Non-Provisional Patent Application # 14597157

USING SPATIAL-CHROMATIC COMPARISON FOR REGULATING VISUAL FOCUS

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ABSTRACT OF THE DISCLOSURE:

The chromatic separation of the frequencies of light inherent in the refraction of a lens of an optical system can be used by a receptors responding to various frequencies of that light to compare the color stimulus and intensity at those frequencies, and in turn use that disparate response to modulate the refraction of the lens to focus an image. This disparate response allows the optical receptors to use chromatic triangulation to modulate the lens focal length.

REFERENCES CITED:

Multi-focal optical lenses, Hsiao-Ching Tung, WO2013101793 A1, Jul 4, 2013

Fixed focal length optical lens architecture providing a customized depth of focus optical system, Kai Engelhardt, Pavel Reshidko, Ephraim Goldenberg, Gal Shabtay, US8559118 B2, Oct 15, 2013

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

Not Applicable

BACKGROUND:

The eye as an optical system is a primary organ of the body for determining location and orientation. The primary components within the eye for responding to that stimulus of light are the photoreceptors. Rod photoreceptors are primarily responsive to the intensity of light. Cone photoreceptors are primarily sensitive to specific frequency ranges of light such as red (L-long), green (M-medium), and blue (S-short). Red (L) photoreceptors tend to have a primary sensitivity to light from 440 nm up to 680 nm with a peak at 564 nm. Green (M) photoreceptors tend to have a primary sensitivity to light from 440 nm up to 640 nm with a peak at 534 nm. Blue (S) photoreceptors tend to have a primary sensitivity to light from 360 nm up to 500 nm with a peak at 420 nm.

As light passes through the lens of the eye, its focus is modulated by the stress of the muscles and cilia attached to it. That focal process also has a chromatic effect inherent in lenses due to frequencies of light being refracted (bent) by the lens at different angles reflective of, and proportional to, that optical frequency. That chromatic refraction not only results in the focus of light, but also results in those frequencies being focused at different sequential depths within the retina based upon that wavelength frequency. With a convex-type lens such as what is typically found in the eye, Blue (S) light is focused at a shorter distance than green (M) light which is focused on a shorter distance than red (L) light.

The current perspective of the primary functioning of the cone photoreceptor response to those frequencies of light is to enable vision in color. What is also occurring as those photoreceptors are responding to those frequencies of light is chromatic triangulation in which the intensity of the light is chromatically separated into its red (L), green (M), and blue (S) components with different focal depths and intensities as the while the red (L), green (M), and blue (S) photoreceptors are responding to that stimulus at an identical distance. As a result, the almost identical image that was transmitted to the lens is perceived by the red (L), green (M), and blue (S) with disparate intensities. The disparate intensity of the perception of that almost identical image facilitates the muscular stress on the lens to regulate its focus of light on the retina.

APPLICATION:

A biological lens tends to be an ovoid (convex) shape whose diameter and thickness are modulated by muscular stress of an eye such that the varying angle and depth of that lens results in acuity and refractive modulation. That chromatic refraction results in the perceived red (Long wave length), green (Medium wave length), and blue (Short wave length) light being focused at different focal lengths and different intensities on the retina.

In a mechanical system, the disparate intensity of different wavelengths of light at approximately the same focal distance for the same image can be used to calibrate the adjustment of the focal length and its adjustment of the lens. Mechanical lenses typically accomplish the same function by adjusting the distance of the lens from the target surface to physically adjust the focal length. (Figure 1.)

Because lenses take identical images, and not only focus the images but chromatically modulate the focus of the image to create varying intensities of perceived red and green and blue, an array of chromatic sensors with disparate perception of visual frequencies of light can compare the intensity of the identical image shape and use that comparison to adjust the focal length of the lens either physically with a symmetrical lens by actually adjusting the image physical focal length, or virtually adjusting the image focal length with an asymmetrical lens by adjusting the focal properties of the iris area of the lens that is targeting the chromatic array.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DIAGRAMS:

FIG 1: Typical Lens types

Item 1 - Double convex lens

Item 2 - Plano convex lens

Item 3 - Double concave lens

Item 4 - Plano concave lens

Item 5 - Meniscus lens

Item 6 - Rays of light

FIG 2: visual photoreceptor response

Item 1 - S – blue photoreceptor range

Item 2 - M – Green photoreceptor range

Item 2 - L – Red photoreceptor range

FIG 3: Chromatic focal regulation for a biological eye

Item 1 - Rays of light

Item 2 – Lens of the eye

Item 3 – Chromatic separation of light intensity on the retina with red at the furthest focal length behind the retina, green focused on the retina, and blue in front of the retina with a convex lens.

