

## DYSLEXIA: ETIOLOGY-CHARACTERISTICS-ASSESSMENT FROM THE VIEW OF THE CLINICAL SPEECH AND LANGUAGE PRACTICE

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### **Abstract**

Regarding the traits of dyslexia, Griesbach (1993) argued that “the difficulties associated with dyslexia are diverse and confusing”. Some characteristics are more pronounced, whilst others are more superficial and more elusive. Although there has been great discrepancy and cautiousness regarding the use of the term “dyslexia”, lately an international tendency towards the acceptance of the opinions of neurologists has been observed. However, scientists examine the theory and practice of identification and assessment of dyslexia in relation to each professional setting or role. Speech and language therapists have a lot to tell.

*Key words: Dyslexia, Speech and Language Therapy*

### **Introduction**

Nowadays there is worldwide and abundant literature regarding learning difficulties, and in relation to each professional setting or professional role, specialists might use all this information, inject new ideas into the existing circumstances and therefore improve the educational systems and provide students with the opportunities needed to fulfill their potential. Nevertheless, the question remains the same, as Ainscow (1991, cited in Mavromati, 2006, p.15) remarks: «How do we really feel with the fact that we do not teach all children successfully?»

### **Suggestions and assumptions regarding the etiology of dyslexia**

#### ***Heredity and Dyslexia***

Heredity has been mentioned as a factor in dyslexia. Smith et al. (1983) observed that there should be some kind of relation between dyslexia and the 15<sup>th</sup> chromosome. Cardon et al., (1994) suggested that the 6<sup>th</sup> chromosome is connected with dyslexia. DeFries & Gillis (1993) argued that reading difficulties are hereditary at a level of 50%. Hence, according to many research there could be “something” regarding dyslexia that might run from a family to another through genes. Although the above views are scientifically approved, what about children with dyslexia who do not have any relatives with dyslexia whatsoever? Looking back in history of course, this may be hard to prove as past relatives may now be dead.

### ***Dyslexia and the brain***

Research in this field was primarily done through the examination of people with dyslexia after they died. Many researchers (e.g. Galaburda, 1994; Galaburda & Kemper, 1978; Hynd & Hiemenz, 1997) had suggested that there were many “anomalies” in the structure of the brain of individuals with dyslexia (i.e. dysplasia, symmetry of planum temporale). In the dyslexic brain, temporoparietal language areas on the two sides are symmetrical without the normal left-sided advantage. Furthermore, brain 'warts' (ectopias) are observed, mostly clustered round the left temporoparietal language areas. When this set of research was first emerged, it was not welcome. However, during the years that followed, a deal of special techniques which describe the function of the brain showed up (i.e. fMRI, PET-scan). The advent of technology confirmed what was first faced with disbelief. Nowadays, according to scientists (e.g. Brunswick et al., 1999; Paulesu et al., 1996), examinations on alive individuals with or without dyslexia are feasible and have been done. These procedures attest that the brain of a person with dyslexia processes differently at the level of phonological processing, compared with the brain of a person who has not dyslexia. Hence, someone might argue that the difficulties observed in dyslexia stem from the differences regarding the function of the human brain between people with and without dyslexia.

### ***Visual processing difficulties and dyslexia.***

The visual magnocellular system is responsible for timing visual events when reading. This system is also particularly sensitive to visual motion, and direction of movement and gaze. In addition, the magnocellular pathway helps control eye movement. Lovegrove et al. (1986) and Livingstone et al. (1991) suggested that the development of the visual magnocellular system is impaired in people with dyslexia (e.g. development of the magnocellular layers of the dyslexic lateral geniculate nucleus (LGN) is abnormal). By far, however, the strongest physical data implicating the MC pathway lies in the postmortem study of five dyslexic brains. These studies showed the magnocells to be disordered and over 20% smaller than cells in normal brains (Galaburda, 1985). Apparently, the magnocellular theory has been fairly useful. However, the localization of cognitive symptoms to core neurological abnormalities neglects to address common symptoms displayed in dyslexics which are not the directly the result of visual or auditory pathway abnormality (e.g. clumsiness, difficulties in handwriting). Snowling (2001) appears quite skeptical and suggests that there are other researchers whose data do not coincide with the above ones. Hulme (1988), Cornelissen et al. (1995) and Brosting (1996) criticized the above theory as well.

### ***Auditory processing difficulties and dyslexia.***

However there is no consensus about the cause(s) of dyslexia, theories have developed suggesting that dyslexia stems (partly) from a phonological deficit (e.g. Goswami 2000, Miles & Miles 2001, Ramus 2003,). Several versions of the phonological deficit hypothesis (PDH) have been proposed, such as the *phonological representations hypothesis* (e.g. Brady 1997, Goswami, 2000, Snowling, Goulandris, Bowlby & Howell, 1986), the *distinctness hypothesis* (e.g. Elbro, Nielsen & Petersen 1994, Elbro 1996), and the *sub-lexical deficit hypothesis* (Ramus 2001, Szenkovits & Ramus 2005). The phonological deficit hypothesis is a prevalent neurological explanation for the cause of reading difficulties and dyslexia. According to the theory, people with dyslexia face difficulties in constructing, maintaining, and retrieving

phonological representations. Nevertheless, critics of the phonological hypothesis point out that it fails to account for symptoms of dyslexia unrelated to phonetic decoding difficulties, such as problems with short-term memory, visual processing issues, or difficulties with balance and small motor coordination that are common to many people with dyslexia. For instance, some research into the German language (Schneider, Roth, & Ennemoser, 2000) suggested that deficits in phonological awareness can be overcome quite easily. Early training in phonological awareness was found to be fairly helpful for children who were identified as having a phonological deficit.

