# CHAPTER TWO

## LITERATURE REVIEW

This chapter deals with issues related to dyslexia which includes the historical background, characteristics of dyslexics, forms of dyslexia, assessment of dyslexia, language processes, the different phases of reading, classification of reading retardation and brain activity of dyslexics.

### 2.0 Definitions

There are many definitions regarding dyslexia but the most recent and widely accepted are those from Orton and The British Dyslexia Association.

According to The Orton Dyslexia Society Research Committee (April,1994 ), dyslexia is a specific language-based disorder of constitutional origin characterized by difficulties in single word decoding, usually reflecting in insufficient phonological processing. These difficulties in single word decoding are often not related to age and other cognitive and academic abilities; they are not the result of generalized developmental disability or sensory impairment.

The British Dyslexia Association views dyslexia as a difference in the brain area that deals with language. It affects the underlying skills that are needed for learning to read , write and spell. Brain imaging techniques show that dyslexic children process information differently.

## 2.1 Terminology of Dyslexia

The term ‘dyslexia’ was coined in 1884 by R. Berlin. Dyslexia is often referred to as a specific learning difficulty because it is a condition which causes difficulty with reading and writing. In Greek, it literally means “difficulty with words.”

## 2.2 Historical Background

Critchley (1996 ) commented that the first description of dyslexia was done by Thomas Willis in 1672. Willis said that the man credited with first using the word ‘dyslexia’ to describe the dyslexic condition in patients was Professor Rudolf Berlin, an ophthalmologist working in Stuttgart in 1887.

Dr James Hinshelwood, an ophthalmologist and assistant surgeon at the Glasgow Eye Infirmary did many research studies on his patients. One of his studies concerned a teacher of French and German, who one morning discovered he couldn’t read the words in an exercise book given to him by one of his student to be marked. However, he could read any number or figures quite fluently without any mistake. Thus, Hinshelwood concluded that his inability to read was not due to a visual problem but a loss of visual memory for letters. This condition was described in an article ‘word blindness and visual memory’ ( Hinshelwood 1895 ). Today his condition would be described as ‘acquired dyslexia’.

Hinshelwood continued to study and wrote many articles about dyslexia for medical journals over a period of twenty years. He then concluded that for one to understand ‘congenital word-blindness’, it is also necessary to study the cases of ‘acquired word-blindness’ ( Hinshelwood 1912 ).

In his final book entitled ‘Congenital Word-Blindness’ published in 1917, he noted that this condition affected more males than females and those affected often had a family history of literacy problems and required different teaching methods.

While Hinshelwood was carrying out his studies on ‘congenital word-blindness’, another study concerning this subject was simultaneously conducted by Dr William Pringle Morgan (a Sussex General Practitioner).

Dr Morgan described fourteen-year-old Percy as a bright and intelligent boy. He was quick at games and in no way inferior to other children of his age but he was unable to spell his name properly. Words written or printed seem to convey no impression on his mind. This study had led him to publish an article ‘A Case of Congenital Word-Blindness’ in the British Medical Journal in 1896. According to Critchley (1970), this is the description of what we today consider as ‘developmental dyslexia’

Dr Orton’s studies on dyslexic children started in the 1900s. He was a neurologist and a psychiatrist. The results he obtained through his studies convinced him that investigation of brain physiology would lead to an understanding of the severe reading disability known as ‘congenital word-blindness’( J.L. Orton, 1963 ).

According to Tomkins( 1963 ) , Orton’s theory received widespread opposition among the academics at that time but today he is hailed as a brilliant diagnostician and pragmatist who championed the rights and needs of his patients.

‘He is also the person to realize that children with reading impairment also had the instability with recognition and recall of orientation of letters and words, which he termed “strephosymbolia” meaning “twisted symbols”.’ (J.L Orton, 1966)

Orton with his dedication and zeal to help dyslexic children to read teamed up with his research assistant, Anna Gillingham , to devise a method for the teaching and remedying the problems he had earlier identified.

