Towards the Prediction of Dyslexia by a Web-based Game with Musical Elements

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http://bit.ly/DysMus
Demo

Dyslexia

- Dyslexia is a ***specific learning disorder*** & people with dyslexia have difficulties **spelling** and **reading** words**.**
- Dyslexia is frequent: around **5% to 15%** of the population has this learning disorder [1].

Motivation

- **Prediction** of dyslexia is **depending** on a minimum knowledge of phonological awareness, grammar, and vocabulary.

➔ **Late detection & then a disadvantage for children with dyslexia!**

Contribution

- **New indicators** for predicting dyslexia while playing a game called *DysMusic* (Figure 2).
- **Improvements** to the first version of the game.

Why Musical Elements?

- Prosodic structure in language is like phonological grammar [2] of music.
- Four acoustic parameters are used to generate the different musical elements: Frequency, Length, Rise Time & Rhythm (Figure 1).

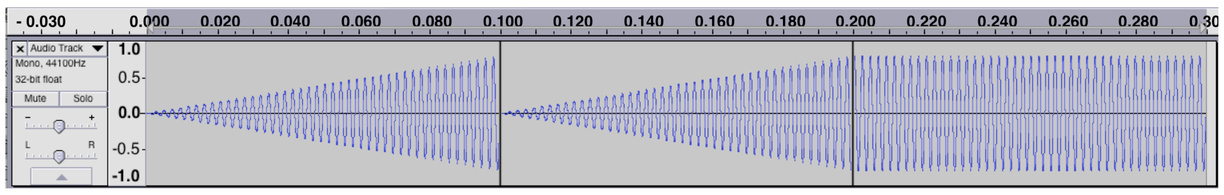

Figure 1: Example of one musical element Rhythm.

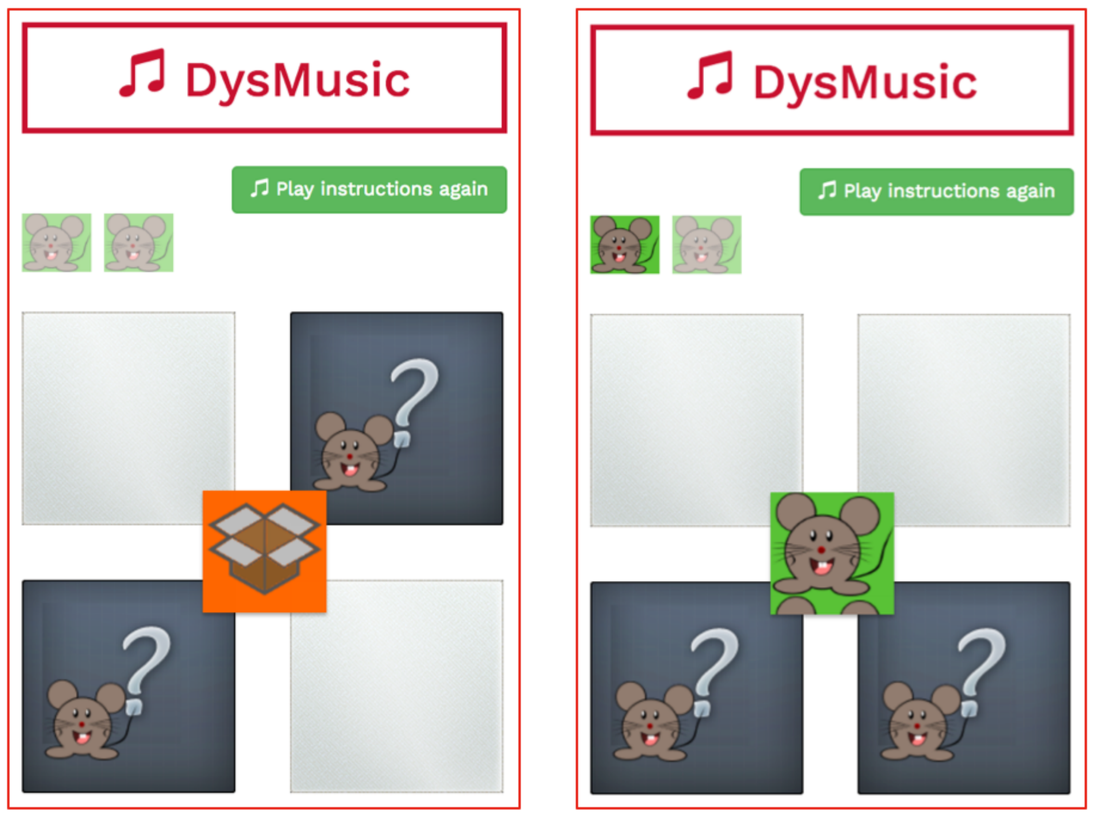

Figure 2: Example of the game DysMusic for the first two clicks on two sound cards (left) and then a pair of equal sounds is found (right).

Usability Study

- 5 users study (five children (users) and five parents) within-subject design, counter-balanced.

Conclusion

- Regarding the user test, all participants understood the game easily and played with no interruptions.

Results

- Participants had different perceptions on how difficult it was to distinguish the sounds and finding the card pairs, depending on the musical elements.
- But all participants mentioned that the first musical element of the first subtask was always more difficult, independently of the musical element.

Future Work

- Include visual indicators into the prototype.
- Set of experiments with 300 participants: Do musical and visual elements distinguish a person with or without dyslexia?
- Test the language independency of the indicators.

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[1] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. American Psychiatric Association, may 2013.
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