

The world we see is dynamic, rather than static. Our eyes are biological machines which enable us to detect motion, distance, and colors so that we can see predators and food and are able to eat rather than be eaten. Vision is a dynamic process inherent in all animals.

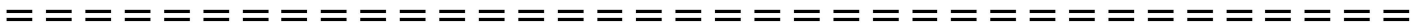
Visual acuity is the term used to describe the clarity of how well you see. A refraction is the process of using special lenses for measuring the optical variables of sphere, cylinder, and axis which go into creating eyeglasses and contact lenses. Previous vision tests such as the Snellen (“Big E”) test used static letters or symbols as the standard targets for measuring vision.

A Dyop® (pronounced “di-op”) is a calibrated segmented spinning ring visual target (aka, optotype) which helps doctors (and you) test how clear your vision is. A Dyop provides a strobic stimulus to the photoreceptors in the central rear area of the retina of your eye called the fovea. (See the illustration below). Dyop testing is better than static letter methods (the Snellen test) or static shapes because it is based on how your eyes work. Static measurement systems are two dimensional using the height of the visual target and the viewing distance to that target. However, the “real world” is a fifth dimensional process consisting of height, width, viewing distance, color, and time.

As a Dyop diameter gets smaller the alternating gaps and segments get proportionately smaller. When the spinning Dyop gaps get sufficiently small, the stimulus area of each gap is smaller than the minimum AREA to stimulate the color-receptive photoreceptors in the rear (fovea) area of the retina, which are clusters of about 20 color receptive photoreceptors. When the Dyop gaps become too small to stimulate a cluster of photoreceptors, the spinning of the Dyop ring is not detected because the receptor gap and segment stimulus tends to merge. That Dyop has a sub-acuity diameter. As the Dyop diameter is increased to have the gaps stimulate a minimum of 20 fovea photoreceptors, that minimum Dyop diameter where spinning IS detected is the Acuity endpoint. That minimum size threshold for detecting the gaps as spinning is the Minimum AREA of Resolution.

The result of using a Dyop for acuity and refractions is that a Dyop is up to three times more efficient than 1862 static Snellen letter-based tests (which use culturally dependent Recognition Acuity static letters or symbols), up to six times more precise, and up to eight times more consistent. A Dyop also can measure acuity regardless of the subjects’ literacy skills or culture, easily enables testing of children or infants, and enables measurement of acuity in color for potential diagnostic and/or therapeutic use.

Static vision tests (e.g., Snellen) are based on how well you recognize culturally dependent letters or symbols, and are influenced by where you are from, or how much you’ve practiced. Using a Dyop makes vision tests simpler, faster, more precise, and more consistent.



Sample Dyop Tests

Online Dyop Visual Acuity Test – Landscape format

https://www.dyop.net/documents/Dyop_acuity_screening.gif

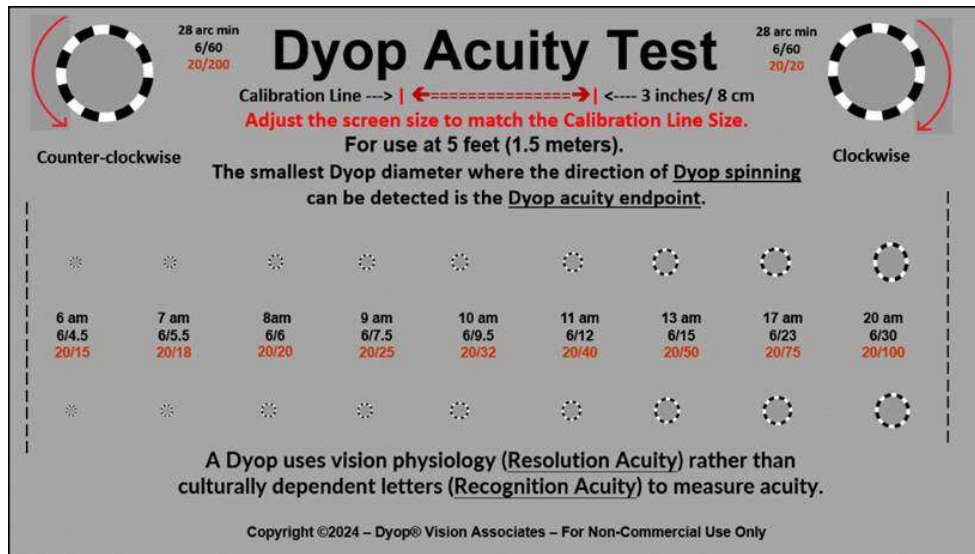
Open the acuity (visual clarity) test with the above link.

