**Theory of Colours**

Light spectrum, from *Theory of Colours*– Goethe observed that colour arises at the edges, and the spectrum occurs where these coloured edges overlap.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Johann Wolfgang von Goethe</th>
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<tbody>
<tr>
<td>Original title</td>
<td>Zur Farbenlehre</td>
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<td>Translator</td>
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Theory of Colours (original German title Zur Farbenlehre) is a work by Johann Wolfgang von Goethe about the poet's views on the nature of colours and how these are perceived by humans, published in 1810. It contains some of the earliest published descriptions of phenomena such as coloured shadows, refraction, and chromatic aberration.

The work originated in Goethe's occupation with painting and mainly exerted an influence onto the arts (Philipp Otto Runge, J. M. W. Turner, the Pre-Raphaelites, Wassily Kandinsky).

Although Goethe's work was rejected by physicists, a number of philosophers and physicists have concerned themselves with it, including Thomas Johann Seebeck, Arthur Schopenhauer (see: On Vision and Colors), Hermann von Helmholtz, Rudolf Steiner, Ludwig Wittgenstein, Werner Heisenberg, Kurt Gödel, and Mitchell Feigenbaum.

In his book, Goethe provides a general exposition of how colour is perceived in a variety of circumstances, and considers Isaac Newton's observations to be special cases. Goethe's concern was not so much with the analytic measurement of colour phenomenon, as with the qualities of how phenomena are perceived. Philosophers have come to understand the distinction between the optical spectrum, as observed by Newton, and the phenomenon of human colour perception as presented by Goethe - a subject analyzed at length by Wittgenstein in his exegesis of Goethe in Remarks on Colour.

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In the preface to the *Theory of Colours*, Goethe explained that he tried to apply the principle of *polarity*, in the work – a proposition that belonged to his earliest convictions and was constitutive for all his study of nature.\(^3\)

It is hard to present Goethe's "theory", since he refrains from setting up any actual theory; "its intention is to portray rather than explain" ([Scientific Studies](#)). For Goethe, "the highest is to understand that all fact is really theory. The blue of the sky reveals to us the basic law of color. Search nothing beyond the phenomena, they themselves are the theory."\(^5\)

[Goethe] delivered in full measure what was promised by the title of his excellent work: *Data for a Theory of Color*. They are important, complete, and significant data, rich material for a future theory of color. He has not, however, undertaken to furnish the theory itself; hence, as he himself remarks and admits on page xxxix of the introduction, he has not furnished us with a real explanation of the essential nature of color, but really postulates it as a phenomenon, and merely tells us how it originates, not what it is. The physiological colors ... he represents as a phenomenon, complete and existing by itself, without even attempting to show their relation to the physical colors, his principal theme. ... it is really a systematic presentation of facts, but it stops short at this.

— [Schopenhauer, *On Vision and Colors*](#), Introduction

The crux of his color theory is its experiential source: rather than impose theoretical statements, Goethe sought to allow light and color to be displayed in an ordered series of experiments that readers could experience for themselves." ([Seamon, 1998](#)). As such, he would reject both the wave and particle theories because they are conceptually inferred and not directly perceived by the human senses. According to Goethe, "Newton's error... was trusting math over the sensations of his eye."


Goethe's theory of the origin of the spectrum isn't a theory of its origin that has proved unsatisfactory; it is really not a theory at all. *Nothing* can be predicted by means of it. It is, rather, a vague schematic outline, of the sort we find in James's psychology. There is no *experimentum crucis* for Goethe's theory of colour.

Historical background

At Goethe's time, it was generally acknowledged that, as Isaac Newton had shown in his *Opticks* in 1704, colourless (white) light is split up into its component colours when directed through a prism.\(^7\)

Along with the rest of the world I was convinced that all the colours are contained in the light; no one had ever told me anything different, and I had never found the least cause to doubt it, because I had no further interest in the subject.
—Goethe

In 1740, Louis Bertrand Castel published a criticism of Newton's spectral description of prismatic colour,\(^8\) where he observed that the colours of light split by a prism depended on the distance from the prism, and that Newton was looking at a special case. This was an argument that Goethe later developed.\(^9\)

Goethe's starting point: Newton's supposed error

But how I was astonished, as I looked at a white wall through the prism, that it stayed white! That only where it came upon some darkened area, it showed some colour, then at last, around the window sill all the colours shone... It didn't take long before I knew here was something significant about colour to be brought forth, and I spoke as through an instinct out loud, that the Newtonian teachings were false.
—Goethe\(^10\)
Reddish-yellow edges overlap blue-violet edges to form green.

Goethe already in 1793 formulated his arguments against Newton in his essay “Über Newtons Hypothese der diversen Refrangibilität” (“On Newton's hypothesis of diverse refrangibility”).[11] His starting point was the supposed discovery of how Newton erred, in the prismatic experiment.[12] However, by 1794, Goethe began to shift away from this view, sensing more and more strongly the meaning of the physiological side of colours.[13]

Announcing the publication of the *Theory of Colours*, he stated:

The theory but that we postulate with certainty indeed also begins with colourless light, avails itself of outward conditions, to produce coloured phenomena; but it concedes worth and dignity to these conditions. It does not arrogate to itself developing colours from the light, but rather seeks to prove by numberless cases that colour is produced as well by light as by what is pitted against this.
—Goethe[14]

Instead of relying on a single crucial experiment to gain knowledge of the nature of colour, Goethe strove to overcome what he perceived as mere interpretation of the phenomena by developing an ordered series of experiments from which to draw his conclusions, and thus gain an insight into the complete phenomenon.

As a look through the prism shows, one does not see white areas split evenly into seven colours, but rather colour exists at light-dark boundaries. Yellow-red edges meet blue-violet edges, and where these overlap, there arises green. From these observations, Goethe concluded that the *spectrum* is not a primary, but a compound phenomenon.

**[edit]Light and darkness**

Unlike his contemporaries, Goethe didn't see darkness as an absence of light, but rather as polar to and interacting with light; colour resulted from this interaction of light and shadow. For Goethe, light is "the simplest most undivided most homogenous being that we know. Confronting it is the darkness" (Letter to Jacobi).

...they maintained that *shade is a part of light*. It sounds absurd when I express it; but so it is: for they said that *colours*, which are shadow and the result of shade, *are light itself*.
Based on his experiments with turbid media, Goethe characterized colour as arising from the dynamic interplay of darkness and light. Rudolf Steiner gives the following analogy:

Modern natural science sees darkness as a complete nothingness. According to this view, the light which streams into a dark space has no resistance from the darkness to overcome. Goethe pictures to himself that light and darkness relate to each other like the north and south pole of a magnet. The darkness can weaken the light in its working power. Conversely, the light can limit the energy of the darkness. In both cases color arises.
—Rudolf Steiner, 1897

Goethe writes:

Yellow is a light which has been dampened by darkness Blue is a darkness weakened by light.

**Experiments with turbid media**

The action of turbid media was to Goethe the ultimate fact — the Urphänomen — of the world of colours.
—John Tyndall, 1880

Goethe's studies of colour began with subjective experiments which examined the effects of turbid media on the perception of light and dark. The poet observed that light seen through a turbid medium appears yellow, and darkness seen through an illuminated medium appears blue.

The highest degree of light, such as that of the sun... is for the most part colourless. This light, however, seen through a medium but very slightly thickened, appears to us yellow. If the density of such a medium be increased, or if its volume become greater, we shall see the light gradually assume a yellow-red hue, which at last deepens to a ruby colour. If on the other hand darkness is seen through a semi-transparent medium, which is itself illumined by a light striking on it, a blue colour appears: this becomes lighter and paler as the density of the medium is increased, but on the contrary appears darker and deeper the more transparent the medium becomes: in the least degree of dimness short of absolute transparence, always supposing a perfectly colourless medium, this deep blue approaches the most beautiful violet.
—Goethe, *Theory of Colours, pp. 150–151*

Starting from these observations, he began numerous experiments, observing the effects of darkening and lightening on the perception of colour in many different circumstances.
When looked at through a prism, the colours seen at a light-dark boundary depend upon the orientation of this light-dark boundary.

When viewed through a prism, the orientation of a light-dark boundary with respect to the prism's axis is significant. With white above a dark boundary, we observe the light extending a blue-violet edge into the dark area; whereas dark above a light boundary results in a red-yellow edge extending into the light area.

Goethe was intrigued by this difference. He felt that this arising of colour at light-dark boundaries was fundamental to the creation of the spectrum (which he considered to be a compound phenomenon).

Varying the experimental conditions by using different shades of grey shows that the intensity of coloured edges increases with boundary contrast.

### Light and dark spectra

Light and dark spectra – when the coloured edges overlap in a light spectrum, green results; when they overlap in a dark spectrum, magenta results.

Since the colour phenomenon relies on the adjacency of light and dark, there are two ways to produce a spectrum: with a light beam in a dark room, and with a dark beam (i.e. a shadow) in a light room.

Goethe recorded the sequence of colours projected at various distances from a prism for both cases (see Plate IV, *Theory of Colours*). In both cases, he found that the yellow and blue edges remain closest to the side which is light, and red and violet edges remain closest to the side which is dark. At a certain distance, these edges overlap – and we obtain Newton's spectrum. When these edges overlap in a light spectrum, green results; when they overlap in a dark spectrum, magenta results.

With a light spectrum, coming out of the prism, one sees a shaft of light surrounded by dark. We find yellow-red colours along the top edge, and blue-violet colours along the bottom edge. The spectrum with green in the middle arises only where the blue-violet edges overlap the yellow-red edges.

With a dark spectrum (i.e. a shadow surrounded by light), we find violet-blue along the top edge, and red-yellow along the bottom edge – where these edges overlap, we find magenta.

### Goethe's colour wheel
Goethe's colour wheel

When the eye sees a colour it is immediately excited and it is its nature, spontaneously and of necessity, at once to produce another, which with the original colour, comprehends the whole chromatic scale.
— Goethe, Theory of Colours

Goethe anticipated Ewald Hering's Opponent process theory by proposing a symmetric colour wheel. He writes, "The chromatic circle... [is] arranged in a general way according to the natural order... for the colours diametrically opposed to each other in this diagram are those which reciprocally evoke each other in the eye. Thus, yellow demands violet; orange, blue; red, green; and vice versa: thus... all intermediate gradations reciprocally evoke each other; the simpler colour demanding the compound, and vice versa. (Goethe, Theory of Colours).

Goethe also expressed his understanding of the light and dark spectra in including magenta in his colour wheel. Whereas for Newton magenta was an 'extraspectral' colour, for Goethe magenta was a natural result of violet and red being mixed in a dark spectrum (see top of colour wheel), just as green resulted from the mixing of blue and yellow in the light spectrum (bottom of colour wheel).

"For Newton, only spectral colors could count as fundamental. By contrast, Goethe's more empirical approach led him to recognize the essential role of (nonspectral) magenta in a complete color circle, a role that it still has in all modern color systems."

Goethe attributed inner qualities to the several colours of the wheel. Red is associated to the beautiful, orange to the noble, yellow to the good, green to the useful, blue to the mean, and violet to the unnecessary.

Newton and Goethe

Due to their different approaches to a common subject, many misunderstandings have arisen between Newton's mathematical understanding of optics, and Goethe's experiential approach.

Because Newton understands white light to be composed of individual colours, and Goethe sees colour arising from the interaction of light and dark, they come to different conclusions on the question: is the optical spectrum a primary or a compound phenomenon?

For Newton, the prism is immaterial to the existence of colour, as all the colours already exist in white light, and the prism merely fans them out according to their refrangibility. Goethe sought to show that, as a turbid medium, the prism was an integral factor in the arising of colour.

"Whereas Newton observed the colour spectrum cast on a wall at a fixed distance away from the prism, Goethe observed the cast spectrum on a white card which was progressively moved away from the prism... As the card was moved away, the projected image elongated, gradually assuming an elliptical shape, and the coloured images became larger, finally merging at the centre to produce green. Moving the card farther led to..."
the increase in the size of the image, until finally the spectrum described by Newton in the Opticks was 
produced... The image cast by the refracted beam was not fixed, but rather developed with increasing distance 
from the prism. Consequently, Goethe saw the particular distance chosen by Newton to prove the second 
proposition of the Opticks as capriciously imposed.[24]

Whereas Newton narrowed the beam of light in order to isolate the phenomenon, Goethe observed that with a 
wider aperture, there was no spectrum. He saw only reddish-yellow edges and blue-cyan edges with white 
between them, and the spectrum arose only where these edges came close enough to overlap. For him, the 
spectrum could be explained by the simpler phenomena of colour arising from the interaction of light and dark 
edges.

Newton explains "the fact that all the colors appear only when the prism is at a certain distance from the 
screen, whereas the middle otherwise is white... [by saying] the more strongly diverted lights from the upper 
part of the image and the more weakly diverted ones from the lower part fall together in the middle and mix into 
white. The colors appear only at the edges because there none of the more strongly diverted parts of the light 
from above can fall into the most weakly diverted parts of the light, and none of the more weakly diverted ones 
from below can fall into the most strongly diverted ones." (Steiner, 1897[19])

Table of differences

<table>
<thead>
<tr>
<th>Qualities of Light</th>
<th>Newton (1704)</th>
<th>Goethe (1810)</th>
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</thead>
<tbody>
<tr>
<td>Homogeneity</td>
<td>White light is composed of coloured elements (heterogeneous).</td>
<td>Light is the simplest most undivided most homogenous thing (homogenous).</td>
</tr>
<tr>
<td>Darkness</td>
<td>Darkness is the absence of light.</td>
<td>Darkness is polar to, and interacts with light.</td>
</tr>
<tr>
<td>Spectrum</td>
<td>Colours are fanned out of light according to their refrangibility (primary phenomenon).</td>
<td>Coloured edges which arise at light-dark borders overlap to form a spectrum (compound phenomenon).</td>
</tr>
<tr>
<td>Prism</td>
<td>The prism is immaterial to the existence of colour.</td>
<td>As a turbid medium, the prism plays a role in the arising of colour.</td>
</tr>
<tr>
<td>Role of Refraction</td>
<td>Light becomes decomposed through refraction, inflection, and reflection.</td>
<td>Refraction, inflection, and reflection can exist without the appearance of colour.</td>
</tr>
</tbody>
</table>
Analysis

White light decomposes into seven pure colours.

There are only two pure colours – blue and yellow; the rest are degrees of these.

Synthesis

Just as white light can be decomposed, it can be put back together.

Colours recombine to shades of grey.

Particle or Wave?

Particle

Neither, since they are inferences and not observed with the senses.

Colour Wheel

Asymmetric, 7 colours

Symmetric, 6 colours

As a catalogue of observations, Goethe's experiments are useful data for understanding the complexities of human colour perception. Whereas Newton sought to develop a mathematical model for the behaviour of light, Goethe focused on exploring how colour is perceived in a wide array of conditions.

Goethe's reification of darkness has caused almost all of modern physics to reject Goethe's theory. Both Newton and Huygens defined darkness as an absence of light. Young and Fresnel combined Newton's particle theory with Huygen's wave theory to show that colour is the visible manifestation of light's wavelength. Physicists today attribute both a corpuscular and undulatory character to light, which is the content of the so-called Wave–particle duality. Curiously, since the crux of Goethe's theory is tied to what is experiential, he would reject both the wave and particle theories since they are conceptually inferred and not directly perceived by the human senses.

History and influence

The original German edition of the Farbenlehre has three sections: i) a didactic section in which Goethe presents his own observations, ii) a polemic section in which he makes his case against Newton, and iii) a historical section.

From its publication in 1810, the book was controversial for its stance against Newton. So much so, that when Charles Eastlake translated the text into English in 1840, he omitted the content of Goethe's polemic against Newton.

Significantly (and regrettably), only the 'Didactic' colour observations appear in Eastlake's translation. In his preface, Eastlake explains that he deleted the historical and entoptic parts of the book because they 'lacked scientific interest', and censored Goethe's polemic because the 'violence of his objections' against Newton would prevent readers from fairly judging Goethe's color observations.

—Bruce MacEvoy, Handprint.com, 2006[^footnote]

[^footnote]: [Handprint.com](http://handprint.com)
Influence on the arts

Turner's The fighting Temeraire, 1839

Goethe initially was induced to occupy himself with the theory of colours by the questions of hue in painting. "During his first journey to Italy (1786-88), he noticed that artists were able to enunciate rules for virtually all the elements of painting and drawing except color and coloring. In the years 1786—88, Goethe began investigating whether one could ascertain rules to govern the artistic use of color." [26]

It was a highly welcome acknowledgement of his aim, for him, when several pictorial artists, above all Philipp Otto Runge, took an interest in his colour studyings. [27] After being translated into English by Charles Eastlake in 1840, the theory became widely adopted by the art world – especially among the Pre-Raphaelites. J. M. W. Turner studied it comprehensively and referenced it in the titles of several paintings. [28] Wassily Kandinsky considered it "one of the most important works." [29]

Influence on Latin American flags

During a party in Weimar in the winter of 1785, Goethe had a late-night conversation on his theory of primary colours with the South American revolutionary Francisco de Miranda. This conversation inspired Miranda, as he later recounted, in his designing the yellow, blue and red flag of Gran Colombia, from which the present national flags of Colombia, Venezuela and Ecuador are derived. (See Flag of Colombia#History).

Reception by scientists

As early as 1853, in Hermann von Helmholtz's lecture on Goethe's scientific works -- he says of Goethe's work that he depicts the perceived phenomena -- "circumstantially, rigorously true to nature, and vividly, puts them in an order that is pleasant to survey, and proves himself here, as everywhere in the realm of the factual, to be the great master of exposition" (Helmholtz 1892). Helmholtz ultimately rejects Goethe's theory as the work of a poet, but expresses his perplexity at how they can be in such agreement about the facts of the matter, but in violent contradiction about their meaning -- 'And I for one do not know how anyone, regardless of what his views about colours are, can deny that the theory in itself is fully consequent, that its assumptions, once granted, explain the facts treated completely and indeed simply'. (Helmholtz 1892) [30]

Although the accuracy of Goethe's observations does not admit a great deal of criticism, his theory's failure to demonstrate significant predictive validity eventually rendered it scientifically irrelevant. Thomas Johann Seebeck was the only prominent scientist among Goethe's contemporaries who acknowledged the theory, but later also saw it critically. [31]

Goethe's colour theory has in many ways borne fruit in art, physiology and aesthetics. But victory, and hence influence on the research of the following century, has been Newton's.

— Werner Heisenberg, 1952
Much controversy stems from two different ways of investigating light and colour. Goethe was not interested in Newton's analytic treatment of colour – but he presented an excellent rational description of the phenomenon of human colour perception. It is as such a collection of colour observations that we must view this book.

Most of Goethe's explanations of color have been thoroughly demolished, but no criticism has been leveled at his reports of the facts to be observed; nor should any be. This book can lead the reader through a demonstration course not only in subjectively produced colors (after images, light and dark adaptation, irradiation, colored shadows, and pressure phosphenes), but also in physical phenomena detectable qualitatively by observation of color (absorption, scattering, refraction, diffraction, polarization, and interference). A reader who attempts to follow the logic of Goethe's explanations and who attempts to compare them with the currently accepted views might, even with the advantage of 1970 sophistication, become convinced that Goethe's theory, or at least a part of it, has been dismissed too quickly.

— Judd, 1970[22]

Mitchell Feigenbaum has coined the phrase *Goethe had been right about colour!*[23]

As Feigenbaum understood them, Goethe's ideas had true science in them. They were hard and empirical. Over and over again, Goethe emphasized the repeatability of his experiments. It was the perception of colour, to Goethe, that was universal and objective. What scientific evidence was there for a definable real-world quality of redness independent of our perception?

— James Gleick, Chaos[33]

[edit]Current status

Goethe started out by accepting Newton's physical theory. He soon abandoned it... finding modification to be more in keeping with his own insights. One beneficial consequence of this was that he developed an awareness of the importance of the physiological aspect of colour perception, and was therefore able to demonstrate that Newton's theory of light and colours is too simplistic; that there is more to colour than variable refrangibility.

— Michael Duck, 1988[34]

Developments in understanding how the brain interprets colours, such as colour constancy and Edwin H. Land's retinex theory bear striking similarities to Goethe's theory (Ribe & Steinle, 2002).


[edit]Quotations

As to what I have done as a poet... I take no pride in it... but that in my century I am the only person who knows the truth in the difficult science of colours – of that, I say, I am not a little proud, and here I have a consciousness of a superiority to many.

— Goethe, as recalled by Johann Eckermann, Conversations

[edit]On the catalytic moment

Aber wie verwundert war ich, als die durch's Prisma angescchaute weiße Wand nach wie vor weiß blieb, daß nur da, wo ein Dunkles dran stieß, sich eine mehr oder weniger entschiedene Farbe zeigte, daß zuletzt die
[Goethe] delivered in full measure what was promised by the title of his excellent work: data toward a theory of colour. They are important, complete, and significant data, rich material for a future theory of colour. He has not, however, undertaken to furnish the theory itself; hence, as he himself remarks and admits on page xxxix of the introduction, he has not furnished us with a real explanation of the essential nature of colour, but really postulates it as a phenomenon, and merely tells us how it originates, not what it is.

—Schopenhauer, *On Vision and Colors*

Goethe's theory of the origin of the spectrum isn't a theory of its origin that has proved unsatisfactory; it is really not a theory at all. Nothing can be predicted by means of it. It is, rather, a vague schematic outline, of the sort we find in James's psychology. There is no experimentum crucis for Goethe's theory of colour.

—Wittgenstein, *Remarks on Colour*

Can you lend me the *Theory of Colours* for a few weeks? It is an important work. His last things are insipid.

—Ludwig van Beethoven, *Conversation-book*, 1820

Should your glance on mornings lovely
Lift to drink the heaven's blue
Or when sun, veiled by sirocco,
Royal red sinks out of view –
Give to Nature praise and honor.
Blithe of heart and sound of eye,
Knowing for the world of colour
Where its broad foundations lie.

—Goethe

See also

Theory of painting

Checker shadow illusion (Same color illusion)

Notes and references

1. ^ [http://findarticles.com/p/articles/mi_m0422/is_2_82/ai_64573524/pg_6](http://findarticles.com/p/articles/mi_m0422/is_2_82/ai_64573524/pg_6)


gesamte Naturbetrachtung konstitutive Prinzip der Polarität gehört zuseinen frühesten Überzeugungen..., an denen er niemals irre geworden sei (Brief an Schweigger, 25. April 1814). Im Vorwort zur Farbenlehre wird es als Hauptabsicht des gegenwärtigen Werkes bezeichnet, dieses universelle Prinzip auch auf die Farbenlehre anzuwenden." (Italics mark citations that may only slightly have been adapted to the descriptive sentence regarding the grammar.) Translation: "The principle of polarity, that is constitutive for all of Goethe's study of nature, belongs to the earliest of his convictions..., that he had never lost faith in (letter to Schweigger, April 25, 1814). In the preface to the Theory of Colours, it is called the main intention of the work at hand to apply this universal principle also to the theory of colours." See Johann Schweigger


begann." ("Goethe's starting point, the discovery of the Newton error, as he called it, in the prismatic
experiment, dwindled from his horizon according to how he began to sense the meaning of the
Physiological Colours.")

bereits angedeutet in Goethes Briefentwurf an Sömmering vom Januar/Februar 1794, der Antwort auf
Sömmerings Brief an Goethe vom 18. Januar 1794 (...): Es ist weit mehr Physiologisches bei den
Farbenerscheinungen, als man denkt, nur ist hier die Schwierigkeit noch größer als in andern Fällen, das
Objektive vom Subjektiven zu unterscheiden." (Italics mark citations that may only slightly have been
adapted to the descriptive sentence regarding the grammar.) Translation: "This change is already indicated
in Goethe's draft for a letter to Sömmering from January/February 1794, the answer to Sömmering's letter
from January 18, 1794 (...): There is much more physiological with the phenomena of colours than one
would think, just that it is even more difficult, here, to distinguish between the objective and the
subjective." The letter is cited by Mandelkow after: Goethe, Die Schriften zur Naturwissenschaft.
Herausgegeben im Auftrage der Deutschen Akademie der Naturforscher (Leopoldina) zu Halle von R.
Matthaei, W. Troll und L. Wolf. Weimar 1949 ff (Goethe, The writings on sciences. Edited on behalf of
the German Academy of Sciences Leopoldina at Halle by R. Matthaei, W. Troll and L. Wolf. Weimar 1949 et
seq.) See: Samuel Thomas von Sömmering

die wir mit Überzeugung aufstellen, beginnt zwar auch mit dem farblosen Lichte, sie bedient sich äußerer
Bedingungen, um farbige Erscheinungen hervorzubringen; sie gesteht aber diesen Bedingungen Wert und
Würde zu. Sie maßt sich nicht an, Farben aus dem Licht zu entwickeln, sie sucht vielmehr durch unzählige
Fälle darzutun, dass die Farbe zugleich von dem Lichte und von dem, was sich ihm entgegenstellt,
hervorgebracht werde."

15. ^ Steiner, Rudolf (1897). Goethe's World View, Chapter III The Phenomena of the World of
Colors. [unreliable source?]


21. ^ Ribe & Steinle, 2002

22. ^ Goethe: Farbenkreis zur Symbolisierung des "menschlichen Geistes- und Seelenlebens".
1809. Kisc.meiji.ac.jp, retrieved July 7, 2011 (German). "Jeder Farbe wird eine menschliche Eigenschaft


27. ^ Karl Robert Mandelkow: Goethes Briefe (Goethe's Letters). 2. edition. Vol. 4: Briefe der Jahre 1821-1832 (Letters of the years 1821-1832). C. H. Beck publishers, München 1976, p. 622. "Wie die Anfänge von Goethes Beschäftigung mit der Farbenlehre veranlaßt waren durch die Frage nach dem Kolorit in der Malerei (...), so war die Anteilnahme bildender Künstler an seinen Farbenstudien für Goethe eine hochwillkommene Bestätigung des von ihm Gewollten, wie er sie vor allem von Philipp Otto Runge erfahren hat." ("As the beginnings of Goethe's occupation with the theory of colours were induced by the question of hue in painting [...], the interest of pictorial artists in his colour studyings was a highly welcome acknowledgement of what he wanted, for him, which he above all received from Philipp Otto Runge.")


Bibliography


**[edit]External links**

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- Texts on Wikisource:
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Essay discussing color psychology and Goethe's theory
Google Scholar: Works citing "Theory of Colours"

http://www.webexhibits.org/colorart/ch.html

Goethe's Color Theory

Until Johann Wolfgang von Goethe came along, no one had questioned the validity of Newton's ideas about light and color.

Goethe was both a writer and a scientist. His 1,400-page treatise on color was published in 1810. According to Goethe:

“That I am the only person in this century who has the right insight into the difficult science of colors, that is what I am rather proud of, and that is what gives me the feeling that I have outstripped many.”

Because Goethe misinterprets some experiments, he incorrectly thinks that these experiments show Newton to be wrong.

Johann Wolfgang von Goethe (1749-1832) was the greatest poet, playwright, novelist and essayist in the German language - comparable to Shakespeare and Dante.

Goethe reformulates the topic of color in an entirely new way. Newton had viewed color as a physical problem, involving light striking objects and entering our eyes. Goethe realizes that the sensations of color reaching our brain are also shaped by our perception — by the mechanics of human vision and by the way our brains process information. Therefore, according to Goethe, what we see of an object depends upon the object, the lighting and our perception.

Goethe seeks to derive laws of color harmony, ways of characterizing physiological colors (how colors affect us) and subjective visual phenomena in general. Goethe studies after-images, colored shadows and complementary colors. And he anticipates Hering’s “opponent-color” theory, which is one basis of our understanding of color vision today. Above all, Goethe appreciates that
the sensation of complementary colors does not originate physically from the actions of light on our eyes but perceptually from the actions of our visual system.

Goethe wanted to uncover color’s secrets and investigated whether rules could be used to govern the artistic use of color. He created a Colour Wheel but later found his ideas were best expressed within an equilateral triangle. In Goethe’s original triangle, the three primaries red, yellow, and blue, are arranged at the vertices of the triangle. He chose the primaries based as much on their emotional content as on their physical characteristics.

To Goethe it was important to understand human reaction to color, and his research marks the beginning of modern color psychology. He believed that his triangle was a diagram of the human mind and linked each color with certain emotions. Blue evoked a quiet mood, while red was festive and imaginative. The emotional aspect of the arrangement of the triangle reflects Goethe’s belief that the emotional content of each color be taken into account by artists.

Goethe’s theories of color and emotional response, once considered radical, are commonplace in today’s world. Over the course of the year, I am learning about my own color preferences in relationship to the circle. Perhaps color observations about our work say as much about us emotionally, as they do our art.

**Color Mixing and Goethe’s Triangle**

In this section we will look at Goethe's color triangle and its possibilities for investigating color mixing.

In Goethe's original triangle the three primaries red, yellow, and blue are arranged at the vertices of the triangle. The other subdivisions of the triangle are grouped into secondary and tertiary triangles, where the secondary triangle colors represent the mix of the two primary triangles to either side of it, and the tertiary triangle colors represent the mix of the primary triangle adjacent to it and the secondary triangle directly across from it. (see example)
Goethe's original proposal was "to marvel at color's occurrences and meanings, to admire and, if possible, to uncover color's secrets" (Norman,49). To Goethe it was most important to understand human reaction to color, and his research marks the beginning of modern color psychology. He believed that his triangle was a diagram of the human mind and he linked each color with certain emotions. For example, Goethe associated blue with understanding and believed it evoked a quiet mood, while he believed that red evoked a festive mood and was suggestive of imagination. He choose the primaries red, yellow and blue based on their emotional content, as well as on physical grounds, and he grouped the different subsections of the triangle by 'elements' of emotion as well as by mixing level. This emotional aspect of the arrangement of the triangle reflects Goethe's concern that the emotional content of each color be taken into account by artists.

Within the context of Goethe's triangle, we find an excellent model for studying different color relationships, as well as for demonstrating some of the fundamental differences between electronic color and pigment (i.e.: additive vs. subtractive color mixing). An interactive triangle on the computer allows a simulation of these differences. On the following page you will find an applet that will let you experiment with different kinds of color mixing. The applet contains a color chooser and a set of three triangles that display averaging, additive, and subtractive mixing. One of the triangles is larger and interactive, while the other two appear minimized above it. The changes incurred to the larger, however, will be visible in all. You may click on either of the smaller triangles to maximize it, and it will trade places with the current maximized triangle.
You will be able to use the HLS color chooser, introduced before, to choose the primary colors at the vertices of the large triangle. Simply make your selection with the chooser and click within one of the vertex triangles. When a primary triangle color is changed, the secondary and tertiary triangles will be remixed. The mixtures of the secondary and tertiary colors are displayed one by one. First the secondary mixes are shown, then the tertiary, so that you can follow the process. **Note:** You will probably need to resize your browser window, the applet is quite large.

Goethe, originator of the concept of World Literature (Weltliteratur), took great interest in the literatures of England, France, Italy, classical Greece, and Persia, and wrote what is considered a high point of world literature, the two-part drama *Faust*. *Theory of Colours* was published in 1810 and Wassily Kandinsky called it, “one of the most important works.” The last major color breakthrough had been in 1660 with Sir Isaac Newton whose work in optics led to his creation of the color wheel. For Newton all the colors existed within white light. But Goethe’s *Colour Wheel* arose from the interaction of light and dark, and the psychological effects of color. Goethe didn’t see darkness as an absence of light, but polar opposite and interacting with light. Colour resulted from the interaction of light and shadow.

I’m currently working on the tail end of October’s mandalas, along with a painting in the studio. The textures and colors are kind of wild on the canvas, so I thought I’d continue to use the mandalas to talk about color. Some time ago, when I was researching information on Providence, I ran into Johann Wolfgang von Goethe’s *Theory of Colours* (original German title, *Zur Farbenlehre*).
August Mandalas — Stage 8 – Functioning Ego

Whether starting your own business, remodeling your home, or managing interpersonal issues as a community leader, Functioning Ego is about taking Action. A time of doing, not being, Stage 8 becomes activated when you take the initiative to bring an inspiration into reality, and really kicks in when you are engrossed in the challenging tasks required to reach your goals.

These mandalas are from the 8th month of a year-long mandala practice that began with the post Coloring Mandalas. Early this year, I made the decision to follow the twelve passages of Joan Kellogg’s The Great Round. According to Susanne F. Fincher, the healing benefits of The Great Round: Stage 8 – Functioning Ego are:

- ability to work comfortably in group settings, organizations, or alone, whichever is needed to accomplish your goals
- inspiration becomes reality through great effort, and takes on a form that is seen and appreciated by others
- you are actively engaged toward personal goals, living life on life’s terms, using the imagination to the fullest to create new and wondrous things
- on the spiritual level, healing takes place through finding ways of sharing wisdom gently and respectfully with others, in ways they can understand

He wrote:
Yellow is a light which has been dampened by darkness; Blue is a darkness weakened by the light. Light is the simplest most undivided most homogenous being that we know. Confronting it is the darkness.
~Letter to Jacobi


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