# Dyslexia and Dysgraphia in Learning English as a Foreign Language: A Case Study of Croatian EFL Learners

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Faculty of Humanities and Social Sciences

Double Major MA Study Programme in Philosophy and English Language and Literature – Teaching English as a Foreign Language and Philosophy

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Diplomski rad

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Znanstveno polje: filologija

Znanstvena grana: anglistika

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Osijek, 2024.

**IZJAVA O AKADEMSKOJ ČESTITOSTI I**
**O SUGLASNOSTI ZA JAVNO OBJAVLJIVANJE**

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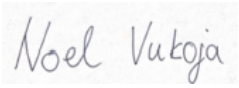
U Osijeku,

30. kolovoza 2024. godine



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# Contents

**Abstract**

Dyslexia and dysgraphia are described as neurodevelopmental disorders and are the most common learning difficulties. Students with dyslexia and dysgraphia struggle in many aspects of education, especially foreign language, and need special adaptations to the learning approach. The Multisensory Structured Language (MSL) approach addresses these needs by engaging multiple senses in a structured simple-to-complex methodology. This paper explores the effects of Spark's and Miller's (2000) Multisensory Structured Language approach on Croatian English as a Foreign Language (EFL) with dyslexia and dysgraphia through a case study. This research paper consists of five parts. The first two chapters offer a historical and theoretical overview of dyslexia and dysgraphia through a comparison of various theories and beliefs while underscoring the most relevant ones in detail. The third paragraph deals with the legal aspect of dyslexia and dysgraphia in Croatia. The fourth paragraph covers EFL teaching methods for said learning difficulties. The fifth and final paragraph presents a multifaceted descriptive analysis of the MSL approach on two high-school EFL learners with dyslexia and dysgraphia. The results demonstrate significant improvements in both EFL proficiency and participants' self-efficacy. The main aim of this study is to raise awareness of the importance of teaching adaptations for students with dyslexia and dysgraphia.

**Keywords:** dyslexia, dysgraphia, case study, MSL, EFL, dominance profile

**Sažetak**

Disleksija i disgrafija opisani su kao neurorazvojni poremećaji te su najčešće poteškoće pri učenju. Učenici s disleksijom i disgrafijom svakodnevno se suočavaju s teškoćama u mnogim aspektima obrazovanja, no posebice pri učenju stranih jezika. Shodno tome, potrebna im je posebna prilagodba pristupa učenju. Pristup višeosjetilnog strukturiranog jezika (*Multisensory Structured Language Approach* - MSL) pripomaže njihovim potrebama angažiranjem više osjetila u strukturiranoj metodologiji jednostavnog prema složenom. Kao referentnu točku koristi ovog rada koriste se istraživanje autora Sparks i Miller (2000) te istražuje učinke višeosjetilnog strukturiranog jezičnog pristupa na hrvatske učenike engleskog kao stranog jezika (ESJ) s disleksijom i disgrafijom kroz studiju slučaja. Rad se sastoji od pet dijelova. Prva dva poglavlja navode povijesni i teorijski pregled disleksije i disgrafije kroz usporedbu raznih teorija i istraživanja uz detaljno naglašavanje onih najrelevantnijih. Treći odlomak bavi se zakonskim aspektom disleksije i disgrafije u Hrvatskoj, dok četvrti odlomak pokriva ESJ metode podučavanja za učenike s disleksijom i disgrafijom. Peti i posljednji odlomak predstavlja višestruku deskriptivnu analizu MSL pristupa na dva hrvatska srednjoškolska učenika ESJ-a s disleksijom i disgrafijom. Rezultati su pokazali značajna poboljšanja u raznim aspektima ESJ-a i samoučinkovitosti sudionika. Glavni cilj ovog istraživanja je podizanje svijesti o važnosti prilagodbe nastave za učenike s disleksijom i disgrafijom.

**Ključne riječi:** disleksija, disgrafija, studija slučaja, višeosjetilno strukturirano poučavanje jezika, engleski kao strani jezik, dominantan profil

# 1. Introduction

Dyslexia and dysgraphia are multimodal neuro-developmental disorders with a biological origin and behavioural signs that extend far beyond problems with written language (Morton & Frith, 1995). These learning difficulties occur in adequate intellectual aptitude and significantly impede an individual's general academic progress, memory, and emotional state, but especially (foreign) language acquisition. It is estimated that around 10% of Croatia's students are diagnosed with dyslexia and dysgraphia which makes them the most common learning difficulties (HUD, 2014). The main indicators of dyslexia and dysgraphia that make them easily identifiable at a young age are substandard phonological awareness and poor grapheme-phoneme relationship in the native language. However, compared to the deep orthography of the English language, the Croatian language is transparent with a straightforward one-to-one phoneme-grapheme relationship which can delay a timely diagnosis (Lenček et al., 2007). In Croatia's Regulations of Education and Care dyslexia and dysgraphia are listed as specific learning difficulties and included in either regular or customized educational programs with individualized approaches. English as a Foreign Language (EFL) teaching methods for students with dyslexia and dysgraphia are countless, but none can be named as the universally best. Yet, the ones that involve simultaneous usage of all human senses (e.g. multisensory method, multiple intelligence approach, cooperative learning, and direct approach) seem to exceed others (Birsh & Shaywitz, 2011). Inspired by these methods, Sparks and Miller (2000) created an approach that incorporates a multisensory learning method with direct, structured, and simple-to-complex language learning, naming it - The Multisensory Structured Language Approach (MSL).

This paper is motivated by the scarcity of research on the MSL approach's influence on EFL teaching among students with dyslexia and dysgraphia. It draws inspiration from previous researchers such as Richard Sparks and Carla Hannaford, but ultimately from the researcher's personal interest in the topic. The main goals of this research paper are to investigate the influence of the Multisensory Structured Language Approach (MSL) in English as a Foreign Language teaching and to raise awareness of the importance of method adaptations for students with dyslexia and dysgraphia. These goals serve as a guidepost for all theoretical information, observations, and empirical evidence gained in the research.

The goals of this research were realized through a case study of two male high-school Croatian EFL learners which was separated into three parts: the observational phase, the dominant profile and the self-reporting questionnaire phase, and the MSL approach phase. The first two phases served to gain a better insight into participants' learning habits and cognitive preferences, in-class behaviour, and language proficiency. The third phase included the eight-week MSL approach lessons and the pre- and post-test which served as descriptive evidence of the approach's effectiveness.

## 2. Dyslexia and dysgraphia: historical overview

The first mention of dyslexia can be traced to 1887 when a German ophthalmologist and professor Rudolf Berlin observed his adult patients as they struggled to read printed words despite having good eyesight. Influenced by his university professor Adolph Kussmaul's research on diabetic ketoacidosis[1], and his first recognition of the possibility that a disability can be viewed as an isolated symptom (Hinshelwood, 1896), Berlin speculated that his patients' difficulties had come from a physical change in the brain (Wagner, 1973). However, it was Kussmaul who named these difficulties *Wortblindheit* or word blindness. It was only due to contemporary medical literature's Greco-Roman condition descriptions that Berlin decided to coin the term 'dyslexia' developed from 'Dys' and 'Lexia' meaning difficulty and words, respectfully. Despite Kussmaul's and Berlin's efforts, it is believed that their descriptions and research were not specifically related to dyslexia, but rather reading difficulties in general (Kirby, 2020). By the end of the century, British physicians took the helm. Their research, led by William Pringle Morgan and James Hinshelwood slowly started to align with today's definition of dyslexia. Pringle Morgan (1986) observed a 14-year-old boy who was bright, intelligent, quick at games, and on par with his peers in all respects except for one significant challenge - he struggled greatly with reading. Pringle Morgan's conclusion (1896) was that the difficulty had come from a congenital defect. Hinshelwood shortly after described a similar case and went a step further concluding that the defect in question might be cerebral and visual, connecting it with "deficiency of the visual memory for words" (Hinshelwood, 1900, p. 46). Moreover, Hinshelwood separated *Wordblindheit* and dyslexia – as the latter is a unique form of *Wordblindheit* (Hinshelwood, 1896). His contemporaries, led by William Broadbent tried to

[1] Diabetic ketoacidosis (DKA) is a life-threatening problem that affects people with diabetes. It occurs when the body starts breaking down fat at a rate that is much too fast. The liver processes the fat into a fuel called ketones, which causes the blood to become acidic.

discredit Hinshelwood's theory by arguments that the terminology 'word-blindness' is not representative of the inability to read which they thought to be a part of a much larger deficit (Broadbent, 1896). Late 19th and early 20th-century dyslexia and reading difficulty research and debates were therefore marked by a dispute of defining specific and general reading difficulties, as dyslexia seemed to be a multi-dimensional difficulty to contemporary scientists. The early 20th-century researchers moved away from attributing dyslexia to visual deficits, instead theorizing that it resulted from a lack of cerebral dominance (Anderson & Meier-Hedde, 2001). Although this theory was incorrect, it raised important questions and spurred further research, leading to the understanding of dyslexia as a developmental disorder and shifting its study to the field of educational psychology (Kirby, 2019). During the 1940s, British governmental educational psychologist Cyril Burt took it as a responsibility to identify and enroll children with learning difficulties into special schools claiming that these difficulties made it impossible to teach "our duller and more backwards pupils" (Majdumar, 2004, p. 576). Despite Burt's controversial statements, he later stated that children suffering from 'congenital word blindness' can and will respond to adequate and appropriate teaching as well as their intelligence allows (Burt & Lewis, 1946), which is widely agreed upon in today's science. The next big strides in dyslexia research occurred in the 1960s in the United States of America when the term *learning difficulties* was coined (Schneider, 1999). Great Britain shortly followed when organizations such as the Dyslexia Institute and the British Dyslexia Association opened the eyes of the British public as the birth-givers to the term 'modern dyslexia' (Kirby, 2020). The term 'learning difficulty' also included language learning difficulties, and it was rightfully believed that specific learning difficulties such as dyslexia, attention-deficit/hyperactivity disorder (ADHD), dyspraxia, dysgraphia, etc. rarely occur in isolation but rather as comorbidities[2] and a continuum of difficulties that happen in conjunction with one another (Kirby, 2015; Kormos, 2017).

The first mention of dysgraphia traces back 50 years after the first mention of dyslexia, however, named *agraphia*. In 1937 Samuel Torrey Orton pioneered with his work *Reading, Writing and Speech Difficulties in Children* where he discovered that dyslexia could co-occur with other neurological disabilities, but also that other neurological disabilities may occur in isolation (see Nicolson & Fawcett, 2011). Just like dyslexia, its name originates from Greco-Roman words 'Dys' and 'Graphia', meaning difficulty or impaired, and writing by hand. Torrey Orton (1937) proceeds to explain dysgraphia (then *agraphia*) in two manners. In the first, an

[2] The topic of comorbidities will be detailed further in subsequent sections.

individual can form letters and produce acceptable writing for their cognitive and developmental level if given an extended amount of time, but the lack of speed may produce difficulties as the grades advance. Torrey Orton (1937) depicts this through an example of a boy who completed 50% of his assignments neatly and accurately but did not have the time to finish the other half. The second manner represents, unlike the first one, an inadequate quality of writing at a satisfactory speed. In recent years, dysgraphia research has gained traction, and authors such as Peter Westwood in his 2013 work *Learning and Learning Difficulties* have taken this difficulty to another level by dissecting stages of writing and identifying the exact issues that may occur which will be explained in detail in the further sections. Due to limited sources of publications on the history of dysgraphia, and since its' relevant historical advancements are covered in the dyslexia section as they share genetic and biological similarities, they will not be explained in further detail.

Nonetheless, the interest of the British and American researchers has attracted a wide variety of interested parties and set forward critical discussions in the cultural, political, and gender histories of dyslexia and dysgraphia. In the twenty-first century, researchers finally agree that defining dyslexia and dysgraphia is an arduous and ambiguous task. As mentioned, the difficulty in defining these neurobiological difficulties comes from a vague understanding of the physical and cognitive causes, but also from its heterogeneous nature. Lawlor (2012) draws a parallel with another condition that was never universally defined due to its physical invisibility and difficult differentiation from other similar conditions – depression. These facts help rejectionists challenge dyslexia, dysgraphia, and similar difficulties via arguments that they are an excuse for laziness, lack of intelligence, bad mood, etc. Frith (1999) states that only about 5% (or even fewer) of the characteristics linked to dyslexia and dysgraphia are common among all individuals with the condition. Moreover, these traits can appear and be noticeable only in specific circumstances, resulting in various manifestations among different people. Despite this, all professionals agree that these disabilities influence and impede different aspects of everyday life including learning due to difficulties in memory, organizational skills, emotional state, perception, and precision (Fišer, 2019).

## 3. Dyslexia

Learning difficulties refer to permanent conditions and represent various impairments in cognitive processes connected to all parts of language acquisition, especially oral and written (Libera, 2014). Descriptions of dyslexia and dysgraphia are differentiated from other varieties

of learning disabilities on the principle that the said disabilities happen unexpectedly in the context of adequate intellectual aptitude in terms of IQ, educational opportunity, and all within the normal range on psychometric tests (Bishop and Snowling, 2004; Shaywitz et al., 1990). To achieve a further understanding of dyslexia and dysgraphia, it is crucial to differentiate between existing learning difficulty types and theories. Scientists believe that dyslexia can be either a result of developmental difficulties, appropriately named *developmental dyslexia*, or a brain injury, named *acquired dyslexia (alexia)*.

The first mention of developmental dyslexia belongs to William Pringle Morgan in which he described a 14-year-old boy (see previous chapter) Percy with regular motor and intellectual skills, the only field lacking competence and comprehension was reading (see Shaywitz, 2003). Pringle concluded that the cause of this reading difficulty must be connected to brain abnormalities in the left angular gyrus that set the ground for further research (see Figure 1).

