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Window to Goethe's Colour Revolution

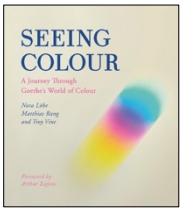
The Philosophy of Polarity in the *Farbenlehre*

David W. Wood[*]

Anastasia Klug, Olaf L. Müller, Anna Reinacher, Troy Vine, Derya Yürüyen (eds.), ***Goethe, Ritter und die Polarität. Geschichte und Kontroversen*****, Brill / mentis, 2021, 385 pp. ISBN 978-3-95743-235-3**

Olaf L. Müller, ***Ultraviolett. Johann Wilhelm Ritters Werk und Goethes Beitrag – Zur Geschichte einer Kooperation*****, Wallstein Verlag, 2021, 625 pp. ISBN 978-3-8353-3978-1**

Nora Löbe, Matthias Rang, Troy Vine, ***Seeing Colour: A Journey Through Goethe's World of Colour*****, Floris Books, 2022, 167 pp. ISBN 978-178250-780-2**



[*] Dr. phil. in the history of philosophy, Université Paris-Sorbonne & Ludwig-Maximilians-Universität Munich – david.wilfred.wood@gmail.com

1. Revolutions

(Fig. 1: Goethean colour circle)

Uranìe m'aiuti col suo coro[1]

The opening pages of Goethe's 1810 scientific treatise on colour – *Zur Farbenlehre*[2] – critically compare his new theory to a number of revolutions. First, to the 1789 political revolution in France. For Goethe, the "Bastille" of Isaac Newton's intellectual edifice has now been stormed, with colour finally liberated from the physicist's darkened cell.[3] Second, to the modern heliocentric revolution in astronomy, inaugurated by astronomers and thinkers like Copernicus, Galileo, and Giordano Bruno. Here again Newton's doctrine should be recognised as too limited and inverted for capturing the manifold manifestations of colour in the world. – It is like wanting to place the "moon at the centre" of our solar system instead of the sun.[4]

Conversely, Goethe appreciatively referred to the work of predecessors who had attempted more systematic overviews of chromatic phenomena, including the ancient Greek peripatetic philosophers, Aristotle and Theophrastus, and the Anglo-Irish chemist Robert Boyle.[5] He also acknowledged the decisive encouragement of contemporaries like Friedrich Schiller[6] or the Duchess Luise of Saxe-Weimar and Eisenach, to whom the work is dedicated.[7]

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[1] Dante, *Purgatorio* 29, 41.

[2] J.W. Goethe, *Zur Farbenlehre,* 2 vols. (Tübingen: Cotta, 1810). I'll cite this original edition (henceforth *Farbenlehre*, followed by volume number, date, and page number), and the abridged version in the Hamburger Ausgabe (= HA; Munich: Beck, vols. 13-14). For an English translation of the Didactic Part, see Goethe, *Scientific Studies*, trans. Douglas Miller (Princeton: Princeton University Press, 1995), 157-298; for the Polemical Part, see: *Goethe's 'Exposure of Newton's Theory'*, trans. Michael Duck & Michael Petry (London: Imperial College Press, 2016). The Historical Part is not yet translated. Unless otherwise noted, all translations are my own.

[3] Goethe, "Vorwort" (Preface), *Farbenlehre I* (1810: xix; HA 13: 319).

[4] Goethe, "Einleitung" (Introduction), *Farbenlehre I* (1810: xxxvi; HA 13: 323).

[5] Goethe, *Farbenlehre I* (1810: xxxvi; HA 13: 323). Goethe also translated into German the small book "On Colours" by Aristotle/Theophrastus, *Farbenlehre I* (1810: 24-53). Cf. his comments on Simon Portius's translation, *Farbenlehre II* (1810: 197-200).

[6] Goethe, *Farbenlehre II* (1810: 691, cf. 694; HA 14: 268).

[7] See Goethe, *Farbenlehre I* (1810: viii; & vol II, 1810: 692; HA 13: 314, 524; HA 14: 269). The Didactic Part of the *Farbenlehre* was already finished in 1808, and the dedication is dated: "Weimar, 30 January 1808."

Zur Farbenlehre is triadic and divided into three main parts: Didactic, Polemical, and Historical. This triadic division and composition became clear to Goethe in 1800 during the period of observing the lunar phases and moon's surface relief with a Herschel telescope.[8] Yet he also realized the work would need supplements, and in this regard the *Farbenlehre* as a whole closes with an epilogue that already presents certain supplementary material by the physicist Thomas Seebeck.[9] It concerns coloured illumination relating to the musician-astronomer William Herschel's discovery of infrared light in 1800 and the use of Bologna *Leuchtstein* or baryte.[10]

The Historical Part of the *Farbenlehre* concludes with a remarkable but frequently overlooked autobiographical text: "Confession of the Author."[11] This scientific confession recounts a dramatic event in Goethe's life: how after returning from Italy he finally attained a conceptual breakthrough in the understanding of colour. In late 1789 Goethe had moved into new lodgings in the so-called Jägerhaus in Weimar (cf. Fig. 2).[12]

(Fig. 2: Large Jägerhaus in Weimar)

[8] Goethe, *Tag- und Jahreshefte, als Ergänzung meiner sonstigen Bekenntnisse*, in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 31 (Stuttgart & Tübingen; Cotta, 1830, 87; passage not included in HA).

[9] Goethe, *Farbenlehre II* (1810: 693-724: cf. HA 13: 536). For further supplements, see among others: Goethe, "Zur Farbenlehre", in the first volume of his scientific journal *Zur Naturwissenschaft überhaupt* (Stuttgart & Tübingen: Cotta, 1817), 9-32.

[10] Goethe had personally collected his own samples of *Leuchtstein* from inside a hill near Paderno outside Bologna in 1786, See Goethe, *Italienische Reise* (HA 11: 110).

[11] Goethe, "Confession des Verfassers", *Farbenlehre II* (1810: 666-692; HA 14: 251-269).

[12] In the Marienstraße, near the Frauentor. – There are two associated dwellings called 'Jägerhaus' (hunter's house or hunting lodge) in Weimar, large and small. They housed a painting and drawing school. The family lived in the Jägerhaus from 1789-1792, and Goethe's son August was born in there on Christmas Day, 25 December 1789. The Marienstraße is named after the old Marienkirche (or Frauenkirche), which was formerly in the vicinity.

Due to this move and other work he did not get around to using some prisms he had earlier borrowed.[13] A messenger arrived to take them back to their impatient owner. Before handing them over to the messenger, Goethe by chance decided to quickly glance through one of the prisms. He held the prism up to his eye and looked at the white walls of the room. No colours appeared. Turning around, Goethe directed his sight at the light coming through the window pane. He saw that colour was now generated. – Against the backdrop of the light-grey monotone sky, colour appeared most vividly on the cross bars of the window. This empirical prism experience gave rise to a sudden scientific insight, or what he would term an *aperçu*:

> It did not need much reflection before I recognised that a boundary was necessary to produce colour, and I immediately said out loud to myself, as though instinctively: the Newtonian doctrine is false.[14]

Goethe's aperçu while looking at the window in Weimar occasioned a revolution in his thinking. Some initial essays on optics appeared in 1791-92, with the bulk of his investigations published twenty years later in *Zur Farbenlehre*. It is his largest written production: a 1,400-page, double-volume + booklet & plates, encyclopaedic study of colour.[15]

The encyclopaedism is visible in the work's relation to fields as diverse as physiology, physics, chemistry, mineralogy, music theory, linguistics, and painting, with paragraphs §§716-721 of the Didactic Part specifically addressing metaphysical issues. Here Goethe directed philosophers to study the Urphenomena (*Urphänomene*) – the first or archetypal phenomena. The work immediately piqued the interest of Goethe's philosophical contemporaries. These included the German idealists, Fichte, Schelling, and Hegel, as well as the young Arthur Schopenhauer. Over a century later Ludwig Wittgenstein would concur, finding the treatise "*very* instructive and philosophically interesting"[16], spending his final years on colour studies, to

[13] Goethe borrowed the prisms from the natural scientist Hofrat C.W. Büttner in Jena, *Farbenlehre II* (1810: 676; HA 14: 257).
[14] Goethe, "Confession des Verfassers", *Farbenlehre II* (1810: 678; HA 14: 259). On Goethe's discovery as an aperçu in "Confession", see *Farbenlehre II* (1810: 684, 686; HA 14: 263, 264).
[15] The 70-page booklet of engraved and illuminated plates with commentary was published concurrently in 1810 with the two main volumes. It includes an announcement and short aperçu of the entire project (cf. HA 13: 524-536).
[16] Wittgenstein, letter of 19 January 1950 to Georg Henrik von Wright, cited in Andrew Lugg, *Wittgenstein's Remarks on Colour*, p. 20.

the mystification of his mentor Bertrand Russell.[17] While the work played an indirect role in the great logician Kurt Gödel choosing his vocation.[18]

The three books here under review share this philosophical concern and trajectory. They are instructive and revolutionary in their own right, and continue the recent academic reassessment of Goethean colour science.[19] In the case of the two books in German, a group of researchers headed by philosophy professor Olaf Müller (Humboldt University in Berlin), along with other associated scholars, are re-evaluating in an interdisciplinary manner the foundations of the *Farbenlehre* and their relation to the theories of the romantic scientist Johann Wilhelm Ritter.

Goethe, Ritter und die Polarität: Geschichte und Kontroversen (henceforth cited as "G", followed by page number), edited by Anastasia Klug, Olaf L. Müller, Anna Reinacher, Troy Vine, and Derya Yürüyen, is a collection of eleven excellent essays, bookended by an introduction and afterword by Olaf Müller, focusing on the theory of polarity in the work of Goethe and Ritter. The first six essays are devoted to the reception of the *Farbenlehre* in Schelling, Oken, Schopenhauer, and others; the next five treat various controversies, such as edge spectra and the limits of colour symmetry. The essays by Brigitte Falkenburg (G: 229-250), Dietrich Zawischa (G: 251-267), and Jörg Friedrich (G: 268-296), are more critical of the Goethean conception of polarity in the field of optics (cf. Müller, G: 19-20). There are numerous high quality colour plates, graphs, and photographs at the end of the volume, as well as brief author bio-bibliographies and a name index. The different contributors mostly adopt philosophical approaches, but because of their multifaceted backgrounds they sometimes engage with other disciplines, such as theoretical physics, mathematics, history of science, technology, literature, and other permutations. Since the *Farbenlehre* is encyclopaedic, any multi-disciplinary approach should yield the most promising results, and this volume provides ample proof of that.

Olaf Müller's monograph *Ultraviolett: Johann Ritters Werk und Goethes Beitrag – Zur Geschichte einer Kooperation* (henceforth cited as "U", followed by page number), builds on the historical, natural-scientific, and philosophical research in his earlier 2015 volume *Mehr Licht: Goethe mit*

[17] Ibid. p. 174. Cf. Daniel Steuer, "Goethe and Wittgenstein on the Limits of Science: Towards a Critique of Abstraction", *Publications of the English Goethe Society* 71 (2001): 52-57.

[18] See Hao Wang, *Reflections on Kurt Gödel* (Cambridge MA: The MIT Press, 1987), 73; J. Dawson, *Logical Dilemmas: The Life and Work of Kurt Gödel* (Wellesley, MA: A.K. Peters, 1997), 18.

[19] Building on the earlier colour research of Johannes Grebe-Ellis, Jutta Müller-Tamm, Matthias Rang, and Friedrich Steinle.

Newton im Streit um die Farben. This new book *Ultraviolett* is a highly readable, engaging, and precisely documented double-biography of Goethe and the romantic scientist J.W. Ritter, revolving around the Goethean background and inspiration for Ritter's discovery of ultraviolet light in 1801. It appears as volume 80 of the *Schriften der Goethe-Gesellschaft*, a series edited by Stefan Matuschek, who has also provided a foreword. *Ultraviolett* is divided into six chapters, each roughly one hundred pages in length. Chapter 1 concerns the background to the collaboration between Goethe and Ritter, with an emphasis on Goethe's theory of polarity and the fact that he almost discovered ultraviolet light himself (U: 21-109). The scientific rapprochement between the two protagonists, intellectually from early summer 1798, to their apparent first meeting in September 1800, is the next focus (U: 111-200). How Ritter's discovery of ultraviolet light was actually made out of the Goethean "spirit of polarity" is the topic of chapter 3 (U: 201-319). The possible origins of various tensions and disputes between Goethe and Ritter is then presented (U: 321-420). Titled "Getrennte Wege" (Separate Ways), chapter 5 describes their scientific split (U: 421-480). While the final chapter portrays how the two scientists began to approach one another again in 1808, before Ritter's untimely death in 1810 (U: 483-560). The volume finishes with a fifty-page bibliography (!) (U: 565-617) and 39 black and white or coloured images. One of the most fascinating threads in the book is Müller's portrait of Goethe and Ritter working on colour theory and the fluorescence of baryte, while in parallel Goethe is working on *Faust*. There is even a possible echo of Ritter's work on ultraviolet in the 1808 *Faust* edition (U: 387), while Müller furthermore deliciously traces numerous "literary mirrorings" (*literarische Spiegelungen*) between Ritter as Faust and Goethe as Mephisto (U: 377, 407-415). *Ultraviolett* will appeal to readers and scholars of Goethean and romantic science and philosophy and deserves a wide-readership.

