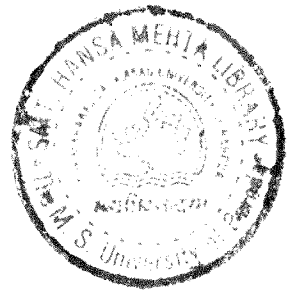


CHAPTER I
INTRODUCTION

1.0 Introduction

In 1896, Dr. Pringle Morgon describes a 14 year old boy with reading difficulty. The boy's teacher says- "He would be the smartest lad in the school if instruction were entirely oral." This is true even hundred years down the history of time! The ability to learn to read and write is a very important stepping stone in making one literate. Literacy is the major benchmark in today's world of cut throat competition. It opens doors to various options that a person can choose in life. To be successful in life, one needs to go through the grind of standard education in which the earliest and the basic step is reading and reproducing that reading skill in the written form which is writing skill and doing mathematical problems in a written form. Any deficit in reading (dyslexia), writing (dysgraphia) and mathematics (dyscalculia) leaves a big gaping hole in ones ability to complete years of formal education. So many apparently bright appearing children fare poorly in the formal assessment at school or are unable to clear their examinations year after year. Unfortunately, awareness of the difficulty being faced by the child is noticed quite belatedly when he/she is not able to cope up with the studies in higher standards. By definition, therefore, dyslexics are not identified until they have tried and failed to learn to read in school. By that time, it is difficult to determine whether observed differences between reading-disabled children and their classmates reflect direct causes, or merely consequences, of reading failure (Scarborough 1990). Initial difficulties in lower classes are overlooked both by the parents as well as the teachers and are attributed to other causes like disinterest in studies, malingering, hyperactivity etc. Even at a very early age, children with language disorders manifest hard-to-manage behaviors and evidence of emotional distress (Sundheim, 2004). With the parents, medical fraternity and educational department becoming more aware of the magnitude of the problem; methods to identify and intervene were developed. Unfortunately, most of the children get identified in the latter years of primary school or some even later. Most of the children receive improper or no intervention at all or they themselves device methods to overcome their difficulty but deficits remain. Learning disabilities are lifelong conditions, which affect learning in individuals with normal or above normal intelligence. These disorders affect learning processes, but not necessarily the capacity to learn. They also affect

an individual's mental health. Learning difficulties lead to poor self esteem, stress, social and behavioural problems. In this modern age most of our communication and work is done through reading and writing. Academic success is a prerequisite to economic and social success and puts these individuals at a disadvantage from the very beginning of formal education. Various names or labels have been given to such conditions like reading blindness, word blindness, dyslexia, minimal brain dysfunction, specific learning difficulty etc.

1.1 History of learning disability

The most consequential piece of legislation for people, with learning disabilities is the 1913 Mental Deficiency Act (Radford, & Park, 1996) .The outbreak of First World War delayed its implementation. The Act is then in force from 1919 till 1959. Eugenics movement began in 1860 in England and quickly spread throughout the rest of the western world. The idea is to create a better breed of people .Those with desirable traits were to be encouraged to propagate and those with undesirable traits be stopped. Many important personalities supported this movement like George Bernard Shaw and Marie Stopes. The use of the term ëcolonyí came into being for a site of care for mentally disabled with the idea that healthy environment would aid cure.

In the second half of the nineteenth century the term began to be used to describe mental hospitals. Underlying this interest in eugenics were two widespread philosophical convictions: a belief in the perfectibility of the human species and a growing faith in science as the most dependable and useful form of knowledge. Today eugenics is in disrepute. Learning disabilities are lifelong conditions, which affect learning in individuals with normal or above normal intelligence. These disorders affect learning processes, but not necessarily the capacity to learn. Students with learning disabilities may experience difficulties in one or more of the following ways: listening, speaking, reading, writing, mathematical reasoning, organizational skills, time management, and social skills. Students with Attention Deficit Hyperactivity Disorder (ADHD), which is not classified as a learning difficulty, often have coexisting learning disabilities, and/or their symptoms interfere with their acquisition and demonstration of knowledge in the classroom.

Dyslexia has found mention in our history too. Mogul emperor Akbar, himself an illiterate man, perhaps because of dyslexia, loved learning and disputation. Famous people from past times like Leonardo da Vinci, Thomas Alva Edison, and Albert Einstein are also

said to suffer from learning problems like dyslexia. In the early years "word blindness" is coined by Dr. James Hinshelwood (Hinselwood,1912).Dr. Pringle Morgan also used the term "congenital word blindness" (1896).

1.2 Theories and models of language development

There are many theories and facets of language development. Various theories have been proposed regarding child language acquisition.

They can be broadly divided into

1) Factors contributed by nature - Chomsky's Universal Grammer Theory
2) Factors contributed by nurture- i) Cognitive Theories – a) Jean Piaget's views
   b) Vygovtsky's Views
   ii) Behaviorist Theories – a) Skinner Verbal Behavior

1) Factors contributed by nature –

Chomsky's Universal Grammer Theory- Noam Chomsky, the great twentieth Century American Linguist, argues that this can only be possible if we are all born with language's already deep structures coded within our brain. His theory has also been called the theory of nativist. His work has shown that development of language in children is a complex thing. This deep structure is the same for all humans. According to him the brain in humans has neural circuits which have linguistic information right from the time of birth. The heard speech acts as a trigger towards a child's natural predisposition to learn language and his brain is able to interpret the heard speech according to the structures the brain contains. This is known as the Language Acquisition Device (LAD). According to him, all human languages share the same common principle. The grammars of different languages are transformations into a surface representation of the same deep structure. All children go through a Critical Learning Period in the first three years of their life. During this period, the child's Language Acquisition Device or LAD is active. It will be much more difficult for someone to acquire a language outside of the Critical Learning Period. It is still very hypothetical as to how the Language Acquisition Device actually works, but the relative ease with which infants learn a language provides evidence for its existence. Specific learning disabilities viz dyslexia, dysgraphia & dyscalculia is a generic term that refers to a heterogenous group of disorders manifested by significant, unexpected, specific & persistent

difficulties in the acquisition and use of reading (dyslexia), writing (dysgraphia) and mathematical (dyscalculia) abilities despite conventional instruction, normal intelligence, proper motivation and adequate socio-cultural opportunities (Catts, 1989). Chomsky's ground-breaking theory remains at the centre of the debate about language acquisition. However, it has been modified, both by Chomsky himself and by others. Originally, Chomsky had proposed that LAD contained specific knowledge about language. Slobin suggested that it may be more like a mechanism for working out the rules of language (Slobin,1977).

Evidence supporting Innateness theory

1. Human anatomy has such an evolved vocal tract to permit articulation of different sounds unlike apes. Also, specific areas of the brain have been identified like Broca's area and Wernicke's area which have different functions in speech and language production (Pinker, 1994).

2. Some dialects of English language like "creole" also support the evidence of LAD. Escaped slaves in Surinam though speaking different languages were forced to communicate in Dutch which is very limited. This resulted in Pidgin language. The adults were past the critical age when they could learn a new language. Surprisingly, their children turned this language into a full fledged language (Creole) which has its own rules and full expressive range.

3. Sign language used by deaf people is a complex and fully grammatical language in their own right. Communication through sign language helps in fulfilling the urge to communicate

Limitations:

This theory does not take into account the interaction between children and their caretakers. Also, it ignores the functions of language.

2) Factors contributed by nurture- i) Cognitive Theories – a) Jean Piaget's views
b) Vygovtsky's Views
ii) Behaviorist Theories – a) Skinner Verbal Behavior

i) Cognitive Theories –

a) Jean Piaget's views -Put forward by the Swiss Psychologist Jean Piaget placed importance on language acquisition in context of a child's mental or cognitive development.

Four stages have been proposed by Piaget regarding a child's development. According to Piaget, cognitive development precedes that of language development. He theorized that social interaction is the key to overcome the instability of the symbols (Becker & Varelas, 2001).

Piaget described four stages of development

Sensorimotor stage: this is the stage when the child uses all the five senses to explore the world. At this stage child is extremely self centered and cannot comprehend the world from other's view point. This stage can be further subdivided into six substages (Chapman, 1988)

(1) Simple reflexes (0-1 mo) Primitive reflexes like rooting and sucking are used to explore

(2) First habits and primary circular reactions (1-4mo) infant learns to coordinate two type of sensation and two type of scheme (habit and circular reaction). Infant tries to repeat and reproduce an accidentally occurred event like thumb sucking.

(3) Secondary circular reactions (4-8mo) awareness of things beyond his body increases and the child becomes more object oriented.

(4) Coordination of secondary circular reactions (8-12mo) child does things intentionally to reach a goal. The ability to combine and recombine scheme in him increases. Object permanence also appears at this stage.

(5) Tertiary circular reactions, novelty, and curiosity (12-18mo) Infant tries out different things to get different results.

(6) Internalization of schemes (18-24mo) child moves to symbolic thinking.

Preoperational stage (2-7 yrs) Child makes rapid strides in development with improvement in language skills. Child is egocentric at this stage and is unable to use logical thinking. Child takes everything at face value and is unable to understand conservation i.e. quantity remains the same even if the shape changes. He is unable to understand the concept as he focuses only on one aspect at a time (centration).

Concrete operational stage (7- 12 yrs) Egocentrism decreases and the child starts to think logically but needs practical aids. He is able to solve complex problems and can group objects seriation ability also develops. They are not able to think abstractly.

Formal operational stage (> 12 yrs) Children develop the ability of abstract thought. They are able to hypothesize. They also learn to use deductive reasoning for drawing conclusions.

Limitations

1. Explanation of processes in real time have not been offered
2. Also, as the child grows older there is difficulty in finding clear link between language and intellect.
3. Children with abnormal mental development have learnt to speak fluently which shows that syntax does not rely in general intellectual growth.

b) Vygotsky's Views – Lev Vygotsky is a Russian Psychologist and laid the foundation for cultural-historical psychology. One of his major contribution is regarding the relationship thought and language development. Connections between speech and cognition and mental concepts were established by him.

