Fall 2020 RES-MATCH Final Report

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1. Introduction

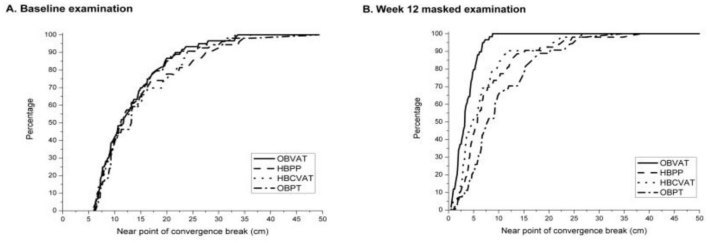
Upwards of 13% of adults and children have or are affected by convergence insufficiency, an ocular disorder that results in chronic eye pain, eye strain, blurry vision, and double vision. This disorder usually goes undetected and almost always requires professional examination for a diagnosis. This disorder can be treated with regular visual exercise and strengthening administered by a licensed optometrist. This generally requires lengthy in-office visits in conjunction with at-home therapy, which is often hard to maintain.

The purpose of this research is to create a device using wireless microcontrollers that, when configured, offer the same ocular-corrective effectiveness as typical office-based therapy while forgoing the need for lengthy in-person visits or inflexible schedules. Some success criteria for this device should include portability, affordability, effectiveness, reliability, and ease of use. Most importantly, this device is optimized to treat CI in a manner that most closely reproduces the results of our data findings.

2. Experimental Methods

This device should be constructed using commercially available prototyping boards and microcontrollers. Resources used will include online peer-reviewed databases as well as the Paul V. Galvin Library, microcontroller forums such as Arduino. cc and Redditt. Physical materials used will include Arduino-native prototyping boards,

3. Results



- Indicative of a decrease in NPC. We concluded that OBVAT, a vision treatment method that implements pencil push-ups, is the most effective means of treating CI. The figures above (hyperlinked) indicate a significant increase in near point of convergence distance. This decrease (in the solid line, OBVAT) means the exercise was effective in strengthening the users' vision. See the above links (click on the image) for more information.

4. Final Discussion

Our findings indicate that, even with basic exercises such as the pencil push-ups exercise, we can create a cost-effective and reliable solution to an underlying problem. Our device is a prototype meant to treat only a certain subset of ocular disorders. Although this prototype does adhere to all aspects of vision therapy, further testing, and clinical trials are needed to confirm the legitimacy of the device being presented. This device should serve as a proof of concept for an approachable means to treating CI, or convergence insufficiency.

References: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2779032/

Randomized Clinical Trial of Treatments for Symptomatic Convergence Insufficiency in Children. (2008). Archives of Ophthalmology, 126(10), p.1336.