Seeing Colour: A Journey Through Goethe's World of Colour (henceforth "SC", followed by page number) is a practical hands-on approach to learning about Goethe's colour theory. Written by the artist Dora Löbe, the physicist Matthias Rang, and the philosopher-physicist Troy Vine (one of contributors and editors of *Goethe, Ritter und die Polarität*), it has a foreword penned by Arthur Zajonc, emeritus professor of physics at Amherst College. The authors certainly haven't overlooked Goethe's scientific "Confession", with the key passage recounting Goethe's prism experience translated in the Introduction, while this aperçu is rightly explored via the nature of scientific revolutions in Galileo Galilei and Thomas Kuhn (SC: 11-15). The book similarly has quality colour plates and photographs supporting the text. What

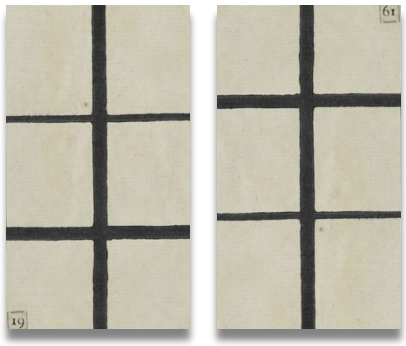
is most astonishing about this book is the incredible range and wealth of colour phenomena and experiments that are outlined and explained in its 167 pages. Among others: afterimages, complementary colours, successive and simultaneous contrasts, coloured shadows, opalescence, and prismatic, polarization, and interference colours, as well as Newton's rings, colour inversion experiments, colour mixing, and multicolour projection. The book also contains an English translation of Goethe's 1792 methodological essay: "The Experiment as Mediator Between Object and Subject", and ends with a more philosophical chapter on "The Order of Colours" (SC 119-127) and the highly informative "Bibliographic Essay on Goethean Approaches to Colour Science" (SC: 143-160). This accessible volume is unique in the English-language literature on Goethe and undoubtedly will be rewarding and enlightening not only for newcomers to his work but for seasoned scholars alike.

Since it isn't possible to cover in-depth all the findings in these three intellectually rich publications, in the next section 2 of this piece I'll briefly focus on the *philosophy* of polarity. In an empirical and metaphysical sense, what is Goethe's idea of polarity? Here I'm also inspired by a passage in the Historical Part of the *Farbenlehre*: "To be instructed in the theory of colour a person has at least to criss-cross the history of natural science and not neglect the history of philosophy."[20] Unfortunately I cannot cover all the contributors, but I'll look at how certain of them and Goethe tackle and answer this question in relation to philosophy.

And because this is a review essay, I'll put forward some of my own views. Specifically, in the much longer section 3, I'll move beyond the confines of a review and conclude with a method for more accurately dating Goethe's prism aperçu. The exact date of this insight remains an unresolved issue in the research. However, I'll show that it precisely the principle of polarity that furnishes the basis for the most satisfying solution to this problem.

[20] "Um sich von der Farbenlehre zu unterrichten, mußte man die ganze Geschichte der Naturlehre wenigstens durchkreuzen und die Geschichte der Philosophie nicht außer acht lassen." Goethe, *Farbenlehre* (1810 II: vi; HA 14: 7-8).

2. What is Polarity?



(Fig. 3: Goethe, 1791 optics card no. 19.
Left, card as presented in *Beyträge I*; right, same card, but inverted)

a) *Urphenomena*

We saw the *Farbenlehre* especially directs the attention of the philosopher to the *Urphenomena*. But what does Goethe understand by this complex notion? As the prefix *Ur* implies, they are phenomena related to *origins*, to the *Urquellen*[21] – the original or archetypal sources. In this regard, the *Urphenomena* play a mediating role between the real and the ideal.[22] Goethe underscores this point in his discussions with the philosopher J.G. Herder. At the time, Herder was working on the *Ideen zur Philosophie der Geschichte der Menschheit* (Ideas for a Philosophy of the History of Humanity), part one of which was published in 1784.[23] Goethe writes:

> Like I had earlier sought the *Urpflanze* (archetypal plant), so now I attempted to find the *Urtier* (archetypal animal), which ultimately means nothing else than: the concept, the idea of the animal. My laborious and tortuous research was relieved, even sweetened, when Herder undertook the *Ideas for a Philosophy of the History of Humanity*. Our daily conversations concerned the *Uranfängen* (archetypal beginnings) of the water earth and the organic creatures that originally emerged on it. This *Uranfang* (archetypal beginning) and its incessant continuing development was constantly discussed and daily explained and enriched, becoming our scientific possession through reciprocal communications and battles.[24]

[21] Goethe, *Farbenlehre I* (1810: xliv; HA 13: 327).
[22] For an excellent recent article on Goethe's view of the *Urphenomena*, see Sebastian Meixner, "Urphänomen (Original/Primordial Phenomenon)", *Goethe-Lexicon of Philosophical Concepts* vol. 2, no. 1 (Dec. 2022).
[23] Herder, *Ideen zur Philosophie der Geschichte der Menschheit*, Erster Teil, (Riga & Leipzig: Hartknoch, 1784).
[24] Goethe, "Der Inhalt bevorwortet" (1817) (HA 13: 63).

It is striking to note the extent to which Goethe employs the *Ur*-prefix here, how he depicts the two extremes in feeling aroused by their efforts, and his insistence that he and Herder share these views in common. This passage illustrates the twofold nature of the *Urphenomena*: on one hand, they are the *first*, original, archetypal, most basic (*Grund*) phenomena[25], also called the main appearances (*Haupterscheinungen*)[26]; and on the other hand, they are the *ideas* of the empirical manifestations. When Goethe employs *Ur* his meaning may even extend to the cosmological, back to universe's earliest beginnings. For Herder begins the *Ideas* by narrating the primeval origins of the cosmos based on the latest astronomical discoveries of Copernicus, Kepler, Newton, and Huygens.[27] With this cosmological beginning, Herder is following in the footsteps of his former teacher Kant. Herder places the latter alongside these astronomers in the *Ideen*, specifically referencing Kant's 1755 *Allgemeine Naturgeschichte und Theorie des Himmels* (Universal Natural History and Theory of the Heavens) as a book that should be more well-known than it is.[28] Kant had begun his own cosmogony in that text by positing the existence of an *Urstoff* or archetypal matter, as well as two original and archetypal attractive and repulsive forces, based on the mechanical principles of Newton's natural philosophy:

> It is with the greatest care that I have indeed relinquished all arbitrary inventions. I have, after I placed the world in the simplest chaos, made use of no forces other than those of attraction and repulsion to develop the great order of nature, two forces which are equally certain, equally simple, and equally original and universal (*zwei Kräfte, welche beide gleich gewiss, gleich einfach und zugleich gleich ursprünglich und allgemein sind*). They have both been borrowed from Newtonian philosophy. [29]

In other words, Kant begins with Newton and the *Urphenomena*. For Goethe, the philosopher's task with regard to the *Farbenlehre* is not to replace the work of the physicist or chemist, but to complement it by more sharply conceptualizing the idea and manifestations of colour itself. The section on philosophy in the *Farbenlehre* presents a necessary circle from the real to the

[25] Goethe, *Farbenlehre I*, § 174 (1810: 66; HA 13: 367).
[26] Goethe, *Farbenlehre I*, § 174 (1810: 66; HA 13: 367).
[27] Herder, *Ideen zur Philosophie der Geschichte der Menschheit* (1784), 3-4.
[28] Herder, *Ideen zur Philosophie der Geschichte der Menschheit* (1784), 4, footnote.
[29] Kant, *Allgemeine Naturgeschichte und Theorie des Himmels, oder Versuch von der Verfassung und dem mechanischen Ursprunge des ganzen Weltgebäudes nach Newtonischen Grundsätzen abgehandelt* (Königsberg & Leipzig: Johann Friederich Petersen, 1755), Preface (unpaginated). (AA I: 234). Kant's book first appeared anonymously. English translation by Olaf Reinhardt in: Immanuel Kant, *Natural Science* (Cambridge: Cambridge University Press, 2012), 204.

ideal worlds in the Goethean conception of science: "The philosopher is a borrower, for he takes a last element out of the physicist's hand, which then becomes a first element for himself."[30]

In *Goethe, Ritter und die Polarität*, Anastasia Klug characterizes the nature of the *Urphenomena*, arguing that it is not in any way an unclear or "abstract principle", but something that directly relates to the empirical and physical world (G: 188). In fact, this is the reason why Schopenhauer rejected and redefined Goethean polarity in the retina of the eye (G: 187-190). Drawing attention to the key paragraph §175 on the *Urphenomena* in the Didactic Part of the *Farbenlehre*, she points out that opposition (*Gegensatz*) and polarity for Goethe can be traced back to the sphere of art, especially to warm and cold colours. Here blue is closely affiliated with darkness and yellow with light, a polarity that Schopenhauer takes over and modifies (G: 187-188). Klug's chapter is an illuminating contribution to the Goethe-Schopenhauer relationship with regard to the polarity of the retina and the philosophy of colour perception. Fully in the Goethean spirit of the *Urphenomena* as the highest and ultimate, Müller concludes his Goethe-Ritter monograph *Ultraviolett* by leading the reader up to the cusp of this difficult topic. In fact, it becomes the final sentence and word of Müller's entire text: "Goethe sprach in solchen Situationen vom Urphänomen" (In these kinds of situations, Goethe spoke of Urphenomena) (U: 562). We share Müller's opinion that with the *Urphenomena* we reach a limit and the subject therefore remains highly *rätselhaft* – mysterious or enigmatic (U: 418).

In the foreword to the book *Seeing Colour*, Arthur Zajonc reminds us that *Urphenomena* are fundamentally painterly. He points to the fact that Goethe's ideas on *Urphenomena* in the world of nature, such as bright red-orange sunsets or the pale blue sky, were taken up by artists themselves (SC: 7-8). We'll come back to this point in a moment.

b) *Urpolarität* - Urpolarity

What was the chief scientific goal of Goethe's *Farbenlehre*? – To introduce the principle of polarity into chromatics. The author explicitly states this in §757 of the Didactic Part[31], as well as in the scientific "Confession" when talking about his original aperçu.[32] While the 1810 *Anzeige und Übersicht* provides a further succinct overview of this scientific intention:

[30] Goethe, *Farbenlehre I*, §720 (1810: 268; HA 13: 483).
[31] Goethe, *Farbenlehre I*, §757 (1810: 286; HA 13: 493).
[32] Goethe, *Farbenlehre II* (1810: 685; HA 14: 264).

> In short, it aims to study the chromatic phenomena in connection with the other physical phenomena, especially to place them into a series with what the magnet and tourmaline teach us, what electricity, galvanism, and chemical processes reveal to us, and hence through terminology and method to prepare a more perfect unity of physical knowledge. It will be shown that in colour, like in the other cited natural phenomena, there occurs a hither (*hüben*) and yonder (*drüben*), a division and union, an antithesis, an indifference, that is to say: a polarity (*Polarität*). And indeed, in a sense that is high, manifold, decisive, instructive, and furthering.[33]

Goethe's goal therefore is a "more perfect unity of physical knowledge." To attain this goal he strives to arrange colour phenomena into a series with some of the main examples of polarity found in the natural world, such as the north-soul polarity of magnetic forces in an iron magnet, or the unusual positive and negative electricity in the tourmaline stone.

The first 100 §§ of the section on physiological colours systematically set forth a different ordering and conception of the chromatic phenomena compared to Newton's *Optics*. Number §1 states that the physiological colours belong to the eye of the subject and therefore "constitute the foundation of the entire theory and reveal the chromatic harmony."[34] They called physiological because they belong to the ordinary "*healthy* eye"[35] as opposed to an unhealthy eye with cataracts or colour blindness. They are not malevolent spirits.[36] In contrast to the polarity in the inorganic sphere of magnetism and electricity in the tourmaline stone, the foundation of polarity in Goethe's colour theory is based on the 'higher' *organic* sphere: on the "reciprocal and living interaction" between the subject and object, the inner and outer worlds (§3).[37] Here in §§1-3 we already have a number of fundamental polarities: between the healthy and ill eye, between the inorganic and organic spheres, etc.

