivity Test

Scoring:

Scoring was done as per the manual. After obtaining raw scores for each sub-test, they were transformed to percentile score.

Reliability (test-retest) of the whole battery has been found adequate, ranging from 0.51 to 0.97 for different sub-tests. Correlation Coefficients of different sub-tests scores with total memory score range from 0.27 to 0.78.

3.3.3. Quick Neurological Screening Test, revised edition (QNST) (Mutti, M. *et al*., 1998)

The Quick Neurological Screening Test (QNST) is composed of 15 tasks (these tasks are very simple in nature and were adapted primarily from a typical pediatric neurological examination; however, a few tasks were derived from developmental scales or neuropsychological tests).

Subjective scoring is required for the tasks, which include handwriting ability, perceptual ability for numbers written on the palms of the hands, eye tracking, finger to nose co-ordination, rapidly reversing repetitive hand movements, tandem walk, and arm and leg extension. The cut-off scores for the full battery are as follows. H=High (>50), S = Suspicious (26-50) and N= Normal (0-25). The high, suspicious and normal ranges for 15 tasks are given below.

Table 3:2

The Cut-off scores for the 15 tasks

SL No.	Tasks	Cut-off scores		
		High (H)	Suspicious (S)	Normal (N)
1	Hand Skill	4 or above	2 or 3	0 or 1
2	Figure Recognition and Production	6 or above	2 or 5	0 or 1
3	Palm Form Recognition	7 or above	4 to 6	0 to 3
4	Eye Tracking	7 or above	4 or 6	0 to 3
5	Sound Pattern	10 or above	6 to 9	0 to 5
6	Finger to Nose	4 or above	2 or 3	0 or 1

7	Thumb & Finger	6 or above	4 or5	0 to 3
8	Double Simultaneous Stimulation of Hand & Cheek	3 or above	1 or 2	0
9	Rapidly Reversing Repetitive Hand Movements	4 or above	1 to 3	0
10	Arm & Leg Extension	9 or above	3 or 6	0
11	Tandem Walk	7 or above	4 to 6	0 to 3
12	Stand on One Leg	3 or 4	2	0 or 1
13	Skip	4 or above	2 or3	0 or 1
14	Left-Right Discrimination	4 or above	2 or 3	0 or1
15	Behavioural Irregularities	3 or above	2	0 or 1

Test re-test reliability coefficient of 0.81 is reported after a month interval for 33 learning disabled children who were tested by a single examiner. However, a lower reliability coefficient of 0.71 was reported in another study after a one-month interval with two different examiners, implying that individual examiners employ slightly different criteria in scoring, even though both attempted to follow the instructions.

The QNST seems to be best for matching the findings of a standard pediatric neurological examination. In one study of over 550 subjects, 30% of who had positive neurological findings, the QNST was abnormally high in 98%. No patient had a positive neurological examination and a QNST in the normal range. (The details of the QNST are presented in Appendix I).

3.3.4 Symptomology Checklist of Learning Disabilities adapted from Harwell, 1989.

The checklist contains:

: Visual perceptual/Visual motor deficits

: Auditory perceptual deficits

: Spatial relationship and body awareness deficits

: Conceptual deficits

: Memory deficits

: Motor output deficits

: Behavioural components

The rater simply puts either a tick mark or a cross mark on the descriptive cues to indicate his view (Details of the checklist are presented in Appendix II).

Detailed studies of these subjects were done by collecting the developmental history through unstructured interview of parents, and the subjects' behaviour was recorded through systematic observation. Besides this, numerous tasks were administered in order to establish cognitive deficits.

3.4 DATA COLLECTION AND ANALYSIS

Data were collected in four phases. Information was gathered through standardised psychological tests, cognitive function tasks, participant observation and unstructured interview with parents and subjects. The researcher studied each case in detail. Standardised psychological tests and other cognitive function tasks were administered in order to establish cognitive deficits. The developmental history was traced through unstructured interviews with the parents. Along with this, behavioural characteristics of each child were recorded.

In the first phase, the reports obtained from the parents and children were crosschecked for congruence. Importance was given to find out the actual difficulty of each child, i.e., whether it related to reading or writing. The researcher examined the specific problems of each child in reading through observation and interviewing. In order to dig out the difficulty faced by the child in reading, the child was made to read the text below his class level. The researcher studied difficulties in reading letters, single words, or group of words and in reading sequential order. Word omissions/ substitutions, missing lines, slow reading, letter-by-letter reading, word-by-word reading and non-comprehensive reading were noted. It was also noted as to whether the child needed someone to read out his/her lessons. Thus, the researcher tried to study each student's present condition.

In order to assess the child's writing ability, the child's way of writing was scrutinised. The researcher noted whether the child could hold pencil/pen properly, applied more pressure while writing, wrote well-formed and well-shaped letters or reversed/inversed letters or resorted to mirror writing. The capabilities of each child to write neatly and legibly and to write on lines were closely studied. It was also analysed thoroughly as to whether the child violated the rules of writing. Moreover, the researcher attempted to trace the area in which each child had challenges in his/her studies, through the analysis of various writing samples. To be precise, the researcher observed the writing while he/she wrote spontaneously, while being dictated to or while copying. It was also observed whether the subject could read his/her handwriting. The writing and drawing samples were also filed. From the above-mentioned analyses, the researcher could observe the area in which each child had the most problems.

In the next stage, the researcher explored the history of each child's current academic problems. The probe began with the following queries: When did parents first notice the child's present problem? When (in which class or age) did the child show difficulty at the initial stage of his/her studies? How did the parents realise that the child had problems? When did the teachers start complaining? What were the complaints? Did the teachers or parents administer any kind of intervention (programme)?

The researcher extended the exploration to the school history of each child. The data collected from school helped the researcher examine whether the student was regular in school, followed the instructions of teachers, was attentive and interacted with peer groups. This also provided information on whether the child failed in class and the range of marks in the subjects and whether he/she changed school or switched over to another medium of instruction. The researcher studied the family history, medical history and the behavioural pattern of each student, including their social skills and daily life activities. The observations were recorded in separate files for each child.

In the second phase of data collection, the researcher gave psychological tests to the students to find out how the problems in reading and writing were related to the peculiar problems in the specific areas of cognitive functions. The subcomponents of each test were given more importance. How the results of the subcomponents correlated with each subject's writing or reading skills were scrutinised.

If the results obtained from the psychological tests revealed any kind of difficulty in any area of cognitive perceptual function, the researcher gave self-developed tasks related to that area, to study the difficulties closely. To be explicit, the student could perform some tasks within the boundary of problem-affected area, but could not perform some other tasks in the same area. The researcher attempted to find out the tasks he failed to perform and the reasons for his failure. The researcher gave him/her tasks again based on the problem and the necessity. To study the subtleties of the problem of each child, the researcher gave them formal and informal tasks related to different areas of language function, memory function (both visual/auditory memory), perceptual function (visual /auditory perception), motor function (gross/fine) and attention span. Visual perception tasks included visual discrimination, visual sequencing, visual spatial and visual organisation. The auditory perception task included auditory discrimination and auditory comprehension. The role of attentiveness was well thought about by the researcher. Various attention-enhancing tasks were given to the student to help him/her sustain attention. His/her success in the task was noticed. The motor functions (both gross / fine) were also examined.

In the third phase, the detailed developmental history was analysed to detect whether the results obtained in the psychological tests and unstructured tasks were reflected in the developmental stage of each child. Hence, the researcher asked the parents whether the child had any kind of peculiarities from the prenatal period to the current stage.

The developmental history of each child was investigated through the answers to the following queries: Did the mother have any kind of mental or physical illness or any other kind of complication in the prenatal period? Was the child's birth complicated? Were there noticeable incidents in the perinatal period? Was the birth cry delayed? Were birth weight and suckling capacity normal? The researcher also examined whether the child had any kind of illness or accidents in the stages of infancy and childhood. Thus the researcher studied, if each child had any kind of difficulty in the area of motor, language, cognitive or social development in the different developmental stages such as the periods of babyhood, early childhood and late childhood. Besides, it was also examined whether the child had any specific characteristic in the cognitive functions.

The researcher explored the stages of the development in each child's motor development functions: whether the child had any delay or difficulty in neck control, turning over, crawling, sitting, standing, walking, stairs climbing, running, jumping, hopping, kicking and catching. Apart from this, it was also noted as to whether the child had any other kind of difficulty. In the same way, in the area of fine motor developments, it was examined if the child had any difficulty to unwrap loosely wrapped objects, turn knobs, string beads, turn pages one at a time, fold paper properly, open and close lids of the containers and hold a pencil properly.

In the region of language function, it was examined whether the child started babbling and uttered its first word, two word phrases and sentences at the normal age and whether there was any difficulty in both expressive and receptive language. It was checked whether the child got enough social stimulation in the developmental stages of his/her language function.

The researcher's exploration extended to each child's social development. Whether the child attained social smile at the normal age, had any problem in social interaction, had any difficulties in self-help skills such as eating, bathing, grooming etc were also checked. In cognitive functions, each student's capability for comprehending the concepts like size, shape, colour and time (yesterday/today/ tomorrow), position (up/down, out/in), and number was looked into.

In addition to all this, if parents reported that their child showed any kind of abnormality in the developmental stage, the researcher tried to understand more about it. Moreover, if the results of psychological examination showed any problem, the researcher enquired about the details of the developmental stages of that problem.

In the fourth phase, the researcher collected information from the parents on the difficulties in the daily life activities of each child along with his/her academic issues. In the last phase of this stage, researcher explored the details of the fundamental problems which resulted in reading and writing difficulties.

Parents were encouraged to maintain contact with the researcher twice a week. From these frequent interactions, the researcher could elicit information related to their child's problem. The researcher gathered and crosschecked information on the child's developmental history from the parents, grandparents and other close relatives with whom the child came for the follow-up sessions. This also helped the researcher to understand the degree of attention and concern of parents towards the child.

Generally, the parents of the selected children gave more importance to the children's academic matters. They paid attention to every area of the child's development and were good at remembering their child's cognitive as well as motor developments accurately. This helped the researcher to trace the developmental history of the child chronologically.

The results obtained from these four phases were analysed and integrated in order to understand each child's problem. Detailed discussion is presented in the next chapter in the form of case analysis.

Chapter – IV

Analysis And Discussion

4.1 Reading Problem
- **4.1.1 Pallavi**
- **4.1.2 Raj**
- **4.1.3. Jacob**
- **4.1.4. Rohan**
- **4.1.5.Varsha**
- **4.1.6. Group Discussion of Reading Problem**

4.2. Writing Problem
- **4.2.1.Vivek**
- **4.2.2. Jama**
- **4.2.3. Abhishek**
- **4.2.4. Deepu**
- **4.2.5. Amal**
- **4.2.6. Tony**
- **4.2.7. Anand**
- **4.2.8. Group Discussion Of Writing Problem**

4.3. Concluding Observations Regarding Learning Disablity

4.4. Limitations of the Study

4.5. Suggesstions for Further Research

4.6. Suggestions For Diagnosis and Clinical Practice.

This chapter analyses the cases of children with normal speech development, but who have problems in reading and writing tasks. The analysis comprises case studies of five subjects with reading problems and seven with writing problems. The cases with the Reading disability are under Section 4.1 and those with the Writing disability come under Section 4.2. The names of all the children featured in this study have been changed to protect their identity.

4.1. READING PROBLEM

The symptoms commonly exhibited by the children in this study are letter or word reversals when reading, letter and word identification difficulties, difficulty in understanding or remembering what they have just read, slow reading, reading comprehension problems, etc. Of the five children with the reading problem, two are girls and the rest, boys.

4.1.1. Pallavi

I remember Pallavi as a somewhat obese girl of charming and pleasant personality. My very first impression was that she was studious. It was only during the sessions that I understood she had some problems with her studies.

She was ten years old and studying in the fifth standard in the English medium. Her parents brought her to the Institute with a problem of very slow reading. She read letter by letter. She was also very slow in copying. She wrote better by herself than when she was copying.

I analysed the history of Pallavi's present problem. Her parents understood that her difficulty in reading was affecting her studies very much. They noticed this when their child was in the second standard. They were aware about this problem earlier. She did not seem to have difficulty in reading letters when in the UKG and first standard, but when Pallavi started word-level reading, she took a lot of time reading words. She found it strenuous to read the notice board, titles shown on television and bus boards. The problem caught her parents' attention from the time she turned six. Her mother told me that she was interested in studies right from the time she started school. Since she could read only very slowly, she would ask her mother to read the lessons to her. According to her mother, she could easily grasp the matter that was read to her, as her listening capacity was better.

I realised that Pallavi's parents understood her problem very well. She was an only daughter. Her parents were educated and the father was employed. They could go deep into the problems of their child and always helped her as and when necessary. Her mother would spend time on her academic improvement and give her special training. She would read out each lesson to her. So Pallavi had good environmental stimulation.

Pallavi's mother was very co-operative. My sessions with the mother revealed that there was a family history of epilepsy. Pallavi's mother had epileptic complaints during her childhood, but she is free from the problem at present. It was reported that she had an episode of seizure at the age of 23, after the first year of her marriage. She consulted a neurologist and took medication (Tegretol) for five years. She had continued with the medicine even during the period of her pregnancy and delivery, and she stopped taking the medicines two years ago.

I examined Pallavi's school history and got the following information: Pallavi started going to school when she was four. At this school with the CBSC syllabus, she was regular, studious and obedient, and co-operated with her teachers and peer groups. Her teachers limited their complaints to her slow reading and difficulties in copying. Everybody at school liked her. The teachers could understand her problems and allowed her extra time for writing exams. She scored above average marks in all the subjects, with 90% in Science and Mathematics.

Pallavi's Social Development/Behavioural traits showed that she was sociable and mingled easily with others, and communicated very well with strangers. She accepted the responsibilities of her age and was interested in doing household chores. However, she was a little bit slow in routine matters. She was sensitive, affectionate and hardworking. She learned music and was interested in playing both outdoor and indoor games.

The information I collected from her detailed Developmental History revealed that her mother had an abortion twice and consequently had to take complete bed rest during that time. In the prenatal stage, she had taken pills to prevent epilepsy during the pregnancy. Perinatal history explained that 18 days prior to the prescribed date of her normal delivery, the birth weight, birth cry and breast suckling of the child were normal. Developmental milestones revealed she had age-adequate gross motor, fine motor and speech development, but had difficulty in catching balls. The difficulty in understanding the concepts of direction had been noticed since she was four years old.

Clinical evaluation became necessary. Hence, a neurologist, pediatrician, speech pathologist, linguist and psychologist appraised her. The report of the neurological evaluation exposed that she had EEG abnormalities, and results of EEG showed spikes and discharges at both the hemispheres of occipital lobe. Sensory abilities were adequate. The results showed no finger anomia, but revealed finger agnosia. Her medical history reported that she did not have any previous consultation for her present complaints but that she had consulted an ophthalmologist (twice) at the age of seven for reading difficulties; her eyes were tested and it was reported that she had no eyesight-related problems.

The linguist and the speech pathologist assessed her and reported that she had normal language development and that her language performance was apparently good. According to the linguistic evaluation reports, she had better skill in phoneme and syllable identification. Letters were missing within words, both initial and final. Her reading skill was that of the third standard level.

I observed the student to assess her problems in reading based on the evaluation reports and data provided by her parents. Pallavi was capable of reading single and simple words without strain. She took more time and had to put in more effort to read single sentences. She read words, reading letter by letter, but it was too tough for her to read sentences. Even to read a simple sentence, Pallavi took approximately one minute. At the same time, she omitted words while reading sentences. Besides, she had to use a finger to read each line.

I assessed whether Pallavi faced challenges in writing like her challenges in reading. She seemed to have no difficulty when she wrote by herself, but when she copied words or sentences from a board or book she was very slow. When I dictated words, she made mistakes in writing. On the contrary, she gave correct spelling orally.

Once again, I closely studied the reports of the team of specialists to apprehend the reading problems of the child. Evaluation by the team of specialists suggested that her auditory comprehension was better. The child used an auditory mode for learning since she did not have flow in reading. According to the report of the neurologist, she had less exposure to the visual processing of words.

I gave Pallavi psychological tests to probe her visual process functions and administered MISIC to assess her IQ. She had above average intellectual functioning. The result of MISIC indicated that her verbal IQ was greater than her performance IQ, but that there was discrepancy between the two. The difference between the total scores was 43. The results are entered in Table 4.1.1.1

TABLE 4. 1.1.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	145	7	Picture completion	75
2	General Comprehension	160	8	Block Design	80
3	Arithmetic	107	9	Object Assembly	57
4	Similarities	119	10	Coding	88
5	Vocabulary	103	11	Mazes	102
6	Digit span	107			
	Total VIQ Score	123		Total PIQ Score	80
Full IQ Score – 101					

Her spatial ability, conceptualisation ability, sequencing ability and acquired knowledge were assessed using the MISIC subtests. Her average score was as follows: spatial ability (Picture Completion, Block Design, Object Assembly) - 71, verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) - 127, sequencing ability (Digitspan, Arithmetic, Vocabulary) - 106, and acquired knowledge (Information, Arithmetic, Vocabulary) - 118. There was discrepancy between the scores; she scored below average for spatial ability.

The result of the verbal test in MISIC revealed that she had average and above average score in all sub-items, but in the performance test, except for the Maze, she had below average scores in all sub-items. The scores in the performance test revealed that she had poor performance for Picture Completion, Block Design, Object Assembly and Coding. The score of the Picture Completion test indicated that her ability to remember the order of symbolic information, skill to distinguish essential from the nonessential, general observation, visual organisation and visual memory were below average level. She had poor ability in spatial and visual organisation, generalising, visuo motor co-ordination and space orientation, which were revealed by the score of block design. The score obtained in coding revealed that her ability to memorise symbols, interpret design, effect eye-motor co-ordination and return the eyes quickly to the appropriate place on the guide key (an important reading skill) were poor. That her capacity for visual organisation combined with past memory was poor as evident in object assembly. She showed a lot of difficulty in arranging pieces of the test material. In the initial trials, she placed the pieces of object assembly in an inverted position. But her Maze score revealed that she had better skill in planning and that fine motor co-ordination was good. The total score of spatial ability also supported the fact that she was poor in visuo-spatial organisation-related skills.

The summary of the score obtained in the memory test is shown in Table 4.1.1.2

TABLE 4.1.1.2

Summary of Scores obtained in the Test of Memory for children

Sl. No.	Items	Raw score	Percentile
1	Personal Information	5	100
2	Mental Control	12	50
3	Sentence Repetition	9	100
4	Story Recall Immediate Story Recall Delayed	11 10	100 90

5	Word Recall (Meaningful Words)	6	40
6	Digit Span Forward Digit Span Backward	6 5	60 100
7	Word Recall (Non-meaningful words)	6	40
8	Delayed Response Learning	3	50
9	Picture Recall	0	0
10	Benton Visual Retention Test	0	0
11	Paired Associate Learning	16	80
12	Cattell's Retentivity Test	5	20
	Total Score	94	50-60

The results of the memory test indicated that her total score in the memory test was 94 and the corresponding percentile was 50-60, suggesting above average skill in general memory.

In the sub items, she scored higher scores for Personal Information, Mental Control, Sentence Repetition, Story Recall (immediate and delayed) and Paired Association. The higher scores suggested that she had sufficient skills in remote and auditory memory, good skills in reproduction of the sentence verbatim and associative learning. She had good scores for auditory memory, but very low scores in the sub-items coming under visual memory.

Her scores in Recall of Words (meaningful and non-meaningful) were below average. In Picture Recall, she scored zero, indicating she had poor skill in visual scanning and visual sequencing tasks. Her score in the BVRT suggested that she experienced a lot of difficulty in visuo-motor integration tasks. Her poor score in Cattell's Retentivity Test revealed that she did not have sufficient skill in visuo-spatial memory.

QNST was also administered. The scores obtained in the QNST are shown in Table 4.1.1.3

TABLE 4.1.1.3

Summary of Scores in QNST

Sl. No.	**Items**	**Score**	**High/ Suspicious / Normal**
1	Hand Skill	1	N
2	Figure Recognition and Production	0	N
3	Palm Form Recognition	4	S
4	Eye Tracking	0	N
5	Sound Patterns	1	N
6	Finger to Nose	1	N
7	Thumb and Finger Circle	2	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	5	H
10	Arm and Leg Extension	2	N
11	Tandem Walk	3	N
12	Stand on one Leg	2	S
13	Skip	2	S
14	Left-Right Discrimination	1	N
15	Behavioural Irregularities	0	N
	Total Score	24	Normal

In QNST, her total score was 24. The detailed result of QNST showed that she had suspecious scores for Palm Form Recognition, Stand on One Leg and skip. High score for Rapidly Reversing Repetitive Hand Movements, These results revealed that she had difficulty in following motor sequencing tasks.

I then administered the Symptomology Check List. It revealed that she had difficulties only in visual perceptual skill. No defects were seen in other areas. When she was given the other unstructured cognitive tasks, it was found that she had many difficulties in all kinds of visually presented activities. She had good auditory memory but poor visual memory. Visual deficits were prominent in visual sequencing, visuo-spatial and visuo-motor integration tasks.

In the subtests of MISIC, she under scored in Block Design, Object Assembly, Picture Completion and Coding. The low score in Block design test indicated her visuo-spatial difficulties. These scores of the rest of items strengthened the finding that she had difficulties in general observation and visual organisation. The low score in Coding and BVRT (sub test of memory) supported that she had difficulties in visuo-motor integration tasks.

To study the details of the test results, the child's developmental history was scrutinised. I went through the cognitive development stages of the child in order to understand whether her present problem had been reflected in any way during those stages. I collected more data about Pallavi, from her parents. I understood that Pallavi could not immediately recognise her relatives and familiar persons from their photographs. To clarify this, I asked her parents for photographs of family celebrations and similar events. During my session with Pallavi, both of us looked at the photographs. These were photographs of all the celebrations in her family, beginning with her first birthday. I pointed to the face of a man common in all the photographs and asked her who that person was. She replied that he was her father's friend. Her parents told me that he was her mother's brother, Pallavi's uncle. She could not recognise him at first sight though he was always in touch with her family. The next day, I asked her again who that person was and she answered that he was one of her uncles. In the sessions that followed, I once again repeated the questions, 'who is that person' and 'what is his actual relationship with you' and she then answered correctly.

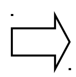
Similarly, it was reported that she lacked the skill to understand the relationships among her family members like 'Ammavan', 'Ammayi', 'Valliayama' and 'Valliyachan' (referring to maternal and paternal uncles and aunts in her mother tongue). She took time to recognise her relatives when she saw them at functions or in public places. She had difficulty in identifying her family members.

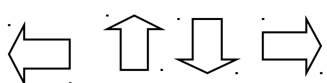
My curiosity compelled me to ask the parents again whether there were other difficulties in cognitive functions. Her parents could clearly recall that Pallavi had experienced other problems like learning the concepts of position, direction and routes and that had been noticed since she was four. If she was asked to take an object from the top or bottom of the cupboard, she was confused about the top and the bottom. Similarly, she could not grasp the routes she had travelled earlier. It was tough for her to identify one particular thing from a group of things, for example, to select a particular vegetable (tomato) from a group of vegetables. This had been noticed since she was six years old and the problem still troubled her occasionally. She had poor topographical memory since the age of six and the same difficulty persists.

Apart from all these in the sub-test of Object Assembly in the MISIC Test, it was found that she placed objects in an inverted position. I enquired about Pallavi’s cognitive developments in order to learn whether this defect was reflected in the developmental history. Her father wondered at the confusion she had about the top of the water tap in her childhood days. She did not know where to open the pipe to get water. Very often, she tried to open the tap from its bottom. This was noticed at the age of three and it continued till she was seven years old. This confusion occurred occasionally. Her confusion about top and bottom was also seen in the way she held objects. She would hold things like chocolates upside down and try to read the names of these things. This problem had been noticed since the age of five and it continued occasionally till she was eight years old.

I focused further on Pallavi’s visual process functions based on the information collected. It could be inferred from the reports of the parents, psychological tests and observations that Pallavi had difficulty in activities related to visual processing. I gave her many tasks related to visual process function which included activities related to visual discrimination, visual sequencing, visual organisation and visuo-motor integration.

As mentioned earlier, I gave her tasks related to the visual process function. To evaluate her visual discrimination function, I drew a design on a sheet of paper, drew the same figure below that and showed it to her along



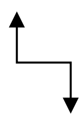


with three different figures. I asked her to match the one on the top (the original design) to one in the set given below:

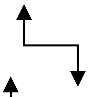
I gave Pallavi thirty questions of the same type out of which she answered twenty correctly. The visual sequencing task I had given was as follows: She was given two different numbers and alphabets on a page and below that I gave the pair of the same numbers and alphabets along with other pairs. Then I asked her to match the pair of numbers and alphabets that was on the top of the page (the original pair) from the list of pairs shown below. The examples are given below:

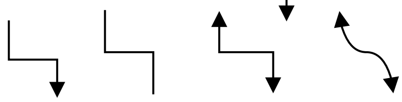
She was asked to select 8 2 9 4 6 from
[8 2 0 4 6, 8 2 9 4 6, 8 4 2 9 6, 8 9 2 4 6]
and the alphabets E S G O from
[E S M O, E G S O, E S G O, E S O O]

Thirty questions of this kind were given to her and she answered 18 correctly. In the visual organisation task, she was given fragmented bits of one picture and asked to organise the fragments into the whole picture. She was also asked to name the picture. Commonly seen pictures were used for this task. Out of the 30 pictures that she had been given, she could organise only two correctly. It was clear that Pallavi had problems in visual organisation. Likewise, she was given a spatial relation task. I showed her a symbol and below that a list of four symbols slightly different from the first



(original symbol), and asked her to select the symbol that resembled the first one.

For example, to select this figure:  from the following set:



In this task, she gave 12 correct answers to 30 questions.

It could be ascertained from the above four tests that Pallavi had much more difficulty in visual organisation than in visual discrimination and visual sequential functions. Visual spatial function stood second in the degree of difficulty she faced. During the sessions, I asked her to draw pictures. It was seen that it was tough for her to copy complex figures. Similarly, she faced problems in drawing pictures like a flower and a clock. It could be assumed that she has difficulties in visuo-spatial related tasks.

