



Dichoptic Treatment For Amblyopia: Brief History & Where We Stand

By: Yasmine Alaa Meqdad, M.Sc.
Assistant lecturer, Cairo University Hospitals

1



Technology

Driven by:

Necessity

War

2

Issues With The Standard-of Care

- Compliance
- Social stigma
- Recurrence after cessation of patching

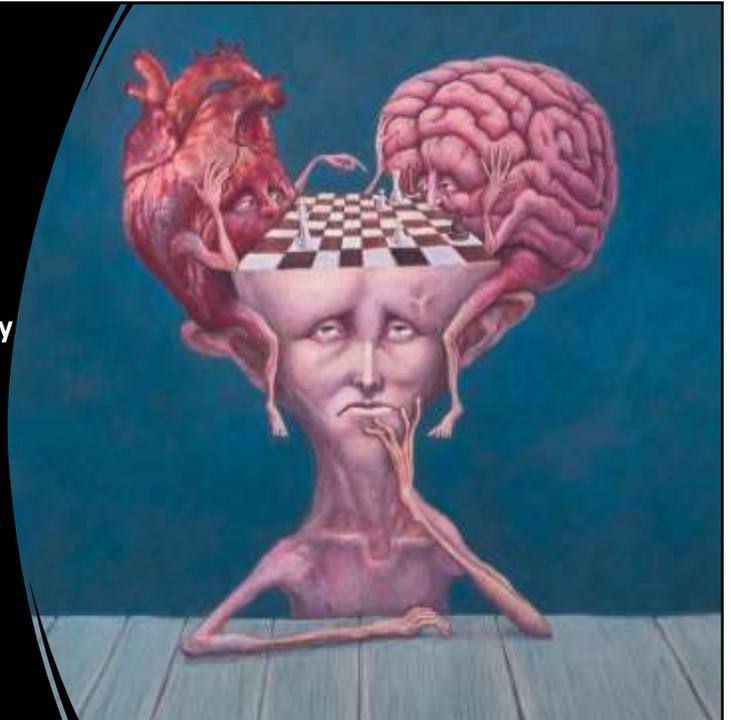


3

Binocular Therapies

Shifting concepts in pathophysiology

- Amblyopes have intact binocular systems
- Functionally monocular due to suppression



4

Binocular Therapies

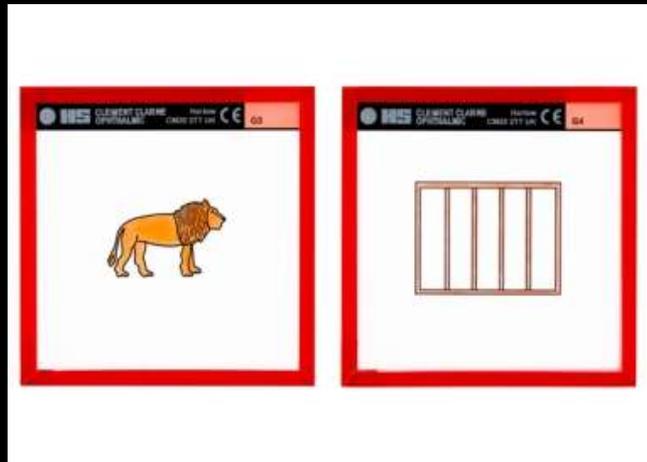
- Active
- Targets interocular suppression
- Promotes binocularity & stereopsis
- Adults & poorly compliant children



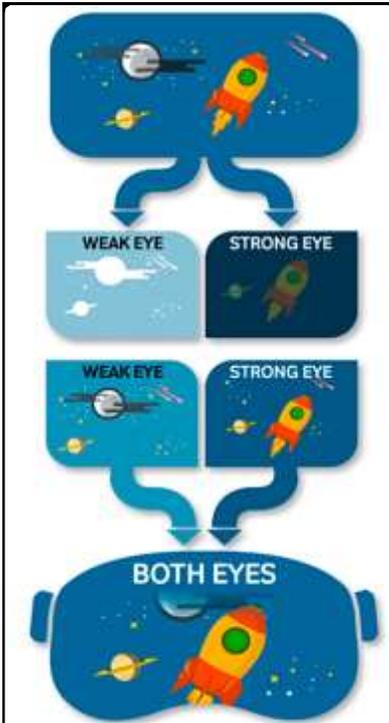
5

The Idea

- In the 1960s with the synoptophore
- Too simple tasks.
- Rapid technological advances
 - ➔ Dichoptic stimulation



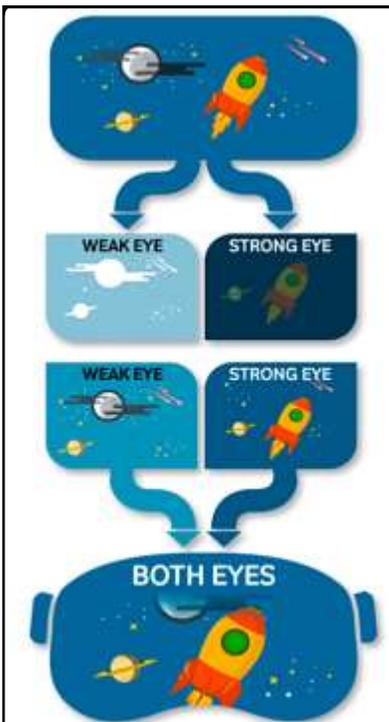
6



What is Dichoptic Stimulation?

