**READING PERFORMANCE OF DYSLEXIC STUDENTS: AN ANALYSIS OF PHONOLOGICAL PROCESSING**

**Eda Can**

*Ph.D. in Linguistics, Dr. Lecturer*

 *Dokuz Eylül University, Turkey*

eda.can@deu.edu.tr

<https://orcid.org/0000-0002-0061-1843>

**Esra Mengi**

*Master’s Degree in Linguistics*

*Dokuz Eylül University, Turkey*

esra.mengi@ ogr.deu.edu.tr

<https://orcid.org/0000-0001-8135-1459>

***ABSTRACT***

*The main aim of this study was to find out the phonetic mistakes of primary school-age children with dyslexia in terms of word type by giving a reading text task on which word type/types they make the most mistakes and to examine the phonetic mistakes of primary school-age students with dyslexia in terms of word type and text type, and to reveal the most common phonetic mistakes in which word type, syllable of the word and text type. In order to reveal this, 50 students and an age/gender/education matched control group were included in this study. Via reading tasks all students performances were tested and all results were analysed in relation to phonological mistakes and word classes of these mistakes. The reading texts were choosen from the textbooks prepared by the Ministry of National Education in accordance with their own grade levels. According to the results, there was statistically differences between two gender in terms of word type and syllable of the word.*

***Keywords:*** *Dyslexia, reading, phonological awareness, word classes, phonetic mistakes*

**DİSLEKSİK ÖĞRENCİLERİN OKUMA PERFORMANSI: SESBİLİMSEL İŞLEMLEME AÇISINDAN ÇÖZÜMLEME**

**Özet**

*Bu çalışmanın amacı, disleksi tanısı olan ilköğretim çağındaki öğrencilere okuma görevi vererek yaptıkları ses hatalarını en fazla hangi sözcük türü/türlerinde yaptıklarını ortaya çıkarmak ve yaptıkları ses hatalarını sözcük türü, metin türü ve sözcüğün seslem yeri açısından incelemektir. Bunun için disleksi tanısı olan 50 öğrenci araştırmaya dahil edilmiştir. Yaş/cinsiyet/eğitim göz önüne alınarak disleksi tanısı olan öğrencilerin yanında bir kontrol grubu oluşturulmuştur. Okuma görevleri aracılığıyla tüm öğrencilerin performansları test edilmiş ve tüm sonuçlar sesbilimsel hatalar ve bu hataların sözcük türü ile ilişkisi açısından çözümlenmiştir. Okuma metinleri Milli Eğitim Bakanlığı tarafından öğrencilerin sınıf düzeyine göre hazırlanan ders kitaplarından seçilmiştir. Elde edilen sonuçlara göre, sözcük türü ve sözcüğün seslem yeri açsından iki cinsiyet arasında istatistiksel olarak farklılık bulunmuştur.*

***Anahtar Sözcükler****: Disleksi, okuma, sesbilgisel farkındalık, sözcük türleri, sesbilgisel hatalar*

1. **Introduction**

Reading disability (dyslexia) is defined by the fact that reading success is significantly lower than expected considering the chronological age of the individual, the level of intelligence measured and the education he/she received according to his/her age (Doğangün, 2008).

Lyon, Shaywitz and Shaywitz (2003) states that as well as described specific learning disability, dyslexia is described a learning disability biological in origin. Difficulties related to dyslexia are recognition of words fluently and spelling and decoding abilities weakly. These difficulties generally arise from phonological deficits in phonological component of language and they are also related to cognitive abilities.

According to Hudson, High and Al Otaiba (2007), as a specific learning disability, dyslexia is a disability in both reading and also involve in spelling. There are two explicit difficulties in children with dyslexia. First difficult is about recognition of word fluently. According to this, when children with dyslexia are given the task of reading at grade levels, they might not be able to read many words compared to average readers. There might be some words that children made mistakes such as stumbling, guessing and omitting of sounds. Secondly, when they encountered some words that they do not know before, they might usually show some problems about decoding words and produce many mistakes. In addition to this, they might not use letter-sound relationship accurately and they might some difficulties about to connect letter and sound relationship due to phonological deficits in phonological component.

Most of the studies emphasize that children with learning difficulties like dyslexia have difficulties in their phonological processes. The phonological awareness levels of these children were found to be weak. Today, it is accepted by many researchers that phonological awareness skills are necessary for literacy (Acarlar, Ege, and Turan, 2002). At the phonological awareness level, the child should be able to distinguish the sounds in speech and match these sounds with letters (Turan ve Yükselen, 2004)

Doğangün (2008) mentions that while learning to read, the child first learns to link sounds (phoneme) with letters so that they can recognize written words. If it is repeated frequently enough, the child begins to see the word as a whole, and after a while the words become automatically recognized and the thoughts are sequenced simultaneously with the reading, so that the child can understand the text he/she is reading.