The above findings give a clear picture of how learning difficulties, cognitive functions and developmental delays are related. The deficits in visual scanning, visual sequencing, visual motor integration and visual spatial deficit manifest in the form of various academic skills. Poor visual scanning and visual sequencing are reflected in her poor reading skills, slow reading, word by word reading, missing lines while reading; visual sequencing difficulties resulted in poor spelling skills, (only at the time of writing) and the visual spatial deficits could be associated with her poor skills in drawing and copying figures. Due to the visual organisation deficits, she is unable to visualise a word as a 'whole'. This may be related to her difficulty in reading words. Griffths (1991) studied dyslexic groups and revealed that dyslexic children have word finding difficulties.

The above-mentioned deficits affected her daily life. She had poor organisational skill and was unable to select a particular item from a group. She had difficulties in recognising familiar persons easily and her topographical memory was poor. She was slow in all her every day activities. Her development history corroborated the present findings. During the prenatal period, her mother had physical ailments and mental stresses, and she had taken anti-epileptic pills during pregnancy.

Pallavi's visualspatial difficulties had been noticed when she was three years old as confusion regarding the top of a pipe, back/front of the dress, etc. She started to read inversionally at five and still she does puzzles inversionally. She had difficulty in understanding family relationships since she was five years old and the problem still exists. Her learning difficulty about the concept of direction and position had been noticed since she was four years old. The topographical problem had been noticed since the age of six and it still persists.

The functions in which Pallavi has showed deficits are sub-served by the occipital lobe and temporal lobe. The neurological assessment reveals spike discharges in the both hemispheres of the occipital lobe. Her detailed analysis reveals that her difficulty might be related to defects in visual functioning areas. The results of the findings reveal that her reading difficulties are related to the defects in the visual processing area. These defects are very well reflected in her daily life and are also correlated with her developmental history. If she is given the intervention related to the visual process tasks, her reading skill could be made effective.

4.1.2. Raj

Of the many students with learning difficulties who were brought to the Institute, a quiet and endearing child called Raj specially caught my attention. Seven years and six months old, he was studying in a CBSC English medium school and had uncommonly severe reading problems. He could read neither the English nor Malayalam alphabets properly and easily forgot the letters he learnt. Raj's parents told me that his reading problems had been noticed since he entered upper kindergarten (UKG).

Turning my attention to his family background, I learnt that Raj was the youngest of the three children and pampered by his siblings and parents. His two elder sisters seemed commendable in their curricular activities and it was only Raj who had reading problems. So in the matter of his studies, the family took care to be especially supportive.

Raj's school history, behavioural characteristics and developmental history were studied in detail. His school history revealed that he started LKG at the age of four. He was initially reluctant to go to school and had to be shifted from one institution to another after a period of one year. In order to understand his difficulty in comprehending letters, his parents and teachers planned to retain him in the first standard.

Raj was very fond of his school. It was privately managed and he got special attention. He got along well with the other children and his teachers, and was obedient in class. His teachers did not have any complaints about his general behaviour, but worried about his academic performance. Raj failed in all subjects in the annual examination.

Raj's social development and behavioural characteristics indicated that he shouldered social responsibilities typical of his age. He helped his mother and sister in household chores. He was generally happy, calm and lovable, and interested in both indoor and outdoor games. He was mingled and played with other children. Moreover, he knew the rules of the game and also displayed leadership qualities when among peers. Generally, Raj showed a lot of interest in electronic and mechanical objects.

Raj's detailed birth and developmental history revealed that in the prenatal period, his mother had developed a skin allergy and taken medication for it. From the postnatal history, I learnt that on three occasions, the child had fallen to the ground from a place of height. In one such incident his head hit on the floor with such force that the boy became unconscious for five minutes. The doctor who examined him reported no organic complications. This incident occurred when he was two years old. His developmental records were found normal and indicated age-adequate speech and motor development. However, in the case of language development, it was found that he had uttered his first word at the age of one, and that there was delay in his speaking two word phrases. This skill was acquired only after he was two years old. Occasional misarticulation continued till he was three. Nonetheless, his communication skills and oral expressions were flawless.

In order to understand the reason for his poor school performance, the boy was put under detailed observation and evaluation by a neurologist, linguist, speech pathologist and psychologist. The neurologist's evaluation pointed out primary decline in reading. The auditory and visual functions were found to be adequate. Though the child had no motor deficits, finger anomia, finger agnosia and right/left confusion were reported.

Speech evaluation revealed that he had a history of occasional misarticulation. He had age-adequate communication skills and normal speech development. Linguistic evaluation reported that he had letter/number naming difficulty and was able to write a series of alphabets only in sequential order, though he had not fully acquired letter-writing skill.

To understand the exact nature of the difficulty regarding reading, I asked the child to read some three-letter words. He expressed his helplessness and said, "I don't know… I can't say." Though I tried prompting him, he could not read the words. Then I asked him whether he could read letters, but he failed to do so. In order to find out whether his challenges in reading were in any way related to perceptual cognitive functions, he was given psychological tests.

In the detailed psychometric evaluation, Raj's overall IQ was found to be 103, which put him in the average intellectual category. His verbal IQ was

102 and performance IQ was 105. The average score of spatial ability, (Picture Completion, Block Design, Object Assembly) was 111, sequencing ability, (Digit Span, Arithmetic, Coding) was 81, and acquired knowledge (Information, Arithmetic, Vocabulary) and verbal conceptualisation (Comprehension, Similarity, Vocabulary) were 89and 121 respectively.

The results of spatial ability, sequencing ability, acquired knowledge and verbal conceptualisation showed that there was discrepancy between scores. Compared to the other scores, he had low score in sequencing ability and acquired knowledge, which indicated that he had extreme lack of some specific learning skill.

The summary of the scores obtained in the tests of MISIC are shown in Table 4.1.2.1

TABLE 4.1. 2.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	85	7	Picture completion	127
2	General Comprehension	145	8	Block Design	103
3	Arithmetic	85	9	Object Assembly	104
4	Similarities	119	10	Coding	78
5	Vocabulary	98	11	Maze	111
6	Digit span	80			
	Total VIQ Score	102		Total PIQ Score	105
Full IQ Score – 103					

The result of the verbal IQ test indicated that his general comprehension was at bright normal level. Similarities and Vocabulary were at an average and above average level. His ability in oral vocabulary responses, verbal concept formation, capacity for verbal abstraction, skill in expressive language capacity and ability to comprehend meanings of words or ideas were at an average level. But he scored below average in Information, Arithmetic and Digit Span. The below average scores indicated that his ability to remember the order of symbolic information, his skill to comprehend numerations and number usage were at below average level. Due to this, he scored below average in Digit Span: Forward (4) and Backward (0). This revealed that he lacked the ability to sustain his attention on sequentially presented tasks.

In the performance tests, with the exception of Coding, Raj had above average scores in Picture Completion and Maze. Average score in Block Design and Object Assembly. This suggested that he had above average ability for general observation, and average ability for visual organisation .He had average skll for visual spatial construction and also he had good planning skills. The low score of coding may be attributed to his difficulties in learning new skills. Thus, from the above- mentioned subtests of MISIC, no visible problems could be traced.

Tests of memory for children were used to assess various aspects of memory. The total score was 59 and corresponding percentile was 30-40. Which suggests that he belonged to the below average level of memory function. Summary of the scores obtained in the memory test is shown in Table 4.1.2.2

TABLE 4.1.2.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Score	Percentile
1	Personal Information	2	10
2	Mental Control	0	0
3	Sentence Repetition	5	30
4	Story Recall Immediate Story Recall Delayed	9 11	100 100
5	Word Recall (Meaningful Words)	0	0
6	Digit Span Forward Digit Span Backward	4 0	10 0
7	Word Recall (Non-meaningful words)	0	0
8	Delayed Response Learning	1	20
9	Picture Recall	3	90
10	Benton Visual Retention Test	4	40
11	Paired Associate Learning	13	90
12	Cattell's Retentivity Test	7	90
	Total Score	59	30-40

The sub-test scores in the Memory Test showed that he had above average scores in Story Recall and Paired Association (Auditory Presentation). These results revealed that he had sufficient auditory memory and associative learning.

In the visual memory test, he had average scores in Picture Recall and Cattell's Retentivity Test. He also had average skill in visual scanning and visuo-spatial memory. The low scores in Word Recall (meaningful and non-meaningful) disclosed that he had poor ability in recalling and pronouncing letters. It should be noted that he was especially unable to recall meaningful and non-meaningful words when they were visually presented. Besides this, he showed difficulties in Mental Control, Delayed Response and Digit Span. This may be due to his attention deficit. He had better scores in all other sub-tests.

QNST was also administered. His total score in QNST was 20, which placed him in the normal group. However, in the subtests, Raj showed deficits in Palm Form Recognition, (he could not identify letters which were written on the palm), Rapid Reversal of Repetitive Hand Movements, and Right/Left Confusion. Results obtained in QNST are shown in Table 4.1.2.3

TABLE 4.1.2.3

Summary of Scores in QNST

Sl. No.	**Items**	**Score**	**High/ Suspicious/ Normal**
1	Hand Skill	0	N
2	Figure Recognition and Production	1	S
3	Palm form Recognition	5	S
4	Eye Tracking	1	N
5	Sound Patterns	3	N
6	Finger to Nose	0	N
7	Thumb and Finger Circle	3	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	0	N
11	Tandem Walk	2	N
12	Stand on One Leg	0	N
13	Skip	0	N
14	Left-Right Discrimination	2	S
15	Behavioural Irregularities	0	N

	Total Score	20	N

The psychological tests results revealed that his performance in the various subtests were better. In MISIC, he showed difficulties in Sequential Ability. In the Memory Test, he scored 'below average skill' in recall of letters and words which were visually presented .

The symptomology checklist of learning disabilities revealed that he had difficulty in naming colours, shape and letters, but no problems in the areas of conceptual and memory functions. He had no difficulties with writing tasks.

Overall, the above-mentioned tests could not provide a clear picture of the child's problem. The fact remained that Raj had severe reading disabilities. To go into the depth of Raj's problem, I made another attempt to study him in detail. The question once again was whether Raj could read and match letters. Raj could not read letters, but he could match them. Raj could identify around ten Malayalam letters like' tha', 'pa', 'na', etc. If he was shown the letter 'tha' and asked to point out the same letter in a list of letters, he could identify it. At the same time, if he was asked to simply point out the letter 'tha' without being shown the letter first, he sometimes made mistakes. When Raj was asked to identify English alphabets, he could do so only in the first twelve or thirteen letters and failed with the rest. However, he could match letters. It was concluded that Raj could match letters and could more or less identify them. It was tough for him to name letters. Perhaps Raj had some problem in auditory comprehension. This led me to give him more than two stage commands and observe whether he could follow these. It was found that he followed the commands without any difficulty.

In the same way, Raj's auditory discrimination functions were tested. Raj was told a small story and asked to retell it. The intention was to test his comprehension and language expression abilities. From the way he retold the story, I understood that the child used semantics for learning. Thus it could be inferred from the tasks provided and the results that he had no comprehension difficulty. In the verbal fluency test, his performance was better.

It was felt that Raj did not have good rote learning skills. The child was asked to name the days of the week and months of the year. He failed to do this correctly. With the help of the child's parents, I taught him the names of days and months. Raj was then asked to repeat what he learnt, but he took a lot of time to do so. Subsequently, it was noticed that Raj's rote learning skills were not as good as his associate skills. He learnt things when they were comprehended by associating them to other things. It was easier for him to reproduce stories than recalling the names of the days and months. The result of the paired association tasks, which is the subtest of the memory test, clarifies the above statement.

Since Raj did not have any problem in auditory comprehension and language expression, attempts were made to ponder on the reasons for the child's inability to read letters of the alphabet. I tested whether it was difficult for the child to write the letters also. When Raj wrote the letters from A to Z, he made only very few mistakes. When he was dictated ten Malayalam letters, he wrote six of them correctly. He was asked to write down numbers and succeeded in this task too by writing the numbers from one to ten correctly. In the task of copying, he proved himself efficient by copying single words in both English and Malayalam in neat handwriting without making mistakes. Raj's success in performing these tasks led the researcher to understand that he had mental pictures of the letters of the alphabet and was therefore able to write them by himself. Raj did not have problems in visual processing and the psychological tests supported this fact. Raj's problem was that he could not read letters that he was shown or what had been written. To get a clear picture of Raj's problem, the researcher spent some time with him.

In the session that followed, I first handed the boy five flowers. Raj was asked to count and state the number of the flowers that he was given. The boy counted the flowers one by one, but could not provide an answer when the researcher asked him how many flowers he had. At the same time, he wrote down the answer correctly, that is, 'five'. I once again asked the child to say how much that was. He read out the number he had written as ' two'. So actually he seemed to have a difficulty in naming numbers and letters orally, though he could write Malayalam and English letters that were dictated to him. Through these tests, I concluded that he had mental pictures of some letters and numbers, which he knew to write spontaneously. At the same time, he could not read the very letters that he himself had written. This was the main problem that the boy faced.

I tried to trace whether Raj experienced any difficulty in other areas similar to his difficulty in naming letters. Time was devoted to studying the various types of naming difficulties he faced. He was given different tasks and various activities to test his ability in naming objects, colours, pictures and shapes.

Raj's handling of the tasks showed that he could name objects without too much effort. I examined whether he could name colours, flowers and pictures. Objects in primary colours of red, green and yellow were placed before him and he was asked to name the colours. He failed to do so. Could he match colours? Yes. I was very happy to realise that Raj could do so, for example, he could match one red coloured object with another red coloured object. He touched the red coloured object when asked to do so, but at the same time, failed to name its colour as 'red'.

Along with Raj's parents, I tried to figure out methods or ways to teach Raj the concept of colour. We decided to teach him to identify and name at least two colours each month. First, we tried with the colours black and white by associating them with familiar things in his environment. For instance, we tried to teach him to make out the colour black by connecting the colour with the colour of hair; similarly, the colour white was connected to the colour of the wall. After a couple of days, when I showed him a black coloured block and asked him to name the colour, instead of saying 'black', Raj touched his hair. When I prompted him further, he said 'thalamudi' (hair). Similarly, when I showed him a white coloured block and a white coloured disc and asked him to name the colour, he answered by pointing his finger at the wall, saying ‘chumaru’ (wall). It should be noted that he said ‘chumaru’ instead of saying ‘white’.

I asked his parents to teach him to identify and name more colours, shapes, flowers, etc. With the help of a private tutor, Raj’s parents set about their task. After three weeks of training, I enquired whether the child could name different shapes. Raj’s mother reported that he had just started to identify and name the shape ‘round’, but only with the help of the pictures in his school textbook. However, still he could not identify and state that the shape of a ball is ‘round’. Similarly, his parents and sisters spent a month trying to teach him the names of five different flowers, but Raj could master the names of only two which were in their garden - hibiscus and jasmine. He could identify and name the flowers without much effort when he saw them on the plant, but seemed confused in naming them when shown pictures of the same flowers.

I checked to see whether he could name and describe pictures. Raj was shown the scene from a movie. He was able to name the actor in the scene, but was unable to describe the scene. When he was given a blend of many pictures, he was incapable of describing them. However, when he was shown pictures of single items that were common and familiar like pictures of animals, he was capable of identifying the object in the pictures. On further scrutiny it was found that he could not name the fingers and he had confusion about his right hand/left hand, right leg/left leg, etc.

I realised that it was necessary to clearly understand Raj's developmental history in order to comprehend the root of his naming difficulty. So I spent more time with his mother and collected the necessary details from her. His naming difficulty had been noticed even at the age of two. Raj's mother clearly recalled that her son could not identify objects in pictures. Right from the time Raj turned two, his mother had been trying to teach him to identify and name objects in pictures, but he could not grasp this. His mother told me that it was tough for Raj to name objects even when he was four years old.

The above observation and assessment made it clear that in Raj's case, the naming difficulty was more prominent than the reading difficulty. Semrud-Clikman *et al.,* (2000) reported that children with reading disabilities were found to be slower on letter- and number-naming tasks. From the psychological tests, it could be inferred that Raj has a few difficulties in sequencing abilities, acquired knowledge and attention deficits. These problems affected his reading ability and the deficits were reflected in his daily life as the naming difficulty.

When Raj was dictated to, he could write and match letters and numbers. As he could follow commands and repeat stories, it could be assumed that he did not have any major problem in auditory comprehension and language expression. Besides, his performance was better in storytelling and the verbal fluency test. It could be inferred that Raj had a mental picture of letters because he could write them down. His problem was in naming.

Therefore it could be assumed that a problem in the area of visual to verbal could be what affected his reading.

Raj's developmental history also supported the present findings, his difficulties in naming colours, pictures and shapes, and his deficits in picture vocabulary had been noticed since he was four years old. His naming difficulty persists. He also has difficulty in naming different shapes, and is still confused with questions like - what is the shape of a ball? Though his parents and teachers have put in extra effort to train him, Raj continues to show colour naming difficulty and difficulty in reading letters. His postnatal history revealed that he had fallen from a height. Galaburda's (1994) findings in autopsy studies, neuroimaging and neurophysiology indicate that dyslexia is accompanied by fundamental changes in brain anatomy and physiology, involving several anatomical and physiological stages in the processing stream, which can be attributed to anomalies in prenatal and immediately postnatal brain development. The incidents of falling from a height may have affected Raj's cognitive processing associated with developmental anomalies of cortical structure and brain asymmetry. During the language development stage, the child showed delay in grasping two word phrases. Occasional misarticulation was also noticed.

To sum up, it can be concluded that the use of clues or associated learning would be better tools to teach Raj. A useful teaching method would be to give as many clues as possible in the first stage and then go on to decreasing clues gradually in accordance with the progress in his studies. Above all, it is evident that Raj needs a great deal of individual attention.

4.1.3. Jacob

This case is parallel to the case of Raj

Jacob came to the Institute along with his parents and his only sibling, an elder sister. He appeared to be a smart boy and entered the therapy room without any hesitation. Jacob was seven years and nine month old when I first met him. He was studying in the second standard in an English medium school. Jacob's elder sister was good at her studies. His parents were educated and employed. They encouraged Jacob in his academic activities**.**

Jacob was not good at his studies. This was why his parents brought him to the Institute. His parents said that he could not read anything – letters, words or numbers. Moreover, he did not pay attention to academic matters.

I had to examine the boy's history to study him. His parents had been noticing that it was too tedious for him to read since the UKG class. From the very beginning, reading was a challenge to him. His mother told me that he was very interested in listening to stories. He always demanded that someone tell him stories, but he never tried to read even comic books. Though his parents coaxed him to read, he would not try. Reading did not interest him at all. I asked his parents about his performance in writing. They told me that he did not face any challenges in writing tasks.

I examined Jacob's school history for an in-depth understanding of the boy. It was reported that he joined the first standard at the age of five. He was regular in attendance at the CBSE English medium school and mingled well with his peers, though he had some initial inhibitions to do so. His teachers reported that though he could not read by himself, he could comprehend the things that were taught to him individually. In his teachers' opinion, he had good auditory comprehension and he followed lessons through his listening skills, scoring average marks in his oral examinations. The teachers had some complaints also. He did not pay attention to the lessons taught in the class. He was quite often restless and talked to his classmates while teachers were taking a lesson. Perhaps he could not follow the lessons. He failed in two subjects – English and Social Science.

Jacob's birth and developmental history was examined. The prenatal period was uneventful. Perinatally, it was a normal full term delivery. The postnatal history revealed that he had normal birth cry, birth weight, normal suckling and swallowing. There was no significant illness. About developmental milestones – he had age-appropriate motor developments both in gross and fine motor developments. Social smile was attained at normal age. His mother reported that he was an active boy from the beginning. Regarding speech development, he uttered his first word at the age of one and two-word phrases when he was one and a half years old. Misarticulation was noticed since the age of two, and at the age of four, his parents noticed lisping. At the time of this study, misarticulating was noticed occasionally. Apart from this, that he had no difficulties in communicatings.

Considering Social Development/Behavioral Characteristics, he was a happy child. It was reported that initially he had hesitation to mingle with relatives and friends which continued till he was six years old. He later became sociable, was lovable, restless, impulsive and quite demanding. He was totally independent in all his daily activities. He showed interest in both indoor and outdoor games.

He was very interested in playing computer games and solving puzzles. In fact, his favourite pastime was playing computer games and watching cartoons. Likewise, his parents happily told me that he had good skills in assembling objects. Jacob's mother told me that compared to the children of their relatives, he could solve complicated puzzles quickly. However, she lamented that her son was very poor in academic performance. Though they tried a lot to teach him to read properly, he could not read without making mistakes. He could not recall what he had been taught the previous day.

To apprehend Jacob's academic problems, a team of specialists evaluated him. He was observed and assessed by a neurologist, linguist, speech pathologist and psychologist. The neurological evaluation revealed a primary decline in reading. The EEG showed no abnormalities, but he had right/left confusion and finger anomia.

The speech therapist reported that the difficulty was more pronounced in the area of reading. The evaluation report revealed that he had occasional misarticulation. From the evaluation reports of the speech pathologist, I understood that Jacob did not articulate words properly and lisped occasionally.

I tried to collect more information from the parents. They told me that Jacob mispronounced some tough words only in certain circumstances. For example, he misarticulated ‘hospital’ as ‘hopistal’. However, he would manage to say ‘tough’ words, though not clearly. These utterances were only occasional and depended on the circumstance. I failed to trace any kind of defect in his communicative skills. In my attempt to extract more details from the parents about this, they told me that they had both been working abroad and that Jacob was with them till he was three years old. They doubted that the child did not get proper language stimulation in the early stages of language development. Since his parents were working, Jacob had been entrusted to the care of a babysitter, a Nigerian lady who did not know Malayalam or English.

Linguistic evaluation showed that he had letter naming difficulty and word level difficulty, but he could match letters and identify them. The child could memorise a series of letters and was able to write only in sequential order though letter writing (alphabet) was not fully acquired. He could do simple mathematical operations, but while writing numbers he made mistakes.

I collected evaluation reports from a team of specialists and other details from Jacob’s parents. Based on this data, I explored Jacob’s case. That Jacob faced challenges in reading was clear. The area of writing was also brought into the focus of my study. I asked him to write from A to Z. He could write English alphabets from A to Z in sequential order without making mistakes. However, when letters were dictated to him, I found that he made some mistakes. He was more familiar with English letters rather than Malayalam letters. His handwriting was good.

In the task of naming letters, he gave answers, but some were wrong. When he was given ten simple letters, he answered correctly in the case of three letters, but needed time and prompting. He tried to avoid the task of reading saying, "I don't know." He could not read even single and simple words. Jacob's capacity for matching letters was evaluated. He was capable of matching letters. Similarly, to examine whether he was able to match words, I wrote down simple words and asked him to match them. But he failed to do so.

During the sessions with the boy, I examined whether he had a number naming difficulty similar to his letter naming difficulty. I found that it was too labourious for the boy to name numbers. One exceptional thing I noticed was that Jacob was competent to dial the phone numbers of his parents and relatives correctly. But when he was asked to state the number he dialed, he was unable to do so. I tested whether he had difficulty in naming colours. The result was negative. The unusual features were that he could dial numbers and match colours, but he could not orally express numbers, colours and letters.

I conducted a detailed psychological evaluation to determine how his current problem was related to cognitive functions. Jacob was seen to be very alert and interested throughout the evaluation procedure, though on some occasions he was seen to be distracted. His general intellectual performance was assessed using MISIC. Jacob's overall IQ was found to be 107 which put him in the average intellectual category. His (VIQ) was 93 (PIQ) was 122 and VIQ-PIQ difference was 29 with a higher performance IQ.

The summary of the score obtained in the MISIC is given in Table 4.1.3.1.

TABLE 4.1.3.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	93	7	Picture completion	104
2	General Comprehension	113	8	Block Design	140
3	Arithmetic	85	9	Object Assembly	131
4	Similarities	105	10	Coding	98
5	Vocabulary	90	11	Mazes	135
6	Digit Span	75			
	Total VIQ Score	93		Total PIQ Score	122
Full IQ Score – 107					

His spatial ability, verbal conceptualisation ability, sequencing ability and acquired knowledge were assessed using the subtests of MISIC. The average score of spatial ability (Picture Completion, Block Design, Object Assembly) was 125.The average score of sequencing ability (Digit Span, Arithmetic, Coding) was 86. The average score of acquired knowledge (Information, Arithmetic, Vocabulary) was 89. The average score of verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 103. The result revealed that there was discrepancy between scores, and compared to the other scores he had high score in spatial ability and low score in sequencing ability and acquired knowledge. These low scores emphasised that he had extreme lack of some specific learning skill.

The result of the verbal IQ indicated that his general comprehension was at bright normal level. He scored average score in Information, Similarity and Vocabulary, but he scored below average for Arithmetic and Digit Span. The score for Arithmetic Skill revealed that his ability to comprehend numeration, understand number concept, number usage and place value were at below average level. The score in Digit Span indicated that he probably had below average skill in attention and also had a short-term memory.

In the performance tests, with the exception of picture completion and coding, Jacob had superior scores in three subtests viz., Block Design, Object Assembly and Maze. This suggested that he had superior level ability in visual organisation and also good skill in planning and visuo-spatial organisation ability. He scored only average for picture completion and coding. Intra-test scatter was observed among the performance tests.

