HEALTH STAFF-ORIENTED

5 OBJECT HUNT FOR SPEECH THERAPY

Gobron Stéphane [1], **Skoruppa Katrin** [2]
1: Haute Ecole Arc Ingénierie, HES-SO, Neuchâtel, Switzerland
2: UNINE, Neuchâtel, Switzerland

Contact: stephane.gobron@he-arc.ch

ABSTRACT

Speech is one of the main ways to communicate in our society, that's why speech-language pathologies, which can affect anybody at any age, can be a real obstacle for a normal everyday life. The problems are well known, and speech-language pathologists specialize in helping the patient overcome their issues expressing themselves orally. The exercises usually provided are mostly very repetitive and can quickly become boring. The transposition of the exercises into a digital platform as a point-and-click object hunt adds a playful dimension to an otherwise uninteresting activity. Furthermore, the addition of a speech-recognition algorithm specialized in speech-impairment allows automatic task evaluation and helps relieve the therapist's work.

KEYWORDS

Serious game, speech impediment, health.

CONTEXT

Speech therapy is a related health profession practiced by speech-language pathologists (SLP). The disorders can appear at many stages in life. Their cause can be organic (sensory, motor, neurological disorders or dysfunctions) or psychosocial (developmental difficulties, socio-cultural deficiencies). The intervention field is vast, touching as well adults as children. Many speech therapy group games exist, mainly card games. Still, individual sessions are not as playful, with the most common exercise being the presentation of an image to the patient and asking him to pronounce the word and make a sentence with it. The game sessions have several difficulty levels with irregular words, silent letters or similar pronunciations. The material for these exercises is mainly printed on cards by the therapist. Each patient configuration is done manually, depending on his situation and needs.

TARGET ISSUE

The issues in the current method are plenty. For the patient, the proposed tasks can quickly become uninteresting and even frustrating, especially for younger children. Repetitiveness and lack of interaction diversity are not very engaging and can even create an aversion towards some exercises. For the therapist, the session preparation is done by hand and can be very long. The results of a session are taken and reported manually in a tedious process, and the results are not analyzed automatically.

PROPOSED SOLUTION

This project proposes to transpose these exercises in a point-and-click hidden object game. More specifically, the patient must find some specific objects in an image full of objects. Nor only does he have to understand the word but he must also find it in the image and correctly pronounce a given sentence. The quantity of objects in the room, the type and number of objects to be found, is decided by the therapist and saved for later sessions. The score is saved in order for the therapist to see the patient's progress. In the app first version, the pronunciation was evaluated by the therapist; in the second, advanced options for result viewing and reporting have been considered.

