

Developmental Dysgraphia

Interpretation and Classification Approaches

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Abstract:

The current study seeks to form a complete theoretical image about one of the most important learning disabilities which is the writing difficulty, according to three basic goals, the first goal is trying to identify the dysgraphia essence by setting the concept referring to the most important psychological and educational approaches that tried to provide coherent definitions about The concept of dysgraphia, while the second goal is related to the researcher's attempt to make a comparison between the various theoretical explanatory models of the emergence mechanism of dysgraphia. The third goal is formulated for reviewing the most important classifications which tried to collect the important clinical appearances of dysgraphia.

In order to prove these goals, the researcher adopted a bibliographic and descriptive method by presenting and analyzing the most important theories and models that attempted to explain dysgraphia. At the end of this theoretical study, the researcher reached to formulate an integrated image of dysgraphia, through which he has proven that dysgraphia is not merely symptom in appearances of other learning disabilities, as some writings have tried to present, but it is a distinct difficulty that needs distinct interventions.

Key words: Developmental Dysgraphia, Learning Disabilities, Explanatory Models, Genetic Approaches.

ملخص:

تسعى الدراسة التي بين أيدينا إلى محاول تكوين صورة نظرية كاملة عن واحدة من أهم صعوبات التعلم وهي صعوبة الكتابة ، وذلك تبعا لثلاثة أهداف أساسية ، يرتبط الهدف الأول منها بمحاولة التعرف على ماهية عسر الكتابة من خلال ضبط المفهوم استنادا لأهم المقاربات النفسية والتربوية التي حاول فيها أصحابها تقديم تعاريف متماسكة حول مفهوم عسر الكتابة ، بينما ارتبط الهدف الثاني بسعي الباحث لإجراء مقارنة بين مختلف النماذج النظرية المفسرة لآلية نشوء عسر الكتابة ، أما الهدف الثالث فقد صيغ بغرض استعراض أهم التصنيفات التي حاول فيها أصحابها تجميع أهم المظاهر الإكلينيكية التي تميز عسر الكتابة.

وبغرض التحقق من هذه الأهداف انتهج الباحث أسلوبا بيبيوغرافيا وصفا من خلال عرض وتحليل أهم النظريات والنماذج التي حاولت تفسير عسر الكتابة ، وقد توصل الباحث في نهاية هذه الدراسة النظرية إلى صياغة صورة متكاملة عن عسر الكتابة ، تأكد له من خلالها أنّ هذا الاضطراب ليس مجرد مظهر من مظاهر صعوبات التعلم الأخرى كما حاولت أن تقدمه كثير من الكتابات ، بل هو صعوبة متميزة وتحتاج لتدخلات متميزة.

الكلمات المفتاحية: عسر الكتابة النمائي ، صعوبات التعلم ، النماذج المفسرة ، مقاربات النشوء.

1. GENERAL INTRODUCTION

Due to its transferable physical properties, the writing skill is considered as one of the most important civilizational functions that people have discovered since ancient times, and on this basis, the human being has always sought to know how to develop this precious ability and overcome the various difficulties and disabilities that may befall it. Thus, the topic of writing and its related problems have obtained a significant interest in the research literature of many sciences, which produce theoretical accumulation that describes and analyzes this function, justifies and explains how it evolves, without neglecting the disability side, diagnose and suggest treatments.

In this context, the notion of genetic of writing has gained a large portion of the interest of scientists and researchers from different scientific disciplines, and multiple approaches. It was necessary for the one who wants to study dysgraphia to form a look at the various approaches. On this regard, we have seen that It is appropriate - before dealing with the approaches that explain and classify dysgraphia - to start by introducing those approaches that address the issue of the emergence of writing per se, because of its importance in understanding the mechanisms and aspects of writing disabilities.

The study of the written language requires creation of methods, models and experiences that lead us to a good identification of writing. In this context, several explanatory models have emerged, such as the cognitive model that referred by (Carbonnel, Gillet, Martory & Valdois, 1996) who suggested and assumed the existence of an internal glossary of words, stored in an organized manner, it provides a process for understanding and producing writing, this requires restoring the written representation of the word and its internal image.