Using of phonological information and representation are deficit in dyslexia (Liberman and Shankweiler, 1985; Wagner and Torgesen, 1987). From this point of view, it is supposed that phonological deficits prevent learning interaction between sound and spelling. It is also important thing to read (Nesari and Kamari, 2015).

Doğangün (2008) mentions that while learning to read, the child first learns to link sounds (phoneme) with letters so that they can recognize written words. If it is repeated frequently enough, the child begins to see the word as a whole, and after a while the words become automatically recognized and the thoughts are sequenced simultaneously with the reading, so that the child can understand the text he/she is reading. In additon to his children need to create a system that requires matching between printed words and their letter strings and phonemic strings containing spoken words to read an alphabetic ortography. Therefore, one of the important steps in learning to read is the capacity to bring phonemes to consciousness. Researchers state that there is a strong relationship between reading difficulties and phonological skills. In addition, researchers try to explain the reading difficulties of dyslexic children by stating that they come to the task of learning to read with insufficient phonological representations (Ehri et al., 2000; Gombert, 1992).

In the light of the information given above, the main aim of this study was to find out the phonetic mistakes of primary school-age children with dyslexia in terms of word type by giving a reading text task on which word type/types they make the most mistakes. In additon to this, the main aim of this study also was to find out to examine the phonetic mistakes of primary school-age students with dyslexia in terms of word type and text type, and to reveal the most common phonetic mistakes in which word type, phoneme of the word and text type.

1. **Method and Materials**

In order to reveal the phonological processing of Turkish dyslexic students, 50 students from the Academy Dyslexia Special Education Institution and a control group from Dokuz Eylül University 75th Year Primary Educational Institution were included in this study. Age/gender/education matched control group were included in this study. Via reading tasks all students performances were tested and all results were analysed in relation to phonological mistakes and word classes of these mistakes. The reading texts were choosen from the textbooks prepared by the Ministry of National Education in accordance with their own grade levels. In this study, students were given two different text types: fictional and non-fictional. Students read a short story and poem in the fictional text type. They read an informative text in the non-fictional type. Considering that students may experience problems such as focus and distraction during reading, we limited the reading time to one minute.

1. **Results**

In this study, results were examined between two gender in terms of place of syllable, syllable number, word class and text type. Statistical Package for the Social Sciences (SPSS) was used for the data analysis. Qui-square test was used for the comparison of phonological mistakes of dyslexic children. The statisical results are shown below with graphics.

**Graphic 1.** Error rates by gender

 According to the results, there was a statistically difference between phonological mistakes. In terms of error rates by gender, boys made more phonological mistakes than girls (p<0,005).

**Graphic 2.** Place of syllable

**Graphic 3.** Syllable number

 In additon to this, there was a statistically difference between phonological mistakes in terms of place of syllable (p<0,005). With regards to phonemes, girls had phonological mistakes on initial syllable whereas boys made phonological mistakes on final syllable as shown in graphic 2. In terms of syllable number, both boys and girls made more phonological mistekes with three-syllable words as shown in graphic 3.

**Graphic 4.** Word class

In terms of word classes, both boys and girls made phonological mistakes in nouns, verbs and adverbs. In addition to this, in terms of word classes boys made the most mistakes in verb and girls made most the mistakes in noun as shown in graphic 4.

**Graphic 5.** Text type

**Graphic 6.** Text type

In terms of text type, both girls and boys made mistakes in the fictional text type. While boys made more phonological mistakes in the informative text, girls made more phonological mistakes in the poem as shown in graphic 5 and 6.

As considered before, the students without dyslexia performed better compared to the experimental group.

 In this study, there was found out that children with dyslexia made phonological mistakes in some words. These results are shown below with tables.

**Table 1.** Phonological mistakes of boys

|  |  |  |  |
| --- | --- | --- | --- |
| **Word** | **Wrong pronunciation** | **Place of syllable** | **Word class** |
| yaşaNır | yaşaMır | Final syllable | verb |
| bilmiyoRum | bilmiyoYum | Final syllable | verb |
| çalışmaLı | çalışmaYı | Final syllable | verb |

According to table 1, in terms of place of syllable, boys made phonological mistakes on final syllable. For example, the verb *yaşanır* is pronounced by children as *yaşamır*. Therefore, the child made phonological mistakes on /n/ phoneme and final syllable. In terms of word class, boys made phonological mistakes on verbs.

**Table 2.** Phonological mistakes of girls

|  |  |  |  |
| --- | --- | --- | --- |
| **Word** | **Wrong pronunciation** | **Place of syllable** | **Word class** |
| Söyleşi | Şöylesi | Initial syllable | noun |
| Çöllerde | Göllerde | Initial syllable | noun |
| dAğlarda | dOğlarda | Initial syllable | noun |
| zEytin | zAytin | Initial syllable | noun |

According to table 2, in terms of place of syllable, girls made phonological mistakes on initial syllable. For example, the noun *söyleş*i is pronounced by child as *şöylesi*. Therefore, the child made phonological mistakes on /ş/ phoneme and initial syllable. In terms of word class, girls made phonological mstakes on nouns.