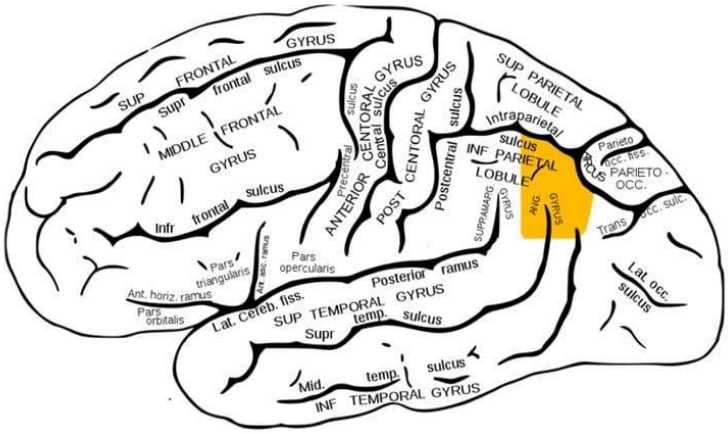


Figure 1. Left angular gyrus (Max Planck Institute, 2017)

The most prominent researcher of developmental dyslexia and dysgraphia, Samuel Torrey Orton, in his work *Reading, Writing and Speech Difficulties in Children* (1937) reflected on Pringle Morgan's theory and developed *cerebral dominance theory* suggesting that neither brain hemisphere is dominant in dyslexics and that the radix of spelling, reading and comprehension difficulties lies in this fact. His theory was disputed by many researchers in the later years, such as Carla Hannaford (1997) whose dominant hemisphere theory on this research will be based upon. Despite his incorrect theory, Orton remains relevant today as an inspiration for *The Orton Dyslexia Society*, now the International Dyslexia Association (IDA) (Kuerten, Mota & Segaert, 2019). Years later, Brown (2011) and Leong and Joshi (2013), speculated that unusual reading patterns in adults after brain trauma or lesion implied that these individuals

were still literate with normal reading patterns before the trauma. However, research by Jackson and Coltheart (2001) implies that people with low reading levels or inadequate education throughout their lifetime also showcase reading patterns on a similar or larger scale, but due to an absence of brain trauma, this condition belongs to *developmental dyslexia*. It is also crucial to note that *acquired* and *developmental* dyslexia are not exclusively connected to age and brain trauma as a cause. Instances have been documented where children, who were previously proficient readers for their age and demonstrated significant progression in their reading skills, suddenly lost their ability to read, making this distinguishment even more ambiguous. Subsequently, acquired dyslexia in children can occur because of environmental influences post-birth (Jackson et al, 2001). Nowadays, there are still researchers who discard all the mentioned theories and claim that the real cause and nature of dyslexia is unknown (Šehić, 2017). For example, Friend and Bursuck (2002, p. 146) distance themselves from defining dyslexia and appropriately refer to it as a "term for describing any serious reading disability". However, a common belief among most researchers is that developmental dyslexia is a neurobiological condition marked by challenges in reading and writing abilities (Cook & Ryan, 2016). Moreover, thanks to medicinal technology development, it is possible to research these difficulties in a plethora of ways. A part of the motivation behind this paper stems from Carla Hannaford's dominant hemisphere theory in school-age children, which is influenced by the following models and theories. Thus, this paper will only deal with developmental dyslexia in more detail in further chapters.

In their (1995) paper, John Morton and Uta Frith seek to present the difference between children whose difficulties stem from the educational process and those who have cognitive difficulties that influence a problem in reading and writing. Considering the importance of structure and attention to rules when such important and ambiguous research is conducted, Morton and Frith (1995) follow five crucial maxims in determining the causality of dyslexia and dysgraphia due to common mistakes and violations in the history of dyslexia research. The maxims relate to starting with biological origins; building causal chains from origin to behaviour; giving full and detailed account of all the symptoms and signs of the disorder; distinction between specific; and general conditions and a clear separation of cause and correlation. Morton and Frith (1995) exemplify the cruciality of these maxims by presenting previous attempts to make a clear difference between subjects with reading difficulties and educational process regression. Rutter and Yule's (1975) attempt to distinguish between the aforementioned groups by considering intelligence and reading test scores and identifying underachievers as dyslexic. However, the

behavioural descriptive basis of the research was ultimately disproved due to its inconsistencies and lack of meaningful evidence that would correlate neurological symptoms to dyslexia. Morton and Frith (1995) give a now widely accepted definition that offers three levels of causal models: *biological, behavioural,* and *cognitive* with the addition of *environmental* factors due to their involvement in all causal models. These causal models are imbued into the four theories that evolved over time which explain dyslexia from a neurocognitive standpoint: *the phonological deficit theory, the double-deficit theory, the magnocellular deficit theory, and the cerebellar deficit theory*. Partition of causal theories originates from difficulties in defining behavioural and cognitive correspondence. For example, some children show no discrepancies compared to their peers, and their poor results can be attributed to a lack of reading experience, developmental delay, or general learning disability; while the other group with reading difficulties can score relative to their IQ (intelligence quotient) and may indicate a cognitive difficulty. Morton and Frith (1995) proceed to explain that the latter group's difficulties may be attributed to second language difficulties, missing out on schooling, or cultural lack of reading value. Therefore, these children are often tested and misdiagnosed as dyslexic. Furthermore, as past (and current) reading tests struggle to identify specific learning difficulties, children with different difficulties get thrown in the same basket. Morton (1995) stresses the asymmetry in the dyslexia definition; the existence of underlying cognitive difficulties implies behavioural manifestation, but behavioural signs do not imply cognitive difficulties.

The three causal models and four theories will be used in this paper to offer a detailed overview of present learning difficulties theories and set the ground for an in-depth analysis as it encompasses multiple strata of dyslexia and dysgraphia.

## 3.1. Dyslexia causal models

### The biological causal model

The biological causal model, the most plausible explanation of dyslexia, came into the spotlight in the late 1980s when Harvard researchers led by Albert Mark Galaburda inspected 8 brains and discovered no typical asymmetry in the planum temporale, a region of the temporal lobes that oversees auditory processing and receptive language. However, the results were of no significant value at the time due to a lack of relevant research. A couple of months later,

Galaburda et al. (1989) found abnormalities in the visual cortex, more specifically, in the V1 area; an important part of the magnocellular system, which is responsible for timing visual processes while reading. Lovegrove, Garzia, and Nicholson (1990) added to Galaburda's work and found that the mentioned visual cognitive deficit might be rooted in reading difficulties and failure. Their peers at the time researching the genetic findings all concurred that phonological processing deficits are underliers of dyslexia (Olson et al., 1989; Stevenson et al., 1987). Researchers have discovered that 65% of children whose parents are dyslexic were later diagnosed with dyslexia. Annett (1992) took Olson's research even further and postulated that only one gene is responsible for left-hemisphere specialization, a main enabler of phonological processing. Despite the efforts in researching the dyslexia biological model in the late 20th century, Morton and Frith (1995) emphasize that any other theories at the time besides the ones implicating genetic factors are second to none, while Bishop (1990) confirmed that there are no conclusive differences in direction and laterality degree in determining developmental dyslexia. However, in recent times, scientists have recorded clear biological symptoms when comparing typical achieving readers to readers with dyslexia who all had problems with naming speed task performance, longer fixation duration, and increased activation of the reading network in the left hemisphere (Al Dahhan et al, 2020).

**The cognitive causal model**

Concerning the cognitive causal model, leading researchers in the field claim that a large proportion of dyslexics and poor readers[3] are deficient in the cognitive structure of grapheme-phoneme correspondence (Snowling, 1991; Frith, 1985). Morton and Frith (1995) explain this causal chain through their X-type model and the deficiency of the phoneme, P, and grapheme-phoneme, GP structures[4], which is indicated in Figure 2.

[3] The term "poor reader" will be used for any individual with sub-par reading skills in regards to their age and/or peer reading development from now on in this research paper.
[4] Phoneme and grapheme-phoneme components and structures will be referred to as P and GP from now on in ths research paper.

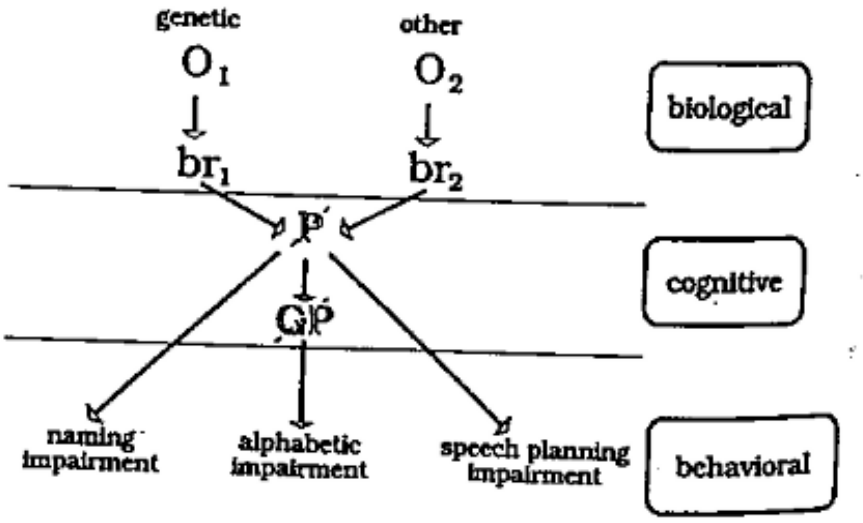


Figure 2. Schematic causal model for dyslexia with biological, cognitive, and behavioural levels of description (Morton & Frith, 1995: 380)

While the exact nature of dyslexia impairments remains unclear, Pennington's leading work (1989) on dyslexia's crucial impairments has been generally accepted even in the present. Pennington names these impairments as "name retrieval", "verbal short-term memory", and "speech production". The very name of these impairments explains their characteristics and it is flagrant that they will be apparent before any significant signs of literacy. What makes the entire cognitive model more interesting is that underlying dyslexia deficits can be also found in illiterate and non-alphabetic cultures (Morton & Frith, 1995). The secondary characterization of developmental dyslexia is a deficit in the P system (Graphics 2), which can be discovered via phonological tests such as alliteration, rhyme matching, and non-word reading (Rack, Snowling & Olson, 1992). This theory is supported by Morton and Frith's (1995) research that shows the absence of the P-component in young children due to the process of maturation (Figure 3).

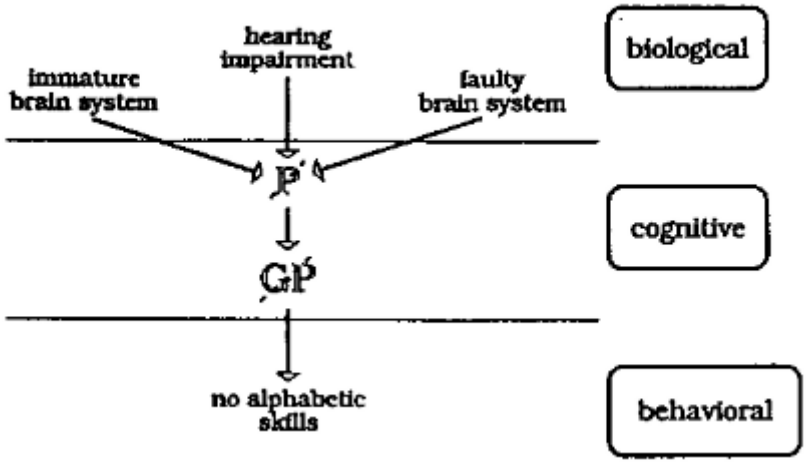


Figure 3. Absence of the P-component in young children due to immaturity, hearing impairment, or faulty brain system (Morton and Frith, 1995: 381)

The third reason for the lack of development of the critical P-component could be hearing impairment such as otitis media with effusion (OME), or simply put, a body of non-infected fluid in the middle ear (Morton and Frith, 1995).

**The behavioural causal model**

As previously stated, the existence of cognitive difficulties implies behavioural manifestation. However, a clear causal path in the biology-cognition-behaviour chain is difficult to validate. Morton and Frith (1995) highlight this issue; showing that blending skills and sub-syllabic segmentation (e.g., ra-di-o) typically develop alongside alphabetical reading skills. However, different components of the phonological process become apparent when phoneme awareness task is given to both literate and preliterate individuals (Morais, 1991). Moreover, poor P-indexed pre-readers (e.g. not being able to substitute a single vowel in a word) can be divided into two groups: those whose P-component is slightly delayed in relation to their peers; and those whose P-component remained faulty. Due to the nature of P-component development in early youth, it is impossible to differentiate a faulty P-component from an immature one. Scarborough (1990) suggested that preschoolers at risk of dyslexia can be timely remediated by analyzing their speech patterns and processes and differentiating faulty and immature P-components. At this point, it is settled that we broadly refer to the faulty P-component when it comes to identifying a dyslexic child. However, when it comes to pointing out specific conclusions of a dyslexia case, there are a couple of different biological causes (Figure 4) (Morton & Frith, 1995). When an individual is impacted by all the deficits as illustrated, they have a general learning difficulty that is affecting every form of formal learning. Despite that,

concerning the nature of this paper, we will strictly deal with specific learning difficulties – dyslexia and dysgraphia, as Figure 4 may present reading difficulties as a part of a much bigger issue, e.g. mental retardation, social disadvantage, etc. As it will be explained more subsequently in further chapters, recent research shows that children with reading problems may be related to attentional deficits and conduct disorder (Lewandowska et al., 2014). If that were to be the case, attentional deficits and conduct disorder could either be a result of reading issues and a child's self-confidence through the educational process, or a part of the SAS (supervisory attentional system) problems.

