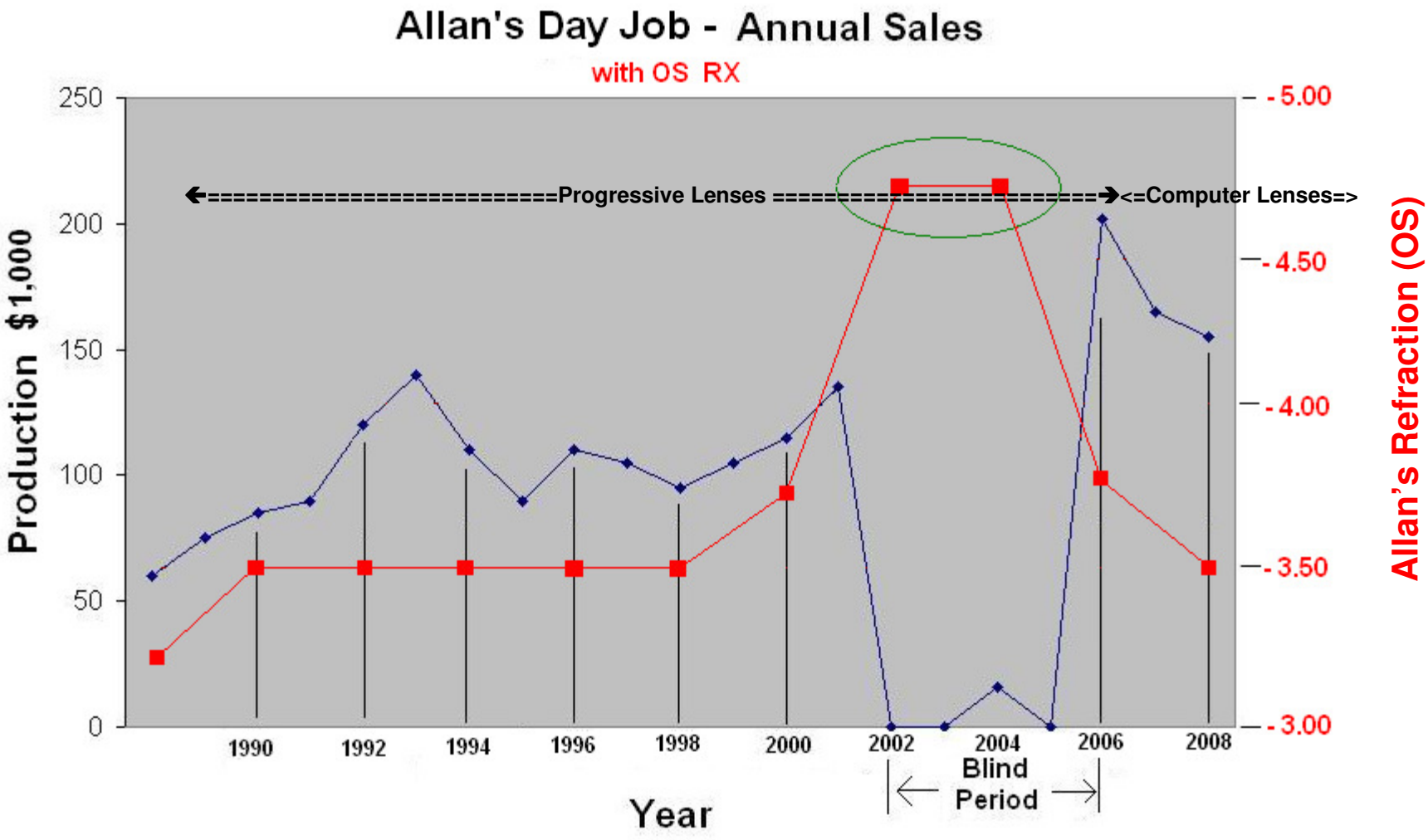
The Origins of Dyops®

Allan Hytowitz

Dyop® Vision Associates LLC

Allan's Problem



Allan's Problem

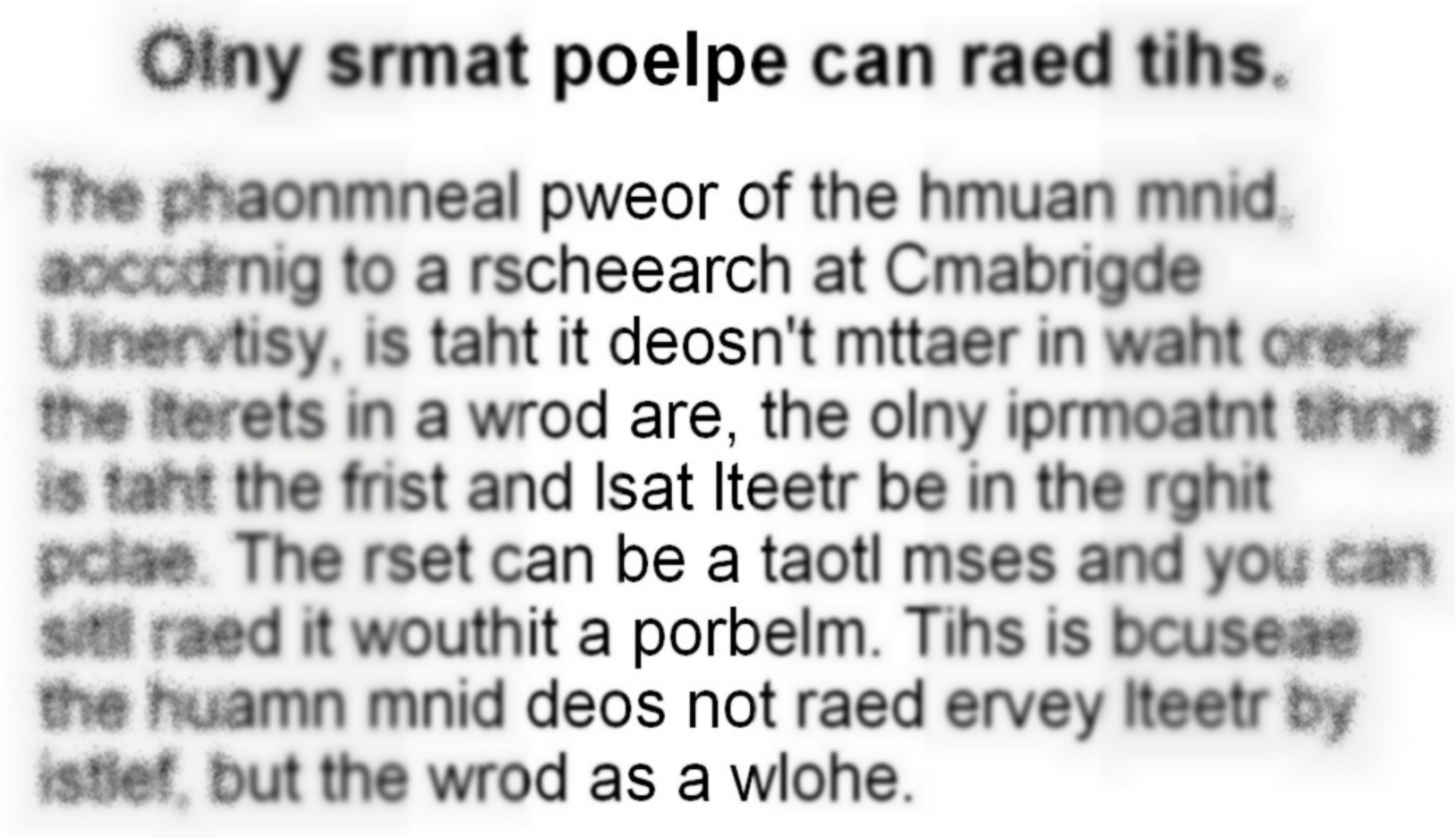
Allan's view with Computer Lenses

Olny srmat poelpe can raed tihs.

The phaonmneal pweor of the hmuan mnid, aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, is taht it deosn't mttaer in waht oredr the lterets in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat lteetr be in the rghit pclae. The rset can be a taotl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteetr by istlef, but the wrod as a wlohe.