In his Introduction to the volume *Goethe, Ritter und die Polarität*, Olaf Müller underscores the importance of the principle of polarity for the Weimar poet-scientist, declaring that this principle did not remain just one scientific law among many for Goethe, but that polarity almost assumed for him the role of a cosmic or "World Formula" (*Weltformel*) (G: 11). He also relates

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[33] Goethe, *Anzeige und Uebersicht des Goethischen Werkes zur Farbenlehre*, published in June 1810 in *Morgenblatt*; reprinted in Goethe, *Erklärung zur Goethe's Farbenlehre zugehörigen Tafeln* (Tübingen: Cotta, 1810: 1; HA 13: 524).
[34] Goethe, *Farbenlehre I*, §1 (1810: 1; HA 13: 329).
[35] Goethe, *Farbenlehre I*, §3 (1810: 2; HA 13: 330).
[36] "*schädliche Gespenster*", Goethe, *Farbenlehre I*, §1 (1810: 1; HA 13: 329).
[37] Goethe, *Farbenlehre I*, §3 (1810: 2; HA 13: 330).

how the deeper understanding of polarity had enormous consequences: fruitfully leading to the use of magnets in compasses and navigation, especially at sea. Or William Gilbert's 1600 discovery that the earth is a giant magnet, with two magnetic poles, which do not entirely coincide with the geographic north and south poles (G: 16-20).

However, Müller rightly raises the issue of the limits of polarity, asking whether we are still within the domain of science if we extend the concept of polarity to other pairs, such as male/female, or good/evil etc. He notes that an "undisciplined misuse" of polarity might result not in scientific research, but rather in "ideology" (G: 15). In fact, polarity properly-speaking is no longer considered a scientific principle today. Hence, it is a key point: how universal is the principle of polarity? And how does it differ from symmetry, inversion, reflection or mirroring, reversals, parallelisms, or the principle of reciprocity? Many of these issues are discussed in the volume *Goethe, Ritter und die Polarität*, and it is noted that by means of *analogy* it is possible to heuristically apply polarity to many other domains of inquiry (G: 14-15).

It is worth recalling that Goethe himself was fully aware of the pitfalls of arbitrarily universalizing the principle of polarity. The primary models of polarity cited by Goethe throughout the *Farbenlehre* are those found in natural physical phenomena, such as the north and south poles in iron magnets, positive and negative forces in electricity, or attractive and repulsive forces in nature, etc.

The primacy of these natural-scientific models is confirmed in §696 of the Didactic Part, which furnishes a general list of polarities in two columns. Goethe writes: "Viewed in general, colour diverges into two sides. It presents an opposition, which we can name polarity and designate rather well by a + and –."[38] Here the colours yellow and blue form a polarity, as well as light and shadow. Goethe's full list of polarities in §696 is:

Plus	*Minus*
yellow	blue
light	shadow
brightness	darkness
strong	weak
warmth	coldness
closeness	distance
repulsion	attraction
relation to acids	relation to alkalis[39]

[38] Goethe, *Farbenlehre I*, §696 (1810: 259; HA 13: 478).
[39] Goethe, *Farbenlehre I*, §696 (1810: 259; HA 13: 478).

Again, in the lower part of this list we see that the forces of "repulsion" and "attraction" found in magnetic phenomena belong to Goethe's scientific concept of polarity. The magnet itself even becomes an *Urphenomenon* for Goethe. Indeed, in the "Foreword" to the *Farbenlehre* the magnetized metal iron is a microcosmic reflection of the macrocosm, since "in its smallest parts we are able to perceive what happens in the entire mass."[40] Hence, when Goethe speaks in 1792 of a Kantian-aligned "Urpolarity of all being" (*Urpolarität aller Wesen*)[41], I would argue he is especially referring to Kant's above text, the *Universal Natural History and Theory of the Heavens*. Just as Kant moves from the phenomena to the *Urphenomena*, Goethe similarly moves from 'ordinary' polarity in magnets and tourmaline to *Urpolarity* or the archetypal phenomenon of polarity itself. Everything seems to have an essential polarity for Goethe, including the human being.

Nevertheless, though Goethe recommends a broader extension of polarity beyond the field of natural science in the *Farbenlehre*, it is often as an analogy, allegory, or as a "symbolic language of nature", and not as blind mysticism or a rigid scientific law to be wielded in every sphere.[42] Goethe stresses that the concept of polarity already contains an opposition and a unity: polarity necessarily implies the existences of two distinct poles in one object. Hence, all polarity "reveals an elementary unity."[43] A magnet has two poles, but it still remains united with itself, as one magnet or one object. Similarly, on a larger scale: the earth remains a single unity and one earth, despite having two magnetic poles.

An extremely influential approach to better understanding Goethe's idea of polarity and how to integrate it into contemporary scientific notions is Olaf Müller's proposal to see it as a form of *symmetry inversion*, where the opposites can be interchanged or inverted, a *Vertauschungsoperation*. Müller states: "Where polarity reigns, there is therefore an operation of symmetry inversion. Polarity is a special kind of symmetry (Polarität ist eine spezielle Art von Symmetrie.)." (U: 556). There is especially a fundamental symmetry between light, darkness, and colour. According to Müller, true polarity has four aspects: i). "exactly two factors are opposed to each other", and these two factors b). "condition (*bedingen*) each other", c). or they can "reciprocally

[40] Goethe, *Farbenlehre I*, Vorwort (1810: xi) (HA 13: 315).
[41] This discussion occurs in the autobiographical text *Campaign in France*. It is with the Platonic Münster circle devoted to Hemsterhuis's works. See Goethe, *Campagne in Frankreich* (HA 10: 314).
[42] Goethe, *Farbenlehre I*, Vorwort (1810: xii-xiii; HA 13: 316).
[43] Goethe, *Farbenlehre I*, §453 (1810: 174; HA 13: 431).

cancel each other out" and hence, should be viewed as "antitheses" (*Gegensätze*), and d). they exhibit a certain form of symmetry. (G: 16). At the conclusion of *Ultraviolett*, Müller explains this conception of polarity and symmetry in even more detail (U: 531-560). Müller thinks that Goethe's idea of polarity functions in a manner similar to the idea of symmetry inversion in modern physics (G: 92). However, other contributors do not entirely agree with him here, and do not find a total equivalence between this idea of symmetry between light and darkness in particular. For Brigritte Falkenburg, Müller has a "non-standard optics of darkness, which in Hegel's eyes would not be better than Newton's ontology of coloured light rays and light atoms" (G: 245). In *Ultraviolett*, Müller states that he absolutely does not want to apply polarity to any sort of religious or political sphere (U: 541), and is even hesitant about treating it as a philosophical idea *per se* (U: 542). As a non-biologist, he wisely chooses to leave the question of the role of polarity in biology to other more qualified people (U: 543). His preference is physics and chemistry, the experimental domain, where the polarity between the forces of attraction and repulsion plays a central role (U: 549, 553).

One of the most interesting and fascinating topics in all three books is the fact that Goethe was convinced that there was an opposite or polar spectrum to Newton's spectrum, in which the traditional colour spectrum is replaced with a spectrum of complementary colours. Instead of sending light through a small hole in a window shutter, Goethe conceived of the inverted or symmetrical process. As *Seeing Colours* puts it: "Goethe was not convinced of Newton's argument. He had discovered that spectra occur not only with light sources, such as the sun, but also with dark shadows in light surroundings. What would Newton's spectrum look like if the sun were dark in a dazzling light universe?" (SC: 91). The book cover of *Seeing Colours* above on page 471 provides a colour reproduction of this inverted Goethe spectrum.

But how to get from the domain of inorganic polarity to that of organic polarity, and even up to the human being? We could start with the plant. For Hubert Schmidleitner, Goethe's intuitive *Urpflanze* is a promising conceptual tool for the organic world (G: 206-207), recalling that parallel to colour theory Goethe was still working on morphology. Here Schmidleitner's article raises a delicate issue – to what extent is the concept of polarity already present in the period of the *Metamorphosis of Plants*? (G: 207-208).

c) *Urversuch* – The Archetypal Experiment

Troy Vine's chapter "Goethes Newton-Kritik als interne Kritik" on the methodology of the *Farbenlehre* is outstanding (G: 31-58). He calls it an

internal critique because Goethe actually follows Newton's own methods and arguments and exposes the shortcomings of them. It banishes many misconceptions and prejudices about Goethe's lack of knowledge of the mathematical procedures of analysis and synthesis (G: 49-52), or that Goethe was ignorant of Newton's experimental optics as such. Goethe is not slavishly defended, on the contrary, he shown to have fully understood Newton's distinction between hypothesis and theory. Goethe criticizes Newton precisely for failing to have adhered to his own distinction, and rejects Newton's view that his *experimentum crucis* shows that light is composed of coloured rays, because it remains at the level of a mere hypothesis (G: 33-35, 46-51). Newton's *experimentum crucis* is one of his most fundamental experiments, and Goethe attacks this fundament at its empirical and theoretical root.

An intellectually and aesthetically pleasing article in *Goethe, Ritter und die Polarität*, is Hubert Schmidleitner's "Über eine Ungereimtheit in Goethes Beschreibung der Kantenspektren" (205-228), which also places Goethe's ideas in the milieu of his intellectual conversations with Herder (G: 206-212). Schmidleitner plays close attention to a rightly neglected aspect of Goethe's *Farbenlehre*, the early set of cards accompanying the 1791 *Beiträge*. One can only follow his arguments with keen interest, especially when he wittily terms these cards: "Choreographie der Anschauung oder rein optische Kartenspiel" (Choreography of Intuition or Pure Optical Card Games) (G: 211). He rightly maintains that these cards should be used practically, to carry out concrete experiments with a prism. In this way, the cards are surveyed intuitively (using *Anschauung*) or as a totality, and Schmidleitner helpfully provides an image of them as a correctly ordered set (G: 212). He compares them with tables from the *Farbenlehre* (G: 213-225) – exactly the perfect approach in my view. Importantly, Schmidleitner considers these pairs of cards in the light of Goethe's own designations, where he had conceived them as "zwei Pole" (two poles) and in "Gegensatz" (opposition) to each other (G: 218). The extent to which the concept of polarity can already be found in these 1791 cards is a basic question for him. These cards are for the most part presented by Goethe in integral pairs, with several curious exceptions, e.g. cards 19 and 23. Hence, we can agree with and make plural the title of Schmidleitner's article that there exist certain "*Ungereimtheiten*" (inconsistencies) in this card game. But can some of them at least be made more consistent?

As the name implies, the Didactic Part of the 1810 *Farbenlehre* seeks to instruct the learner into the foundations of Goethe's theory. Starting with the organic or living human eye, the phenomena of colour are classified into three

main types: physiological, physical, and chemical. The 1791-92 *Contributions to Optics* already had a similar pedagogical purpose. As mentioned, this short text was accompanied by a prism and a set of cards with images to encourage readers to generate the colour insights for themselves. Or as Goethe writes in the "Confession of the Author", their purpose was so that "the aperçu could brought forth in someone else's spirit just as it had so livingly worked in mine."[44] This seems to be meant literally, as card number 19 (Fig. 3) is a picture based on the upside-down window of a house.[45] Indeed, the 1791 text itself directly relates card number 19 to the experience of seeing colours on the cross bars of a window.[46] The card can be turned diagonally, to become a "St. Andrew's Cross", according to Goethe. As presented in the *Beiträge*, it has the form of a Petrine Cross, but turning it upside down brings it back to the image of the classical Christian cross. This card 19 is often considered as isolated and without a pair in the 1791 series. But just the eye creates a complementary image in its striving for totality, or produces a complementary colour, so the complementary image for this card is to be found in itself, since card 19 is symmetrical. As a consequent, by inverting card 19 and using a prism the reader can have a colour experience similar to the one Goethe had when looking at the window in the Jägerhaus in Weimar.