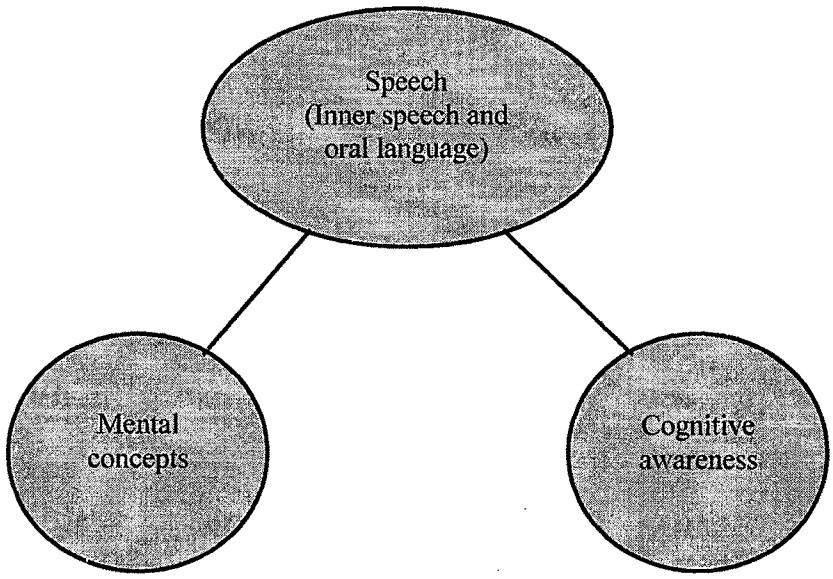


Fig 1.1

He described inner speech as being different from outer speech. He thought that inner speech developed from outer speech but in its mature form inner speech would be unintelligible to anybody else except the thinker and would not resemble spoken language (Santrock, 2004).

A child learns to understand the meaning of sign language by interacting with the care giver and soon these interactions take verbal sound as the child learns through social interaction that he can use these verbal sounds (Santrock, 2004). Child starts to use language as a means of social interaction. Initially there is self talk which becomes negligible over time and is used as a self directed and self regulating behavior. Then it becomes internalized. In the end it becomes inner speech. This develops through its differentiation from social speech (Santrock, 2004). It's not as if thinking cannot take place without language but it brings it to a higher level of sophistication. Inner speech converts speech into inward thoughts whereas external speech turns thoughts into word (Santrock, 2004).He tried to explain this on the basis of zone of proximal development which is the gap between actual competence level and the potential developmental level. It states that learning can force cognitive development.

ii) Behaviorist Theories –

a) Skinner Verbal Behavior – Skinner did a lot of work on experimental analysis of behavior. Also he worked on language and its relation with language (Skinner, 1957). According to him children learn language while imitating adults and their correct utterances get reinforced when they get rewarded for the same. Successful utterances are reinforced. Unsuccessful utterances are forgotten. Children imitate adults. Their correct utterances are reinforced when they get what they want or are praised.

Limitations-

1. Children make mistakes while actively working out and applying rules.

2. The stages of language acquisition that most of the children go through is same and sequential (developmental milestones) for children in all societies.

3. McNeil (1966) showed that children are not always able to repeat what an adult says. This is true especially true when the child comes across a structure which he has not started to use.

4. Language acquisition has a critical period (Chomsky), and if children do not acquire language by seven they do not entirely catch up.

5. There is evidence for a critical period for language acquisition. Children who have not acquired language by the age of about seven will never entirely catch up (DeVillers, 2001).

1. 3 Early language development and associated Implications

To put it formally: "Dyslexia is a specific learning difficulty that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction"(Lyon, Shaywitz & Shaywitz, 2003). It is generally accepted that children with developmental dyslexia present deficits in phonological processing— difficulty in awareness of the sound structure of words (Shaywitz, 1998). In addition to the phonological impairment, dyslexic subjects show deficits in the processing of rapidly changing auditory information, implying that the phonological impairment might result from this more fundamental deficit. Language and literacy acquisition must be woven together for a child to attain the multiple strands of literacy. The developmental precursors to this are varied skills, knowledge and attitude for conventional reading and writing (Dickinson & McCabbe 2001). Each strand is made up of sub strands (Dickinson & McCabbe, 1991) what is less understood is the pattern of interrelationship among these strands across time (Dickinson & McCabbe, 2001). Early knowledge of alphabet and alphabetical principals are the key to later reading (Adams, 2001).

Horwitz and colleagues noted a pattern of impaired social competence as early as 18 to 23 months of age, which persisted at the 24- to 29-month age range. (Horwitz, 2003). Receptive and receptive or expressive language delay (but not expressive language delay at age 3 years is predictive of behavioral problems at ages 7, 9, and 11 years (Sundheim, 2004). Dyslexic or reading disabled or specific learning retards (SRR) are used interchangeable. Such children show a mismatch between their IQS (Intelligence Quotient).

Various theories have been put forward by researchers. It has been well established that language disorder is a precursor of dyslexia: early speech and language skills predict

individual differences in literacy outcome (Scarborough, 1990; 1991).More contemporary interventions for language and reading disorders, which assess the specific nature of the deficit and focus interventions on phonemic awareness and/or syntax, semantics, and grammar, will not only have a positive impact on language but will also enhance academic success.

Language and literacy acquisition must be woven together for a child to attain the multiple strands of literacy. The developmental precursors to this are varied skills, knowledge and attitude for conventional reading and writing (Dickinson & McCabbe, 2001). Each strand is made up of sub strands (Dickinson & McCabbe,1991) what is less understood is the pattern of interrelationship among these strands across time (Dickinson & McCabbe, 2001). Early knowledge of alphabet and alphabetical principals are the key to later reading (Adams, 2001). As children start learning their spellings reflect their emerging knowledge of the relationships of sounds and spellings (Bear, Invernezzi, Templeton, & Johnston, 1996; Bissex, 1980; Henderson, 1981). There is a clear interplay between spoken language and spelling (Dickinson & McCabbe, 2001) which is very complex. The relationship between reading and writing is complex and both depend on oral language when the child is first exposed to literacy in the preschool years (Dickinson & McCabbe, 2001).

1.4 Indices of Children's Early Language Development

In order to know what is not normal, one needs to know the normal development of language and certain landmarks in the development of language which helps one in knowing what is deviant from the regular path of language development. These indices help in identifying children early

1.4.1 Stages of early language development:

Language development is a complex process and can knowing the various stages of development can help in identifying delay or deviation.

Development at 6 months of age

Child vocalization with intonations, is able to respond to his voice, is able to respond appropriately to friendly and angry tone.

Language development at 12 months of age

At 12 months of age is able to use one or more word with meaning and understand simple instructions whether physical or vocal cues. Also practices inflections and is ware of social value of speech.

Vocabulary Comprehension at 14 Months:

Information can be obtained on vocabulary comprehension and production by actions and gestures.

Verbal Comprehension at 18 Months:

In the Verbal Comprehension items, the child is presented with an array of stimulus materials and asked to identify the specified object by pointing or picking it up or by responding with specified actions. Mental Scale items critically tap the child's language comprehension and production skills. MDI correlates highly with expressive language measures.

Global Language at 26 Months:

Global language can be measured by

1) Vocabulary production
2) Mastery of inflections
3) Maximum sentence length
4) Verbal comprehension
5) Expressive language
6) Comprehension of inflections

Phonological awareness is compared in two groups of 3.5-year-old children: children with familial risk for dyslexia and children without such risk. The control group children were found to manifest higher mastery of phonological awareness skills than the at-risk children. There were no statistically significant differences between boys and girls on the phonological awareness skills both in at risk and control group. Parental educational

background did not correlate with children's phonological awareness skills (Puolakanaho et al, 2004).In this study comparing at risk dyslexics and control group approximately half of the children with familial risk for dyslexia eventually manifest reading problems. Early and concurrent language correlated highly in both groups. Phonological awareness at 3.5 years is predicted by early language skills (e.g., verbal comprehension, vocabulary, and inflectional skills) assessed between 14 and 26 months of age. The group difference in phonological awareness remained significant even when both early language and concurrently assessed language skills were controlled for. This study supports the importance of assessing emerging phonological awareness skills in association with risk for dyslexia (Puolakanaho, Poikkeus, Ahonen, Tolvanen, & Lyytinen, 2004).

Reading difficulty and social behavioral difficulties have been considered two distinct yet interrelated developmental risk factors for predicting school maladjustment and its roots may be detected as early as the preschool (Maughan, Pickles, Hagell, Rutter, & Yule, 1996), Sometimes social difficulties become manifest as early before academic problems become apparent. Phonological awareness refers to a person's ability to shift his or her attention away from the content to form speech (Yopp, 1992). Training and instruction in phoneme awareness have been shown to significantly contribute to early reading skills (Ball, & Blachman, 1991; Byrne, & Fielding- Barnsley 1993; Vandervelden, 1997)

1.4.2 Indicators of early language development

Understanding typical language development becomes very important in order to identify deviations in developmental process early.

Language and reading- oral language development plays a critical role in learning to read (Snow, 1998).Vocabulary plays a major role in the development of decoding skills and phonological sensitivity (Vetullino, 1991). It has been well established that language disorder is a precursor of dyslexia: early speech and language skills predict individual differences in literacy outcome (Baker, 1987; Beitchman, 1997; Scarborough, 1990; Silva, 1987; Stark 1984). Behavioral difficulty is one of the earliest sign that the mothers noticed in their children who were later identified as having speech and language delay (Jenkins, 1980; Sundheim, 2004).

Phonological sensitivity is a micro level language skill compared with syntactic and semantic processes. This skill development is crucial to the acquisition of word decoding

skills. Early manifestations of phonological awareness include the recognition of rhyming words. Most of them are also able to identify large segments and develop a level of alliteration (Grizzle, 2007). Research report that children develop phonological sensitivity at a phoneme level by 5 years of age (Foorman, 2002). Another important predictor for later reading skill as the children start growing older is alphabet recognition (Stevenson, 1984). Identification of alphabet letter is a better predictor of reading skill acquisition than letter sound understanding (Burgess, 2002). In contemporary intervention programs for language and reading disorders which assess the specific nature of the deficit and focus interventions on phonemic awareness and/or syntax, semantics, and syntactic and phonological abilities have been used as effective indices to address the reading status in children (Scarborough, 1991).