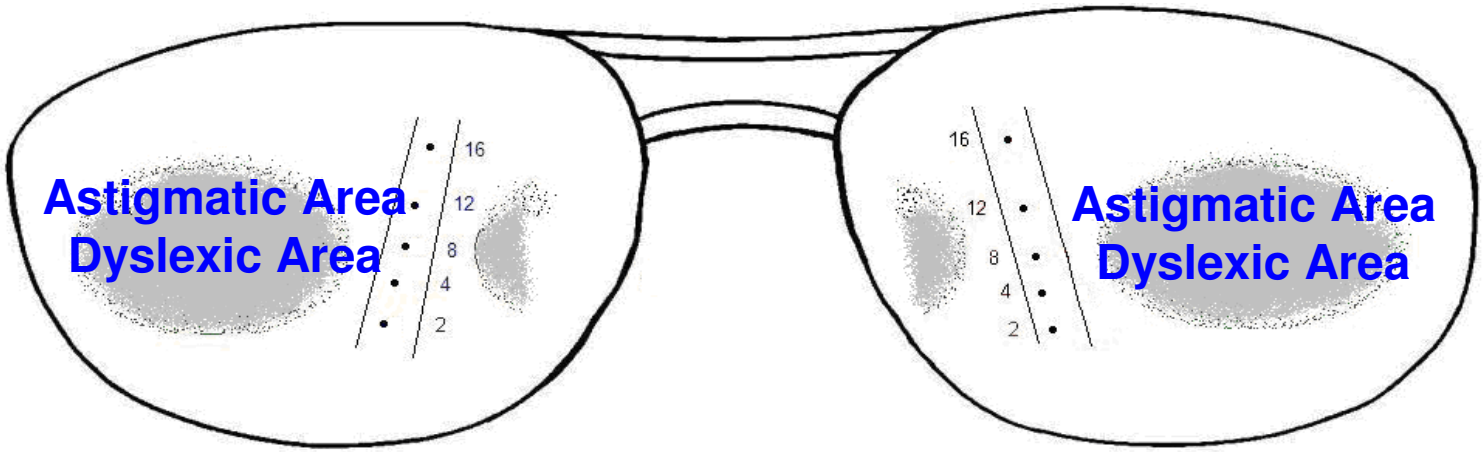
Allan's Problem

Allan's view with Progressive Lenses



Allan's Problem

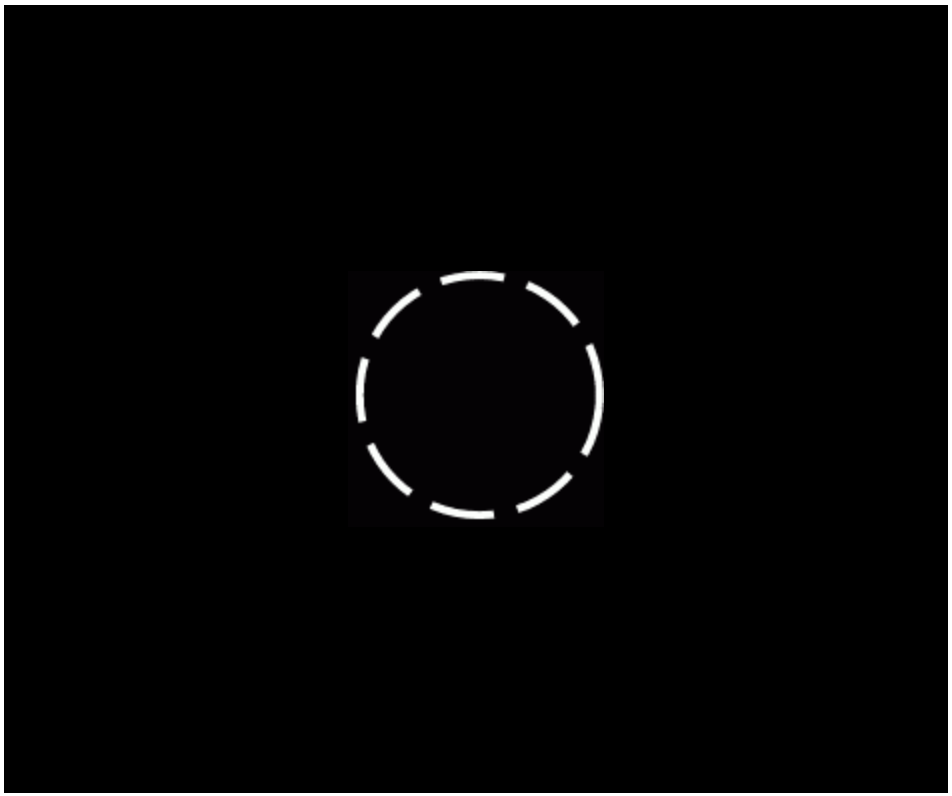
Inherent Vision Loss with Progressive Lenses



Dyslexic Areas caused blurry and distorted vision and almost four years of functional blindness