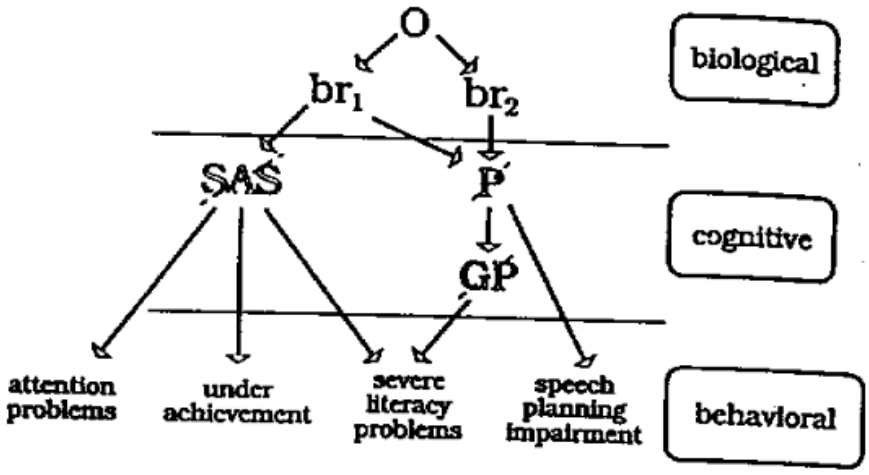


Figure 4. Aggravated dyslexia where a biological deficit is caused by P-component and SAS (supervisory attentional system) deficits (Morton & Frith, 1995: 382)

## 3.2. Dyslexia deficit theories

### The phonological deficit theory

In recent years, phonological deficit theory research in dyslexia has gained momentum, and developed remedial programs based on phonology (Lyon et al., 2003). Despite the disagreements and differences in views on phonology in dyslexia, a consensus arises when a correlation between cognitive and behavioural causes is questioned. From a neurological basis, the perisylvian cortex, located in the left hemisphere of the brain, is responsible for phonetic processing that makes grapheme-phoneme connections. Additionally, the left inferior temporal-occipital regions are responsible for phonological reading tasks (Shaywitz & Shaywitz, 2005). Despite the obvious connection with the visual cortex of the brain, it is important to note that

dyslexia does not have a link with any form of physical disability related to reading. Stemming from this explanation of phonological deficit, evidence has shown that dyslexic students struggle the most with tasks including segmentation and manipulation of speech sounds. Ramus (2004) describes the phonological processing deficit through its three main components: poor phonological awareness, slow lexical retrieval, and poor verbal short-term memory.

Vacca et al. (2003) believe that reading difficulty in dyslexic learners occurs from difficulty in retrieving phonological information from their short- and long-term memory, more precisely – phonological awareness. According to Vacca et al. (2003, p. 14), the term phonological awareness refers to "an understanding that words and syllables are comprised of a sequence of elementary speech sounds, and that this understanding is essential to learn to read an alphabetic language", or in practice, the ability to manipulate and learn grapheme-phoneme (GP) relationships. As GP connections are the foundation of alphabet learning, failure to establish a good base will almost certainly affect further language development. Moreover, there is a common consensus in the scientific community of it being a powerful indicator of a child's later reading (non-)success as PA[5] especially manifests in syllable counting, phoneme deletion, lexical retrieval, and sequence remembering (Ramus, 2004). E.g. many dyslexics struggle greatly when forced to read a text aloud, or even rapidly letters in isolation. Slow lexical retrieval refers to a lower level of semantic fluency resulting in a slower selection of target lexical items that are semantically correct. In this fashion, research has shown that children with dyslexia make significantly more phonological errors than the control group when it comes to the speed and the selection of the most appropriate word for expressing a concept (Nation et al., 2001). For example, when given a topic of "cities", individuals without dyslexia can quickly name Osijek, Vinkovci, Zagreb, and Split because of the semantic mapping and inter-word associations under the category "Croatian cities", while dyslexics struggle due to weaker semantic connections which leads to fewer items retrieved. The bigger semantic maps are, the easier and faster lexical retrieval is, and vice versa (see Mengisidou et al., 2019). Verbal short-term memory is associated with the amount of verbal and written information an individual produces at a given time. Due to short- and long-term memory cooperation and usage of the language system storage from long-term memory, the likelihood of an item being produced in the short-term memory depends greatly on the size of the latter (see Gathercole et al., 1999). Congruently, poor short-term memory is a direct consequence of phonological awareness and slow lexical retrieval (Majerus & Cowan, 2016). Taking everything into account, if tasks of any

[5] The term "PA" will be used for any referring to "phonological awareness" from now on in this paper.

type (syllable counting, phoneme deletion, lexical retrieval, sequence remembering, etc.) are directly affected by all three, or even one of the phonological processing deficit components it may lead to challenges in cognitive and behavioural dyslexia difficulties.

**The double-deficit theory**

As the phonological deficit theory gained traction, scholars began to doubt and started speculating that phonological deficit might not be the singular cause of dyslexia. This led Wolf and Bowers (2000) to propose an extension to the phonological deficit theory, appropriately naming it the double-deficit theory. The double-deficit theory states that dyslexics have a deficit in rapid automized naming **(**RAN), phonological processing, or both. Although consistent recordings of a RAN-only deficit have not been recorded, many researchers still consider rapid automatized naming only in relation to phonological family and will be discussed as such in this paragraph. RAN is the ability to name and read aloud known items in a series for high-frequency stimuli, such as colours, animals, numbers, letters, or shapes. It is measured considering the time taken to deliver a verbal stimulus for the given visual stimuli. Therefore, slow naming equates to a failure to recognize words rapidly (see Bowers & Wolf, 1999). In other words, if an individual takes more than the average time (of the tested group) to provide an answer, they most likely have a RAN deficit. It is also believed that readers with both deficits are on the more severe side of the spectrum; those with phonological processing difficulties exhibit fewer impairments, while those with only RAN deficits exhibit little to no difficulties (Wolf & Bowers, 2000; Vukovic & Siegel, 2006). Due to its testing characteristics, RAN tests are perfect indicators of reading difficulties in young learners and can be a powerful indicator of reading performance in languages with a one-to-one grapheme-phoneme relationship e.g. Italian or Spanish (see Nijakowska, 2010). However, scientists have yet to discover specific aspects of RAN that contribute to reading development. From a structural perspective, Morton and Frith (1995) and Galaburda (2005) believe that the cognitive level of dyslexia underlies biological and behavioural levels as brain structure and its physical abnormalities are fundamental to dyslexia research. Galaburda (2005), following the previous research of Norman Geschwind, claims that in typical individuals, the left hemisphere of the brain is bigger than the right hemisphere. On the other hand, dyslexics have a symmetrical brain or a bigger right side. Another study by Galaburda et al. (1985) comparing seven brains (four male and three female) found more differences in neural abnormalities of the male brain than in the

female brain. As medical technology has advanced, dyslexia researchers have gained the ability to observe brain activity through tools such as fMRI (functional Magnetic Resonance Imaging). Subsequently, new dyslexia theories surfaced: the magnocellular and the cerebellar deficit theory.

**The magnocellular deficit theory**

The 21st-century dyslexia research has been closely associated with visual impairments to the point where dyslexia is referred to as Specific Reading Disability. However, an exact connection between visual deficiency and dyslexia is yet to be discovered. As visual identification of words and letters is one of the basic requirements for reading, Stein (2001) states that dyslexia could result in neural abnormalities in the visual system. The visual system is divided into two pathways – parvo- and magnocellular, respectfully. Parvocellular (P) cells are smaller, require more response time, and their pathways deliver small, high-resolution information. Magnocellular (M) cells are larger allowing their pathways to respond quickly to changing stimuli (Yoonessi, 2011). The most prominent and widely accepted dyslexia visual theory is the magnocellular deficit theory. It is based on the belief that dyslexics' subpar reading performance stems from smaller magnocellular cells. Research has shown that dyslexics have 27% smaller magnocellular cells and more disorder in their pathways than typical (Livingstone et al., 1991). Sousa (2001) also claims that magnocellular deficit causes letters on a page to bundle and overlap or appear to move. This visual detection difficulty leads to frustration and visual stress resulting in eye strain, strong headaches, poor concentration, disorganization, loss of short-term memory, and word/letter omission. Such difficulties were attributed to hardships in the differentiation of letters *b* and *d, p* and *b, q* and *g,* etc. Reflecting on Morgan and Frith's (1995) causal model theory, the magnocellular deficit is connected to the behavioural level of dyslexia. Reading performance depends on visual information processing, and dyslexics have a lower visual and auditory sensitivity. On a cognitive level, dyslexics exhibit an omission of small visual and auditory stimuli, leading to behavioural-level difficulties on tasks with the perception of motion, reading, or speech development (see Stein, 2001).

**The cerebellar deficit theory**

Just like the magnocellular theory, the cerebellar deficit theory has gained attraction since the early 2000s. Because of the brain's complex and interconnected structure, magnocellular pathways affect the cerebellum, the area responsible for automating fine motor skills and

learning (see Nicolson & Fawcett, 2008). The cerebellar deficit theory proposes that a dysfunction in the right cerebellum might cause reading difficulties (Nicolson et al., 1999). In the same manner, Frith (1999) claims that cerebellar deficit can be viewed through a cognitive-behavioural chain: atypical cerebellum indicates a processing deficit that influences motor and phonological skills, time management, and balance. On the other hand, Ramus et al. (2003) found no correlation with time estimation or reading skills. In conclusion, both magnocellular and cerebellar deficit theories explain dyslexia as a consequence of a general sensory processing deficit and imply that sensory remedial learning could be useful in individuals with developmental dyslexia.

# 4. Dysgraphia

The writing process can be viewed as the production of individual words and characters, and a complex process of composing words into sentences, paragraphs, and texts. If an individual fails to do the mentioned tasks in relation to their age, they might suffer from dysgraphia. Following the line of thought, the most present dysgraphia definition is the one by Chung et al. (2019), claiming that dysgraphia is a writing disorder, including letter formation, spacing, spelling, motor coordination, grammar, writing rate, and composition. Despite that, it is not an indicator of intellectual ineptness. Dysgraphia can also be divided into acquired and developmental. The first is caused by damage to the brain such as a disease or an injury resulting in a previously developed skill. In contrast, developmental dysgraphia is defined as a difficulty in developing writing skills despite general learning aptitude, and (above) average cognitive capabilities. This research will focus on the latter because of its relevance to the research topic. Moreover, different classifications and theoretical mechanisms of dysgraphia through years of research made it impossible for the reader to understand this disability. However, all relevant research belongs to the following five dysgraphia subtypes: motor (peripheral), visual-spatial, phonological, lexical (surface), and linguistic (dyslexic) dysgraphia which will be discussed in more detail.

## 4.1. Dysgraphia subtypes

### Motor (peripheral) dysgraphia

Motor, or peripheral dysgraphia is a dysgraphia subtype characterized by fine motor skills issues and failure or difficulties in letter or number production. Individuals with this condition see and understand graphic symbols but fail or hesitate to use motor skills to form letter shapes and write (DOT(WA), 2019). Motor dysgraphia affects only the shape and the quality of the written text and does not influence the symbols of writing (see Figure 5).

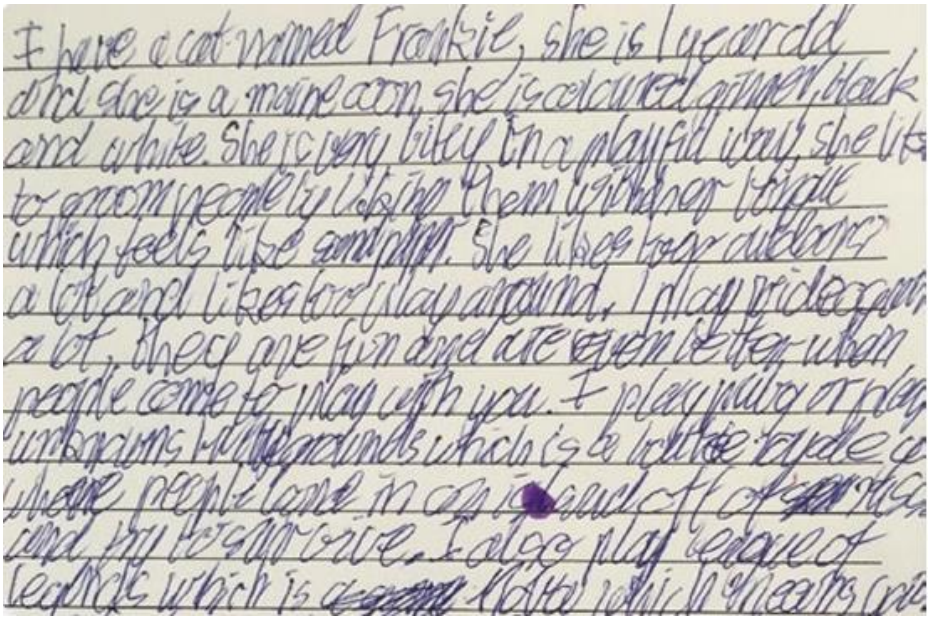

Figure 5. A handwriting example of an individual with motor dysgraphia (DOT(WA), 2019: 25)

According to Feder and Majnemer (2007), key handwriting performance components include kinesthetic skills such as motor planning, sensory awareness of the fingers, poor posture, and in-hand manipulation skills (pencil grasp). Furthermore, Chung (2015) claims that symptoms of motor dysgraphia vary with age. Preschool children may be hesitant to write, have an unusual pencil grip, which is closely associated with handwriting issues, tilt their bodies, and get tired quickly. Young students have trouble writing within the lines in the notebook, and their letters vary in size and shape. Adolescents tend to use only short sentences as a defense mechanism. Research has shown different results in the general percentage of students with motor dysgraphia. Van Hoorn (2013) claims that the percentage is 5-27%, while Stefansson and Karlsdotter (2002) claim a somewhat higher percentage of 10-30% that decreases with age, while additionally highlighting that males (66-88%) are more prone to motor dysgraphia. Finally, there is a higher possibility that students with motor dysgraphia will not be timely diagnosed than students with some more 'popular' or obvious difficulties, such as dyslexia. Engel-Yeger et al. (2009) also state that teachers tend to give higher grades to students for clear and neat writing which causes academic issues for students with motor dysgraphia.