1.4.3 Normal reading development

One has seen children becoming familiar with books at the end of the first year of life through grabbing and mouthing them (Grizzle, 2007).As they start getting older; toddlers understand intonation patterns being used by parents when they are read to. They learn to memorize phrases and words in often read books. They can identify illustrations from books which are read regularly and even have some conversation about the content. Also they are able to pick up that book which has been read to them. Often children are seen flipping through the pages of book and repeating the memorized text. They also begin to recognize print from scribble. This scribbling reflects the child's entrée into the abstract nature of language, oral and written. These early literacy activities are reflected and encouraged best through play (Grizzle, 2007).

Once children enter school, they go to a stage called phonetic cue reading from the pre reading. They begin to read phonetically from the letter representation. They begin to associate the letter to the sound. At the early stage they are able to associate mapping sound only to a select letter string especially the beginning and ending letters. As they grow up they must recognize all letters in the word and mapping orthographic representations on the correct phoneme. Only with repeated exposure, words get transferred into their automatic lexicon. Then only reading fluency and speed begins to develop (Grizzle, 2007).

1.4.4 Reading comprehension

Learning to read is defined as learning to recognize and decode words (Grizzle, 2007). At the beginning there is limitation in reading due to print awareness. As decoding and word recognition skills improve, other factors which come into play helps them in understanding the textual meaning. These are vocabulary, oral comprehension and working memory (Snowling, 2000). Readers also use various strategies to enhance comprehension like goal setting, inference making, identifying the main idea, summarizing, predicting, monitoring and back tracking(Byrnes,2001).Family too influences reading in the kindergarten stage through(Burgess,2002):

1) Value placed on literacy reflected by parent reading and encouraging their children to read
2) press for achievement
3) availability of reading material at home
4) reading to and with children
5) opportunities for verbal interaction

1.5 Major components of Oral language

1.5.1 Phonology

Children can perceive speech sounds at birth (Eimas, Siqueland, Jusczyk & Vigorito, 1971) and in their early school years they learn the production of sound in their vernacular or native language. Phonological skills are precursors to literacy; there is evidence that literacy too has an impact on the phonology (Dickinson & McCabbe, 2001). Phonological awareness is important for the child to be able to focus on grapheme and link them to phoneme (Byrant, MacLean, & Bradley, 1990; Byrant, MacLean, Bradley & Crossland, 1990). Phonological awareness refers to the person's understanding that speech is composed of a series of individual sounds and to the ability to treat speech as an object by analyzing and manipulating its units rather than focusing on the meaning(Most,2000). Children with phonological awareness deficits have difficulties linking speech sounds to letters, their decoding skills are labored and weak resulting in extremely slow reading (Pratt, & Brady, 1988).Phonemic awareness is important in order to learn to read. In order to start learning to

read one must have a certain level of phonemic awareness. Different gradations of phonology can be seen. They can be simple like sounds coming in the beginning, middle or ending of the word, breaking or segmenting word into individual sounds. Slowly the child is able to go to higher gradation like blending different sounds to form a word. Also they can then segment utterance into its separate sounds (McBride, 1995).Research has shown that although children with reading disabilities were able to perform simple task like syllable segmentation, they still showed problems in higher level tasks which refer to smaller units of speech – the phonemes (phoneme segmentation or phoneme deletion) (Kamhi,1989). For phonological awareness one needs to hear the spoken stimulus, comprehend and express a response to the spoken stimulus. For all this one needs to have a basic cognitive processing ability (McBride-Chang, 1995). Phonological awareness can be tested by identifying initial phoneme recognition and production, identification-, phonemic segmentation and integration. Such children also scored less on peer nomination. Such children also viewed themselves lonelier than their peers and even their sense of coherence is also low. They felt less confidence within their world. Children who were more accepted by their peers showed higher phonological skill. Thus, children at risk for developing learning disabilities revealed two separate types of deficits- phonological awareness difficulties and social-emotional difficulties. The study is especially useful in demonstrating the importance of multivariate examination of these cognitive and emotional difficulties at early development stages, when they were not affected by formal learning at school. Also it emphasises the need to examine critical areas of early functioning such as phonological awareness and social-emotional aspects to enhance the understanding of children with risk for developing learning disabilities (Most, Al-Yagon, Tur-Kaspa, & Margalit, 2000).

1.5.2 Morphology

In a study done by Casalis et al 2004 they found out that children who had developmental dyslexia were poorer in morphemic segmentation tasks. They produced more derived words in production task. This suggests that phonological impairment prevent segmentation of affixes but allow development of productive morphological knowledge. Also morphological awareness cannot be developed entirely independently of reading experience or phonological skills. They develop certain kind of morphological knowledge which they use as a compensating strategy.

Morphology refers to the smallest unit of meaning: morphemes. Meaning of a word in totality is due to the combination of morphemes. There are different kinds of morphemes: roots- that may or may no be words themselves and bound morphemes – that cannot be words, the prefix and the suffix. There are also inflections marking gender, number and tense. Therefore, the meaning of an unknown word can be broken down into its morphemic constituents or new words can be created by combining morphemes. Morphemes carry phonological, semantic and syntactical information (Casalis, 2004).

Some studies indicate that expert readers process morphological information when reading isolated words (Cole, 1997; Feldman, 1995) According to Schreuder and Baayen (1995), morphological processing may involve three stages. The first stage "concerns the mapping of the speech input onto form-based access representations of full as well as bound forms. The second stage licensing, involves checking whether representations that have become co-active can be integrated on the basis of their sub categorization properties. The third stage, combination, deals with the computation of the lexical representation of the complex word from the lexical (syntactic and semantic) representation of its constituents, given that this integration has been licensed (Schreuder & Baayen, 1995; Casalis, 2004).

Morphological awareness, as part of meta linguistics, involves reflection on language and its use and skills of monitoring and planning (Casalis, 2004).The development of meta linguistic skill is non obligatory and may depend on external factors like learning to read.(Duncan, 2000).Meta linguistic abilities are characterized by conscious monitoring of the processing performed on the language. They are mastered according to the complexity of the systems, their frequency and their utility on the new task (Casalis, 2004). In a sense the domain of morphology may be considered to be greater than phonology. Furthermore, the contribution of morphology score to reading achievement increased progressively (Grades 4 to 6); supporting the view that morphological awareness plays a role in later reading development (Mahony, 1994). However, effects are also observed early in development (Grades 1 and 2), indicating that morphological awareness could be important as soon as children start learning to read (Casalis & Louis-Alexandre, 2000). In a study done by Casalis et al. on dyslexic children, between the age of 8 and 12 years, they performed systematically below the normal readers on morphological tasks. This indicates that morphological skills may not develop normally in developmental dyslexia. Their study suggests a developmental dissociation in the morphological skills of dyslexic children. Tasks that focus on formal analysis are poorly performed. Those requiring productive knowledge are performed at the level expected according to reading age. The superiority of the fluency score suggests that

dyslexics may benefit from oral as well as written language input in order to develop morphological skills (Casalis, 2004). If the development of morphological awareness is hampered by poor phonological skills, it would be relevant to compare dyslexic groups who differ in their phonological abilities. The comparison between the two categories of dyslexic children may help us to grasp the role of poor phonological skills in morphological knowledge. The comparison of phonological dyslexics with delayed dyslexics is appropriate since they also have poor word recognition skills.

Dyslexic children display a particular profile in their oral morphological abilities. Their morphological skills develop, at least in part, independently of their phonological skills. Consequently, they may have built compensatory strategies to bypass the impediments caused by their poor phonological skills. This point of view is supported by the results of Elbro and Arnbak (1996) in training disabled readers in morphological analysis. They found that the slight benefits from morphological training were gained independently of phonological abilities. This suggests that morphology develops in dyslexic children and may even constitute a compensatory strategy. Studies show that morphological processing is not absent in poor readers (Laxon, 1992). However, the nature of this morphological processing still has to be determined. In all, various aspects in morphological awareness should be considered in the field of reading acquisition, especially when considering the possibility of building compensatory strategies for disabled readers (Casalis, 2004) when dyslexics aged about 12 were asked to name visually presented arrays of five, six and seven digits, they needed more time than younger controls matched for spelling age (Ellis & Miles, 1977).

1.5.3 Vocabulary

It is predictive of a later reading comprehension. Children with language impairments demonstrate a broad range of semantic difficulties, including problems with new word acquisition, storage and organization of known words, and lexical access/ retrieval. Unfortunately, assessments of children's semantic skills are often limited to measures of receptive and expressive vocabulary size. As a result, the semantic deficits of these children may not receive the attention they need (Brackenbury & Pye, 2005).

1.6 Factors affecting learning difficulty

1.6.1 Constitutional aspects of learning difficulty

One of the very early ideas about brain function is phrenology which is devised by the German physician Franz Joseph Gall. Phrenology is a very popular brain science practiced from the middle of the 18th to the middle of the 19th century. Phrenologists believed that they could analyze a person's character from the shape and bumps of his or her skull. They also believed that different parts of the brain were responsible for very specific characteristics, skills and talents. This is the first localization theory.

In 1861, Broca discovered brain language area in the left hemisphere. Soon after that in 1874 Wernicke discovered another language area in and around the sylvian fissure. In 1878, Dr. Kussumaul, a German doctor described a man who inspite of getting adequate education could not learn to read and coined the term – 'reading blindness.' Another German doctor, Dr. Berlin coined the term dyslexia.

In 1892, Dejerine discovered that reading difficulties resulted due to damage to left angular gyrus. A Scottish eye surgeon published a report about word blindness in 1895. In 1925, an American Neurologist Dr. Samuel T Orton, proposed the theory of specific learning difficulty. He also proposed the term 'strephosymbolia' which means "twisted symbols". According to him if one side of the brain had to dominate and become specialized in order to be able to learn. If this did not happen it led to confusion and learning difficulties and thus twisted symbols. This is later dropped and replaced by the term dyslexia. He is optimistic that many of the children could be taught to read with new methods that exploited their other senses -- touch and hearing – which were not impaired.

In 1936, Anna Gillingham published "Remedial Training for Children with Specific Difficulty in Reading, Spelling and Penmanship". This teaching method took into consideration Dr. Orton's recommended teaching methods and till today the method is known as Orton-Gillingham method. Lot of modifications has been made since then but the basic principlehas remained the same. They both went on to establish the Orton institute.