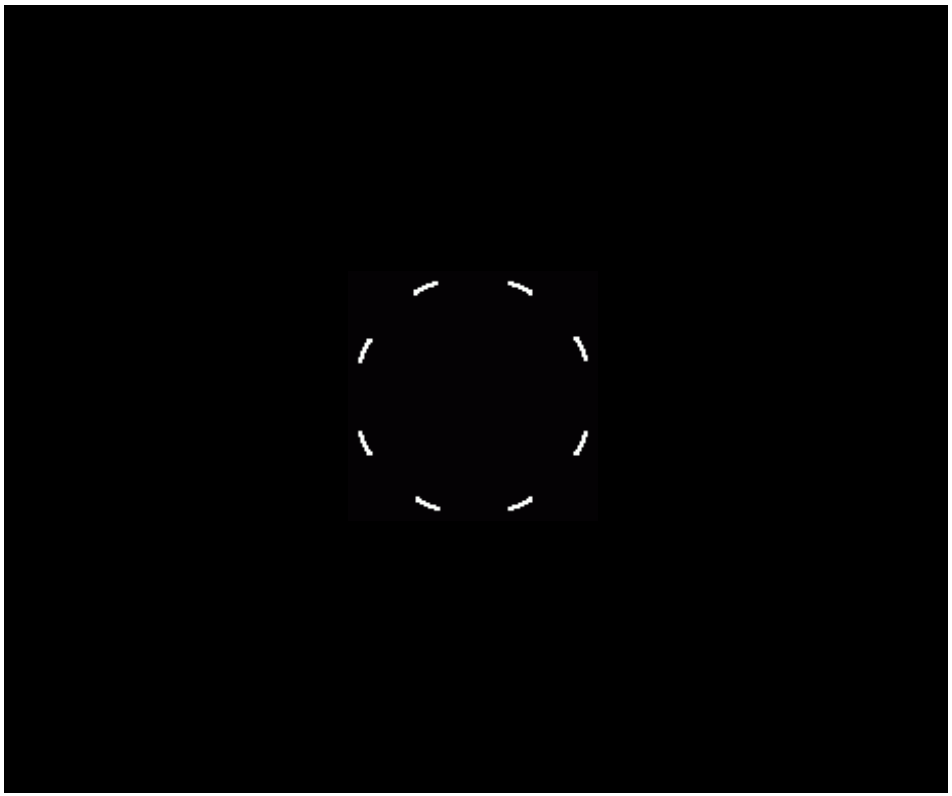
Allan’s Original Vision Test Device

Rotating Segmented Circles



Early attempts to create a rotating image

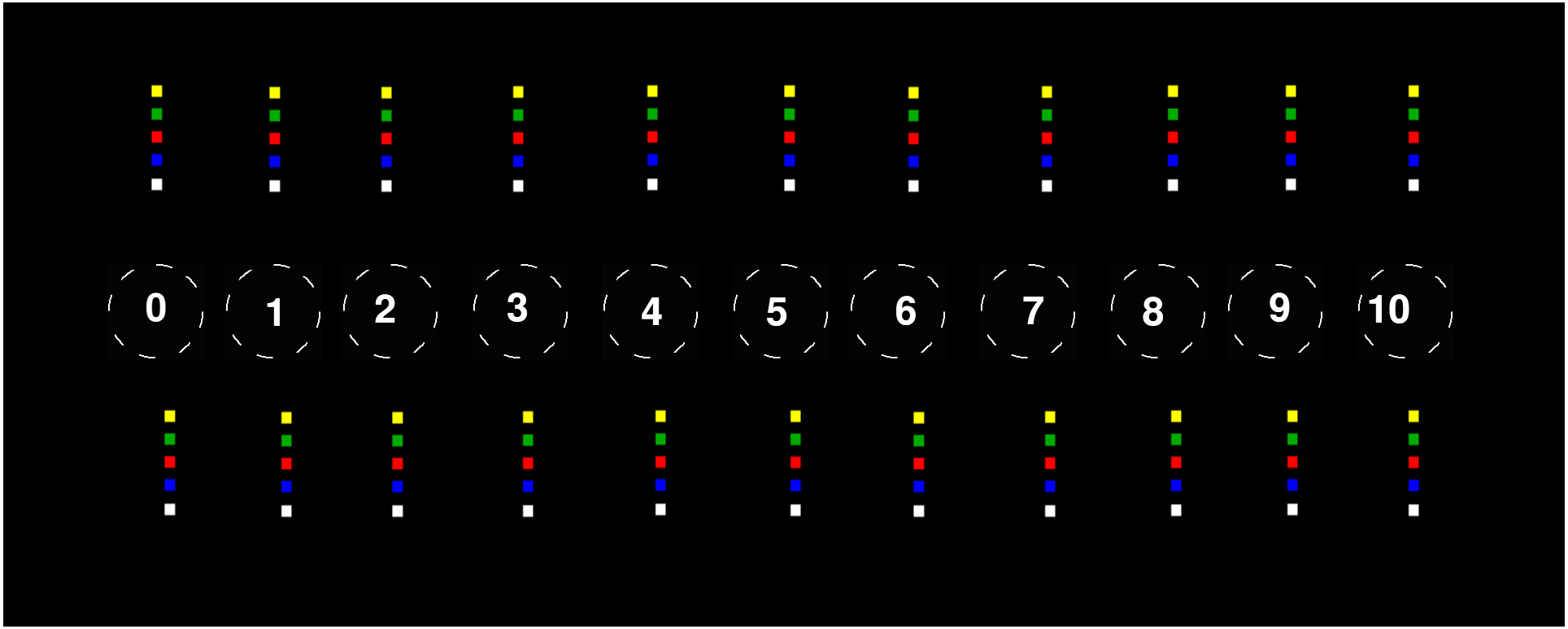
Rotating Segmented Circles



Early attempts to create a rotating image

Rotating Segmented Circles