The test of the memory for children was administered. The total score was 39 and corresponding percentile was 0-10 which suggests that he belonged to the below average level of memory function. The summary of the scores obtained in the memory test is shown in Table 4.1.3.2

TABLE 4.1.3.2

Summary of Scores Obtained in the Test of Memory for Children

Sl.	Items	Raw score	Percentile

No.			
1	Personal Information	2	10
2	Mental Control	1	10
3	Sentence Repetition	2	0
4	Story Recall Immediate Story Recall Delayed	6 5	70 70
5	Word Recall (Meaningful Words)	0	0
6	Digit Span Forward Digit Span Backward	3 0	0-10 0
7	Word Recall (Non-meaningful Words)	0	0
8	Delayed Response Learning	1	20
9	Picture Recall	2	40
10	Benton Visual Retention Test	6	80
11	Paired Associate Learning	6	60
12	Cattell's Retentivity Test	5	60
	Total Score	39	0-10

The subtest scores of the memory test showed that he had above average scores in Story Recall (immediate and delayed), Paired Association, Cattell's Retentivity Test and BVRT. He had low scores in Mental Control, Sentence Repetition, Word Recall (Meaningful and Non-meaningful), Delayed Response and Picture Recall. Above average scores in the sub-items of Story Recall (immediate and delayed) and Paired Association revealed that he had good skill in auditory memory and associative learning. The score of Cattell's Retentivity Test and BVRT suggested that he had average skill in visuo-spatial memory tasks and above average skill in visuo-motor integration tasks.

The low score in Mental Control, Delayed Response Learning and Sentence Repetition revealed that he had difficulty in sustaining attention, and had inability in the sequential reproduction of the sentences verbatim. He also showed difficulty in recalling words and letters which were visually presented. The below average score in Picture Recall revealed that he had deficits in visual sequencing.

QNST was administered. His total score in QNST was 29, which placed him in the suspicious group. Summary of the scores are shown in Table 4.1.3.3

TABLE 4. 1.3.3

Summary of Scores in QNST

Sl. No.	Items	Score	High/ Suspicious/ Normal
1	Hand Skill	0	N
2	Figure Recognition and Production	0	N
3	Palm Form Recognition	4	S
4	Eye Tracking	0	N
5	Sound Patterns	3	N
6	Finger to Nose	2	S
7	Thumb and Finger Circle	3	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	3	S
11	Tandem Walk	4	S
12	Stand on One leg	1	N
13	Skip	3	S
14	Left-Right Discrimination	2	S
15	Behavioural Irregularities	1	N
	Total Score	29	S

Jacob showed deficits in Palm Form Recognition, Finger to Nose, Rapid Reversal of Repetitive Hand Movements, Arm and Leg Extension, Tandem Walk,Skip, and Right/Left Confusion. In QNST, he showed deficits in graphasthetia (which may be due to his insufficient skills in recognising letters). Difficulty in following the sequential order of motor reproduction was revealed in the score of Arm and Leg Extension, Tandem Walk,Skip and

Finger to Nose, etc. He also had Right/Left confusion. His difficulties related with motor tasks may be due to his restless behaviour.

The result of the symptomology checklist of learning disability revealed that Jacob had difficulty in colour naming and difficulty to understand time relationships like yesterday/today, after/before, etc. There was no difficulty in auditory perception but he showed auditory discrimination difficulty. In the area of behavioural components, he showed impulsiveness and low frustration tolerance.

Apart from the psychological test results, I needed more information to study his cognitive functions. So I spent some more time with him. I understood that it was necessary to study his language function because he misarticulated in certain circumstances. I therefore asked his parents once again about the history of his language development. I understood that the child attained single words at the right age. To put it explicitly, he began uttering one word at the age of one, but there was delay in uttering two-word phrases. He started uttering two word phrases when he was around two years old. His parents had noticed Jacob's misarticulation of words since he was two and a half years old. He was not given any kind of speech therapy for this problem.

To estimate Jacob's language function, I gave him tasks related to these functions. To test his auditory comprehension, I checked whether he followed two stage commands. When he succeeded in following two stage commands, I gave him three commands which he also followed. Tasks were once again given to get a clear estimate of his auditory discrimination skill because when the symptomology checklist of learning disability was administered, a difficulty in auditory discrimination was observed. I gave him auditory discrimination tasks to clarify this. It was confirmed that he had auditory discrimination difficulty. Besides, I tried to understand Jacob's language abstraction. I checked this by asking him proverbs, similarities and differences, and analogies. His performance was good which indicated that he had adequate reasoning and abstracting abilities.

I analysed his verbal fluency and narrating skills and gave him a particular letter, asking him to utter as many words as he could in a minute, beginning with that letter. The names of birds, animals and rounded objects were counted. Thus a verbal fluency test was administered. Jacob's performance was good.

I then analysed the psychological tests to trace the area of cognitive function that affected Jacob's reading ability. It could be apprehended that Jacob had no difficulty in visuo-spatial skill because good constructional skills were noticed in the Block Design Test. Moreover, he showed average skills in drawing complex figures.

The total score in Picture Completion, Block Design and Object Assembly reflected his spatial ability. The total score in spatial ability revealed that he had good skill. But the test results disclosed that he had sequencing ability challenges. The results obtained in MISIC tests clarified the above statement. Besides, in QNST, his difficulty in sequential verbal reproduction was noticed.

The Memory Test could not trace any problem in auditory memory. However in visual memory, there were a few difficulties in tasks related to visual sequencing. To further test visual sequencing, the child was shown three pictures to check whether he could remember the order in which they were shown to him. When I observed that this was tough for him, I gave him objects (first five objects, then three objects) to test whether he could recollect them in sequential order. In both the tasks, he failed to recall the objects in sequential order. The visual sequencing tasks showed that Jacob had difficulty in recollecting both objects and pictures.

Apart from these, other cognitive functions were also tested. To study the cognitive functions related to Jacob's problem, I asked his parents about the developmental history of his cognitive functions. He had difficulty in understanding the concepts of colour, shape, size and number . His right/left confusion still persisted. These difficulties were noticed at the age of four or five. His parents had given him proper training. At present, he can identify shapes, designs, colours, numbers, but has difficulty in naming for these. According to Felton and Wood (1989), poor readers are significantly impaired in measures of naming and phonological awareness.

These findings provide some insights on how developmental delays, learning difficulties and cognitive functions are related. Jacob's deficits in visual sequencing skill co-related with his difficulty in learning spelling and in reading. His auditory discrimination difficulty also supported this. He was unable to write alphabets sequentially and made omissions. This again co-related with his visual sequencing skills. The low score of memory reflected his difficulty in the recalling letters and words.

The other deficits in cognitive functions had an influence on Jacob's daily life, as shown by his naming difficulty of colours, and his restless and impulsive behaviour. The developmental history also confirmed the present findings. His restless behavior was noticed when he was three and a half years old, while his difficulties in naming colours, shape, number and letters were noticed since he turned four.

The cases of Raj and Jacob need a common Discussion and Conclusion. We can assume that reading disability may appear in various forms, such as with or without speech problems, and with or without writing problems. The case studies of Raj and Jacob show that their speech as well as writing development is normal, but in language developments they show delay in attaining two word phrases.

The common feature underlying the cases suggests that this could be an example of Dyslexia without Dysgraphia. Both have a similar IQ profile and show the same results in various types of cognitive function tasks. Their prominent problem is centered on naming difficulty. Lovett's (1987) study report revealed that visual naming speed impairment was associated with both profile of deficient reading skill. The test results confirm that both of them had defects in their learning process. At the same time, they are able to preserve the mental picture of the letters and they are able to write. On cross matching this characteristic with their daily life, it is seen that still they have difficulty in naming colours and mentioning different shapes and right/left confusion.

Such findings lead us to the conclusion that in the two cases cited above, the difficulty could be due to some disconnection in the verbal area. The fundamental issue of visualisation in the verbal area impairs their learning ability. It also affects their acquired knowledge too.

Both the above-mentioned cases may be related to the theory of Dejerine (1892, cited by Heilman & Valenstein, 2003). His theory suggested that anatomy of alexia is a disconnection syndrome. Pure word blindness results from destruction of fibres connecting the calcarine region to the angular gyrus, with the central site of damage being in the white matter of the lingual lobule .It was Quensel (1931) who stressed the necessity of the calossal lesion, and emphasised the ‘‘disconnection’’ aspect of the syndrome.

According to this theory, the lesion in the left visual area prevents visual stimuli from entering the left hemisphere and reaching the angular gyrus, which is necessary for reading, while visual stimuli that enter the intact right hemisphere are prevented from reaching the left hemisphere because the splenium of the corpus callosum is destroyed. This theory states that the significant factors in pure alexia are a combination of lesion in the lingual and fusiform gyri of the dominant occipital lobe.

4.1.4. Rohan

Rohan appeared older than his age. When I think of Rohan, his smile always comes to my mind. He was shy and blushed whenever he saw the staff of the Institute. Eight years and ten months old, Rohan was studying in the second standard in an English medium school which followed State syllabus.

What affected him most in his studies was his very slow pace in reading. He read very slowly even the words that had been learned. It was as if he was seeing those words for the first time. Moreover, he forgot quickly the words that had been taught to him. He read letter by letter. While reading, he omitted words, guessed words, missed lines and would take a lot of time to read just a single sentence. He failed in all subjects; when taking an exam, he did not read the question paper and would simply write any answer. He was slow in writing too.

I asked for more details about his performance in studies. His detailed academic history reported that he was confused about letters and it was too tough for him to identify capital and small letters right from the beginning of his kindergarten days. At the initial stage, he missed lines while copying and made spelling mistakes. At the time of this study he could copy without missing lines, but made spelling mistakes when he wrote spontaneously.

The reports from his school showed that he would not sit for long in the same seat. He was restless in class. At the time I was studying him, he was easily distracted in the classroom, but he was regular in school and cooperated with teachers and peers. In the last examination conducted at the time, he had failed in all subjects. He had failed twice in the first standard.

The detailed conversation with Rohan's parents gave me his family status and details of his developmental history. Rohan was the second of two children. His elder brother was 'above average' in his studies. His parents were educated, the father, a businessman and mother, a housewife. His mother spent a lot of time helping him with his studies.

I enquired about Rohan's birth history. His mother told me that she was 27 years old at the time of delivery. The prenatal history was found uneventful except that his mother had high blood pressure in the eighth month of pregnancy. Perinatally, it was a full term Caesarean delivery. At the time of delivery, the umbilical cord was wound around his neck. Post-natal history was uneventful. He had age adequate motor and speech development. He started to babble in the eighth month and uttered his first word at the age of one, but delayed in uttering two-word phrases and sentences. He attained two-word phrases at the age of two and went on to the sentence level after two and half years.

I asked his mother about his general behaviour and she reported that he had age adequate social skills and responsibilities as he did all his household chores. Unlike the other members of his family, Rohan was very responsible in all his daily routine matters. His mother did not have to tell him what had to be done at home. He knew about everything very well, except the lessons he had to learn. He was lazy only in academic matters and other than that he had no behavioural problems. He found it difficult only to recall those matters which were related to his studies. His mother told me that he had a good memory in all other matters. To be explicit, he could remember thoroughly the routes he had travelled, the proper place of the things at home and all other matters related to domestic and social life. According to his mother, he had better social skills when compared to his elder brother.

I examined the clinical evaluation reports. The neurologist's report revealed that he had normal EEG pattern, no gross or fine motor deficits, but had right/left confusion. The speech pathologist suggested that he had age adequate language skill. Linguistic evaluation revealed that while being dictated to, he mixed up letter names and sounds and he showed confusion in identifying letters and words. He did not have adequate visual processing skills. He made substitutions and omissions while reading and spelling mistakes while writing.

I conducted a detailed psychometric evaluation. His overall IQ was found to be 110. His Verbal IQ was 106 and Performance IQ was 114. The summary of the MISIC test scores are given in Table 4.1.4.1

TABLE 4. 1.4.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	85	7	Picture completion	100
2	General Comprehension	125	8	Block Design	159
3	Arithmetic	85	9	Object Assembly	112
4	Similarities	152	10	Coding	88
5	Vocabulary	100	11	Mazes	113
6	Digit span	92			
	Total VIQ Score	106		Total PIQ Score	114
Full IQ Score – 110					

In Verbal IQ, he scored high in General Comprehension and Similarities and scored average in Vocabulary and Digit Span, but had low scores in Information and Arithmetic. The result of the performance IQ revealed that in the subtest of Block Design, Rohan had a superior score and above average score in the other subtests of Object Assembly and Maze, and he had average scores in Picture Completion. In coding, he had only below average score. His verbal conceptualisation ability, spatial ability, sequencing ability and acquired knowledge were assessed through the subtests of MISIC. The average score in verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 126. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 124. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 88 and in acquired knowledge (Information, Arithmetic, Vocabulary) was 90.

There was discrepancy between the scores. He scored below average in sequencing ability. The result of the MISIC highlighted his below average scores in Information, Arithmetic, Coding and Sequential Ability. The low score in Information and Arithmetic may be because of his lack of skill in acquired knowledge, educational experience and lack of skill in understanding the number concept and difficulty in comprehending numeration. The low scores in coding and sequential ability indicated that he had difficulty in visual sequencing activities.

The tests of memory were used to assess various aspects of memory. Table 4.1.4.2 gives the summary of the scores obtained in the Tests of Memory for Children.

TABLE 4.1. 4.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw score	Percentile
1	Personal Information	2	10
2	Mental Control	6	10
3	Sentence Repetition	2	10
4	Story Recall Immediate Story Recall Delayed	8 7	80 70
5	Word Recall (Meaningful Words)	6	40
6	Digit Span Forward Digit Span Backward	6 3	30 20
7	Word Recall (Non-Meaningful words)	5	40
8	Delayed Response Learning	0	0
9	Picture recall	1	20
10	Benton Visual Retention Test	6	70
11	Paired Associate Learning	13	60
12	Cattell's Retentivity Test	4	30
	Total	69	30-40

The sub-test scores in memory test showed that he had above average scores in Story Recall, Paired Associative learning and BVRT, and scored below average in Mental Control, Sentence Repetition, Word Recall (meaningful/non meaningful), Delayed Response Learning, Picture Recall and Cattell’s Retentivity Test.

The results threw light on the fact that he had sufficient skill in auditory memory, associate learning, and visual motor skills. Barring these three sub-tests, he scored below average score in all the other items. The scores in Mental Control and Delayed Response Learning revealed his difficulties in sustaining attention in academic activities. The scores in Word Recall (meaningful), Word Recall (non-meaningful), Picture Recall and

Cattell's Retentivity Test also underscored his difficulties in visual scanning and visual sequencing skills.

His total score in QNST was 36. The summary of the scores are shown in Table 4.1.4.3.

TABLE 4.1.4.3

Summary of Scores in QNST

Sl. No.	Items	Score	High/ Suspicious/ Normal
1	Hand Skill	1	N
2	Figure Recognition and Production	1	N
3	Palm Form Recognition	4	S
4	Eye Tracking	0	N
5	Sound Patterns	8	S
6	Finger to Nose	0	N
7	Thumb and Finger Circle	4	S
8	Double Simultaneous Stimulation of Hand and Cheek	2	S
9	Rapidly Reversing Repetitive Hand Movement	2	S
10	Arm and Leg Extension	2	N
11	Tandem Walk	3	N
12	Stand on One Leg	2	S
13	Skip	3	S
14	Left-Right Discrimination	3	S
15	Behavioural Irregularities	1	N
	Total Score	36	S

The result revealed that he fells in the suspicious range, which indicated the possibility of minor neurological deficits. Rohan also demonstrated difficulty in Palm Form Recognition. He showed inability in following motor and verbal sequencing task, imbalance in gross motor tasks like Stand on one Leg and Skip. He also showed difficulty in right/left discrimination.

The result of the symptomology checklist of learning disabilities revealed that he had visual perceptual deficits, (reversals of letters, difficulty in identifying capital/small letters, inability to copy accurately, slow pace in reading). In the auditory perceptual area, he showed difficulties in auditory discrimination. Difficulties were noticed in recalling both the objects and words in sequential order.

I continued the sessions with the child to study his problem closely from the results of the tests and also to clarify these results. I gave him tasks in accordance with the results of psychological tests. The test results indicated that he had difficulties in sequential tasks. Once again, I made him perform certain activities to understand how the difficulties seen in the sequential tasks were spread across the areas of cognitive functions. The sequential related tasks were given to Rohan once more. First, I made him read four simple words in one minute, and then asked him to recall them. He did not give the correct answer. He was given the same task again with the number of words reduced to three. This time also, he failed to give the correct answer. I continued the task with two words. He succeeded in recalling one word. A similar task was again given to Rohan, this time with letters. This task began with seven single letters. It was too hard for him to recall those letters. I reduced the number to five and asked him to recall these in sequential order. He failed once again. However, I did not give up. I reduced the number of letters to three and he now recalled two letters, but not in sequential order. Finally, he was given two single letters to recall. It was understood that he could recall only two single letters.

As he had difficulty in recalling words and numbers, I checked whether he had the same kind of difficulty in recalling objects. To test this, I showed him five objects (very familiar objects) for three minutes and asked him to recall them in sequential order. In the task, he named two objects in non-sequential order. So I cut down the number of objects to three and asked him to recall them. He then memorised and stated the name of only one object. I gave two objects again and in this task, he recalled the names of both objects, but in reversed order.

It could be inferred that he had difficulty not only in recalling words, objects and letters, but also pictures in sequential order. I began with five pictures, decreasing the number of pictures to three and finally, two. When he was given three pictures, he remembered two. In the task with two pictures, he recalled both pictures, but not in order.

It became clear that it was difficult for Rohan to recall visually presented tasks in sequential order. Similarly, I tested whether it was hard for him to memorise auditory tasks in the sequential order. With this intention, I told Rohan five single words and asked him to recall and repeat them in order. He stated three words from memory in non-sequential order. I attempted more than one time. Later, when he was given three words to recall, he said two words from memory in wrong sequential order.

When I examined his cognitive functions with the intention of understanding the developmental history of the defects mentioned above, I noticed that it was too labourious for him to learn the concept of colour. He is still confused about colours and has right/left confusion. I realised that, along with these difficulties, he had difficulty in learning the concept of time and the concept of back and front that had been noticed since the age of four. He could not make out the difference between today, tomorrow and yesterday. He continues to experience these difficulties.

Along with these, in the other cognitive function tasks he showed difficulties related with body awareness tasks. He showed difficulties in somato sensory discrimination, (which was evident in the subtest of Double stimulation of hand and cheek in QNST). He had finger agnosia, finger anomia and asterognosis (difficulty in recognising common and familiar objects with eyes closed when they were placed in his hands). Along with this, I understood that he failed to point out the sensation of touch on his body. This was clarified by the following task. I asked him to close his eyes and at that time touched his cheeks and elbow, but he could not point out the part of the body where I touched him. He could not recall the objects and words in the sequence that they were presented to him.

Rohan's deficit in visual and verbal sequencing was manifested in the form of reading difficulties such as poor reading skills, slow reading, word retrieving and identification difficulties and making omissions and substitution while reading. Visual sequencing deficits could be responsible for his difficulty in copying notes, that is, he was very slow in copying. But at the same time, he had sufficient drawing skills and his score in BVRT was above average. He did not show any fine motor difficulties. He held a pencil in the proper way and his handwriting was readable. These results suggested that his poor copying skill might be related to visual sequencing difficulties and not to fine motor deficits.

Rohan's sequencing problems were evident in psychological tests. He showed difficulties in coding and the other subtests of visual, verbal, and motor sequencing tasks. I found that in unstructured tasks given to him, he had difficulties in recalling objects, letters and words in sequential order. In his daily activities, he had difficulties like confusion about colour, right/left, front/back of clothes, etc. He had finger anomia, finger agnosia, asterognosis and tactual deficits. When Rohan's language developmental history was analysed, it was noticed that he attained single words during the first year, but there was a delay in speaking two words at a time.

The detailed case analysis suggested that his problem in the area of sequencing was evident in all kinds of sequencing tasks (motor, verbal and visual). This might be because of a general delay in sequencing as he was found to have problems in quick perception also. Rohan would probably benefit if more activities were provided in the above-mentioned affected areas.

4.1.5. Varsha

Studying in the fourth standard in an English medium school, Varsha was nine years old. She did not seem at ease as she entered the Institute. She appeared quiet and passive and had trouble socialising with strangers. It took her some time to interact with me.

Talking to her parents, I learnt that Varsha's was an upper class nuclear family. Her parents were educated and understood her problems. Her mother devoted a lot time for Varsha's academic enhancement. Varsha's main problem was in the area of reading. She also had a writing problem history. She had a poor memory and found it difficult to remember her lessons. It was reported that she was able to identify most alphabets in Malayalam and English, but had confusion with some alphabets, mistaking 'm' for 'w' and 'u' for 'n'. She was able to read simple words, reading letter by letter, rather than reading the whole word together quickly. Besides, it was too tough for her to read lengthy words and that made her very slow in reading. She could not read English or Malayalam smoothly. Reading comprehension was not adequate in either language and she omitted and missed lines while reading.

I realised the need to probe the history of her present problems. Her parents told me they had been aware of her problems since Varsha was four. They started educational therapy when she was in the first standard. Varsha would identify letters very slowly and had to put in a lot of effort to learn the alphabet. She had a history of mirror writing, letter and number reversal and was confused between upper and lower case letters. While being dictated to, she made numerous spelling mistakes in both English and Malayalam, very often with even familiar words. She makes spelling mistakes even now. She had a history of jumbling of letters while writing on her own, but her handwriting was legible. Her copying skill was good and she encountered more difficulty in reading rather than in writing. She did not have difficulty in mathematics.

Her parents saw that their four-year-old daughter could not understand the questions put to her. They had also been noticing Varsha's difficulties in narrating events since she was five. She took a lot of time to explain events. She still has the same difficulties. She had to make a great effort to learn names of peoples and places (especially in her Social Study lessons).

I asked her mother about Varsha's method of study. Her mother explained that she would read out to her and teach each lesson repeatedly as the child took time to learn even a single answer. She did not have much difficulty with writing tasks on the lessons she had learned. Her main problems were with reading and comprehending the lessons.

She started to get special intervention from the time she was five years old. It was reported that her writing skill has been improving as a result of continuous intervention, but the difficulty in reading continues to trouble her. Along with the special educational training provided to her, Varsha's mother helped her immensely.

I collected details about the history of Varsha's Developmental Stages. Her mother told me that prenatally, she had taken antibiotics under medical supervision for a kidney stone ailment in the eighth month of pregnancy. Medicines were taken for premature contractions. No abnormality was reported in the prenatal and postnatal period, but the baby continually cried at night and did not sleep well during the first six months. She was a dull child, but her parents could manage her. Varsha attained social smile at normal age. She had normal gross/fine motor and language development. My probe into cognitive developments disclosed that she had attention deficits from when she was five years old which continued to the present period. The concepts of shape and time baffled her. At the age of six, it was noticed that she had difficulties in drawing a circle and throwing and catching ball, though these are not problems at present. Her parents began noticing her left/right confusion when she was seven years old.

The details provided from her school revealed that Varsha was reluctant to go to school and did not communicate with her peers. However, she had recently begun to show interest in going to school and she had just started to communicate with her classmates, but only with very few of them. She would talk to her mother endlessly. She feared examinations. She would exhibit psychosomatic complaints (like stomach ache and vomiting) when she had to study, especially for test papers and examinations. She failed in most subjects till the third standard, but this year (fourth standard) she got through with just pass marks in science subjects and failed in Malayalam and English. She scored average in Mathematics.

Studying her Social Development/Behavioural Characteristics helped me to understand more about her problems. Her mother had to prompt her with all her daily routine activities. She was a very affectionate but demanding girl. Varsha also needed help especially from her mother for her studies. She was unable to get along with her elder sister. Her mother told me that she had an inferiority complex when she was compared to her elder sister who did well at school and was better looking than her. Varsha would grieve over the fact that she was not as fair as her sister. She would always complain about her friends and teachers. During the session, Varsha said to me “My classmates tease me because I get low marks. I don’t like them, they don’t like me”. During the session, I sensed the complaining tone very often.

Varsha underwent a clinical evaluation. A neurologist, pediatrician, speech pathologist, linguist and psychologist examined her. No EEG abnormalities were reported. According to the evaluation reports, her sensory abilities were adequate, but she had right/left confusion and complaints of stomach pain and vomiting (psychosomatic symptoms). No other illness was reported.

The linguist and speech pathologist assessed her and their evaluations revealed that she had normal language development and could comprehend complex verbal commands, could follow the “what”, “where”, “why” question forms and others like “how much”, “how far”, etc. She encountered no difficulty in understanding and comprehending spoken languages. She had appropriate language expression skills and expressed herself verbally using appropriate sentence forms. Though she attempted to narrate stories, she could not provide adequate information.

The linguistic evaluation report informed the researcher that her reading comprehension was not adequate. She jumbled letters while reading and made spelling mistakes while writing. According to the linguist, her language performance was below the level expected of her in class and her spelling and syntax skills were also not up to the mark. Varsha read very slowly because she found the process of pronounciation of the letter strings difficult. Her reading comprehension was also problematic, but Varsha had adequate oral language skill.

I carried out detailed psychological evaluation. In MISIC, her general IQ was found to be 97, which put her in the average intellectual functioning group. Her scores in verbal IQ were 92 and Performance IQ was 103. The summary of the MISIC Test are shown in Table 4.1.5.1.

TABLE 4.1.5.1

Summary of Scores obtained in the MISIC Test

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	100	7	Picture Completion	90
2	General Comprehension	100	8	Block Design	117
3	Arithmetic	92	9	Object Assembly	92
4	Similarities	90	10	Coding	102
5	Vocabulary	84	11	Mazes	113
6	Digit Span	85			
	Total VIQ Score	92		Total PIQ Score	103
Full IQ Score – 97					

In MISIC, her sub-tests in Verbal IQ revealed that Varsha scored average in Information Content, General Comprehension and Arithmetic and Similarities. She scored below average in Vocabulary and Digit Span. In the performance test, she had above average score for Block Design and average score for the rest of the items.

The below average scores in vocabulary explained that her ability to remember auditory labels, and her ability in oral vocabulary responses, verbal concept formation, capacity for verbal abstraction and capacity for the recall of old memories were at below average level. Her score in Digit Span showed lack of skill in sustaining attention, short-term memory and concentration.

In the performance test, she had above average scores in Block Design, and her average score in Coding and Maze revealed that she had sufficient ability in perceptual and spatial organisation, abstract conceptualising ability, and sufficient skills in eye motor co-ordination and planning. The average score in Picture Completion and Object Assembly suggested that she had average skill for distinguishing essential from non-essential details, general observation and alertness. Her capacity for visual/ visuo-motor organisation combined with past memory or habit formation was average.