In 1939, Dr.Alfred Strauss & Dr. Heinz Werner published a report of children with wide range of learning difficulties. They emphasized the importance of looking at each child individually to access their particular needs. From the viewpoint of pediatric medicine, it is especially problematic that dyslexia has historically been seen as both an educational

difficulty, involving weaknesses in cognitive and language processing that impede learning to read, and as a neurological disorder, stemming from constitutional differences that may be genetically transmitted (Shapiro,1999).

The Research Group on Developmental Dyslexia from the World Federation of Neurology recommended the two definitions of dyslexia in 1968 which is still in use today. Developmental dyslexia is a condition in which reading development lags behind other academic abilities despite absence of sensory deficits. Adequate opportunity for learning to read has been provided. Sometimes reading level requires to be two years below grade level while other skills may be at grade level. Isabella Liberman did a lot of work to show that deficits in the phonological processing underlie most of the learning difficulties. In 1977, public law 94-172 is passed in the USA ensuring the rights of American children with SLD to 'appropriate evaluation' and 'management' of their problem. In a six year study done by Dr.Galaburda, he found abnormalities in the structure of the brain in the autopsies of dyslexics and interpreted that dyslexia is a normal variation of the human brain rather than being disorder. He hypothesized that during fetal development there is superior development of the right hemisphere (Galaburda, 1985). The United Kingdom too, passed an education act in 1981 which entitled children. In 1998, a major breakthrough is made by professors from oxford- Dr. John Stein and Tony Monaco who approximate the gene site for dyslexia. With the advancement in the scanning techniques –Positron emission tomography researchers led by Prof Rodrick Nicholson were able to demonstrate reduced activity in the cerebellum in dyslexics.

In 1998, the work published in the lancet by Australian researcher Dr. Caroline Rae showed altered ratio of certain chemicals in two areas of the brain which suggested that differences exist in the development of the brain in dyslexics and non-dyslexics (Rae, Lee, Dixon, Blamire, Thompson, Styles, Talcott, Richardson, & Stein, 1998).

A study is done in a Norwegian family which had large number of people suffering from dyslexia. The study is a joint venture involving researchers from United States, Norway and Belgium and is led by Dr. Torrii Fagerheim. Out of the 30 family members studied 11 were found to be having dyslexia and on having their gene analyzed; it is found that one short sequence in their genetic material is causing the problem which is published in the British journal of medical genetics.

Another approach to early identification would be based on behavioral assessments of skills and knowledge that are known to be associated with later differences in reading achievement, and that probably represent strands of preschool development that contribute

causally to success in learning to read. The accuracy of early identification would depend heavily on the reliability of early assessments and on the strength of their predictive relationship with dyslexia (Shapiro, 1999).

1.6.2 Aspects of phonological processing

A lot of work has been done phonological processing and its role in the development of language and reading abilities. Phonological processing is the ability to discriminate phonetic contrasts and includes discrimination of speech sounds, categorical perception (voice onset time, place of articulation) and the ability to segment and manipulate phonemes and larger units (Molfese, 2001).

Research done in people suffering from reading disabilities show that, regardless of their age or mother tongue, have difficulties in finding words(word finding deficit) (Dockrell, Messer, George, & Wilson, 1998; Felton, Neylor, & Wood, 1990; Leonard, 1998; Watson & Willows, 1995; Wiig, Zureich, & Chan, 2000; Wolf, Miller, & Donnelly, 2000; Wolf & Obregon, 1992). A word finding deficit has been defined as a problem in generating the specific word evoked by any given situation (Rapin & Wilson, 1978). Children with reading difficulty have problems name measuring tasks and spontaneous oral language. Children with dyslexia also have been found to have subtle dysnomia (Wolf & Obregon, 1992). Dyslexic children have deficits in phonology. Children with specific language impairment (SLI) have primary oral language deficit especially in morphosyntax (Bishop, 1997). Some studies show that this deficit impairs the development of reading comprehension and some aspects of word recognition (Catts et al., 1999). Catts' study suggested that ability to produce speech sounds distinctively may be less important than phonological awareness. Strong predictors of reading in kindergarten were phonological awareness and rapid naming skill (Snowling, 2000).

Study done by Puolakanaho et al show that phonological awareness can be assessed using age adapted tasks long before formal reading instruction. The methods used were phonological awareness at 3.5years of age. The subtasks were word level segment identification (WI) (The child's task is to identify the object that contained the requested part of a compound word). Syllable- level segment identification (SI) (target units consisted of subword elements), Synthesis of phonological units (SY) The child hears segments of varying size (words, syllables, phonemes) that were presented using a 750-msec pause between each segment, and she or he is asked to produce the targeted animal name, and

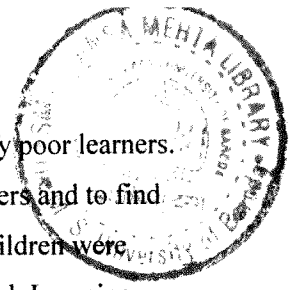
Continuation of phonological units (CO) The child is given the beginnings of "secret" words and asked to guess how the words continue.

Some studies have shown that there is significant relationships between the children's reading ability and several of the family related variables, the strength of these relationships is not high (Olofsson, 1999). The significant relationship between a child's interest in being read aloud to and later reading ability may indicate the existence of bidirectional mechanism of parent- child interaction. This could be an early expression of the dislike or difficulty with the written language (Olofsson, 1999).

1.6.3 Phonological awareness and its role in children at familial risk of learning difficulty

Studies done by Puolakanaho et al indicate that familial risk for dyslexia is reliably reflected in emerging phonological awareness already at this early age and it can be assessed independently of other language skills. The difference between the at-risk and control group at 3.5-year in phonological awareness remained significant. When the children are learning to read i.e. the reading acquisition phase they become aware of the phonological element of speech while learning the alphabetical code and this leads to a growing alphabetical skills. (Morais, 1991; Vellutino, Scanlon, & Chen, 1995; Wagner, Torgesen, & Rashotte, 1994). Both reading and phonological skills are known to be strongly genetically transmitted (DeFries et al, 1991; Pennington, 1995). Pioneering work done by Scarborough showed that children with familial risk had difficulties in pronunciation accuracy, deficiency in utterance length and syntactic complexity at 2.5 years. They showed difficulty in object naming and receptive vocabulary at 3 years of age. Such deficiency became evident when they were assessed at 5 years of age. These very children were labeled as reading disabled at 8 years of age (Scarborough -1989, 1990, 1991). Studies done by Byrne, et al. (1997) found that at risk children at 4 years 7 months had difficulty in initial phoneme identification but not in rhyme awareness. On assessment at 6 years of age Elbro, et al. (1998) demonstrated phoneme identification, letter naming, and distinctness of phonological representations were predictors of dyslexia.

In a study done by Gray on preschoolers with specific language impairment who spoke English as their primary language and were in the age group of 4-6 years, they wanted to determine whether phonological memory or semantic knowledge tasks predicted word



learning success and whether performance on these measures helped to identify poor learners. Also, it is to identify children who were poor word learners relative to their peers and to find out if phonology or semantics contributed to their word learning problems. Children were tested when all of them had received equal learning opportunities for each word. Learning probes were considered more stringent measures of learning as they measured consistency of performance across time. Also, a drawing task is used to test the change in child's semantic knowledge. Tests administered were non word repitition task, semantic spontaneous naming task, semantic drawing task, semantic vocabulary task- naming and semantic vocabulary task- recognition. It is found out that 30% of the children with SLI learned as many words as the NL group, 30% performed similarly to their SLI peers. 35% were considered poor learners relative to the SLI group. Coincidently, they found one child in the normal group also as a poor word learner. Lexical knowledge which is measured by the semantic drawing task is found to be a significant predictor of word learning production which is consistent with other research findings.

1.6.4 Poor learners and normal learners

Previously, also researchers have found that there is positive relation between existing lexical knowledge and their ability to learn new words (Gray, 2004; Gathercole & Baddeley, 1990) or to name objects successfully (McGregor, Friedman, Reilly, & Newman, 2002). It is important to develop local norms for SLI groups as every poor learner in the above study performed below the SLI group mean for PPVT-III (Peabody picture vocabulary test-3rd edition). Surprisingly, this level of performance would not be taken seriously by clinicians or researchers. The standard score for poor learner is falling within the normal range. So, another important identifier for poor word learners could be PPVT-III. The Spelt-II, a language test designed to assess expressive grammatical morphology is a significant predictor for the number of words children learned to produce but is not able to identify poor word learners. The means for poor and normal learners were significantly different on this measure (Gray, 2004). This study found out fast mapping comprehension predicting word- learning comprehension and fast- mapping production predicting word- learning production (Gray, 2004).The non word repetition task which short term phonological memory predicted 31% variance associated with the number of trials children required to reach learning criterion for production but the scores on this task did not differ for the normal and poor learners. Most of

the time poor learners have enough semantic knowledge to convincingly draw the object that they could not consistently name (Gray, 2004). The semantic knowledge is tested by asking the patient to draw target objects. It is also seen that when they could not do so they also did not reach the criterion for production of the word. There is evidence that children with SLI fast map fewer semantic attributes of objects than normal learners (NL) peers(Alt, Plante & Creusere, 2004) and poor naming is associated with limited semantic representation (Mcgregor, et al. 2002). That is why poor learners could not produce some of the words consistently. Some studies have also shown that there is a relation between accurate semantic representation of a word with poor naming and storage and retrieval of its phonological form (McGregor, 2002).Gray found this to be the case most of the time in their study too. They found out that for most words poor learners had enough phonological representation to consistently comprehend and recognize new words and to draw their referents but they could not consistently produce the words (Gray, 2004). Poor word learners have difficulty in both semantics and phonology, with the production of new words. This is the biggest obstacle in their way.

