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COMPARISON OF VISUAL AND PHONOLOGICAL SKILLS IN DYSLEXIA SUBTYPES

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Abstract

The objectives of this study are to characterize and compare the visual, phonological and mixed subtypes of students with an interdisciplinary diagnosis of developmental dyslexia. A total of 122 students, aged between 8 years and 11 years and 11 months, from the 3rd to 5th year of Elementary School I in the public network, divided into groups, being GI (61 students with an interdisciplinary diagnosis of dyslexia); and GII (61 students with good academic performance), paired with GI in relation to the school year. All were submitted to Phonological Skills and Visual Perception Assessments. Factors were created for profile classification for GI, with dyslexics separated into phonological, visual and mixed profiles. The results indicated that there was significance for all comparisons between GI and GII. There was a significant difference between the GV and GPH groups; GPH and GM groups and Between GV and GM. The findings of this study allow us to conclude that students with dyslexia can present visual defects regardless of the phonological one. These findings have clinical and educational implications.

Keywords: *Phonological awareness, visual perception, learning, education, educational measurement.*

1. Introduction

Developmental dyslexia is a neuro-cognitive disorder described as a difficulty in acquiring reading skills, despite adequate intelligence and sufficient reading opportunities (Shaywitz, 1996; Shaywitz & Shaywitz, 2005). Reading requires the coordination and integration of visual and verbal information. In particular, children's awareness of the relationship between sounds and letters, or letter-sound correspondence, has been emphasized. Phonological awareness was suggested to underlie grapheme–phoneme conversion (Share, 1995). In contrast, visual perceptual skills, which appear to be essential to letter learning, have been much less thoroughly investigated (Woodrome & Johnson, 2009) especially regarding dyslexia. Therefore, this study was based on the hypothesis that students with dyslexia subtypes would have difficulties with visual and phonological skills.

2. Objectives

The objective was to characterize and compare visual, phonological, and mixed profiles in students with an interdisciplinary diagnosis of developmental dyslexia and with good academic performance.

3. Methods

This study was approved by the Research Ethics Committee of the Faculty of Philosophy and Sciences – CEP/FFC/UNESP, under numbers 3.202.014 and 4.862.668.A total of 122 students, aged from 8 years to 11 years and 11 months old (35 women, 43 men, mean age = 25.25, SD = 2.248), from the 3rd to the 5th year of Public Elementary School I, were divided into GI groups composed of 61 students with the interdisciplinary diagnosis of dyslexia; and GII composed of 61 students with good academic performance, matched with GI in relation to the school year. GI was composed of students with the interdisciplinary diagnosis, carried out by the Learning Deviations Laboratory (LIDA/ UNESP – FFC/ Marília – SP), composed of speech therapists, neuropsychologist, and occupational therapist, based on the criteria described in the Statistical Manual for Mental Disorders and of Behavior – DSM-V (APA, 2014; Germano et al, 2014). Students from GII were indicated by their teachers with good academic

performance, with good academic performance being those who presented satisfactory performance in two consecutive two-month periods in the Portuguese Language and Mathematics assessment, with a grade greater than or equal to the average (5.0). Students from GII were paired with GI and their profiles, according to chronological age and school year. As exclusion criteria, students who did not present the Free and Informed Consent Term signature, with the presence of sensory (hearing and/or visual impairment) and cognitive deficits described in school records and/or in neuropsychological assessment findings and who participated in speech therapy and pedagogical remediation.

As procedures, the students were submitted to the following assessments, individually, lasting up to 4 sessions, with approximately 30 minutes, as follows:

- *Phonological skills assessment protocol* (PROHFON- Germano & Capellini, 2016): composed of 12 tests that assess the student's performance in phonological awareness, allowing classification by test and school year.
- *Visual Perception Development Test III* - DTVP III (Hammill, Pearson & Voress, 2014). This protocol consists of a battery of five subtests that measure different visual-motor and visual-perceptual skills.