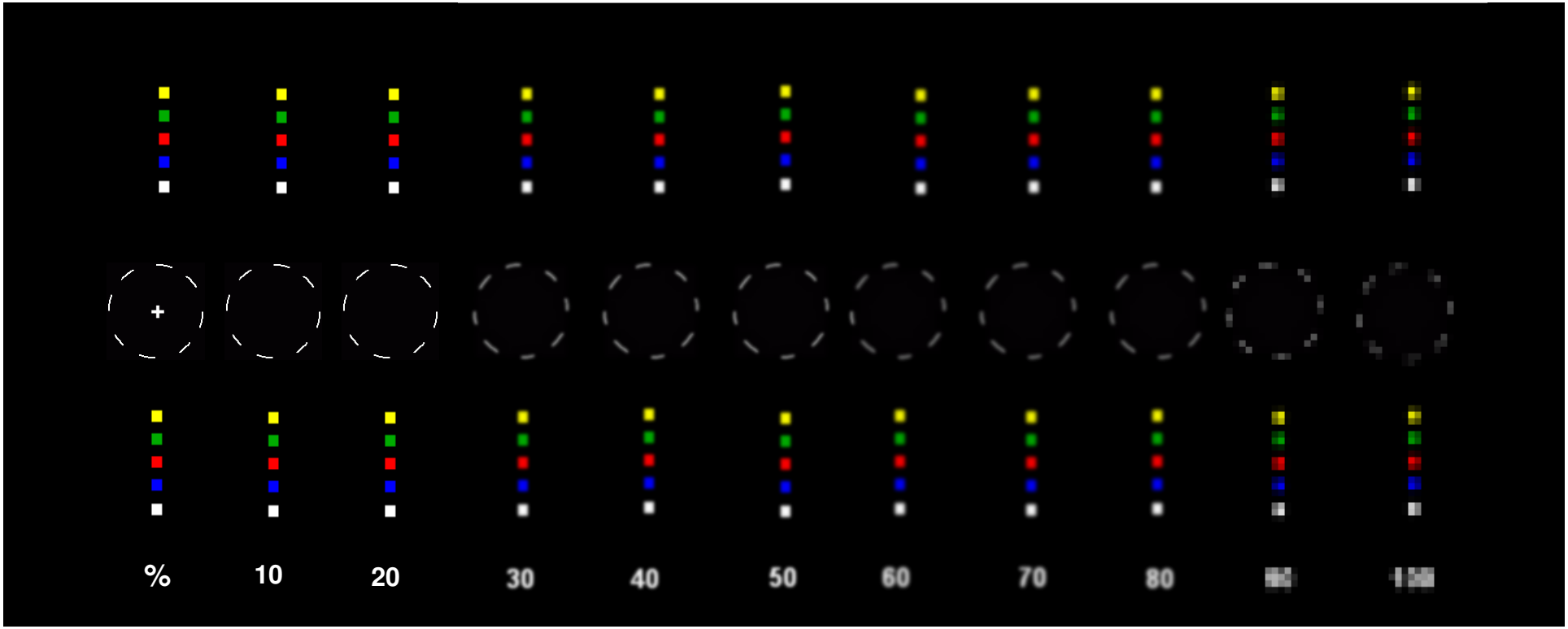
Allan's view with Single Vision Lenses



Focus on Circle 0 (zero), and then MOVE ONLY YOUR EYE(S) to note which circles appear to be out of focus.
Each number represents 2 arc degrees when viewed at 28 inches on a 19" monitor.