**Visual-spatial dysgraphia**

At the very beginning of the writing learning process, children visually learn the shapes of the letters (allographic units) before making a phoneme-grapheme connection (PGC) and starting to write. Visual-spatial dysgraphia might be the reason for a failure to satisfy these fundamental writing conditions. Acquired form of visual-spatial dyslexia occurs from lesions in the right hemisphere of the brain unlike other forms of dysgraphia which occur from damage in the left hemisphere (Silveri et al., 1996). Whitmore et al. (1999) offer a case overview of a 9-year-old girl with a normal general aptitude, no family history of disorders, fine motor skills, and cognitive capabilities but with a hesitation to write in school after an acute illness with septicemia (blood poisoning). She wrote diagonally on the paper while continuing to write on the table after the space on the paper ran out, and the spacing of the words was poor. When trying to keep notes of what was dictated, she faced difficulties. Writing on the keyboard lessened the errors, but visual-spatial dysgraphia meant that recognition of the keys on the keyboard was slower than regular. The developmental form of visual-spatial dysgraphia manifests itself when visual-spatial tasks without motor skills are presented, Deuel (1995) claims. These tasks highlight the lack of coordination and understanding of physical space. If the condition is more severe, individuals may have drawing difficulties as well. Just as is the case with acquired visual-spatial dysgraphia, students with developmental visual-spatial dysgraphia tend to not use equal margins in each row, slope the lines when writing from left to right, intertwine the lines of text, space words unevenly, and misjudge the size needed for a word at the end of the line (see Figure 6).

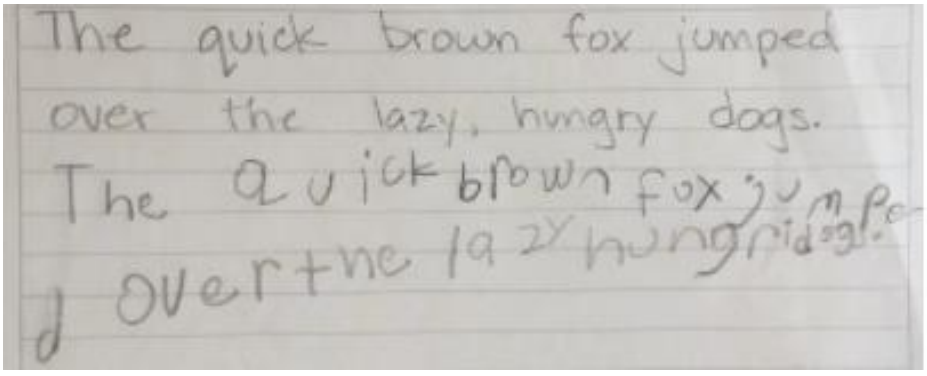


Figure 6. A handwriting example of an individual with visual-spatial dysgraphia (Finn, 2020)

**Phonological dysgraphia**

Phonological dysgraphia is its least researched type as it is usually overshadowed and thought to be closely connected to its more popular counterpart, phonological (processing) dyslexia. It is a subtype characterized by difficulty processing non-words/quasi-words compared to real words, spelling unfamiliar words, and phonetically irregular words (Beavouios et al., 1979). One group of researchers suggests that posterior perisylvian lesions could be the central source of phonological dysgraphia (Roeltgen et al., 1983). The other believes that it stems from a central phonological deficit instead of damage to the cognitive system responsible for writing (Rapcsak, 2008). However, this acquired dysgraphia subtype manifests itself through the developmental phase which makes it difficult for an individual to hold phonemes in memory and use them in a correct sequence.

**Lexical (surface) dysgraphia**

Lexical (surface) dysgraphia is a spelling deficit that stems from an impairment in the lexical route for spelling, resulting in spelling via the phoneme-to-grapheme conversion (PGC) route. (Friedmann & Gvion, 2023). Unlike phonological dysgraphia, acquired lexical dysgraphia occurs due to lesions in the left brain hemisphere. Developmental lexical dysgraphia is almost a replica of its acquired counterpart. Research concerning developmental lexical dysgraphia seems to be inconclusive as one part of the researchers claims that some students with developmental lexical dysgraphia require more spelling repetition than their peers. The other side claims that word exposure is not a factor in developmental dysgraphia (Friedmann & Gvion, 2023). Individuals with lexical dysgraphia will struggle with the spelling of words whose orthographic form does not directly replicate its phonological counterpart, e.g. writing ‘nait’ instead of ‘knight’, ‘jem’ instead of ‘gem’, or ‘nife’ instead of 'knife’. This form of lexical dysgraphia is named *orthographic lexicon surface dysgraphia.* Moreover, some errors can produce lexically correct or existing words by accident. This phenomenon also occurs in young children who are learning a language, i.e. they do not have the target word stored in their orthographic lexicon, e.g. ‘night’ when wanting to spell ‘knight’ (see Yachini & Friedmann, 2022). If the degree of lexical dysgraphia is more severe, a complete disconnection in the PGC route may occur naming it *disconnection surface dysgraphia*. If the disconnection in the PGC route is partial, the lexicon can be rebuilt in the places where the disconnection is present with

the help of present connections that serve as the basis, also named *orthographic skeletons* (Wegener et al., 2017).

### Linguistic (dyslexic) dysgraphia

Linguistic (dyslexic) dysgraphia, also called dysorthography, is a language-processing deficit related to written expression (Chung et al., 2019). A graphomotor dysfunction and the lack of communication between the phonologic memory and the orthographic memory in the writing process characterize this form of dysgraphia, i.e. poor writing with missing or extra letters, unnecessary spacing, incoherent sentences, or wrong usage of capital letters. Moreover, storage, working memory, and verbal functioning are impaired in this dysgraphia subtype while research suggests that motor skills such as finger tapping are not impacted. Individuals with linguistic dysgraphia often struggle with spelling as they find it difficult to remember the sequence of the letters in specific words, e.g. “friend” might be written as “freind” or “firend”. Remedial multisensory teaching methods, such as tactile letters, salt trays, finger painting, etc. are necessary to create stronger connections between phonologic and orthographic memory.

## 5. Dyslexia and Dysgraphia in Croatian Educational Curriculum

The classroom learning conditions and the environment have a major impact on the learning outcomes of students with learning disabilities. In the past, it was a common belief among teachers that any child could learn and succeed if they had enough motivation, and that every underachievement is due to a child’s laziness or lack of intelligence (Hayes, 2000). However, this could not be further from the truth. Children with learning disabilities require an approach catered to their needs that ameliorates their strengths but also addresses their weaknesses.

Dyslexia and dysgraphia are not included in The Republic of Croatia’s law acts because they are classified as specific learning difficulties covered by the National Regulations of Education and Care. If the official committee upon the elementary school enrollment determines that a student has severe learning or perception difficulties, they are directed to the educational bodies responsible for remedial education, e.g. speech therapists (Nn, 87/08., 86/09., 92/10., 105/10., & 90/11.). Students can also, for any reason, seek remedial education and professional help at any point, e.g. if the learning difficulty is diagnosed later. Furthermore, according to the Regulations on Primary School Upbringing and Education of Students with Developmental

Disabilities (Narodne novine, 59/90), students with dyslexia and dysgraphia with difficulties in school curriculum acquisition are entitled to special types of education depending on the severity of the difficulty. Despite this, ambiguity occurs in an attempt to differentiate between 'light' and 'severe' levels of dyslexia and dysgraphia, i.e. there are no standardized and defined criteria that can be used as a reference point. The Croatian Dyslexia Association (2014) claims that these difficulties can be regarded as 'light' in comparison to others, such as autism, blindness, deafness, psycho-physical developmental difficulties, etc., but dyslexia and dysgraphia cause severe educational problems for students. In spite of this, the more recent Act of Education in Primary and Secondary Schools regards students with dysgraphia and dyslexia as 'students with difficulties' and gives a more thorough description of the educational support offered.

Moreover, article 4 of the Regulations on Primary School Upbringing and Education of Students with Developmental Disabilities (Nn, 23/91) ensures the integration of children with learning difficulties into regular education while stating that: "Up to three students with developmental difficulties can be included in a class department, and such department cannot have more than 25 students total". In accordance, a student with learning difficulties can attend either of the two types of educational programs with or without professional help:

a) regular educational program with an individualized approach
b) customized program with an individualized approach

Regular educational programs with an individualized approach are the most common among dyslexic students, however, its goals might be difficult to accomplish due to a lack of educated professional staff in schools on the topic (Croatian Dyslexia Association, 2014). This educational program is characterized by regular academic obligations of the dyslexic student while the teachers apply specific teaching forms in and out of the classroom. For example, predicting a longer learning time for more complex topics, multisensory method usage, oral forms prioritization in testing and teaching, systematic repetition and explanation usage, usage of simpler textual forms, avoiding public writing for the dyslexic student as it causes stress, assigning a smaller number of tasks, and giving an unlimited amount of time for written assignments (Croatian Dyslexia Association, 2014). In the case of written examination, teachers should employ the following adaptations: avoiding larger texts, using wider margins, using "sans serif" or "dyslexie" fonts with a size 14-pt, avoiding bolded, highlighted, or italic texts, using double-spacing without justified text, and using matt paper (NCVVO, 2007). Customized

programs with an individualized approach are rarer. It is used for 'more severe' (despite the poorly defined reference points) cases of dyslexia and dysgraphia, i.e. when a student has more difficulties, or if they are discovered too late and the child has not adapted to the educational curriculum (Croatian Dyslexia Association, 2014). A customized program with an individualized approach, as the phrase suggests, is created for each student individually by the teacher in agreement with a defectologist and a speech therapist. It is marked by a lowered volume and less difficult curriculum, as well as enrichment of the learning experience by various methods and activities. More so, in theory, if a student attends a customized program with an individualized approach e.g. foreign language, that does not necessarily mean that they should attend it in every subject as their difficulties might not hinder other learning skills. In reality, this is highly unlikely, and the program gets applied to every subject due to many reasons such as under-educated, -motivated, or -staffed educational collective, respectfully (Fišer, 2019; Erdeljac & Franc, 2012). Furthermore, the issues in the classroom scale even further when teachers must balance between catering to the needs of the majority of the part of the class without learning difficulties and cater the individualized needs of the learning-disabled students (Thompson, 2013). Finally, these oversights in accommodating students with learning difficulties can be solved only by proper education and motivation of the professional staff, as well as hiring more educational rehabilitation professionals, and curriculum changes (Fišer, 2019).

## 6. English as a Foreign Language teaching methods - an overview

In comparison, the early stages of foreign language teaching were characterized by the (somewhere still) dominant teaching method - *Grammar-Translation*. It was based on a comprehensive morphological analysis where students learn grammar by heart and practice the rules by doing endless translation tasks. Writing and reading were the dominant teaching methods while listening and speaking were rarely employed. In the early 19$^{th}$ century, Francois Gouin revolutionized foreign language teaching by introducing the *Total Physical Response* and *Situational Language Teaching* methods. Moreover, he changed foreign language teaching forever by carefully selecting the study material and giving the same amount of attention to both productive and receptive language skills (Fišer, 2019). Gouin's actions further paved the way for the formation of applied linguistics. The last big reform in EFL teaching occurred in

the 1970s when *Communicative Language Teaching* was born.[6] It was based on real-life input and situations with the belief that direct grammar teaching was redundant (Fišer, 2019).

A modified version of *Communicative Language Teaching* is still being used in many classrooms in Croatia. However, CLT[7] is often criticized because higher levels of foreign language speaking, and academic writing require a higher degree of grammar knowledge, which it lacked (Ellis, 2005). For CLT to be effective, students must recognize the target language input presented via formal instruction. Ellis (2005) states that formal instruction serves as an awareness-raising tool for the target language features which are then memorized and used in language acquisition. Formal instructions can be focused on the meaning or the form. Meaning-focused instructions prioritize learning the meaning and put less emphasis on the form and isolated grammar constructions (White et al., 1991). On the other hand, form-focused instructions accentuate grammatical structures such as words, phonemes, intonation, stress, etc. Both have advantages but are innately flawed; meaning-focused instructions can lead to inadequate grammatical competence due to a general lack of grammar while the latter stems from the *Grammar-Translation* method which conflicts with CLT (White et al, 1991). Therefore, Long (1991) states that the exclusive usage of either of these instructions will lead to a lack of language competence and that they need to be used together. Larsen-Freeman and Anderson (2011) go a step further and introduce a further classification of the CLT: *Content and Language Integrated Learning (*CLIL), *Task-based Approach* (TBA), and *Participatory Approach* (PA). *Content-based Approach* (CBA), or *Content and Language Integrated Learning* (CLIL) in European curriculums, is based on a foreign language teaching for a specific profession or a discipline, e.g. medicine, architecture, history, geography, etc. CLIL classes need to be carefully planned and executed through different methods as the main goal is to use the new content for communication in a target field. *The Task-based Approach* (TBA) is an inductive method in which the target language is introduced through guided tasks with clear outcomes. *The Participatory Approach* (PA) does not strictly follow the curriculum but uses dialogue and real-life context in the classroom to strengthen the four language skills. Larsen-Freeman & Anderson (2011) include three additional methods focused on the students in their classification: the *Learning Strategy Training, the Cooperative Learning,* and *the Multiple Intelligence Method,* which was based on Howard Gardner's (1985) eight intelligence types. *Learning Strategy Training* and *Cooperative Learning Method* promote structured

[6] This paper will not go into a detailed history of EFL teaching due to space constraints and because it is beyond the focus and the scope of this paper. (see more in Fišer, 2019)
[7] CLT will be used to refer to Communicative Language Teaching in this paper from now on.

learning through communication, cooperative learning, and examination while the *Multiple Intelligence Method* focuses on choosing an appropriate activity based on one of the individual's intelligences (Gardner, 1985). All the latter methods should work in a balanced environment to ensure successful learning. While none of the mentioned methods can be described as 'the perfect method', the real world requires each one to be modified to suit the specific characteristics of a student, either with or without learning disabilities. Nonetheless, to employ the best-suited method for a student with a learning disability, teachers must have a comprehensive knowledge of the specific disability.