- **Dichoptic Stimuli:** Stimulus A to right eye, Stimulus B to left eye.
- **Goal:** Balance input of both eyes, promote binocular integration

7



Techniques of Dichoptic Presentation

- 1- Different parts of visual scene to each eye.
- 2-High-contrast stimuli to amblyopic eye

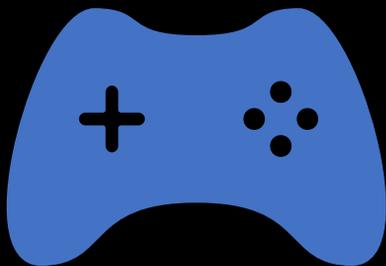
8

Delivery of Dichoptic Treatment

- Dichoptic video games
- Binocular movie viewing
- Virtual reality (VR)



9



Dichoptic Video Games

10

Delivery of Dichoptic Games

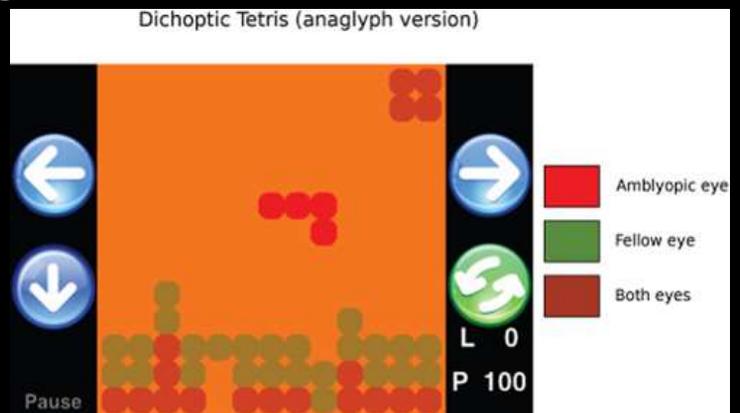
The patient wears red-green, polarized or shutter glasses



11

Dichoptic video games

- Falling blocks game



12



13

Dichoptic video games

Issues:

- Boring
- Inferior to patching.
- Comparable to spectacles!



14

AAO Review



AMERICAN ACADEMY
OF OPHTHALMOLOGY®

Ophthalmic Technology Assessment

Binocular Treatment of Amblyopia

A Report by the American Academy of Ophthalmology

Stacy L. Pineles, MD,¹ Vinay K. Aakalu, MD, MPH,² Amy K. Hutchinson, MD,³ Jennifer A. Galvin, MD,⁴
Gena Heidary, MD, PhD,⁵ Gil Binenbaum, MD, MSCE,⁶ Deborah K. VanderVeen, MD,⁷ Scott R. Lambert, MD⁷

Ophthalmology, Volume 127, Issue 2, 261 – 272
Published October 13th, 2019

15

AAO Review

Conclusions: There is no level I evidence to support the use of binocular treatment as a substitute for current therapies for amblyopia (including patching and optical treatment). Furthermore, 2 large randomized controlled trials showed inferior performance compared with standard patching treatment. On the basis of this review of the published literature, binocular therapy cannot be recommended as a replacement for standard amblyopia therapy. However, more research is needed to determine the potential benefits of proposed binocular treatments in the future. *Ophthalmology* 2019;■:1–12 © 2019 by the American Academy of Ophthalmology

16

Virtual Reality



17

Virtual Reality

VR presents content in 3D

Head-mounted VR display

Luminopia One



18

Luminopia One

VR movies with a 'dichoptic twist'



19

 A collage of four images illustrating the Luminopia One experience.

- Top Left:** A young boy wearing a VR headset, smiling. Behind him are two circular screens displaying various video thumbnails.
- Top Right:** A screenshot of the Luminopia One interface, featuring the company logo and a Cookie Monster character.
- Bottom:** Two side-by-side VR views of a video scene. The left view is labeled 'WEAKER EYE' and shows a scene with a person in a dark uniform. The right view is labeled 'STRONGER EYE' and shows a similar scene but with a different visual quality or focus.