Allan's view with Single Vision Lenses

"Rotating Segmented Circles"

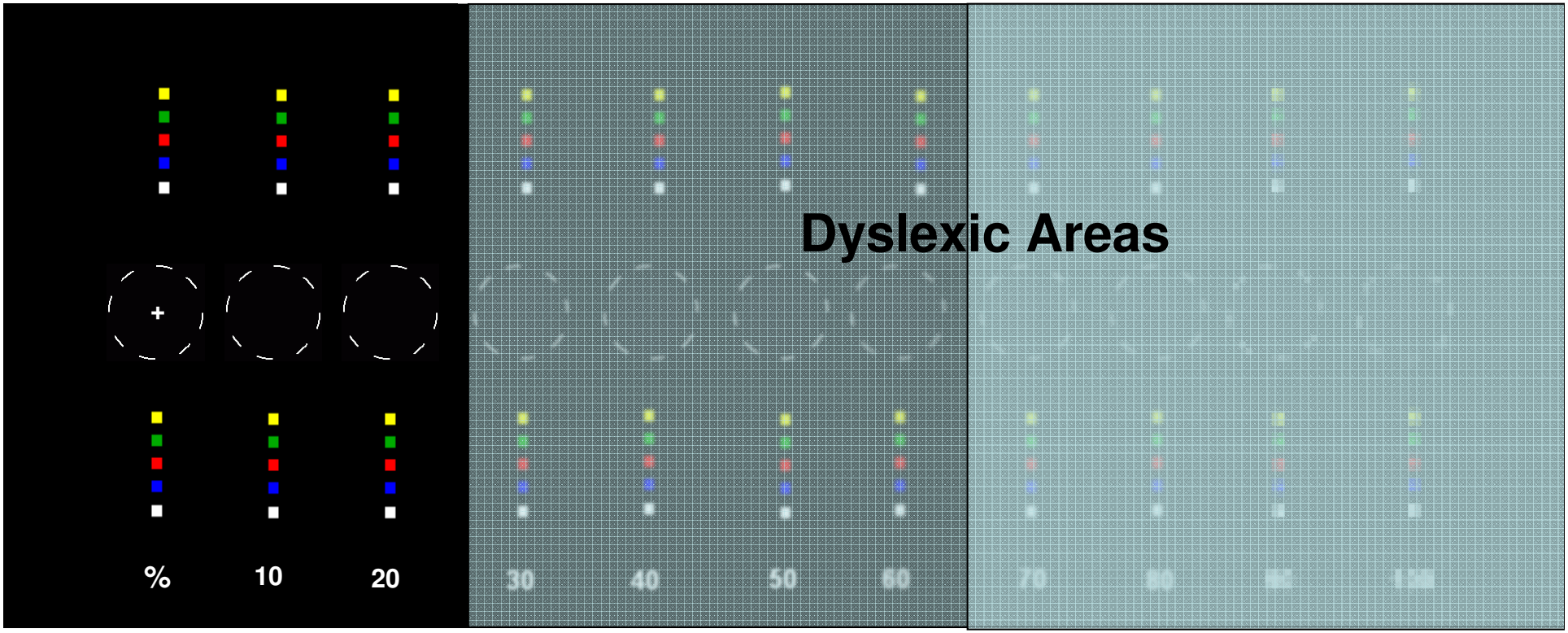


As you MOVE ONLY YOUR EYE(S) the dyslexic areas become blurry with color distortion

How big should the "Rotating Segmented Circles" be?

Allan's view with Single Vision Lenses

"Rotating Segmented Circles"