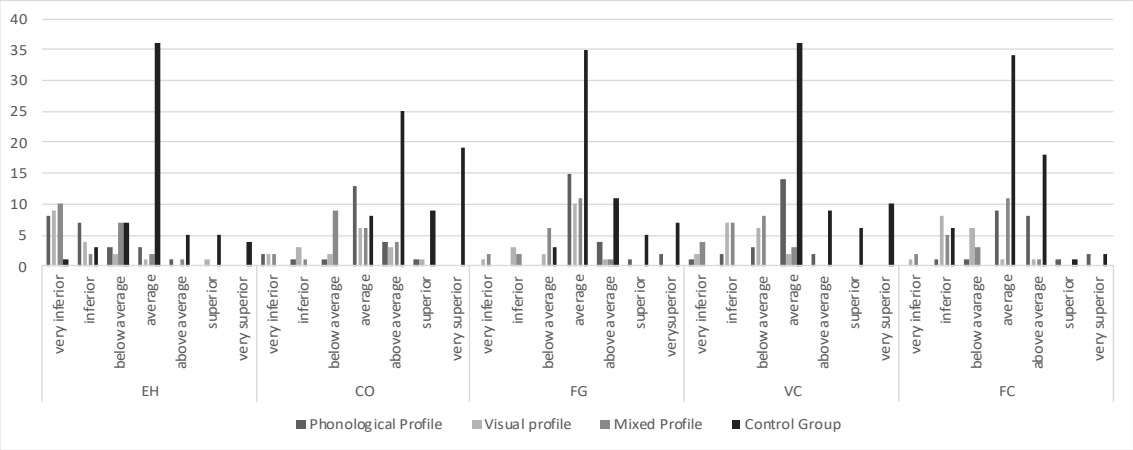
After applying the assessments, the GI students were separated according to the profiles of the dyslexia subtypes. For the separation in the diagnostic profiles, the following criteria were considered:

- Phonological Profile. To compose the phonological subtype, we considered the classification "under attention" in more than 50% of the phonological skills subtests (PROHFON – Germano & Capellini, 2016) and performed within and/or above average for the visual subtests (Figure – Background; Visual Closing; and Constancy of shape) and for the composite score of reduced motor perception of the visual perception test (DTVP-III; Hammill, Pearson & Voress, 2014). A total of 22 students met this criterion.
- Visual profile. To compose the visual subtype, we considered students who performed "expected" in more than 50% of the metaphonological skills subtests (PROHFON, Germano & Capellini, 2016) and presented below average performance for the visual subtests (Figure – Background; Visual closure; and Shape constancy) and for the composite score of reduced motor perception of the visual perception test (DTVP-III; Hammill, Pearson & Voress, 2014). A total of 17 students met this criterion.
- Mixed. To compose the mixed subtype, we considered students who performed "under attention" in more than 50% of the metaphonological skills subtests (PROHFON, Germano & Capellini, 2016) and presented below average performance for the visual subtests (Figure – Background; Visual closure; and Shape constancy) and for the composite score of reduced motor perception of the visual perception test (DTVP-III; Hammill, Pearson & Voress, 2014). A total of 22 students met this criterion.

4. Results

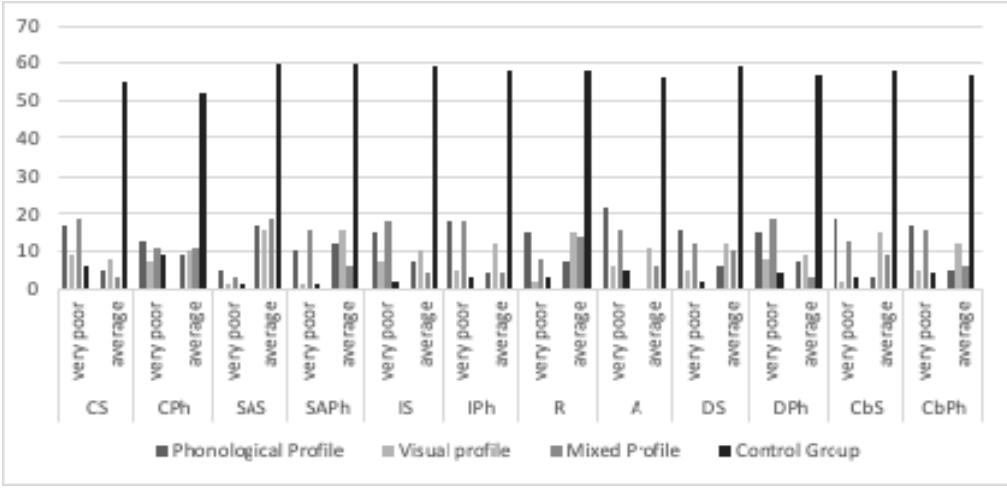
Figure 1 and 2 show the performance classification for the visual and phonological variables, respectively. The Likelihood Ratio Test was applied for comparison between categorical variables, that is, according to the classification of procedures. All variables showed significant differences.

Figure 1. Distribution of performance classification of visual variables.



Caption: EH: hand-eye coordination; CO: Copy; FG: Figure –ground; VC: Visual closure; CF Shape Constancy

Figure 2. Distribution of performance classification of phonological variables.



Caption: S: syllable; Ph; C: Count; SA: Synthesis and Analysis; I: Identification; A: Rhyme; A: Alliteration; D: Deletion: Cb: Combination

5. Discussion

The findings of this study allowed us to observe that Brazilian students with dyslexia showed differences in performance regarding phonological aspects and visual perception, indicating the heterogeneity of dyslexic manifestations. Specifically, it was possible to observe that the phonological subtype was characterized by deficits in the phonological skills of syllable and phoneme synthesis and analysis, alliteration, and syllable combination. Phonological deficits primarily affect pseudoword reading, although they also prevent the normal acquisition of lexical orthographic knowledge (Share, 1995, 1999). As for the visual subtype, its characteristics were deficits in visual motor skills, visual figure-ground and constancy of form. Visual figure-ground is a high-level discrimination skill, the student must recognize relevant lines and curves and, simultaneously, disregard unimportant ones. The teaching of visual figure-ground activity can help the student to give adequate and concentrated attention to relevant stimuli, ignoring irrelevant ones (Fusco, Germano, & Capellini, 2015; Frostig, Horne, Miller, & Lorenzo, 1984). Regarding constancy of form, it enables student to develop the ability to generalize in relation to the visual stimulus, as well as the identification of geometric shapes and learned words, regardless of their size, color, shading or positioning (Frostig, Horne, Miller, & Lorenzo, 1984).

The findings of this study indicate that it was possible to identify subgroups of dyslexic children in terms of visual and phonological abilities, and these discoveries clearly document the existence of individual differences in the dyslexic population. Thus, cases of developmental dyslexia with normal phonological processing have been documented (Valdois et al., 2004), despite the use of sufficiently sensitive phonological measures. Another important aspect observed is in relation to phonological skills. When observing the distribution of students regarding performance classification, it is noted that all subtypes had some phonological impairment. That is, we can infer that dyslexic had failures in accessing the phoneme, in some way. This aspect can be related to the current literacy methodology in Brazil, which does not prioritize the systematic and reflective teaching of grapheme-phoneme conversion. This aspect entails not only theoretical implications, but also in terms of clinical and educational practice, as it denotes the need for interventions with phonological remediation programs, even in the case of a visual subtype.

6. Conclusion

The findings of this study allowed us to observe that Brazilian students with dyslexia showed differences in performance regarding phonological aspects and visual perception, indicating the heterogeneity of dyslexic manifestations. These findings contribute to the discussion about the diagnostic criteria used by professionals, in addition to increasing the need to implement intervention programs with visual and phonological approaches. Finally, these findings alert us to the need to better understand the student's profile to improve curricular adaptation policies.

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