1.6.5 Naming deficit and speed deficit and its role in learning difficulty

Also naming speed deficit and phonological deficit are now increasingly being evidenced as being specific to children with specific learning difficulties (Swan & Goswami, 1997; Wolf & Obregon, 1992). Picture naming deficit is explained on the basis of difficulty in specifying and retrieving the phonology of names as concluded by Swan and Goswami in their study. Also, they found out the difficulty in naming is most evident in complex names which were especially long, low frequency in nature. Studies have shown that developmental dyslexia can be predicted by the deficit in the ability to retrieve verbal labels (Badian, 1998; Denckla & Rudel, 1976; Wolf, Bally, & Morris, 1986). Similar conclusion is also reached by other researchers who found the core deficits in phonological skills (Manis et al., 2000). The speed with which children with learning difficulty are able to name objects in speed naming tasks (RAN-Rapid automized naming and RAS-Rapid alternating stimulus) is different. Children with learning difficulty respond slowly. The results correlate with the severity of the problem. The more the severity, the more is the difficulty and the reaction time gets prolonged. Performance on theses tests have been found to be predictive of later learning disabilities (Denckla & Rudel, 1974, 1976; Katz, Stecker, & Henderson, 1992; Murphy,

Pollatsek, & Well, 1988; Wiig, Zureich, & Chan, 2000; Wolf, Bally, & Morris, 1986). Also children with dyslexia seem to manifest these naming problems in their daily routine spontaneous speech in form of hesitation, repetitions, use of non specific words, substitution, reformulation and stereotypic starters (Dockrell, Messe,George, Wilson, 1998; German & Simon, 1991).These behaviors try to hide their word naming problem but sometimes leaves the listener confused as the content of the lines spoken do not actually convey the meaning(Faust, Dimitrovsky, & Shacht, 2003).The researchers feel that their could be a possible connection between the word naming problem which presents early and the later reading problem as hypothesized by some as the specific retrieval hypothesis (Wolf & Bowers, 2000; Wolf & Obregon, 1992). It is important that this should be identified, examined and assessed and treated systematically as this learning difficulty has a major impact on the communicative and academic skill of the child and also on his behavior. The major hurdle is that these deficits are as of today poorly understood and understudied, so developing effective protocol for intervention is difficult (Faust, Dimitrovsky & Shacht, 2003). Some researchers also feel that the naming speed deficit could be a second core deficit which is independent of phonology (Lovett, Steinbach, & Frijters, 2000).The words the children have difficulty in retrieving seems to be comprehended by them (Faust, Dimitrovsky, & Davidi, 1997; German, 1992; Swan & Goswami, 1997).

With advancing research, models are being made which are able to distinguish the different sub processes involved in the lexical retrieval. These help in identifying the underlying impaired mechanism in children with learning difficulties (Faust, Dimitrovsky, & Shacht, 2003).The identification of specific causes of naming deficits may lead to the development of more effective made-to-order treatment protocols. Levelt et al (Bock & Levelt, 1994; Indefrey & Levelt, 2000; Levelt, 1992, 1999; Levelt, Roelofs, & Meyer, 1999) developed a two stage model of lexical access. According to this model, to produce a spoken word –the information about words is retrieved from memory in order to map a lexical concept onto an articulatory program (Faust, Dimitrovsky & Shacht, 2003). The activation of a particular lexical concept will in turn activate the specific lexical item associated with that concept. The first stage in this process, lexical selection, is the retrieval of the appropriate word given the lexical-semantic representation. This result in retrieval of a lemma, which makes available the semantic and syntactic information associated with that specific lexical item, the lexeme. The retrieval of this phonological form is the starting point of the second stage of lexical access, phonological encoding. This takes the stored phonological form of a word and produces a phonetic plan, which is the input to the final stage of speech production.

The lexeme contains sufficient information to specify both the segments of a word (phonemes) and its metrical structure (number of syllables and their weight or stress) (Faust, Dimitrovsky, & Shacht, 2003).

According to this model, each word finding error could reveal something in the underlying impaired linguistic system. When the incorrect lemma is retrieved, a semantically related real word results. When the phonological word form is misaddressed, a phonologically related real word results. However, other researchers have shown that a lexical-semantic and a lexical form deficit can yield the same error types in picture naming (McGregor, 1994; Miceli, Amitrano, Capasso, & Caramazza, 1996).Methods currently used to study naming deficits like RAN and RAS tests do not give much information regarding the underlying difficulty. They measure the speed of the word retrieval process as a whole. They also do not differentiate between the different types of naming deficit.

1.6.6 Tip of the tongue and its relationship with learning difficulty

Tip of the tongue experimental study is based on the hypothesis that speaker knows the word but experiences a temporary breakdown in lexical retrieval. The children function correctly in the first stage of lexical access (lemma retrieval) but the retrieval of phonological form fails. Due to this children with dyslexia often have difficulty in word finding – manifesting intact verbal semantics together with all loss of information about the phonological representation of the target word (Faust, Dimitrovsky, & Shacht, 2003).Thus, TOT (tip of the tongue) states provide a means of isolating phonological processes within a conceptually driven task (Rastle & Burke, 1996).children with dyslexia are less accurate in naming pictures than their peers. In the study done by Faust et al. children with dyslexia had fewer correct responses, spontaneous recalls, and correct recognitions, and they had more TOT responses than the typically reading children. Don't know (DK) responses reflect an actual lack of knowledge, whereas valid TOT responses are believed to be the result of retrieval failure when there is at least partial knowledge (Wolf & Segal, 1992).Studies have shown that children with dyslexia difficulty in retrieving the phonological codes of known picture names, rather than an actual vocabulary deficit. Studies done by Swan and Goswami (1997) that dyslexic children recognize significantly more unnamed target words than either typically developing readers. Children with dyslexia have a specific difficulty in the retrieval of known names on demand whereas poor readers have an impoverished vocabulary level.

When children with dyslexia cannot name a word, they often recalled a semantically or phonologically similar word. They produced more semantic and more phonological substitution than the typically achieving readers which indicate appropriate access of the semantic representation but difficulty with phonological representation (Lahey & Edwards, 1999).

In these children, the semantic substitutions were not caused by a semantic processing impairment. Thus, both types of substitution errors found in children with dyslexia seem to reflect deficits in the phonological representation of the target word (Faust, Dimitrovsky & Shacht, 2003). These children appear to know the full meaning of the target words but the major difference seen is that when they could not name the word; they provided less valid phonological information. These findings are consistent with claim that dyslexic children have deficient mapping of phonological representation (Swan & Goswami, 1997). Due to this children erroneously select phonologically similar words and non words in the recognition test. Furthermore, the relative ineffectiveness of phonological cueing on word retrieval may also point to a phonological processing impairment. When the children with dyslexia initially reported a TOT state, their success in later recognizing the target word in a recognition test is significantly lower than that of the typically developing readers. FOK refers to a person's belief that he or she could retrieve or recognize an unrecallable target word if he or she were given more powerful hints or cues. In typically developing participants, FOKs are correlated with subsequent recognition performance, and the accuracy of FOKs increases with age (Koriat & Lieblich, 1974; Schwartz, 1999; Wellman, 1977). The children with dyslexia were less able to correctly differentiate words they did not know from words they knew but temporarily could not retrieve, with their relative lack of valid partial phonological information perhaps contributing to the inaccuracy of their FOK judgments (Faust, Dimitrovsky, & Shacht, 2003). Study done by Faust et al too showed a strong relationship between various kinds of phonological responses elicited by the participants when they experience retrieval failure and measures of phonological awareness. Their study suggests that difficulties like word finding deficit and reading difficulty experienced by children with dyslexia could be due to basic deficit in the representation of speech sounds.

Models have been proposed by various researchers that there is a disconnection between lemmas and phonological forms. The models suggest that the target lemma is selected successfully but the phonological form of the target word is not selected. This leads to lexical retrieval deficit. They are able to give semantic information on the missing target

word. This shows that there is possibility of strong predictive relationship between the phonological aspect of naming, phonological awareness and reading. This opens up avenues for early identification and treatment of children with dyslexia. The type of intervention which would be most effective becomes clear. Children whose naming deficit involves the phonological but not the semantic component would require intervention stressing on phonological representation. Such treatment may help by enhancing phonological output representation or by increasing access to these representations. There is evidence that such intervention has led to significant improvement in naming ability. It has been suggested that children with word retrieval problems may benefit from treatments that contrast the sound characteristics of rhyming words and other minimal pairs, in order to help them differentiate naming targets from competing phonological neighbors (McGregor, 1994). Other suggestions for phonological treatments of naming problems include specific methods (e.g., repetition, reading aloud, orthographic cueing) aimed at the activation of the phonological representation of words in the output lexicon (Basso, Marangolo, Piras, & Galluzzi, 2001), as well as phonological treatment that includes an opportunity to make a choice and reflect on the word form (Osborne, Hickin, Best, & Howard, 1998). According to these suggestions, encouraging reflection on the phonology of words may be important in giving insight into word finding problems and in the transition from immediate, externally cued improvement to what has been internalized and may be used in accessing items other than those specifically treated.

1.6.7 Visual Spatial Abilities and Learning Difficulty

It has been proposed by some researchers that there is association dyslexia and visual –spatial talent (Geshwind & Galaburda, 1985) and suggested that there such individuals excel in the fields of engineering, architecture and art. This is termed as the pathology of superiority. Some evidence has been shown that dyslexia is overrepresented in these fields of spatial (engineering, architecture and art) and in other vocations that require a high visual spatial orientation (Tobias, 2004) which could be due to relative strength in visual spatial versus verbal areas. Models proposed are deficit model and compensatory models. Retrospective case studies of famous inventors or mathematicians have shown that even though not diagnosed as dyslexic they had reading and language problems with strengths in visual spatial areas example studies done on inventors like Thomas Alva Edison, Leonardo Da Vinci, Michael Faraday and visual artist like Charles Marion Russell and Auguste Rodin. Students majoring in Math, science or Arts are more likely to have a past history of dyslexia

rather than in humanities or social science (Von Karolyi & Winner, 2004). Very young children with high visual spatial difficulties have been found to have language difficulties (Von Karolyi & Winner, 2004).

Two hypothesis have been proposed on this basis –

1) The Default hypothesis (Winner, Casey, DaSilva, & Hayes, 1991)
2) The Channeling hypothesis (Winner, von Karolyi, Malinsky, French, Seliger, Ross, & Weber, 2001).

Models

Deficit models- Deficit models are differentiated on the basis of pathology. Reading problems are either in isolation or a part of the broader pattern of the spectrum. Here it is proposed that the individual will have either average or inferior visual spatial field.

Default hypothesis- Individuals without dyslexia do not differ from individuals with dyslexia in the visual spatial ability. As they are unlikely to succeed in the areas requiring verbal strength, they enter into the areas of visual spatial ability by default. People without dyslexia enter into such fields due to their strength in visual spatial ability. So, the default hypothesis proposes that individuals with dyslexia in the visual spatial field would be having weaker spatial skills than individuals without dyslexia in the visual spatial field.