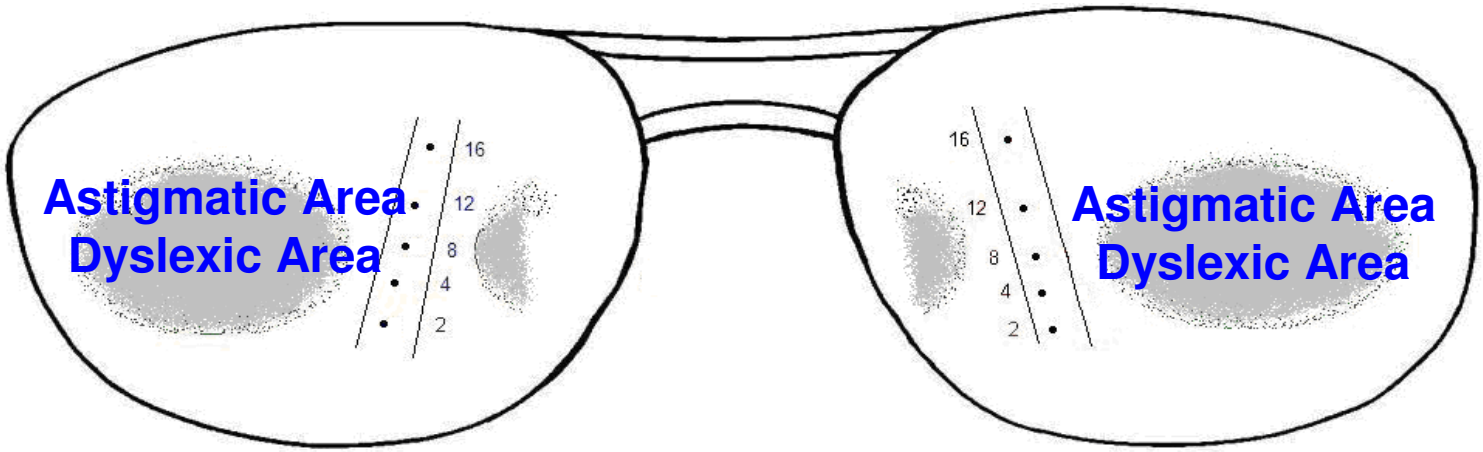


As you MOVE ONLY YOUR EYE(S) the dyslexic areas become blurry with color distortion

How big should the "Rotating Segmented Circles" be?

Allan's Problem

Inherent Dyslexic Vision Loss



Dyslexic Areas caused blurry and distorted vision and almost four years of functional blindness

Allan's Problem

Allan's view with Progressive Lenses
Peripheral color distortion reduces comprehension

Left ←

Normal colors

→ Right

Dyslexic Area

Astigmatic color shift

Dyslexic Area

Astigmatic color shift

Dyops™

Dynamic Optotypes™

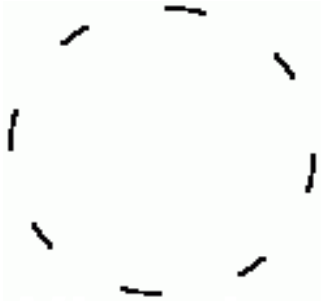
How big should the "Rotating Segmented Circles" be?

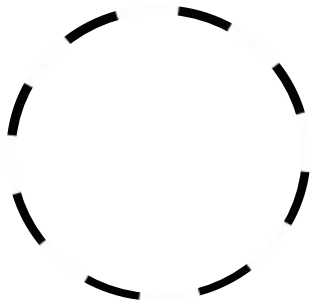
You either see the rotational motion at that distance,
or you don't.

What is a Dyop™?

Dyop ™ = dynamic optotype

Dyop™ color = White vs. Black
Dyop™ background = Black vs. White
Dyop™ stroke width = 2.5 % sw to 20% sw?
Dyop™ sectors = 2 sectors to 16 sectors?
Dyop™ 20/20 diameter = 12 mm to 16 mm
Dyop™ shape = dots vs. segments vs. triangles?

