

# Photography & Reality

LIGHT AND COLOR IN NATURE

## Year of Color

*With the change of the year PHOTOGRAPHY & REALITY is taking on new colors – quite literally.*

*While teaching online throughout 2020 and 2021 I acquired a number of rare and sometimes quite obscure color books. In moments of true madness I obtained every edition of a specific textbook. Looking at my commitments for this year I regret that I will not have the time to craft extensive lectures. However, I want to continue PHOTOGRAPHY & REALITY and decided to change its format to a study group.*

*Each month I will curate a set of readings from historical, philosophical, and/or scientific sources. Some of these will be quite simple, and others very complex. Most of these will be available by pdf in the course resource page. I will also assign one or two chapters from the books at the bottom of this page.*

*Every month also includes a color assignment based on the readings. These will start out simple, but progress in complexity to the recreation of famous color experiments. I will endeavor to keep these inexpensive, but do expect to spend a little bit of money to acquire supplies.*

*On the day of class we will discuss the readings and share our assignments! I cannot think of a more beautiful way to spend the year learning with others. Here's to a colorful year!*

*Gordon Haberberg*

#### REQUIRED TEXTS:

- Ball, Philip. *Bright Earth: Art and the Invention of Color*. Chicago: University of Chicago Press.
- Hardin, C.L. *Color for Philosophers: Unweaving the Rainbow*. Indianapolis: Hackett Publishing.

WHITE  
ARISTOTLE / LEONARDO

22<sup>ND</sup> OF JANUARY

The earliest written 'color theory' is Aristotle's *On Color*. This text remained influential throughout the Medieval era and into the Renaissance. In his *Treatise on Painting*, Leonardo expanded on Aristotle's ideas and inventoried many scintillating observations on color in nature. This first month takes a 'naive' view of color with its readings and assignments.

YELLOW  
NEWTON

19<sup>TH</sup> OF FEBRUARY

Newton initiated color as a science with his famous *experimentum crucis* - where he separated the rainbow through a glass prism. This month looks at his famous *Opticks* and his linking the spectrum into the first 'color circle.'

ORANGE  
GOETHE

19<sup>TH</sup> OF MARCH

Goethe's *Farbenlehre* is not so much a developed color theory, but a catalog of color phenomenon that cannot be explained by Newton's *Opticks*. Goethe's phenomenological viewpoint is fundamental to our experience of color. Also, his criticism of Newton's *experimentum crucis* proves that color is a psychovisual phenomenon.

RED  
SCHOPENHAUER

16<sup>TH</sup> OF APRIL

Rarely mentioned in color theory texts is Schopenhauer's *On Vision and Colors*, his response to Goethe's color theory. Schopenhauer's argument that color is a 'part of daylight' proved influential to Wilhelm Ostwald, Erwin Schrödinger, and anticipates the Opponent Color Theory of Ewald Hering. The assigned color experiments will explore this psychovisual aspect of color experience.

LEAF GREEN  
CHEVRAUL

14<sup>TH</sup> OF MAY

Michel Eugene Chevreul was a renowned chemist who was thrust into the depths of color theory when asked to solve a problem with colored dyes for the Gobelin Manufactory. He initiated the concept of the just noticeable difference (JND) and simultaneous color contrast. Using his book *The Harmony and Contrast of Colors* we explore one of the first confluences of science and art.

SEA GREEN  
MAXWELL / HELMHOLTZ

11<sup>TH</sup> OF JUNE

James Clerk Maxwell and Hermann von Helmholtz are associated with the Trichromaticity Theory of Color Vision - that we see color by three discrete 'color receptors.' However, they are two sides of the same coin. Maxwell worked assiduously on the 'space of beams' with his color wheel establishing the additive primaries of red, green, and blue. Helmholtz pioneered the field of psychophysics and the physiology of vision proposing that we see based on red, green, and blue sensitive cones. Explore these ideas by building your own color disk and replicating Maxwell's famous experiments.

## BLUE

## ROOD

9<sup>TH</sup> OF JULY

Ogden Rood's *Modern Chromatics* is a seminal text synthesizing and building on the work of Newton, Chevreul, and Maxwell. His work continues our 'scientific' thread of color theory. Continuing the use of our color disks we commence the mathematical exploration of color.

## VIOLET

## MUNSELL

6<sup>TH</sup> OF AUGUST

Albert H. Munsell produced his famous 'color tree' as a means to codify and educate others about color. He also developed within his system an entire set of principles of *balance*. This class covers Munsell's ideas in order to create works of art that are 'perfectly in balance.'

## BLACK

## OSTWALD

3<sup>RD</sup> OF SEPTEMBER

Wilhelm Ostwald pioneered physical chemistry at the turn of the century. Late in his career he turned to color theory and produced one of the most ingenious and misunderstood color systems. He originated color definitions that tie colors to concrete concepts and developed a novel colorimetry. Using his only publications in English we can explore his famous color solid and analyze a work of art through its 'molecular structure.'

## SILVER

## C.I.E.

1<sup>ST</sup> OF OCTOBER

By the mid-20th century The International Commission on Illumination had established many different color spaces and color standards. Reviewing different standards and spaces we will learn about the mathematics behind each space and its relation to the *qualia* of color. Here we will discover a level of technological empowerment in quantifying color, but also a problematic lack of understanding about the experience of color.

## GOLD

## COLORIMETRY

5<sup>TH</sup> OF NOVEMBER

Returning to the thread from Goethe to Schopenhauer and through Ostwald, we will look at the color solid of Erwin Schrödinger. The 'rounded cube' of Schrödinger's work on physical colors is a sorely missed topic in color theory. More importantly we look to the future to see what mid-to-late 20th century color scientists are uncovering and explaining.

## COLORLESS

## WITTGENSTEIN

3<sup>RD</sup> OF DECEMBER

Finishing our exploration we turn to Ludwig Wittgenstein, one of the most opaque philosophers, and his unpublished *Remarks on Color*. For an entire year we have grappled with many of the same questions as he asked in this unique book. At this juncture can we answer any of Wittgenstein's questions? Do certain questions take on new dimensions? Or are his statements mere paradoxes one can climb out of?