Note the smallest pair of Dyop rings you can detect as spinning.

View the spinning rings at a five-foot distance.

The center row of numbers between the smallest pair of rings you can detect as spinning rings is the measure of your acuity.

(Below is a static image of the Dyop online Acuity test.)

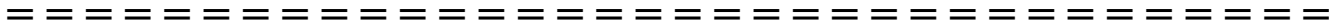


https://www.dyop.net/documents/Snellen_vs_Dyop_Refractions-Sanni.pdf

https://www.dyop.net/documents/ASOP-2022-01_Sanni-update.pdf

https://www.dyop.net/documents/JCOVS-21-Gordon_refraction_comparison.pdf

https://www.dyop.net/documents/Guy_Barnett-Itzhaki_The_Dynamic_Optotype.pdf



Online Dyop Color Screening Test - Landscape format

[Basic Dyop Blue Green Visual Screening Test](#)

Open the acuity (visual clarity) test with the above link.

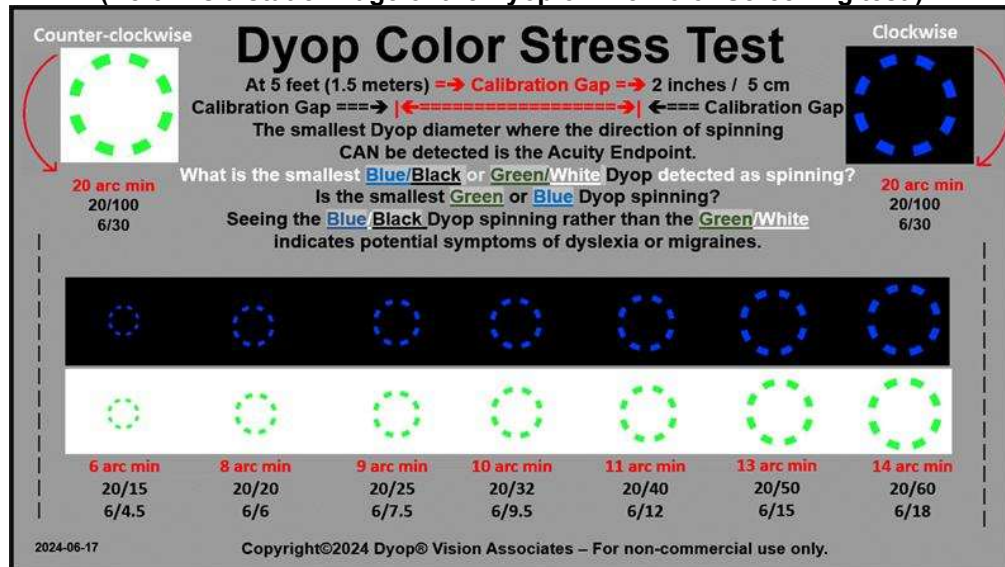
View the spinning rings at a five-foot distance.

The smallest colored Dyop ring (Blue/Black or Green/White) you can detect as spinning indicates your color acuity profile.

Preferentially seeing the Blue/Black rather than the Green/White indicates a probability (90%) of symptoms of dyslexia, migraines or epilepsy.

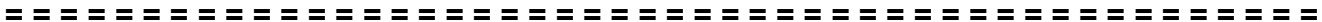
The center row of numbers between the smallest rings you can detect as spinning is the measure of your color acuity.

(Below is a static image of the Dyop online Color Screening test.)