Her spatial ability, verbal conceptualisation ability, sequencing ability and acquired knowledge were assessed using the sub-tests of MISIC. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 100. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 93. The average score in acquired knowledge (Information, Arithmetic, Vocabulary) was 92. The score in verbal conceptualisation (Comprehension, Similarity, Vocabulary) was 91. The results of the sub-tests of MISIC made me realise that they failed to give evidence of any visible defect.

I then administered the test of memory for children. The results of the Memory Test showed that her total score was 80 and corresponding percentile was 40. Table 4.1.5.2 summarises these results.

TABLE 4.1.5.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw Score	Percentile
1	Personal Information	4	50
2	Mental Control	3	0-10
3	Sentence Repetition	7	40

4	Story Recall Immediate Story Recall Delayed	14 9	100 70
5	Word Recall (Meaningful Words)	5	30
6	Digit Span Forward Digit Span Backward	4 2	0-10 20
7	Word Recall (Non-meaningful words)	5	30
8	Delayed Response Learning	2	40
9	Picture Recall	1	20
10	Benton Visual Retention Test	6	60
11	Paired Associate Learning	12	60
12	Cattell's Retentivity Test	6	50
	Total	80	40

The scores of the Memory Sub-tests revealed that she had 100 percentile for Story Recall (immediate), and average score in Story Recall (delayed) and Paired Association. She scored below average in Mental Control, Sentence Repetition, Word Recall (meaningful), Word Recall (non-meaningful), Delayed Response and Picture Recall. In the visual memory test, her performance was not better. She had low scores in Word Recall and Picture Recall. These low scores suggested that she did not have sufficient skill in visual memory of words, because she did not recall words, letters and pictures which were visually presented. The result of the memory test indicated that, she scored low in the sub items, which were related to with academic matters.

Following these tests, I administered QNST. Her total score in QNST was 21, which placed her in the normal group. Table 4.1.5.3 indicates the summary of QNST.

TABLE.4.1.5.3

Summary of Scores in QNST

Sl.	Items	Scor	High /

No.		e	Suspicious/Normal
1	Hand Skill	1	Normal
2	Figure Recognition and Production	1	Normal
3	Palm Form Recognition	4	Suspicious
4	Eye Tracking	0	Normal
5	Sound Patterns	7	Suspicious
6	Finger to Nose	0	Normal
7	Thumb and Finger Circle	1	Normal
8	Double Simultaneous Stimulation of Hand and Cheek	1	Suspicious
9	Rapidly Reversing Repetitive Hand Movement	2	Suspicious
10	Arm and Leg Extension	0	Normal
11	Tandem Walk	2	Normal
12	Stand on One Leg	0	Normal
13	Skip	0	Normal
14	Left-Right Discrimination	2	Suspicious
15	Behavioural Irregularities	0	Normal
	Total Score	21	Normal

From the results of the test it can be deduced that Varsha showed deficits in Palm Form Recognition, Sound Pattern, Double Simultaneous Stimulation of Hand and Cheek, Rapidly Reversing Repetitive Hand Movement, and Left and Right Discrimination.

The results of the symptomology checklist revealed that she had a history of letter and number reversal, mirror writing, jumbling of letters, poor copying skill and excessive erasure, all symptoms which emphasised that she had visual perceptual defects. In the symptomology checklist of learning disabilities, Varsha showed that she had visual perceptual deficits, auditory perceptual problems and spatial relationship awareness difficulties. To test her visual perceptual function, I gave her visual discrimination, visual organisation and visual spatial tasks. Her performance was better in all these tasks and she did not make visible mistakes. The child's poor performance in the symptomology checklist may be due to its difficult academic-related content.

Once again, I observed her reading skills. I realised that it was too hard for to read lengthy words and when she did, she read letter by letter. I was compelled to give her more tasks to find out the reasons for her problems in reading. The defects in the cognitive functions, if any, could not be detected from the tests given so far. Though more tasks were given in visual perceptual functions, they could not give evidence of any difficulty. So I gave Varsha tasks to test her auditory perceptual functions.

I asked Varsha to comprehend the difference between rhythmic words in order to test this. She performed well in that task. Then I checked her skill to follow two stage commands. Varsha found this difficult. I asked her mother whether she felt that her child faced any of these difficulties at home. Her mother said that when she was given any command to follow, she frequently had doubts about what she was asked to do, often repeating the same. This problem was evident mainly when she was at home and associated with her academic works.

Next, I gave her the verbal fluency test to get a clear picture about her language functions. Her performance was good. Some difficulties were observed in the functions of narrating and creating stories.

The overall test results indicated that Varsha showed some difficulties in narrating skill and following more than two stage commands, attention deficit and behavioural problems. Her behavioural difficulties may have aggravated her school-related problems. Varsha knew about her problems, but she could not cope with them. She was not willing to co-operate with her classmates. At home, too, she was not comfortable with her elder sister, resulting in sibling rivalry. She lost her temper quickly and was quick to grieve. She was very emotional. Moreover, she always had psychosomatic complaints. Smart (1996) reported that behavioural problems may exacerbate reading delay.

To summarise, the researcher failed to identify or locate any serious problem in the perceptual and cognitive functions. The existing difficulties could not explain her reading problem. This case appears as an instance in which we observe limitations in reading, but fail to observe limitations in the perceptual, cognitive, linguistic and neuro-psychological domains. Whether such a case can be labelled as learning disability is a controversial issue. The roots of her problem may lie in the social-emotional-motivational domain. It could also be rooted in the variables of instruction or an interaction of the socio-emotional factors. In the common definitions of learning disability, the role of instruction is usually ruled out. However, there is no specific method to rule out such problems in practice. Varsha's case poses serious challenges to the conceptual and practical aspects of learning disability.

4.1.6. GROUP DISCUSSION OF READING PROBLEM

Reading problem is one of the most common crippling factors confronting children with learning disability. Reading ability is a multiple procedure that consists of a large number of decoding and comprehension processes. So any malfunction in any of the processes can lead to imperfections in reading skill. Reading disability is the condition where reading ability is significantly below expectancy for both age and intelligence. It also projects the learner's lack of cultural, linguistic and educational experience. Children with reading disability exhibit symptoms like inaccuracy in reading, missing out words, guessing difficult words, letter-by-letter reading, letter and word reversal, repetition of sentences, slow reading, etc.

Difficulty in reading can be attributed to many factors. Acquiring normal reading skills can be a stupendous task due to the lack of proper and guided motivation, below average intelligence, socio-emotional problems and delayed speech development and absence of phonological awareness. Children with normal language skill and normal speech development may show reading disability. This is mainly due to dysfunction in decoding and comprehension processes. Proper functioning of orthographic and phonological processes will enable the reader to decode and read words, but mildly defective cognitive functions may make this somewhat difficult. At the same time, improper functioning of visual and auditory processes, visual and auditory memory, and visual to verbal translation can lead to dysfunction in reading. Several studies have been dedicated to revealing the various reading characteristics of children with such difficulties.

The present study carefully inspects five children with normal language and speech development, but who display severe reading disability. The study has helped in the formulation of some basic requirements for a child with the cognitive perceptual functions; slight defects in the latter can lead to difficulties in different reading processes. One phenomenon was the defects seen in the visual process, which are of two kinds – visuo-spatial and visuo-organisational. Another noticeable defect was the conversion problem faced while translating from the visual to the verbal area. There was no noticeable dysfunction in either visual or verbal processes, but when these were combined they did not give the desired result. This gave rise to another interesting angle in the study, i.e., the role of the sequencing function in a child. The difficulty in the sequencing process was visible in all the sequencing activities of the child such as visual sequencing, verbal sequencing and motor sequencing, while reading was affected only by dysfunction in visual sequencing.

The above cases largely focused on the cognitive dysfunction. At the same time, the researcher noticed that children without this dysfunction also showed reading disability largely due to socio-emotional or instructional factors. This startling fact was revealed by one particular case study.

Subjects in the case study of the visuo-spatial and visuo-organisation area were tested for intellectual/psychological attributes. One subject showed low scores in Block Design, Object Assembly, Coding and Cattell's Retentivity Test. Object Assembly was this subject's major hurdle. This led the researcher to the conclusion that her defects were related to visual process functions. Object Assembly and BVRT Test were used to assess visual organisation skills. The low score in Cattell's Retentivity Test and the Block Design Test revealed problems in visuo-spatial area. The subject already had difficulties in various stages of development. These were largely related to locating or arranging objects, top/bottom differentiation, front/back confusion, route/landmark recognition, and lack of comprehension of intimate relatives from photographs. The child showed certain reading peculiarities. She not only had trouble in reading words, but also was slow at doing this.

The reading difficulty connected with the visual to verbal area was indeed recognised from the naming period itself. The fundamental problem was directly related to naming rather than reading. Some subjects usually had trouble in colour naming. So colour naming could be used as a diagnostic tool for naming difficulty. The researcher did an in-depth in study of two such cases. The two subjects scored similarly in the intellectual test, with low scores in digit span and mathematics. Compared to the other scores, they had low scores in coding. Their developmental stages also showed difficulties in picture naming prior to colour naming.

However, for another child, visual sequencing was the problem. The child could read single words but not groups of words. The child also had low scores in Coding tasks. One case was studied in a different context. Though cognitive function or psychological tests did not reveal any evidence of a problem, detailed analysis and a clear tracing of the child's history revealed that she had experienced some emotional or school-related problems.

The case study and detailed references of study in the above-mentioned five cases revealed that their problems in reading were of five different types. Assessment of the first four cases showed four different difficulties in perceptual and cognitive functions. The first case showed visuo-spatial and visual organising problems, whereas the second and third cases had trouble with their visual to verbal area. The fourth was a case of visual sequencing. The last case evidently emphasised that emotional or school-related matters could also be a cause of reading disability.

The research shows that reading difficulty is not homogenous. It is desirable and effective to study each child's perceptual behavioural pattern, his/her core difficulty and arrive at an in-depth diagnosis of the case. Therefore, it is crucial to detect each child's core difficulty and intervene in a befitting manner. Personalised intervention would be more effective in achieving a positive result.

4.2. WRITING PROBLEM

Difficulties in writing caused the children to perform poorly in school examinations, resulting in low self-esteem. The children struggled with problems such as writing alphabets, spelling words correctly, using punctuation marks, writing legibly, writing slowly, copying problems, etc. The analysis of writing disorder was done on seven subjects, six boys and one girl.

4.2.1. Vivek

Restless and full of energy, Vivek was a cute boy who looked tall for this age. Eight years and eleven months old, he was studying in fourth standard in a school following the State syllabus. He would come to the Institute along with his parents and run around the place, talking loudly. However, his energy seemed to fail him when it came to his studies. He was not motivated enough in academic matters.

He had a very slow writing pace and was not able to complete notes. He reversed letters and was confused about small and capital letters. He made many mistakes when he wrote by himself and while being dictated to. Moreover, his poor handwriting showed up when he wrote his exams. In short, his writing skill was poor. He encountered trouble in reading too. He would read word by word and omitted words while reading he had those problems till the second standard. Over the years, his reading ability was improved but his difficulties in writing persisted. However, he was good in Mathematics.

I asked Vivek's parents about the history of his present problems. His academic history revealed that till the fourth standard, he studied in a private school following the CBSE syllabus. He failed in the fourth standard. He was then shifted to another management school with the State syllabus. He was regular in school and co-operated with his teachers, but occasionally got into quarrels with his companions. In the annual exams, he failed in Malayalam and English.

He was disinterested in reading and writing right from the beginning of his kindergarten days. When he was three, his parents had noticed that he could not hold a pencil properly. In fact, he tried to avoid holding a pencil as far as possible. He found it difficult to draw small shapes, but had more problems with spontaneous writing. Vivek had pre-writing skill difficulties including lack of interest in colouring, difficulty in cursive writing and so on. His mother told me that he was also disinterested in reading. He did not even read storybooks, though he liked to listen to stories. However, his mother said that laterly, he had started to read comic books on his own.

My conversation with his parents enlightened me about his psychosocial condition. From a well-to-do upper class family, Vivek was the elder of two children. His younger sister could be rated 'above average' in her studies. Vivek's parents were educated, understood his problems and concerned about his welfare and studies. There was a family history of reading and writing problems and his first cousin (aunt's son) suffered from these difficulties.

Vivek did not like to study. When he was asked to study or while doing so, he would complain of a headache and leave the room. He dreaded exams. He became angry, adamant and disobedient when he had to take a test or exam. To add to these problems, he would sweat excessively while writing exams. He often quarreled with his parents. His mother resorted to beating the child when she could not put up with his behavioural problems and poor academic performance.

Vivek was aggressive and restless and would quarrel with his sister quite often. Sometimes he got so angry that he would beat her and say, “I will kill you.” I discussed his quarrelsome attitude with his mother and gathered that it probably stemmed from the fact that he was always being compared with his younger sister who studied well. They would advise him to look up to her as a role model. Moreover, his parents always faulted his poor performance in school while praising his sister. Vivek probably felt belittled.

I asked for his detailed birth and developmental history. Vivek’s birth history revealed that maternal age at the time of delivery was nineteen. A prenatally normal and perinatally forceps delivery, the birth cry of the child was normal. The child’s postnatal history revealed that motor and speech development was also normal. He uttered his first word when he was one, but delayed in the utterance of two-word phrases till he was about two and a half years old. He managed sentence construction around three. Initially, he lacked clarity of speech, but after he turned four, he did not experience any difficulties in communication. His mother told me that he had age-adequate social smile, gross motor development, and was normal in activities such as walking, running and jumping.

Vivek’s social development characteristics showed that he had good interactive skills, was sensitive and lovable and sought the attention of the people around him. He played and socialised with his peers and liked outdoor games like running, playing ball, etc. However, he tactfully avoided spending time on his studies and made excuses for wasting his time.

Referred to a team of specialists for clinical evaluation, Vivek was diagnosed as learning disabled. Neurological results revealed that he had right/left confusion, finger agnosia and slight cerebellar sign deficits. The evaluation of the speech pathologist and the linguist noted initial lack of clarity in speech. He found it difficult to pronounce certain words even at present (the time of the study). His writing sample revealed reversal of letters, mirror writing, spelling mistakes and lack of space between the words. He also wrote phonetically. Moreover, he could not write properly on lines, jumbled small and capital letters and omitted punctuation. His skill in Mathematics was comparatively better and he could do addition and subtraction.

I administered the psychological test and the results revealed that his overall IQ was 107, which put him in the average intellectual category. The summary of the scores in the MISIC test can be seen in Table 4.2.1.1

TABLE 4.2.1.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ score	Sl. No.	Performance Items	IQ score
1	Information	128	7	Picture completion	110
2	General Comprehension	145	8	Block Design	113
3	Arithmetic	100	9	Object Assembly	96
4	Similarities	105	10	Coding	98
5	Vocabulary	114	11	Maze	94
6	Digit span	80			
	Total VIQ Score	112		Total PIQ Score	102
Full IQ Score – 107					

His verbal IQ was 112 and performance IQ was 102. The result of the verbal IQ revealed that his scores in General Comprehension and Information were high. His score in Vocabulary was above average. He scored average in Similarity and below average in Digit Span. In the performance tests, he scored average and above average in all sub-items. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 106 and in sequencing ability, (Digit Span, Arithmetic, Coding), 93. Verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 121 and acquired knowledge (Information, Arithmetic, Vocabulary) was 114. Vivek's average scores in spatial ability, verbal conceptualisation ability and acquired knowledge showed that there was discrepancy between the scores. Overall, the test result revealed that he scored low score in Digit Span. This could be because of his lack of attention or working memory.

In the Memory Test, his total score was 80 and corresponding percentile, was 40. The results are shown in table 4.2.1.2 below.

TABLE 4.2.1.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw score	Percentile
1	Personal Information	4	50
2	Mental Control	6	10
3	Sentence Repetition	3	10
4	Story Recall Immediate Story Recall Delayed	12 12	100 90
5	Word Recall (Meaningful Words)	6	40
6	Digit Span Forward Digit Span Backward	4 2	0-10 20
7	World Recall (Non-Meaningful words)	4	10
8	Delayed Response Learning	1	10
9	Picture recall	2	40
10	Benton Visual Retention Test	4	20
11	Paired Associate Learning	16	90
12	Cattell's Retentivity Test	4	10
	Total score	80	40

The result of the memory test indicated that he had satisfactory skills in auditory memory and associative learning. He scored below average in Picture Recall, BVRT, Cattell's Retentivity Test and Sentence Repetition. The low scores in Picture Recall and BVRT suggested that he had below average skill in visuo-motor integration tasks and visual scanning skill (sequentially). The low score in Sentence Repetition revealed that he had not been able to reproduce sequentially, the sentence verbatim. He also showed difficulty in recalling words and letters that were visually presented in sequential order. In the Memory Test, most of his difficulties were in the visual processing area.

I put him through QNST. His total score was 36, which put him under the suspicious category. The summary of the scores is in Table 4.2.1.3

TABLE 4.2. 1.3

Summary Scores in QNST

Sl. No.	Items	Score	High/ Suspicious/ Normal
1	Hand Skill	2	S
2	Figure Recognition and Production	2	S
3	Palm form Recognition	3	N
4	Eye Tracking	2	N
5	Sound Patterns	6	S
6	Finger to Nose	3	S
7	Thumb and Finger circle	3	N
8	Double simultaneous stimulation of Hand and cheek	3	H
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	3	S
11	Tandem walk	1	N
12	Stand on one leg	2	S
13	Skip	2	S
14	Left – Right discrimination	0	N
15	Behavioural irregularities	1	N
	Total Score	36	S

Vivek did not perform well in the various sub-tests of figure recognition and production and sequential reproduction of sound pattern. His motor co-ordination deficit was evident in the areas of Hand Skill, Motor Tasks, Rapidly Reversing Repetitive Hand Movements, Stand on One Leg, Skipping, etc. He showed difficulties in balancing and had right/left confusion also. The above-mentioned difficulties revealed that he had slight cerebellar signs, which were revealed in the score of Standing on One Leg, Skipping, etc. When I examined the results of QNST, I asked his mother whether the child had any difficulty in motor function. His mother then told me that he had difficulties in riding a tricycle up to the age of five.

I further examined the result of his symptomology checklist of Learning Disability. It revealed letter reversal and the fact that he was very slow in recognising letters or words. His drawings were immature and he had difficulty in spacing the letters and words appropriately. He could not write the letters on the line and was unable to colour within lines. In fine motor functions, he had difficulty in holding a pencil.

As I wanted to know more about his motor functions, I made him go through more tasks like pegboard activities, beading and picking up small beads using thumb and index finger. As far as fine motor developments were concerned, Vivek's mother told me that she had noticed that Vivek had been holding the pencil improperly since he was three and he had pre-writing difficulties. His reluctance to hold a pencil and to write was noticed right from the beginning.

His school reports proved that his handwriting was poor, besides indicating a clear history of orthographic problems. When I asked his parents whether his problems affected his daily routine, the answer was positive. His parents reported that he could not hold food grains in his fist and that if he tried to transfer the grain from a basin to another container using his hands, most of the grain fell down. Likewise, when he tried to take and eat a pinch of sugar, most of it got spilt. Also, he was hardly able to pour a mug of water on his body while bathing – only very little water fell on his body. Over and above, he had difficulty in brushing his teeth and washing his mouth. His father told me that Vivek could not cup his hands to hold water and most of it spilled. I personally observed this to be true.

Further enquiries about his cognitive functions, revealed that he was confused about time. He could not make out the differences between yesterday, tomorrow and today. This difficulty remains. His confusion about right and left was noticed from the time he was four years old. He was confused about which hand to use for eating and about how to put on his shoes properly. He had difficulty in identifying the front and back of clothes. He took a long time to make out the hands and numerals of a clock. Up to the age of seven**,** he found it difficult to distinguish between notes and coins.

During the sessions with Vivek, I observed his copying skills. He did not make many mistakes when copying, but he was very slow. However, he showed more difficulties in spontaneous writing than in copying. If given word dictation, he made many spelling errors. He had no problems with writing simple letters, but was confused when I dictated single words and complex letters. Vivek seemed to be distracted while he was asked to write. His handwriting was very poor and showed fine motor difficulties. His writing sample disclosed a clear history of orthographic problems. This could be due to his lack of skill in comprehending the visual picture of words.

I found that he was energetic and pleasant though he displayed some behavioural problems. During the group therapy sessions, he would try to escape the task, demanding simple exercises in sequential order. When I gave him those activities, he found it difficult to follow. Moreover, he disturbed the activities of his peer groups and caused unnecessary laughter. In the group therapy sessions conducted exclusively for the learning disabled, questions were asked on the portions of the text read out to them and Vivek answered loudly to the questions put to other children. It seemed that he was better at learning what was read out to him than learning by himself. He often showed a lot of impatience. While engaging in games that demanded sequential responses, he not only experienced difficulty, but disturbed other children as well.

The above-mentioned psychological test results indicated that he had deficits in visuo-motor integration and fine motor difficulties which were reflected in his handwriting problems, including illegible handwriting, pressurised writing and improper pencil holding. His writing sample revealed that he had visual discrimination difficulty, letter confusion and poor spacing between letters and words. His visuo-motor difficulty was once again reflected in his poor drawing skills. His difficulties in sequential reproduction were also seen in his writing as poor spelling skill.

His developmental history revealed that his mother's age at the time of delivery had been 19 and that it was a forceps delivery. He delayed in uttering two-word phrases. The motor co-ordination difficulties mentioned earlier had been noticed since his early childhood. The results of the study by Smiths-Engelsman (2001) suggested that serious handwriting problems are accompanied by fine motor deficits. It was difficult for Vivek to hold a pencil, and he was unable to perform pre-writing tasks and hence avoided writing. He could not colour within the lines, draw simple shapes and also showed difficulties in pincer grip. visual

Vivek's visual process deficits were reflected in his difficulty in understanding the difference between the two hands of a clock. He had visual discrimination difficulties (like letter reversal and inversion of letters) from the beginning of his school life. As he got distracted easily, it was clear that he had an attention deficit, and this had been noticed since he was four years old. He was unable to pay attention even for a short time while performing any task and the problem persists.

Vivek's primary difficulty was poor writing skill. His secondary characteristics were that he had right/left confusion, finger agnosia, behavioural problems, restlessness, etc. Vivek had seen to have problems in verbal orthographic tasks, probably due to deficits in the teaching and learning process. The child had not been given enough attention while learning alphabets. Studying the academic history of this child, I understood that he had difficulty in remembering the structure of any visual picture, especially in remembering the structure of letters. Besides this, he suffered from certain fine motor problems also, which were seen in the fact that the letters he wrote lacked shape. It can be concluded that the child's problem is not limited to the verbal area or learning process, but is also related to the problems in fine motor area. Therefore, Vivek can be said to have problems in the area of visuo-motor functions. It could help the child if he were provided more training in this area.

4.2.2 Jama

Nine-year-old Jama was studying in the fourth standard in a school with the CBSC syllabus. Jama was an affectionate girl though she did not mingle easily with strangers. She was brought to the Institute with the complaints of writing difficulties such as poor handwriting, slow writing, spelling mistakes, and reversal of letters, words and numbers.

Looking at her problem closely, I observed that Jama lacked space orientation, did not keep margins, was unable to draw and write on a straight line, and did not have appropriate class-level writing skill. She was very slow and did not pay attention while writing.

I asked her mother about the facts of Jama's writing problem. Her mother told me that she noticed the child's writing difficulty right from her kindergarten days (since UKG). She said that Jama experienced a problem acquiring pre-handwriting skills. It was difficult for her to trace along horizontal and vertical lines. The difficulty of writing on lines was noticed when she was four years old. Gradually, Jama's writing problem got worse. Her teachers had been complaining about it since she was in the first standard and this continued when she was in the second standard. It was mostly her handwriting that the teachers criticised. As for reading, her mother told me that Jama had difficulties only in the initial stage of her schooling. She was slow in reading till the first standard, but had no such problems now (at the time of this study). However, her writing difficulties persisted and as far as possible, she tried to avoid writing.

I collected data on Jama's family background from her mother. She was the youngest of three children and had a brother and sister as siblings. Her family was very well to do. She longed for the love and care of both parents, but her father was not at home and was working in U.K. Her mother noticed that the father's prolonged absence upset the child. The mother herself was a busy gynecologist and hence Jama did not get much support for her educational advancement from her mother. For that, she depended on her grandfather.

Jama's family had a history of illness. I traced the family history of epilepsy, mental illness and learning disability. Jama's second cousin had symptoms of schizophrenia and another relative suffered from mental illness. Jama's elder brother had complaints of epilepsy (myoclonic) at an early age, but the disorder ceased to trouble him after he turned five. Like Jama, he too had writing problems. Barring this, he was a bright boy. Jama's sister, studying in the ninth standard, was a good student.

Jama's mother narrated her child's detailed developmental history. She was 35 years old when she had Jama. The prenatal period had been uneventful and it was a full-term caesarean delivery. The postnatal history showed that the baby's first social smile occurred at the normal stage. Jama had normal gross motor development in activities like standing, sitting, walking, running, climbing, etc.

As for language development, Jama uttered her first word when she was one, two-word phrases at two and sentences when she was two and half years old. Childish blabber continued till she was four (Jama was an over-pampered child). Gradually, she showed improvement. She was not given any special training for language function and at present, has no difficulties with spoken language.

Her school reports indicate that attendance was regular. She socialised well with her teachers and peers. She failed in languages (Tamil and English) and scored just average in science and mathematics. According to her teachers, Jama could have scored 80% marks in examinations if it were not for her writing problem.They reported that she had bettered her reading skills, but that she avoided writing tasks.

I extended my analysis to her behavioural characteristics and social development. The analysis showed that she had age-appropriate social skills. She helped in household chores and got along well with her family. She was active and talkative. She was obedient, sensitive, lovable and occasionally demanding. However, her parents said that she was very careless in routine matters and even lost her study material. My personal observations also supported this comment. Jama often kept her watch, books and pencil box on my table and left the room without taking them. She also forgot the things that I asked her to bring along.