Anna Gillingham was an educational psychologist and an outstanding teacher. She understood the frustration of the teachers over their failures in teaching pupils to read especially pupils who appeared bright and talkative.

Finally, Gillingham and Stillman (1956 ), managed to design a program known as ‘ The Multi-Sensory Teaching Program’. The multi-sensory techniques outlined in this program were intended to help pupils with their underlying weaknesses and difficulties which Orton had identified.

The multi-sensory teaching involved the simultaneous use of the eyes, ears, hands and lips to utilize all the pathways to the brain when learning.

### 2.3 Forms of Dyslexia

There are two major forms of dyslexia. Developmental dyslexia appears to be present from birth and acquired dyslexia is the result of brain trauma.

#### 2.3.1 Developmental Dyslexia

Reading involves seeing the correspondence between the visual symbols and sounds of language.

Dyslexic children have problems with conscious awareness of the sounds of native language, which they show on tests of phonological awareness such as rhyming, word segmentation tasks, phoneme deletion tasks and so on. ( Bradley and Bryant , 1981; Liberman and Shankweiler , 1985; others ). This form of dyslexia is known as phonological dyslexia and it is the most common form of developmental dyslexia .

Autopsy studies indicate that brain areas involved in phonological and other language processes contain minor mal-formations that originate during fetal life ( Drake , 1968 ; Galaburda et al ., 1985 ).

Similarly, functional imaging studies in subjects performing language or other cognitive tasks , also show dysfunction in the parts of the cerebral cortex that are involved in phonological processing and auditory - visual association ( Paulesu et al ., 1996 ; Rumsey et al ., 1987 ; Shaywitz et al ., 1998 ) .

All of this points to a constitutional problem arising during early brain development , well before a child is exposed to reading.

A small proportion of dyslexics ( the exact numbers are not known ) do not have problems handling speech sounds and can read pseudo – words without difficulty. Instead , these dyslexics have trouble only with irregular words , such as “enough,” “yacht,” and “naive.” This form of dyslexia is known as surface dyslexia ( Castles and Coltheart , 1993 ). All dyslexics have problems with irregular words , but this subset does not have problems with pseudo-words .

In acquired dyslexia , which is a result of stroke and acquired brain injury, the site of the lesion that produces problems with reading irregular words is different from that accounting for problems with pseudo-words .

Therefore , it should then be the case , that the two forms of developmental dyslexia , phonological and surface , have different brain mechanisms, too .

### 2.3.2 Acquired Dyslexia

Acquired dyslexia is a term used to describe subjects who have adequate reading function but have lost it following head trauma , vascular accident or malignancy. In other words , acquired dyslexia is the loss of a skill already attained .

Acquired dyslexia is seldom seen in children except in cases of major head injuries where they lose their reading ability that had been established earlier .

## 2.4 Characteristics of Dyslexics

Ronald D. Davis places forth the argument that most dyslexics will exhibit about ten of the following traits and behaviours. These characteristics can vary over time, from day-to-day or minute-to-minute.

The most consistent thing about dyslexics is their inconsistency. Symptoms increase dramatically with confusion , time pressure , emotional stress or poor health .

### 2.4.1 General Characteristics of Dyslexic Children

They appear bright , highly intelligent and articulate but unable to read , write or spell at their grade level . They have high IQ yet may not do well academically. They may perform extremely well orally yet may not be able to express themselves in writing . They may be labelled as lazy , dumb , careless or immature by an untrained person.

Educators may think that they are not trying hard enough or suffering from a behavioral problem. They are not " behind enough " or " bad enough " to be helped in the school setting .

They feel dumb and have low self-esteem . They usually hide or cover up their weaknesses with ingenious compensatory strategies . They are frustrated and emotional about school reading and testing. These children learn best through hands-on experience, demonstration , experimentation and visual aids.

