

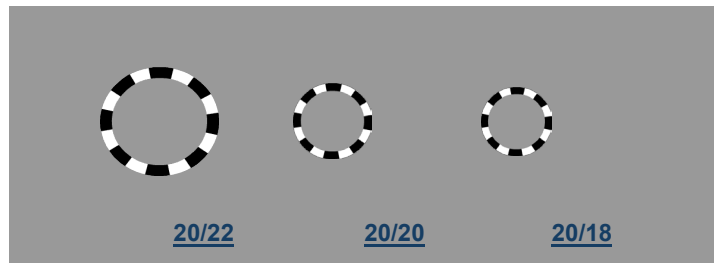
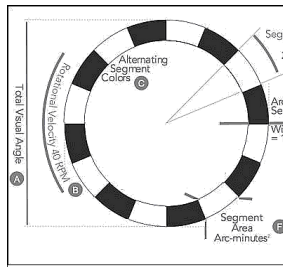
The Mechanics of Vision

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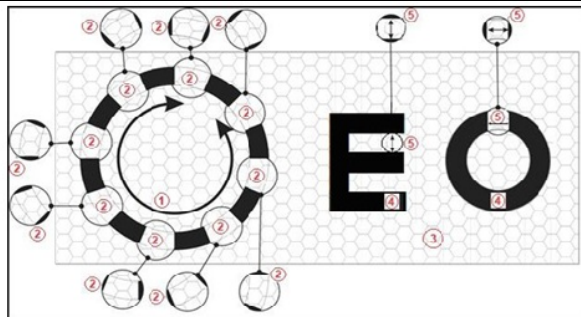
Vision is an autonomic and dynamic process inherent in all animals because the world we see is dynamic, rather than static. Our eyes are **biological machines** which help us survive by enabling us to **automatically detect motion, distance, and colors** so that we can see predators and food and eat rather than be eaten. Inherent in vision is the pattern recognition process which allows animals to find patterns of meaning as to what we see. By vision being autonomic most of us don't have to think about the images we see properly being in focus. Ironically, the greater disparity between what we see and what we think we see creates a sense of authoritarianism and a sense of excess confidence.

Visual acuity is the term used to describe the **clarity of what we see**. A **refraction** is the process of **using special lenses** to measure the **optical variables of sphere, cylinder, and axis** which go into creating eyeglasses and contact lenses and compensate for "less than perfect" vision. "Traditional vision tests" use **static letters or symbols** as standard targets for measuring vision [2]. The **flaws in static measurement systems** are that they typically measure only **two dimensions** using the **height** of the visual target and the **viewing distance to that target**, and that they typically require culturally dependent cognition (called **Recognition Acuity**) as the "visibility" threshold. Instead, the **world we see** is a **fifth dimensional process** consisting of **height, width, colors, distance, and time** (using **Resolution Acuity**) as the variables.

A **Dyop®** (pronounced "di-op" and short for a special type of **dynamic optotype**) is a **dynamic strobic stimulus (DSS)** using a segmented spinning ring as a visual target (aka, optotype) to **help doctors (and you) test the clarity of your vision**. [3] A **Dyop** provides that **dynamic strobic stimulus** to the **photoreceptors in the central rear area of the retinal** of your eye called the **fovea**. The smallest angular diameter of a **Dyop** which can be detected as spinning is the **acuity endpoint**. When a Dyop becomes sufficiently small as to its angular diameter, the contrasting gaps and segments become too small to be detected as spinning and the Dyop has a **sub-acuity diameter**. Comparative refractions have documented that a **Dyop is up to six times more precise than Snellen testing, up to eight times more consistent, and up to three times more as efficient for acuity and refraction measurement** [4]. The lack of the need for (letter-based) cognition, also allows Dyop testing to measure acuity in infants as young as 14 weeks of age [5]. However, comparative Snellen refractions also consistently show an excess of approximately -0.50 diopters of **minus power** compared to **Dyop** refractions [6]. Dyop color permutations can also measure **acuity in color** as a diagnostic and as a potential for therapy for symptoms of dyslexia, migraines, epilepsy, and pre-emergent glaucoma [7]. This systematic overminus with Snellen/Sloan likely contributes to visual fatigue, reduced comfort, diminished literacy outcomes, and the **Global Epidemic of Myopia** [8].