The cognitive trend- according to the opinion of these researchers - explains the cognitive mechanisms used by the individual to produce writing, as there are many researches within this approach that have been able to identify the methods used in the kinetic control of the writing process, starting from recording the movement of the pen tip to the writing space through Space orientation and within a specific time. Several special models have emerged to interpret this mechanism, under this cognitive approach.

Neuropsychology, like the rest of the disciplines, followed the issue of the evolution of writing process. Shallice (1988) and Denckla & Roeltgen (1992) presented a neurological evolutionary model for the writing process, based on studies they conducted on individuals who suffered from acquired brain injuries. Where they were able to discover areas in the memory called (Buffer) or (memory plug / Mémoire-tampon) that could be defined as part of the memory «allows a temporary storage of information between two members, which have different characteristics» (Legendre, 2005, 13)

Away from the previous model, Alajouanine (1960) presents the Baillarger and Jackson principle, which is a purely neurological model, that clarifies the role of cortical areas in the writing process, and they have proven that the role of the primary

motor cortex- and more specifically its part called (the supplementary motor area (or SMA) - is a stimulant of writing movements, that is, the initial path of writing.

Ignoring the graphical considerations of writing, the analytical approach attempts to provide dynamic interpretations of the emergence and evolution of writing. Where the authors of this approach see that the primary graphical effects are related to the individual's physical identity, and in order to break free from this graphical effect that is full of affectation, this physical expression begins to transform by very abstract and symbolic means, which is writing. It appears precisely when the child cannot transform this physical expression to another through primary subjects.

Consequently, "writing is included within the physical relationship with the other, yet this relationship fills the whims and generates language ... Thus the writing removes the stakes of domination and body disturbance" (Tajan, 1982, p26)

Writing is also the basis for the distinction between the ego and the non-ego, and more specifically is related to the occasional and fragile separation between the ego and the non-ego (the libidinal subject and the narcissistic subject) (Sophie, 2007)

Thus, when the child shows a drawing of his writing, he depends on the feelings and the representation of the ego, as he did not find the ability to rationalize and encode the identity effectively, which in turn protects the physical reference; This dependence on the feelings also accompanies the imagination process «where, in a direct way, it succumbs to mental consumption without the possibility of putting the word» (Deitte, 1993, 9).

The first studies prepared by (De Gobineau) in the fifties on the emergence of writing; in addition to the studies of (Ajuriaguerra et al.) In the sixties, formed a real nucleus for a new approach that included an attempt to explain the writing process based on a psycho-motor reading; this approach was later divided into two basic models: The Grapho-motor model, which considers writing as a complex motor activity that requires special manual capabilities that have the ability to link movements and their timing on the one hand, and the ability to respect the speed requirements and accuracy on the other hand. So, according to this direction; the psychomotor growth is considered as the basis of written activity (Ajuriaguerra et al. 1979, 223). Here, the researcher Estienne, (1977, 24) showed that the formation of linear signals and their distribution over a narrow area - represented in the paper - requires an ability to control the precise movements of the fingers.

As for the second model, it can be called Grapho-Structural model, where the owners of this model link the writing growth to the drawing growth, Here, Liliane & Wallon (1987, 71) provide a structural evolutionary model based on the relationship between the drawing and writing process on the one hand, and the drawing and body scheme on the other hand. Drawing according to (Wallon) and (Lang) "constitutes a direct and symbolic translation of a child's body identity" and on the other hand, it constitutes "a constructive approach to the writing process"

This previous reading in the theoretical literature, which includes several models that explain the consistence mechanism of the writing skill, would help us in understanding the various conceptual and explanatory models of dysgraphia. This is exactly what will be covered in the following pages where we will try to present and

compare the various models that attempt to explain, understand, and classify writing disorders.

2. DEFINITION OF DEVELOPMENTAL DYSGRAPHIA

like writing and the difficulty of its definition, it is the same with dysgraphia, as this disorder has faced for many years a lot of disregard, as it was considered as a disorder accompanied with dyslexia, which was reflected on the various definitions presented about it, despite the widespread prevalence of this disorder, Where Shaywitz and Shaywitz, (2005); Hawke et al. (2009) refer that the prevalence for reading and writing impairments is reported to be about 7–17% .