### 6.1. Dyslexia and dysgraphia in learning English as a Foreign Language (EFL) in Croatia

According to Butcher (2017), reading is often the first step in learning new vocabulary and enhancing critical thinking skills. However, unlike listening and writing, which are a crucial developmental part of every human being, reading is the most difficult task to achieve as it is not a naturally occurring process. Sousa (2001) proceeds to explain that the brain's ability to acquire spoken language with amazing speed and accuracy is the result of genetic hard-wiring and specialized cerebral areas that focus on this task. However, there are no specialized areas of the brain that focus solely on reading, making it the most difficult task that the young brain undertakes. The genes have not incorporated reading into their coded structure, unlike spoken language which has been formed as a survival skill. Most of the world's educational systems introduce at least one foreign language subject at the beginning of formal education, with some including two or more. Consequently, when students with learning disabilities do not acquire appropriate productive and receptive skills on time, many problems emerge not only with academic achievements but also in everyday life. Dyslexic and dysgraphic students' difficulties can stem from any part of the language, be that phonology, morphology, lexicology, or syntax. The educational bodies therefore must ensure that every student has proficient learning skills in every area of language. Teachers must utilize specific strategies and methods when instructing and interacting with students with learning disabilities to support their unique needs. The fundamental condition for any dyslexia or dysgraphia teaching adaptation to be successful is the 'dyslexia and dysgraphia-friendly' climate in the classroom where the teaching environment is adjusted for students with learning difficulties (Fišer 2019, as cited in Coffield et al., 2008). Language learning strategies and methods naturally follow, e.g. *Linguistic Coding*

*Difference Hypothesis* states that poor readers struggle the most with the grapheme-phoneme relationship, especially if the target language does not function in a one-to-one G-P ratio. Therefore, students need the most work and help in this area (Reid, 2015).

As previously mentioned, today's consensus in European and Croatian schools is that dyslexia and dysgraphia are treated through teaching adaptations aimed at using more graphemes and phoneme-grapheme conversion, given additional time for tasks, adjustments are made to font style and size, and special approaches are employed. Some of the most researched and verified approaches in teaching students with learning difficulties stem from the foundations of the Orton-Gillingham method, such as multiple intelligence, learning strategy training, cooperative learning, and direct approaches. These approaches serve to present information in visual, kinaesthetic, auditory, and tactile forms; immerse the individual into communication; or tailor the teaching suited to students' dominant intelligence to enable a better acquisition of the target language (Birsh & Shaywitz, 2011, as cited in Snowling et al., 2020). Even though many various approaches to teaching a foreign language exist, this paper will focus only on the Multisensory Structured Language Method (MSL) as it was used in the case study connected to this paper, and because many relevant studies confirm that it is the best method for dyslexia and dysgraphia teaching (Schenider & Ganschow, 2000, Nijakowska, 2010).

### 6.2. The Multisensory Structured Language Approach

By nature, all humans use their senses to understand the environment and learn from it. As phonological and orthographic processing is lower for students with dyslexia and dysgraphia, other methods, such as incidental learning can be extremely challenging. Sparks et al. (1991) used this fact to modify the Orton-Gillingham method and create a unique teaching approach that employs sight, hearing, touch, smell, and taste to create a better learning experience, naming it the multisensory structured language approach (MSL). A couple of years later, Schneider and Ganschow (2000) added *The Dynamic Assessment*, which evaluates the student through the learning process rather than testing the outcomes. The theory behind the multisensory structured language approach states that if a certain learning skill is difficult for an individual, e.g. reading, simultaneous learning through another skill, e.g. touch, could enable additional learning pathways, and help develop the lacking skill (Thomson, 1990, as cited in Fišer, 2019). However, not all senses provide the same amount of learning stimulus. Humans generally learn the most through touch and sight, and the least through hearing (Ginder, 2010).

It is crucial to note that students with poor native language skills almost always achieve lower results in the FL than their peers with decent or good native language skills. According to Carron & Sapon (1959, as cited in Sparks & Miller, 2000), this occurs because of weak phonological and orthographic skills that have a carryover from native to foreign language, but also low FL aptitude. Still, no differences in semantic and verbal memory, or general cognitive ability have been recorded.

According to Kaldonek-Crnjaković and Fišer (2019), MSL is constituted of five key components:

a) Explicit language pattern instructions with native and foreign language differences and similarities analysis
b) Gradual and logical introduction of language concepts, e.g. grammar, from less to more complex. More complex concepts are built on the simpler ones.
c) Simultaneous use of auditory, visual, kinaesthetic, and tactile channels is the main learning concept.
d) Learning the metacognitive level of language helps students independently learn language, and self-monitor and correct their progress.
e) Constant revision of the learning material, i.e. *overlearning*

In a typical MSL approach lesson in a foreign language, these components work in the following way. Vocabulary teaching occurs when the teacher introduces new vocabulary through graphemes (letters) that correspond to phonemes (sounds). As students learn the G-P relationship, they simultaneously review previously learned material. Grammar is presented slowly from simpler to more complex concepts while encouraging metalanguage learning, e.g. how words are formed (prefix, suffix, root, etc.). Naturally, MSL activities are various and will differ concerning the used senses, lesson outcomes, material, etc. Moreover, research conducted by Sparks (1998) has proven that teaching a FL for two years following the MSL approach to dyslexic and dysgraphic students gave the same or better exam results as their peers without learning difficulties. Sparks and Miller (2000) offer an example of an MSL lesson (see Table 1):

Table 1. An example of a Multisensory Structured Language (MSL) lesson

| *Activity* | *Language skill* | *Time spent* |
|---|---|---|
| *Oral warm-up* | Listening, speaking, vocabulary | 1-2 min |
| *Blackboard/writing drills of phoneme–grapheme correspondences* | Phonology, orthography | 10-12 min |
| *Grammar and meaning units* | Syntax, morphology | 10-15 min |
| *Vocabulary and dialogue* | Syntax, morphology, semantics | 10-15 min |
| *Reading/communication* | Phonology/orthography, syntax, morphology, semantics | 10 min |

# 7. The present study

## 7.1. Review of previous studies

Empirical research on the MSL approach in students with learning difficulties exists in small numbers even today. It is also important to note that most of the mentioned research were conducted in transparent languages (Spanish, German, and English), that is, with a one-to-one grapheme-phoneme relationship. Nonetheless, the first descriptive and empirical research on the topic of multisensory structured foreign language (MSL) teaching approach was conducted by Sparks et al. (1992). They examined the pre- and post-test results of three FL learning groups after teaching each one through a different approach. The tests measured phonology, orthography, vocabulary, general language aptitude via the MLAT (Modern Language Aptitude Test), and verbal memory. The first group was instructed through the MSL approach in English and Spanish, the second through the MSL approach only in Spanish, and the last one using a textbook-based methodology. The MSL English and Spanish group made big progress in all the mentioned categories, while the Spanish language group made progress only in general language aptitude. The textbook-based methodology group made no progress in any category. In the following study, Sparks and Ganschow (1993) tested the MSL Spanish language group students from the previous research, and a new MSL English and Spanish language group. The first group maintained all previously gained knowledge, while the second group progressed in the MLAT and phonological and orthographic knowledge. Four years later, the first significant

MSL research testing learning difficulties followed. In their (1997) study, Sparks et al. used the MSL teaching approach again and analyzed 15 high school sophomore females enrolled in second-year Spanish classes over 2 years. They divided the participants into two groups: at-risk, and not-at-risk, i.e. the ones who have been diagnosed with learning difficulty, and those who have not. The at-risk group made progress only on the MLAT and phonology/orthography, while the not-at-risk group made progress on the MLAT and the Phoneme Deletion. However, the at-risk group did not achieve the same FL proficiency results as the not-at-risk group. Sparks' last MSL research (1998) gave the most credibility to the effectiveness of the MSL approach on at-risk (learning difficulties) students. The research was, however, based on instruction in Spanish. Results have shown that over the course of 2 years, the MSL approach at-risk group had significantly better results than the not-at-risk and at-risk textbook-based groups in most of the language aspects, such as the MLAT and FL proficiency. Other than Sparks, Pfenninger (2015) researched Swiss students with English as the third language and the findings have reported improvements in vocabulary and receptive skills. The most relevant research in the Croatian language was conducted by Kaldonek-Crnjaković (2019) who researched vocabulary development effects of the MSL approach in two dyslexic individuals - an adult and a child. The results have shown big progress in both participants as the child learned 100, and the adult 70 new phrases.

### 7.2. The aim and the research questions

The main goal of this case study was to investigate the influence of the Multisensory Structured Language Approach (MSL) on English as a Foreign Language (EFL) Croatian students with dyslexia and dysgraphia. The main motivation for this research paper stems from several reasons: the scarcity of dyslexia and dysgraphia research in EFL learning in Croatia, the author's personal interest in the topic, and the inspiration gained from the research of previous authors, such as Richard Sparks and Carla Hannaford.

The case study investigated the following research questions (RQs):

1. To what extent does the usage of the Multisensory Structured Language Approach (MSL) improve the vocabulary, listening, grammar, and reading comprehension skills of English among Croatian English as Foreign Language (EFL) learners with dyslexia and dysgraphia?

2. How does the Multisensory Structured Language Approach (MSL) influence the self-efficacy and confidence of Croatian EFL learners with dyslexia and dysgraphia in English language usage?
3. Does the individual's dominance profile impact the specific categories of the post-test results among the EFL learners with dyslexia and dysgraphia through the MSL Approach?

Considering the previous studies, it is hypothesized that Croatian EFL students with dyslexia and dysgraphia will significantly benefit from the MSL approach and will see improvements in the morphological, semantic, and phonological skills (RQ1) (see Kaldonek-Crnjković, 2015; Pfenninger, 2015, Sparks et al., 1998). As for the RQ2, it is hypothesized that the MSL approach will improve EFL efficiency and confidence among students with dyslexia and dysgraphia (see Stagg & Eaton, 2018; Gosiewska-Turek, 2022). The RQ3 hypothesis is that the individual's dominance profile will impact the acquisition of EFL, i.e. the logical hemisphere dominant individuals have better preconditions to score higher on the problem-solving logical tasks, and the gestalt hemisphere dominant individuals will score higher on visual and auditory tasks. However, the results will largely depend on the similarity between participants' dominance profiles and the success of the MSL approach.

### 7.3. Participants

This study was conducted among two male EFL participants, and their mother tongue was Croatian. The first participant (P1) was fifteen years old, while the second participant (P2) was sixteen years old. They were both in the first year of the Vocational school of Osijek. They had gone through 8 years of formal English as a Foreign Language education, while P1 also learned German as a Foreign Language through 4 years of elementary education. Both participants were diagnosed with learning difficulties by the expert committees consisting of a speech and language therapist and a psychologist. P1 was diagnosed with learning difficulties in 2021, and his specific learning difficulty falls under group 3, subgroups 3.2.1., 3.2.2., and 3.2.6. which translates as reading difficulty (dyslexia), writing difficulty (dysgraphia), and other learning difficulties, such as attention disorder. P1's general learning aptitude was not defined by the expert committee. P2 was diagnosed with learning difficulties in 2016, and his learning difficulty belongs to groups 3 and 6, subgroups 3.1.3., 3.2.2., 3.2.1., 3.2.5. and 6.7., meaning speaking difficulty, reading difficulty (dyslexia), writing difficulty (dysgraphia), mixed learning

difficulties, and behavioural disorder. P2's general learning aptitude was marked as below average with a note saying, "difficulties in following the curriculum with the individualized program". P1 and P2's EFL teacher claimed that both have difficulties following the curriculum and keeping the attention on the topic for the duration of the class. Also, the previous EFL examination of P1 and P2 was adjusted through oral examination, font, and size adjustments, and unlimited time for written testing.

### 7.4. Methodology

The study was conducted in Osijek, Croatia during March, April, May, and a part of June of 2024 at the Vocational School of Osijek. It was comprised of three phases. The first phase lasted for two weeks, or 8 school hours, in which the researcher observed the participants during their regular textbook-oriented EFL classes and gained a better understanding of P1 and P2's strengths, weaknesses, and specific learning situations that might be causing issues, such as stress, inability to focus, etc. During the first phase, the researcher also paid attention to the usage of visible dominant organs, e.g. dominant hand, eye, or leg, and made assumptions and plans about further testing. After this phase, there was a two-week break for the researcher to sort the material, plan the MSL lesson plans, and create the pre-test.

At the very beginning, it is crucial to note that the dominance profile testing was not conducted by a professional psychologist or a speech therapist and that the results are strictly a reference point for the researcher. Moreover, this research does not label the participants in any way as it is impossible to see every unique aspect that makes an individual. Dominant profiles are not meant to label and type the students but only indicate the way they respond to information stimuli.