They are talented in art , drama , music , sports , mechanics , story-telling , sales , business , designing , building or engineering .

They tend to " Zone Out " or daydream often . They get lost easily or lose track of time . They find themselves difficult to sustain attention and seem to be " hyper " or " a daydreamer. "

### 2.4.2 Vision, Reading and Spelling

Dyslexics may have Irlen's Syndrome which means the glare of the white page against black letters causes the word to shake, shiver or spin after a few minutes of reading . The treatment is testing and using coloured plastic overlays to help anchor the words to the page. Coloured, transparent plastics placed over white sheets of paper will help the child to anchor the words while reading.

Spelling - Dyslexics appear to be unable to hear vowel sounds. For example, the word " animal " may sound like " nml ."

Reading – Due to dyslexics' excellent long term memory, young children tend to memorize the readers but unable to read individual words or phrases.

### 2.4.3 Hearing and Speech

Dyslexics have extended hearing which means they hear things not said or apparent to others . They are easily distracted by sounds. They have difficulties putting thoughts into words, speaking in halting phrases, leaving sentences incomplete and stutter under stress. They also mispronounce long words or transpose phrases , words and syllables when speaking . Generally, dyslexics are auditory learners.

### 2.4.4 Writing and Motor Skills

They have trouble with writing or copying because their pencil grip is unusual . Thus, their handwriting varies and is illegible.

They can be clumsy, uncoordinated , poor at ball or team sports and have difficulties with fine or gross motor skills and tasks. They are also prone to motion sickness.

They show ambidextrous qualities but are often confuse between left / right, over / under.

Some may write in " mirror writing " ( writing that appears backwards but can be read when reflected in a mirror. )

Dyslexics tend to "draw" letters and numbers. They like to doodle. They take a long time before any automatic actions is achieved.

### 2.4.5 Mathematics and Time Management

Dyslexics have difficulty telling the time , managing time , learning sequence formation or tasks or being on time. They show dependence on finger counting and other tricks when doing mathematics. They must see the big picture first before the details. They know the answers but can't put it down on paper. They have difficulty counting objects and dealing with money.

Dyslexics may be gifted in mathematics but poor in reading and cognitive skills.

### 2.4.6 Memory and Cognition

Dyslexics have excellent long-term memory for experiences, dates, names, locations and faces. But they have poor memory for sequences , facts and information that have not been experienced. They think primarily with images and feelings , not sounds or words ( little internal dialogue ). Their short-term memory is poor and they tend to forget things easily particularly when a sequence of actions is required.

### 2.4.7 Behavior, Health, Development and Personality

Dyslexics are extremely disorderly or compulsively orderly. They can be class clowns, trouble-makers or extremely quiet. Their developmental stages can be extremely early or late ( crawling, walking, talking and tying shoe laces ). They are prone to ear infections; sensitive to food , additives and chemical products. Being extremely sensitive to human contacts – when another person touches them they may feel very uncomfortable.

Dyslexics are either extra deep or light sleepers; bed wetting beyond their appropriate age. They have unusually high or low tolerance of pain.

Though they have some disparities and weaknesses, dyslexics have a strong sense of justice. They are emotionally sensitive and strive for perfection. They will put a lot of effort into what they are doing and always find ways to help friends in need.

Though dyslexics seem normal to many , they are not so normal in a sense ; they lag an average of two years behind their peers in emotional and social development .

**2.5 Brain Development and Brain Activity of Dyslexics**

The human brain is divided into left and right hemispheres; each having primary duties. In most people, the right hemisphere is mainly responsible for non-verbal perceptual abilities. The left hemisphere regulates verbal function including spelling, comprehension, writing and reading.

For a long time, it was suggested by many researchers that the brain of a dyslexic worked differently. It was only in recent years with advances made in functional Magnetic Resonance Imaging that these differences were to be observed for real and studied to unravel the secrets of the brain of a dyslexic.