This basic window experiment in the *Contributions to Optics* forms a further direct symmetry with the presentation of the physiological colours in the *Farbenlehre*. Starting at paragraph number §19 the reader is introduced to successive and simultaneous image contrasts, and the main repeated experiment is one based on looking at the cross bars of a window.[47] In the observer, this results in the polar alternation of a light or dark cross generated by the organic physiology of the eye.[48] While in §61 of the Didactic Part, Goethe defends a conception of colour totality and colour harmony, in which the researcher circles and "returns back to the point" from which they started. This paragraph number §61 is identical to the perceived number 61 on the inverted card in the *Contributions*. Thus, the window experiment can be termed Goethe's *Urversuch* or original colour experiment. "Everything

[44] Goethe, *Farbenlehre II*, "Confession des Verfassers" (1810: 686; HA 14: 264).
[45] The fact that card 19 is based on an inverted house window is known in the research. For instance, see Robin Rehm, "Bild und Erfahrung. Goethes chromatisches Kartenspiel der *Beiträge zur Optik* von 1791", *Zeitschrift für Kunstgeschichte* 72 (2009): 508-510.
[46] See *Beiträge zur Optik* 1 (1791), 37-40.
[47] See §§19-40, §80, §§90-91, Goethe, *Farbenlehre I* (1810: 7-15, 35, 38-39; HA 13: 333-337, 350, 352).
[48] See §20, §29, §31, Goethe, *Farbenlehre I* (1810: 7, 10-11; HA 13: 333-335).

depends on the primary or original experiments (*Urversuche*), and the chapter that is built on them stands secure and solid."[49]

d) *Urfarben* – Archetypal Colours

Goethe underscores in the Introduction to the *Farbenlehre* that colour belongs in a natural series of polarity:

> Colour is an elementary natural phenomenon for the sense of the eye. Like the other phenomena, it manifests itself in division and opposition, in mixture and union, in elevation and neutralization, in communication and diffusion, etc., and can be best observed and understood using these general natural formulae.[50]

However, colour can not only be understood using natural formulae, but also by deploying *philosophical* expressions. This is a crux for Goethe. In line with the philosophical *Urphenomena*, Goethe speaks of *Urfarben* – "all colours can be reduced to three colours", the three primary colours, which have long been known.[51]

Philosophical formulations are more general or universal than mere natural ones: "In order to generate colour, we require light and darkness, brightness and darkness, or if one wishes to employ a more universal formula: light and non-light (*Licht und Nichtlicht*)."[52] This is because the *Farbenlehre* seeks to articulate higher or more encyclopaedic connections, as it were, and cannot confine itself solely to the domains of physics and chemistry. Goethe explains this towards the end of the Didactic Part, in the chapter on the relationship between the theory of colour and general physics:

> We found an archetypal (*uranfänglich*) and enormous antithesis between light and darkness, which can be more universally expressed by light and non-light (*Licht und Nichtlicht*); we sought to mediate this antithesis and thereby to build a visible world out of light, shadow, and colour. While developing the phenomena, we employed various formulae, which are traditionally drawn from the theories of magnetism, electricity, and chemistry. But we had to go further, because we found ourselves in a higher region and had to express more manifold relationships.[53]

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[49] Goethe, "Betrachtungen im Sinne der Wanderer", *Werke*, vol. 22 (Stuttgart & Tübingen: Cotta, 1829), 260.
[50] Goethe, *Farbenlehre I*, "Einleitung" (1810: xxxix; HA 13: 324-325).
[51] Goethe, *Farbenlehre II* (1810: 549; HA 14: 201).
[52] Goethe, *Farbenlehre I*, "Einleitung" (1810: xli-xlii; HA 13: 326).
[53] Goethe, *Farbenlehre I*, §744 (1810: 279; HA 13: 489).

In the paragraph §69 on coloured shadows in the Didactic Part of the *Farbenlehre*, Goethe draws attention to a crucial aspect of colour. He characterizes colour as "Schattiges", as something shadow-like, shadowy, or mixed with shade:

> Here an important consideration appears to which we will often return. Colour itself is something shadowy (*skieron*), which is why Kircher was perfectly correct in calling it *lumen opacatum*, and because it is related to shadow, it tends to join itself with it …[54]

This use of the Greek word *skieron* is unusual, but as Olaf Müller recalls, it underscores Goethe's view of colour as an admixture of both light and darkness and not just solely light (U: 508). The root of this word is *skia*, a word indeed signifying shadow or shade, and certain scholars see a philosophical connection with Plato's cave allegory.[55] But just as shade in English not only refers to the shadow of a large object, but still has a literary connotation with deceased souls, so too the root of this word. It can be found in an *Urbuch* in the canon of Western literature, in Homer's *Odyssey*, when in Book 11 Odysseus descends to the underworld, and encounters there the spirits or shades of the dead. With this shade-like element of colour we see how the *Farbenlehre* can pass into the domain of poetry and literature, as Goethe himself already seems to attempt in §§75-78 of the Didactic Part. The experience of coloured shadows while descending from the Brocken in the Harz Mountains is described as like entering a "*Feenwelt*" or fairy-tale world.[56] The Brocken of course makes a further literary appearance in *Faust*.

The transition from colour to the domain of painting follows a similar path via the nature of colour as something shade-like. Even more: the very origins of the art of painting appear to be connected with shadows too:

> According to Pliny's assertion, all the oldest traditions agree that painting actually began with the outline of the shadow of the human being; under the proviso that it wasn't probably real shadows or silhouette figures but rather the first lineal attempts at drawing a shape on a surface: for this indeed is the most elementary component of painting.[57]

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[54] Goethe, *Farbenlehre I* (1810: 34; HA 13: 346).
[55] For instance, see Helga W. Kraft, "Goethes *Farbenlehre* und *Das Märchen*. Farbmagie oder –wissenschaft?", in: *Die Farben imaginierte Welten*, Monika Schausten (ed.) (Berlin: Akademie Verlag, 2012), 97.
[56] Goethe, *Farbenlehre I* (1810: 32-34; HA 13: 348-349).
[57] Goethe, *Farbenlehre II* (1810: 70).

Hence, the first image or *Urbild* in painting appears to have arisen from the shadow of the human figure. As a student of painting in Italy Goethe similarly emphasized the significance of the human form as an object of artistic knowledge: "I have now grasped the human figure, the alpha and omega of everything known to us."[58]

In the history of art, a window is often viewed as the frame of a painting, as Goethe was aware from his study of Leonardo da Vinci's *Treatise on Panting*, and from living with painters during his years in Italy.[59] Some of the earliest origins of Goethe's interest in colour can be traced back to his musings on Leonardo's theory of the blue sky, as the painter and colour researcher Hubert Schmidleitner helpfully recalls (G: 207-209). *Seeing Colour* also shows the enduring fruitfulness of Goethe's colour theory for understanding the works of painters such as van Gogh, J.M.W. Turner, and Georges Seurat (SC: 8-11; 81, 108-109, 115, 144). So when Goethe glanced through the prism and saw colour on the window bars in Weimar, or when he created artistic cards to generate this same aperçu in others, there is not merely a scientific component to this event, but without doubt an aesthetic one as well. As such, this aperçu requires a practised artistic eye to fully grasp it. Or as Goethe calls it in Venice in 1786: "seeing with the eye of the painter."[60]

A complete circle can be traced in Goethe's work by means the definition of colour as shadow or shade-like in §69. Colour passes from the poetic-literary sphere, to the earliest beginnings of painting, to the coloured shadows in the physiological section of the *Farbenlehre*. It is a path that Goethe personally traversed:

> And so I had, without really noticing it, landed in a foreign field, by moving from poetry to the fine arts, and from the fine arts to natural science … I found the fortunate path back to art again via the physiological colours and through their ethical and aesthetic effects in general. (HA 14: 267).

Apart from Goethe's reference to Plotinus's philosophy in the *Farbenlehre*, where exactly to place Goethe's worldview that includes the *principle of polarity* in the history of philosophy? Goethe himself traces the first tentative beginning of such a worldview that strives at unification back to Frankfurt around 1769, when reading books like *Aurea Catena Homerii* (The Golden Chain of Homer), which posited an interconnected organic cosmos of higher

[58] Goethe, *Italienische Reise* (HA 11: 386).
[59] Goethe, *Italienische Reise* (HA 11: 517).
[60] Goethe, *Italienische Reise* (HA 11: 86).

and lower forces. The subtitle of the book is the *annulus platonis*, or the Rings of Plato. Plato's dialogue *Ion* explains how the chain of inspiration from Homer to a poet on the stage, is similar to an interlinked chain of magnetized iron rings:

> This is not an art in you, whereby you speak well on Homer, but a divine power, which moves you like that in the stone which Euripides named a magnet, but most people call 'Heraclea stone'. For this stone not only attracts iron rings, but also imparts to them a power whereby they in turn are able to do the very same thing as the stone, and attract other rings; so that sometimes there is formed a quite long chain of bits of iron and rings, suspended from one another.[61]

Hence, based on the pivotal nature of the magnet in the *Farbenlehre*, the Platonic stream could be one ancient philosophical tradition that Goethe had in mind. Moreover, in light of Goethe's insistence on a higher unity to polarity than the one found in magnets or tourmaline, another tradition could be Giordano Bruno's principle of the reconciliation of opposites. Bruno's principle is mentioned in Jacobi's 1789 edition of his Spinoza book, *Über die Lehre des Spinoza in Briefen an Herrn Moses Mendelssohn.*[62]

Lastly, there is of course the Herderian, Kantian, and Hemsterhuisian traditions, which Goethe explicitly mentions. However, there is another contemporary philosopher whose work appears to be connected with the foundations of the *Farbenlehre* but is often overlooked: Johann Gottlieb Fichte. As a few earlier historians of philosophy have noted, such as Eckart Förster[63], Goethe's above unusual polar formulation of "light and non-light" (*Licht und Nichtlicht*) on the one hand, and the method of mediating between antitheses on the other, the *Farbenlehre* seems to express the same philosophical spirit as Fichte's *Wissenschaftslehre*. Like Kant, Fichte sees a polarity in the natural world between centrifugal and centripetal forces. Like Bruno and Hemsterhuis, he seeks a reconciliation of two opposing forces. These same forces are present in human striving and interactions, and the philosopher seeks in cognition to overcome dualities of these kinds via the power of the creative imagination. Hence, the I (*Ich*) strives to know itself and everything that is not part of the I, the Not-I (*Nicht-Ich*), and to reconcile

[61] Plato, *Statesman, Philebus, Ion*. Greek with translation by Harold N. Fowler and W.R.M. Lamb, Loeb Classical Library, 164 (Harvard University Press, 1925), 421.
[62] See Jacobi, *Über die Lehre des Spinoza in Briefen an Herrn Moses Mendelssohn* (Breslau: Löwe, 1789), 304-309.
[63] Among others, see Eckart Förster, "Da geht der Mann dem wir alles verdanken!" Ein Untersuchung zum Verhältnis Goethe-Fichte", *Deutsche Zeitschrift für Philosophie* 45 (1997): 331-344.

all polarities or antitheses between itself and the world through the imagination, which ultimately manifests itself as the light (*Licht*) of the spirit (*Geist*).[64] In other words, Goethe is pointing to the complementarity between the three main principles of the *Wissenschaftslehre* and the foundation of the *Farbenlehre*.

After these reflections on the philosophical nature of the *Urphenomena* and polarity, we will now turn to an unresolved problem in the scholarship on the *Farbenlehre*.

3. The Prism Aperçu

(Fig. 4, left, Faust engraving attributed to the Dutch Painter Rembrandt 1652; right, version by J.H. Lips for Goethe's 1790 *Faust* edition.)

When exactly did Goethe have his prism aperçu? Or to invoke *kairos*, an idea from ancient Greek philosophy and culture, on what date did the opportune moment occur that sparked Goethe's intensive research into optics and colour? To be fair, the three volumes under review do not at all have this dating question as their main focus. They are of course not to be criticized for that. On the contrary, as we saw, their choice of the topic of polarity is an extremely judicious and fruitful one. I would like to show that this topic can be extended to other contested issues in the *Farbenlehre*, especially the problem of dating Goethe's prism aperçu. From this point on I will now mostly move beyond a review of these books.

It appears that Goethe intentionally presented his prism aperçu in an enigmatic manner as a riddle for the research; yet as a rationally open riddle, not as a closed or impossible one, in line with his conviction of "open mysteries" in nature, science, and art.[65] In cases of this kind, we usually don't

[64] On the Ich, Nicht-Ich, and the imgination, see: J.G. Fichte, *Grundlage der gesammten Wissenschaftslehre* (Weimar, 1794/95).

[65] On Goethe's view of "problems" and "open mysteries" (*offenbare Geheimnisse*) in science, nature, and art, see among others, Goethe, "Probleme" (1823) (HA 13: 35-37).

see that the solution itself is openly present before our eyes, until we have dispensed with preconceptions, gathered enough experience, appropriately ordered the material, adopted a suitable approach, or asked the right question.

In *Ultraviolett*, Olaf Müller acknowledges that the precise dating of this prism experience still remains an unsolved problem in the scholarship: "Among experts on Goethe's colour research it is disputed whether Goethe had already begun to assail Newton's optics in the year 1790 or only first in the following year. With strong arguments Wenzel dates the beginning of this investigation to the 17.5.1791."[66] Müller points out how scholars like Manfred Wenzel bolster support for the year 1791 by calling upon a private letter of Goethe to the Duke Carl August. In this letter of 17 May 1791, Goethe writes that he had reduced multiple colour phenomena to the "simplest principle." Müller finds "plausible" Wenzel's contention that the "simplest principle" is a reference to the principle of polarity, but judges "less plausible" the short time span for both the prism aperçu and such a complex reduction (U: 68).