1. **Discussion and Consclusion**

In this study, phonological mistakes of students with and without dyslexia were investigated and it was found out that there was statistically differences between dyslexic children and the control group. As considered before, the students without dyslexia performed better compared to the experimental group.

Specifically, the phonological mistakes of primary school-age children with dyslexia was analysed in terms of word type by giving a reading text task. In addition to this, the analyse was done in terms of the most common phonetic mistakes in these word types phoneme of the words and text types.

First of all, it was found out that boys made more phonological mistakes compared to girls. In terms of place of syllable, whereas boys made more phonological mistakes on final syllable, girls made more phonological mistakes on initial syllable. In terms of word class, both boys and girls made more phonological mistakes in nouns, verbs and adverbs. There was statistically differences between two gender. From this point of view, boys made more phonological mistakes on nouns, whereas girls made more phonological mistakes on verbs. In terms of text type, both boys and girls made more phological mistakes in fictional text type. In additon to this, boys made more phonological mistakes on the informative text, girls made more phonolgical mistakes on the poem.

These results prove that the students with dyslexia have phonological deficits and it is mainly parallel with previous studies. Children wtih dyslexia read meaningful words they knew and new words they encountered more erroneously than the group without dyslexia. Some studies about this situation also support this view (Baydık, 2002; Manrique & Signorini, 1994; Porpodas, 1999; Wimmer & Hummer, 1990; Manis, 1985).

With regards to reading, Ehri (2005) states that there are two periods for word reading in children: *the pre-alphabetical period* and *the alphabetical period*. Especially in the alphabetical period, children use the alphabetical / phonological word reading strategy. Frith (1985, 1986) states that the child in this period combines the sounds of the letters to read words and points out the importance of the order of the letters in the word. Children who use the alphabetical / phonological strategy use their phoneme-phonemic relationship knowledge to convert the phonemes of words (letter or letter group representing phonemes) into phonemes and to combine them (Beech & Awaida, 1992; Kamhi & Catts, 1999).

In the light of this information, it is possible to say that the phonetic mistakes of children with dyslexia and their reflection on the word type are due to the difficulties they experience in phonological processes and the difficulties in using the alphabetical / phonological strategy.

Baydık (2006) supports this view and states that the acquisition of alphabetic / phonological strategies is very important in the development of word reading and children who cannot acquire this skill can not read new words, as well as develop their holistic vocabulary and can not read automatically and quickly.

On the other hand, studies examining the word reading skills of children with reading difficulties (Baydik, 2002; Manis, 1985; Porpodas, 1999) have shown that although these children prefer the alphabetical / phonological strategy in word reading, they cannot use this method effectively.

At the level of phonological awareness, according to Turan and Yükselen (2004) the child should be able to distinguish the sounds in speech and match these sounds with letters. Since children with dyslexia have problems with phonological processes, their phonological awareness levels are weak (Wolf and Denckla, 2005; Norton and Wolf, 2012) and they have problems in distinguishing sounds and matching sounds with printouts, they make these mistakes, which is consistent with previous studies

 With regards to word classes, firstly it needs to be said that word classes are divided into two parts. These are content and function words (Booij, 2007; Lieber, 2009; Fabregas and Scalise, 2012). Pulvermüller (1999) states that different brain areas are necessary for processing content and function words. It is stated that content words such as nouns, verbs, adjectives and adverbs might be housed in both hemispheres. For function words, left hemisphere of the brain is faster than right hemispheres with regards to accurate responses. In this respect, it is stated that the groups of cells representing function words are lateralized to the left. According to Gevins et al. (1994,1995) function words are lateralized to the left but this is not the case for content words.

In terms of pohonological mistakes, there are two systems in the brain which is important for reading. These are left parietotemporal and left occipitotemporal systems. Left parietotemporal system is very important for in terms of matching the sounds equivalents of letters and written words. Left occipitotemporal system is important for fluent reading and rapid access to whole word. (Shaywitz et al., 2002; Haim and Keil, 2004).

In additon to this, there are two material in the brain. These are grey matter and white matter. Especially, grey matter is responsible for processing. If there is little grey matter in the brain, problems may arise in processing the sound structure of the language. This is also closely related to phonological awareness (Hudson, High and Al Otaiba, 2007). Booth and Burman’s (2001) study support this view and they revealed that individuals with dyslexia have less gray matter in the left parietotemporal area.

In the light of this information, it is possible to say that these areas in the brain can be investigated for phonological processing. There may be some problems about processing the sound of the language and there may be some important differences in the processing of the the word class in terms of lateralizing in Turkish children with dyslexia. For further studies, this situation can be investigated with event-related potentials (ERP) or fMRI results.

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