This technique is based on the principle that there is an increase in oxygenated blood in localized areas of the brain where there is an increase brain activity. It is used to obtain information on structural details of the brain. It can also be used to pinpoint regions where oxygen levels are changing as a result of neural activity. It is a non-invasive procedure as it exploits a magnetic tracer, namely hemoglobin that is a normal constituent of blood.

Representations of the brain scan of a normal reader and that of a child with reading difficulties can be found in Appendix 1. The picture representation of the fMRI in

Appendix 1 shows children with reading difficulties such as those in dyslexia show greater brain activity in the right hemisphere as compared to a normal reader.

This recent results has, to some extent, validated a theory proposed by dyslexia pioneer, Samuel Orton in 1925. He expressed that normally, children depend more upon the visually oriented right side of the brain at first, perhaps interpreting words as if they were pictures. As reading matures, the brain language-linked left side grows to dominate and visual stimulation is suppressed.

In 1979, anatomical differences in the brain of a young dyslexic were documented. Albert Galaburda of Harvard Medical School noticed that the language center in a dyslexic brain showed microscopic flaws known as ectopias and microgyria . Both affect the normal six-layer structure of the cortex.

An ectopia is a collection of neurons that have pushed up from the lower cortical layers into the outermost one. A microgyrus is an area of cortex that includes four layers instead of six.

These flaws affect connectivity and functionality of the cortex in critical areas related to auditory and visual processing. These and similar structural abnormalities may be the basis of the hard to overcome difficulties in reading.

Researchers studying the brain of dyslexics have found that during reading tasks, dyslexics showed reduced activity in the left inferior parietal cortex. It has been claimed generally, that it is not that uncommon for dyslexics who have trained themselves to cope with their afflictions, to develop efficient visual memories which aid in reading and comprehending large quantities of information much faster than typical. Commonly dyslexics show ten times more brain activity when reading. However, increased brain activity is not necessarily a sign of better

processing. Conversely, some dyslexics may show a natural dislike for reading. They compensate by developing unique verbal communication skills, inter-personal expertise , visual-spatial abilities and leadership skills.

### 2.6 Assessment of Dyslexia

The knowledge and understanding of dyslexia has broadened as people become better informed. The recognition and help for these children is usually parent driven with the help of specialist organizations. Professionals are trying to find the most reliable ways of diagnosing dyslexia so that help and remedy can be administered as early.

A number of researchers claim that it is possible to identify areas of weaknesses and difficulties in children from around as early as 3 – 4 years of age. Children with dyslexia are usually chatty but they are not able to convey messages accurately. Some adults might mistook them for lies told by the children. They would prefer to look at pictures rather than words.

The work of Bradley and Bryant ( 1982 ), suggested that the phonological ( sounding out ) awareness task was a good predictor of reading and spelling ability over three years later.

#### 2.6.1 Diagnostic Tests for Early Identification

There are now two diagnostic tests available for early screening: the Dyslexia Early Screening Test ( DEST ) and the Cognitive Profiling System ( CoPS 1 ).

### 2.6.1(a) Dyslexia Early Screening Test (DEST)

Nicolson and Fawcett were researchers at Sheffield University in 1996. They became aware that early screening could prevent the cycle of 'cumulative' and 'corrosive' damage and 'emotional scars' that dyslexia imposes on its sufferers. They devised a test which could be administered by the pupil's own teacher or school health professional on pupils' first entry to school.

The features of the DEST are:

- It is suitable for children age from 4.6 to 6.5 years.
- It consists of ten simple sub-tests which allow the tester to check for strengths and weaknesses.
- It is a pencil and paper test which can be applicable to all schools.
- It takes about 30 minutes per pupil to administer.
- It can be administered by teachers and health professionals without prior experience in psychological testing.

### 2.6.1(b) The Cognitive Profiling System (CoPS 1 )

CoPS 1 was a project funded by Humberside County Council and was developed by Singleton and colleagues at the Psychology Department at the University of Hull. It consists of a number of computer-based tests.

