

***How Color Works: Color Theory in the Twenty-First Century***  
**Pamela Fraser**

**Chapter One: Color as Theory**

*Chapter Summary*

This chapter describes the discoveries and innovations that led to the concept of “color theory.” Although the two subjects are often conflated, color theory is distinct from color itself. Color theory is an aesthetic tradition inextricable from early color science, especially beginning with Isaac Newton’s tremendous discoveries about color and light in 17<sup>th</sup>-century Europe. Through the 18<sup>th</sup> and 19<sup>th</sup> centuries in Europe, theorizing color was a visual, scientific, and philosophical endeavor; and these categories were understood as integrated. This chapter lays the groundwork to understanding how many color concepts came about and to appreciate their cultural-specificity.

*Suggested Projects*

- *Try.* Following an exercise from Goethe’s *Zur Farbenlehre*, draw and color a simple image entirely in the oppositional colors in which the subject actually appears. After staring at it for sixty seconds, the positive version of the image (in oppositional, or complementary, colors) should appear before your eyes briefly, especially if you stare at a white wall or piece of paper immediately afterwards. This fleeting color experience is caused by the excessive excitation of one hue and the counter-reaction of its opponent color. Alternatively, this exercise can be achieved by coloring a picture in oppositional colors and then viewing it in inverse mode on a camera. The painting in image 1.6 shows how the student understood this concept well. Because the colors she used in her painting are precise opposites to her source image, the colors of the inverse image—in the camera display—appear identical to the image at which she originally looked.
- *Try.* As Mérimée suggested, make your own twelve-color circle of three primary, three secondary, and six tertiary colors. You need not name these colors, just try to make each admixture perceptually between each constituent hue. You may use red, yellow, and blue (traditional); or cyan, magenta, and yellow (process) as primaries. Then, test the accuracy of your mixtures by making middle mixtures of the colors opposite one another on the circle. They are the complementary colors and will neutralize each other if exactly opposite.

*Recommended Links*

1.1: Moses Harris, Primary and Compound Colors, from *The Natural System of Colors*, circa 1766.

[link: http://brightonmuseums.org.uk/discover/2013/07/04/rare-copy-of-moses-harriss-natural-system-of-colours-on-display-at-the-royal-pavilion/](http://brightonmuseums.org.uk/discover/2013/07/04/rare-copy-of-moses-harriss-natural-system-of-colours-on-display-at-the-royal-pavilion/)

1.2: Newton's color disc.

Link: [http://web.mit.edu/22.51/www/Extras/color\\_theory/color.html](http://web.mit.edu/22.51/www/Extras/color_theory/color.html)

1.3: Isaac Newton, color circle from *Opticks*, 1704.

Link: <http://library.si.edu/exhibition/color-in-a-new-light/science>

1.4: Jacob Christoph Le Blon, *Portrait of Cardinal de Fleury*, after Rigaud; 3 progress proofs, & composite image, color mezzotint, 1738. Courtesy Bibliothèque nationale de France, Paris, France.

Link: <http://library.si.edu/exhibition/color-in-a-new-light/science>

1.5: Johann Wolfgang von Goethe, symmetric color wheel with "reciprocally evoked colors" from *Zur Farbenlehre*, 1810.

Link: <https://mitpress.mit.edu/books/theory-colours>

1.6: Johann Wolfgang von Goethe, diagrams of the changes in the appearance of colors related to circles, squares and strips, from the 1840 English (Eastlake) edition of *Theory of Colours*.

Link: <https://mitpress.mit.edu/books/theory-colours>

1.7: Spencer Finch, *The Most Beautiful Blue* (Goethe's Theory), 2007, Candle, Pencil, White paper, Daylight, Dimensions variable. Courtesy of the artist.

Link: <http://www.spencerfinch.com/>

1.9: Michel Eugène Chevreul, optical mixing with colored thread, from *The Laws and Contrast of Colour and their application to the arts of painting, decoration of buildings, mosaic work, tapestry and carpet weaving, calico printing, dress, paper staining, printing, military clothing*. Translated by John Spanton. London: Routledge, Warne, and Routledge, 1861

Link:

[https://books.google.com/books/about/The\\_laws\\_of\\_contrast\\_of\\_colour\\_tr\\_by\\_J\\_S.html?id=KmEDAAAAQAAJ](https://books.google.com/books/about/The_laws_of_contrast_of_colour_tr_by_J_S.html?id=KmEDAAAAQAAJ)