In *Goethe, Ritter und die Polarität*, Hubert Schmidleitner advances the view that Goethe returned to the topic of colour "from 1790" or "around 1790" (G: 206, 207), but similarly citing the May 1791 letter[67] prefers to place the prism aperçu itself in the year 1791: "His aperçu, as he called it, was the spontaneous rejection of Newton's thesis, when looking through the prism in 1791 he realized that the colours only appeared as narrow edges at more or less strong light-dark boundaries, and not everywhere as he had expected."[68]

In an influential piece from over seventy years ago, the Goethe scholar and editor Rupprecht Matthaei had posited January or February 1790 as the most likely months of the prism aperçu, just prior to Goethe's second trip to Venice.[69] However, the more recent work of Wenzel seems to have tipped

[66] "Unter Kennern der Farbforschung Goethes ist es umstritten, ob Goethe schon im Jahr 1790 oder erst im Folgejahr begonnen hat, die Optik Newtons anzugreifen. Mit starken Argumenten datiert Wenzel den Beginn dieses Unterfangens auf den 17.5.1791". (U: 68)
[67] (G: 208).
[68] "Sein Apercu wie er es nannte, war die spontane Abkehr von Newtons These, als er bei seinem Blick durchs Prisma 1791 gewahr wurde, dass die Farben sich nur an den mehr oder weniger starken Helldunkelgrenzen als schmale Ränder zeigten, und nicht überall, wie er es erwartet hatte." (G: 211)
[69] "Dies kann nur Januar oder Februar 1790 gewesen sein, denn am 13. März machte sich Goethe auf nach Venedig." Rupprecht Matthaei, "Über die Anfänge von Goethes Farbenlehre", in: *Goethe. Neue Folge des Jahrbuchs der Goethe-Gesellschaft* 11 (1949): 250.

much expert opinion in favour of the year 1791.[70] At any rate, it appears difficult to arrive at a more precise date for this aperçu than either the years 1790 or 1791 because more specific written testimony on Goethe's part is apparently lacking.

Prima facie, Goethe's portrayal of his colour aperçu therefore seems unlike his account of his botanical aperçu. In the *Italian Journey* Goethe goes to great lengths to make sure the reader does not overlook exactly when and where his aperçu of the *Urpflanze* occurred. He even later returns to the event[71] to underscore the exact time and place of this botanical insight: 17 April 1787, in the Public Garden in Palermo.[72]

How to proceed? As stated at the outset, I will conclude this piece with a method for more accurately dating Goethe's prism aperçu. The method consists in applying the principle of polarity to this problem. However, we just saw that polarity is no longer considered a scientific principle as such; hence, this could immediately be dismissed as an out-of-date approach. Just to be clear: my aim is not at all to rehabilitate the principle of polarity, but simply to determine if its employment in Goethe's work extends to the issue at hand.

The location of Goethe's prism aperçu is not contested: it occurred in the Jägerhaus in Weimar. But the date does not seem to be given. The problem is obviously and above all a *problem of time*. The researcher could therefore ask: what is Goethe's conception of time in the *Farbenlehre*? If the aim of the work is to introduce the principle of polarity into chromatics, could polarity also play a role in Goethe's idea of time? If this proves to be the case, it might help towards solving the dating problem. Continuing this line of inquiry, we could furthermore pose the question: what is the antithesis or the polarity of time? Answer: *space*. In other words, an investigation of the idea of time in the *Farbenlehre* could include Goethe's idea of space, to see if the time and space of this aperçu reciprocally shed light on one another.

There are four steps to this demonstration. I'll provide an abridged version here. It can be further confirmed with many more references and other supporting material.

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[70] See especially Manfred Wenzel, "'… ich sprach wie durch einen Instinkt sogleich vor mich laut aus, dass die Newtonische Lehre falsche sei.' – Dokumente und Deutungen zur Datierung von Goethes Prismenaperçu", in: A. Remmel & P. Remmel (eds.), *Liber amicorum. Katharina Mommsen zum 85. Geburtstag* (Bonn: Bernstein, 2010), 541-570. Although, as Wenzel himself notes, 1791 is actually a return to the earlier proposal of scholars like Salomon Kalischer (1906) or Reinhold Solch (1998). See M. Wenzel (ed.), *Goethe-Handbuch Supplemente*. Vol. 2: *Naturwissenschaften* (Stuttgart: Metzler, 2012), 82.

[71] See Goethe, *Italienische Reise*, July 1787 (HA 11: 374-375).

[72] See Goethe, *Italienische Reise* (HA 11: 266-267).

a) Sources

As we have seen, polarity is closely intertwined with natural and aesthetic symmetry, totality, and harmony. All these ideas are deeply integral to Goethe's theory of colour, both in the various written texts and in the accompanying images. Earlier I partially cited Goethe's view of harmony from paragraph §61 of the Didactic Part of the *Farbenlehre*. I'll now quote paragraph §61 in full:

> When the elements of an organic totality are still discernible within it, we may rightly designate it a harmony. The theory of colour harmony can likewise be derived from these phenomena, and through these qualities alone, the colours become capable of being applied for aesthetic purposes. This will be seen once we have passed through the entire circle of observations and returned back to the point from which we started.[73]

I contend that in his oeuvre as a whole Goethe works in accordance with this organic idea of scientific and aesthetic harmony and continually circles back to his starting point. Colour harmony is just one instance of a much greater intellectual harmony. Goethe believed all empirical effects, from the most accidental to the highest flights of genius, are "interconnected and constantly merge into one another; they undulate, from the first to the last."[74] He often lamented that his scientific and artistic "confession of faith" (*Glaubensbekenntnis*) was misunderstood, once declaring to Schiller in 1794: "there must be another method, in which nature is not treated in an isolated and separate manner, but where we strive to present it dynamically and livingly, from the whole to the parts."[75] The problem of the dating of his prism aperçu, therefore, should be seen within this broader context; it requires a holistic approach, and supplementary material beyond the *Farbenlehre*. I think the solution to this problem can be obtained solely using works published by Goethe himself, so I'll draw the supplements from those publications.

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[73] Goethe, *Farbenlehre I*, §61 (1810: 26; HA 13: 345). See too §813 from the section "Totality and Harmony" in the Didactic Part: "Thus, although these harmonious opposites that are given to us in a narrow circle are actually very simple, it is an important hint that through totality, nature is inclined to elevate us toward freedom, and this is where we obtain a natural phenomenon that is immediately applicable for an aesthetic purpose." (1810: 304; HA 13: 502-503).

[74] Here Goethe's uses the example of a falling *Ziegelstein* to illustrate this example. See Goethe, "Chromatik" in: *Zur Naturwissenschaft überhaupt* I (1817), 320; and "Wartesteine", ibid., 380.

[75] Goethe, "Glückliches Ereignis" (published in 1817) (HA 10: 540).

Accordingly, the first step is to examine the published sources directly relating to the chronology of Goethe's colour experiences. If the autobiographical account of the prism aperçu in the "Confession of the Author" is going to be taken seriously, then the times or dates connected with it should be systematically considered as well. It goes without saying that diverging dates should not be overlooked; but inversely, any chronological convergences should be acknowledged.

Goethe's earliest scientific studies on colour were the *Beiträge zur Optik*. They were publicly announced in a statement dated "Weimar, 28 August 1791"[76] with part one of the *Beiträge* appearing at Michaelmas that same year.[77] – The 28 August is of course the date of Goethe's birthday. Hence, in the first announcement about his new colour research Goethe brings it into connection with his own birthday. We recall that no date is explicitly cited in the *Farbenlehre* when Goethe recounts his aperçu in the autobiographical "Confession"; yet he does date the opening dedication: 30 January 1808. – The 30 January is the date of the Duchess Luise's birthday, to whom the work is dedicated. Goethe circles back to this dedication at the end of the "Confession." Goethe had earlier dedicated other pieces to Luise on her birthday, including the masquerade "Planetentanz. Zum 30. Jannar 1784" (Dance of the Planets. On the 30 January 1784).[78] In terms of further biographical symmetries, Goethe had begun his journey to Italy from Carlsbad on 3 September 1786. – The 3 September is the date of the Duke Carl August's birthday, the husband of the Duchess Luise, and Goethe's patron in Weimar. Goethe remained in Italy until 1788 and the *Italian Journey* shows him becoming increasingly intrigued by the phenomena of colour in nature and in painting.[79] He returned from Italy, moved house in 1789, and subsequently had his prism aperçu. Carlsbad appears again at the conclusion of this twenty-year process of experimenting and writing about colour: "In May of the year 1810, when the printing of the *Farbenlehre* was ended, I immediately travelled to Carlsbad."[80] Goethe next began writing his autobiography.

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[76] Goethe, "Ankündigung eines Werks über die Farben", in: *Intelligenz-Blatt des Journals des Luxus und der Moden*, Nr. 9, September 1791.
[77] See Goethe, *Beyträge zur Optik*, Erstes Stück, mit XXVII Tafeln (Weimar: im Verlag des Industrie-Comptoirs, 1791).
[78] Goethe, "Planetentanz. Zum 30. Jannar 1784", in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 13 (Stuttgart & Tübingen; Cotta, 1828), 206-213.
[79] Among others, see Goethe, *Italienische Reise* (HA 11: 86-90, 139, 370-371, 439-441, 517). This text was first published in instalments in 1816-1817, 1829.
[80] Goethe, "Chromatik" in: *Zur Naturwissenschaft überhaupt* I (1822), 277.

It should now be pointed out that the exact *year* of the prism aperçu is not actually left unstated by Goethe. He supplies this year in an autobiographical work that bears the unusual title: *Tag- und Jahreshefte, als Ergänzung meiner sonstigen Bekenntnisse* (Daily and Yearly Notebooks, as a Supplement to My Other Confessions). The prism aperçu was a turning point in Goethe's biography, so it should not be surprising to find further information about it in his autobiographical texts. Writing under the rubric for the year 1790, Goethe alludes to his colour aperçu, and this account echoes the one in the scientific confession:

> The *Metamorphosis of Plants* was written as a heartfelt relief. […] Painterly colour schemes simultaneously caught my eye, and as I returned to the first physical elements of this theory, I discovered to my great astonishment that *the Newtonian hypothesis was false and untenable*. A more detailed investigation only confirmed my conviction.[81]

Hence, according to Goethe's own published testimony, his prism aperçu occurred in 1790. Here this insight is mentioned in relation to the 1790 *Metamorphosis of Plants*; it simultaneously happened while returning to the origins of colour schemes in painting; and it is communicated in an autobiographical work titled a *supplement* to his other *confessions*. This late account in the *Tag- und Jahreshefte* does indeed supplement the earlier one in the "Confession of the Author" by supplying the year of the prism aperçu's occurrence – 1790.

Nevertheless, in contrast to other discoveries like the intermaxillary bone, which Goethe excitedly transmitted to Herder in a confidential letter, it might be objected that traces of Goethe's colour discovery are not overtly present in his private correspondence until around May 1791, so the year 1790 should be ruled out as a chronological error on his part. Two possible replies to this objection: Firstly, Goethe clearly underscores that he did not always immediately reveal his ideas or discoveries privately or publicly, but sometimes kept them to himself, even for years.[82] Secondly, in the text of the "Confession of the Author" itself, Goethe admits that initially he did not know what to make of his discovery; he was told by scientific colleagues it was neither original nor primary; yet he still felt it was important because "it

[81] Goethe, *Tag- und Jahreshefte, als Ergänzung meiner sonstigen Bekenntnisse*, in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 31 (Stuttgart & Tübingen; Cotta, 1830), 13-14 (HA 10: 434-435).

[82] For instance, see Goethe, "Bedeutende Fördernis durch ein einziges geistreiches Wort" (1823) (HA 13: 37-41).

appeared to link onto some things that I had up to now experienced and believed."[83] This last point is crucial.

But only the year is given in the *Tag- und Jahreshefte*, not the precise day. We therefore need a second step.

b) Simultaneous Time

In the Historical Part of the *Farbenlehre*, Goethe is adamant that researchers need to have a true aperçu to make scientific progress. But what exactly is an aperçu? It is a correct perception of the essential nature of a phenomenon, an exceedingly consequential insight. As the authors of *Seeing Colour* write: "It is the moment in which we see something new in something familiar, the moment in which a new aspect of something shows itself." (SC: 13) Here Goethe cites a discovery by the Italian astronomer and physicist Galileo Galilei as the model of an aperçu:

> genius shows that a single case can hold for a thousand, insofar as Galileo develops the laws of the pendulum and falling bodies from the swinging of church lamps. Everything in science depends on what can be called an aperçu, a perception into what actually underlies the phenomena. A perception of this kind is infinitely fruitful.[84]

Scientific genius and aperçus are interrelated. Galilei's pendulum insight is fundamentally connected with the problem of time, and had incalculable consequences for the history and accuracy of time-keeping, a fact particularly crucial at sea, eventually resulting in the Dutch astronomer Huygens's development of a much more precise pendulum clock. Goethe's choice of this particular example reaffirms that it might be worth examining the dating of the prism aperçu in the light of his concept of time.