After recognizing its independence as a special disorder, its definition was revised, where two basic generations of definitions have emerged. We will suffice here to introduce the second generation of dysgraphia definitions.

Diana, Klaus and Stefan (2018) define Developmental dysgraphia as a disorder characterized by difficulties in the acquisition of writing/spelling skills despite adequate schooling, visus and normal IQ.

It is noted on the previous definition that that the judgment on dysgraphia should take into account the absence of imbalances in the learning process and mental impairment, these criteria were the focus of other definitions. McCloskey and Rapp. (2017) developmental dysgraphia we mean impairment in acquisition of writing (spelling, handwriting, or both), despite adequate opportunity to learn, and absence of obvious neuropathology or gross sensory-motor dysfunction.

Add to Ajuriaguerra et al. (1979) who defines the child with dysgraphia by saying that "We say that a child has dysgraphia, when his writing level is low with absence of neurological trouble or mental retardation that explains this impairment, this means that child from a mental aspect is normal but his writing is unreadable or very slow, These difficulties often impede the proper functioning of this child's education" (Ajuriaguerra et al.1979, 224)

In addition to what was presented by (Ajuriaguerra et al.1979), Hamstra Bletz et Blote (1993) define dysgraphia as "mechanical mechanisms disorder of written language, and this is evident in the weak capabilities of the child with normal intelligence, with the absence of all forms of neurological , Cognitive, motor, and sensory disorders" (Charles, Soppelsa, et Albaret, 2004, 8)

Gelbert, (1996) referred to dysgraphia as "a difficulty in acquiring writing among a child without any motor, nervous, or cognitive disabilities... This appears as writing lines that are wavy, uneven in size, contiguous, and intermittent, accompanied by a poor sitting position, incorrect head position and incorrect pen holding position"(Gelbert, 1996, 291)

Previous definitions have shown a new idea that was not presented by the old definition, which is the issue of exclusion of the cases that suffer from mental , neurological, cognitive and sensory disorders, Take it out of the definition of dysgraphia. Ajuriaguerra et al. (1979) adds another aspect of dysgraphia which is not mentioned in appearances identified by Gelbert, (1996) in his definition, which is a

slow-writing aspect. Postel (1993) adds to the previous exclusions, the grammatical aspects in dysgraphia, so he defined dysgraphia as "an injury at the level of graphic functions, that is manifested in the space components of writing, this produces a dynamic disorder in the space coordination of graphic elements, whereas the grammatical components are not injured"(Charles, Soppelsa, et Albaret, 2004, 8)

In addition to excluding grammatical disorders from dysgraphia, Postel presented a new evaluation aspect of dysgraphia, which is the graphic space .

As a summary of the various previous definitions, we can provide the following definition of the developmental dysgraphia. It is a distortion that affects the letters form that make the writing syllables, or the suitability of these letters and syllables in relation to each other, or in relation to the area designated for writing, or through unsuitable pressure on the writing instrument; or unsuitable speed for copying these syllables.

These previous imbalances include: writing by spelling input (hearing), visual input (seeing), or by memory input.

Thus, we exclude from this description all children who suffer from a sensory, mental, and cultural disability.

3. CONCEPTUAL EXPLANATORY APPROACHES OF DYSGRAPHIA

The topic of dysgraphia didn't got a large share of studies like that of the rest of learning disabilities. Psychological literature indicates that the first interest of interpretation of dysgraphia was in (1918) when the Scottish doctor (James Hinshelwood) made the first acceptable bulletin, that describes an explanatory approach, and therapeutic intervention techniques for this disorder. (Rubery, 2019)

However, the ambiguity of this disorder and the variation of its appearances left the subsequent studies scattered and differed in their explanations according to several cognitive approaches. the five most important of these approaches are the following:

3.1. The cognitive approach:

Some pioneers of this approach have concluded that children with dysgraphia have not the information of the graphic form of words acquired by writing, they write the dictated words and they cannot recall the graphic forms of words from their memories, just as they write quasi-words as real words, and here they are unable to solve their problem (Kohnena et al., 2018).

According to previous findings, these researchers thought that those with dyslexia suffer from an inability to recall the written trace appropriate for audible writing.