The second phase started after the school spring break, and it consisted of dominant profile testing and a self-reporting dyslexia questionnaire that provided more information about strengths and weaknesses in everyday tasks. To determine the participants' dominant profiles in this study, an evaluation method by Carla Hannaford (1997) was employed. According to Hannaford (1997), this is the most effective way of determining dominance profiles in younger lower language aptitude learners as they do not have highly developed replacement or coping strategies that could hinder the evaluation. This phenomenon named *adaptive processing* may occur in adults who have found adaptations and can e.g. alternate between body sides depending

on the task at hand, or stress levels. In the lateral dominance testing, the participants participated in simple tests with the help of the researcher. Following the instructions of Hannaford (1997), the researcher has used a character of *DomiKnow* (see Figure 7) on which the researcher colours P1 and P2's dominant eye, ear, brain hemisphere, arm, and leg after the testing to determine which of the 32 potential profiles they might belong to (Figure 8). Dominance profiles can be divided into 2 main categories: logical (left) and gestalt (right) dominant hemisphere, and are based on the following characteristics (Hannaford, 1997):

1. which hemisphere is dominant in stressful conditions or when meeting new learning material
2. functions or modalities of learning that the individual prefers in those situations
3. limited functions in stressful situations

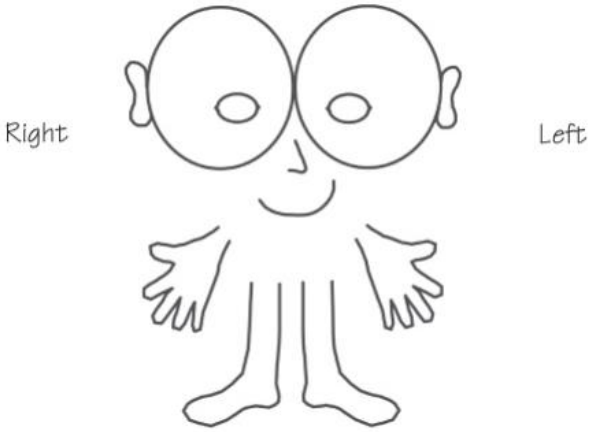


Figure 7. An unmarked example of DomiKnow (Hannaford, 1997: 39)


Figure 8. Key to the 32 Dominance Profiles

Determining the dominant hand: a simple test of handing a pen to the participant towards the middle of their body was employed. The hand which the participant uses to grab the pen is the dominant one.

Determining the dominant eye: the participant vertically extends the thumb of the dominant hand and lines it with a vertical line in the room e.g. outline of a chalkboard. The participant will see a double image with both their eyes open. The participant then closes their eyes one at a time and sees which eye holds the image of the vertical object lined up with their thumb (Hannaford, 1997).

The dominant leg: two quick tests were used to determine the dominant leg; a small ball was passed on the floor to a participant and observed which leg they used to kick it, and the participant was also asked which leg they used first while climbing the stairs to further confirm the previous test results.

The dominant ear: the researcher played music on a speaker in the neighboring room and asked the participant to guess the song by placing their ear on the wall. The ear that was put against the wall first was most likely the dominant one.

The dominant brain hemisphere: the researcher observed the participants in their regular English language classes, made notes, talked with the participants about their learning preferences, examined the self-reporting dyslexia questionnaire, and compared the findings to the relevant points from Hannaford (1997) to determine if they are gestalt or logical hemisphere dominant.

The self-reporting dyslexia questionnaire (Saba, 2024) consisted of 38 statements across 8 categories: understanding, memory, use of language, concentration, knowledge and learning, organization and time, behaviour, and physicality. The participant's task was to indicate the degree to which each statement applies to them on a 5-point Likert scale as follows: 5 - *always*, 4 - *often,* 3 - *sometimes*, 2 - *not often,* and 1 - *never.*

The third, and longest, phase took place through April, May, and several days of June of 2024, and it consisted of 3 parts:

1. A pre-test that tested elementary school-level EFL knowledge created in consultation and agreement with participants' regular EFL teacher. The pre-test covered a part of participants' first-semester material which they had previously failed, and it included comparison (comparative and superlative adjective forms), prepositions, Present Simple and Present Continuous tenses, describing humans (adjectives and vocabulary), town and countryside vocabulary, and social expressions. The material was tested through various types of tasks such as reading and listening comprehension, cloze-type tasks, crossing out the odd one, connecting the illustration with the object, etc.
2. The Multisensory Structured Language Approach (MSL) teaching phase lasted for 8 weeks, i.e. 16 school hours. The topics for the MSL Approach phase were chosen in agreement with the participants' regular EFL teacher, and they followed the New Headway: Elementary textbook (Soars & Soars, 2011). The lessons were held in students' free time, usually on Wednesdays and Fridays after their regular classes had ended. Also, the lessons were taught in both Croatian and English languages as they offered clearer instructions, but also because the participants did not have enough English language proficiency. Each class was carefully planned and structured following Sparks and Miller's (2000) MSL Approach activity plans and focused on employing MSL methods to the EFL material.

3. The post-test was identical to the pre-test to ensure the validity of the results (Shuttleworth, 2009). The post-test occurred 9 weeks after the pre-test, which was not given to the participants for an insight to ensure that no copying or taking photographs of the test happened.

### 7.5. Results

When interpreting the results, it is pivotal to take its strengths and weaknesses into consideration. The nature of this research is descriptive, and the results vary on many variables. Therefore, causal connections between its constructs and variables cannot be made. Moreover, as the case study focuses on a small number of instances, the findings are not applicable to the general population. The in-depth analysis could lead to researcher bias and subjective interpretation which might influence the findings. However, the in-depth analysis is also one of the research's main strengths as it offers multiple aspects of participants' learning difficulties, preferences, and experiences. This scarcely researched topic also gives future researchers a good basis for the MSL Approach research.

The case study adopted the qualitative approach which included participants' dominance profile test, dyslexia self-questionnaire, MSL Approach lesson plans, and activity descriptions, along with pre- and post-test results. To effectively compare the results, it is crucial to distinguish between the pre- and the post-test results. To achieve a clearer overview of each participant, the dominance profile results, as well as the dyslexia self-questionnaire, and the researcher's initial observations will be presented in separate paragraphs for each participant. However, the MSL Approach descriptions, lesson plans and activity examples, and both the initial and the final assessment will be presented jointly for both participants in the same section due to space restrictions and the fact that MSL Approach lessons were equal for both participants.

#### Participant 1 (P1)

P1's lateral dominance tests revealed that his dominant limbs and organs were the right leg, right hand, left eye, left ear, and right (gestalt) brain hemisphere (see Figure 8).

Figure 9. P1's lateral dominance marked on DomiKnow (Hannaford, 1997: 84)

All the characteristics indicate that the P1 belongs to the 'Profile I' according to Hannaford's (1997) classification. 'Profile I' individuals learn the best through auditory and visual input, while verbal communication and movement will be limited in stressful situations. These individuals must experience the entire picture or sound to process the stimulus while detail processing is difficult under stress. They interpret language through tone, pitch, and rhythm and can follow step-by-step instructions but prefer to see the end product and let intuition guide them. Reading and writing difficulties usually occur because the left eye scans from the right to the left side which causes letter transposition. Hannaford (1997) offers tips that can help 'Profile I' individuals in learning: encouraging them to relax before communicating, sitting in the middle front of the room to access the dominant eye and ear, and activities such as writing and drawing with both hands, lazy 8's, cross crawls, etc. Also, music, movement, and interpersonal skills proved very useful in FL learning.

The initial observations of P1 marked intermediate English language speaking skills with no issues expressing their thoughts and independent task solving. Recognition difficulties of b, v, g, y, and similar letters were spotted, as well as a lack of general concentration in class with a pronounced sensitivity to outside noise (cars, workers, etc.), difficulties in multi-tasking, and a lack of internal motivation for most topics which was visible in the lack of interest for the learning material. However, no difference was spotted in information retrieval under stress compared to a stress-free situation. More so, he followed the teacher's intonation and pronunciation and could easily replicate it. The conclusion from context was especially pronounced, sometimes even better than students without learning difficulties.

For the self-reporting dyslexia questionnaire results (see Appendix A), only the relevant categories with a high degree of presence, i.e. marked 4 or 5 will be presented in more detail in the paper.

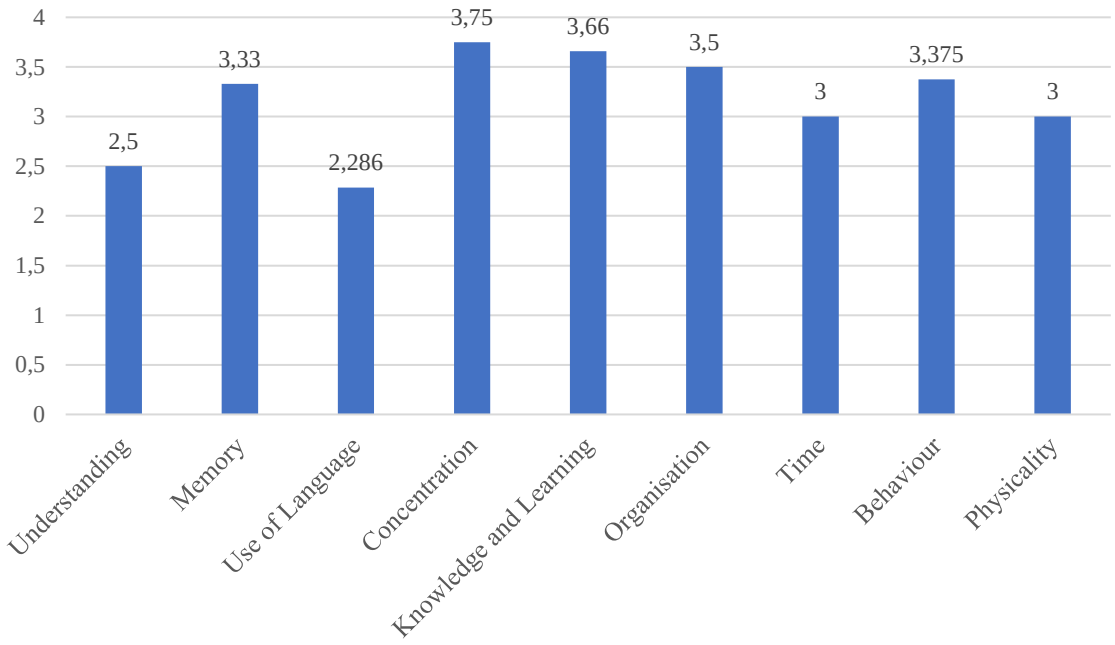


Figure 10. Categorized median values of self-reporting dyslexia questionnaire results (P1)

As presented in Figure 9, P1 reported the most difficulties in the *Concentration* category in which the 'I have a short concentration span in task-solving' and 'I daydream' were marked as 5- *always*, while 'I have a poor natural awareness of surroundings' was marked as 4 - *often*. The *Knowledge and Learning* category closely followed by 'I have a poor general knowledge' marked as 4 - *often,* and "I find academic learning difficult" as 5 - *always*. Under the *Organisation* category, P1 reported 5 - *always* on the "I am disorganized and messy" and on "I have difficulty ordering and sequencing".

When comparing P1's self-reporting questionnaire with the initial observations and the dominance profile test results, most of the characteristics match. However, there were some mismatches. 'Profile I' characteristics indicate a high probability of reading or writing in the English language, while P1 reported no difficulties whatsoever in reading or writing comprehension. On the summarizing and detail noticing question he reported no difficulties, but 'Profile I' marks sequencing and attention to detail issues as one of its primary characteristics. Also, initial observations recorded multi-tasking problems, while P1 selected 1- *never* on the multi-tasking problems question. Lastly, initial observations recorded a lack of

internal motivation and reliance on external motivation factors, while P1 reported no initiative and motivation problems in the self-reporting questionnaire.

**Participant 2 (P2)**

P2's lateral dominance profile test revealed that his dominant limbs and organs were the right leg, right hand, right eye, left ear, and right (gestalt) brain hemisphere.

Figure 11. P2's lateral dominance marked on DomiKnow (Hannaford, 1997: 87)

P2's characteristics indicate that he belongs to the dominance 'Profile J' (Hannaford, 1997). This profile is marked by an auditory learning preference as he must hear the topic elements to fully understand and learn, while visual input, movement, and verbal communication are limited in stressful situations. Just like P1, P2 interprets language from tone, pitch, and dialect. However, due to limited eye function, processing of information mainly occurs through sound with attention to detail. What makes this more interesting is that 'Profile J' individuals tend to prefer imagining the result and then letting intuition guide them. They can also imagine the entire picture but have difficulties verbalizing their thoughts as they cannot separate the whole into pieces, i.e. the biggest challenge is putting pieces together in a linear manner. Stressful situations can inhibit movement until the situation feels safe. Hannaford's (1997) teaching suggestions for 'Profile J' individuals include relaxing the individual, sitting in the back on the right side so they can use their dominant ear, and integrating a balance of movement, music, and interpersonal skills to improve linguistic learning. Some activities that have been proven to boost learning input are lazy 8s, writing and drawing with both hands, cross crawls, etc.

The initial observation marked a sub-intermediate or beginner English language speaking and comprehension with difficulties in expressing his thoughts. P2 also struggled in independent

task-solving in free writing or reading comprehension tasks and preferred structured 'cloze' types of tasks with more reproduction and reception. Teaching through real-life examples, kinaesthetic and auditive teaching, and colour-coding different materials, e.g. tenses, helped greatly. He showed anxiety when speaking which might be due to insecurity and a lack of internal motivation in class, however, he sometimes solved the tasks successfully after the teachers' encouragement and help. While reading, P2 tended not to finish the entire sentence or guessed the following words in the sentence. Also, lines of text were mixed for him while reading and he could not keep focus on the text. Unlike P1, the outside noise did not bother P2.

As presented in Figure 11, in the dyslexia self-reporting questionnaire, P2 reported the most difficulties in the *Knowledge and Learning* category, more specifically statements about general knowledge, low academic achievement, and difficulty of academic learning.