Its chief features are:

- It is suitable for children aged between 4 and 8 years.
- It can be carried out using the school computer hardware.

- It takes about 45 minutes to administer.
- It is designed to be used by qualified teachers and educational professionals.
- The interpretation of results requires professional expertise.

DEST and The CoPS 1 are the assessments used by specialists and educational professionals to detect and diagnose dyslexia in young children.

There are many other diagnostic tests that are currently being used by many dyslexic centre and schools in Malaysia and neighboring countries. Some of these assessments are:

### 2.6.2 The Norm Referenced Tests

These tests are used for screening purposes, evaluation of teaching strategies, to look out for discrepancies between IQ and literacy skills as well as to measure the achievement of the child compared to his peers.

Examples of such tests include New Reading Analysis Test, Raven's Matrices, British Picture Vocabulary Scales (BPVS), British Ability Scales (BAS) and Webster Intelligence Scale for Children (WISC).

### 2.6.3 Diagnostic Assessment of Sub-Skills

These tests are used for testing auditory, visual and processing skills. The Aston Index and Bangor Dyslexia Test are available for these purposes.

### 2.6.4 Criterion Referenced Tests

Criterion Referenced Tests are used to determine the child's entry point into a structured remedial program. The Heaton Test is a very good example where trained educators use to test their pupils before selecting them for any remedial program.

The British Picture Vocabulary Scales ( BPVS ) and Raven's Matrices are used to provide reasonable estimates of verbal and non-verbal abilities ( Snowling 1990 ). These tests can also be used to identify the discrepancy between the child's intelligence and literacy skills.

The Raven's Matrices assessment measures non verbal listening skills using spatial relationship to complete patterns. It is a reliable estimate of a child's ability to think clearly, working at his own speed without any interruption. This assessment is suitable for group as well as individual administration.

### 2.6.5 Intelligence Tests

For children with reading difficulties, it is very important to assess whether the reading problem is specific or due to poor intellectual abilities.

According to Thomson ( 1990 ), 'the appropriate assessment of intelligence is one of the most crucial factors in the diagnosis of dyslexia'.

Doyle, 1996, also commented that intelligence plays an important role in the reading process because it can contribute a great deal to a child being able to read better than most others his age, as well as having the opposite effect.

The Wechsler Intelligence Scale for children ( WISC-R ) is conducted for children aged between seven to sixteen. This assessment has two sections.

The Verbal Scale measures oral abilities while the Performance Scale assesses practical abilities.

From the Verbal Scale, the child is tested on information, similarities, arithmetic, vocabulary, comprehension and digital span. The verbal IQ is regarded as one of the best measures of academic potential because a lot in education depends on good verbal skills.

The Performance Scale consists of the following sub-tests which include picture completion, picture arrangement, block design, object assembly and coding.

Many psychologists now use the WISC-III ( Wechsler, 1992 ) which also includes the Wechsler Objective Reading Dimension ( WORD ) to show a child's reading abilities with others of similar age.

There are others who prefer to use The British Ability Scale ( BAS II ) designed by Elliot, 1996 which has an age range of 2 years 6 months to 17 years 11 months.

The Aston Index, on the other hand, consists of a comprehensive series of tests that assess auditory, visual, perceptual memory, sequencing skills, laterality and directionality. The nature of the child's learning problems can be indicated by the profile results that represent the summary of the diagnostic tests.

Since reading requires the administration of a series of skills which the dyslexic needs to master, it is only appropriate that some word recognition tests be used in the initial assessment of the reading process. Some of these tests include the Schonell Graded Word Reading Test, Vernon's Word Recognition Test and Burt's Reading Test.

There are also other reading tests to assess sentence reading ability of individuals. They are The Salford Reading Test, Neale Analysis of Reading Ability, the Individual

Reading Analysis for younger children and The New Reading Analysis Test (NFER/ Nelson ).