However, Goulandris & Snowling (1991) suggested a possible existence of a visual memory disorder in people with dysgraphia, because the visual memory contributes to the learning of reading and writing (Hanley and Sotiropoulos, 2018), As for Hanley and Sotiropoulos, (2017) they were able to show that there is no disorder in Visual memory for a case with dysgraphia and dyslexia, because it does not find any difficulties in recognizing or remembering written forms visually.

As for Zoubrinetzky et al. (2019) They assumed the possibility of a lack of visual attention focus in people with dysgraphia, because the studied cases had a visual scanning disorder (Balayage visuel) on the appropriate word recognition test.

3.2. The psycho-nervous approach:

Louria (1970) affirms that the language centers in the left side of the brain, specifically the posterior temporo-parietal regions, as well as the left sensorimotor cortex, are active during the writing process, accordingly he presented the following model for interpretation the dysgraphia (Yaneva- Nedeva, 2018):

- A. The trouble in the left temporal lobe operating system impedes the patients from writing during spelling, and these individuals may continue to write certain special words such as their signature with great repetition.
- B. The trouble in the system of posterior lobe , or the left bilateral parietal lobe, leads to reducing the ability of writing in transcription or dictation, and these individuals do not have the ability to visualize or remember the visual image of letters.
- C. The trouble in the left sensory speech center leads to misalignment of letters while writing words.
- D. The trouble in the motor cortex of writing that appears in the image of repetition or deleting some letters, that will show problems in writing.

Returning to the model of both (Shallice, 1988) and (Denckla & Roeltgen, 1992) we notice that they emphasize that the three model systems may be injured independently, which may give different types of dysgraphia.

Some support the hypothesis of the damage of the alteration of the graphical buffer, this happens when the letters are written correctly, but it are misplaced within the word, or they are doubled.

Concerning the damage at the level of the stock of graphic reproduction, errors appear in choosing the appropriate letter pattern, for example a letter is written in its typographic form within a word written in Cursive one and this appears frequently during the process of transferring printed texts (Legendre, 1993, 14-15).

Michelbest, also emphasizes that a child who suffers from developmental delay appears to have dysgraphia, due to the fact that the main areas of the brain are not yet fully developed, at the normal rate for them, as in the minor functional disorder in the posterior parts of the brain, That leads to dysgraphia in the child, this is done for both writing during transcription, spelling, or written expression (Kamil, 2004, 60-61).

3.3. The psycho-analytical approach:

Experts who adopted this dynamic approach, have noticed that many children who have a bad handwriting, have previously been placed within a narcissistic problem, which expresses a weakness in identity (Tajan, 1982, p18).

Here (Du Pasquier, 2010) believes that writing becomes impossible "when investing it in an excessive narcissistic way ..."

Consequently, according to the opinion of the owners of this approach, the writing disability is due to identity problem, and the narcissism problem, which refers to the issues of loss and separation within the psychological conflict.

The excessive investment of the body imposes on these children a continuous link between ego and non-ego , and between the libidinal subject and the narcissistic subject, during the separation process, children experience the loss process, which is reflected in their writing .. also, symbolic activity is a reason for these children, where the loss of the subject is balanced by large amount of Identities activity, and by excessive representation of body "where the body takes the place of lost subject" and as long as writing is the way of the body it is also troubled, instead of being a mirror of conscious, writing becomes a mirror of unconscious (Winnicott, 2005), and the equations of the famous Symbologist (Pelzer) become two inverse equations; the first equation "Writing narrows the body margins on paper, and creates a space around it" The second equation "Writing is the expression of conscious/ drawing is the expression of the unconscious" (Witkowski, 1997,5)

3.4. The psycho-Motor approach:

Galivret believes that a strong disorder in the learning of writing can occur if the child shows troubles in the body scheme organization, as its place in space is determined by the direction of its body in it, as the poorly constructed internal perception in relation to other parts of the body leads to a false and incomplete perception of space and direction.

This leads to absence of the harmonious laterality, thus impedes the formation of the landmark in the child's space, and if the space perception emerged in a disruptive development, it can lead to difficulties in identifying the arrangement and organization of letters according to the relationship between each other.

