

Assessment of subtypes of Dyslexic dysgraphia

Thesis

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List of Abbreviations

- ARST : Arabic Reading Screening Test.
- DDS : Dysgraphia Disability Scale.
- DSM-V : Diagnostic and Statistical Manual of Mental Disorders fifth edition.
- MADST : Modified Arabic Dyslexia Screening Test.
- PALPA : Psycholinguistic assessment of language processing in aphasia.

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ABSTRACT

Background: Writing requires a complex set of motor and information processing skills. It requires not only the ability to organize and express ideas in the mind but it also requires the ability to get muscles in hands and fingers to form these ideas, letter by letter, on paper. Many people have poor handwriting, but dysgraphia is more serious. It's a neurological disorder that generally appears when children are first learning to write and is showing increased incidence among young children.

Aim of the Work: is to make a depth assessment of the developmental dyslexic dysgraphia to clarify its subtypes (surface and deep dysgraphia).

Patients and Methods: Spelling and copying tasks included in Modified Arabic Dyslexia Screening Test (MADST) were applied on the subjects of this study who comprised a convenient sample of 40 children diagnosed as being dyslexic ranging in age from 8-10 years.

Results: There was statistically significant difference between the mean scores of children with surface and deep dysgraphia regarding spelling of regular sense, irregular sense words and nonsense words.

Conclusion: it was proved that dyslexic dysgraphia which is common among young Egyptian children could be further subdivided into surface and deep dysgraphia.

Key words: Dyslexia, Dysgraphia, MADST, reading ,spelling, and copying

Introduction

Learning Disabilities refer to a number of disorders which may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information. These disorders affect learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning. As such, learning disabilities are distinct from global intellectual deficiency. Learning disabilities result from impairments in one or more processes related to perceiving, thinking, remembering or learning. These include, but are not limited to: language processing, phonological processing, visual spatial processing, processing speed, memory and attention and executive functions (e.g. planning and decision-making) **(Walcot-Gayda, 2004)**.

Learning to read begins well before the first day of school. Key to the process of learning to read is the ability to identify the different sounds that make words and to associate these sounds with written words. Reading development is influenced by numerous factors, phonological awareness, phonics (letter sound relationship), fluency, and vocabulary and text comprehension **(Barker et al., 2014)**.

Developmental dyslexia (DD), which is also known as Specific learning disability with impairment in reading, can vary between problems in word reading accuracy, reading rate, or fluency and reading comprehension **(Dohla and Heim, 2016)**.

Developmental dyslexia can also be accompanied by dysgraphia (**Duel et al., 2015**).

Handwriting is the result of a process in which linguistic, psychomotor and biomechanical factors interact with physical maturation, cognitive development and learning. It requires a complex set of motor and information processing skills not only it requires the ability to organize and express ideas in the mind but also requires the ability to get muscles in hands and fingers to form these ideas, letter by letter, on paper (**Ofiesh et al., 2004**).

Dysgraphia is a specific learning disorder with impairment in written expression which is divided into problems with either spelling accuracy, grammar and punctuation accuracy and clarity or organization of written expression (**Dohla and Heim, 2016**).

Many people have poor handwriting, but dysgraphia is more serious. Dysgraphia is a neurological disorder that generally appears when children are first learning to write (**Silverman, 2003**).

According to the dual route theory of reading, reading and writing disorders are generally divided into: surface dyslexia and deep dyslexia also dysgraphia is divided into surface dysgraphia and deep dysgraphia (**Basso, 2008**).

Patients with surface dyslexia depend on grapheme-phoneme conversion for reading with poor whole word

reading (logographic reading) (**Sotiropoulos and Hanley, 2018**).

While in Deep dyslexia they depend on using whole-word reading, while they are unable to sound out words (**Friedman and colt heart, 2018**).

In the same way Dysgraphia could be also subdivided into surface dysgraphia which is characterized by reliance on standard sound-to-letter patterns with misspelling of phonetically irregular words or very long words or unfamiliar words because these words are hard to pronounce by grapheme-phoneme. While in deep dysgraphia they are unable to spell out words by depending on phoneme grapheme correspondence (**Duel et al., 2015**).

Assessment of reading and writing abilities in young children has been an issue to discuss through the past years but none of them targeted in depth assessment of subtypes of developmental dyslexia (surface and deep dyslexia) nor subtypes of dyslexic dysgraphia similarly no studies have shown how they can be related to each other in Egyptian children.