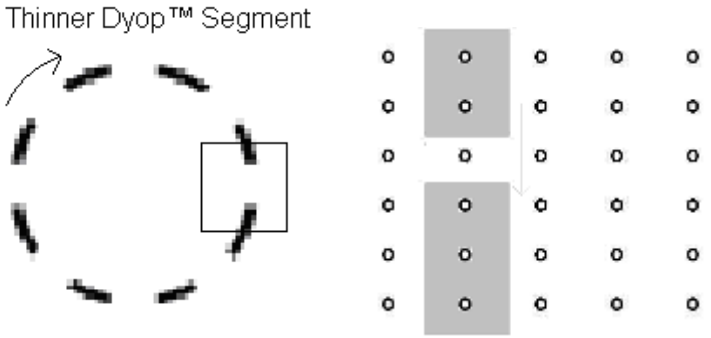




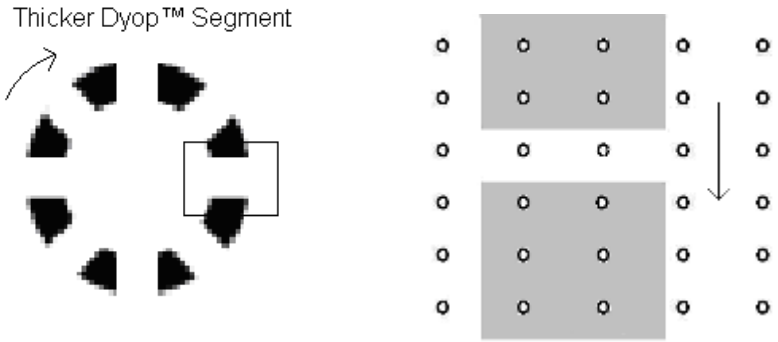
Dyops™ - Pixels in the Eye

Allan's Theory

Dyop ™ stroke width versus photoreceptor stimulus path



Thinner Dyop™ = thinner segment photoreceptor stimulus



Thicker Dyop™ = thicker segment photoreceptor stimulus

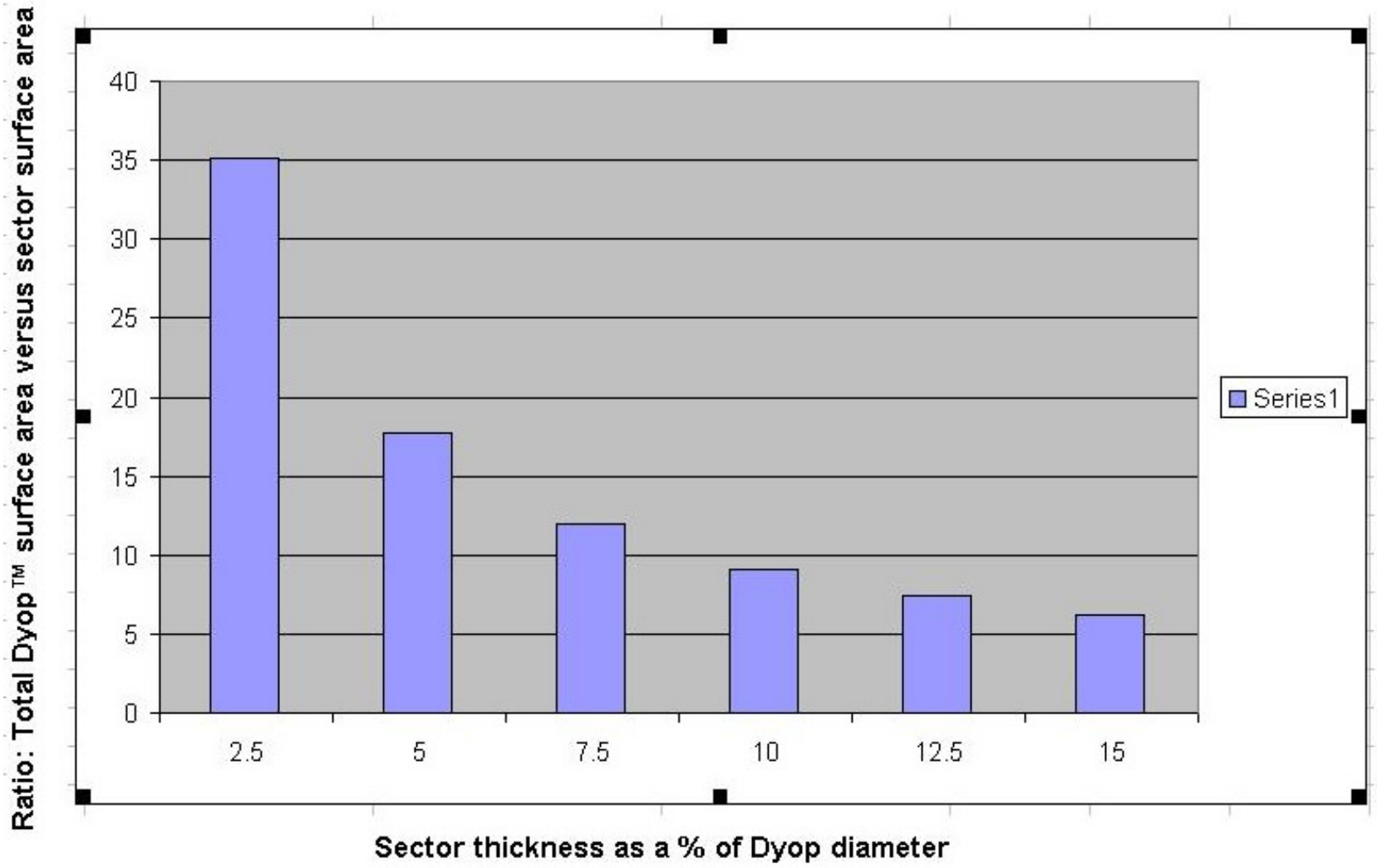
What is a Dyop™?

Dyop ™ stroke width versus Perception Distance

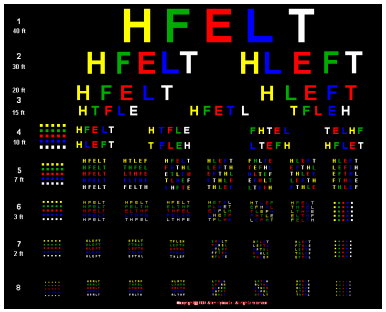
Dyop™ Threshold Image versus Perception Distance as of 2009-10-27
Stroke widths (& gap widths) of 2.5%, 3.75%, and 5%
8 segments per Dyops™ with 22.5 degree gap height @ 40 rpm
White segments on a Black Background

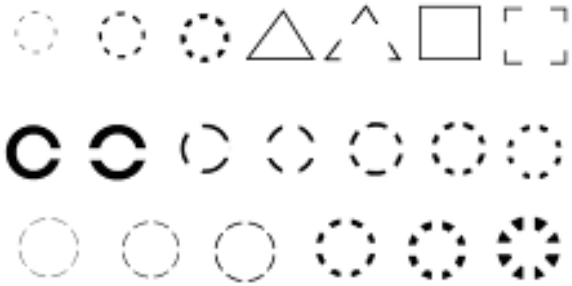
Threshold Image diameter	Perception Distance 2.5% stroke width	Perception Distance 3.75% stroke width	Perception Distance 5% stroke width
mm (* see Note)	PD - feet*	PD - feet*	PD - feet*
18	24	25	26
17.25	23	24	25
16.5	22	23	24
15.75	21	22	23
15	**20**	21	22
14.25	19	**20**	21
13.5	19	19	**20**
12.9375	18	18	20
12.375	17	17	19
11.8125	16	16	18