A neurologist, linguist, speech pathologist and psychologist evaluated her. Neurological assessment showed that she had no EEG abnormalities and that her sensory abilities of vision and hearing were adequate. However, the report revealed right/left dysfunction and Graphasthesia (the condition of not being able to identity numbers written on the left palm).

The speech pathologist assessed and reported that her speech development was adequate. At present, she has flow in reading, adequate phonetic skill and adequate comprehension. Linguistic assessment revealed that her handwriting was poor and that she was not interested in writing. She showed attention deficit and made orthographic and substitution errors while doing dictation. Numerous spelling mistakes, omissions and violation of punctuation rules were also noticed in Jama's writing tasks.

I did a detailed psychometric evaluation on Jama. During the sessions, she seemed talkative. When she was asked to write, she tried to avoid the task and instead wanted to spend time by talking. I observed that she was careless in academic activities.

Her overall IQ was found to be 101which put her in the average category. Her VIQ was 106 and PIQ, 97. The summary of the MISIC test scores is shown in Table 4.2.2.1

TABLE 4.2.2.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	**Verbal Items**	**IQ score**	**Sl. No.**	**Performance Items**	**IQ score**
1	Information	120	7	Picture completion	109
2	General Comprehension	109	8	Block Design	96
3	Arithmetic	94	9	Object Assembly	93
4	Similarities	122	10	Coding	89
5	Vocabulary	100	11	Maze	98
6	Digit span	89			
	Total VIQ Score	106		Total PIQ Score	97
Full IQ Score – 101					

Examining the detailed results of the MISIC, I found Jama's informative and abstractive skills to be at a superior level. Her skills in General Comprehension, Vocabulary and Arithmetic were average. However, she had below average score in Digit Span, which indicated that she scored 5 digits for forward, and 2 digits for backward. In the performance test, Jama scored evenly for Block Design, Object Assembly, and Picture Completion, which explained that her perceptual, spatial and visual organisation abilities were at an average level. The score of Maze revealed that she had average performance in planning, but she had low scores in Coding, which revealed that her capacity for new learning, eye-motor co-ordination and fine motor co-ordination skills were below average level.

Her spatial ability, verbal conceptualisation ability, sequencing, verbal conceptual abilityand acquired knowledge was assessed using the MISIC sub-tests. The average score of spatial ability (Picure completion, Block Design,ObjectAssembly) was 99 The average score of sequencing ability(Digitspasn, Arithmetic,Coding)was 91 The average score of verbal conceptualisation abilities(Comprehension,Similarity,Vocabulary) was 110 and the average score of acquired knowledge(Information, Arithmetic, Vocabulary) was 105. Jama's average scores in spatial ability, verbal conceptualisation ability and acquired knowledge showed that there was discrepancy between the scores; comparatively, she had low score in sequencing ability.

In the tests of memory for children used to assess various aspects of memory, she had a total score of 97 and corresponding percentile of 70 which signified an above average memory. The summary of the scores are shown in Table 4.2. 2.2

TABLE 4.2. 2.2

Summary of Scores Obtained in the Test of Memory For Children

Sl. No.	Items	Raw Score	Percentile
1	Personal Information	5	100
2	Mental Control	12	70
3	Sentence Repetition	6	30
4	Story Recall Immediate Story Recall Delayed	11 10	90 80
5	Word Recall (Meaningful Words)	9	80
6	Digit Span Forward Digit Span Backward	5 2	10 20
7	Word Recall (Non-meaningful words)	8	80
8	Delayed Response Learning	3	70
9	Picture Recall	2	40
10	Benton Visual Retention Test	7	80
11	Paired Associate Learning	13	70
12	Cattell's Retentivity Test	4	10
	Total Score	97	70

In the Memory Test, the scores of sub-items revealed that she had sufficient auditory memory capability, which was reflected in the scores in Story Recall and Paired Association. The low score in Sentence Repetition indicated that she might have difficulty in sequential reproduction of the sentences verbatim. But in the Visual Memory Test, she scored below average in Picture Recall and Cattell’s Retentivity Test. This throws light on the fact that she had below average skills in visual scanning and visuo-spatial memory. She had better scores in the rest of the items.

On administering QNST to assess her motor function, it was found that her total score was 32, which placed her in the suspicious group. The QNST results are summarised in Table 4.2.2.3

TABLE 4.2.2.3
Summary of Scores in QNST

Sl. No.	Items	Score	HIgh/ Suspicious/ Normal
1	Hand Skill	0	N
2	Figure Recognition and Production	0	N
3	Palm Form Recognition	7	H
4	Eye Tracking Movement	3	N
5	Sound Pattern	6	S
6	Finger to Nose	1	N
7	Thumb and Finger Circle	2	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	3	S
11	Tandem Walk	4	S
12	Stand on one leg	0	N
13	Skip	2	S
14	Left-Right Discrimination	0	N
15	Behavioural Irregularities	1	N
	Total Score	32	S

The result of the QNST also provided another clear picture. Jama had difficulty in following the sequential order of motor reproduction and verbal reproduction. She had suspicious scores in Sound Pattern and Rapidly Reversing Repetitive Hand Movement. She had slight cerebellar signs that were revealed in the scores of Arm and Leg Extension, Tandem Walk and

Skip. She experienced difficulty in Palm Form Recognition, i.e., inability to recognise letters and numbers which were written on the palm.

When I observed her difficulty in Coding and the defects in QNST, I understood that it was necessary to know more about her motor developments. I wanted to understand the detailed history of the child's present problem. So I collected more information on this from her mother, grandfather and aunt. I asked her family members repeatedly whether Jama had any kind of problem in motor co-ordination. What I could understand from their replies was that Jama had normal gross motor development, but at the age of four, it was noticed that she had difficulty in riding a tricycle. I asked her parents whether she had any difficulty to catch balls at that time. Her mother confirmed that she had a difficulty in catching balls and that this continued till she was seven (this could be due to her poor motor co-ordination). The family members also told me that Jama avoided active sports and preferred indoor games. She joined a dance class at the age of four, but she was slow to learn the steps and began to avoid the class. She had restarted her dance lessons recently, but I was informed that she was planning to stop since she found them very difficult to follow.

Observing her writing skills on many occasions, I understood that she was very slow and inattentive while writing. She found the task of copying very tedious. It was with much effort that she read her own handwriting. The analysis of her handwriting showed that she had difficulty in holding the pencil and that the letters were very small and misshapen. Though she was very slow in drawing and painting, she could paint well and loved using watercolours. She once presented me with a picture of Mickey Mouse that she had done. When I gave her tasks related to fine motor activities, she tried to avoid them with the excuse that she was not interested. Instead, she was keen on doing puzzles.

It was necessary to have a clear picture of Jama's fine motor developments. On enquiry, her mother told me that she noticed that Jama's difficulties were related to fastening sheets of paper with a large paper clip, using a key to open a lock, solving puzzles and buttoning her shirt. These difficulties were noticed when she was six years old. At present, she finds it difficult to thread a needle and also needed help with the task of taking off her socks and shoes.

Her handwriting sample disclosed that there was neither gaps between letters or words nor punctuation marks. She did not put margins on the pages. Though reminded many times to do all this, Jama just could not recall what she had been told. Her handwriting showed she had spacing problems, though the MISIC sub-tests did not give any evidence of this. Jama had a good score in Block Design, but her scores in the Cattell's Retentivity Test and sub-test of memory were poor. This could be because of her difficulty in spatial memory. Zhang's (2002) study result indicated that students with learning disabilities had difficulties in visuo-spatial working memory.

After getting a detailed picture about her writing problems, I discussed Jama's cognitive function developments with her parents. When I studied her cognitive functions, I noticed that she was slow in understanding different shapes. She failed to properly grasp the time concepts of yesterday/today/ tomorrow. According to her parents, she learned to understand the concept of ‘more’ (quantity) only after the age of four and a half. She had difficulty in differentiating between the two hands of a clock till she was six years old. At present, she has developed the skills to learn all about the concepts of colour, shape, time, number and money calculation. Distractive behaviour had been noticed since she was three years old. In the Maze Test, she made errors like lifting the pencil from the paper and applying excessive pressure for drawing. These problems could be because of the difficulty in sustaining attention and in eye-hand co-ordination. In the visual memory test, her deficits were prominent in visuo- motor and visuo-spatial tasks.

These findings revealed some connections between her learning difficulties, developmental delays and cognitive functions. Her deficit in visual scanning and visuo-spatial skills manifested itself in the form of spelling mistakes. She lacked spatial orientation for writing tasks. It was difficult for her to write on lined pages. Her eye-hand co-ordination and eye-tracking difficulties co-related with all her writing difficulties. Her fine motor deficits were co-related to her poor handwriting. Moreover, she was very slow in copying figures.

The above-mentioned deficits in cognitive functions had an influence on her daily life. She had attention deficits in all her activities, was careless, and was in the habit of losing things. Her motor co-ordination difficulty was evident in her day-to-day activities. Her performance in QNST revealed that she had problems in learning dance steps and in ball catching. Her fine motor deficits were co-related with her difficulties in buttoning clothes, etc. Her developmental history testifies the present findings. Her difficulty in riding a tricycle is co-related to her motor deficits, and her fine motor difficulties were reflected in all her pre-writing activities. Jama's parents noticed that she had experienced all these problems since she was three years old. This once again gave a clear picture about her eye-hand co-ordination problem. Since she was three, Jama displayed right/left confusion when putting on footwear. She had time identification difficulty and she took more than sufficient time to learn shapes.

Jama's case is one of writing trouble with fewer problems in the visuo-spatial function and more in the motor coordination function. Her case helps to understand how motor co-ordination problems affect writing skill/ability. From my experience with Jama, I deduced that if she were given proper training in the area of fine motor and visuo-spatial areas, she could improve her writing skills.

4.2.3. Abhishek

Abhishek was a seven-year-old boy throbbing with vigour. Even on the first day of his arrival at the Institute, he showed no hesitation or embarrassment and rushed into the therapy room. Lean and energetic, he was extremely impatient. Abhishek disliked being taught at the Institute. As he entered, he would say aloud, "I won't write. Nobody should tell me to write".

Enrolled in the second standard in a school following the CBSE syllabus, he wrote very slowly and had poor handwriting. I observed that he mixed up capital and small letters, reversed numbers and letters and that the letters he wrote were poorly formed. Further he displayed confusion in the orientation of letters and had a history of mirror writing.

I requested Abhishek's parents for the details of his problems. They told me that he had started going to an English medium school at the age of three. From the beginning itself, his parents noticed that he had a difficulty in acquiring prewriting skills. He was unable to colour, copy and to write on lines. While he had problems taking dictation, his copying disability stood out from the rest. The teachers had complained about his handwriting ever since he was in the first standard. Gradually, Abhishek's writing problem got worse. His difficulties in school were further aggravated by his behavioural problems. His teachers complained that he was restless in the class, had difficulty in sustaining attention and needed prompting to do academic work.

Abhishek was from an upper class well-to-do family. He was the second born of a consanguineous parentage. His elder sister was affected by pneumonia and passed away at the age of five. He had a younger sister who was well behaved and 'above average' in her studies. It was reported that Abhishek's father had certain difficulties in studies during his school days and was academically below average. Abhishek's mother, who was a science graduate, helped him with his studies.

From the sessions with Abhishek, I came to understand that his mother was short-tempered. She got upset with his poor school performance and was overly anxious about Abhishek's future. Moreover, she was not patient with him and always expected sudden and speedy improvement in his condition. She used to question the therapist about the effectiveness of the treatment administered in her child's case, how long he would have to undergo therapy, whether any of the medication was useful to him etc. More sessions were needed in order to convince and make her understand the situation. Though she spent time teaching Abhishek, she meted out physical punishment when she was enraged. She would vent her dissatisfaction and disappointment in the child's presence and blame him for his disabilities, even remarking that he would never be capable of finding employment, wondering about his future and what she would do with him if his condition did not improve. Her pessimism had a very negative impact on Abhishek.

The discussion with Abhishek's mother provided me the details about his developmental history. His birth history revealed that his mother conceived him immediately after the death of the elder child. She was 33 years old at the time of conception and emotionally distressed during this period. She had to take an injection every 15 days during the period of conception (due to the weakness of her uterus) and was advised to take bed rest by her gynecologist. No abnormality was reported in the prenatal and postnatal period.

Abhishek’s developmental records revealed age-adequate gross motor and speech development. He had problems with understanding the concept of shapes and showed right/left confusion. Since he was five years old his parents had noticed these inabilities. It was noticed that he had hyperactivity and attention deficit at the age of three, which still persist.

I got a vivid picture of Abhishek’s problem from his school reports. He was regular in school and scored average marks in Science, Social Studies and Mathematics, but was poor in languages. His writing skills were poor. One of my most important findings is that Abhishek experienced greater difficulty in written copying than in spontaneous writing and taking dictation. He was so bad at copying written matter that his mother would copy his notes for him.

Though his writing skills were poor, Abhishek had excellent auditory comprehension and scored full marks in the oral exams. He also had good math skills. In one of the most recent exam, his scores were as follows: Oral (General Knowledge) - 100/100; General Studies 60/100; Science 45/100; English - 20/100 and Tamil - 25/100. His mother’s support was vital in completing his notes.

Abhishek’s mother told me about his social development and behavioural characteristics. According to her, he had not yet gained age appropriate social responsibilities, that he lacked personal cleanliness, often lost his study materials, was lazy and needed prompting to perform his daily routine activities. He was not interested in personal hygiene or grooming. He needed assistance in dressing (confused of the front and back of his shirt, unable to button it properly, etc). His left/right confusion was conspicuous when he tried to put on his shoes. He had difficulty in controlling his emotions and often talked loudly in public places. He was talkative, but quarrelled with his friends frequently, did not know how to behave with strangers and lost his temper easily. He enjoyed listening to music and recalled musical notes and tones well. He was learning music and was the best student in the music class, for which he bagged the first prize.

A team of specialists evaluated Abhishek on his academic and behavioural difficulties. On his EEG, the neurologist commented that there were spikes and wave discharges in the occipital and posterior part of the frontal lobe. His sensory abilities of vision and audition were normal. Right/left confusion and finger anomia were evident. The speech pathologist and linguist assessed him and reported that he had normal speech development and no difficulty in communicative skills. The linguist reported that though he was quite efficient in grasping a pencil, he could not copy written matter. He was slow in writing, and made omissions and spacing errors. His letters were not well shaped and often violated the rules of writing. Inadequacy in syllable identification was also detected.

During the sessions, I observed that he was very impulsive and had low tolerance levels. Initially, he had difficulty in waiting and used to rush to the therapy room. He became restless when he was made to wait. He also had difficulty in maintaining eye contact while conversing. Drumming fingers, tapping toes, rolling a pencil and incessantly talking – Abhishek displayed all these mannerisms when he was supposed to focus on his studies. He was reluctant in engaging quietly in the activities assigned to him in the therapy room. His restlessness was evident – he got up from the seat unnecessarily and carelessly, putting down the play activity and academic objects, which were placed on the table. In addition to all this, his most serious handicap was that he had a problem copying out what was written, rather than in writing spontaneously. During one of the sessions, Abhishek protested saying, "I don't like copying. I can't write neatly. I get headache and my hand and eyes hurt". He made excuses and avoided copying.

The detailed psychological test results revealed that his overall IQ was 97 which put him in the average category of intellectual function. Table 4.2.3.1 gives the summary of scores in the MISIC Test

TABLE 4.2.3.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information Test	115	7	Block Design	103
2	General Comprehension	106	8	Object Assembly	100
3	Arithmetic	90	9	Picture Completion	111
4	Analogies and Similarities	91	10	Maze	93
5	Vocabulary	98	11	Coding	73
6	Digit Span	85			

	VIQ	98		PIQ	96
Full IQ Score-97					

His VIQ was 98 and PIQ was 96. He scored low in Digit Span and Coding, but had average scores and above average scores in the rest of the sub-tests. Among verbal tests, he had difficulty in sustaining attention as indicated by the low score in Digit Span.

The results of the subtest of PIQ explained that except of Coding, Abhishek had average scores in the other four sub-tests viz., Picture Completion, Block Design, Object Assembly and Maze. In Coding, he had below average score, which indicated that Abhishek had below average skills in eye-motor co-ordination and this also indicated his inability to return his eyes quickly to the appropriate place on the guide key and his difficulty in paying attention to the task at hand.

His verbal conceptualisation ability, spatial ability, sequencing ability and acquired knowledge were assessed using the MISIC subtests. The average score in verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 98 The average score in spatial ability was (Picture Completion, Block Design, Object Assembly) was 105. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 83, and acquired knowledge (Information, Arithmetic, Vocabulary) was 101.

The total scores in spatial ability, verbal conceptualisation, sequencing ability and acquired knowledge showed discrepancy between the scores, with the lowest score in sequencing ability. Briefly, the result of the MISIC highlighted his below average skill in both eye and hand motor co-ordination, difficulties in visual sequencing and sustaining attention. The scores obtained in the Memory Test are provided in Table 4.2.3.2

TABLE 4.2.3.2

Summary of Scores Obtained in the Test of Memory For Children

Sl. No.	Items	Raw score	Percentile
1.	Personal Information	2	10
2.	Mental Control	2	0-20
3	Sentence Repetition	3	10
4.	Story Recall immediate Story Recall delayed	5 4	60 60
5.	Word Recall (Meaningful Words)	5	20
6.	Digit Span Forward Digit Span Backward	4 2	10 10
7.	Word Recall (Non-meaningful Words)	6	60
8.	Delayed Response Learning	1	20
9.	Picture Recall	1	20
10.	BVRT	2	10
11.	Paired Associate Learning	10	80
12.	Cattell’s Retentivity Test	2	20
	Total	49	10-20

The sub-test scores in the Memory Test showed that he had above average score in Story Recall (immediate and delayed), Word Recall (non-meaningful words) and Paired Association. Barring these four sub-tests, he scored below average in all the other items. These results threw light on the fact that he had sufficient skills in auditory memory and associate learning. The scores in Word Recall (meaningful), Picture Recall, Cattell’s Retentivity Test and BVRT also underscored his difficulties in visual scanning, visual sequencing, visuo-spatial perception and visuo-motor skills.

On administering QNST, he scored a total of 28. The details are in Table 4.2. 3.3

TABLE 4.2.3.3

Summary of Scores in QNST

Sl. No.	**Items**	**Raw Score**	**High/Suspicious/ Normal**
1.	Hand Skill	1	N
2.	Figure Recognition and Production	0	N
3.	Palm Form Recognition	4	S
4.	Eye Tracking	4	S
5.	Sound Pattern	0	N
6.	Finger to Nose	2	S
7.	Thumb and Finger Circle	2	N
8.	Double Simultaneous Stimulation of Hand and Cheek	0	N
9.	Rapidly Reversing Repetitive Hand Movement	3	S
10.	Arm and Leg Extension	3	S
11.	Tandem Walk	2	N
12.	Stand on One Leg	1	N
13.	Skip	2	S
14.	Left-right Discrimination	0	N
15.	Behavioural Irregularities	4	S
	Total Score	28	S

The result revealed that he was in the suspicious range, which indicated that he had minor neurological deficits. Abhishek showed difficulty in palm form recognition, eye tracking movement, inability to follow motor tasks, sequence ordering and imbalance in gross motor tasks like arm and leg extension and behavioural irregularities during the testing session.

The symptomology checklist of learning disability revealed that he had letter reversal, jumbling of small and capital letters, difficulty in copying accurately, frequently leaving unnecessary spaces while writing, re-reading/skipping of lines, excessive erasures, and complaints of eye-itching. He could not colour within lines. Besides, when I gave him other visuo-motor task like copying figures, connecting dots and trial making tests, his performance was not up to the mark. However, he had average skills for creating stories, memorising whatever he had just seen or heard, and good semantic and incidental memory.

The following findings were drawn from the detailed evaluation of Abhishek. These included writing difficulty, difficulty in sustaining attention, visual sequencing and visuo-motor skills. To sum up, Abhishek was provisionally diagnosed as writing disabled with attention deficit.

The present findings brought some fresh insight regarding the relationship between cognitive functions, developmental hazards, difficulties in daily activities and learning difficulties. Abhishek's deficit in visual sequencing, and visual to fine motor skills might be manifested in the form of poor handwriting and copying.

Difficulties in visual perception and eye-motor co-ordination were co-related with his poor drawing and writing skill. Visual to fine motor difficulties was the proof of his poor copying skill and eye-tracking movement difficulties that took the form of omission and missing of lines while writing. Visual to fine motor deficits could be responsible for his difficulties in copying notes. He was highly irritated when put on a copying task. The child's visual to fine motor problems were evident in the psychological test. He showed difficulties in Coding and BVRT.

To be more accurate, he did not have much of a problem either in fine motor function or visual process function, but the complication he faced was during translation of visual process to fine motor process. The results of other unstructured tasks also supported that he had more difficulty in visual to fine motor functions.

Overall, his attention deficit was also responsible for his low academic standards. Further scrutiny of his writing skill revealed that his obvious problem was in copying rather than in spontaneous writing or doing dictation. The defect shown was in the conversion of visual image to fine motor abilities.

Looking at his daily routine activities, it was noted that he lacked skill in games those were frequently seen in children’s magazines like joining dotted lines (to form a picture), finding the path (to the finish point), etc. His deficits in visual to fine motor skills were evident in daily life as inability to cut, colour, paste and copy. He was also confused regarding the front and the back of his shirt, buttoning it properly, right and left shoe, combing his hair and brushing his teeth properly, losing materials (books, pencils, papers, lunch box), etc.

The deficiencies like difficulties in sustaining attention was reflected in Abhishek's daily life as restless behaviour, short attention span and fidgetiness. Maternal stress during the prenatal period had been identified as a potent cause of hyperactivity in the foetus, which is manifested as general irritability and distractibility, and other such conditions that made adjustments in post-natal life difficult (Hurlock, 1981). His restless behaviour had been noticed since he was two and a half years old and his behavioural problems started from the age of three. He showed right/left confusion at the age of four along with deficit in visuo-motor skills. Inability in pre-writing skills and right/left confusion had been noticed since the early developmental years. Visual and visuo-motor deficits experienced during early childhood exerted a heavy toll on the writing process, especially in copying tasks.

4.2.4. Deepu

"I cannot write properly. I find writing difficult and because of this I do badly in my exams and end up getting low marks. Although I understand what is being taught, I cannot write it down. I wish my parents, especially my father and my teachers could understand my problems. When they blame or scold me it really hurts", said Deepu.

An eleven-year-old boy studying in sixth standard in a Malayalam medium school, Deepu seemed passive and quiet in nature. He stood apart from the other children with writing problems. This was a peculiar case because Deepu did well in the IQ test and no defects could be detected in similar tests. He often looked troubled, his expression always reflected that he was aware of his difficulty.

Deepu was brought to the Institute with complaints of writing difficulty. His handwriting was poor and he was slow in copying and completing class notes. His notes were full of spelling mistakes, omissions, substitution and spacing errors. His reading skill was better than his writing skill and had improved over the years, while his writing difficulties persisted. In spite of all this, he was good in Mathematics.

I went into the details of the history regarding his present problem. Deepu's mother reported that he could not hold a pencil properly and that he wrote with difficulty. He started his schooling at the age of three and a half. He had difficulty in differentiating between similar symbols and signs even from when he was in the UKG. His poor writing skill was also noticed from his kindergarten days, when he had difficulty in acquiring pre-writing skills and writing alphabets. These initial difficulties included misshapen letters, space errors and punctuation errors. These problems still persist. Along with all this, he made spelling mistakes especially in secondary graphemes, for example, in the case of simple Malayalam words, he wrote slgp¸v for slmgp¸v Alcw for Blmcw. He was also confused regarding the appropriateness of certain Malayalam letters, for example, in the word, Bbp[w, he was confused about [w/Zw/Xw. Similar difficulties were observed in the case of Hindi letters like {{É /¤É, etc. His reading pace was slow and he had a history of jumbling and omitting words while reading. The task of differentiating Malayalam letters like K, i, P, C was very tedious for him. He was confused about alphabets like b/d, u/v, and n/h till he was nine years old. His main problem was poor writing skill.

Deepu's parents were educated and employed. Even though his mother was a teacher, she could not understand her son’s actual problem. Deepu’s father would get upset with his son’s poor performance in school; he is unable to understand his problem even now and punishes the boy often. Deepu’s mother accompanied him to the Institute. When his father was asked to come, he turned up only once. The mother said that Deepu’s father felt that the boy would overcome his problem in the course of time and that he did not need any special training for its rectification. His believed that Deepu’s problem was his lack of interest in learning. His mother thought the same till two years ago, but she then came to realise that Deepu had a real problem. Since then, she took a lot of interest in bringing her son for the sessions at the Institute. She also insisted in teaching him and because of this, Deepu was upset with her. According to his mother, Deepu’s younger brother, though hyperactive, did not show any learning difficulty. When I analysed the family tree, it was clear that there was a history of mental illness and writing problems. Deepu's maternal grandfather suffered from mental illness. His father had a writing problem, which got worse in the presence of other persons.

Deepu’s birth history revealed that his mother had a complaint of continuous vomiting till the last month of first trimester. She had experienced mental stress due to family problems. She had complaints of chest infection in the eighth month of pregnancy and had taken antibiotics for it. Perinatally, it was a full term normal delivery. The postnatal history disclosed that the child had chest infection till he was three years old. His developmental milestones revealed age-adequate gross motor and speech developments. Social smile appeared at normal age. However, he was reported to be a passive boy from the beginning as he avoided activities like jumping and climbing. I probed his cognitive functions. His mother told me that it was difficult for him to understand the concepts of shape, position of objects and time, even when he was 7-8 years old. His lack of attention in the classroom was noticed since he was four.

When I examined his school reports, I realised that he was regular in school and co-operated with his teachers and peers. His teachers started complaining about his writing from the second standard onwards as they were unable to decipher what he had written. He just scraped through his exams in the English medium till the fourth standard. Unable to endure it any further, he was switched to the Malayalam medium in the same school recently. The present year, he failed in two subjects (Malayalam/Hindi), scored just pass marks in other subjects and average marks in Mathematics. He was well behaved in the classroom, though not very attentive. Teachers limited their complaints to his handwriting and regarded him otherwise as an intelligent boy.