Aim of the Work

This work aims at depth assessment of developmental dyslexic dysgraphia to clarify its subtypes (surface and deep dysgraphia) and correlate them to their similar subtypes of dyslexia. This classification will help better detailed intervention.

"Developmental Dyslexia"

Literacy is defined as competence in reading and writing, with full recognition that such competence ordinarily rests upon an extensive experience base in the use of spoken language (**Khaled et al., 2014**).

Reading is considered a part of literacy which is using written information to function in society, to achieve one's goal and to develop one's knowledge and potential (**Khaled et al., 2014**).

The development of reading can be divided into three phases identified with three strategies; logographic (instant recognition of familiar words), alphabetic (knowledge and use of associations between graphemes and phonemes) and orthographic (instant analysis of words into orthographic units without phonological conversion) (**ElFiky et al., 2016**).

Developmental dyslexia (DD), which is also known as Specific learning disability, is the commonest among learning disabilities. Dyslexia constitutes 80% of the learning disabilities (**Handler et al., 2011**).

Dyslexia is a familial, neurologically-based disorder that is interfering with language acquisition and getting information through prints. Degrees of severity are variable; it is manifested by difficulties in receptive and expressive language, phonological processing, reading, writing, spelling, handwriting, and sometimes in arithmetic. The disorder is not due to sensory impairment, lack of

motivation, inadequate instructional or environmental opportunities, or other limiting conditions, but may occur together with these conditions. Although dyslexia is life-long condition, dyslexic children frequently respond successfully to early and appropriate intervention (**ElFiky et al., 2016**).

The prevalence for developmental reading disorders is about 17 % among school-aged children. In fact, it accounts for nearly half of all disabilities in the school-aged population (**Alfonso and Flagnen, 2018**). Diagnostic and statistical manual of mental disorders, fifth edition (DSM-V) estimates the prevalence of all learning disorders (including impairment in writing as well as in reading and/or mathematics) to be about 5–15% worldwide (**Dohla and Heim, 2016**).

Theories of Dyslexia:

There are many theories for developmental dyslexia. Here are the most recent and accepted ones (i) Asynchrony theories, (ii) Cerebellar theory and (iii) Phonological theory

I- Asynchrony theories (Menashe, 2018):

It is recently postulated that dyslexia is the outcome of the failure to synchronize these areas (anterior and posterior brain sites, right and left cerebral hemispheres and different cognitive levels activated during reading), suggesting that the wider the speed of processing (SOP) gap between the different brain entities the more severe the word decoding failure will tend to be.

II-The cerebellar theory (Nicolson and Fawcett, 2018):

It is primarily based on the observation that dyslexic children mostly show variable degrees of motor impairments that are manifested by clumsiness, poor manual dexterity, imbalance and incoordination. And the capacity of dyslexic children to automatize would be affected among other things.

III. The Phonologic-Deficit theory (Pretes and Feitosa, 2016):

The primary difficulty with word recognition in students with developmental dyslexia is based on a deficit in their phonological coding, the process of translating units of print into sound. Difficulty with phonics is manifested in students with dyslexia, so reading becomes less automatic, which in turn interferes with the reading comprehension. These deficits in phonics make spelling inaccurate and not automatic.

"Dysgraphia"

Writing requires a complex set of motor and information processing skills not only it requires the ability to organize and express ideas in the mind it also requires the ability to get muscles in hands and fingers to form these ideas, letter by letter, on paper (**Sidhom et al., 2017**).

Handwriting is an important component of writing, in order to have good handwriting students must have the ability to recall the letter forms and use the correct motor patterns to write them. They also must be able to appropriately judge the amount of space that is needed between the letters and the words and where they are being placed on the page. Handwriting must also be legible and fluent in order to be considered effective (**Golley, 2015**).

The motor and psychomotor components related to handwriting performance may include fine motor control (in-hand manipulation, bilateral integration, and motor planning), visual–motor integration, visual perception, kinesthesia, sensory modalities, and sustained attention (**Sidhom et al., 2017**).

Handwriting proficiency typically develops in the following stages:

1. Imitation (preschool to kindergarten), when children pretend to write by copying others.
2. Orthographic presentation (1st and 2nd grade), when children learn how to form letters and to write on a line with proper spacing.