https://www.dyop.net/documents/Dyslexia_and_Color_Perception-SandraStark.pdf

https://www.dyop.net/documents/ASOP-06-0651-Dyop_Color_Perception.pdf

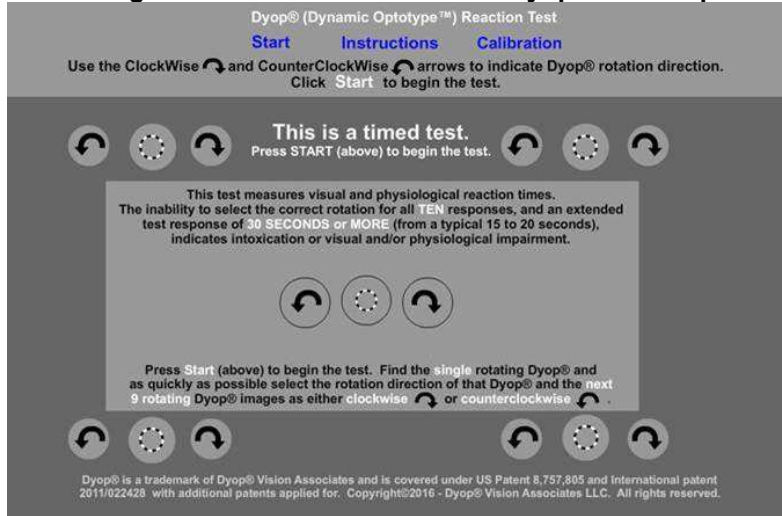


Dyop Visual-Impairment Test

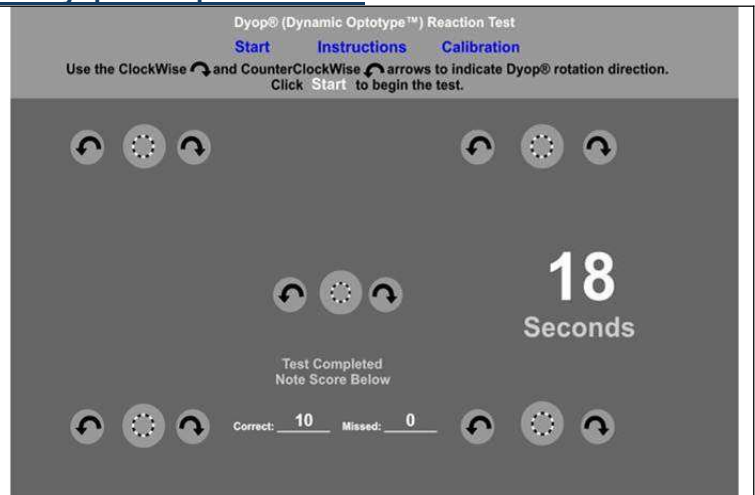
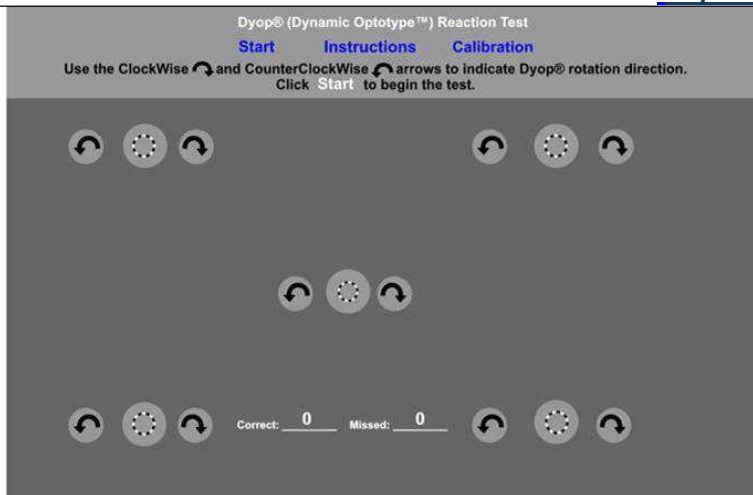
A Dyop may also be used to evaluate the mental impairment associated with marijuana intoxication, PTSD, concussion injuries, and possible mental difficulties such as Alzheimer's.
https://www.dyop.net/documents/Dyop_Visual-Impairment_Test-x10.swf.html

Use the link above to open the Dyop Visual-impairment test.

(Below is a static image of the initial screen for the Dyop Visual-Impairment Test.)



Note that THIS is a timed test. Click the word "Start" at the top of the test to begin.
 Additional details are at: <https://www.dyop.net/impairment.htm>



There are now FIVE Dyops on the screen but only ONE of them is spinning. Use a computer mouse to click the arrow adjacent to the spinning Dyop to indicate its spin direction.
 That Dyop will then stop spinning and ONE of the other FOUR Dyops will then start spinning. Click the arrow adjacent to that spinning Dyop to indicate its spin direction.

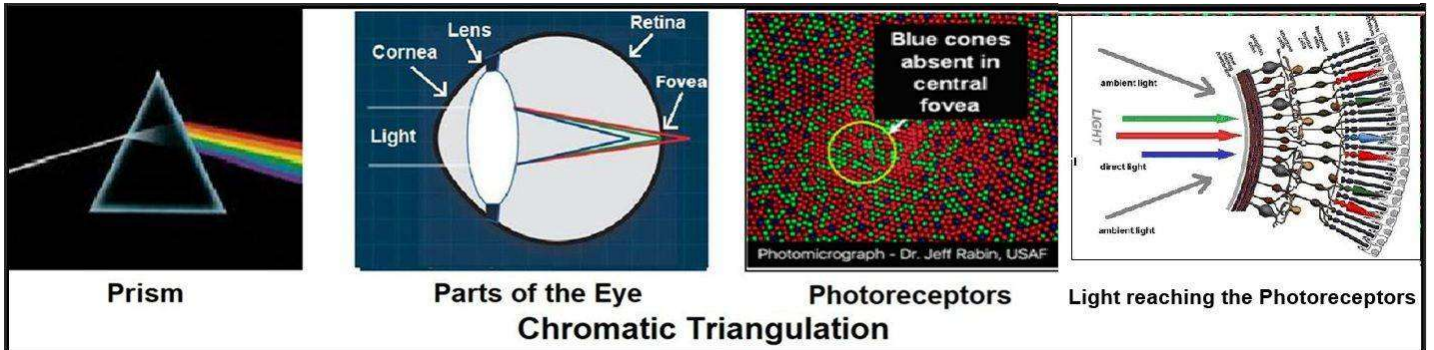
When you have found and detected all ten of the spinning Dyop test response trials, the screen will display the number of correct selections and the elapsed test time.
 A test completion time of 14 to 16 seconds with 10 correct responses indicates mental alertness.
 A test completion time of 21 to 26 seconds with less than 10 correct responses indicates minor mental impairment.
 A test completion time of 28 to 32 seconds with less than 8 correct responses indicates increased mental impairment.
 A test completion time of 35 to 40 seconds with less than 6 correct responses indicates significant mental impairment



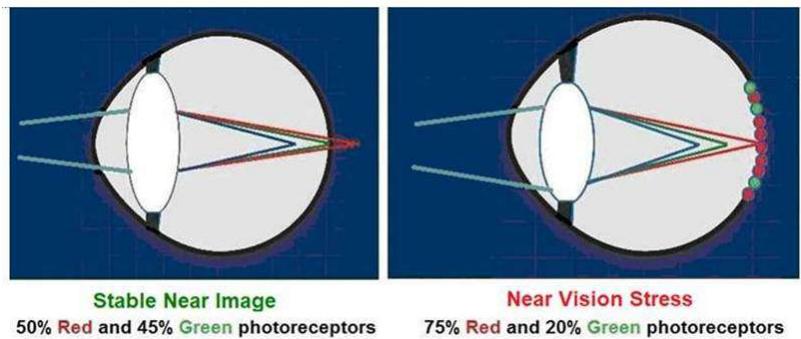
What Regulates Acuity

For vision to be effective and efficient, we need to be unaware of that process. Acuity is **NOT** regulated by the brain. As light goes through the **cornea and lens**, it is bent so that **Blue** is focused in **FRONT of the retina**, **Green** is focused **ON** the retina, and **Red** is focused **BEHIND** of the retina. Acuity is regulated by the relative focal depths and intensity of those colors as they are perceived by the fovea at the back of your eyes. Those color sensitive photoreceptors then send their signals forward to the layer of neuroganglia in front of the retina. That neuroganglia layer in turn then sends a signal to the lens to regulate the shape of the lens to bring that image into focus.

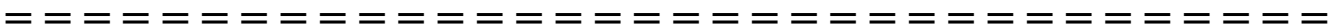
It is similar to the images you see on your **computer monitor, tablet, or Smartphone**, in that you **think** that you are seeing lines, shapes, letters, and/or words. **What you really are seeing are pixels of light moving rapidly across the surface of your computer screen, tablet, or Smartphone in combinations of Red, Green, and Blue.** This process of acuity regulation and accommodation is called **Chromatic Triangulation**.



Chromatic Triangulation is based on the concept of light that Isaac Newton discovered in 1665 when he filtered light through a prism. The stimulus of a **cluster of about 20 photoreceptors in the fovea** of the retina serves to regulate acuity.



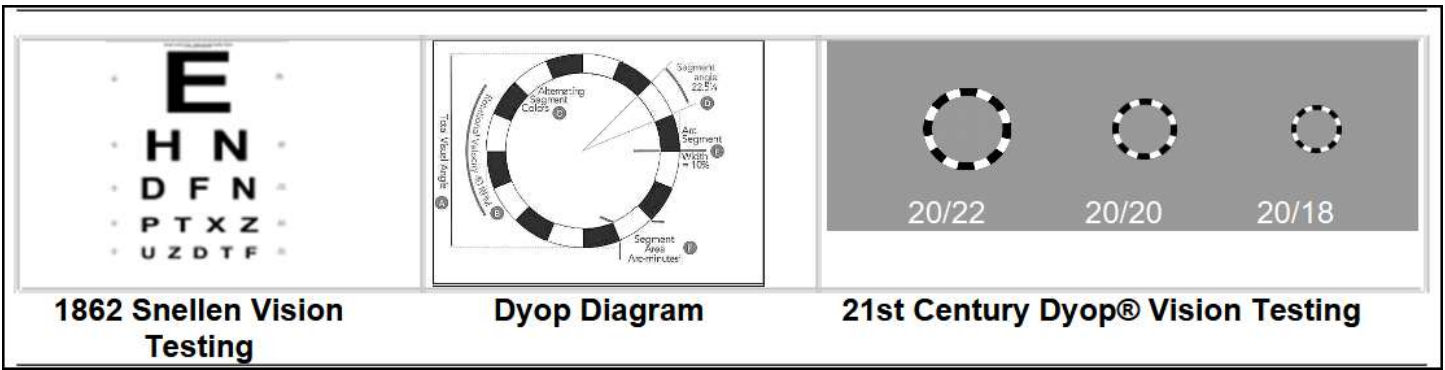
A simple experiment to demonstrate that acuity is regulated by the **Chromatic Triangulation of Red, Green, and Blue**, rather than by the brain, is to **close one eye and look around the room where you are now.** You will notice that with **only one eye open you can still determine the relative distance to nearby objects without the need for binocular vision.**



How Acuity is Measured

The properties of visual clarity (acuity) are the **SIZE OF THE IMAGE** being observed, the **VIEWING DISTANCE** to that image, and the ability of the visual system to **PROCESS THAT IMAGE** as clearly as possible (**Resolution Acuity**). As a **Dyop® spinning ring** gets smaller, the (equally sized) gaps and segments become so small that it becomes impossible for the eye to detect the direction of spin of the Dyop ring rotation.

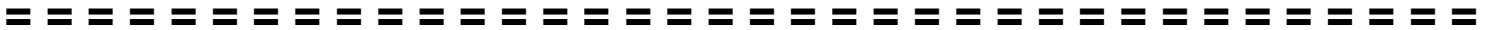
The **Dyop acuity endpoint** is the smallest **Dyop** diameter where the direction of rotation of the **Dyop spinning ring** can still be detected. It serves as a **precise indicator of visual clarity and vision correction.** A **Dyop test** can measure vision without the need for patient literacy, **measure vision in infants** as young as 14 months of age, and **let doctors** precisely measure vision in color **enabling potential diagnostics for symptoms of dyslexia and glaucoma.**



Static acuity tests (such as Snellen letters) are inherently imprecise, inconsistent based on measuring vision in only two dimensions: the height of the visual target and the viewing distance to that target. They mistake the process of visual cognition for visual resolution and have an overly large stimulus area (1.0 arc minutes squared) as the benchmark of vision rather than the empirically determined smaller Dyop stimulus gap area (0.54 arc minutes squared). Additionally, static vision tests such as Snellen deplete the dynamic response of the color receptive photoreceptors in the fovea and lack the Dyop uniform precision. The result is that static vision tests tend to add excess minus power to acuity and refractions, lead to angular elongation of the eye and increased myopia, and indicate that Snellen testing may be a factor in the Global Epidemic of Myopia.

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 does reduce your cognition and IQ by possibly 10 points.

A complimentary copy of the DYOP test for research is available for Eye Care Professionals interested in evaluating it. <https://chart2020.com/dyop-download-form>



The Dyop® (Dynamic Optotype™) tests and concept are covered under U.S. Patent US 8,083,353 and International Published Patent WO 2011/022428.

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