**2.7 Factors Involved in Academic Learning**

Where academic learning is considered, there are various factors involved. They are:

1. General intelligence which includes verbal performance. It is the ability and the capacity to abstract , to move from the concrete to the general, and to do problem solving.

2. Vision including discrimination and hearing including discrimination. In order for a child to utilize fully his learning capacity, his vision and hearing must be relatively intact or his disabilities fully corrected.

3. Neurologic integration in children is all about minimal brain damage and soft neurologic signs ; often the signs are so minimal as to be insignificant. Encephalopathy with brain damage may affect learning in non specific ways through interfering with impulse control and concentration.

4. Symbolization Skills – The capacity to deal with symbols is a specific language function that is essential to reading.

5. Emotional Problems – Many neurotic children, regardless of the severity of their neurosis, function relatively well on achievement tests but they still may obtain failing grades because they cannot apply themselves to the tasks at hand.

6. Motivation is closely related to the emotional freedom to learn. There are many potentially competent and productive children whose learning is impaired due to lack of involvement and motivation.

7. Opportunity is one of the factors involved in academic learning. In many aspects, retarded readers are held in double jeopardy because they have limited acquired skills to offer them opportunities for positive learning. Thus, they are blamed or scorned because they have failed to learn. (Ralph D. Rabinnovitch,M.D., & Keeney, 1968)

**2.8 Early Literacy Development in Children**

Reading is part of the developmental skills of learning a language. For most children learning to read is the decoding of a set of symbols on the page.

There are now a number of theories dealing with the normal development of literacy skills. The 'stage theories' in different versions are viewed by prominent researchers like Frith, 1985, Morton, 1989; Seymour, Bunce and Evans, 1989, Ehri; 1990.

These theories see the child as passing through a series of stages or phases before becoming fully literate.

In the initial stage, reading is viewed as visually based and proceeds by the use of partial cues. At this stage, the child has no strategies in deciphering unfamiliar printed words other than known words.

The next stage, according to most theories, is when a child begins to decode using the mappings between letters and sounds.

The final stages of literacy development involves reading and writing as automatic processes, the mappings between print and sound being at the phonemic level ( Ehri, 1992 ).

However, through the studies done by ( Bryant and Bradley, 1985), there is strong evidence that children who perform well in phonological processing tasks go on to become good readers and that training of phonological awareness promotes the development of literacy.

It is also important to note here that different languages have different phonological system. Generally, dyslexic children tend to make more mistakes and are slower than normal readers when reading is done in English because of the irregularities in the language. In more regular languages like German, Spanish or Norwegian, dyslexics are slower readers, and only make certain mistakes, but to a lesser degree than irregular languages, since phonological rules are easier to learn.

### 2.8.1 The Three Phases of Early Literacy Development

Frith ( 1985 ) break down early literacy development into three distinct phases namely the logographic, the alphabetic and the orthographic.

#### a. The Logographic Phase

In this phase, children learn to recognize words as visual wholes and are dependent on visual processing skills. Only familiar words can be read like their favourite food advertisement and store labels on bags. This could not be recognized if it is written in different script or context. Visual errors are characteristic of reading performance at this stage. Spelling could be correct because the word is known or becomes strange because of an inability to utilize a sound strategy. There is a disassociation between reading and spelling at this stage ( Stackhouse, 1990 ).

**b. The Alphabetic Phase**

When children enter into this phase, they already have a good grasp of letter-knowledge for advancement of reading and spelling development. The relationship between letter and sounds is learned and unfamiliar words can be read using the phoneme-grapheme translation rules. They learn the letters and the sounds and may explain the close relationship between letter naming and literacy development. Children at this phase are able to use letters rather than visual strategy to invent spellings. Though spelling may not be a perfect score here, it does show children's increasing sound awareness.

