

# Stephen Auger

## Twilight Array Installation

Much has been written about the aesthetic beauty of twilight color as it is expressed in art and nature, but less is known about our capacity to perceive these colors. Since the 1970's I have been immersed in a search to expand the sensory experience of color. *The Twilight Array* consists of paintings and specialized lights that explore the outer limits of color perception, especially the elusive, resonant and mysterious realms of twilight. As Paul Klee noted, "Art does not reproduce the visible; it makes things visible."

*The Twilight Array* is my most advanced exploration into this phenomenon. I am working on the project with the guidance and research of neuroscientist Dr. Margaret Livingstone at Harvard University, Dr. Benjamin Smarr at UC Berkeley and a team of advanced illumination technologists.

*The Twilight Array* consists of ten 32" square chromatic paintings placed in a curved array, which engages the entire visual field of perception. Each painting is composed of hundreds of thousands of particles that emit, reflect or radiate wavelengths of light specific to the sensitivity of mesopic (low light) vision. The paintings will be installed collectively or in suites of 5 in an environment illuminated with advanced lighting technology developed specifically for this installation, which engage the "circadian response" by emulating both the specific color frequency curves and movement of light at dawn and dusk. The installation immerses the viewer in an environment, which engages a myriad of perceptual responses unique to twilight. This installation will therefore engage the viewers' vision so that twilight perception is not a fleeting sensation but a sustained experience.

The results of this collaboration unite art, science and technology into an evocative experience of color sensation. Beyond evoking the rare and alluring beauty found in twilight color, *The Twilight Array* creates an unprecedented opportunity for viewers to discover whether they are among a special group of people possessing an additional color receptor. Scientifically and artistically, *The Twilight Array* explores an uncharted realm where art can inform science and science can become art.

Although we can identify and communicate different colors and color changes, our true perception of color is guided by unique psychological, physiological and environmental factors. No two people actually "see" the same color. Color, ultimately, exists only in the mind of the person viewing it. With this awareness, *The Twilight Array* explores this personal experience of color. For some viewers, the installations may even provoke an encounter with "extraordinary" colors—colors whose existence has only recently been confirmed by researchers and which remain unnamed.

Color is created when your retina, a light-sensitive layer at the back of your eye, absorbs light. Light-sensitive cells in the retina, called cones and rods, then transform light into signals that are carried into your brain by your optic nerve. A small spot in the center of your retina, called the fovea, is responsible for sharp central vision. This spot is needed for any visual activity, such as reading and driving, when detail is crucial. Your fovea also contains the cone cells responsible

for color vision. There are three types of cone cells. Each type is sensitive to a different range of color. They work best in relatively bright light whereas rod cells, located throughout the rest of the retina, work better in dim light. Twilight is almost entirely perceived by rod cells. There are approximately 125 million rod cells in the human retina, compared to 6 to 7 million cone cells. Rod cells are approximately a hundred times more sensitive to light than other optical cells. During twilight and night, rod cells are responsible for sensing and perceiving light and motion. These cells are arranged concentrically around the fovea and specialize in perceiving the edges of your visual field. When you gaze into the sky at night and see a star out of the corner of your eye, you might notice it disappear if you look at it directly. This mystery occurs because flickering of this subtle starlight can only be perceived by your peripheral vision. Rod cells, the cells that enable you to experience the wonder of that starlight, are the cells engaged by *The Twilight Array*.

*The Twilight Array* stimulates mesopic vision, which uniquely engages the rod and cone cells and enables some viewers to discover their ability to experience a greater color-spectrum than other people. Vision researchers are currently exploring the possibility that some people possess four, not three, types of cone cells. Thanks to these additional cells, these people may experience a range of colors invisible to the rest of the population. Whereas the average person sees approximately 10 million colors, a person with an additional cone can perceive 100 million colors, many of which remain unnamed and impossible to describe. In addition, these cells contribute, like rod cells, to low-light vision. Because color perception is a subjective experience, people with this variation have no way of knowing whether they see beyond assumed limits of human vision.

People with this expanded perception posses the ability to experience subtleties of color beyond the norm. This capability distinguishes four-cone vision from three-cone vision. Although perceptual differences may occur throughout the spectrum, they are most noticeable in low light. The paintings in *The Twilight Array* include elements that emit color frequencies beyond the normal color spectrum of color into the near ultraviolet and near infrared. Viewers who respond to these elements in specific paintings can explore the possibility that they posses this expanded color vision. Because this is an exciting new territory for both science and art, we cannot definitively predict what these viewers will see however *The Twilight Array* is an art exhibition that promises the possibility of significant discovery.

While some viewers may have dramatic experiences of perception, *The Twilight Array* will enrich all viewers' understanding of color and light. *Twilight's Array* viewers will have the opportunity to experience *sensing* as a distinct mode of perception. Because some viewers may experience unnamed colors, *The Twilight Array* raises our awareness of the limitation of language to express the experience of color sensation. In addition to widening our understanding of vision, *The Twilight Array* pushes the boundaries of our expectations of painting and stimulates a fresh dialogue about relationships between art and neuroscience.