A conception of time can already be found in the important paragraphs §19-§61 of the Didactic Part of the *Farbenlehre*. We saw that these same paragraphs contain Goethe's original window experiment or *Urversuch*, where a person perceives the light and dark images of a cross when looking at the cross bars of a window. Goethe explains time in relation to the living human eye, saying it experiences light and darkness as a polarity and seeks the complement to these effects. Although it is a unified experience, the imprinting of these images on the retina of the eye is twofold – it occurs both *simultaneously* and *successively* in time (cf. especially §§33-34). In other words,

[83] Goethe, "Confession des Verfassers", *Farbenlehre II* (1810: 679; HA 14: 260).

[84] Goethe, *Farbenlehre II* (1810: 245-246; HA 14: 98). Goethe could have read about Galileo's insight in the book of his Weimar colleague, Christian Joseph Jagemann: *Geschichte des Lebens und der Schriften des Galileo Galilei* (Leipzig: G.E. Beer, 1787), 5-6.

if the simultaneous and successive are considered as chronological opposites or antitheses, then it could be argued that here is an idea of time based on the principle of polarity.

Philosophically, this relates in turn to Goethe's very idea of the idea itself. That is to say, we saw that the *Urphenomena* can be the *idea* of the plant or animal etc. Goethe's understands and defines the idea itself as encompassing both the *simultaneous* and *successive*:

> The difficulty of joining idea and experience together appears as a hindrance in all research of nature: the idea is independent of time and space, the research of nature is confined to space and time; in the idea, the simultaneous and successive are therefore inwardly joined, while at the standpoint of experience, in contrast, they are always separate. …[85]

Consequently, when examining Goethe's ideas or the *Urphenomena*, we are philosophically already in the sphere of the simultaneous and successive.

However, what about considering Goethe's idea of successive and simultaneous time on a larger scale, say for the year 1790 itself? This would again be in line with the title of the autobiographical text, *Tag- und Jahreshefte*, insofar as the *year* of the aperçu could perhaps elucidate the *day*.

Starting with *simultaneous* time. Look at the works Goethe was simultaneously working on in the year 1790 to see whether they harmonize, or perhaps even furnish supplementary information about the date of his prism aperçu. Some of these works have already been mentioned, so I'll just briefly summarize the key points.

i). The 1790 *Venetian Epigrams*. As the title states, this text was written in Venice in 1790; it was first published in Schiller's *Musen-Almanach* in 1796.[86] This literary almanac also contained information on events in the gospels, the weather, and celestial occurrences, such as eclipses and the phases of the moon. The *Venetian Epigrams* contains three successive epigrams relating to Newtonian colour theory. Nos. 77 and 78 cite optics, Newton by name, and his school, while no. 79 also evokes the Easter event by critically bringing Newton's doctrine into connection with the crucifixion of a "living body" on a "wooden cross" (Habt ihr einmal das Kreuz von Holze tüchtig gezimmert, Passt ein lebendiger Leib freilich zur Strafe daran).[87] Newton's *experimentum crucis* will subsequently receive a scientific and

[85] Goethe, "Bedenken und Ergebung" (1820) (HA 13: 21).
[86] First anonymously, as "Epigramme. Venedig 1790", *Musen-Almanach* (1796): 205-260; and then in Goethe, *Ausgabe letzter Hand*, vol. 1 (1828), 347-376. Only no. 77 is included in abridged HA edition, as epigram no. 31 (HA 1: 181).
[87] "Epigramme. Venedig 1790", *Musen-Almanach* (1796): 247-248.

aesthetic counterpart in Goethe's window cross experiment in the 1791 *Beiträge* and 1810 *Farbenlehre*, both of which are based on his original prism aperçu at the window in Weimar. Most importantly for the chronology, the *Venetian Epigrams* do not simply agree with the year 1790 for the dating for the prism aperçu, but considerably narrow the time frame for its occurrence. For Goethe was in Venice from March to May 1790, so his glance through the prism must have occurred in Weimar before his departure, i.e., in either January or February.

ii). The 1790 *Metamorphosis of Plants*.[88] This scientific treatise on botany was published at Easter 1790, and it is mentioned in the *Tag- und Jahreshefte* in conjunction with his colour aperçu. In fact, the *Metamorphosis of Plants* contains the same organic theory of successive and simultaneous time as the one in the *Farbenlehre*, but applied to the growth of a plant.[89] In other words, there is a direct correspondence between these two scientific treatises with regard to their idea of time. Moreover, with both the living eye and the living plant, we are in the higher domain of organic forces or the "vital force" (*Lebenskraft*)[90], as Goethe terms it, and no longer in the domain of the merely inorganic, like with the examples of magnetized iron and electrically charged tourmaline. And lastly, the *Urpflanze* transports the philosopher into the sphere of the *Urphenomena*.

iii). The 1790 *Faust: A Fragment*.[91] This text was published both separately and in volume seven of Goethe's *Schriften* in early 1790. The inside cover of the *Schriften* edition contains a picture of Faust in his study. He sees a light with a cross on the window while an adjacent spirit figure holds a mirror reflecting Faust's image (cf. Fig. 4). This engraving was made by J.H. Lips under Goethe's direction and presents a symmetrical mirror or complementary image to Rembrandt's famous Faust picture. In Goethe's text, Faust, beholds a spirit after contemplating images in an astronomical book, including that of the macrocosm. Faust's meditation on the sign of the macrocosm results in a religious "confession" – the Manichean belief in the harmony of the ascending and descending celestial forces in golden buckets

[88] Goethe, *Versuch die Metamorphose der Pflanzen zu erklären* (Gotha: Ettingersche Buchhandlung, 1790).
[89] See Goethe, *Versuch die Metamorphose der Pflanzen zu erklären* (1790), §§112-123, 73-79 (HA 13: 98-101).
[90] Goethe, *Versuch die Metamorphose der Pflanzen zu erklären*, §113, 73 (HA 13: 99).
[91] Goethe, *Faust: ein Fragment*, in: *Goethe's Schriften,* vol. VII (Leipzig: bey Georg Joachim Göschen, 1790), 1-160. Also printed separately, *Faust: ein Fragment* (Leipzig: Göschen, 1790).

or vessels.[92] This is a poetic pendant to Goethe's characterization of the Urphenomena as a cognitive ladder in §175 of the Didactic Part of the *Farbenlehre*. Goethe supplements Faust's study scene in the second 1808 edition, with Faust hearing the Easter bells, the commemoration of the resurrection of Christ after his crucifixion on the cross, and the Manichean doctrine of "two souls."[93] – Or in more philosophical language: Giordano Bruno's theory of two souls as the metaphysics of an essential polarity in the human being.[94]

Just as the aperçu of light and colours on the window cross furnishes the empirical basis for Goethe's 1790 window experiment, this 1790 poetic text of Faust and its accompanying aesthetic engraving furnish an identical image of a researcher observing an enigmatic cross of light on a window. Lastly, the 1790 text + image confirm that the ideas of *mirror symmetry* and the *Urpolarität* of all beings were similarly at the forefront of Goethe's mind at the beginning of 1790.

In summary: when Goethe says of his prism aperçu that "it appeared to link onto some things that I had up to now experienced and believed"[95], then the above ideas, texts, and images, would be prime candidates for such a concatenation. In terms of simultaneous time, these three works all mutually support the dating of Goethe's colour insight to early 1790. This dating can be strengthened by additionally including the two musical pieces published with *Faust* in the same 1790 volume of the *Schriften*: *Jery und Bätely*[96] and *Scherz, List und Rache*[97], as well as Goethe's Venice reflections on painting restoration.[98] Thus, Rupprecht Matthaei seems to be right in situating the prism aperçu in either January or February 1790. But is it possible to be even more precise than these two months?

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[92] Goethe, *Faust: ein Fragment*, in: *Goethe's Schriften*, vol. VII (1790), 8 (HA 3: 22). For one of the earliest interpretations of this passage as a reference to the Manichean golden vessels, see *Goethe's Faust. Erster und zweiter Theil.* Zum erstenmal vollständig erläutert von Heinrich Düntzer, Erster Theil, (Leipzig: Dykische Buchhandlung, 1850), 173-174.

[93] Goethe, *Faust* (HA 3: 41, 47).

[94] On his idea of "two souls" and the duality or polarity of the whole of nature, see the reprinting of original Frankfurt Latin edition of 1591, accompanied by a German translation: Giordano Bruno, *Das Buch über die Monade, die Zahl, und die Figur* (Nordhausen: Verlag Traugott Bautz, 2010), 130-139 (especially 137).

[95] Goethe, "Confession des Verfassers", *Farbenlehre II* (1810: 679; HA 14: 260).

[96] Goethe, *Jery und Bätely. Ein Singspiel* in: *Goethe's Schriften*, vol. VII (Leipzig: bey Georg Joachim Göschen, 1790), 161-224.

[97] Goethe, *Scherz, List und Rache. Ein Singspiel* in: *Goethe's Schriften*, vol. VII (Leipzig: bey Georg Joachim Göschen, 1790), 225-320.

[98] Goethe, *Aeltere Gemahlde, Venedig 1790* in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 38 (Stuttgart & Tübingen; Cotta, 1830), 215-230.

c) Successive Time

We will now briefly look at the year 1790 with respect to *successive* time. That is to say, at other *prior* years leading up to the prism aperçu. And because the philosopher should examine the first or *Urphenomena*, I'll chose examples of years that Goethe himself connects with the earliest origins of the *Farbenlehre*, and see what they point to. The Historical Part of the *Farbenlehre* itself begins in the *Urzeit* and ends with Goethe's prism aperçu.[99] Hence, its composition relates to the Goethean twofold idea of *Urzeit* or archetypal time: both the earliest time and the idea of time.

Here we find a misconception about Goethe's theory of the aperçu. A genuine scientific aperçu is not a spontaneous intuition occurring out of the blue, arising from some vague inkling or fantastical genius, but it depends on the preceding serious work of the researcher. It is not the first, but the *middle link* in a much longer chain of experiences. An aperçu shares a philosophical affinity with the cognitive ladder of the Urphenomena. Moreover, what was a youthful experience of the earth and heavens united through a Homeric *aurea catena* in 1769, is now articulated in more philosophical language:

> Every true aperçu arises from consequences and results in consequences. It is the middle link in a large, productive, and ascending chain.[100]

But not to be misunderstood about successive time. One could first look at an event in the history of Goethe's color research, and then investigate the year it occurred. For instance, one of the earliest events mentioned in the *Farbenlehre* is Goethe's experience of coloured shadows on the Brocken, which we briefly referred to above. The time of this experience is not mentioned, but a further inquiry shows it took place in the year 1777.[101] Or, we know Goethe had his aperçu in Weimar after moving house, but in what year did he first move to this town? An inquiry shows Goethe arrived in Weimar in the year 1775 after being invited there by Carl August and Luise. It is imperative to look at these events and they form key prior links in the chain of Goethe's prism aperçu. But here I am talking about the reverse procedure: first prioritizing the *time* over the event. That is, firstly, look at a Goethean reference to an early specific year in the history of his colour research that is before the year 1790; and only then secondly, inquire into the event connected with that year, to see if any sort of longer interlinked chain

[99] Goethe, *Farbenlehre II* (1810: xxiii, 679; HA 14: 11, 260).
[100] Goethe (HA 12: 414).
[101] See Goethe's own commentary to Harzreise im Winter (HA 1: 392-400).

results. Again, some of these points have already been mentioned, so I'll just summarize key items.

i). The year 1749. Goethe makes the following remarks about the origins and beginnings of his scientific knowledge:

> Thus, my research into nature rests on the pure basis of the experienced (*Erlebten*); who can take away from me that I was born in 1749, and (skipping over many things) that I diligently instructed myself using the first edition of Erxleben's *Naturlehre* …[102]

Even though Goethe's interest in the phenomena of magnetism and electricity already manifested itself in his boyhood, as he relates in his autobiography,[103] I can agree with Olaf Müller when he conjectures that Goethe's more scientific knowledge of the polarity of tourmaline and its curious relation to electricity could have come from Erxleben's work (U: 103-105). For Erxleben's *Naturlehre* contains information about the polarity of the forces in magnets, magnetism, electricity, and tourmaline. Yet I see no need to say that this scientific knowledge comes from the subsequent editions of Erxleben edited by Lichtenberg (U: 104). The first 1772 edition of Erxleben's *Naturlehre* already contains this information about the polar properties of magnets and tourmaline, close to each other in the text.[104] Moreover, here is an apparent homophone, symmetry, and contradiction. Homophone: Erleben & Erxleben. Symmetry: Goethe directs the reader to the *first* edition of Erxleben, while in the "Confession of the Author" he opines that his colour studies had not been included in the *last* edition of Erxleben, edited by Lichtenberg.[105] Contradiction: research based on nature, research based on books. Or are they just complementary?