**c. The Orthographic Phase**

This phase marks the development of the ability to spell and read larger units more specifically known as morphemes. Children at this phase are able to recognize root words plus their affixes. They also are able to see the regularities across words and learn the orthographic patterns to represent morphophonemic rules. Thus, normal children first learn the letter-sound correspondence when writing and later transfer it to a reading situation.

According to Frith ( 1985 ), failure to achieve orthographic reading would be revealed by a reliance on alphabetic and logographic skills.

As such, it would appear that problems with reading development are most likely to arise from some underlying phonological deficits.

## 2.9 Classification of Reading Retardation

Reading retardation is defined as a significant discrepancy between the actual reading level and expected reading level for performance mental age. Dyslexia is viewed as one cause of reading retardation, among many other possible causes.

Reading retardation can be classified as:

1. Primary:

   a. Developmental Dyslexia

2. Secondary:

   a. Other encephalopathy {Specific language impairment

   {Motor- concentration impairment

   b. Emotional disturbance.

   c. Motivation or opportunity factors.

   d. Deprivation or distortion in language experience. (Rabinovitch, 1968)

Basically, there are two groups of reading retardations:

1. Those in which the reading retardation reflects a definitive neurologic dysfunction in the absence of history or absence of brain injury referred to as primary reading retardation or developmental dyslexia.

2. Those in which the reading retardation is not primary but is secondary or reactive to other pathology or problem. ( Ralph D. Rabinovitch & Keeney, 1968)

The phrase " secondary to other encephalopathy " implies evidence of brain damage in the history and examination, with part of the total encephalopathic picture being a difficulty in dealing with symbols – a symptomatic specific language impairment. In other cases of encephalopathy, no specific language impairment exists, but concentration and impulse control are sufficiently affected to impair reading skills.

**2.10 The Reading Difficulties of Dyslexic Children**

Under ideal conditions, a child is prepared to make an easy transition from oral language to written language. He learns to listen, then to talk; he learns how language is organized in the form of sentences and paragraphs. This combination of concepts, attitudes and interests provides the foundation upon which reading ability is built. It takes 5 – 8 years to develop this readiness. With each child there is some variation in the facility he shows for reading readiness. At the age of 6 years, many factors might influence or retard the coordinated development of his reading skill and play a prominent part in the causation of a reading problem.

In describing the reading problem, a sharp distinction must be made between the " slow " reader and the " retarded " reader. The slow reader is one who reads below his grade level, but whose level of reading is consistent with his intelligence level. On the other hand, a retarded reader is one who reads below his grade level but who may have higher-than-average intelligence.

Orton designated dyslexic children as a group including those who are retarded in reading much below their achievement in other subjects, whose attempts at reading are characterized by frequent reversals and by confusion between words such as ‘ saw ’ and ‘ was ’, and who show a greater facility in mirror reading than do normal readers. The frequency of reversals caused Orton to suggest the word “ strephosymbolia ”, meaning twisted symbol.

The principal criteria of this group of cases are:

1. The reading disability is specific. The acquisition of reading skill lags behind the other scholastic achievement and reading does not measure up to expectations normally justified with the child ’s age.

2. There is a tendency to reverse letters and words. Many children normally reverse or mirror-write in the first or second grade. The average reader soon corrects this abnormality, but a reader who has a specific defect retains these characteristics.

3. The confusion extends over all reading. In some cases a child may spell the words correctly but is unable to read them, or he may show a complete disability in spelling as well as difficulty in reading. Some children substitute other words for those they cannot read. Some of them are especially good at looking at a picture and making up their own story while pretending to read from the text.

Presently, there is so much emphasis on universal education and the ability to read well with comprehension because there is a realization that during the later school years about ninety percent of a student’s studies depend directly on his

reading ability. To the dyslexic child learning to solve the reading riddle is indeed a great challenge.

### 2.11 Teaching Reading to Dyslexic Children

Teaching of reading to a dyslexic child may differ from the methodology used to teach reading to normal children.