Item 4 – Fovea location for chromatic sensitive photoreceptors.

Item 5 – S – Blue – short wavelength of light

Item 6 – M – Green - medium wavelength of light

Item 7 – L – Red - long wavelength of light

Item 8 – Layers of neural ganglia for signal processing

Item 9 – Array of S-M-L photoreceptors

FIG 4: Schematic for chromatic focal regulation in a non-biological eye

Item 1 - Rays of light

Item 2 – Adjustable lens

Item 3 – Chromatic separation of light intensity on the sensor array with red at the furthest focal length behind the array, green focused on the array, and blue in front of the array with a convex lens.

Item 4 – Array of chromatic sensors

Item 5 – Aperture view port

Item 6 – Short wavelength of light

Item 7 – Medium wavelength of light

Item 8 – Long wavelength of light

Item 9 – Short focal wavelength sensor in an array

Item 10 – Medium focal wavelength sensor in an array

Item 11 – Long focal wavelength sensor in an array

CLAIMS:

We claim that the disparate chromatic perception of the intensity of light for the same image transmitted by a refraction lens can be used to adjust the focal length of that lens in an optical system.

DRAWINGS:

FIG 1:

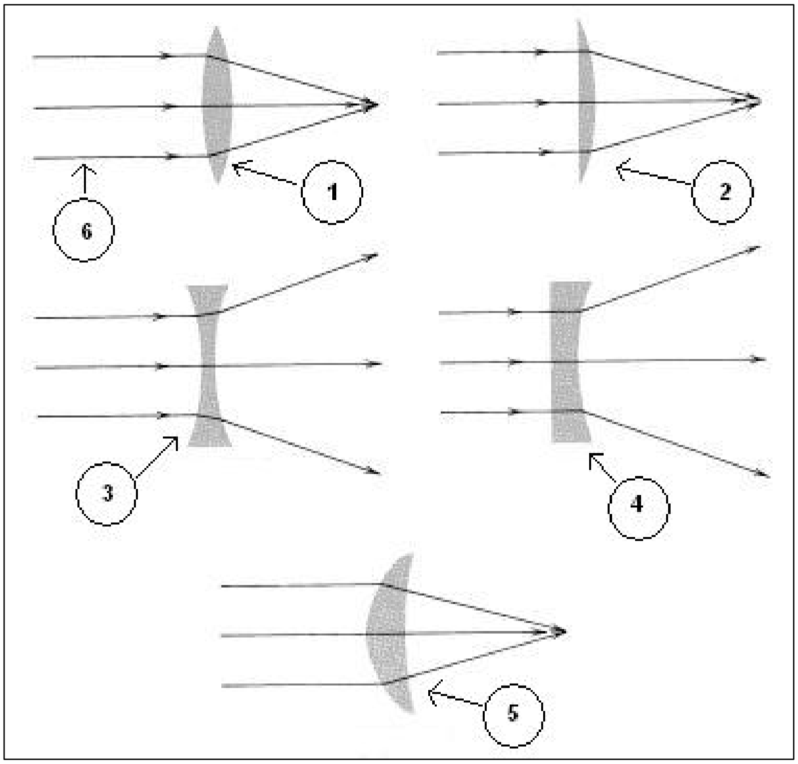

FIG 2:

