Systematic approach to the treatment of binocular dysfunction using virtual reality

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BACKGROUND

Many patients who would benefit from vision therapy (VT) do not receive it. One of several reasons is that binocular vision (BV) is highly complex: VT requires one-on-one testing and treatment by highly skilled clinicians who are in short supply. Here we describe a framework that allows the doctor or vision therapist to off-load some of their patients’ treatment, testing, and the more routine parts of decision-making to at-home virtual reality (VR) software. The goal of this project is for specialists to be able to treat more patients at lower cost by increasing the amount of skill-appropriate treatment between office visits.

PRINCIPLES OF HOME OPERATION

VT addresses specific skills, such as: vergence ranges along with awareness of diplopia; flat fusion; and stereopsis. Manipulating accommodative demand is difficult within currently available consumer-grade VR displays, however, decoupling of vergence and accommodation (as done with Vectograms/graphs in the clinic) is straightforward.

During home training, an artificial intelligence agent, the VT Virtual Assistant (VTVA™):
• Controls game difficulty to keep patient engaged in training
• Monitors training variables such as blur, occlusion, vergence demand, and binocular disparity
• Collects, reports, and responds to subjective ratings in questionnaires for comfort, asthenopia, etc.
• Assesses specific skills, including awareness of diplopia, flat fusion, vergence ranges, and stereopsis with results available over the internet to the clinician.

HOME TREATMENT EQUIPMENT

EXAMPLE: INTERMITTENT EXOTROPIA

**EXAMPLE: SEQUENCING IN “BREAKER”**

HOME TREATMENT OF SUPPRESSION

**REFERENCES**