It was evident from the sessions with Deepu that he wanted to do well in his studies, but was crippled for lack of ability to transfer what he had studied onto the answer sheet. He was very disappointed with his repeated failure in the exams. On enquiring as to what he found most challenging, his reply was that it was recalling what he had studied and writing it down. He was confronted with confusion in spelling and lack of speed in writing as well, but he made more spelling mistakes when he wrote by himself. He could narrate a story or paragraph, but could not write it down.

Deepu's social and behavioural characteristics showed that he was basically reserved and mingled only with familiar persons. However, recently this had been improved slightly. He was sensitive and lovable but lost his temper if he was compelled to study. He understood his problem very well. As far as play activities was concerned, it was noticed that he did not show any interest in interactive activities, and restricted himself to passive indoor games even from his early childhood. He could not accept losing in a game and so preferred to watch television. His family had to prompt him to carry out his daily routine activities. His laziness was very evident in his manner of dressing, buttoning up his clothes, combing his hair, brushing his teeth, etc. Moreover, he did not arrange his books and clothes properly. His organisational skills were also poor. He had no interest in colouring or drawing but was drawn to mechanical gadgets. He helped mother in all household chores and went out to made small purchases on her behalf.

Due to the problems with his studies, he was referred to the clinic and evaluated by a team of specialists. The neurological evaluation report revealed a primary decline in writing and also right hemispheric dysfunction. The EEG report revealed abnormality and spike discharges predominant in the frontal bihemispherical side.

The speech pathologist and linguist assessed him and reported that he had age-adequate speech development and communication skill, while the linguistic evaluations showed that he had writing difficulty. The difficulty was more pronounced in the area of writing. Improper spacing, reversal and omissions of letters, poor usage of symbols and poor narrative writing were identified from the writing sample. His reading comprehension was found good and his receptive and expressive language skills were age-appropriate.

I administered a detailed psychological evaluation. During the sessions, I observed that he was passive and obedient while following instructions, but his expression was melancholy. During the evaluation he was attentive, though sometimes distracted. Deepu seemed to have a general curiosity and interest about everything. The detailed psychological test results revealed that Deepu's overall IQ was 128, which put him in the superior intellectual category.

The summary of the scores obtained in the test of MISIC are shown in Table 4.2.4.1

TABLE 4.2. 4.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ score	Sl. No.	Performance Items	IQ Score
1	Information	145	7	Picture Completion	134
2	General Comprehension	153	8	Block Design	130
3	Arithmetic	115	9	Object Assembly	116
4	Similarities	136	10	Coding	102
5	Vocabulary	144	11	Maze	124
6	Digit Span	115			
	Total VIQ Score	135		Total PIQ Score	121
Full IQ Score – 128					

His verbal IQ was (135), his performance IQ was (121) and his VIQ-PIQ difference was 14. The result of the verbal IQ revealed that his General Comprehension, Information, Vocabulary and Similarities were at a superior level. Deepu's score in Digit Span (forward) was 8 and Digit Span (backward) was 5. In the performance tests, with the exception of Object Assembly and Coding, Deepu had superior scores in three sub-tests, viz., Picture Completion, Maze and Block Design. He scored above average in Object Assembly and Coding.

His spatial ability, verbal conceptualising and sequencing abilities, and acquired knowledge were assessed using the sub-tests of MISIC. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 127. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 111. The average score in verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 144. The average score in acquired knowledge (Information, Arithmetic, Vocabulary) was 135.

The test of memory for children was used to assess various aspects of memory. His auditory memory was assessed using Paired Association, Story Recall and Sentence Repetition tasks. Visual memory was assessed using Word Recall (meaningful and non-meaningful), Picture Recall, Cattell's Retentivity Test and BVRT.

The summary of the scores are shown in Table 4.2.4.2

TABLE 4.2.4.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw score	Percentile
1	Personal Information	5	100
2	Mental Control	14	90
3	Sentence Repetition	7	20
4	Story Recall Immediate Story Recall Delayed	18 9	100 60
5	Word Recall (Meaningful Words)	7	40
6	Digit Span Forward Digit Span Backward	8 5	100 90
7	World Recall (Non-meaningful Words)	7	50
8	Delayed Response Learning	2	30
9	Picture Recall	3	70
10	Benton Visual Retention Test	2	0-10
11	Paired Associate Learning	16	60-70
12	Cattell's Retentivity Test	7	70
	Total Score	110	80

The total score was 110 and the corresponding percentile was 80. The result revealed that he had very good memory. The sub-test scores in the memory test showed that he had above average scores in Personal Information, Mental Control, Story Recall (Immediate and Delayed), Paired Association and Cattell’s Retentivity Test. His score in Word Recall, both meaningful and non-meaningful, was average (which were visually presented). He had below average score in Sentence Repetition and BVRT.

In the Memory Test, the scores of sub-items like Story Recall and Paired Association revealed that he had sufficient skill in auditory memory and associative learning. The score in Cattell’s Retentivity Test suggested that he had average skill in visuo-spatial memory tasks, but scored below average in BVRT. The low score in BVRT suggested that he had below average skill in visuo-motor integration tasks. The low score in Sentence Repetition revealed that he had difficulty in sequentially reproducing sentences verbatim. In brief, Deepu had low scores in visuo-motor integration in the visual memory tests.

Then I put him through the QNST. The scores are entered in Table 4.2.4. 3

TABLE 4.2. 4.3

Summary of Scores in QNST

Sl. No.	Items	Score	High/ Normal/Suspicious
1	Hand Skill	1	N
2	Figure Recognition and Production	0	N
3	Palm Form Recognition	0	N
4	Eye Tracking Movement	4	S
5	Sound Patterns	3	N
6	Finger to Nose	0	N
7	Thumb and Finger Circle	0	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	3	S
11	Tandem Walk	1	N
12	Stand on One Leg	0	N
13	Skip	2	S
14	Left-Right Discrimination	0	N
15	Behavioural Irregularities	0	N
	Total Score	17	N

His total score in QNST was 17 which placed him in the normal group. However, the detailed results of QNST revealed that Deepu had difficulty in following the sequential order of Motor and Verbal reproduction tasks. The difficulties in eye tracking movement, inability to follow motor tasks in sequential order and imbalance in gross motor tasks like Arm and Leg Extension and Skip were observed. The difficulty in Skipping, Arm and Leg Extension may be due to his poor balance.

When I gave him the symptomology checklist, Deepu showed some difficulties in the visual perceptual area. He skipped lines while copying, did not write words in the sequential order, missed words, did not leave enough space between words, found it difficult to write on lines, erased frequently and complained repeatedly that his eyes hurt while writing. I asked his mother about his complaint regarding eye pain. His eyes were tested, but the reports of the test showed that his eyesight was normal. I gave Deepu many tasks based on the evaluation reports obtained from the tests. When he wrote words, there were more mistakes in the area of secondary grapheme. Therefore, auditory discrimination tasks were given to him, but his difficulties in this area could not be traced from these tasks.

The analysis of Deepu's developmental history revealed that he had fine motor difficulties. He was given tasks related to fine motor activities in order to interpret his difficulties. The tasks included puzzles for the construction of models of objects like houses and ships, using building blocks, peg board and beading activities and the activity of putting the thread through the eye of a needle. Noticeable difficulties were seen in the pegboard and beading activities and in the task of threading the needle. In addition to these tasks, I asked him to pick up small objects using thumb and index finger. He did all these tasks, but was slow.

I gave him more tasks, including colouring activities. I made him colour drawings of flowers, houses and other familiar things. Deepu rose to my expectations. He coloured the drawings neatly, but at snail's pace. When I asked him to colour the space between double lines and intricate curves, I was disappointed – I noticed that he could not colour the pictures neatly or in the proper way. He could not colour the space between two curved lines neatly and that his pace was slow in this task as in the case of colouring pictures. I concluded that Deepu had mild fine motor difficulties since he found tasks like colouring the spaces between intricate curves, a problem.

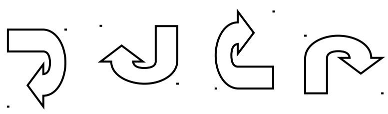
To get a better picture, I scrutinised his developmental history once again. I observed that Deepu's difficulties in fine motor developments which were noticed at the age of three, comprised the difficulty to unwrap even loosely wrapped small objects, to turn pages of books, etc. When he was four years old, his parents noticed that his pencil grasp was not proper and he applied a lot of pressure while writing. They also observed that it was too difficult for him to tie shoelaces and to button shirts, and was dependent on others for these tasks till he was eight years old. However, his parents did not give him any special training to help him solve these difficulties.

Deepu's problems were not limited to fine motor functions. Some problems were clearly seen in the gross motor tasks and in the QNST tests results. The assessment of Deepu's developmental history also helped me to understand the factors that supported the presence of gross motor difficulties. Likewise, results of the QNST showed that he had eye movement difficulties.

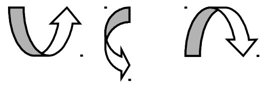
On further inquiry about the problem, his mother informed me that this was noticed when he was eight months old. She said that he did not follow the movements of objects or toys during the first eight to twelve months. She could not give the boy the care and attention he needed because the circumstances at the time put her under a lot of pressure. As she was working, she could not attend to all his needs in his growing years. A maidservant looked him after in his mother’s absence till the age of three. The visual perceptual theorist Getman (1985) suggested that infants who are delayed in their sense of touch, balance and reflexes would have particular difficulty in organising information that is gathered through their sensory motor functions. Deepu’s mother started to shower more attention and care on him when she noticed that her child was poor in his studies. Earlier, she was at sea, not knowing how she could rise to the occasion and tackle her child’s problems.

During the examinations, Deepu was seen to be extremely distracted. He was given various unstructured visual perceptual tasks so as to examine his capacity for visual discrimination. He was first shown the figure 

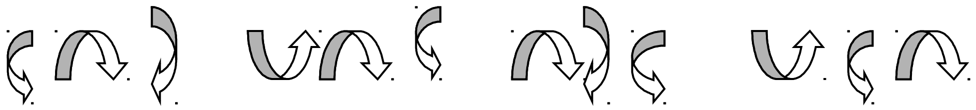
and asked to point out this figure from the following set of four figures:



He was given thirty-five items of different shapes and he did 14 of them correctly. I then evaluated his capacity for visual sequencing by giving him related tasks. I gave him four sets of various shapes or designs among which one set was similar. The boy was asked to point out the similar sets of shapes or designs.

For instance, I asked Deepu to select this particular set 

from the set of figures shown below:



The same experiment was carried out using numbers and alphabets. He was asked to point out the number set ‘5,7,4,8,2’

from the sets of numbers [4 8 2 7 5, 7 4 5 2 8, 5 7 4 8 2, 7 4 8 2 5].

Similarly, he was asked to point out the set ‘E S G O’

from the sets of alphabets [E S M O , E G S O, E S G O , E S O O] . He made several mistakes in the visual discrimination task.

The other cognitive function test results revealed that he had better auditory memory but in visual memory, the deficits were prominent in the visual discrimination and the visual motor integration tasks. Motor difficulties became apparent in simple motor sequencing tasks. However, there was no motor apraxia.

We can conclude that there are deficits in the visual discrimination and the visual motor integration tasks. Visual discrimination deficits are seen while writing the letters, and the word and motor difficulty is seen especially in fine motor deficits and the difficulty in reproducing the motor sequencing tasks. He had difficulty in sustaining attention, especially to visually presented stimuli. His deficit in the visual discrimination skills and the visuo-motor integration manifested itself in the form of various writing difficulties. The letter confusion and spelling mistakes reflected the visual discrimination difficulties. The orthographic errors could obviously be due to his fine motor deficits which appeared in the form of laboured and pressured writing, crude letter formation and improper holding of the writing tool. The deficits in the eye tracking movement co-related with slow writing and making omissions while copying.

The present findings provide some fresh insight regarding how his developmental delays, learning difficulties and cognitive functions are correlated. All the above-mentioned deficits have an influence on his daily life as shown by his passive interests, sluggishness, poor organisational skills, difficulty in performing the necessary activities of daily life, laziness and lack of interest in grooming, and slowness in tasks like buttoning clothes and combing hair. His developmental history also corroborates the present findings. Prenatally, his mother had physical illness and mental stress. The difficulty in the eye-tracking movements was noticed as early as 6-8 months. His disinterest in communicating and interacting with others was evident in his dislike for interactive games and lack of enthusiasm.

Deepu showed difficulties in all areas of writing skills. His inappropriate writing skills were noticed from the beginning of kindergarten days. He had difficulties in visual sequencing and visuo-motor tasks. Eden (1996) reported that dysgraphic children were impaired in a number of visual tasks involving visuo-motor, visuo-spatial and visual motion processing. Deepu showed difficulties in the motor sequencing, especially in fine motor tasks, and this had been noticed since he was four years old. Inherent spelling anomalies had also contributed to his problem. He might have been affected by the lack of opportunities to learn the correct pronunciation of words. As his parents were employed, he was influenced more by the maidservant who looked after him during his speech development stage. The insufficient and inadequate learning processes, defects in certain areas of the visual process and mild deficits in fine motor developments had also affected his writing ability and his writing sample clearly indicated this fact.

4.2.5 Amal

A friendly, talkative nine year old, Amal would reach the therapy room and catch our attention with his incessant chatter. “How are you, Aunty? Where are all the others?” he would say to the staff. This obese boy attracted our attention and won us over with his sociable mannerisms, naughty queries, energetic chatter and attention-seeking ways.

From an affluent background, Amal was a fourth standard student in a CBSE school when he was brought to the Institute. Amal’s writing problem was that he was slow, mixed up small and capital letters, reversed letters and made numerous spelling mistakes. On his performance in school, his mother told me that initially, he had problems in reading and could only read slowly. The reading difficulty was noticed in the first standard, but over the years Amal overcame those difficulties. At the time of this study, his reading was better than his writing. He had good comprehension skills but his writing problems persisted. He also showed difficulty in drawing. According to his mother, he had a poor memory in matters relating to his studies and would easily forget his lessons. However, he managed to do his math problems.

I gathered data about his psychosocial situation. In this nuclear family, Amal was the only child of educated parents, with a working father and housewife mother. His mother spent a lot of time helping him in his studies. Though very much concerned about her child, she failed to realise his difficulties initially and meted out physical punishment for his poor school performance. It was only recently that she started to understand his problems.

The sessions with Amal and his parents enabled me to draw a vivid picture about Amal's developmental history. He was born when his mother was twenty. She had a miscarriage before his birth. During pregnancy, she underwent severe mental stress because of family problems. It was a full-term normal delivery. There was delay in the birth cry for 5-10 seconds. The baby attained social smile and speech and motor milestones at the normal age. However, he did not crawl using his knees. Barring this, there were no noticeable problems in the child's gross motor developments. It was reported that he was an obese baby.

I collected the reports from his school to study Amal more closely. He had been in the same school since LKG. He was reluctant to go to school from the beginning, but he ended up going regularly because of his mother's determination. He was obedient and had no problems interacting with his schoolmates. His teachers began complaining about his poor performance last year and his parents noticed his difficulties when their child was five years old. He failed in two subjects (English and Social Studies) in the last exams, scoring average marks in Science and Hindi, and above average in Mathematics.

On observing behavioural aspects, it was seen that he was a sensitive child. Although he talked to children of his age, he did not like to play with them. His mother told that she noticed that from the time Amal was two years old, he displayed a selfish attitude and did not like to share his toys with others. Another negative aspect was that he had begun telling lies in connection with his studies. Amal was hygiene conscious and would become nauseous when he came across dirty places. He liked indoor games, but he avoided outdoor activities. He liked working on the computer, playing videogames and showed interest in vehicle mechanics. According to his mother he had age-appropriate social skills, was curious about general matters and cleared any doubts he had with his parents. The child communicated well with his mother.

I felt the need to study the reports of clinical evaluation in detail. Amal was evaluated by a neurologist, pediatrician, speech pathologist, linguist and psychologist, and was provisionally diagnosed as writing disordered with attention deficits. His EEG result was abnormal, that revealed a typical sharpness in sleep. His medical history reported that he had asthmatic complaints during his early childhood period, but he was free from that when I met him. He had pneumonia when he was two. Evaluations by the speech pathologist and linguist revealed that he had adequate speech and language developments though unclear speech had been noticed up to three years, particularly with certain difficult words. This was only occasional. The child's spelling skill was poor. Moreover, he wrote phonetically and his handwriting were not well formed. He was slow in writing and violated punctuation rules. His auditory comprehension was good and he had adequate reading comprehension also.

I conducted a detailed psychometric evaluation. During the sessions, he was apparently distracted when I asked him to write or read. He was attentive while doing puzzles and other activities that interested him. He was pleasant and co-operative. He would always find something interesting to talk about when he was asked to write something and tactfully avoided writing. His overall IQ was found to be 101. which put him in the average category of intellectual function. His VIQ was 110 and his PIQ, 92. The detailed result of the sub-items is shown in Table 4.2. 5.1

TABLE 4.2. 5.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	126	7	Picture Completion	97
2	General Comprehension	142	8	Block Design	85
3	Arithmetic	100	9	Object Assembly	75
4	Similarities	94	10	Coding	84
5	Vocabulary	110	11	Maze	121
6	Digit Span	89			
	Total VIQ Score	110		Total PIQ Score	92
Full IQ Score 101					

The result of Verbal IQ revealed that his General Comprehension and Information were at superior level. He scored average for the rest of the items. His score in Digit Forward was 5, Digit Backward was 3 and his total score was 89. In the performance test, Amal had a superior score only for Maze, he scored average in Picture Completion. He had below average score in Block Design, Object Assembly and Coding, which indicated that his ability in visuo-spatial construction, general observation and visual organisation were at below average level. The score in Coding indicated that he was poor in eye-motor co-ordination, learning new skills and lacked the capacity to return his eyes quickly to the appropriate places on the guide key. Intra-scatter was noticed in the various parts of the performance test. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 86. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 91. The average score in verbal conceptualisation ability (Comprehension, Similarity, Vocabulary) was 115 and for acquired knowledge (Information, Arithmetic, and Vocabulary) was 112. These results indicated that he had low scores in spatial ability. Amal also went through the Test of Memory for Children and the results were shown in the Table 4.2.5.2.

TABLE 4.2. 5.2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw Score	Percentile
1	Personal Information	4	50
2	Mental Control	10	40
3	Sentence Repetition	5	20
4	Story Recall Immediate Story Recall Delayed	11 12	90 90
5	Word Recall (Meaningful Words)	9	80
6	Digit Span Forward Digit Span Backward	5 3	10 30
7	World Recall (Non-Meaningful words)	6	50
8	Delayed Response Learning	3	70
9	Picture recall	2	40
10	Benton Visual Retention Test	3	10
11	Paired Associate Learning	16	90
12	Cattell's Retentivity Test	5	30
	Total Score	94	60-70

The sub-test scores in memory tests showed that he scored above average in Story Recall (immediate and delayed), Word Recall (meaningful) and Delayed Response Learning and Paired Associative Learning. He scored average in Personal Information and Word Recall (non-meaningful). These average scores in the various sub-items revealed that he had good skills in auditory memory, recognition memory and associative learning. However, he scored low in Mental Control, Sentence Repetition, Picture Recall, BVRT and Cattell's Retentivity Test. The low score in the sub-items of the memory test showed that, skill in Mental Control, skill of sequential reproduction of the sentences verbatim, visual motor integration and visual scanning skills were below average level.

On administering QNST, it was found that his total score was 37, which placed him in the suspicious group. His scores are given in Table 4.2.5.3

TABLE 4.2. 5.3

Summary of Scores in QNST

Sl. No.	Items	Score	High/Suspicious/ Normal
1	Hand Skill	2	S
2	Figure Recognition and Production	2	S
3	Palm form Recognition	4	S
4	Eye Tracking	2	N
5	Sound Patterns	1	N
6	Finger to Nose	1	N
7	Thumb and Finger Circle	0	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	5	H
10	Arm and Leg Extension	4	S
11	Tandem Walk	6	S
12	Stand on one Leg	3	H
13	Skip	3	S
14	Right-Left Discrimination	3	S
15	Behavioural Irregularities	1	N
	Total Score	37	S

In QNST, Amal’s total score 37, showing that he came under the suspicious category. He had high scores in the sub-tests like Rapidly Reversing Repetitive Hand Movements and Stand on One Leg, though much imbalance was noticed in Arm and Leg Extension. The child had 'suspicious' scores in Hand skill, Figure Recognition and Production, Palm form Recognition, Tandem Walk, Skip and Right-Left Discrimination.

In the checklist of learning disability, he showed difficulties in visual discrimination tasks and fine motor and gross motor functions, but did not have any kind of apraxia. In the other cognitive function tasks, he did not have any problems in language function, memory function, and auditory perceptual function. He had difficulties in the area of motor functions.

The below average score in Block Design, Object Assembly and Coding (sub-test of MISIC), BVRT, Picture Recall and Cattell's Retentivity Test (sub-test of memory) indicated that he had difficulty in perceptual and spatial organisation, visuo-motor co-ordination and visual organisation skills combined with past memory. He had below average skill in eye-motor co-ordination and new learning skill, which was evident in his Coding score. His total score in spatial ability also was below average.

Based on the results of the tests mentioned above, I once again gave Amal tasks to perform in order to clearly understand the nature of his problems which could be traced in the areas of cognitive functions. To clarify the information on the difficulties he had in visuo-motor functions, I asked the child to copy some small figures. It was observed that he had to make a lot of effort to perform this task. I then gave him the design fluency test and observed that though he joined the dots to form the outline of a figure, he was very slow in doing this.

Next, I gave Amal various kinds of building blocks. This was to evaluate his capacity for constructive activities and comprehend his visuo-spatial functions. He took a lot of time to carry out the construction activities, but succeeded in completing the tasks that I had given him. Visuo-spatial difficulties were reflected in the drawing tasks such as drawing the picture of a clock and a house. Moreover, his mother told me that he found it tedious to draw geometrical figures.

In Object Assembly, a sub-test of MISIC, Amal scored below average. I gave him various fragments of a picture and asked him to organise them into one whole. His performance in this test was not different from that in the other tests. As usual, he was slow in performing the task.

In addition to all these, he had difficulties in motor functions. There were no problems in general motor functions, as he encountered no impediments in running, jumping, walking and so on. It could be seen that he avoided outdoor games. The study of developmental history disclosed that he avoided playing with peer groups even in his early childhood. His obesity could be one possible reason for this. The other reasons might be that it was in his nature to play alone or that he disliked playing with peer groups.

The detailed analysis of Amal's results indicate that the child has problems in the visuo-motor, fine motor and visuo-spatial area. Amal suffered from problems in the visuo-spatial area, which is indicated in the difficulty in his earlier reading and poor drawing skill. This might have affected his learning process in an early learning stage.

Amal's main difficulties were centered on the visual process and were related to fine motor functions. However, the analysis of the child's writing sample made me doubt as to whether he had fine motor problems. To test his fine motor functions, I gave him tasks such as beading, pegboard activities, picking up small objects with thumb and index finger and so on. His performance was slow and lethargic in all these tasks. These difficulties were very evident in his developmental history. He had difficulties in joining dots, especially drawing circles, copying simple figures and pre-writing skill stimulation. During the session with his mother, she reported that Amal was generally lazy and needed prompting to perform routine activities. His mother also said that till a year ago, he used to depend on her to comb his hair and brush his teeth. His dependence on her to tie his shoelaces and button his shirt persists.

The major findings from this case study are the defects found in fine motor developments, slow pace in writing and irregularity in the shape of the letters. Fine motor problems were seen in his daily life and developmental history. This case also showed a partially defective visual process. So it may be concluded that the subject has multiple dysfunction of both these defects. If this child is given proper training in these two areas, he can improve.

4.2.6. TONY

Nine-year-old Tony was a reticent boy who did not mingle easily with others. Slow in all his movements, he would arrive at the therapy room at a lethargic pace. Obese, passive and quiet, Tony was in fourth standard in an

English medium school following the ICSE syllabus and was brought to the Institute by his father. His parents were worried about his poor scholastic performance.

His most worrying disability was his slow pace in writing. He could not make out the difference between capital and small letters, omitted letters and words and made numerous spelling mistakes. He would spell the words as they sounded. His mother accompanied Tony when he came for the second session and that was when I asked her for more details about his present problem. From the beginning of his school days, his parents noticed his difficulty in reading and writing and found that his pace in both was very slow. Over the years, he overcame the reading problems, but not his writing difficulties. The boy was very slow in both copying and spontaneous writing. He reversed letters at the initial stage. However, his handwriting was neat and readable. Tony depended on his mother for help in his studies. He easily forgot whatever he himself had read, but at the same time, could recall lessons that his mother read to him.

Tony's was a well-off nuclear family. He was the only child of his parents who were well educated and employed. His mother was a teacher. The parents were over concerned about the child and particular that he should get proper training. I started my study by collecting details about Tony's developmental milestones. Tony's birth history revealed that his mother had met with an accident during the initial week of her pregnancy, injuring her hipbone, which had to be x-rayed. She took full bed rest till the last month of her pregnancy. It was perinatally a full-term Caesarean delivery. Her postnatal history revealed that Tony attained social smile at normal age and had adequate gross motor and speech development. However, he had occasional bouts of asthma till the age of five.

When he was two, Tony's parents sent him to a play school. His formal schooling started when he was three and a half years old. His school attendance was regular and he obeyed his teachers, but was very passive in the classroom. Initially, he seemed reluctant to mingle with children his age, but has recently started to play with them. Though his writing skills were poor, he had excellent auditory comprehension. His parents reported that he had failed three subjects in the annual exams.