### ***Dyslexia and the double deficit hypothesis***

Bowers & Wolf (1993) suggested that children with phonological and naming-speed deficits are poorer readers than children with one or neither of these deficits. Badian (1997) maintained that the hypothesis of Bowers & Wolf is correct. However, other researchers (e.g. Vukovic and Siegel, 2006) argued that, before jumping to conclusions, more evidence that would investigate naming speed deficits independent of phonological deficits is needed.

### ***The hypothesis of Nicolson and Fawcett***

Difficulties in handwriting, clumsiness, automating skills are amongst a few commonly found traits, which are present in a great deal of individuals with dyslexia. Many of these characteristics have been proposed to be the result of a cerebellar abnormality which affects dyslexics' fine motor (i.e. the ability to automate skills and balance). From this idea, researcher Nicolson, Fawcett, and Dean (1990) proposed the *cerebellar deficit* theory as an additional cause of dyslexia. They suggested (2001) that the core deficits; reading, writing and spelling, could all be linked to abnormal functioning of the cerebellum.

### **Characteristics of Dyslexia-Scientific stances and assumptions**

According to the BDA (2008): "Dyslexia is a specific learning difficulty which mainly affects the development of literacy and language related skills. It is likely to be present at birth and to be lifelong in its effects. It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed, and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effects can be mitigated by appropriately specific intervention, including the application of information technology and supportive counselling". Before the citation of the symptoms of dyslexia, some very important comments should be made. Griesbach (1993) argued that "the difficulties associated with dyslexia are diverse and confusing". Some characteristics are more pronounced, whilst others are more superficial and more elusive. It is important that not every trait is present in every person with dyslexia. Characteristics vary on the point of age, the severity of dyslexia etc. Furthermore, dyslexia is detached from intelligence. Under no circumstances should dyslexia be associated with intelligence.

As children progress in school, many unexpected difficulties (e.g. learning to read, write, speak foreign languages) might be noted. When reading, omissions or reversals of letters or words (such as was/saw, b/d, p/q) might be noted. Slow rate of reading and tiredness are traits as well. People with dyslexia labour to concentrate and often face difficulties with comprehension. As for writing, omission of letters (e.g. *tbl* instead of *table*), replacement of letters (e.g. *milt* instead of *milk*), reversal of letters

and spelling errors might occur. In addition, many may reverse letters or words when spelling words are presented orally. They might have poor handwriting or printing ability and poor drawing ability. Most of them find it quite hard to put their thoughts on paper. Sometimes, arithmetic skills are poor, although some individuals can be quite advanced regarding mathematical theory and practise as well. Other difficulties concern understanding or remembering what is said to them.

Problems with spatial orientation can make people with dyslexia more clumsy. Griesbach (1993, p.7) suggested that: “irritability, inconsistency, and a certain ease of distraction are sometimes present, but not always easily detectable”.

Furthermore, a persistent confusion between left and right is very common. Orton (1937) was impressed by the number of children who did not show consistent preference for their right side of their body. He also found a high frequency of left handedness amongst dyslexics and their relatives.

Many of the traits listed above, can be found in a great non-dyslexic percentage of population at different times. However, it is the persistence and overlap of symptoms that point to dyslexia.

### **Dyslexia and Comorbidity**

Livaniou (2004) argues that dyslexia may coexist with other disorders as well. The comorbidity of AD/HD-ADD and reading disabilities has been well documented (e.g. Holobrow and Berry, 1986; McGee et al., 1987). Gilger et al. (1992) argue that in some cases, ADHD and reading difficulties may occur due to a common etiology. More, difficulties with memory tasks, rhythm, organization and clumsiness may be present in people with dyslexia (Livaniou, 2004).

### **Assessment procedures of written language from the view of the clinical speech and language therapy practice.**

Before any assessment is carried out, case histories of children are firstly sought from parents. This includes questionnaires devised by speech and language therapists (SLTs) in order to gather information on past and present educational, social histories etc. Then an interview with the child follows. During this interpersonal contact with the child, speech therapists elicit the thoughts of the children regarding their difficulties in written language, their attitude in relation with their parents, school etc. Then thorough assessments of oral and written language follow. Afterwards, the clinical aspect follows the previous procedures. That is an interview with the child and his/her parents where speech and language therapists observe how they relate. For instance, the demeanour of parents towards the child is observed (e.g. are they over-protective, demanding?). Frequent contacts with teachers is fairly crucial and helpful (Spantidakis, 2004). Teachers informs speech and language therapists about the performance of pupils at school, their difficulties, weaknesses and so on. Moreover, very important is a harmonious collaboration with other specialists. Multi-disciplinary collaboration permits the clarification of all aspects of the problem, so that a more unambiguous picture of the situation can be acquired.