The owners of this approach also emphasizes that those who suffer from dysgraphia may suffer from a misuse of time consolidation, therefore they have a problem in controlling the written rhythm (intensity, duration, tone, character, height) and problems between the synonymous and harmonious sounds (Boulinier, 1973, 155).

3.5. The phonological approach:

In this approach, Zesigner presents an explanatory model of dysgraphia, dividing this latter as follows:

- Difficulties associated with the development of sectional strategies, which include phonological difficulties.
- Difficulties associated with the acquisition of spelling strategies, which also include problems with how to use the spelling glossary.

This lack of phonological awareness is caused by difficulties in phonological memory, due to the difficulty in treating the sequence of sounds in a short period, this was assumed by clinical phonological research conducted by Paul Atallal, which

showed that there is difficulty in analyzing the components of speech, resulting from difficulties in perceiving and controlling the speech-forming units (Boulinier, 1973, 27-28).

4. PATTERNS AND ASPECTS OF DYSGRAPHIA

If the writing in normal children is varied, and different, how it would be among dysgraphic children, where there is no such thing as (standard dysgraphia)? There are many patterns, where each child develops his own disorder according to several factors.

In this regard, several classifications of dysgraphia have emerged, as There are those who classified them according to groups of children with dysgraphia, and others who classified them according to the type of dysgraphia itself, we can mention:

4.1. Classification of (Ajuriaguerra et al. 1979, 224-256)

It is classified into five types, as follows:

A. The hardened pattern: The main features of this type are consisted of 12 appearances, as follows:

1. A general constriction in writing.
2. Narrowing of the central region (very high but not wide).
3. Narrow curves of the outer region (taller than the width).
4. Frequent sharp writing.
5. letters arcs curved sharp.
6. Conjoined lines, (the space between the lines is less than two letters).
7. Adherent words.
8. child bend to the right clearly.
9. Frequent microscopy writing.
10. Patching and correcting letters.
11. Wide, dark-colored pieces (reflecting the child's large pressure on the pen)
12. Relative moderation in the direction, and a noticeable curvature of the letters.

Appearance 4 and 5 appear frequently in this group, then the following appearances appear: (8-2-7-1-9-12) are similar in frequency and they are followed by appearances (3-6-1-11).

B. The soft pattern: It is noted on this pattern of children suffering from dysgraphia has 11 basic features and they are as follows:

1. Small writing, where the letter dimensions are less than the established standards (2.5 mm).
2. The two outer regions are less developed than the central region which is clearly dominant.
3. Floating movement; with hesitation in the forms, and changes in curves so that it appears on the writing that it is going from left to right - as if it is a rapid movement - but it is in its place.

4. The small size of the spreading area; bends dominate the lines and corners appear puffy.
5. The characters are loose and less precise.
6. The lines are relatively coming down.
7. Words dance on the lines.
8. Lots of microstructures.
9. Atrophic letters.
10. Warp in the direction.
11. Warp in dimensions.

Appearances (3-8-11) appear regularly in this pattern, followed by appearances (7-5-9-2-1-10).

C. The impulsive pattern: eleven basic appearances are observed on this pattern, as follows:

1. Writing in its general form is hasty.
2. Movement and tendency to speed.
3. Lots of vibrations.
4. Corrugated lines.
5. Poor exploitation of the page; margins are disrespected.
6. The ends of words, letter covers and diacritics are all too long.
7. Coexistence between good and bad characters links.
8. Coexistence between curves and acute angles (due to vibrations or sudden angles intermittently).
9. Coexistence between relaxation and tension (writing shapes and then faltering on the one hand, shaking and re-patching on the other hand)
10. Many patches.
11. A large warp in dimensions.

Appearances (1-2-3) are the most visible in this group, and then appearances (5-11-7-10)

D. The clumsy pattern: It is observed on the members of this pattern - as in the previous two patterns - 11 basic appearances are as follows:

1. delay in writing in general, with difficulty in diacritics.
2. Writing takes a huge place.
3. Bad quality clips, with no moderation in the darkness level (repeat writing)
4. The margins and the space between the lines and words are clearly narrow.
5. Writing puffy and atrophic at the same time, some letters are huge and others are very small.
6. The links are very poor.
7. major no-moderation in dimensions.
8. Words dancing on the line.
9. Whiteness is not moderately divided.
10. EM result is high.