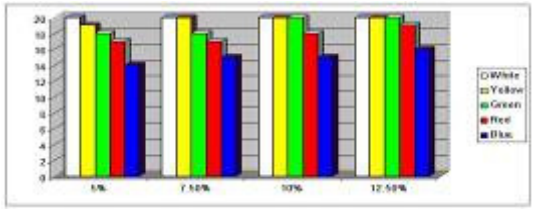
Optimum Dyop™ Stroke Width

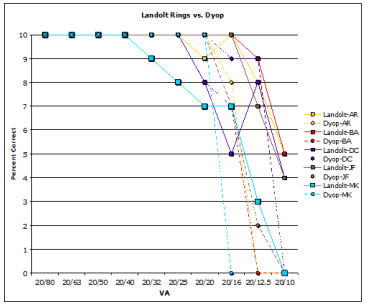


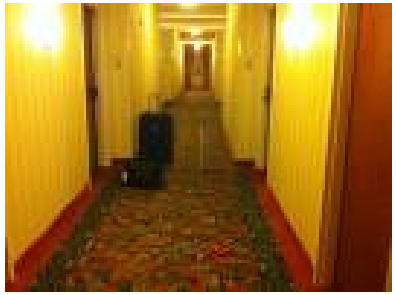
12,000 Hours Later…



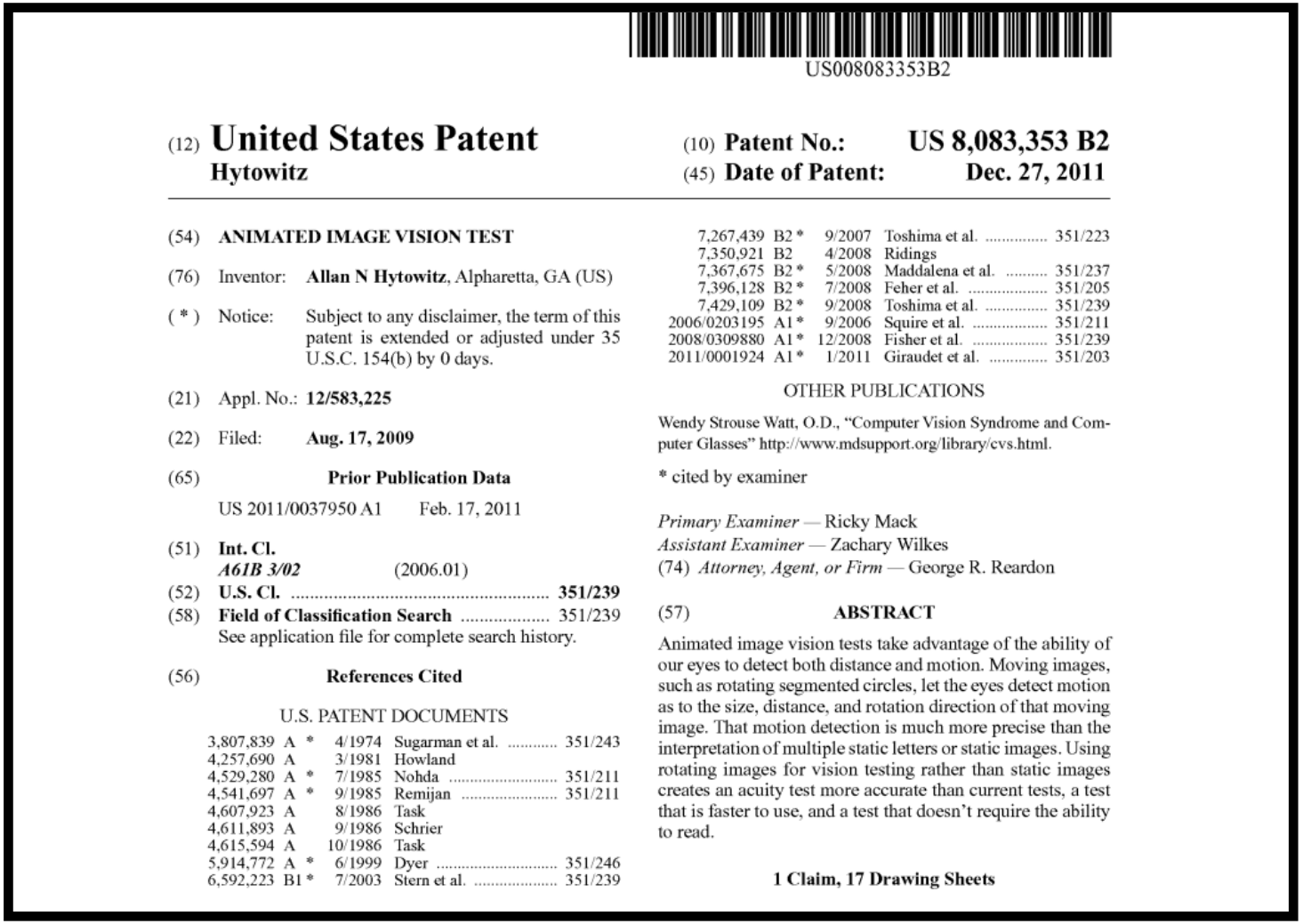








The Vision Revolution



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(12) **United States Patent**
Hytowitz

(10) **Patent No.: US 8,083,353 B2**
(45) **Date of Patent: Dec. 27, 2011**

(54) **ANIMATED IMAGE VISION TEST**

(76) Inventor: **Allan N Hytowitz**, Alpharetta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: **Aug. 17, 2009**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
A61B 3/02 (2006.01)

(52) **U.S. Cl.** **351/239**

(58) **Field of Classification Search** 351/239
See application file for complete search history.

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Primary Examiner — Ricky Mack
Assistant Examiner — Zachary Wilkes
(74) *Attorney, Agent, or Firm* — George R. Reardon

(57) **ABSTRACT**

Animated image vision tests take advantage of the ability of our eyes to detect both distance and motion. Moving images, such as rotating segmented circles, let the eyes detect motion as to the size, distance, and rotation direction of that moving image. That motion detection is much more precise than the interpretation of multiple static letters or static images. Using rotating images for vision testing rather than static images creates an acuity test more accurate than current tests, a test that is faster to use, and a test that doesn't require the ability to read.

1 Claim, 17 Drawing Sheets