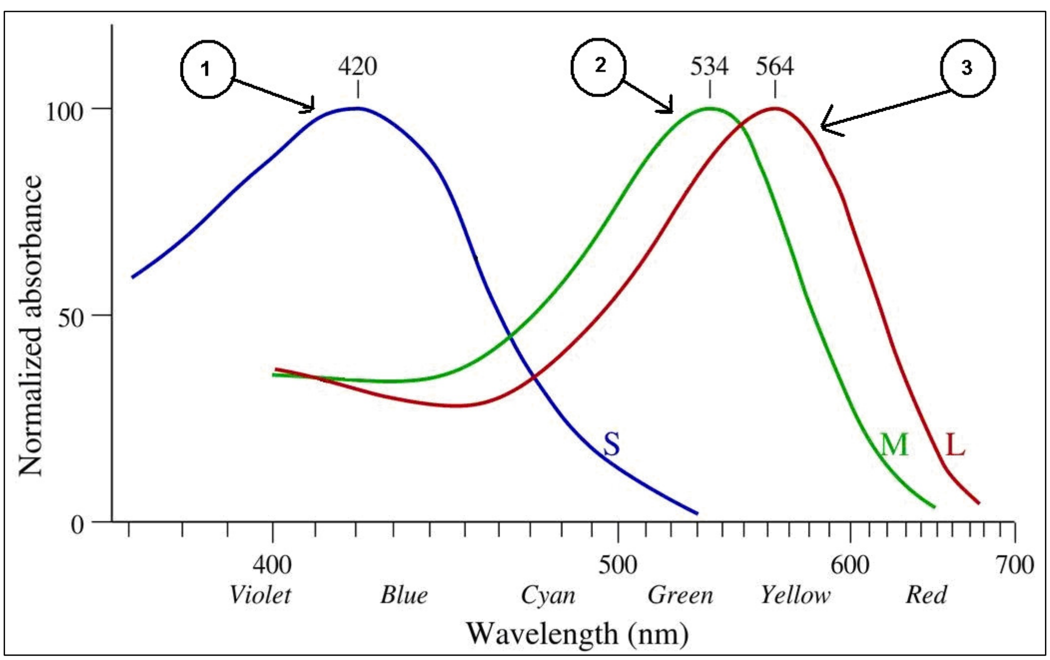

FIG 3:

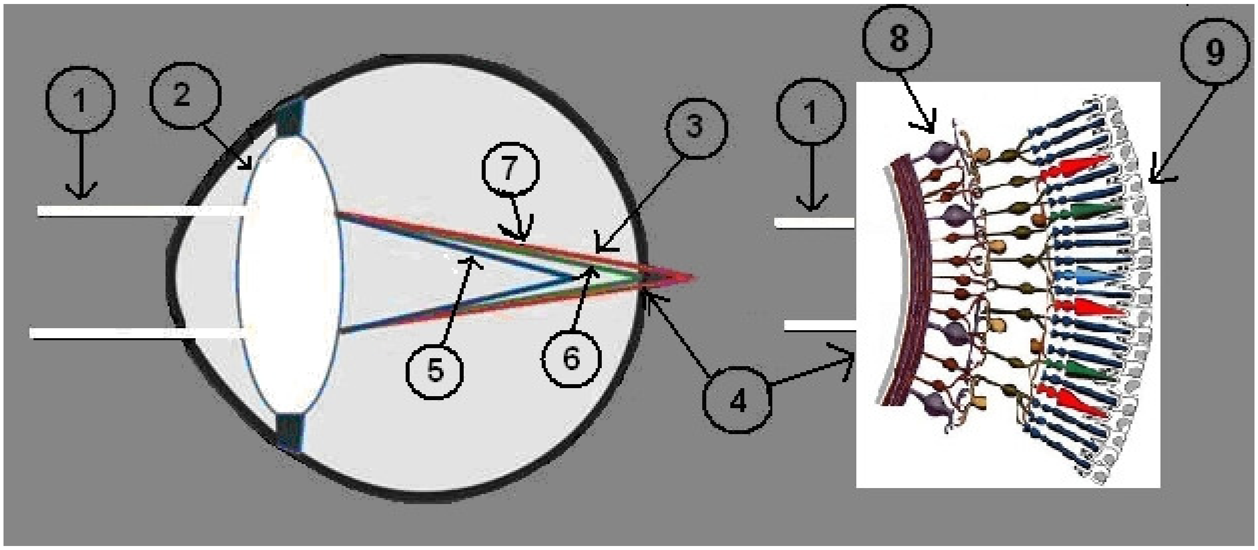

FIG 4: