

Dyslexia Exercises on my Tablet are more Fun

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ABSTRACT

Worldwide, around 10% of the children have dyslexia, a learning disability characterised by difficulties with accurate word recognition and poor spelling. These difficulties can be overcome by language exercises. Typically, they come in the form of books. Hence, they are static and do not adapt to a child's specific needs. We present *Dyseggxia*, a game for mobile devices for children with dyslexia. It features five different exercises, which were derived from previous research on dyslexic errors. A study with 12 children with dyslexia confirmed that the game is fun and more attractive than traditional exercises. When playing, the exercises adapt to the specific difficulties of the individual player. The game is available for free for iOS and Android and it has been adopted into the program of institutions which support children with dyslexia. This is the first time English and Spanish reinforcement exercises are presented in an adaptive and fun-to-do way.

Categories and Subject Descriptors

K.3 [Computers in Education]: Computer Uses in Education—*Computer-assisted instruction*

Keywords

Dyslexia, Serious Game, Spanish, English, Android, iOS.

1. MOTIVATION

Background: Dyslexia is a neurological learning disability that affects reading and writing, especially with new words, rare words, very long words, complex words and phonetically and orthographically similar words [2]. This condition affects 10% of the population and has a considerable presence on the Web [1], making it more difficult to access written information.

Problem: Overcoming dyslexia requires a great effort for children and requires doing regular language exercises [2].

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However, these exercises are typically paper-based, with the following limitations:

- (i) The unappealing format of paper-based exercises, as the children's learning is mediated via electronic devices, such as book readers.
- (ii) The added difficulty some students face from writing on paper due to the fact that dysgraphia¹ is comorbid with dyslexia [5].
- (iii) The methodology to create the exercises is based on traditional pedagogical methods that do not take advantage of current technology to tailor and adapt the exercises on the basis of a child's performance.

Solution: We present *Dyseggxia*, which integrates pedagogical exercises in a more appealing and up-to-date format: a game for mobile devices. By using a game, we hope to provide exercises in a way that motivates children to work on them regularly. Further, the use of mobile devices allows us to isolate language problems from handwriting problems. Finally, the game monitors the player's performance and adapts the exercises over time.

Dyseggxia presents six types of word exercises: (a) add a letter; (b) remove a letter, (c) change a letter, (d) choose the correct word ending, (e) cut into words, and (f) order the letters or syllables (Figure 1). The goal of the game is to correct and create valid words. *Dyseggxia* is available for English and Spanish, the second and third most spoken languages in the world.

Mobile Applications Related to Dyslexia: Compared to the other existing applications in English and Spanish for children with dyslexia, *Dyseggxia* is the only one that contains word exercises scientifically designed on the basis of empirical analysis. For a more in-depth literature review, please refer to our previous research [7].

2. BACKGROUND RESEARCH

Dyseggxia is strictly designed based on findings from previous research on people with dyslexia.

Determining Text Presentation: Since the presentation of text has an effect on reading performance, *Dyseggxia* includes the text guidelines parameters where this target group reaches the best readability, based on a study with 22 people with dyslexia [8].

¹Dysgraphia refers to a writing disorder associated with the motor skills involved in writing, handwriting and sequencing, but also orthographic coding [5].



Figure 1: The evolution of the penguin (up) and screenshots for the five types of exercises (a-e) (down).

Creating the Exercises: For creating the exercises, we applied natural language processing techniques using two corpora of English and Spanish texts written by children with dyslexia [6]. We analyzed the most frequent errors, made a linguistic analysis of the patterns [9], and created exercises from them.

Identifying Appropriate Difficulty Levels: We tailored the levels considering the languages difficulties for this target group [2]. As the difficulty level increases, the target word and the distractors [4] are less frequent, longer, have a more complex morphology, and have a higher orthographic and phonetic similarity with other words in language.

Engaging the User: We improved the game with insights from a think-aloud evaluation with 12 children. For instance, we added in-game achievements: by solving challenges, a penguin is born, grows, and wins prizes (Figure 1). These achievements can be shared via iOS' Game Center, in order to engage players and so results can be compared with other players online.

3. SOCIAL IMPACT

Dyseggia has received a good share of attention by the media. It has been featured in TV3 Televisió de Catalunya, Catalunya Ràdio, and El Periódico [3].²

Three centres that support children with dyslexia, Centro Creix Barcelona,³ Centro Coddia,⁴ and UDITTA,⁵ have adopted *Dyseggia* into their curriculum. By being embedded into the pedagogical context of these centres, *Dyseggia* has the potential of playing an essential role in helping children to overcome dyslexia.

Furthermore, *Dyseggia* is currently available for free on the iOS Store. From its release in June 2012 until March 2013, it has been downloaded more than 5,000 times (Figure 2). Exercises are available in Spanish and since January 2013 in English as well. We also developed a beta version for Android.⁶ With these offers, *Dyseggia* has the potential of reaching a large number of children and helping them in improving their reading skills in a playful way.

4. REFERENCES

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⁴www.coddia.com

⁵<http://www.uditta.com/>

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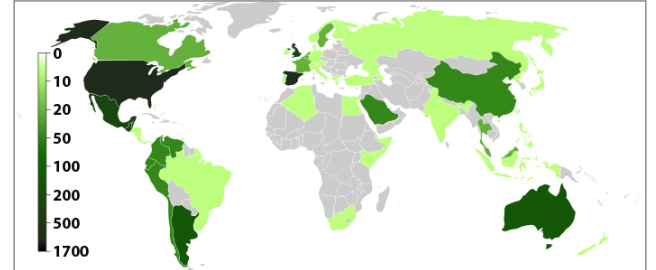


Figure 2: Number of downloads of Dyseggia.

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