Tony's social development and behavioural characteristics showed that he had age-appropriate social responsibilities, but was very slow in all his daily routine activities like brushing his teeth, bathing, grooming, etc. He needed to be prompted to do even his daily chores. This lethargy was evident in the way he walked to the Institute, and in actions like taking his book out of his bag, reading out lessons, etc. In his mother's opinion, this characteristic was most reflected in matters relating to his studies. At home, his mother had to look into his academic matters, even in things like whether he was taking the right books to school (as per the timetable). Owing to his handicaps, Tony's mother helped him in his all activities and he was very attached to her. Studies failed to interest him and he enjoyed listening to music and playing cricket.

He was clinically evaluated. The neurologist reported that his auditory and visual functions were normal, but he had right/left confusion, finger agnosia and graphaesthesia in letters and numbers. The speech therapist and linguist reported that he had age-adequate speech development and communication skills, which showed that his oral expression was age adequate. The linguist reported that his phonic and spelling skills were poor. He lacked phonological awareness, and had difficulty in reading words with irregular spellings. He was slow in spontaneous writing and copying. He was confused about upper and lower case. His concept of spacing was poor and punctuation marks were absent.

The detailed psychological test results revealed that his overall IQ was 101. His verbal IQ was found to be 106 and performance IQ, 97. The scores in the MISIC Test are given in Table 4.2.6.1

TABLE 4. 2.6.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	97	7	Picture Completion	97
2	General Comprehension	122	8	Block Design	106
3	Arithmetic	88	9	Object Assembly	87
4	Similarities	108	10	Coding	72
5	Vocabulary	124	11	Maze	121
6	Digit Span	100			
	Total VIQ Score	106		Total PIQ Score	97
Full IQ Score – 101					

In the MISIC sub-test, he got low scores in Arithmetic, Object Assembly and Coding, but had average scores in the rest. The below average scores in Arithmetic indicated that his ability to solve problems was at below average level. On the other hand, the result of the sub-test of PIQ explained that with the exception of Object Assembly and Coding, Tony had average and above average scores in other sub-tests. The below average score in Object Assembly revealed that he did not have sufficient skill in visual organisation, which was combined with past memory or habit formation. The low score in Coding suggested that this might be due to difficulty in new learning skills. His verbal conceptualisation ability, spatial ability, sequencing ability and acquired knowledge were assessed using the sub-tests of MISIC. The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 97. The average score in sequencing ability (Digit Span, Arithmetic, Coding) was 87, and in acquired knowledge (Information, Arithmetic, Vocabulary) was 103. The average score in verbal conceptualisation ability (Comprehension, Similarity Vocabulary) was 118. The lowest score was in sequencing ability. Table 4.2.6.2 shows the summary of the Memory Test.

TABLE 4.2.6.2

Summary of the Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw score	Percentile
1	Personal Information	4	50
2	Mental Control	6	10
3	Sentence Repetition	4	10-20

4	Story Recall Immediate Story Recall Delayed	12 10	100 80
5	Word Recall (Meaningful Words)	5	30
6	Digit Span Forward Digit Span Backward	6 3	40 30
7	Word Recall (Non-meaningful Words)	5	30
8	Delayed Response Learning	2	40
9	Picture recall	1	20
10	Benton Visual Retention Test	6	60
11	Paired Associate Learning	18	100
12	Cattell's Retentivity Test	5	30
	Total Score	87	50-60

The sub-test scores of the Memory Test showed that he had above average score in Story Recall and Paired Association. These results throw light on the fact that he had sufficient skill in auditory memory and associate learning. He scored below average in Word Recall (meaningful), Word Recall (non-meaningful), Picture Recall and Cattell's Retentivity Test. In the QNST, his total score was 24. The details are in Table 4.2.6.3

TABLE 4. 2.6.3

Summary of Scores in QNST

Sl. No.	**Items**	**Score**	**High/Suspicious/ Normal**
1	Hand Skill	1	N
2	Figure Recognition and Production	1	N
3	Palm Form Recognition	4	S
4	Eye Tracking	0	N
5	Sound Patterns	3	N
6	Finger to Nose	1	N
7	Thumb and Finger Circle	1	N

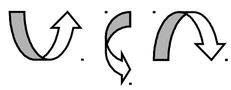
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	2	S
10	Arm and Leg Extension	3	S
11	Tandem Walk	2	N
12	Stand on One Leg	2	S
13	Skip	2	S
14	Left-Right Discrimination	2	S
15	Behavioural Irregularities	0	N
	Total Score	24	N

The results revealed that Tony falls in the normal group. However, he experienced difficulty in Palm Form Recognition, motor sequencing and gross motor tasks like Arm and Leg Extension, Skip, and Stand on One Leg. This was probably due to his obesity. He also showed right/left confusion.

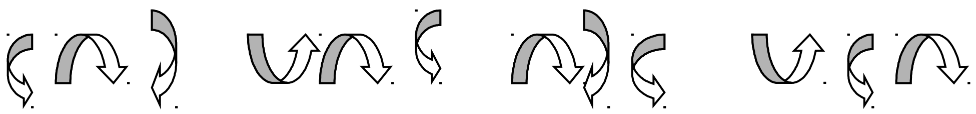
The symptomology checklist of learning disability revealed that while writing and reading, Tony skipped lines. He had sequencing errors like writing 'was' instead of 'saw', 'on' instead of 'no' and so on. At present, he is slow in both copying and self-writing. He erases very often. I closely examined his writing. It was not very difficult for Tony to hold the pencil and his handwriting was readable. I understood that the most difficult task for him was to reproduce letters. Tony did not make mistakes when I gave him dictation of Malayalam, English and Hindi letters. My scrutiny of his writing as well as his daily life activities could not reveal any fine motor difficulty. Hence my focus was on the possible reasons for his difficulty in reproducing the letters. I gave him more tasks related to visual processing.

In tasks related to visual organisation, I gave Tony many parts of simple and familiar pictures and asked him to organise them into one whole picture within a given time limit. Out of thirty-five items, he organised twenty items correctly. Though he was given a time limit to do the tasks, he could not do them within this limit. I assessed his capacity for visual sequencing by giving him related tasks like the following:

I gave him four sets of various shapes or designs among which two sets were similar. The boy was asked to point out the similar sets of shapes or designs.

For instance, I asked Tony to select the following figure set: 

from the sets shown below:



The same kind of experiment was done with numbers and alphabets. He was asked to point out the number '3 2 1 7 4'

from the sets of numbers: [3 2 1 7 4, 3 2 2 7 4, 4 2 1 7 3, 3 2 3 7 4].

Similarly, he was asked to point out 'C Z V O'

from the sets of alphabets: [C V Z O, C Z V I, C Z V O, O V Z O]

He made more mistakes in the visual sequencing task of alphabets than in the other tasks. The net inference from the task results was that although Tony had done everything correctly, he took a lot of time to complete the tasks.

According to the results of the psychological tests, he had difficulties in Coding. Coding is a subtest of MISIC. It is a time bound test and designed to measure the speed. The first step in coding is a trial test which is meant to enable the child to study the task. It is expected that the child will be able to perform the tasks that follow with a small amount of automatic response. But Tony was very slow and had to make a lot of effort to complete the task. This could be the reason for his below average performance in the coding tests. Tony had low scores in the subtest of the Memory Test (Words Recall, Picture Recall and Cattell's Retentivity Test). The scores were more or less even for all the three tests. It was observed that recalling of a word took him more time. It was also noticed that when he recollected some part, he eventually lost track of an earlier part. It was possible for Tony to attain more than the 30 percentile and it was probably only his slowness that made him score less than that.

To evaluate whether he had the same trouble in recognising pictures as in the case of words, he was given a few other tasks to perform. I showed him two simple pictures; he found the task too problematic and took time to give a correct answer. His mother assigned him the same test at home. She reported that if he was asked to recall the pictures of the story, he failed to do so correctly. He even failed to explain what the story-related pictures hinted at. The pictures usually comprised of UKG-level stories of the monkey and the crocodile and the like. After being shown a picture for 10 seconds, he was unable to respond the query. But when the picture was shown to him repeatedly (two or three times) a positive response could be elicited from the boy. This case may be attributed to the slowness of picture registration process. The whole dysfunction can be attributed to the slowness to complete executive functions.

Tony's parents told me about the other difficulties that he faced in his normal day-to-day life. His mother explained that his organising capabilities were poor. The manner in which he arranged his books, papers, lunch box, etc was irregular and he depended on mother for organising academic and non-academic materials. It was also very strenuous for him to recall the places where the most familiar objects were kept. His developmental history also confirms these findings. He showed difficulties in understanding positions like up/down/middle. His right/left confusion, deficits in performing visual organisation tasks and puzzle works had been noticed since he was four years old.

His writing sample revealed that his major problem was centered on the difficulty in reproducing letters. Tony was very slow in writing but his handwriting was legible. It could therefore be concluded that the child did not lack in fine motor developments. In addition to this, there was no report of fine motor problems in his daily routine. After a detailed analysis of his handwriting sample, it could be understood that his letters were well shaped and had clarity. But at the same time, he showed difficulty and delay in reproducing the letters. The difficulty of writing does not originate from a visuo-motor problem or a fine motor problem. The problem is with speed of performing writing tasks. Tony's writing difficulty was that he was slow. The perceptual speed may be a deciding factor for this. So he spent more time thinking about the letters. Every time he wrote a word, he found it a novel experience. He took time to recall the letters. The non-existence of automatic registration of letters could be one of the reasons for his writing disability. His reading suffered the same fate as his writing. The time duration taken to register the letter could have lead to the initial reading difficulties. Gradually, given proper training, his reading improved. Sternberg (1996) suggested that the most automatic processes govern relatively easy tasks. The difficult tasks require controlled processing, although with sufficient practice, even extremely complex tasks, for example, reading and writing can become automatic.

4.2.7 Anandh

Anandh's case stands out from rest of the cases that have been discussed so far. Anandh was 11 years old when he came to the Institute. He was studying in sixth standard in a school that followed the CBSE syllabus. His parents told me that he lacked motivation when it came to his studies. He had reading problems and gave lame excuses to avoid studying. Recently, he showed a little improvement in reading, but his difficulties in writing persist.

I wanted to know more about Anandh's problems. The time spent with Anandh and with his parents provided me with a picture of his main problems in school. His mother reported that he was an average student till the fourth standard. After that his performance deteriorated. He was very slow in both reading and writing. His handwriting was very poor and he made numerous spelling mistakes both in spontaneous writing and dictation. While copying, he wrote legibly but was very slow. He had difficulties with writing tasks during examinations. He failed to complete his class notes and made omissions while writing. Anandh had to read repetitively to understand his lessons, but was able to read and follow story books and comics.

Analysing Anandh's psychosocial situation, I learnt that his parents were educated. He was the elder of two children, the younger being a girl. Anandh's sister did better than him in school. He would quarrel with his sister. His mother helped with his school work, reading out lessons and also completing his notes.

Anandh's birth history revealed that his mother had complaints of bleeding during the first trimester and underwent treatment for it. She was advised to take bed-rest. She had a Caesarean section after completing a full-term pregnancy. The postnatal history revealed that he had age-adequate motor and language development. No difficulties were reported in concept development. He showed attention deficit in matters relating to his studies, but was conscientious in all other activities.

Anandh's school reports provided more insight about his condition. I got to know that he joined school at the age of four. He started to show disinterest in school since the first standard. His mother reported that Anandh was seemed tense on the days he had to go to school. He showed psychosomatic symptoms and made lame excuses for avoiding school. Since the past two years, he had failed in all subjects. According to his parents, he lacked motivation for studying from the beginning of his school days. He was fidgety, especially at study time, and preferred to watch television. However, he scored just pass marks for some subjects and failed in one or two subjects last year. When he was promoted to the sixth standard, the situation got worse. He failed in all the subjects. In the second quarterly exam, the marks he scored were as follows: English - 14/50, Malayalam - 13/50, Hindi - 12/50, Social Science - 13/50, Physics - 10/25, Biology - 8/25, Chemistry - 1/25 and Mathematics - 20/25. Teachers had started to complain about his poor scholastic performance since the past two years, though they did not fault his general behaviour. Anandh got along well with his teachers and peer groups.

I looked into Anandh's social development and behavioural characteristics. I found him to be pleasant, reserved and socially shy. He was reticent with strangers, but always had a smile on his face. He had age-appropriate social skills. He liked both indoor and outdoor games and was especially fond of cycling and playing cricket. However, on school days, he was lazy when it came to routine things like dressing, grooming himself, etc. On the other hand, he was very enthusiastic to get ready if going to the cinema, the beach or picnics. He made small purchases for his mother, helped her with household chores and was also interested in mechanical gadgets.

A team of specialists evaluated him. The neurological evaluation report revealed that his academic performance was poor. However, there was no right/left confusion, no finger agnosia or finger anomia. The speech pathologist reported that he had age-adequate speech development and communication skills. The linguistic evaluations reported that he had writing difficulty. His letters were not well formed. He was very slow in writing and not attentive enough while writing. Improper spacing between the words, misshapen letters and poor narrative writing were identified from his writing sample.

The detailed psychological evaluation report revealed that Anandh's overall IQ was 113 which put him in the above average intellectual category. His verbal IQ was 109 and performance IQ was 117. He scored average and above average score for all sub-items. The details of the MISIC Test scores are given in Table 4.2.7.1

TABLE 4.2.7.1

Summary of Scores Obtained in the Test of MISIC

Sl. No.	Verbal Items	IQ Score	Sl. No.	Performance Items	IQ Score
1	Information	105	7	Picture Completion	107
2	General Comprehension	160	8	Block Design	124
3	Arithmetic	92	9	Object Assembly	100
4	Similarities	110	10	Coding	115
5	Vocabulary	96	11	Mazes	141
6	Digit Span	92			
	Total VIQ Score	109		Total PIQ Score	117
Full IQ Score 113					

The average score in spatial ability (Picture Completion, Block Design, Object Assembly) was 110, and sequencing ability (Digit Span, Arithmetic, Coding) was 100. The average scores in verbal conceptualisation (Comprehension, Similarity, Vocabulary) and acquired knowledge (Information, Arithmetic, Vocabulary) were 122 and 98 respectively. These results indicated that he had average skill in these areas. The results of the subtest of both Verbal and Performance IQ test revealed that he did not have deficits in any area.

The test of memory for children was administered and the scores are entered in Table 4.2.7.2

TABLE 4. 2. 7. 2

Summary of Scores Obtained in the Test of Memory for Children

Sl. No.	Items	Raw Score	Percentile
1	Personal Information	4	40
2	Mental Control	5	0-10
3	Sentence Repetition	8	30
4	Story Recall Immediate Story Recall Delayed	16 14	100 100
5	Word Recall (Meaningful Words)	6	30
6	Digit Span Forward Digit Span Backward	5 3	10 20
7	Word Recall (Non-meaningful words)	6	30
8	Delayed Response Learning	4	100
9	Picture recall	3	70
10	Benton Visual Retention Test	7	70
11	Paired Associate Learning	16	60-70
12	Cattell's Retentivity Test	6	40
	Total Score	103	60

In the memory test he scored low in Mental Control, Sentence Repetition, Word Recall-meaningful and non-meaningful (visually presented). These low scores could be due to his attention deficit, difficulty in sequential reproduction of verbatim and difficulty to recall words.

Then QNST was administered and his total score was 15. He came under the normal category He showed difficulties in Palm Form Recognition, Rapidly Reversing Repetitive Hand Movements and reproduction of sound pattern in a sequential order. The summary of the QNST are shown in Table 4.2. 7.3

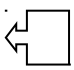
TABLE 4. 2. 7. 3

Summary of Scores in QNST

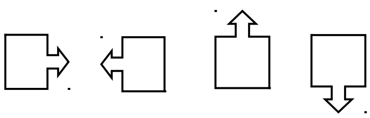
Sl. No.	Items	Score	High/ Suspicious/ Normal
1	Hand Skill	0	N
2	Figure Recognition and Production	1	N
3	Palm Form Recognition	4	S
4	Eye Tracking	0	N
5	Sound Patterns	3	N
6	Finger to Nose	1	N
7	Thumb and Finger Circle	0	N
8	Double Simultaneous Stimulation of Hand and Cheek	0	N
9	Rapidly Reversing Repetitive Hand Movement	3	S
10	Arm and Leg Extension	0	N
11	Tandem Walk	0	N
12	Stand on One Leg	2	S
13	Skip	0	N
14	Left-Right Discrimination	0	N
15	Behavioural Irregularities	1	N
	Total Score	15	N

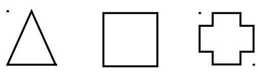
The symptomology checklist of Learning Disability showed that Anandh had a history of letter reversal. He skipped lines while writing and reading and made a lot of spelling mistakes. He did not have any difficulty in auditory, perceptual and spatial relationship tasks. He had no deficits in conceptual and memory functions. He had no problem remembering what he had heard or seen but had a little difficulty in auditory and visual sequencing tasks.

It became evident that the results of the psychological tests could not trace his problems in academic areas clearly. However, it was tiring to read his handwriting and he made many errors in spelling. I attempted to find out whether he had fine motor difficulties. I asked him to draw pictures. He drew pictures beautifully and had no difficulty in copying complex pictures and drawing pictures from memory. Other tasks I assigned him to test his fine motor functions included beading, pegboard activities and the like. His performance in these tasks was good. He had no fine motor difficulties in his daily life as well. I gave him other tasks with the intention of finding out the reason for his numerous spelling mistakes. Anandh was given tasks related to visual process functions such as visual discrimination, visual sequencing, visual organisation and spatial relation tasks.

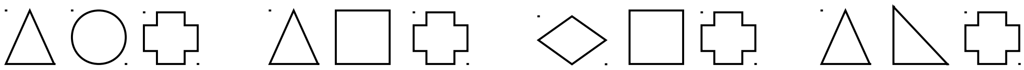
In the visual discrimination task, he was shown a figure and asked to identify a similar figure from a set of four figures. For instance, he was asked to identify the figure: 

from the set of following pictures:



He was given thirty-five items of different shapes and he did all of them correctly. Visual sequencing tasks included different designs, numbers and alphabets. A set of designs was first shown to him and was asked to select the same from a group of four sets of designs. For example, select this particular design: 

from the following set of designs:

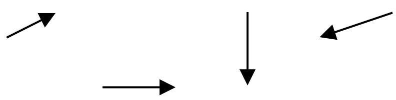


Numbers and alphabets were used in this type of task. For example, he was asked to select the number: ‘891763’

from the list of numbers: [890763, 891763, 819673, 861793].

The set of alphabets ‘CZVO’ was to be selected from the following list CVZO, CZVI, CZVO, OVZO.

In each group, twenty-five items were given and from each group of items he gave nearly twenty correct answers. To test Anandh’s visual-spatial ability, he was to select this symbol: 

from the following list: 

Out of twenty-five questions, he gave twenty-five answers correctly.

In the visual organisation task, he was given fragments of pictures and asked to organise them and say what picture it was. He gave twenty-seven correct answers to the thirty-five questions asked. The boy did not seem to have any problems in performing all the above-mentioned activities.

Subsequently, it was tested whether Anandh could recall things in sequential order. This task was done with objects, pictures, words and letters. I showed him eight objects and put them away, after which he was asked to recall the names of all the objects shown to him. He recalled and correctly named all the objects. The same kind of task was done with pictures, letters and words. He recalled all the pictures in the correct order. However, when he was shown seven letters, he remembered three but did not say them in order. When he was shown five words, he could recall only two and in the task with three words, he recalled two. In all these tasks, he failed to recall the items in the order in which they were shown to him. He seemed to have more problem I recalling words.

I gave him auditory sequential tasks like visual sequential tasks to ascertain whether he had any difficulty in performing them. He was given a sentence repetition task. When he was asked to reproduce sentences in sequential order, he took a lot of effort in doing so. It should be noted that he was uninterested only in activities relating to academics. He was good at everything else and very enthusiastic in other activities like solving puzzles and so on.

The analysis of his developmental history showed no difficulties worthy of mention. By observing him and after conducting an unstructured interview, I found that he had attention deficits. In all the sessions, he was fidgety (drumming fingers, rolling the pencil, etc.) and complained of headache when he had to study. He had trouble recalling letters and words in sequential order when they were visually presented, but could recall objects and pictures very well. This might be because of his difficulty in sequentially related tasks or his disinterest in tasks relating to academics. Apart from this, he did not show any difficulty in other cognitive function tasks. Moreover, he had good verbal fluency skills.

Generally, Anandh's test results revealed normal, perceptual and intellectual development. Anandh performed all the cognitive function tasks that I administered with interest and no defects were detected in any of the tests. However, in the sub-tests of memory, he showed difficulties in sentence repetition, which could be because of his attention deficit. He scored low in Word Recall (meaningful and non-meaningful words). His lack of motivation in academic matters might account for this.

Anandh seemed to have problems only in his school-related tasks. He was interested in the mechanical gadgets and in music. No defects were found in the child's developmental history, or cognitive and motor developments. He lacked interest in school-based activities right from the start. He would display psychosomatic symptoms when school reopened and on Monday mornings.

Anandh's parents often blamed Anandh for his shortcomings. Even in his presence, Anandh's father said that it was a waste to spend money on him and that it was useless to give him an education. Till last year, Anandh was given special tuition for all subjects, but his father stopped the practice this year as he had shown little improvement.

From my interaction with his parents, I found that they tended to always compare him with his younger sister. The sibling rivalry was recent.

The parents used to scold him in the presence of his sister, admonishing him that he might serve as a bad model for his younger sister and that she would follow his erroneous ways. From further sessions with his mother, I gathered that Anandh scored only just pass marks till the second standard. His sister was born when he was in the second standard, and after that his mother could not give Anandh the attention he deserved. His performance in academic matters got worse when he was in the fourth standard.

Anandh's case could be a school-related affective case. The problem with children like Anandh could be due to a defective learning process. In between the sessions, I asked him whether there was anything which made him disinterested in going to school regularly. Initially, he used to brush aside my queries with a smile. After much questioning, I found out that Anandh's teacher had given him a beating for his poor performance in the class test and that this was the reason for his reluctance to go to school. The boy had to be repeatedly prompted to reveal his emotional problems. From my observations and tests, I finally concluded that Anandh needed more individual sessions, behavioural therapy and parental counselling.

4.2.8 Group Discussion Of Writing Problem

Writing is a complex activity that requires the use and co-ordination of many skills simultaneously: organizing thoughts, choosing/recalling words, forming letters, spacing letters and words, recalling correct spellings, remembering and using the rules of written language and managing time when writing a lengthy piece. A learner who has difficulty in any of these areas may have a writing problem.

Disorder of written expression is characterized by writing skills that are significantly below the expected level for a child's age and intellectual capacity. These difficulties impair the child's academic performance and writing in everyday life.

The many components of writing disorder include poor spelling, errors in grammar and punctuation, and poor handwriting. Spelling errors are among the most common difficulties for a child with a writing disorder. Spelling mistakes are most often phonetic errors, that is, an erroneous spelling that sounds like the correct spelling.

In the past, it was believed that dysgraphic (i.e., poor writing skills) did not occur in the absence of a reading disorder, however, evidence indicates that disorder of written expression can occur on its own (Sadock & Sadock, 2003).

There are three types of dysgraphia:

Dyslexia dysgraphia : With dyslexic dysgraphia, spontaneously written work is illegible, copied work is fairly good and spelling is bad. Finger tapping speed (a method for identifying fine motor problems) is normal, this type of dysgraphia does not necessarily mean that the child has dyslexia, a reading disability, although other learning disabilities may be present as well.

Motor dysgraphia : Motor dysgraphia is due to deficient fine motor skills, poor dexterity, poor muscle tone, and or unspecified motor clumsiness. Generally, written work is poor to illegible, even if copied by sight from another document. Letter formation may be acceptable in very short sample of writing, but this requires extreme effort and an unreasonable amount of time to accomplish, and cannot be sustained for a significant length of time. Writing is often slanted due to holding a pen or pencil incorrectly. Spelling skills are not impaired. Finger tapping speed results are below normal.

Spatial dysgraphia : Dysgraphia due to deficit in understanding of space, has illegible spontaneously written work, illegible copied work, but normal spelling and normal tapping speed. Some children may have a combination of any two or all three of these symptoms.

Out of the seven children analysed for writing problems, only one case, with at least some confidence, can be described as having ‘pure’ dysgraphia, i.e, a person whose speech development is normal, reading is normal, but writing is seriously affected. Analysis of that case (Abhishek) indicated that his primary difficulty lies in translating a visual information to a fine-motor activity. Additionally, he had some problems in visual perception. The problem is matching with his specific extraordinary difficulty in copying. Spontaneous writing and dictation are far better and generally error-free when compared to copying. This pattern is indicative of the underlying visual - fine motor translation difficulty.+ In Psychological tests, this difficulty was represented by low scores in coding and BVRT.

All the other selected children had problems in reading in initial stages. But their reading performance was improved in due course. Because of this, they generally show difficulties both in visual perception and fine motor skills. For two children, problems in fine motor activities seemed to be more dominant. For them, difficulties are evident in all the three forms of writing: Spontaneous writing, dictation and copying. Problems in mastering fine motor activities were clearly evident in their developmental history.

All the possible errors like spelling problems, spatial errors, fine-motor difficulties and slowness were evident in most of the cases with varying amounts. These difficulties are most clearly represented in the coding test of MISIC. Additionally some children scored low in BVRT.

The writing performance of one child was generally good with a clearly readable handwriting with well-formed letters. The problem lies in the speed of writing. He was so slow in writing. But, he was slow in many other activities. Writing was an effortful activity, rather than an automatic easy one for him. Why such a problem occurred is not very clear.

One case demonstrates a possibility that a writing problem can occur without any kind of perceptual, motor, linguistic or cognitive problem. The analysis has suggested that the problem may either be affective or related with instructional variables. Even after severe scrutiny, such a case was included in the analysis is indicative of the difficulties in distinguishing children who have cognitive, affective or instruction-related problems.

4.3. CONCLUDING OBSERVATIONS REGARDING LEARNING DISABLITY

I have completed this thesis on learning disability. But even at this point, if someone were to ask me what the term ‘learning disability’ means, my answer would be: “I don’t know!” My experiences in the field compel me to make the following observations: about 90% of the students who are labelled as learning disabled do not have any kind of problem – linguistic, perceptual, cognitive, motor, neurological or psychological! No problem in the structural or functional aspects of the nervous system! No problem in the basic psychological processes! In fact, they do not seem to have any problem except in the activities of reading and writing. They do not have any kind of disability, but we, the experts call them ‘disabled’.