Luminopia One works by modifying popular TV shows and movies into therapeutic visual stimuli within a VR headset. With a broad library of beloved content available, all you have to do is pick a video and enjoy as we take care of the rest!

20

Luminopia One



AMERICAN ACADEMY
OF OPHTHALMOLOGY®



Randomized Controlled Trial of a Dichoptic Digital Therapeutic for Amblyopia

Scott Xiao,¹ Endri Angjeli, MS,¹ Hank C. Wu, MS, MBEE,¹ Eric D. Gaier, MD, PhD,^{1,2} Stephanie Gomez,¹ Dean A. Travers,¹ Gil Binenbaum, MD, MSCE,³ Robert Langer, ScD,⁴ David G. Hunter, MD, PhD,¹ Michael X. Repka, MD, MBA,⁵ for the Luminopia Pivotal Trial Group

Ophthalmology Volume 129, Issue 1, 77 – 85
Published September 13th, 2021.

21

Luminopia One

- 104 amblyopic children 4 to 7 years old.
- Luminopia One Vs. spectacle wear.
- VA improvement: 1.8 lines with Luminopia One, 0.8 line with spectacle wear
- Excellent compliance, no serious side effects.

22

Where We Stand...

Luminopia scores FDA approval for TV-based amblyopia therapy

23

Virtual Reality

VR presents content in 3D

Diplopia game (Vivid Vision)



24



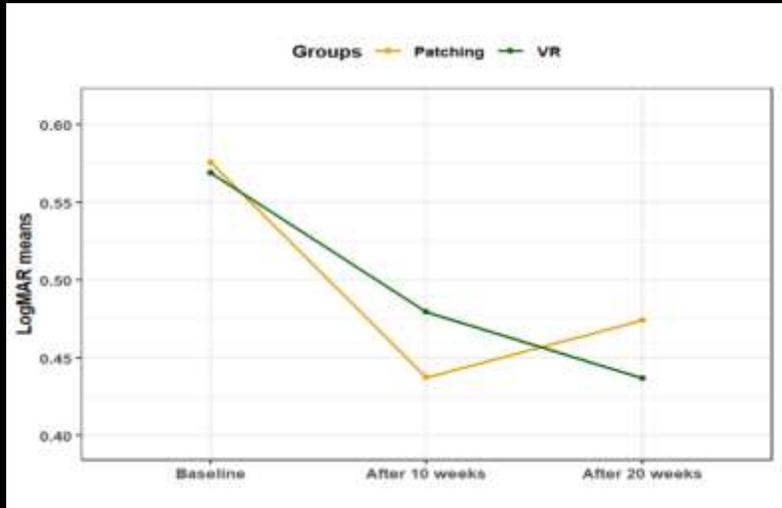
25

Vivid Vision – The CUPS Experience

- 86 amblyopic children & adults 6 to 37 years old.
- VR Vivid Vision Vs. Patching.
- VA improvement & stereopsis after 10 & 20 weeks.

26

Vivid Vision – The CUPS Experience



27

Binocular Movie Viewing



28

CureSight Pivotal Study



AMERICAN ACADEMY
OF OPHTHALMOLOGY®



An Eye-Tracking–Based Dichoptic Home Treatment for Amblyopia

A Multicenter Randomized Clinical Trial

Tamara Wygnanski-Jaffe, MD,^{1,2} Burton J. Kushner, MD,³ Avital Moshkovitz, PhD,⁴ Michael Belkin, MD,^{2,5}
Oren Yehezkel, PhD,⁴ on behalf of the CureSight Pivotal Trial Group

Ophthalmology, Volume 130, Issue 3, 274 – 285
Published October 25th, 2022

29

CureSight

30

CureSight

- 103 amblyopic children 4 to < 9 years old.
- CureSight Vs. Patching
- VA improvement: 2.8 lines with CureSight, 2.3 lines with patching
- Better compliance, no serious side effects.

31

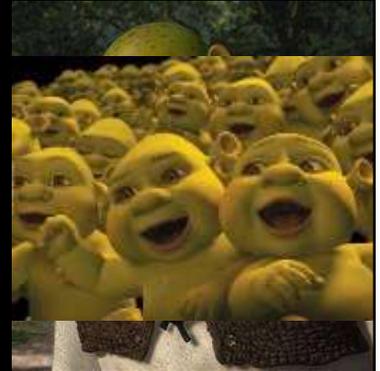
Where We Stand...

Eye Patch Bypass: NovaSight's CureSight Lazy Eye Treatment Earns FDA Clearance in U.S.

October 25, 2022

32

The Future has arrived!



33

In Summary

- Binocular treatment for amblyopia is not sci-fi anymore.
- **Luminopia One & CureSight**; potential value in amblyopia therapy
- Patient adherence & satisfaction matter.

34