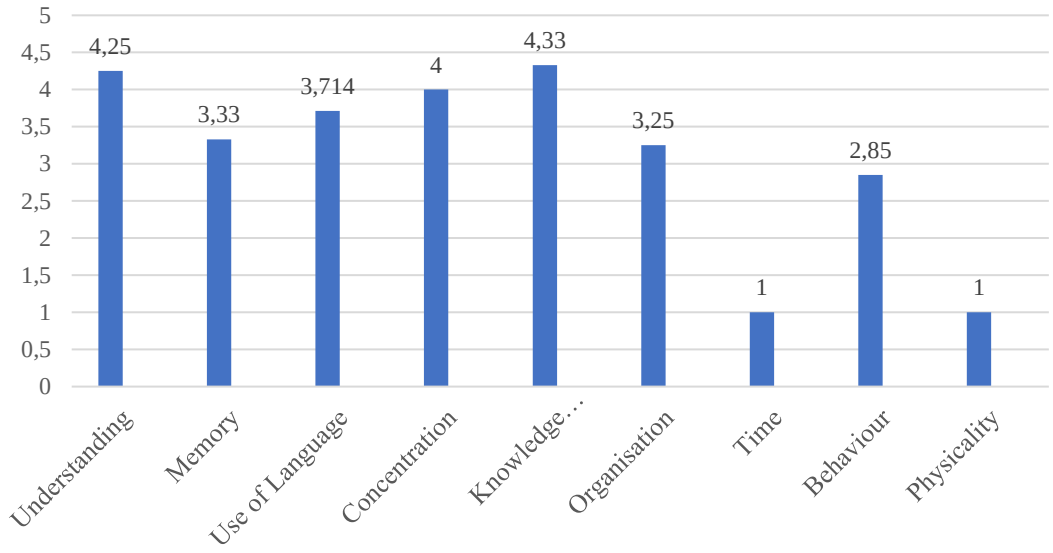


Figure 12. Categorized median values of self-reporting dyslexia questionnaire results (P2)

The *Understanding* category followed closely as P2 marked all the statements with 4 - *often* or 5 - *always* for difficulty in reading comprehension. *Use of Language* had the third-highest median with all statements ranging from 3 - *sometimes* to 5 - *always.*

To compare, most of the characteristics of P2's dyslexia self-reporting questionnaire and initial observation match Hannaford's (1997) 'Profile J' descriptions. Difficulties in expressing thoughts, as well as lack of spontaneity to questions and requests, were both marked in the questionnaire and the initial observation. Also, P2 reported problems in reading which match 'Profile J' limited eye function and mixing of lines of text. Short concentration span on tasks or

the inability to focus on multiple things simultaneously was also reported in all tests. P2 also reported problems in initiative and motivation which matches the other findings. In contrast, P2 reported no issues with difficulty in sequencing and detail understanding while the initial observation and 'Profile J' characteristics described it differently. Lastly, he reported no issues in laziness at the beginning of the task, but the initial observation recorded either laziness, insecurity, or both until the teacher encouraged P2 to participate.

In conclusion, when taking the initial observation, dyslexia self-reporting questionnaire, and the dominance test, P1 exhibited a higher level of English language knowledge than P2 in the initial observation. Both stood out and struggled with specific tasks and parts of learning, e.g. P1 had difficulties with outside noise, while P2 exhibited insecurity and hesitation in task solving. However, most of the characteristics were shared because of the 'profile I' and 'profile J' similarities.

**Pre-test results**

The pre-test was conducted two days after the dominance profile testing. The participants did not have a set time limit, and the tests were hand-written (not computer) due to equipment restrictions, but also because it provides more insight into possible writing difficulties. P1 was placed in the front middle of the classroom, while P2 was seated in the right back because of his dominant left ear. The pre-test was made of 10 tasks with 126 points in total. It consisted of four categories:

1. Vocabulary, which had four tasks: a multiple-choice task, a matching task connecting objects to words, a free-writing description task, and a fill-in-the-blank task. The cumulative maximum points for these four tasks was 41.
2. Grammar consisted of three tasks: choose-the-correct-form task, fill-in-the-blank with Present Simple or Continuous tenses task, and choose-the-correct-form of comparison task. The cumulative maximum points for these three tasks was 33.
3. Listening comprehension which had two listen and fill-in-the-blanks tasks with 15 maximum points.
4. Reading comprehension with a 250-word text in which the participants first had to underline all the comparative and superlative adjectives, sort them in a table, and then answer 5 questions regarding the text. The maximum number of points was 37.

On the pre-test, P1 achieved 71 out of 126 points, while P2 achieved 54 out of 126 points. The results of each category are showcased in Figure 12.

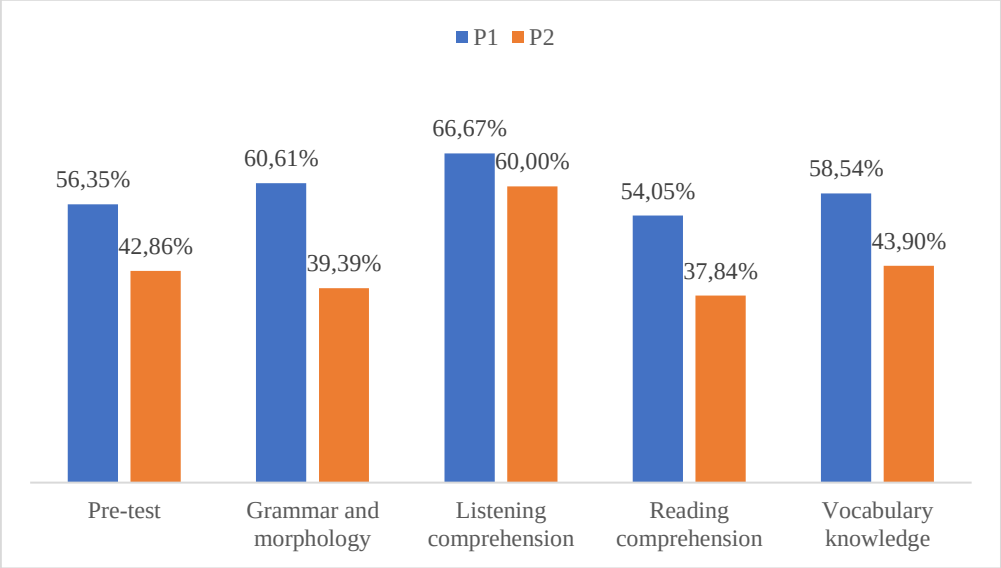


Figure 13. P1's and P2's cumulative and categorized pre-test results

As Figure 12 shows, the participants achieved less-than-expected overall results for their educational level. However, P1 achieved better results than P2 in every category of the pre-test. Both P1 and P2 scored the best results in the *Listening comprehension* category, and the worst in *Reading comprehension*.

**Multisensory Structured Language Approach in this research**

During the 8 weeks (16 hours) of the MSL approach phase, 6 lesson units were covered. Most of the topics were covered over 2 school hours, while some required only 1. They were coordinated within the regular English as a Foreign Language Croatian vocational school curriculum and covered in the following order: *Town and Country*, *Directions*, *Simple or Continuous*, *Describing People*, *Social Expressions*, and *Going Far*. All lessons followed Sparks' and Miller's (2000) MSL lesson plan guidelines (Table 1): oral warm-up drills, blackboard writing drills of new P-G relationships, grammar instructions and drills, vocabulary and dialogue drills, and reading or communicative activities. The lessons were held simultaneously for both participants as their dominance profiles did not differ a lot, i.e. both were gestalt hemisphere dominant with auditory and/or visual input preferences. P1 was seated in the front middle, while P2 sat in the right back of the classroom. Some activities were

adjusted to fit the P1's or P2's dominance profiles. Description of a typical lesson and activities will be described below.

Each lesson began with a couple of questions for the participants about various topics, e.g. How was your week? Did you watch last night's football game? If you could travel anywhere in the world, where would that be and why? What is your favorite city? What kind of clothes do you like wearing? These questions served as an ice-breaker lead-in activity that warmed up their speaking skills. This part of the lesson was held only in the target language with an exception for clarifications in the meaning of some questions. If the participants could not think of an English translation of a word, they would ask: 'How do you say ___?'. This part usually lasted up to 5 minutes.

The lesson continued with sound presentation via direct teaching of phonology and orthography in new vocabulary. Sounds presenting was done as a part of the vocabulary direct teaching and was employed in situations in which participants could not pronounce the target word. For example, in the term 'the Underground' vowels (U, E, O) were covered first followed by diphthongs (OU) and blends (GR). The participants were then explained the difference between the Croatian (phonetic language) and English pronunciation rules; every letter in Croatian is pronounced the same, that is, one letter is one sound which is not the case in the English language. Sound presentation in this manner regularly allows students to predict the P-G relationships in unknown words (Sparks & Miller, 2000). This technique uses auditory and visual learning channels to teach the P-G connections. The participants were presented with illustrations of new vocabulary items which were pinned to the blackboard. They were first asked if they already knew the name of the item. The teacher (researcher)[8] then pinned the written vocabulary item on the blackboard and pronounced it after which the participants individually pronounced the vocabulary item and transcribed it into their notebooks or wrote in in the air for the kinaesthetic learning channel (see Figure 13).

[8] The term 'teacher' will be used from now on in the case study description when referring to the researcher due to simplicity.


Figure 14. An example of phoneme-grapheme vocabulary teaching via flashcards in the MSL approach

Every vocabulary item and their P-G relationship were repeated multiple times in the later stage of the lesson and throughout the subsequent lessons. The teacher uses the vocabulary items flashcards for further learning games and activities such as Pair Matching or Scrabble. This part of the class was further adjusted to fit the participants' dominance profiles by putting each vocabulary item into context, e.g. the story of Quasimodo of Notre Dame or the Eiffel Tower in Croatia's national colours for the 2018 Football World Cup.

Grammar was presented through direct instruction in the Croatian language first and then adjusted in the English language. The teacher first placed a poster (Figure 14) with the colour-coded target tenses rules and formation on the blackboard and asked the participants if they noticed any differences between the tenses. After the participants had noticed morphological differences (the -s and the -ing suffixes), the teacher presented how Present Simple and Present Continuous tenses were formed in the English language through instructions in the native language.

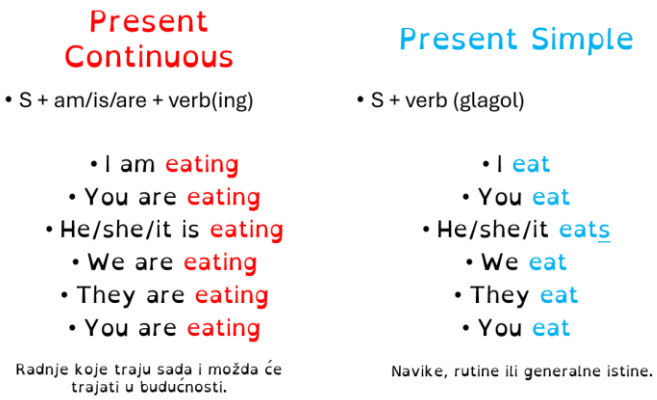


Figure 15. An example of Present Continuous and Present Simple tense presentation

Grammar drills were extensive in this part of the lesson. They started with the participants repeating the tenses one by one after the teacher who was pointing to the tense that was pronounced. The teacher then provided examples in the native language which participants translated to the FL, such as 'Ja jedem voće svaki dan.', 'Volim igrati nogomet.', etc. When the participants had mastered the concept of the target tenses and could comfortably employ them in simple sentences, the teacher introduced tasks such as fill-in-the-blank or cloze exercises which further attributed to participants' strong sides according to the dominance profile test. Once the participants had become familiar with the target tenses, listening activities were employed (e.g. from *New Headway*, p. 80.). Lastly, learning games were used to boost kinaesthetic, reading and speaking skills. For example, in the game 'Gallows' the teacher lets participants draw papers from the hat containing sentences in the Croatian language that need to be translated to the English language. If the participant translates the word incorrectly, a body part is drawn on the gallows. Morphology is directly taught through grammar as it allows the participants to make connections about the form of the words. This was especially beneficial in teaching comparison of adjectives, that is, comparative and superlative. Participants gained a better understanding of this concept through colour-coding and contextualization.

Vocabulary was further practiced toward the end of the lessons through multisensory drills and games such as dialogues, describing and experiencing the target item through videos, photographs, or imitation. E.g. connecting the word with an illustration, *Pictionary*, and *Matching Pairs*. The usage of similar activities and drills can help participants gain automaticity in vocabulary usage.

At the end of each lesson, participants practiced reading and communication as they are essential for productive skills development. All activities were practiced in the English language. Reading was practiced through reading comprehension tasks in two different ways. In the first one, focus questions were written before the text and they helped the participants steer their focus while reading. In the second, participants were instructed to listen to the recording of the text, read the entire text independently, and were asked questions about the text by the teacher to practice expressing their thoughts. Also, participants were asked to simulate real-life situations, such as talking about each other's clothes and appearance or simulating a customer and a shop assistant. It is also crucial to note that as the lessons proceeded, the participants became more relaxed and confident in their EFL usage.

**Post-test results**

The post-test was identical to the pre-test. It was conducted one week after the final MSL approach lesson, and nine weeks after the pre-test. The writing conditions for the participants were the same as on the pre-test (see Pre-test results section).

On the post-test, P1 achieved 106 out of 126 points, while P2 achieved 80 out of 126 points. As showcased in Figure 15, both P1 and P2 have scored significantly improved results on the post-test.