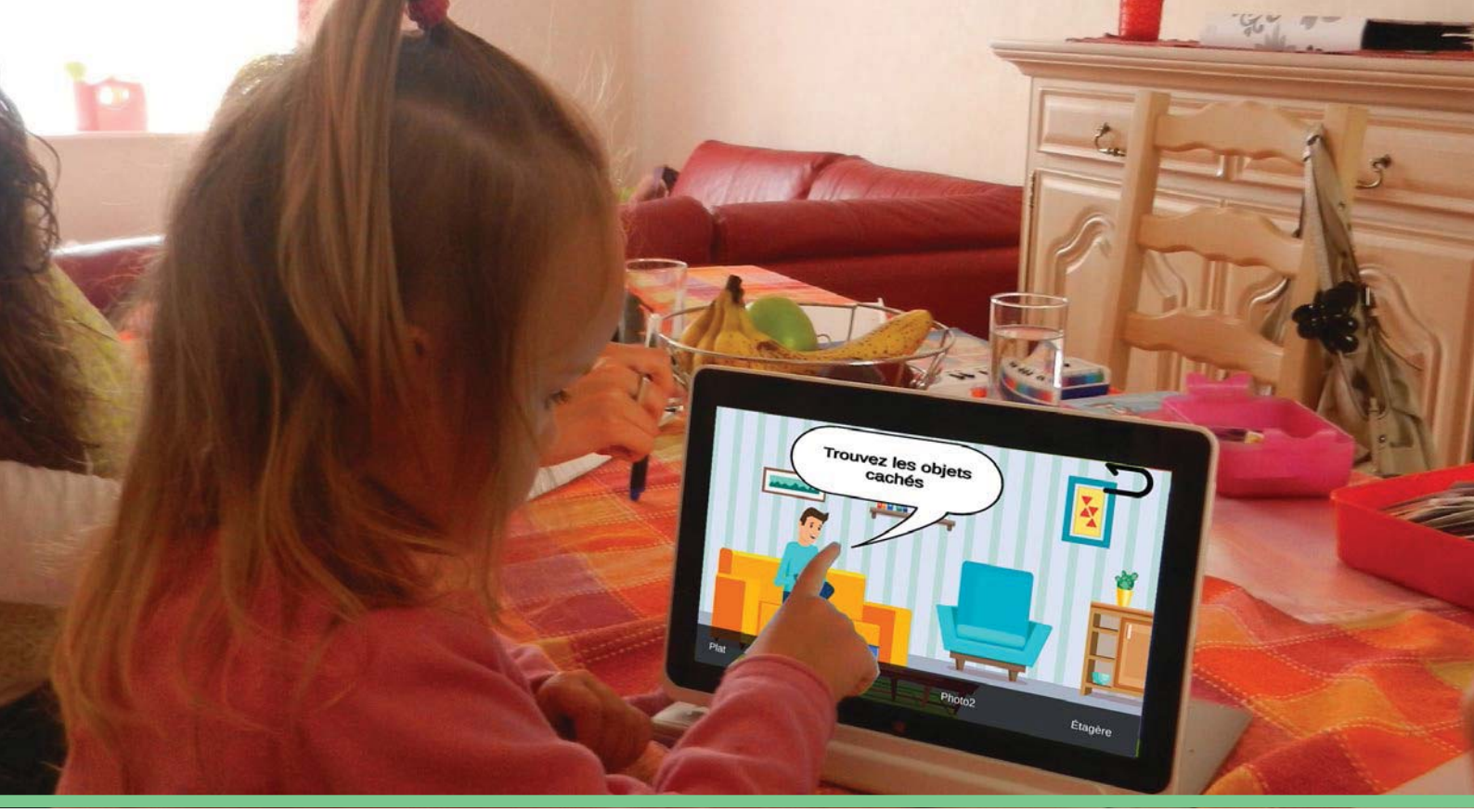
RELEVANT INNOVATION

The main innovation is a voice recognition algorithm that allows automatic evaluation of the pronunciation with personalized feedback and rewards. This is a real challenge as most of the patients suffer from some speech impediment. The project will use databases of transcribed interactions with speech-impaired patients to train the algorithm for speech recognition. Furthermore, the removal of a systematic human evaluation can help the patient relax, as they feel less judged. The serious game provides a better engagement as well as a better overall feeling about the therapy. The creation of a platform digitalizing the patient results and progress helps the therapist have a better overall view of the situation.

This project aims to bring assistance to a field that is rarely targeted by technological health innovations

PROJECT OUTCOMES & RESULTS

A prototype has been done, including three levels in the same room. The number and type of objects can be configured through an editor interface. The pronunciation validation is temporarily carried out by the therapist, as the speech recognition algorithm is not ready yet. The next step is to add more levels, with more objects and several "styles" of levels (cartoon, photorealistic, futuristic ...). The final step will be to integrate a speech recognition algorithm, tailored to different speech impediments. The final app will be deployed on a computer, with therapist access enabling patient data export into appropriate files.



CONCLUSION

This project aims to bring assistance to a field that is rarely targeted by technological health innovations. It intends to bring more fun and enjoyable experience to the patient and ease the therapist's work by providing help for repetitive tasks via a partially automated analysis system.

PERSPECTIVES & NEEDS

The needs for the projects are now the creation of an object database and the creation of more scenarios addressing different real-life problems for patients and therapists. The testing on patients is also a requirement throughout the app development.

ACKNOWLEDGEMENTS

He-Arc, UniNE

REFERENCES

[1] Pedroli, Elisa & Padula, Patrizia & Guala, Andrea & Meardi, Maria & Riva, Giuseppe & Albani, Giovanni. (2017). *A Psychometric Tool for a Virtual Reality Rehabilitation Approach for Dyslexia. Computational and Mathematical Methods in Medicine.* 2017. 1-6. 10.1155/2017/7048676.

[2] Rello, Luz & Bayarri, Clara & Otal, Yolanda & Pielot, Martin. (2015). *A Computer-Based Method to Improve the Spelling of Children with Dyslexia. ASSETS14 - Proceedings of the 16th International ACM SIGACC ESS Conference on Computers and Accessibility.* 10.1145/2661334.2661373.

[3] Vanessa Harrar, Jonathan Tammam, Alexis Pérez-Bellido, Anna Pitt, John Stein, Charles Spence, *Multisensory Integration and Attention in Developmental Dyslexia, Current Biology, Volume 24, Issue 5, 2014,* Pages 531-535, ISSN 0960-9822.