11. Failure to respect the proportionality between the three regions.

The two appearances (7-10) are considered one of the most important characteristics of this category, followed by the appearances (1-9-2-5).

E. The slow and precise pattern: The individuals of this pattern show 10 basic appearances:

1. Seeking to organize the page by trying to extend and straighten the lines, and by setting margins.
2. Extensive and straightening the lines.
3. The whiteness between the lines and the words is relatively harmonious.
4. The absence of kinetics.
5. The writer is leaning to the right.
6. Superficial writing.
7. The letters are precise.
8. Curved characters, with moderate brackets.
9. Relative moderation in orientation.
10. Relative moderation in dimensions.

Appearances (4-3-5-6-8-9) are the most important characteristics of this type of writer, then appearances (2-7-11) according to their frequency.

4.2. Classification of (Deuel, 1994):

Beyond considerations regarding the appearance of writing as in the previous classification, Deuel provides us with a classification of dysgraphia based on its reasons, divided into two categories: special and non-special:

A. Special dysgraphia: reasons for this type include motor coordination disorders, language disorders; as well as motor components that share with physiological problems, as well as difficulties of executive functions, motor planning, and visual spatial disorders.

All of these factors produce special dysgraphia.

B. Non-special dysgraphia: This type of dysgraphia is due to cultural deprivation, school absenteeism, lack of training and weakness of the strategies used by teachers. (Charles, Soppelsa, et Albaret, 2004, 8)

4.3. Classification of (Mojet, 1991):

In this classification Mojet tries to divide dysgraphia into a group of patterns, according to the type of writing presented, into three types: (Charles, Soppelsa, et Albaret, 2004, 9).

A. The first type: the person is distinguished by the heaviness in writing, but his letters are well diacritics, the writing size is medium, the letters are regular, the rhythm is heavy, the writing time is not regular, the length of the stopping time, the

pressure on the pen is medium, and here we can talk about excessive discipline by the child.

B. The second type: is characterized by speed in writing, letters are not well diacritic, large dimensions, height and length of letters are not respectful, unorganized graphical production, speed and non-stop, here the dynamics of writing is not infected but it does not control it.

C. The third type: the child is heavy in writing, the letters are not well diacritic, the capital letters are not regular, the time is disorganized, the pressure on the pen is strong and accompanied by problems with motor coordination and the appearance of fatigue.

4.4. Classification of (Didier, 1993, 49-50)

Porot presents this classification based on the perceived side of this disorder, which are of two main types:

A. Aphasic dysgraphia: It is due to a disorder at the level of special language mechanisms, the properties are preserved, and the use of symbols is disturbed, as it is impossible to rewrite letters correctly.

B. Motor dysgraphia: is caused by disturbance of the conditions of motor implementation of writing without the presence of basic primary motor disorders, due to a disorder at the level of the largest parietal lobe, and in this type writing appears as scribbling, and the space path of the lines is disturbed.

CONCLUSION:

So, after these comparisons, it can be said that the writing process is a mixture of mental and motor strategies, so students with learning disabilities who have weakness in these areas also have weakness in written expression, their writing is not arranged, it is full of spelling errors and punctuation errors.

Technical difficulties can arise from mental difficulties such as dysfunction of the visual memory or the ability to be in the place, or in knowing directions, or from motor difficulties such as insufficient control of the fine muscles in the hand, or in the coordination between the hand and the eye, and difficulties in written expression due to weakness and poverty in the linguistic dictionary from a weak language or from a weak ability to compose a correct structural sentence. Or a psychological trouble associated with the early stages of life.

To understand the mental aspect of writing, it is necessary to differentiate between the approach that sees writing as production and the approach that considers it a stand-alone process.

The first approach considers that writing is a production where the student produces and creates it alone. The student examines the words if the spelling is correct, the writing is readable and the sentence is built according to the rules of grammar and numbering. The teacher often corrects the production and expects the student to learn from his mistakes.

The accepted approach today among educators and therapists shows the importance of the thinking process during writing and the stages of writing, according to this approach we can develop the linguistic abilities of the student and provide him with strategies that help him in dealing with the difficulty of writing.

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