The explanation is simple. Their problems in reading and writing are the natural result of our typical instructional practices. About forty students are sitting in a classroom and we provide uniform instruction. Further, the focus of the teachers is the ‘front-bench’ bright students. The result: about 25% master the content, about 50% learn at least up to a satisfactory level, and about 25% lag behind. In the latter group, some students may have at least an average level IQ. We call them ‘learning disabled’. Instead of finding fault with the prevailing practices of education, we blame the students.

After this labelling, we provide intervention. What is the intervention? Better methods of instruction with proper individual attention. Yes, our intervention is successful! Parents and teachers are happy with the result. This is the common prevalence in Kerala. We give the public the false notion that the problem is neurological. We find fault with the neurology, when it is perfect in most of the cases.

This is not to deny that neurological problems may cause learning disability. But the reverse is not true. Serious problems in reading and writing cannot directly be attributed to neurological problems without proper evidence. We eliminate instructional factors in definition and we also disregard them in diagnosis. The investigator holds the opinion that this is a very serious error which has important social implications.

The researcher argues that it is a fundamental right of all students without a significant disability to master at least the basic essentials of schooling like reading, writing and arithmetic. But, unfortunately, our educational system is not successful in creating such a result. Hence, many students without any fundamental problems find it extraordinarily difficult to master even these basic essentials. So instead of calling these unfortunate children disabled, we should call the system of education disabled. So, the primary implication of disability research has to be the fundamental changes that have to be made in the instructional practices.

In the present research work, all possible efforts have been taken to eliminate the above-mentioned problem. Selection of the sample was very strict in the sense that other possible explanations were attempted to be ruled out to focus on personal-level problems. Even then, the researcher would like to confess that the efforts were not fully successful.

Even if we empirically rule out the possible role of instructions, the problem need not be cognitive or neurological; it could be affective. When an educational system provides learning experiences which lack motivation, focusing on punishments, not leading to success, is boring or threatening, the end result is negative affect and results in the failure to learn. Such an affective state leads to serious trouble for further learning. In Kerala, we should seriously think about the probable role of affective states in the occurrence of severe reading and writing problems. Such an understanding is not clearly evident in diagnosis and intervention as it is practised in the State.

Now, let us assume that the basic problem lies with the cognitive functions of the student. In such a situation, there is no logic in excluding a person who may be a socially backward individual. A neurological problem can, of course, co-exist with social backwardness. This argument is true in the case of a below average IQ-between 70 and 85. So, the exclusionary criteria of learning disability have to be re-defined.

If the problem of learning disability is somehow related to a minor abnormality in the nervous system, the percentage of students who have this problem would be much less than that is estimated at present. Review of research clearly suggests that the root cause of the problem of these children arises during pregnancy, delivery or the first few days after delivery. Disease, medication, accidents or stress during the pregnancy period may be the possible events that are causally related to the problem. The present research work also makes such an observation. Accidents during infancy may be another causal factor. The case of one student in the present sample indicates such a possibility.

Results of the present research make it clear that signs of the problem would be evident during early childhood. Many concentrated research studies attempting to trace the developmental history would be necessary listing such valid indicators. At least one such indicator has been identified by the researcher: colour naming. Children who have difficulty in colour naming will tend to develop difficulties in naming letters and numbers in the future. Two such cases have been identified and analysed by the researcher. It is important to note that the profiles of these students are mostly parallel.

The specific difficulties that a child faces could be from a single domain like visual or auditory or verbal or motor; or it could be from the process of translation from one domain to another. Two examples of the latter are identified in this study. One is a difficulty in translating materials from visual to verbal domains which is observed in two cases of reading disability. Another difficulty is in translating visual material to motor action, which is observed in the case of a child with writing difficulty whose spontaneous writing, was far better than copying.

It is important to understand that reading disability is not a homogenous category. Different types of reading disability have to be analysed separately. For that a clear classification scheme is essential. The general questions like the relative importance of linguistic or non-linguistic factors and the comparison of verbal and non-verbal intelligence are doubtful.

Questions of this sort have to be seriously suspected because reading disability is not one, but many with a unique pattern for each. Three different types were encountered in this research work – the type that originated from the difficulties in spatial perception, the type arising from the limitations of sequencing and the type having problems in translating visual materials to verbal domain. Similarly, the research clearly indicates that writing disability also is not at all homogenous.

Regarding problems in reading and writing which are unrelated to neurological or cognitive functions (the vast majority of reported cases of learning disability seem to be this kind), the researcher would like to make some social observations. Recent educational transformations in Kerala have made the instructional practices more child-friendly, which is a very fortunate event. But at the same time, English medium schools are coming up very fast. The children in these schools are forced to learn reading and writing in three or four languages from age three onwards. As a result, childhood has become more stressful and prone to failures in learning, and result in affective and behavioural problems. These problems have become more complicated because of the increasing anxiety among parents. The growth of the field of learning disability is related to this social phenomenon

Towards the end, the researcher would like to quote Harris & Hodger (1981 cited by Tallal & Miller, 1995):

“Due to all the differing assumptions about the process and nature of possible reading problems, dyslexia has come to have so many incompatible connotations, that it has lost any real value for educators except as a fancy word for reading problems.”

4.4. LIMITATIONS OF THE STUDY

1. When the researcher had decided to select 124 cases for the preliminary sample, the expectation was that there will be 30-40 cases in the final sample. But when the exclusionary criteria were strictly followed, sample size reduced to be 12. This reduction has affected the divergence of the findings.

2. In addition to the above, the ‘pure’ cases of reading and writing disability were relatively less; so the description of pure cases could not be sufficiently formulated.

3. From the starting stage onwards, the investigator felt serious difficulty in excluding instructional factors. This is one of the fore-most difficulties in diagnosis. Even after so much efforts, the researcher could not rule out explanations regarding instructional variables. One case each from the reading and writing problems clearly reflect such a difficulty.

4.5. SUGGESSTIONS FOR FURTHER RESEARCH

1. As it is evident from the present research that reading disability is not a homogeneous category, detailed classification schemes have to be prepared. For that, concentrated studies on pure cases are essential.

2. The present study clearly indicates that translation of experiences from one domain to another (Visual, Verbal, Fine motor) could be a possible factor in reading and writing disability. This phenomenon has to be investigated further with a neuro - psychological perspective.

3. The study also suggests that the problem of each child is unique. So interventions have to be individually tuned and designed by giving a clear focus to the underlying difficulties of each child. Studies in the area of intervention for each type of reading and writing disability are suggested.

4.6. SUGGESTIONS FOR DIAGNOSIS AND CLINICAL PRACTICE.

1. A distinction has to be made between speech disability, reading disability, and writing disability. Speech disability is more primary than the other two. When reading and writing problems are associated by a delay or extra ordinary difficulties in speech, the latter issue has to be addressed first.

2. It is observed that conceptual clarity is missing with respect to instructional influence. This issue has to be seriously dealth with.

3. Whenever any fundamental problem occurs in the areas of linguistic, perceptual, cognitive or motor domains, it will usually be reflected in areas of daily life other than reading and writing.

Such verification seems to be essential before suspecting neuropsychological impairment and labeling a child as learning disabled.

Summary and Conclusion

5.1. Objectives
5.2. Design
5.3. Sample
5.4. Tools
5.5. Data Collection
5.6. Inferences and Implications

'Learning disability' is a relatively recent construct that gained prominence in educational circles of Kerala with a history of nearly 10 years. The present study is one of the initial attempts in the state to understand this phenomenon more closely.

Several conceptual issues exist regarding the term 'learning disability'. The controversies revolve around inclusionary and exclusionary criteria. Definitions usually exclude instructional, cultural and other environmental factors. With respect to personal variables, definitions usually exclude below average intelligence, sensory impairments, emotional and motivational variables and serious neurological disorders. Conceptual problems become more severe when it comes to diagnosis and practice. It is very difficult to exclude environmental factors including instructional variables.

The present study is an attempt to conduct case analysis of children who are suffering from serious reading and/ or writing problems. As speech disability is more fundamental than reading and writing, children who have problems in speech were excluded in the study.

5.1. OBJECTIVES

The following objectives were formulated.

i. To identify a sample of students who have serious difficulties in either reading or writing, but do not having problems in speech and listening;

ii. To conduct a detailed analysis of their issues and errors with respect to reading and writing, and to study their behavioural problems, if any;

iii. To identify and study the underlying difficulties in the areas of perceptual, intellectual and motor functions;

iv. To trace the developmental history of these identified underlying difficulties.

Being an exploratory study, hypotheses are not formulated.

5.2. DESIGN

An exploratory design with case-analysis approach was followed.

5.3. SAMPLE

The preliminary sample consisted of 124 children identified as learning disabled by a team of specialists in an institute. A sample of 30 children were short-listed after excluding cases of dyscalculia, speech problems, and other impairments. These 30 children were studied in detail through psychological tests, interview and observation. After a further scrutiny, the sample size reduced to 12, with five children having dominant problems in reading and the remaining seven having dominant problem in writing.

5.4 TOOLS

The following tools were utilized.

a) Malin's Intelligence Scale for Indian Children (MISIC) (Malin, 1959).

b) Test of Memory for children (Uma *et al*, 2002)

c). Quick Neurological Screening Test, Revised Edition, (QNST) (Margarret Mutti *et al., 1998)*

d). Symptomology Check list of Learning Disabilities adapted from Harwell (1989).

e) Interview with parents regarding present problems, academic and personal history, developmental problems observed, if any.

f) Unstructured tasks developed by the investigators as and when necessary.

5.5 DATA COLLECTION

Data were collected in four phases.

1. Exploratory analysis of the problems faced by children in reading and/ or writing.

2. Collection of detailed information regarding academic and personal history.

3. Administration of psychological tests and unstructured tasks to find out underlying problems, if any.

4. Collection and analysis of developmental history of identified underlying deficit/ problems.

5.6. INFERENCES AND IMPLICATIONS

There were five children who had serious problems in reading. Two of them could not read or name even the alphabets and numbers. Analysis showed that they had naming difficulty. The study suggests that this difficulty, which is a limitation in translating visual information to verbal domain, can be identified by colour naming.

Another child showed a difficulty in reading words. No difficulty was observed in the identification of letters. No difficulty was observed in spontaneous writing or dictation; but copying was difficult. She could not read even simple and familiar words which she could easily write. These pattern of difficulties clearly indicate a problem in the visual domain which was substantiated by psychological tests. She obtained very low scores in Object Assembly (sub test of MISIC) and BVRT (sub test of memory). Spatial and visual organisational difficulties were observed from childhood onwards.

The intelligence profile of one child showed below average score in sequencing ability. This difficulty in sequencing was also observed in other tasks having visual, auditory and motor responses.

In the fifth case, no underlying difficulty could be observed in linguistic, perceptual or cognitive domains. Other explanations(environmental or affective) are necessary for understanding such a case.

The cases suggest that reading disability is not a uniform category. The specific difficulties in reading and the underlying problems are different. Hence, broad generalisations do not seem to be fruitful. Further, the study convincingly argues that the underlying difficulties will be evident from early childhood onwards.

As was observed in the second chapter, when speech and reading are controlled, the major underlying causes associated with writing disability are fine-motor difficulties and visual-motor integration difficulties. Out of seven cases analysed, one could be considered as a 'pure' case of dysgraphia. In this case, visual-motor translation difficulty was observed. Copying was more difficult than spontaneous writing and dictation.

Difficulties in visual perception and problems in fine-motor activities were observed in four cases. The dominance of these problems were different. Associated problems in daily life were clearly observed.

The interpretation of two other two cases was more difficult. One child showed a severe 'slowness' – slow pase in writing, but well formed letters and words. He was slow in several other activities. In the case of another child no perceptual cognitive, motor or linguistic problem could be identified.

When we consider the preliminary sample of 124 children as a whole, some general observations can be made. The role of instructional factors seem to be very dominant in most of them. If the fundamental problem is with the child, there could be a linguistic problem which will be evident in speech. Many children of the preliminary sample have speech problems. The research work clearly suggests the necessity to make the distinction between speech disability and reading disability. The former is more fundamental than the latter.

Regarding intervention, the study suggests that such programmes should address the underlying problem and should be designed in an individually specific manner. Regarding diagnosis, the study argues for more conceptual clarity. The role of instructional and cultural factors should be meaningfully incorporated. For diagnosis, well-defined classification system is essential.

Before attributing learning failures to individual limitations, much more evidence and ethical considerations are essential. No doubt, all children who have problems in reading and writing should be helped. However, before but, before labelling any child 'learning disabled', we should make sure that the instructional system is not disabled. When we make such a distinction, the percentage of children who have a serious problem will come down – much less than the estimated 10%, probably, even less than 1%.

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Appendices

APPENDIX - 1

QUICK NEUROLOGICAL SCREENING TEST - REVISED EDITION – RECORDING

Name ______________________________ Date____________________________
Address ____________________________ Age ____________ Sex____________
Examiner __________________________ Grade ___________________________
School ____
and / or source of referral) ____
______________________________Total Score ___________________________
Indicate letter H, S, or N in box each subject category
____
____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

H = High (above 50)

S = Suspicious (26 – 50)

N = Normal (0 – 25)

1.Hand skill (Circle Hand Preference RL) Score

Holds pencil clumsily, tightly (circle which)	1
Prints	2
Keeps eyes close to paper	1
Exhibits observable tremor	3
Comments :	Total

4 or above	H
2 or 3	S
0 or 1	N

2. Figure Recognition and Production

Scor
e

Names fewer than five figures	1
Draws figures on horizontal plane	1
Executes very slowly or every rapidly (circle which)	1
Draws figures too large, too small, irregularly (circle which)	1
Rotates paper to write or draw	1
Biases figures left or right (circle which)	1
Self-direct/ drawing orally	1
Demonstrates poor closure	1
Demonstrates poor angle execution	3
Exhibits observable temor	3
Comments:	Total

6 or above	H
2 or 5	S
0 or 1	N

3. Palm Form Recognition (Note instructions for under age 8) Score

Responds with letters rather than numbers (if numbers fail, try letters)			
Right Hand	3	(A)	1
	2	(C)	
	5	(E)	1
	7	(O)	1
Left Hand	2	(B)	1
	8	(T)	1
	4	(H)	1
	6	(N)	1
Comments: (Also note L-R differnce in item 15)			Total
		7 dr above	H

4 to 6	S
0 to 3	N

4. Eye Tracking (Circle Eye Prefernce R L) Score

Moves head while eye tracking		1
Exhibits horizontal jerkiness		3
Exhibits vertical jerkiness, incoordination		3
Displays distractibility		3
Comments:	Total	

7 or above	H
4 or 6	S
0-3	N

5. Sound Patterns (Motor Oral) Score

Succeeds only with rhythmic pattern		1
Misses any one sequence		
Alternates hands, uses one hand, laps hands (circle which)		1
Affected by loudness or softness (circle which)		
Uses reversals (e.g. does 1-3-2 or 2-3-1)		1
Reveals speech irregularities (eglisps)		2
Perserverates (doesn't know when to stop)		3
Misses oral reproduction (two or more patterns)		3
Misses motor reproduction (two or more patterns)		3
Comments:	Total	

10 or above	H
6 to 9	S
0 to 5	N

6. Finger to nose
Exhibits poor left –right discrimination (holds up mirror hand) score in item 14: check here)

Score

Is usually fast or slow (circle which)	1
Moves hand consistently to right or left or target in space (examiner's hand)	1
Moves hand consistently to top or bottom of target in space (examiner's hand)	1
Misses tip of nose by more than one inch (note if consistently does so in one place)	3
Random of unsteady control of movement	3
Comments : (Note L-R difference in item 15.	Total

4 or above	H
2 or 3	S
0 or 1	N

7. Thump and Finger Circle
Exhibits poor left-right discrimination (holds up mirror hand score in item 14 : check here)

Score

Reverses pattern (goes from little finger to index)	1
Shows overflow or slight movement in fingers of opposite hand	1
Indicates flat circle, constricted small circle, incomplete search (circle which)	1
Holds and facing him, concentrates intently, often with body tense	1
Registers random body movement, twitching in opposites side	3
Manifests confusion regarding next finger, skip fingers.	3
Random of unsteady control of movement	3
Comments : (Note L-R difference in item 15.	Total

6 or above	H
4 or 5	S
0 to 3	N

8. Double simultaneous stimulation of Hand and Cheek

	Score
Jerks involuntarily when cheek is touched	1
Occasionally does not feel hand stimulation	1
Does not feel hand stimulation on both sides (normal under age 6)	3
Consistently does not feel hand stimulation on one side (abnormal at any age)	3
Displays unusual sensory behaviour (names inappropriate location)	3
Comments: (Note L-R difference in item 15)	
Total	

3 or above	H
1 or 2	S
0	N

9. Rapidly Reversing Repetitive Hand Movements

	Score
Uses floppy rotation or finger motion	1
Employs unusually fast or slow rate (circle which)	1
Displays double hand bounce, rigid or tense finger position	1
Distinct left-right difference (note also in item 15)	3
Manifests asymmetry (one side differs from other)	3
Comments:	
Total	

4 or above	H
1 to 3	S
0	N

10. Arm and Leg Extension

	Score
Displays random body, hand, or tongue movement (circle which)	3
Reveals extreme muscle tension (note hypo-or hypertonic tendencies)	3
Unable to hold position (extremities move lower involuntarily)	3
Unable to hold position (whole body moves forward involuntarily)	3
Reveals unusual finger position (eg., clawing of fingers)	3
Demonstrates wrist dip	3
Exhibits observable tremor or twitch (circle which)	3
Comments: (Note L-R difference in item 15)	
	Total

9 or above	H
3 or 6	S
0	N

11. Tandem Walk (10 feet)

	Score
Harder to do backward	1
Harder to do with eyes closed	1
One hand curls, in other hand ourls out	1
Deans left or right (circle which)	1
Takes wide steps or steps on own toes (circle which)	1
Exhibits pigeon-toe distance bent knees	3
Demonstrates poor balance (note arm waving)	3
Displays random body movement (note if more movement in upper or lower extremities)	3
Comments: (Note L-R difference in item 15)	
	Total

7 or above	H
4 or 6	S
0 to 3	N

12. Stand on One Leg (Circle Foot Preference RL)

Score

Exhibits poor left-right discrimination (mirrors leg stance) (score in item 14: Check one)	
Demonstrates poor balance	1
Impossible to do with eyes closed	1
Harder to do one left or right leg (circle which and note also in item 15)	1
Stands with body contorted	1
Comments:	
	Total

3 or 4	H
2	S
0 or 1	N

13. Skip Score

Demonstrates poor balance Reveals left-right differences (note also in item 15)	1 1
Hops or skips on one foot	1
Unable to perform (significant after age 5 with girls after age 8 with boys)	3
Comments:	
	Total

4 or above	H
2 or 3	S
0 or 1	N

14. Left-Right Discrimination (Score from item 6, 7 and 12) Score

Poor left-right discrimination (mirroring) from item 6	1
Poor left-right discrimination (mirroring) from item 7	1
Poor left-right discrimination (mirroring) from item 12	1
Comments:	
	Total

4 or above	H
2 or 3	S

0 to 1	N

15. Behavioural irregularities Score

Demonstrates usual behaviour patterns (eg., hair twisting, scratching)	1
Perseverates	1
Talks excessively	1
Exhibits withdrawal symptoms	1
Fidgets, touches (circle which)	1
Shows defensiveness, anxiety	1
Displays excitability, distractibility, impulsivity (circle which)	1
	Total

3 or above	H
2	S
0 or 1	N

Comments: Note approach to motor planning, sequencing, and rhythm throughout subjects. Circle L-R differences for items 6, 7, 8, 9, 10, 11, 12, 13

APPENDIX – II

Symptomology Checklist

SYMPTOMOLOGY CHECKLIST – LEARNING DISABILITIES

(Check behaviours seen. Mark: S= sometimes; O = often)

Visual Perceptual Deficits

- reversals: *b* for *d*, *p* for *q*
- inversions: *u* for *n*, *w* for *m*
- yawns while reading
- complains eyes hurt, itch/rubs eyes
- complains print blurs while reading
- turns head or paper at odd angles
- closes one eye while working
- cannot copy accurately
- loses place frequently
- rereads lines/ skips lines
- does not recognize an object/ word if only part of it is shown
- reading improves with larger print/ fewer items on page/ uses a marker to exclude portion of page.
- sequencing errors: *was/saw, on/no*
- does not see main theme in a picture, picks up some minute detail
- slow to pick up on likenesses-differences in words; changes in environment
- erases excessively
- distortions in depth perception

Visual Perceptual/ Visual Motor Deficits

- letters collide with each other/ no space between words
- letters not on line
- forms letters in strange way
- mirror writing (hold paper upto mirror and you see it as it should look)
- cannot color within lines
- illegible handwriting
- holds pencil too tightly; often breaks pencil point/ crayons
- cannot cut
- cannot paste
- messy papers

Auditory Perceptual Deficits

- auditory processing: cannot understand conversion or learning delivered at the normal rate/ may comprehend if information is repeated very slowly
- auditory discrimination: does not hear differences in sounds: sort *i, e;* plosive sounds *b, p, d, t, c, g, j, n, m;* does not hear final consonants accurately
- cannot tell direction sound is coming from
- does not recognize common sounds for what they are
- cannot filter out extraneous noise; cannot distinguish teacher's voice from others-hears wrong answers, steadfastly maintains "teacher said it" (some children get very tense in noisy classroom)
- does not follow directions
- does not benefit from oral instruction.

Spatial Relationships and Body Awareness Deficits

- gets lost even in familiar surroundings such as school, neighbourhood
- directionality problems, does not always read or write left to right
- no space between words
- cannot keep columns straight in math

- bumps into things; clumsy, accident prone
- does not understand concepts such as *over, under, around, through, first, last, front, back, up, down*

Conceptual Deficits

- cannot read social situations, does not understand body language
- cannot see relationship between similar concepts
- cannot compare how things are alike/different; classification activities are difficult
- does not understand time relationships- *yesterday, today, tomorrow, after/ before, 15 minutes* versus 2 *hours, “hurry”*
- does not associate can act with its logical consequence. “If talk, I get detention” (being punished for no reason. Unfair.)
- little imagination
- no sense of humor; cannot recognize a joke/ pun
- tends to be expressionless
- slow responses
- not able to create, to “think”, to create poetry, original stories
- cannot make closure; cannot read less than clear ditto; cannot finish a sentence such as “I like it when...”; difficulty filling in blanks
- excessively gullible
- cannot do inferential thinking. What might happen next? Why did this happen?
- great difficulty in wiring
- bizarre answers/ or correct answers found in bizarre ways
- cannot think in an orderly, logical way
- does not understand emotions, concepts such as *beauty, bravery*
- classroom comments are often “off track” or reason in bizarre ways
- difficulty grasping number concepts: *more/less;* >/<; can’t estimate
- mispronounces common words

Memory Deficits

- cannot remember what was just seen (was shown)
- cannot remember what was just heard
- cannot remember sequence of 4 numbers given auditorally
- cannot copy math problems accurately
- cannot remember spelling for common/ frequently encountered words
- remembers things from long ago but not recent events
- poor sight vocabulary-few words known to automatic level
- slow to memorize rhymes/ poem (makes many errors)
- appears to know something one day but doesn't know it the next
- limited expressive language; does not remember names for objects-"that thing"
- limited receptive language
- makes same error again and again; does not seem to benefit from experience
- writing poor-cannot remember to capitalize, puncture, skip a line, indent, and so on

Motor Output Deficits

- preservation-gives same response again and again (hangs up)
- distortions in gross motor functions-cannot skip, hop, hit ball, and so on
- difficulty cutting, pasting, coloring, writing (can point to correct way to form a letter but cannot produce it on paper)
- can point to correct spelling but cannot copy it accurately
- can dictate story or paragraph but cannot write it
- does not communicate orally to a degree appropriate for age
- mouth noises
- tics

Behavioural Components

Attention Deficit Disorder

- good days-bad days
- cannot sit still
- cannot stand still
- impulsive; does not consider consequence before acting
- low frustration tolerance; short fuse
- cannot finish assignments in allotted time
- visually distractible; looks up to all visual stimuli
- auditorally distractible; responds by looking up to all noise
- fidgety: drumming fingers, tapping toes, rolling pencil, fooling with objects; makes mouth noises; incessant talking
- short attention span
- spaces off-confused-does not sit up/ head on desk/ "tired"
- negativistic/ oppositional behaviour
- little work produced; daydreams
- reads something correctly, but mind is elsewhere as evidenced in poor comprehension
- overreacts to stimuli (cannot mind own business)
- does not follow rules; often claims didn't hear them
- may be cruel, mean to others; makes fun of them
- mood swings
- disorganized; loses books, papers, lunch box, coat

Failure Syndrome

- describes self as "dumb"
- does not take reprimands well
- tends to avoid group activity

- avoids activity; does little; claims illness
- daydreams/ withdrawal
- class clown-acting out behaviour
- immature bahaviour; babyish, seems younger, dependent

Serious Emotional Overlay

- explosive, unpredictable, dangerous behaviour, lashing out
- preoccupation with death, destruction; prefers dark colors and red, purple, yellow
- no work produced coupled with lack of enthusiasm for anything
- tells bizarre stories and purports they really happened
- shallow feeling for others
- cannot distinguish reality from fantasy
- withdraws; alone; little communication
- feels “picked on”; uses projection, denial; never assumes responsibility for actions
- fearful, anxious, insecure, tense

PROGNOSIS

Much can be done to help persons with learning disabilities. We know that the earlier the problem is detected and appropriate intervention given, the better the out come will be.

We also know that learning disabilities can be compensated for or over come. Sum of our most worth while people were learning disabled- Winston Churchill, Thomas Edison, Woodrow Wilson, Hans Christian Anderson and George Bernard Shaw to name only a few.