Channeling models proposed that individuals with strength in visual spatial field and dyslexia choose spatial professions due to the barrier in the verbal field. Individuals with dyslexia who go into spatial professions should have spatial skills equivalent to professionals in the spatial filed who have no dyslexia.

Compensation hypothesis- Compensation model proposes that individuals with dyslexia have deficit in one area and it is balanced by skill enhancement in another area. These models suggest that dyslexia is not a pathological condition but insist that it is a distinct style of processing that have some adaptive value. These models hypothesize that individuals with dyslexia have absolute strength in one or more visual spatial areas.

Specific Talent hypothesis - Compensatory talent in specific areas have been proposed in this theory which such as superior abilities in music or athletics or visual spatial areas. Pathology of superiority hypothesis (Geshwind, 1982) also suggests that deficit in one area is linked to compensatory strength or strengths. Many visual spatial skills are mediated by the right

hemisphere. Compensatory growth of right hemisphere could lead to atypical symmetric brain as seen in some dyslexics (Galaburda, Sherman, Rosen, Aboitiz & Geschwind, 1985). The nature of this relationship between dyslexia and visual spatial abilities remains unclear and further research needs to be conducted before arriving at a conclusion. Findings of absolute strengths in visual spatial abilities are scarce but they do exist (Von Karolyi & Winner, 2004).

1.7 Implications of learning difficulty:

1.7.1 Psychosocial problems:

Children with reading difficulties face a lot of emotional problems. Some times these become manifest before their academic failure becomes apparent. A child once considered bright in the preschool classes where reading and writing is not involved and minor difficulties in phonology often get missed but as academic demands increase, the child starts getting isolated. Their experience of alienation and feelings of loneliness have been highlighted by Margalit (1991). Low level of social acceptance, peer rejection and problems in making friends were repeatedly considered to be a secondary impact of reading difficulties and this is predictive of the negative experience of social isolation and loneliness (Asher, 1990, Parker, 1993). Benasich (1993) reported on the basis of his longitudinal study that girls who were language impaired were found to be socially withdrawn than other girls. They were shy, timid, wouldn't talk, aloof etc, Expressive language impairment at age 4 years significantly predicted social withdrawal behavior at age 8 years. Boys, on the other hand, with language impairment were found to be more hyperactive, than controls. Language impairment at age 5 years is associated with an increased risk of psychiatric disorder at age 19 years (Beitchman, 2001).

1.7.2 Later problems due to learning difficulty

Caulfield and colleagues identified a significantly increased rate of shyness or fearfulness in new situations in these children. Such children also find problems with bedtime (going to sleep, sleeping through the night, or remaining in own bed through the night—potentially anxiety-related issues) (see Caulfield, 1989). Beitchman and colleagues also noted an increased rate of anxiety disorders in children evaluated at age 5 years (Beitchman, 1986).

Studies have shown that children who get identified later as suffering from reading difficulties did have delay in the acquisition of oral language skills including vocabulary, grammatical expression and phonological deficits (Gallagher, 2000).Failure risk is the greatest in children who have both oral language and phonological processing (Catts, 1999). Such findings have led to the view that dyslexia and specific language impairment may be the part of the same spectrum (Tallal, Dukette, & Curtiss,1997). This has lead to the formation of severity hypothesis, which maintains that children with dyslexia and SLI have qualitatively similar impairment, differing in degree (Snowling, 2000). Severely affected children have frank difficulties in spoken language. Those having milder impairment may have early language but are less likely to be diagnosed but such children's problems are diagnosed when they come to higher classes. The reading problems seen in specific language impairment have the same underlying defect as seen in dyslexia. It is only the severity which is different (Snowling, 2000).

1.8 Theories of Dyslexia

1.8.1Traditional theories of Dyslexia

Dominance Failure

Samuel Orton's theory of dyslexia: The brain is divided into two cerebral hemispheres and they are interconnected to each others by bundles of nerve cells called corpus callosum. Each hemisphere controls the opposite side of the body. The left hemisphere controls the language, speech and the right hemisphere controls functions like visual spatial orientation skills. The hemisphere which controls the language skills is called the dominant hemisphere. The hand that we use for most of our work is called the dominant hand and this is called laterality. Usually the laterality and the dominant hemisphere correspond i.e. left hemisphere controls the language and the right hand (preferred hand). According to Orton one side of the brain has to dominate over the other for the child to learn some specialized function. When this fails to happen there is difficulty in learning which Orton called twisted sign – "Stephosymbolis'.

The Geschwind-Galaburda hypothesis

Norman Geschwind and Albert Galaburda hypothesized in their published work in the archives of neurology in 1985 that dyslexia is a part of symptom complex which includes allergies, left handedness, autoimmune diseases, great visual abilities and creativity. They linked high testosterone levels in mother during the first trimester which caused alteration in the child's brain structure.

The Temporal Processing Hypothesis

Defects have been found in magnocellular (big cell) system between the eye and the part of the brain that processes visual information.

The Automatization Deficits Hypothesis

Nicolson & Fawcett at University of Sheffield have developed yet another hypothesis of the basis of dyslexia. They discovered that dyslexic children have problems doing things that are automated in normal readers. They can do it properly only if they can compensate for their atomization deficit. Dyslexic will have difficulty in standing on one foot if they are blindfolded but if vision is restored they will do so properly.

1.8.2The modern theories of dyslexia

Phonological Theory

A lot of work has been done phonological processing and its role in the development of language and reading abilities. Phonological processing is the ability to discriminate phonetic contrasts and includes discrimination of speech sounds, categorical perception (voice onset time, place of articulation) and the ability to segment and manipulate phonemes and larger units (Molfese, 2001).Some phonological skills are present at birth too that help the infant discriminate speech sounds. Molfese and Molfese showed that phonological discrimination is present at birth for some phonemic contrasts (e.g., place of articulation;

Molfese & Molfese, 1979b, 1980, 1985) and by age 2 months for others (e.g., voicing contrasts; Molfese & Molfese, 1979a). Subsequent studies showed that these patterns of discrimination stabilized by 3 to 4 years of age in lateralized responses to place and voicing differences in speech sounds (Molfese & Hess, 1978; Molfese & Molfese, 1988). Further studies revealed that these differences in newborn ERP(Event related potential) components were strongly predictive of performance on language tasks at 3 and 5 years of age (Molfese, 1989; Molfese & Molfese, 1985, 1997) and predictive of reading scores of 8-year-olds (Molfese, 2000). Also they appear to be sensitive to phonetic contrast of other languages (Eilers, 1977; Eilers, Wilson, & Moore, 1977). In the later part of infancy there is a change towards sensitivity to contrasts unique to the infants' language environment, which appears to facilitate language acquisition (Molfese, 2000). Recent research has suggested that dyslexia to a large extent is a language based disorder and can be predicted from language development during the pre reading stage (Catts, 1989, 1996; Scarborough, 1990, 1991; Olofsson & Nidersoe, 1999). If dyslexia or learning difficulty is identified on the basis of reading performance, children will not be identified till they are already in the primary school. Once children start having difficulty in reading they experience a lot of negative consequences (Spear-Swerling & Sternberg, 1994; Olofsson, 1999).Research based evidence shows that core deficit in children with dyslexia may be the phonological deficit (Rack, 1994; Elbro,1996). This theory postulates that there is specific impairment in the representation; storage and retrieval of speech sounds (Ramus, 2001) Researchers have identified a lot of predictors in the areas of phonological processing. In particular task demanding explicit. There is significant connection between early language measures and reading skills in the early school years (the first four years). This relationship is much stronger after the onset of reading instruction (Olofsson, 1999). Their study on early language development and phonology suggests that there is continuity from early development in phonology to learning to read eight years later the areas where phonology seems to be involved is in speech production, in working memory and in language awareness.

It tries to explain that the ability to read requires grapheme-phoneme correspondence –letters being converted into their constituent sound of speech. If there is difficulty in representation of these sounds, storage or retrieval, the reading system is affected (Snowling, 1981; Brady & Shankweiler, 1991; Ramus, 2003). This theory tries to find a direct link between cognitive deficits and behavioral problems (Ramus, 2003). The level of lesion has been localized at the perisylvian brain area of the left hemisphere which is the area of phonological and orthographic representation (Ramus, 2003). Anatomical work (Galaburda,,

Sherman, Rosen, Aboitiz, & Geschwind, 1985) and functional brain (Shyawitz, 1998; Shaywitz, Shaywitz, Pugh, Mencl, Fulbright, Skudlarksi, et al. 2002) imaging support the left perisylvian localization.

Explicit phonological awareness such as identifying the first sound in a word, blending phonemes into a word or analyzing the constituent sounds in a word have emerged as effective predictors of reading development (Brady & Shankweiler, 1991; Elbro, 1996; Leong, 1991; Sawyer & Fox, 1991). Experimental research has shown that phonemic awareness training in kindergarten on successful reading abilities (Ball & Blachman, 1991; Kozminsky & Kozminsky, 1995; Lundberg, Frost & Peterson, 1988; Olofsson, 1993; Schneider, Kuspert, Roth & ViseMarx; 1997).

Magnocellular Theory

For a person to read, one needs to have good orthographic skills to recognize the visual form of the written words (Stein, 2001). The visual magnocellular system helps in timing the visual event when reading. It signals any visual motion that occurs if there is any retinal slip (unintended movement leading to images moving off fovea). These signals bring the eyes back on target. The visual motions are very important in order to develop orthographic skills. In dyslexics this is impaired. In dyslexics the development of magnocellular layer in lateral geniculate body is impaired – the motion sensitivity is reduced, many dyslexics show unsteady binocular fixation, hence poor visual localization especially on the left side (left neglect) (Stein, 2001). Letters appear to move around and cross over due to poor binocular instability and visual perceptual instability (Stein, 2001). For good phonological skills, one needs to have high frequency and amplitude modulation sensitivity well developed. The magnocellular system in the cerebellum contributes to binocular fixation and inner speech for sounding out words and this is clearly defective in dyslexics (Stein, 2001). Magnocellular theory postulates that magnocellular dysfunction involves the visual pathway as well as the auditory and tactile pathway (Ramus, 2003).There seems to a genetic basis to this impaired development. The linkage has been identified on the short arm of the chromosome 6 in the region of major histocompatibility complex class 1 which helps to control the production of auto antibodies. The magnocells development gets impaired due to auto antibodies. The down side to all this is that in persons who have underdeveloped magnocellular system have a better developed parvocellular system that control holistic,

artistic and entrepreneurial skills (Stein, 2001). The drawback of magnocellular theory is its inability to explain the absence of sensory and motor disorders in a large number of dyslexics (Ramus, 2003). This theory has been gaining criticism as a number of studies have not been able to replicate findings of auditory disorder (McArthur & Hogben, 2001). Some studies have found auditory deficits in only a subgroup of dyslexics (Marshall, Snowling, & Bailey, 2001; Ramus, 2003).