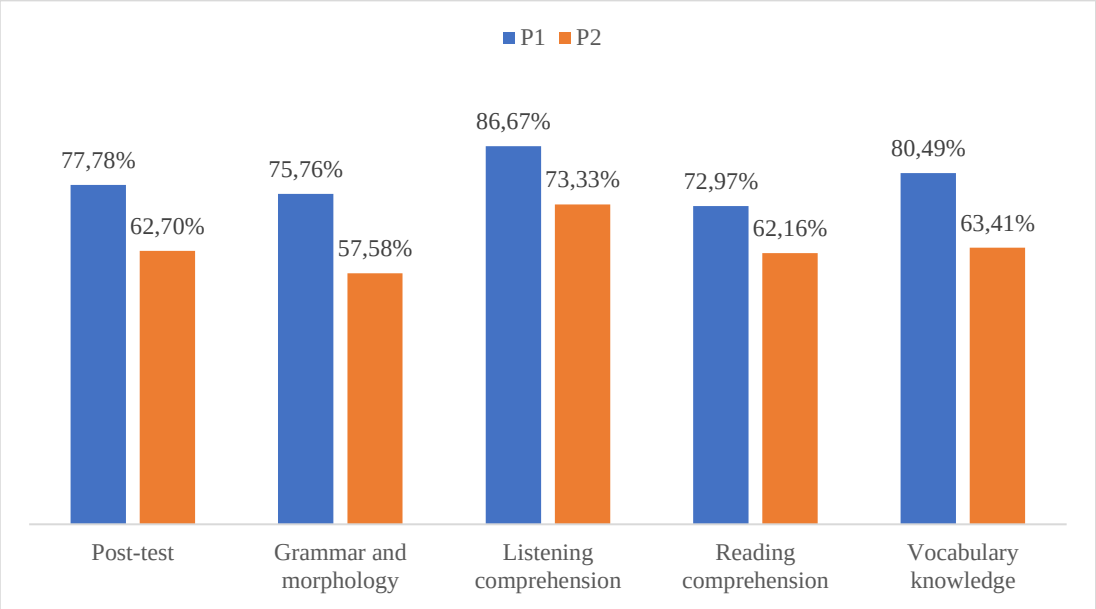


Figure 16. P1's and P2's cumulative and categorized post-test results

## 8. Discussion

Dyslexia and dysgraphia are specific learning difficulties with a neurobiological origin. Morton and Frith (1995) supplemented the previous incomplete and paradoxical dyslexia definitions and defined it as a complex causal chain from biological and cognitive to behavioural levels through multiple theories. Dysgraphia is defined as a writing disorder that includes letter formation, spacing, spelling, motor coordination, grammar, writing rate, and composition (Chung, 2019). As previously listed, both dyslexia and dysgraphia can be divided into multiple categories which give more insight into specific difficulties. Croatian National Regulations of Education and Care offer several ways of treating learning difficulties, such as professional help, remedial learning, and individualized educational programs depending on the severity of

an individual's difficulty. Sparks (1991) acted upon the fact that a foreign language can be especially burdensome to master for students with dyslexia and dysgraphia and created the Multisensory Structured Language Approach (MSL) which combined all senses to provide a higher quality learning experience.

The first research question was guided toward the effect of the MSL Approach on vocabulary, listening, grammar, and reading comprehension skills among Croatian EFL learners with dyslexia and dysgraphia. To explain in further detail, the pre-test results partly matched the initial observations which marked P1 as an intermediate English language speaker with no major difficulties in independent task-solving. P1's pre-test results have shown below-average language knowledge for an intermediate EFL speaker with a 56,35% score in the pre-test overall. P2's initial observation marked a below-intermediate or beginner English language speaker with comprehension and independent task-solving difficulties. The initial observation was an indicator of his overall pre-test results (42,86%). Both participants scored the highest percentage in the *Listening comprehension* (66,67% and 60%), and the lowest in the *Reading comprehension* category (54,05% and 37,84%). This could be correlated with the initial observation about P1's ability to conclude from context, usage of tone and rhythm in learning, and scanning difficulties which cause letter transposition, but also P2's reading difficulty noted by the expert committee.

The post-test results show significant improvements in both participants' results. In comparison, P1's overall post-test percentage was 77,78% which shows an improvement of 21,43%. P2 scored 62,70% on the post-test, which showcases a 19,84% improvement. Moreover, P1 recorded high percentages in all categories, especially *Listening comprehension* and *Vocabulary knowledge*, with 86,67% and 80,49%, respectively. P2 scored significantly higher in the *Reading comprehension* and *Vocabulary knowledge* categories with 62,16% and 63,41% which shows a big improvement of 24,32% and 19,51%. For example, Pfenninger's (2015) findings implied that the MSL approach in dyslexic learners provided considerable progress, however, not up to the non-dyslexic learners' level due to the P-G connections difficulties. The qualitative analysis of the dominance profile test, self-reporting questionnaire, MSL approach lessons, and pre-and post-test results has led to the conclusion that the MSL approach is an effective EFL teaching method. This conclusion directly or partly corroborates the findings from similar research on the MSL approach's effect on EFL learners with learning difficulties (Sparks et al., 1992, 1993, 1997; and Miller and Sparks, 2000), but especially Sparks and Ganschow (1993)

whose participants with dyslexia made significant gains on all metrics including MLAT and maintained their gains for the entire length of the research (two years).

The second research question regarded the influence of the MSL Approach on self-efficacy and confidence among Croatian EFL learners with dyslexia and dysgraphia. Both participants reported lower grades and a lack of confidence throughout their primary and current secondary education in most subjects. The participants' EFL classes were previously taught mostly through textbook-oriented methods with adaptations to basic learning adaptations regulated by the National Regulations of Education and Care in the teaching and testing methodology. The lack of in-class involvement and participation, self-comparison to other learners, and a trend of constant low grades innately lead to a decrease in participants' confidence. In the initial observation phase, it was noted that P1 struggles with concentration and a general lack of motivation for most topics while P2 has shown anxiety, insecurity, and a lack of internal motivation in class. Both participants also reported difficulties in initiative and motivation in the self-reporting questionnaires. Throughout the MSL Approach lessons, both participants started expressing more interest in the topics, expressed more interest in EFL class participation, raised their hands to answer the questions, and self-initiatively expressed their opinions, even if it led to only semi-accurate answers. Therefore, it can be argued that the MSL approach had a positive impact on participants' self-efficacy and confidence in English language usage among dyslexia and dysgraphia students. The results are backed up by the findings from similar research (see Stagg and Eaton, 2018 and Gosiewska-Turek, 2022). This positive influence could be attributed to the basic principles of the MSL approach which stimulate all learning skills and allow individuals with dyslexia and dysgraphia to express themselves in a plethora of ways, and the smaller learning group in which more attention was dedicated to both participants' interests and learning preferences. Other factors could have contributed to participants' confidence and self-efficacy, however, such improvements in the short-term must be recognized and worth noting as the possibilities for long-term effects of the MSL approach.

The third research question reflected on the impact of an individual's dominance profile on the post-test results of EFL learners with dyslexia and dysgraphia through the MSL Approach. Both participants were identified as gestalt (right) hemisphere dominant. P1's dominance profile was 'I', while P2's was 'J'. As previously mentioned, these profiles are imaginative, interpersonal, and characterized by auditory and visual input learning preferences with limited reading skills, verbal communication, and/or movement in stressful situations. Hannaford's (1997) teaching suggestions include relaxing the participants, seating them in adequate parts of the room to

access their dominant organs, and integrating a balance of movement and interpersonal skills in class. As Figure 15 shows, both participants scored marginally better post-test results in *Listening comprehension* and *Vocabulary knowledge* compared to other categories. As this research did not include logical hemisphere dominant participants, Li et al. (2022) will be used as a reference point. They found that logical hemisphere-dominant students significantly improved in *Grammar* and *Reading comprehension* categories as they involved logical problem-solving. In comparison, P1 scored significantly lower in these categories with 75,76% and 72,97%. P2 scored marginally lower in *Reading comprehension* compared to *Vocabulary knowledge*, but significantly lower in *Grammar* with 57,58%. P1 was more successful than P2 in both categories, but it remains unclear if this can be attributed to his dominance profile learning preferences, previous knowledge, MSL approach influence, or all of the above. Previous research on this topic is scarce, but the post-test results comply with the initial hypothesis and similar research findings (see Li et al., 2022; Oflaz, 2011).

## 9. Conclusion

Dyslexia and dysgraphia are prevalent neurobiological difficulties that inhibit not only learning but many aspects of everyday life. In the context of English as a Foreign Language (EFL) teaching, a plethora of methods and approaches can be employed, yet they must be adapted to individuals with said difficulties. Selecting a proper method can be laborious and require more than a surface insight into an individual with a learning difficulty. The individual analysis may include methods like dominance profile testing, questionnaires, learning preferences and proficiency observation, consultation with a professional, and self-education about the specific difficulty.

The research employed The Multisensory Structured Learning Approach (MSL) alongside the aforementioned methods. The data analysis indicates that the MSL Approach is an effective teaching method for EFL Croatian learners with dyslexia and dysgraphia. The post-test has shown significant improvements in all categories and the overall results. Eight weeks of the MSL Approach teaching have shown 21,43% and 19,84% increase compared to the pre-test. Further observation has shown that the self-efficacy and confidence of both participants have improved gradually throughout the MSL teaching phase relative to the observational phase and the participants' self-confidence answers on the questionnaire. Moreover, a partial connection between the participants' dominant hemisphere and the post-test categories was observed. Both

participants were gestalt hemisphere dominant with strong imagination and auditory and visual learning preference and have shown substantial improvements in *Listening comprehension* and *Vocabulary knowledge*.

It is important to address the strengths and weaknesses of this study and note suggestions for further research. This study provides a concrete correlation between the participants and the results, alongside a detailed observation, description of methods, and participants' learning preferences and habits. However, the short duration of the study, the subjectivity of the researcher and the nature of the study may lead to inconclusive results as identifying a single key factor in participants' success could be challenging. Further research on the topic could include a longer-period study to examine the long-term effects of the MSL approach on EFL dyslexia and dysgraphia learners or employ a larger and more diverse sample of participants to make the results more applicable to the general population. Lastly, these findings spotlight the necessity and urgency of teaching method adaptations among students with learning difficulties as they can significantly enhance the overall educational quality.

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Zakon o odgoju i obrazovanju u osnovnoj i srednjoj školi, Narodne Novine, 87/08, 86/09, 92/10, 105/10, 90/11.

## 11. List of Figures

## 12. List of Tables



## 13. Appendix



**Questionnaire - A Preliminary Diagnosis**

This questionnaire is to provide information on a person's possible strengths and weaknesses when performing some basic everyday tasks, particularly communicative ones. If an individual consistently performs poorly in particular areas, then the information provided from this questionnaire can be the first step in finding out why.

Who fills it out?

To be filled out by:

a) Anyone who is suspected of having a language disability.

b) A family member, partner, or close friend of the individual.

How is it to be filled?

Indicate with a circle (O) along the scale indicating the degree to which you, or the person you are assessing possesses the feature.

5 - *always*, 4 - *often,* 3 - *sometimes*, 2 - *not often,* and 1 - *never.*

For example, for the feature 'Difficulty understanding when reading' A circle around 4 means often has difficulties understanding.

A circle between 5 and 4 means very often has difficulties understanding.

Questions can be omitted if they are not applicable. Just answer as many as possible the best you can. If you are a family member, partner, or close friend of the individual, use a different coloured pen to the person being tested.

| **Understanding** | | | | | |
|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 |
| 1) Difficulty understanding when reading, particularly novels, magazines, newspapers,textbooks, poetry. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 2) Difficulty understanding when listening, particularly jokes, stories, discussions and lectures. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 3) Difficulty interpreting and filling out forms. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 4) Difficulty understanding abstract ideas. | always | often | sometimes | not often | never |
| **Memory** | | | | | |
| | 5 | 4 | 3 | 2 | 1 |
| 5) Difficulty remembering information from listening, e.g. taking messages in a phone conversation. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 6) Difficulty remembering information from | always | often | sometimes | not often | never |

| | | | | | |
|---|---|---|---|---|---|
| reading, e.g. simple facts, names, dates, times, places, etc. | | | | | |
| | 5 | 4 | 3 | 2 | 1 |
| 7) Difficulty remembering names of people, places, items, and times of events. | always | often | sometimes | not often | never |
| **Use of Language** | | | | | |
| | 5 | 4 | 3 | 2 | 1 |
| 8) Meaning is sometimes vague when speaking. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 9) Difficulty summarizing or making a point, i.e. tends to go around the subject. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 10) Struggles when describing and explaining things in detail, e.g. stories or events. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 11) Poor writing skills, e.g. inappropriate word choice, poor sentence construction, grammar, spelling, and punctuation. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 12) Lacks spontaneity to questions and requests. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 13) Difficulty learning other languages. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 14) Slow with mathematical calculations or difficulty understanding mathematical ideas. | always | often | sometimes | not often | never |
| **Concentration** | | | | | |
| | 5 | 4 | 3 | 2 | 1 |
| 15) Short concentration span on tasks. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 16) Can concentrate only on one thing at a time, e.g. cannot write and listen at the same time. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 17) Daydreams. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 18) Poor natural awareness of surroundings*. | always | often | sometimes | not often | never |
| Knowledge and Learning | | | | | |
| | 5 | 4 | 3 | 2 | 1 |
| 19) Has poor general knowledge. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 20) Consistently low academic grades in some subjects. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 21) Overall, finds academic learning difficult. | always | often | sometimes | not often | never |
| **Organisation** | | | | | |
| 22) Is disorganized and messy. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| 23) Difficulty planning, particularly when implementing an idea. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| | | | | | |
| 24) Difficulty ordering and sequencing. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| 25) Difficulty following instructions. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| **Time** | | | | | |
| 26) Is slow to complete routine tasks, e.g. dressing, showering, cleaning etc. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| 27) Struggles to be on time and is frequently late. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| **Behaviour** | | | | | |
| 28) Is clumsy. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| 29) Often loses or misplaces items. | 5<br>always | 4<br>often | 3<br>sometimes | 2<br>not often | 1<br>never |
| 30) Exhibits laziness and slow at beginning tasks. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| 31) Periods of lacking confidence and low self-esteem. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| 32) Lacks initiative and relies on others for motivation. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| 33) Dislikes reading and/or rarely reads | 5 | 4 | 3 | 2 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| novels, magazines, or journals. | | | | | |
| | always | often | sometimes | not often | never |
| 34) Possesses a particular interest in non- academic areas such as arts, crafts, music, photography. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| 35) Has occasional behavioural problems, e.g. loses temper, disruptive. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| **Physicality** | | | | | |
| 36) Is sensitive to background noise, e.g. holding a conversation against background sounds. | 5 | 4 | 3 | 2 | 1 |
| | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 37) Has a poor sense of direction, i.e., finds it difficult to get around in a strange place. | always | often | sometimes | not often | never |
| | 5 | 4 | 3 | 2 | 1 |
| 38) Is slow to learn sports or follow drill instructions, including dance steps. | always | often | sometimes | not often | never |