

# STILLING COLOR VISION TEST

Authored by  
**Mohammed looti**

October 21, 2025

## RECOMMENDED CITATION

Mohammed looti (2025). *STILLING COLOR VISION TEST*. Encyclopedia of psychology.  
Retrieved from <https://encyclopedia.arabpsychology.com/?p=15000>

## Stilling Color Vision Test

### Introduction: Core Definition and Purpose

The Stilling Color Vision Test is a specialized psychophysical tool designed for the thorough examination and quantitative assessment of an individual's ability to perceive color accurately. It functions primarily as a screening device to determine the presence and degree of Color Vision Deficiency, commonly known as color blindness or color weakness. Unlike simple pass/fail tests, the Stilling plates often aim to classify the specific type of deficiency (e.g., red-green weakness) and provide an indication of its severity, which is vital for clinical diagnosis and occupational screening purposes.

At its core, the test relies on a series of charts known as pseudoisochromatic charts. The term "pseudoisochromatic" is derived from Greek, meaning "falsely equal in color." These carefully constructed charts feature patterns, typically numbers or geometric shapes, embedded within a field of dots. The critical design element is that the dots composing the pattern and the dots composing the background are selected to be easily distinguishable by individuals with normal color vision, primarily through subtle differences in hue, but appear identical or nearly identical to those with specific color vision deficiencies due to shared spectral confusion lines.

The fundamental mechanism driving the Stilling test's effectiveness is the exploitation of color confusion. The dots used in the plates are meticulously chosen to possess dissimilar features in terms of hue (the pure color), intensity (brightness), and saturation (chroma or purity). For a person with typical trichromatic vision, the combination of these features allows the embedded figure to stand out clearly from the background field. However, in cases of anomalous trichromacy or dichromacy, the specific way the defective cone photopigments respond to light causes the figure and background colors to fall along the individual's 'confusion axis,' rendering the pattern invisible or extremely difficult to discern, thereby establishing the presence of the deficiency.

### Historical Development: Jakob Stilling's Contribution

The Stilling Color Vision Test was developed by the distinguished German ophthalmologist, Jakob Stilling (1842-1915). Stilling first introduced his set of pseudoisochromatic plates in the late 19th century, specifically in 1878. This period marked a crucial time for vision testing, driven largely by the increasing necessity for reliable and safe transportation, particularly the burgeoning railway industry. Accurate color perception was quickly recognized as a critical safety requirement for signalmen, locomotive engineers, and sailors, necessitating standardized testing tools that were objective and easily administered.

Before Stilling's work, color blindness testing often relied on subjective methods, such as asking subjects to name colors or matching colored wool strands (like the Holmgren test). While these

methods were foundational, they lacked the precision and standardization required for large-scale screening. Stilling's innovation lay in applying the nascent understanding of color theory and human perception to create structured, printed charts that did not rely on the subject's knowledge of color names, thus providing a more objective measure of the physiological deficiency itself.

Stilling's plates were among the earliest examples of standardized pseudoisochromatic tests, preceding the more widely known Ishihara test by several decades. His initial designs were groundbreaking because they systematically varied the luminance and saturation of the dots, ensuring that individuals who might try to cheat or deduce the pattern based on non-color cues (like brightness differences) would be foiled. The test has undergone several revisions and adaptations since its introduction, maintaining its relevance in the clinical setting due to its systematic approach to detecting various types of inherited color weakness.

## The Mechanism of Pseudoisochromatic Plates

The scientific effectiveness of the Stilling plates hinges on the principle that color vision deficiencies are often based on inherited defects in the retinal cone photopigments, which mediate color perception. Normal vision (trichromacy) relies on three types of cones (S, M, L) that are sensitive to short, medium, and long wavelengths of light. Deficiencies, such as Protanopia (L-cone defect) or Deuteranopia (M-cone defect), cause colors that appear distinct to normal observers to appear confused or identical to the deficient observer.

In the Stilling charts, the designer selects two specific colors--one for the figure and one for the background--that lie along a particular individual's color confusion line. For example, a plate designed to detect red-green deficiency might use a reddish color for the number and a greenish color for the background. To a normal viewer, the difference in hue makes the number pop out. To a protanope or deuteranope, however, these two hues stimulate their remaining cone systems in such a similar manner that the figure and background blend seamlessly into the same perceived neutral color, making the embedded pattern impossible to resolve.

The intricate design of the dots, varying not just in hue but also in size, brightness, and density, prevents compensation. If the dots forming the pattern were simply brighter or darker than the background dots, a color-blind individual could still perceive the pattern based on luminance contrast alone. By manipulating the intensity and saturation so that these factors are random or balanced across the figure and background, the Stilling test forces the subject to rely exclusively on hue discrimination, thereby isolating the color vision deficit. This careful balancing of non-chromatic cues is what makes the pseudoisochromatic method robust and reliable.