Visual Theory

It is postulated that visual system has two different divisions –the magnocellular and the parocellular. It is postulated that the magnocellular pathway is disrupted and the parvocellular pathway is intact. The selective disruption of the magnocellular pathway leads to deficiency in the visual processing and through the posterior parietal cortex to abnormal binocular control and visual spatial attention (Stein & Walsh, 1997; Hari, Renvall, & Tanskanen, 2001). The visual theory emphasizes a visual contribution to the reading problems. Evidence for this comes from studies which show anatomic abnormalities of the magnacellular layer in the lateral geniculate nucleus (Livingstone, Rosen, Drislane, & Galaburda, 1991).

Cerebellar Theory

It is postulated that cerebellum is mildly dysfunctional due to which a number of cognitive issues crop up. As it is known that the cerebellum plays a major role in motor control and speech articulation. This theory postulates that due to a dysfunction in articulation, it leads to phonological deficit. Cerebellum plays a role in automatization of over learned task like driving, typing etc. due to dysfunction in the cerebellum, automatization is weak which leads to poor automatization of phonemes, graphemes etc. Lot of studies show support for this theory in the form of poor performance of dyslexics in motor tasks, impaired automatization of balance, time estimation etc. (Fawcett & Nicolson,1996; Nicholas & Fawcett,1990; Ramus, 2003; Nicolson, Fawcett, & Dean, 1995)

Rapid Auditory Processing Theory

This theory tries to explain the deficits on the basis of deficit in the perception of short and rapidly varying sounds. Evidence to support this theory arises from the fact that dyslexics show poor performance on a number of auditory tasks, frequency discrimination and temporal order judgment (Tallal, 1980; Nagarajan, Mahncke, Salz, Tallal, Roberts, & Merzenich, 1999; Ramus, 2003,). The difficulty in differentiating phonemic contrasts like /ba/ versus /da/ is due incorrect representation of short sounds and fast transitions. There is also evidence that dyslexics may have poorer categorical perception of certain contrasts (Serniclaes, Sprenger-Charolles, Carré, & Démonet, 2001; Ramus, 2003). According to this theory auditory deficit is the direct cause of the phonological deficit and hence of the difficulty in learning to read (Ramus, 2003). The original version of the auditory theory did not explain it at the biological level but is now specified within the magnocellular theory.

1.9 Methods used to identify learning difficulty

Conducting tests developed for older children to identify learning difficulty on younger children becomes questionable as levels of development in reading and writing areas are age dependent. So, if one tries to identify the precursors of learning difficulty in younger children, one may be more successful in identifying them early and remediation might be done at the right time to prevent long term complications.

1.9.1 Need for early identification of learning difficulty

There may be confusion regarding the age at which children should be labeled as having dyslexia but there is overwhelming research which supports that early identification and intervention benefits children as early as two years of age (Steele, 2004). The most important advantage of early identification and intervention is that it provides a foundation for later learning and thus, can help in later academic success (Peltzman, 1992; Soyfer, 1998). In addition early identification help in preventing secondary problems like anxiety and frustration from occurring (Catts, 1991; Lowenthal, 1998). The importance of early identification lies in the fact that that if identified early, these children can be intervened early which improves their academic foundation and helps them to develop their potential which

leads to academic success later in life (Peltzman, 1992). The worst part of not being identified early is that children lose the motivation to read and write due to which they go down further in their academics (Catts, 1997).

Also it prevents secondary problems from developing like frustration, anxiety, dropping from school, behavior problems and developing greater academic deficiencies (Catts, 1991; Lowenthal, 1998).If children are identified early and intervened early, they can be integrated into regular schooling programme and this prevents the need for extensive special education programme. Studies show that early phonics instruction, for example, prevents later reading deficits and enhances early reading and writing experiences (Vandervelden, 1997).

With the pros come the cons, the stigma of labeling children so early, which can be avoided. The availability of the tests, cost factor and standardization too comes into consideration. Early identification of LD is difficult because the required underachievement in an academic area does not clearly relate to young children (Steele, 2004). Instead of delaying the identification and intervention until the child is in even more trouble, it is important to realize that the technical definition is not required for young children with LD to receive services. More general labels such as developmental delay or at risk can be used instead, avoiding some of the above concerns (Steele, 2004).

1.9.2 Strategies for identification in preschool areas

All children need to be taught skills to help them in academics. The skills are learnt faster if they are taught in developmentally appropriate ways. These all issues become more important when they are having a difficulty or are lagging behind. It becomes appropriate to start at the level they are at and then help them progress and come to age appropriate level. Interventions with activities that are routine are most effective (Lowenthal, 1998; Steele 2004).

Studies conducted pay a lot of importance on the teacher's observation strategies and judgment of progress. Using observation as one of the diagnostic tools is one of the way to get the benefits of early identification without the stigma of labeling. Teachers play an important role where they can identify the child at risk and take appropriate steps early. The area where the teacher can identify early would be the oral language area. Catts (1997) suggested that difficulties with morphology, syntax understanding words and sentences

orally, awareness of speech sounds, word retrieval, word memory and speech production can be used diagnostically. These parameters correlate with later problems in word recognition and phonics. As these can be observed prior to formal reading-they are good indicators of future reading difficulties. Also, he designed a list of observations – trouble with rhyming, difficulty remembering the alphabet, difficulty following directions, frequent mispronunciations, trouble understanding stories, small vocabulary, and short disorganized sentences when talking for identification and further referrals (Steele,2004).Other studies also show that behavior problems like hyperactivity, in coordination, perseveration, impulsivity, processing deficit, distractibility and memory problems (Lowenthal,1998; Peltzman,1992). In kindergarten readiness skills such as listening, following directions, dressing, appropriate attention span; and prerequisite academics such as alphabet skills, rhyming, colors, counting, and copying can be observed (Lowenthal, 1998). Alert teachers can identify children with learning difficulties if they notice certain difficulties like talking with words in correct order, understanding sentences said aloud, remembering specific words when talking, remembering what they hear, participating in rhyming games and activities, remembering the alphabets, following directions, pronouncing words correctly when speaking spontaneously, understanding stories read aloud, using words properly when speaking, talking with organized sentences and thoughts, sitting still, attending to tasks, remembering what they see, impulsive, difficulty focusing on a topic, listening to stories for an extended period, dressing, identifying colours, counting and copying (Steele, 2004).

1.9.3 Preschool programs for children with learning disabilities

Increasing awareness in society and active parent advocacy has increased the need and demand for these early intervention programmes. There are different approaches for these children with learning disabilities. The different approaches tried are child development approach, psycho educational approach, behavioral approach, cognitive-developmental approach, diagnostic perceptual approach and perceptual motor model (Esterly, 1987).Each model has different approach towards intervention.

The child development model stresses on self initiated exploration and non structured approach. It pays special importance on social and emotional development and achievement of milestones. The role of teacher in this model is to provide instructions appropriate to the child's developmental level (Esterly & Griffin, 1987; Hanson, 1984; Lewis, 1980). The

psycho educational model stresses the development of personality, motivation and self-concept. Learning is believed to be due to interaction between the environment and maturation. The teacher can play an important role as the facilitator of play imitation and conflict resolution (Esterly &Griffin, 1987; Hanline 1985).The behavior model maintains that child's environment is the most important and can be structures to bring about the desired effect. Teachers can help in manipulating external variables with reinforcement, repetition, measurable goals, observable behavior (Esterly&Griffin, 1987, Clark, 1984). The cognitive developmental approach pays importance on the sequential development of child's intellectual structure. Viewing child as an active learner underlies the intervention (Reid & Hresko, 1981; Esterly& Griffins, 1987). The diagnostic-perspective approach pays importance on the dual role of heredity and maturation equally. Teachers can help by keeping a match between the skills being taught and the developmental age of the child. Detailed attention is given to the child's achievement of developmental milestones. Child needs to be assessed for his development and depending on that certain skills are targeted for remediation.

The environment is then structured to train these skills (Clark, 1984; Esterly & Griffins, 1987). The perceptual-motor model pays attention on spontaneous learning in an organized environment. Materials are sequenced to promote error free learning and importance is paid on sensory, motor and language development. This is based on the hypothesis that higher cognitive skills can be achieved by the use of perceptual skills (Esterly, 1987; Hresko & Reid, 1981). Early language-based interventions when the child is in preschool or kindergarten hold the greatest promise for improving social and emotional and academic outcome (Sundheim, 2004).

1.10 Intervention for learning difficulty

Various models have been put forward by researcher regarding intervention in children with learning difficulties. These four models are the Medical Model, Psychological Process Model, Behavioral Model, and the Cognitive/Learning Strategies Model (Algozzine, Henley, & Ramsey, 1993).

1.10.1 Intervention through teaching

Huey, in 1908 compared the development of fluent reading to psychomotor skills such as playing tennis and reading. In his classic review of 19th-century reading research, Huey (1908) likened the development of fluent reading to the development of other psychomotor skills such as playing tennis, remarking that both skills benefited from practice. The school teacher's role does not just get over with early identification. They can intervene early in teaching strategies so that the child has better chances to overcome his reading difficulties. He gets a better chance of working on his drawbacks and improving them if not overcoming them completely. Allen and Schwartz (2001) recommend short tasks with familiar materials, individual workspaces, choice of activities, clear organization and preparation, and clear transitions (Steele, 2004).Children with learning difficulties benefit better if task are broken up into small segments, done consistently, repeated regularly and routinely (Steele, 2004). The teachers can help with the following activities when teaching children who are at risk for learning difficulty- use material that are familiar to the children , give them more space, allow them some choice in their activities, help them in organizing and preparing tasks, plan clear transition between activities, expand the words into sentences, provide good language models, teach phonic skills, label objects around classroom, use rhyming activities, clap out syllables, play alphabet and vocabulary games, use all this in topics the child is interested in, have them participate actively, multisensory activities, have children dictate stories and ideas, practice with sound, read aloud to the child, use finger play, incorporate songs in lessons, use puzzles, memory games, have children count objects, incorporate group activities, play memory games, break tasks into small activities, repeat new learning frequently, these all help in making child's first school experience pleasant and successful(Steele, 2004).