According to Thomson and Watkins ( 1990 ), that ‘ in reading, the reader simultaneously synthesizes information from a number of sources which include previous experiences, knowledge of syntax, semantics, orthography, sound to symbol mapping and phonetic information’.

Ellis, 1993, also proposed that in the very earliest stages of reading development, written words are identified purely on their visual appearance hence words with distinct features are often more easily recognized – McDonalds, Spiderman,Chicken Little. But for many dyslexics, the printed words make no impression on their visual perception system, therefore they do not remember the word when seen in isolation or in a different context.

As Sheffield ( 1991 ) observed, when children were taught by whole words, natural readers abstract rules and categories but dyslexic children learn hopelessness, passiveness and avoidance.

There are various methods in which a teacher can employ when teaching reading to children. Some of these methods are:

- The ‘ Phonic’ method
- The ‘ Whole Sentence’ method or the ‘ Language Experience’ model
- The ‘ Alphabetic Multi-sensory’ method

With the ‘Phonic’ method, the pupils are taught the relationship between the letter names and the sounds of letters. They learn to sound out each letter in the word. This is useful for deciphering unfamiliar words.

According to Ellis ( 1993 ), a child who possess some phonic reading skill is a much more independent reader.

The ‘Whole Sentence’ method or the ‘Language Experience’ model emphasizes the reading of sentences and it is the content of what is read that is of primary importance. Here, the pupils are encouraged to use the meaning of the sentence to help them make sense of (or guess ) the individual words. An extension of this method is the ‘cloze procedure’ which includes using a text where letters, words or phrases are omitted and a gap is left. Pupils have to read the text and insert a suitable word so that the sentence makes sense. Pupils may also be given a multiple choice. The disadvantage of this method is when pupils meet an unfamiliar word they are not able, they are not taught how to decipher it.

The ‘Alphabetic Multi-sensory’ method teaches pupils to see, hear and feel letters and sounds simultaneously. This method is especially suitable for dyslexics because they are better able to make connection between the sound and its symbol which is the crux of learning to read.

According to Angur (1985), the aim of multi-sensory learning is to enable the learner to the names sounds and shapes of all phonograms so he has a permanent and automatic response.

Hickey ( 1977) said that the value of multi-sensory learning is that it enables individuals to use their own approach to the tasks through utilizing their strong areas and at the same time, exercising their faulty ones. They use the visual, auditory, tactile, kinaesthetic and oral-kinaesthetic perceptual systems to make learning secure. All of these are done simultaneously.

Hornsby ( 1994 ), said that ‘ currently teachers who teach ‘phonics’ only teach sounds and no names, which is as much a disaster for the dyslexic as the whole word method is.’

Realizing that dyslexic readers progress better with multi-sensory learning as compared to the ‘Phonic’ or the ‘Whole Sentence’ method, it would be prudent for teachers of such children to use suitable techniques to help these children to overcome their reading difficulties.

## 2.12 Current Research and Development on Dyslexia

Researchers today are looking at the issue of phonological awareness and processing which they realize have some connection with the reading difficulties of dyslexic children.

Dyslexic children, basically, have problems remembering the sounds of letters, matching and blending of sounds which make reading tasks difficult.

Studies have shown phonological awareness is the root cause of reading, writing and spelling difficulties. This theory is supported by Snowling, Stackhouse and Hinshelwood ( 2000 ).

Dr Sally E. Shaywitz, a pediatrician and researcher from Yale School of Medicine, together with her group of researchers had used Magnetic Resonance Imaging ( MRI ) to identify the brain activity of people who were thinking and reading. Both normal readers and children who were thought to be dyslexic were studied. The results at the end of the study showed that the brains of people with dyslexia showed less activity in the area of phonemic awareness.

Thus, educators and researchers today are studying various methods to balance the brain activities of dyslexic children.

Currently, with the studies done one can safely deduce that dyslexia is related to the brain activities in the language centre of the brain other than physiological and genetic conditions.