1862 Snellen Vision Testing	Dyop Diagram	21st Century Dyop® Vision Testing
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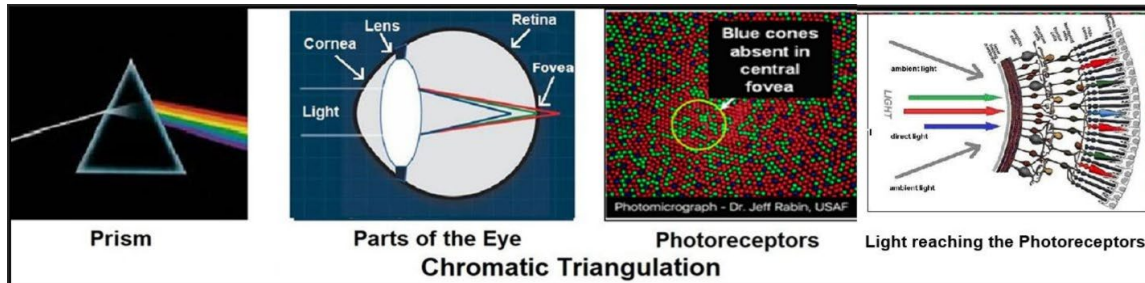
- Dyop Spinning Ring Components**
- Item 1** – the visual angular movement/velocity for the strobic contrast response for **Resonance Acuity**
 - Item 2** – a moving segmented **Minimum angle/arc/Area of Resolution (MAR)** for dynamically stimulating retina cells with motion
 - Item 3** – retinal cell clusters
 - Item 4** – examples of static historic optotypes – **Recognition Acuity** and **Resolution Acuity**
 - Item 5** – the static **Minimum angle/arc/Area of Resolution (MAR)** of a historic optotype

Chromatic Triangulation and Acuity Mechanics

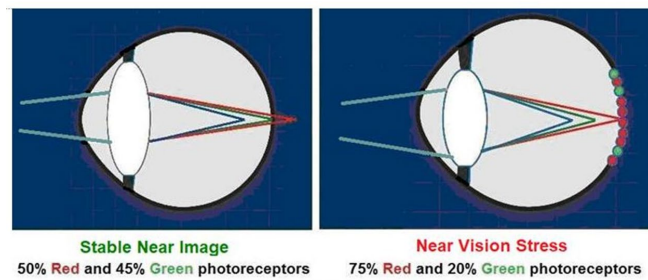
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Acuity is NOT regulated by the brain but rather is regulated using **Chromatic Triangulation** of the **Red, Green,** and **Blue** color sensitive photoreceptors in the fovea (rear area) of the retina. As light passes through the cornea and lens of the eye, it is bent so that the focal depths of **Blue** is in **FRONT** of the retina, **Green** is **ON** the retina, and **Red** is focused **BEHIND** the retina. As the biological lens changes its shape, the focal depths of those three colors move forward and backward in relation to the retina and the signal to the lens changes the shape of the lens to keep green focused on the retina.

A simple experiment to demonstrate the retina control of focus is to close one eye and look around the room where you are now. You will notice that with only one eye open you can **still determine the relative distance to nearby objects without the need for binocular vision** due to **Chromatic Triangulation** documenting that acuity is NOT regulated by the brain.



If you wear glasses, **a simple test to verify that your lenses are too strong** (with too much minus power IF you wear glasses), is to push your glasses about a half inch away from your face and see if the words you are reading become larger and more legible. If you notice that the words get more legible, that **Snellen-induced excess minus power** of your glasses is typically about **0.25 to 0.50 diopters**. While it isn't much, it likely reduces your cognition and possibly your IQ by 10 points.



You can verify the hyper-stimulus visual effect of your computer monitor and the emitted white light of computerized Snellen (letter-based) testing by briefly staring at a white light bulb and then closing your eyes. With your eyes closed you should notice a white stimulus ring for an additional ten seconds from the depleted photoreceptor response. The similar **hyper-stimulus of the computer-generated WHITE background for Snellen** and other static vision tests is a **probable contributor to the visual damage (with an excess -0.50 diopters of sphere) done by using Snellen testing**. Snellen testing is a major factor in the **Global Epidemic of Myopia [8]** of the past forty years.

References

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