1.10.2 Medical Intervention

The medical model takes into consideration the neurological symptoms and functions and Intelligence testing and different medications administration. This model tries to determine a cause and is used in 1940s and 1950s (Caletti, & McLaughlin, 2003).

1.10.3 Psychosocial Intervention

With regards to social and behavioral problems noticed in these children, like sharing, getting along with others, impulsivity needs to be addressed and worked upon. Self esteem too needs boosting up. Strategies like taking away the toys, time out, or not allowing them to participate in their favourite activity can be used. It is important to establish clear rules, review rules frequently for prevention and using consequences consistently (Klien, Cook, & Richardson-Gibbs, 2001).

The psychosocial model used in the 1960s shifted the focus from medical to educational. Structured pull out programs and special classes were used for the treatment. The main aim is to change the behavior that accompanied the learning difficulties and identify the differences and work with such children. This helped raise the teachers' and public awareness (Caletti, & McLaughlin, 2003).

1.10.4 Behavioral Intervention

The behavioral model came into play in the 1970s due to lack of success of psychological process model in improving the academic outcome. This model worked not only on academic skills but also the social skills. Various behavioral approaches were used to improve the child's behavior and academic skills like precision teaching. Various reinforcers were used for specific behaviors. Mental processing skills were deemphasized and application of academic skills in daily functioning and self sufficiency is emphasized (Caletti, & McLaughlin, 2003).

1.10.5 Models for Intervention

The cognitive/learning strategies model focuses on teaching students to learn managing their own behaviors from the environment and generalize this learned information in other settings. They are cognitive modification and cognitive strategy model. They are taught various strategies and then the students are able to select the strategy that best fits their needs. One such procedure involves these steps: cognitive modeling; overt, self-guidance; faded overt, self-guidance; and covert self-instruction. This process helps regulate behaviors (Algozzine et al., 1993). The next area is known as the cognitive strategy model. This model teaches study skills techniques based on student learning styles, cognitive styles, thinking skills, and cognitive behavior modification research. This model also focuses on

generalization and maintenance skills to allow improvements to carry over into other areas and settings. The focus here is to teach students how to learn (Algozzine et al., 1993).

Many social and behavioral difficulties are noticed in children with learning difficulty. Poor self esteem and self concept, poor social skills, hyperactivity, withdrawal, dependency, distractibility and preservation (Lerner, 2000; Caletti, & McLaughlin, 2003).

Assessment of sociobehavioral problems are done by ecological assessment which looks at a student's functioning in various settings t hat they will operate like school, home, community and peer interactions. Social and academic behavior is influenced by functioning in these fields (Caletti, & McLaughlin, 2003). The main areas of assessment are systematic observation, teacher-child interaction systems, behavioral checklists and rating scales, and sociometric techniques (McLoughlin & Wallace, 1988).

Behavioral observation seen is recorded and their duration, antecedents and increase and decrease are recorded. Teacher child interaction gives a variety of information and helps in planning further management. Also, general classroom environment, teacher's rapport, teaching method and style should be taken into consideration (Caletti, & McLaughlin, 2003).

Behavior rating scale helps in knowing a child's strengths and weaknesses. Also, helps in knowing teacher-child interaction and child- child interaction. Sociometric techniques help in finding out the individual's acceptability in the group and the group structure. Two types of techniques used are – nomination technique (allows teacher to differentiate sociable from unsociable children). The second method is Q-sort (sorting themselves into categories –they believe they are or how they wish they were).the discrepancies help in targeting the behavioral intervention (Caletti, & McLaughlin, 2003).

These techniques include behavior modification, token economies, contracting, and social skills training (McLoughlin & Wallace, 1988).

Behavior modification place importance on external behaviors which interfere with learning. A central element of the behavior modification process is reinforcement. Reinforcers, both positive and negative, help control behaviors (Caletti, & McLaughlin,2003).

Token economies are a form of behavioral management that increases desired behavior by using tokens as reinforcers. Tokens (represented by some sort of object) can be exchanged for activities or items that serve as positive reinforcers. Basic rules, such as selecting the target behavior, modifying the unwanted behavior and presenting the desired behavior to the child are established (Caletti, & McLaughlin, 2003). This needs to be monitored and is time consuming.

In contingency contracting, in order to choose an activity of his choice, the child has to do something that his parent or teacher wants him to complete. These contracts can be verbal or written. These help in transferring more responsibility on to the child for bringing a change in his or her behavior. This can be used at school as well as at home (Caletti, & McLaughlin, 2003).

Another technique is life space interview where a students' social-behavioral problems are immediately discussed with a teacher after a crisis situation. Specific steps are planned out and are to be used when a crisis arises. This is useful where the numbers of children are less (McLoughlin & Wallace, 1988).

Another important method is social skill training which is perhaps most important. *Social skills learning takes place primarily through observation, imitation, and feedback from the environment* (McLoughlin & Wallace, 1988, p. 230). Three main types of programs are available for teaching social skills: Self-Management Training (Self-Control Curriculum, Teaching Behavioral Self-Control to Students, and Study Strategies: A Metacognitive Approach), Social Skills Training Programs, (Social Learning Curriculum, Social Skills in the Classroom, and ACCEPTS: A Curriculum for Children's Effective Peer and Teacher Skills, ASSET: A Social Skills Program for Adolescents, and RECESS: Reprogramming Environmental Contingencies for Effective Social Skills) and Affective Training Programs (Developing Understanding of Self and Others: Revised- for elementary-aged students (K through 4) and is aimed at helping these students to understand and cope with the social and emotional behavior of themselves and others and Toward Affective Development is for grades three through six and helps students gain self-awareness and learn how to work well with others) (McLoughlin & Wallace, 1988; Caletti,& McLaughlin,2003).

1.10.6 Developmental Orientation as Intervention

Developmental delay in one area has an impact on the test scores of other areas of development. The developmental orientation stresses importance in all areas of development like cognition, language, gross and fine motor, social and self care. Another method of orientation to programming is functional. This assumes that children have a purposeful behavior, which is either appropriate or inappropriate. The aim is to shape the behavior towards achievement of appropriate skills.

The longitudinal orientation: They are taught skills which make them independent in the environment in which they are living. This includes the school, domestic, recreational and community environments (Esterly & Griffin 1987). Many schools in many countries have preschool programmes where the children who come to school for the first time are assessed. Many parents come to know that their child is developmentally delayed once the child comes to school. Once assessment is done and child assessed in different area of development –it becomes easy to determine child's eligibility for various preschool programmes. It becomes very important to identify the gap in the development and the child can be made to improve those areas. Assessment becomes the starting point and helps in identifying the lag and then helps in developing, implementing and disseminating strategies to improve learning. This all becomes very important when the child enters kindergarten (Fratt, 2005).

1.10.7 Emerging research questions

On the backdrop of review of literature and critical understanding of existing theories, the need is felt to develop a tool for early identification of reading difficulty. Although the need has been identified by earlier research (Olofsson & Niedersoe, 1999) and addressed in various ways in different parts of the world. Unfortunately, In India, we do not have any standardized measure to identify learning difficulty in preschoolers. We have measures to identify specific learning difficulty in children five years older or above using NIMHANS SLD test (Kapur, John, Rozario, & Oommen, 1992).

The purpose behind the development of a tool at an early age is to catch them young and as early as possible to start the remediation process and give them a jumpstart in reading and writing. The objective is to minimize their deficit when they grow older and prevent long term complications at school, home and social environment. The age group of 4-5 years is considered as the precursors of learning difficulty are easily identifiable. The exposure to English language too is present as the children are already in school for a period of 1-2 years. Training and instructions given at this age can significantly reduce the co existing morbidities like social and behavioral difficulties.

Medical practitioners, child developmental experts, preprimary and primary school teachers too can actively participate in early identification before the children join regular school or are ready for school. Criteria like attention, phonemic skills, auditory processing skills and visual spatial motor skills have been taken into consideration. As the language of testing is in English, children form English medium schools were tested as they would have

been exposed to the language for a minimum period of one year and would be understanding most of the instructions in English.

The present study is an attempt to develop a tool to identify children who are at high risk of developing specific learning difficulty when they grow older. The idea behind the study is to identify children as early as preschool (4-5 years), who may develop specific learning difficulty, so that intervention can be done early and these children can be helped at the onset of early school years. The objectives and tests were planned as per the deficits shown by the children in studies done over the years like phonological processing deficit, impaired word recognition, naming visual symbols, speed of naming in the Indian context.

1.11 Objectives of the study

a) To assess the existing tools available to measure learning difficulty in early school children.
b) To come up with an assessment tool to measure learning difficulty among early school children (4-5 years) in the Indian context either by adapting to an existing tool (if available) or by constructing one.
c) To prepare a profile of learning disabilities among 4-5 years age children
d) To establish the reliability, validity and percentile and age norm of the developed tool for standardization.

1.12 Hypothesis of the study

Based on the literature review and the objectives of our study, the following hypotheses have been conjectured.

a) There will be significant difference in the test scores of normal children and children identified as having learning difficulties in
   i) In phonemic decoding skills
   ii) In auditory processing skill
   iii) In visual-spatial motor skill
b) There will be significant correlation between the test scores on the developed test and the existing test (NIMHANS- SLD) to measure learning difficulty which is administered after six months.

c) There will be significant correlation between the test scores on the developed test and the ratings of the teacher.

d) There will be no significant difference in the test scores of the newly developed test and the NIMHANS-SLD test when tested on children identified as at risk of learning difficulty.

e) There will be significant difference in the test scores, in different dimensions of the newly constructed test in children identified with and without risk of learning difficulty.