Simultaneously in this same year of 1772 Goethe was reviewing for the *Frankfurter Gelehrter Anzeigen*, edited by his friend Johann Heinrich Merck, alias "Mephistopheles Merck."[106] Traces of Goethe's Erxleben reading can be detected in his review of Sulzer, a thinker also mentioned in the "Confession of the Author." This review and other texts from the time describe the creative and destructive forces in polar opposition in the

[102] See Goethe, "Betrachtungen fortgesetzt zu Seite 315" in: *Zur Morphologie I,4* (1822): 361.
[103] Goethe, *Aus meinem Leben. Dichtung und Wahrheit*, 1811 (HA 9: 117-118).
[104] Johann Christian Polykarp Erxleben, *Anfangsgründe der Naturlehre* (Göttingen und Gotha: J.C. Dieterich, 1772). Paragraph §534 on tourmaline, pages 430-432. Paragraph §537 on magnet, starting page 436.
[105] Goethe, *Farbenlehre II* (1810: 684; HA 14: 263).
[106] Goethe, *Aus meinem Leben. Dichtung und Wahrheit*, 1814 (HA 10: 72).

universe.[107] Another early source of tourmaline for Goethe could be a 1782 scientific paper written by J.H. Merck himself. Merck's *Lettre à M. de Cruse, sur les os fossiles d'éléphants et de rhinocéros, qui se trouvent dans le pays de Hesse-Darmstadt*[108] underlines the unusual polar properties of a tourmaline specimen found near Frankfurt.[109] In terms of successive time, the year 1772 seems to be important link to Goethe's later 1790 colour aperçu. Yet the year *explicitly* given in the above passage on Erxleben is not 1772, or a year earlier in his boyhood, but one that points us much further back in Goethe's biography, back to 1749, the year of his birth.

ii). The year 1749. Goethe refers to the year 1749 in the Historical Part of the *Farbenlehre*. He points out that 1749 is when the French painter and engraver Jacques Gautier d'Agoty expounded a "correct aperçu" of his theories on colour. Although Gautier has the right insight, there remains opposition, he is up against the Newtonians and the French Academy of Sciences: "In November of the year 1749 he reads a comprehensive treatise (*memoire*) to the academy […] at the same time as this capable man was putting the French academy under pressure, I lay in the cradle as a child of a few months."[110] What was Gauthier's correct aperçu while Goethe was in the cradle? It was of the *Urphenomena* that "all colours can be reduced to three colours", i.e. of the *Urfarben*, of the three primary colours.[111] Thus, in the *Farbenlehre*, Goethe draws a direct parallel between the *Urphenomena*, a correct aperçu, and the year of his birth.

iii). The year 1749. After completing the *Farbenlehre* Goethe immediately began writing his autobiography *Aus meinem Leben – From My Life*. The year 1749 is found at the opening of the first instalment, *Poetry and Truth*: "On the 28 August 1749, at midday with the first stroke of the bells at twelve, I came into the world in Frankfurt am Main. The constellation was fortunate."[112] Goethe's autobiography begins with the exact day, month,

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[107] See *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 33 (Stuttgart & Tübingen; Cotta, 1830), 24-33. Likewise the duality of forces in the 1772 essay "Von Deutscher Baukunst" in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 39 (Stuttgart & Tübingen; Cotta, 1830), 339-351.

[108] *Lettre à M. de Cruse, sur les os fossiles d'éléphants et de rhinocéros, qui se trouvent dans le pays de Hesse-Darmstadt* (Darmstadt: Imprimerie de la Cour & de la Chancellerie, 1782).

[109] "Je m'attendois surtout de jouir de votre étonnement, quand je vous aurois montré une Tourmaline qui a ses Poles attractifs & répulsifs & qui a été trouvé dans les environs de Francfort." (I cannot above all wait to see your astonishment when I show you a piece of tourmaline, whose has attractive and repulsive poles and that was found in the vicinity of Frankfurt.) *Lettre à M. de Cruse* (1782), 5.

[110] Goethe, *Farbenlehre II* (1810: 549; HA 14: 201).

[111] Goethe, *Farbenlehre II* (1810: 549; HA 14: 201).

[112] Goethe, *Aus meinem Leben. Dichtung und Wahrheit* (Tübingen: Cotta, 1811), 3 (HA 9: 10).

year, and place of his birth. There follows a poetic and symbolic description of the heavens over Frankfurt at the time, but the underlying astronomical observations are still empirically correct. The last instalment of *Poetry and Truth* published by the poet himself ends with the adult Goethe and his mother contemplating his childhood cradle.[113] Hence, the conclusion of *Poetry and Truth* evocatively orbits back to his birth at the start of *Poetry and Truth*. In a famous passage in the same text Goethe speaks of all his works as being "fragments of a great confession."[114] Fragments have to be collected together in order to make a whole. Goethe's confession here seems to be identical with this religious spirit: "I am the alpha and omega, the first and the last, the beginning and end."[115] The 1795 *Märchen* similarly has the announcement "The time is at hand!" (Rev. 1:3, 22:10) as one of its foci. Evidently Goethe's idea of simultaneous and successive time should be examined in this tale.[116]

These autobiographical passages in *Poetry and Truth* can be supplemented by the prose commentary to the poem *Urworte*, where Goethe puts forward his *philosophy* of the day of birth using ancient Greek terms. The birth is when the daimon, individuality, or genius of a person particularly reveals itself.[117] The daimon is opposed to tyche, also known fortuna, fate, chance, or destiny. Goethe also gives tyche another name – *das Zufällige*, the accidental, while our daimon is "necessary" (*notwendig*). Here is an antithesis between the necessary and the accidental, necessity and chance; but like in the Neoplatonic tradition of Plotinus, the daimon "again and again invincibly returns" despite the opposition from tyche.[118] In addition to the ancient Greek word *skieron* (shadow) used by Goethe to define colour, with these *Urworte* we are in the sphere of the *Ursprache* or archetypal language.[119]

What happened on the day of Goethe's birth? This is when his eye first "perceived the light."[120] In terms of *Urphenomena*, this is Goethe's earliest direct experience of sunlight, or of the *Urlicht*, a name he gives to the sun in the *Farbenlehre*.[121] According to Giordano Bruno, the five senses are the five

[113] Goethe, *Aus meinem Leben. Dichtung und Wahrheit* (Tübingen: Cotta, 1814), 537-538 (HA 10: 74).
[114] Goethe, *Aus meinem Leben. Dichtung und Wahrheit* (Tübingen: Cotta, 1812), 166 (HA 9: 283).
[115] Rev. 22:13.
[116] Goethe, *Märchen* (HA 6: 216, 218, 226).
[117] See Goethe, *Urworte. Orphisch* (commentary) (HA 1: 403-405).
[118] Goethe, *Urworte. Orphisch* (commentary) (HA 1: 403-405).
[119] The *Ursprache* was of course a subject treated in depth by both Herder and J.G. Fichte.
[120] Goethe, *Aus meinem Leben. Dichtung und Wahrheit* (1811), 4 (HA 9: 10).
[121] Goethe, *Farbenlehre I*, §337 (1810: 128; HA 13: 404).

windows of the monad or individuality.[122] In this tradition in the history of philosophy, the eye is a window. At Goethe's birth in Frankfurt, the window of his eye was looking at the light of the sun, just as in Weimar his eye was looking at the window. In the *Farbenlehre*, Goethe also speaks of the year of the birth of a person: "the year of birth contains in this sense actually the true prognostics of the nativity, more in the sense of the confluence of earthly things than the sequential effects of the heavenly constellations."[123] Thus, although Goethe's autobiography presents his birth empirically and symbolically, describing the situation of the planets, constellations, and the phase of the moon, his overall attitude about this in the *Farbenlehre* is not astrological, poetical, or mystical, but rationally sober and astronomical. That is, more like Ptolemy's *Almagest* than his *Tetrabiblos*.

To summarize: if an examination of simultaneous time supported the dating of the year 1790 for Goethe's prism aperçu, a study of the earliest successive time leads us back to the year 1749, and to the day of his birth. It is apparently the first link in our chain. We recall that the very first public announcement of his new colour theory is in a piece dated to his birthday. Goethe clearly seems to believe that light, aperçus, Urphenomena, genius, and birth, are all interconnected. Of course, the researcher does not need to agree or even disagree with him here, but rather should aim to present as accurately as possible Goethe's own ideas on these topics.

In short: according to simultaneous and successive time, Goethe ultimately seems to be pointing to a specific relation between his prism aperçu in Weimar and his birth in Frankfurt. When he speaks of harmony as circling back to the point from which one started, does he mean it literally, back to the point of birth? If that is true, the inquiry so far into Goethe's idea of time may have uncovered a few promising chronological leads, but it still has not yielded a more exact solution to the dating of his prism aperçu. In fact, it currently leaves us with two unreconciled opposites or unmediated polarities. A polarity of time: early 1790 and 28 August 1749; and a polarity of space: Weimar and Frankfurt.

We obviously need another step.

d) Astronomy

We recall that in paragraph §75-§78 of the Didactic Part of the *Farbenlehre* Goethe has painted a remarkable scene of the phenomenon of coloured shadows which he experienced during his decent from the Brocken. Instead

[122] See Giordano Bruno, *Das Buch über die Monade, die Zahl, und die Figur*, 231.
[123] Goethe, *Farbenlehre II* (1810: 243; HA 14: 96).

of the shadows being dark or colourless, Goethe perceives them to be green. He compares this green with the green seen by underwater divers in diving bells.[124] These divers include the celebrated astronomer Edmund Halley, whose name is given to the comet that periodically returns to the skies above the earth roughly every 76 years. Via the light entering in through a small window in the diving bell, Halley once saw a red colour on his hand, like that of a damask rose, while the shadow in the water below was coloured green.[125] This unity of colour experience in diametrically opposed geographical regions of the earth leads Goethe to exclaim:

> The same phenomenon that I perceived on a lofty mountain, is observed by others in the depths of the sea, and thus nature is everywhere in harmony with herself.[126]

The result of an organic totality and harmony is that one returns back to the starting point. When Goethe published the *Beiträge zur Optik* in 1791, he included a drawing on the cover of the accompanying pack of cards (Fig. 5).

(Fig. 5: Goethe, Cover vignette of Optics Cards, 1791)

It contained an astronomical motif: an eye as the sun, or an eye in identity with the light of the sun. The formation and origin of the eye lies in the light of the sun, in an astronomical body. The cover picture also contains clouds and a rainbow, and some basic instruments of colour investigation, a prism and mirror. Comparing this eye to paintings and pictures, it appears that this eye is based on the eye of Goethe himself. The poet-scientist's principal organ of cognition is the window of his eye: "The eye was above all the organ with which I grasped the world."[127] Like an artist or painter he would have used a mirror to draw this cover picture.

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[124] Goethe, *Farbenlehre I* (1810: 32-34; HA 13: 348-349).
[125] Goethe, *Farbenlehre I* (1810: 638-640). An explanation of this via the water as turbid medium is presented in §§663-666 of the Polemic Part.
[126] Goethe, *Farbenlehre I*, Didactic Part, §78 (1810: 34; HA 13: 349).
[127] Goethe, *Aus meinem Leben. Dichtung und Wahrheit*, 1811 (HA 9: 224).

Starting at paragraph §1 of the *Farbenlehre*, the physiology of the eye and its living polarity is the alpha and omega of the work. In paragraph §2 Goethe refers to the *couleurs accidentelles* (accidental colours) of Buffon. Like the necessary daimon and the accidental tyche, here is an opposition between the eye and the accidental colours that must be reconciled. Goethe first learnt about accidental colours as a twenty-year old in Frankfurt, in a text published in 1769 by the French scientist Nicolas de Béguelin: *Mémoire sur les ombres colorées* (Treatise on Coloured Shadows).[128] For Béguelin builds on Buffon's work, as well as referring to coloured shadows and the astronomer Edmund Halley's experience in the diving bell.[129] In the *Farbenlehre*, Goethe indirectly connects Béguelin's experiments with his own original window experiment.[130] The rings of Plato from the year 1769 are becoming further interlinked.