When all these are well carried out (extensive assessments may be divided into separate sessions), thorough conversations with parents and the child follow. The degree of difficulties that the child faces is explained. The goals of a possible intervention are therefore announced and the child is asked if he/ she wants to move forward and overcome the difficulties. Listening to the student’s voice is so important. Last but not least comes an exclusive conversation with parents. Parents express their thoughts and other matters they do not want to talk about in front of their child. For

speech and language therapists, this encounter concerns the clarification of certain issues, so that the needs of the child can be met.

### ***Assessment of oral and written language***

The assessment of oral and written language concerns the functional assessment of linguistic and metalinguistic competence of both oral and written language. Moreover, it concerns assessment of cognitive and metacognitive parameters of language, through informal structured assessment. In a Greek conference conducted by the National Association of Speech Therapists, Sakellariou (2007) referred to the aspects of oral and written language that should be assessed:

#### ***Written language***

##### ***Reading***

Many aspects of reading, such as comprehension and decoding are assessed.

##### ***Decoding***

The nature of the difficulties are assessed. According to age and reading stage (Frith 1985) the types of errors are noted: distortion of words, phonological errors, morphological mistakes etc. More, it is observed if the child labours to read words that occur very often in texts.

##### ***Reading of non-words***

In this section, the ability to read simple structured (CV) and more complicated (e.g. CVCVCV) structured non-words is assessed. The speed of reading is also observed.

##### ***Other aspects of reading***

Rate, rhythm, intonation are also examined.

##### ***Comprehension***

In this area, SLTs assess abilities regarding morphosyntactic, semantic and pragmatic perception of language. At text level, what is examined is if the child is able to answer questions regarding the persons of a story, place, time etc. Another factor is if the child understands the sequence of facts, if he or she understands pronouns and their associational role in the text

##### ***Acquired vocabulary***

In this section, speech and language therapists try to estimate the average of the acquired vocabulary of the child according to its chronological age. The level of his/her expressive language in terms of vocabulary (i.e. we do not measure the quantity of the vocabulary that the child uses when speaking or writing) is not the purpose of the examination.

##### ***Output written language***

According to the level of each child SLTs examine written narration on demand (e.g. we tell the child to write down a story seen in pictures) and spontaneous written narration (e.g. writing of a visit in a museum or zoo etc.). In both examinations, phonological errors, suprasegmental elements of speech (punctuation for written language), vocabulary etc. are assessed.

##### ***Orthography***

In this section many factors are assessed as well. For example, mistakes that concern phoneme-grapheme correspondence, spelling errors, graphic-motor capacity, visual perception and memory are noted. The rate of writing is also observed and SLTs try to differentiate the causes of slow writing. For instance, a child might write quite slowly due to problems that stem from difficulties concerning phonemic-

grapheme conversion. Someone else might be slow due to difficulties relevant to deep organization of speech (e.g. interpreting thoughts into written language).

### **Oral language**

In this domain, many factors are tested as well. For starters, if in spontaneous spoken language phonological errors are spotted, then phonological awareness is examined in a fairly thorough way. Moreover, SLTs test if the child can understand the concept of a story and the ability to perceive the sequence of facts of a story. Other aspects concern descriptive powers of children, morphosyntactic perception and production, input and output vocabulary, pragmatics, metalinguistic and metacognitive abilities. Furthermore, there are other tests which concern semantic categorization, word definitions, perception of metaphoric language.

Perception of numbers, different types of memory (e.g. short-term memory), analogies, orientation, pro-mathematic concepts and mathematic-logical thought are also tested.

### **Especially in Greece**

In Greece, for the Greek language, three tentative tools have been standardized which assess spoken language and indirectly written language. The whole work has been done by the committee of research and committee of prevention of the National Association of Speech Therapists (Sakellariou, 2007).

As for the steps of the procedure, they depend on the general condition of the child. The speech and language examination of difficulties on written language focuses on qualitative analysis and description of the procedures of perception-production of oral and written language. Sakellariou (2007) argues that there is great correlation between spoken and written language. Besides, this statement is confirmed on a daily basis in clinical and educational practice.

### **Conclusion**

A matter of great importance as it is, dyslexia has been a motivation for parents of children with dyslexia all over the world. Particularly, with the contribution of special scientists, parents found “*Dyslexia Associations*”. This way parents campaign for recognition of dyslexia as a specific learning difficulty, and for the special educational intervention that people with dyslexia need.

No child should have to grow up feeling undermined and inferior. All constitute unique presences of creation. Education should avoid putting children in a mould. Knowledge is infectious. Nonetheless, as Confucius once quoted “it does not matter how slowly you go as long as you do not stop”. The people who are responsible for educating have a duty to be sources of inspiration for children. They should assist children to cultivate the unique talents of their minds and souls.

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