1.10: Eugène Delacroix, *Algerian ladies in their apartments*, 1834, Musée du Louvre Paris. Alfredo Dagli Orti / The Art Archive at Art Resource, NY

Link: <http://www.louvre.fr/en/oeuvre-notices/women-algiers-their-apartment>

1.11 James Clerk Maxwell, the first color photograph, 1861

Link: [http://www.clerkmaxwellfoundation.org/html/first\\_colour\\_photographic\\_image.html](http://www.clerkmaxwellfoundation.org/html/first_colour_photographic_image.html)

1.12: Claude Monet, *Impression, Sunrise*, 1872, oil on canvas

Links: [http://www.marmottan.fr/uk/Claude\\_Monet\\_-musee-2517](http://www.marmottan.fr/uk/Claude_Monet_-musee-2517)

and

<https://www.khanacademy.org/humanities/becoming-modern/avant-garde-france/impressionism/a/a-beginners-guide-to-impressionism>

1.13: Paul Signac, *Women at the Well*, 1892, oil on canvas

Link: [http://www.musee-](http://www.musee-orsay.fr/index.php?id=1388&L=1&tx_ttnews[tt_news]=4175&no_cache=1)

[orsay.fr/index.php?id=1388&L=1&tx\\_ttnews\[tt\\_news\]=4175&no\\_cache=1](http://www.musee-orsay.fr/index.php?id=1388&L=1&tx_ttnews[tt_news]=4175&no_cache=1)

1.14: Wilhelm von Bezold, black type on purple ground, from *The theory of colour in relation to art and art-industry*. Boston: L. Prang & Co., 1876

Link:

[https://books.google.com/books/about/The\\_Theory\\_of\\_Color\\_in\\_Its\\_Relation\\_to\\_A.html?id=vqYAAAAYAAJ](https://books.google.com/books/about/The_Theory_of_Color_in_Its_Relation_to_A.html?id=vqYAAAAYAAJ)

1.15: Wilhelm von Bezold, red disk on yellow and purple grounds, from *The theory of colour in relation to art and art-industry*. Boston: L. Prang & Co., 1876

Link:

[https://books.google.com/books/about/The\\_Theory\\_of\\_Color\\_in\\_Its\\_Relation\\_to\\_A.html?id=vqYAAAAYAAJ](https://books.google.com/books/about/The_Theory_of_Color_in_Its_Relation_to_A.html?id=vqYAAAAYAAJ)

1.16: Albert Munsell, *The Color Tree*, from *A Grammar of Color*, 1921, Mittineague, Massachusetts: Strathmore Paper Company

Link: <http://munsell.com/>

1.17: Albert Munsell, charts showing scales of value and chroma for complementary gamuts, from *Atlas of the Munsell Color System*, 1915, Malden, Massachusetts: Wadsworth, Howland & Co., Inc. Printers

Link: <http://munsell.com/>

1.18: Wilhelm Ostwald, triadic harmonies, from *Die Farbenfibel*, Leipzig: Verlag Unesma G.m.b.h., 1917

Link: [https://www.nobelprize.org/nobel\\_prizes/chemistry/laureates/1909/ostwald-bio.html](https://www.nobelprize.org/nobel_prizes/chemistry/laureates/1909/ostwald-bio.html)

1.19: Theo van Doesburg, *Interior*, 1919, and study of ceiling, 1925, Autumn 1924 issue of Paris journal *L'Architecture Vivante*

Link:

[http://www.getty.edu/vow/ULANFullDisplay?find=&role=&nation=&prev\\_page=1&subjectid=500007926](http://www.getty.edu/vow/ULANFullDisplay?find=&role=&nation=&prev_page=1&subjectid=500007926)

1.20: Froebel's second gift on cover of *De Kindertuin*, kindergarten manual, by Joha. Wierds Van Coehoorn-Stout, 1904

Link: <https://www.scholastic.com/teachers/articles/teaching-content/pioneers-our-field-friedrich-froebel-founder-first-kindergarten/>

1.21: Untitled. Work of a Bauhaus student Dessau/Berlin, gouache on paper, 32.1 x 32.1 cm.

Link: <https://www.bauhaus.de/en/>

1.22: Oskar Schlemmer, costumes from *Das Triadische Ballett (The Triadic Ballet)*, 1922

Link: <http://www.museoreinasofia.es/en/exhibitions/oskar-schlemmer>

1.23: Josef Albers, *Homage to the Square (Guarded)*, oil on Masonite, 1952

Link: <http://www.albersfoundation.org/>