The *Farbenlehre* encyclopaedically draws upon and refers to the work of countless other scientists in many different fields. To do this with honesty and integrity, while not overlooking the contributions of others, gives rise to a form of *aesthetic* aperçu, as Goethe remarks when writing about the astronomer Johannes Kepler:

> How much he reveres his master and teacher Tycho! […] How happily he speaks about Copernicus! How assiduously he points out that the sole beautiful aperçu, where history can still be utterly gratifying, is that genuine human beings in all epochs announce one another in advance, refer to one another, prepare for one another.[131]

Astronomers and astronomy play a special role in the content and composition of the *Farbenlehre*. As we have seen, Goethe repeatedly appeals to astronomers like Galileo Galilei, Wilhelm Herschel, Edmund Halley, and Johannes Kepler, specifically as models for fruitful scientific aperçus, or in the case of the astronomer Tycho Brahe, as the model for a narrow and one-sided aperçu. Astronomy is inscribed in the textual symmetry of the entire *Farbenlehre* itself. The Introduction to the *Farbenlehre* begins by insisting on the correct empirical and conceptual center of our astronomical system, which is of course solar and not lunar. While the work ends with the important infrared insight of the astronomer Herschel, the discoverer of

[128] Nicolas de Béguelin, *Mémoire sur les ombres colorées*, in: Histoire de l'Académie Royale des Science et Belles-Lettres, Année MDCCLXVII (1767) (Berlin: chez Haude et Spener, 1769), 27-40.
[129] Nicolas de Béguelin, *Mémoire sur les ombres colorées*, 39.
[130] Goethe, *Farbenlehre II*, Historical Part (1810: 579-580).
[131] Goethe, *Farbenlehre II*, Historical Part (1810: 248-249). (HA 14: 100).

Uranus. Here we have a circle in the astronomical sense – the revolutions of the heavenly bodies.

Although sharp criticisms of this science and its instrument-based methods can be found in Goethe's work[132], his repeated recourse to astronomy here should not be surprising, because colour arises from the interplay of light and darkness, and his original prism aperçu arose from the light of the sun. Or did it? Perhaps this is a one-sided assumption and we are still only looking at the part and not the whole.

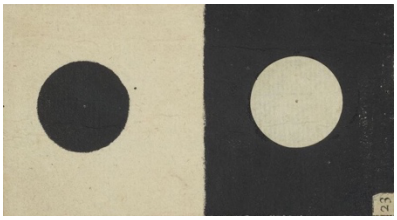
When faced with a difficult research problem, Goethe recommends finding a "pregnant point" to see if it might lead to a solution.[133] There exist other scientific disciplines as options, but let's return to the above two polarity problems and the dating of Goethe's prism aperçu, and conclude by contemplating them from the standpoint or lens of astronomy as it were. Indeed, the lens of the telescope is a supplementary instrument in the *Farbenlehre*, and one Newton himself was working with when he had, in Goethe's eyes, his "hypothetical", "petrified" (*erstarrtes*), and "false aperçu."[134] The hypothetical, incorrect, and one-sided, are crucial in intellectual history, insofar as opposition to them can lead to what is truer, more accurate, and whole. A distinction is made in §729 of the Didactic Part between astronomers who observe and astronomers who calculate.[135] Goethe favours observation, so perhaps an observational perspective in this field will help us find such a pregnant point. There is an enormous amount of further supporting material in his work, here I will have to confine myself to the barest minimum.

i). The polarity of space: How are the two different cities of Weimar and Frankfurt geographically or astronomically related in space? Of course, many correspondences exist, here is just one example related to astronomical polarity. Both Weimar and Frankfurt lie on the same *Polhöhe* or latitude: 50°. This is also the case for Carlsbad, from where Goethe departed on his journey for Italy on 3 September, 1786. In fact, Goethe was supposed to depart Carlsbad for Italy on 28 August, his birthday. He explicitly refers to this fact and the latitude or *Polhöhe* of Frankfurt in the first opening paragraph of the *Italian Journey*. *Polhöhe* in German gets its name from the poles of the earth, and seen from this empirical but global perspective, Weimar and Frankfurt

[132] For instance, in Goethe, *Wilhelm Meisters Wanderjahre* (1829) (HA 8: 120-121). On Goethe's relation to astronomy, see among others, Aeka Ishihara, "Goethe und die Astronomie seiner Zeit. Eine astronomisch-literarische Landschaft um Goethe", in: *Goethe-Jahrbuch* 117 (2000): 103-117.
[133] Goethe, "Bedeutende Fördernis durch ein einziges geistreiches Wort" (HA 13: 40).
[134] Goethe, *Farbenlehre II*, Historical Part (1810: 402, 417, 419, 479).
[135] Goethe, *Farbenlehre I*, Didactic Part, §729 (1810: 271-272; HA 13: 485).

share this spatial relationship in common. These two poles in Goethe's life and work form a unified pair through their latitude.

ii). The polarity of time: How can the times of early January 1790 and 28 August 1749 be astronomically reconciled? We recall that the very tripartite classification of the *Farbenlehre* occurred to Goethe during the period of observing the surface and phases of the moon through the lens of a Herschel telescope. Astronomically, therefore, we could consider time from the standpoint of the lunar month and examine the lunar phases. Here too we find a polarity: between the new moon and full moon. From the vantage point of the earth, the new moon is when the sun and moon are in *conjunction* and no sunlight is reflected by the moon; the full moon is when they are in *opposition*, and the lunar surface is fully illuminated by the sun. Goethe explains these phases of the lunar month in §17 of the Didactic Part of the *Farbenlehre*, observing how the moon in conjunction (small, dark, new) appears one fifth smaller than when in opposition (large, bright, full).[136]



(Fig. 6: Goethe, Optics card number 23, 1791)

This polarity between the new moon and full moon can be visualized by looking at card number 23 from the *Beiträge zur Optik* (Fig. 6). To have an experience more identical to Goethe's 1790 original prism aperçu by taking into account the phase of the moon is not some directive by the late Goethe, but can already be found in the text of the 1791 *Beiträge* when he recommends supplementing the window cross experiments on card 19 with further experiments on card 23. Seen through a prism, the circular forms on card 23 become "half-moon-like" (*halbmondförmig*).[137] *Halbmond* is the German term for the first quarter of the moon's phase. Moreover, among the entire group of prism cards, number 23 appears isolated and not to have another image as a literal counterpart, just like card 19 initially does (Fig. 3). I suggest card 23 be paired with the cover image of the eye as the sun (Fig. 5), insofar as sun and moon form a complementary image and pair. Consequently, looking through a prism at the colours generated on card 19

[136] Goethe, *Farbenlehre I*, §17 (1810: 6). (HA 13: 332).
[137] See *Beiträge zur Optik* 1, §65 (1791), 39.

+ card 23 can lead to a fuller experience of Goethe's original aperçu. Returning now to some of the key episodes above from this astronomical perspective of lunar time and the phases of the moon.

Goethe's genius was born on 28 August 1749 – it was a full moon. The birth was difficult, the infant almost died and had to be revived. As Goethe relates, both the sun and full moon were in the sky, and this maximal phase of the moon had to pass before he could be born.[138] Here is literally a pregnant point. It was the overcoming of an opposition, daimon struggling with tyche. Daimon and tyche have complementary astronomical identities – they represent the sun and moon.[139] The precise date of Goethe's original entry into Weimar, where his fate became inextricably linked with Carl August and Luise, is the 7 November 1775.[140] The light of the moon on this propitious day was at its greatest – it too was a full moon. We just cited Goethe's influential early experience of coloured shadows on the Brocken. The *Farbenlehre* recommends a specific lunar phase for best viewing this phenomenon – under the light of a full moon.[141]

The very first text in the *Farbenlehre* is not the Introduction or Foreword, but the dedication to Luise. Goethe circles back again to this dedication at the very end of the "Confession of the Author", writing: "And so here at the conclusion, like already at the beginning, the work that was luckily completed under her influence is gratefully dedicated to that princess who cannot be revered enough."[142] The date of Luise's birthday is the 30 January and it is directly stated in the dedication. We recall that Goethe dedicated the *Dance of the Planets* to Luise on an earlier birthday, a text that refers to Herschel's recent discovery of the new planet Uranus.[143] Is Luise, therefore, another Makarie-like figure in Goethe's work, whose significance

[138] Goethe, *Aus meinem Leben. Dichtung und Wahrheit* (Tübingen: Cotta, 1811), 3 (HA 9: 10).
[139] There is a general consensus in the research that Goethe's poem *Urworte* on daimon and tyche was partly inspired by his reading of Georg Zoega. This astronomical interpretation can be found in Georg Zoega, *Abhandlungen* (Göttingen: in der Dieterischen Buchhandlung, 1817). 39-40.
[140] See the text printed on the 50th Jubilee anniversary of his entrance into Weimar: *Zu Goethe's Jubelfeste in Weimar den siebenten November 1825*.
[141] Goethe, *Farbenlehre I*, Didactic Part, §76 (1810: 33; HA 13: 348-349). For an overview of this experiment of this kind, cf. *Seeing Colour*, 28-29.
[142] Goethe, *Farbenlehre II* (1810: 692; HA 14: 269). The Didactic Part of the *Farbenlehre* was already finished in 1808, and the dedication is dated: "Weimar, 30 January 1808."
[143] There the planet Uranus is referred to under the early suggested name of Cybele. See Goethe, "Planetentanz. Zum 30. Jannar 1784", in: *Goethes Werke. Vollständige Ausgabe letzter Hand*, vol. 13 (1828), 212.

only dawns on us, when, like Wilhelm Meister, we look out the window and observe the astronomical phenomena?[144]

That may be, but a historical date is not just a literary motif but an empirical and scientific fact. In this purely factual sense, the date of 30 January is not hidden, but openly present before our eyes in the opening pages of the *Farbenlehre*. If Goethe is consistent and rigorous in his striving for empirical totality and aesthetic harmony on the one hand, and in his adherence to the principle of "open mysteries" on the other, then the 30 January 1790 should be the solution to the problem of his prism aperçu, and the phase of the moon on this date should similarly be full. Consulting an almanac, calendar, or astronomical epherimedes, indeed confirms that there was a full moon on 30 January 1790. The above polarities of space and time, between Goethe's birth in Frankfurt and the prism aperçu in Weimar, can be astronomically reconciled by means of latitude and the phase of the full moon in the lunar month. Astronomy is an *aurea catena* in Goethe's work.

But it could immediately be objected that there was also a full moon on 1 January 1790, as well as another on the 1 March 1790, and that one of these two dates might be the correct one for the prism aperçu. That is to say, January 1790 was unusual in that there were two full moons in the same month, with February having none, and Goethe had not yet left for Venice on 1 March. Nevertheless, considering Goethe's repeated emphasis on the relationship between aperçus, Urphenomena, complementarity, and scientific genius, there is a greater and more open unity with the contents and composition of the *Farbenlehre* and the January date in the dedication.[145]

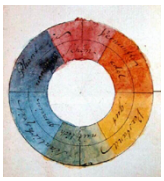
To conclude: Goethe's idea of time in the *Farbenlehre* provides a method for finding the exact date of his prism aperçu. For when Goethe's eye first saw the light on the day of his birth in Frankfurt, and successively, when he fortuitously put a prism to his eye in Weimar and saw colour vividly manifested on the cross bars of the window, the source of this light was simultaneously from both the sun and the full moon, the moon as the complement and mirrored light of the sun. Systematically and philoso-

[144] Cf. Goethe, *Wilhelm Meisters Wanderjahre* (1829) (HA 8: 121-122). In this regard, see Aeka Ishihara, *Makarie und das Weltall: Astronomie in Goethes 'Wanderjahren'* (Weimar: Böhlau, 1998), and Reto Rössler, "Goethes Sternwartenszene der 'Wanderjahre' und die Transformation(en) deskosmologischen 'Weltgebäudes' der Auflklärung", *Goethe-Jahrbuch* 137 (2020): 51-62.

[145] That a solution is to also look at the astronomical calendar or the epherimedes to confirm the date of 30 January 1790, also forms a curious but harmonious connection with Rupprecht Matthaei's discovery in the Goethe archives that the Ur or very first note of Goethe on colour in Weimar seems to have occurred on the back of an old disused 1789 house calendar. See Rupprecht Matthaei, "Über die Anfänge von Goethes Farbenlehre", in: *Goethe. Neue Folge des Jahrbuchs der Goethe-Gesellschaft* 11 (1949): 251.

phically applying the principle of polarity to this problem reveals that his prism aperçu occurred on 30 January 1790. Indeed, precisely this date yields an astonishing harmony between the *Farbenlehre* and the rest of Goethe's scientific, poetic, religious, and autobiographical writings:

> This will be seen once we have passed through the entire circle of observations and returned back to the point from which we started.[146]



(Fig 7: Goethean colour circle)

[146] Goethe, *Farbenlehre I*, §61 (1810: 26; HA 13: 345).