## Practical Example: Administering the Test

A practical, real-world scenario where the Stilling test is applied involves screening a prospective

pilot or train operator. Before the test begins, strict protocols must be followed to ensure validity. The examination must take place in a room with standardized, adequate illumination, ideally using daylight or a light source calibrated to simulate daylight (CIE Standard Illuminant C or D65), as the light source dramatically affects how colors are perceived. The subject is then positioned approximately 75 centimeters (30 inches) from the charts, which are held perpendicular to the line of sight.

The "how-to" application of the Stilling test involves presenting the series of plates sequentially. The plates are designed in various categories: transformation plates, vanishing plates, and diagnostic plates.

**Presentation:** The examiner opens the test booklet and presents the first plate, which usually contains a number easily visible to everyone (a demonstration plate) to ensure the subject understands the task.

**Reading Time:** The subject is instructed to identify and state the number or shape they perceive on the plate. They are typically given only a few seconds (e.g., three to five seconds) to respond. Limiting the time prevents the subject from exhaustively searching the plate and potentially deducing the pattern from non-chromatic artifacts.

**Recording Results:** The examiner records the subject's response immediately. For example, on a plate where a normal individual sees the number '74', a protanope might see '21', and a deuteranope might see nothing at all. The discrepancy between the expected normal response and the subject's stated response is the basis for diagnosis.

The key step in this process is the presentation of the "vanishing plates." These plates are constructed so that the pattern is visible only to the normal viewer and completely invisible to the color-deficient viewer. If the subject consistently fails to identify the patterns on these specific plates, it provides strong evidence of a color vision deficiency. Furthermore, the inclusion of diagnostic plates helps pinpoint the precise nature of the defect, differentiating between protanomaly, protanopia, deuteranomaly, and deuteranopia by using different confusing color pairs.

## Significance and Impact in Modern Psychology and Medicine

The Stilling Color Vision Test holds profound significance in both clinical ophthalmology and applied psychology, particularly in the realm of human factors and occupational screening. Its primary importance lies in its ability to quickly and reliably screen large populations for deficiencies that could pose significant safety risks. For instance, in fields where color coding is critical--such as electrical engineering, chemical handling, maritime navigation, or aviation--the identification of a severe deficiency is mandatory for job placement. The Stilling test provides a standardized metric

to inform these crucial hiring and licensing decisions.

Furthermore, in clinical settings, the test serves as an essential diagnostic tool. While most color vision deficiencies are inherited and static, acquired color deficiencies can sometimes signal underlying medical conditions, such as optic nerve damage, retinal disease, or exposure to certain toxins. Detecting the specific pattern of color confusion using tests like Stilling's can provide ophthalmologists with initial data pointing toward the etiology of the vision problem, thus guiding subsequent neurological or retinal investigations.

The lasting impact of the Stilling approach is evident in its methodological legacy. The concept of the pseudoisochromatic plate established the gold standard for rapid color screening, influencing the design of virtually every subsequent printed color vision test, including the globally accepted Ishihara charts. This methodology is simple, non-invasive, and requires minimal training to administer, ensuring its continued use even in low-resource environments where complex computerized testing systems are unavailable. Thus, Stilling's work provided the foundation for ensuring that individuals requiring precise color judgment can be reliably identified and protected from potentially dangerous occupational mismatches.

## Connections and Relations to Other Vision Screening Methods

The Stilling Color Vision Test belongs broadly to the subfield of **Sensory Psychology**, specifically within the domain of physiological optics and perception research. It is categorized alongside other screening tools that measure fundamental sensory capabilities. However, it is essential to understand its specific relationship to the other major color vision assessment methods, which fall into two primary categories: pseudoisochromatic plates and color arrangement tests.

The most closely related concept is the Ishihara test, which is structurally similar, relying on the same principles of pseudoisochromatic plates. While both tests utilize dots of varying characteristics to exploit confusion lines, the Stilling test is often noted for its slightly different palette selection and plate designs. Historically, the Stilling plates were particularly effective in diagnosing the severity of red-green deficiencies, especially protanopia and deutanopia, and remain a valuable alternative or complement when the results from the Ishihara plates are inconclusive or require confirmation.

In contrast to the rapid screening provided by pseudoisochromatic plates, tests like the Farnsworth-Munsell 100 Hue Test (or its shortened D-15 version) require the subject to physically arrange colored caps in order of hue progression. These arrangement tests provide a more detailed, quantitative measure of the severity and axis of the color defect, offering a precise mapping of the individual's confusion circle. While the Stilling test excels at initial diagnosis and rapid screening, the Farnsworth tests are preferred when a detailed quantification of the color defect is required for specialized research or clinical monitoring. Therefore, the Stilling test serves

as the foundational screening tool, quickly directing clinicians toward either a clean bill of health or the need for more complex, quantitative follow-up testing.

ARABPSYCHOLOGY.COM