

## THE CAVATINA'S TIMBRE

*An analysis of Beethoven's expressive 'timbral' markings in the String Quartet Opus 130 through the lens of Goethe's Theory of Color and Music Theory*

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### **Abstract**

A discussion and analysis of musical timbre as “*klangfarbe*” / *tone color*  
in Beethoven’s Cavatina from the String Quartet Opus 130  
through the lens of Goethe’s *Theory of Color*

## I. INTRODUCTION

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

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

Musical timbre was described as tone color - or *Klangfarbe* by the German physician and physicist Herman von Helmholtz in 1863 in his work *On the Sensations of Tone as the Physiological Basis for a Theory of Music*.<sup>1</sup> Helmholtz, is best known for his research on color vision, the sensation of sound, and the perception of tone, and explored, throughout his work, the quality of tone – or timbre - in relation to color. However, despite modern advances in timbral analysis – especially with the advent of spectral analysis, no theory exists today, according to Wayne Slawson, that “is consistent with the auditory system in describing musical practice and defining a set of operations through which timbre can be adequately and objectively analyzed and discussed.”<sup>2</sup> Even though timbre has played a central role in musical performance practice since at least the early Renaissance if not earlier, the task of defining a theoretical language through which to discuss and analyze timbre continues to be an enigma for music theorists. This paper proposes two paths of inquiry into this dilemma.

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1 H. von Helmholtz, *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (Braunschweig: J. Vieweg, 1863), trans. A. Ellis as *On the Sensations of Tone* (London: Longmans, Green, 1885), p. 24n. Ellis translated *Klangfarbe* as “quality of tone.”

2 Wayne, Slawson, *The Color of Sound: A Theoretical Study in Musical Timbre*, *Music Theory Spectrum*, Vol. 3 (Spring, 1981), pp. 132-141

First, through a discussion of Johann Wolfgang von Goethe's *Theory of Color*, it presents the possibility of an alternative understanding of the color spectrum to the Classical Newtonian perspective, one based on a phenomenology of perception rather than an abstraction of mathematical laws. Secondly, this paper demonstrates that timbre has always been an integral element of musical performance practice. While the study of timbre has been somewhat side-stepped in music theory until recently, it has always remained critical in performance practice. Building on an extensive manuscript study of Beethoven's complete String Quartets by Nicholas Kitchen of the Borromeo String Quartet at the New England Conservatory this paper proposes that Beethoven, over the course of his life, developed a highly nuanced and sophisticated language of expressive markings in his compositional process. Though they have never been published, these markings play a critical role in communicating the timbral performance practice of his music to performers.

In this paper, I will examine the facsimile manuscript of the *Cavatina* from the String Quartet Op 130 informed by Kitchen's analysis and consider some of Beethoven's expressive markings as performance indications for timbre and tone color. I will attempt to describe these timbral expressive markings through the lens of Goethe's *Theory of Color* and *Music Theory*. In doing so I hope to identify and articulate a language of timbral analysis – specifically for the 8-measure section of the *Cavatina* marked *beklemmt*. Beginning with a historical and philosophical overview of the Goethe's scientific epistemology specifically in his *Theory of Color*, I will then explore Kitchen's analysis of Beethoven's expressive markings as they relate to articulation, dynamics, swells, and slurs, and then bring these two explorations together in the *Cavatina*'s eight measure middle section marked *beklemmt*.

## II. BACKGROUND

*“The only philosophy which can be practiced responsibly in the face of despair is the attempt to contemplate all things as they would present themselves from the standpoint of redemption.”*<sup>3</sup> – Theodore Adorno

The evolution of the concept of *timbre* is as rich and varied as the word itself is elusive. The original spelling as “*tymbre*” is derived from the Latin noun “*tympanum*,” meaning a drum or bell.<sup>4</sup> The Dictionnaire de l’Academie Françoise (1694) defines it is a kind of bell with a clapper inside struck by a hammer. Later definitions include the quality, beauty, and *resonance* of a musical tone – especially in relation to the human voice. According to Emily Dolan these definitions of *timbre* can all be traced back through history’s various inventions of musical instruments attempting to imitate the human voice.<sup>5</sup> Some of these include Leonardo da Vinci’s rosin-wheeled keyboard or *viola organista* (1489), Hans Heiden’s *Geigenwek* (1775), and most notably Benjamin Franklin’s *glass armonica* (1761). In 1765 Jean-Jacques Rousseau first described musical *timbre* as one of three primary attributes of sound: ie. *pitch, volume, timbre*. Based on his belief of melody as being the ‘heart of music,’ Rousseau’s definition of *timbre* - as the ideal of sound in relationship to the human voice, begins a new discourse on instrumental music and instrumentation. One of the first of these discussions on *timbre* and instrumentation is found in Ancelet’s *Observations sur la musique, les musiciens, et les instruments* (1757) in which the quality of tone of each instrument is discussed. This is followed by several instrumentation treatises including the work of Johann Friedrich Daube (1773) on the emerging

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<sup>3</sup> Theodore Adorno, *Minima Moralia: Reflexionen aus dem beschädigten Leben* (Frankfurt: Suhrkamp Bibliothek, 1951), 100-1.

<sup>4</sup> Emily Dolan, *The Orchestral Revolution: Chapter 2: Haydn and the Technologies of Timbre* (New York: University of Cambridge Press, 2013) 54

<sup>5</sup> *Ibid.*, 55

concept of tone sonority or *klangfarbe* of the different instruments. The historical turning point in this development is Hector Berlioz's well known *Grand traite d'instrumentation et d'orchestration modernes* (1844).

In the 19<sup>th</sup> century, the birth of modern aesthetics gave rise to two streams of thought – rooted in the opposing philosophies of Jean-Jacques Rousseau and Jean-Philippe Rameau. Rousseau's belief in mathematical proportions eventually leads to Kant's aesthetic ideal of as a function of form, while Rameau's criticism of Rousseau, and his belief in a *corps sonore*, is taken up in Johann Gottfried von Herder's *Viertes Wäldchen* (1769). Removing form from a discussion of the aesthetic ideal in music, Herder argues that our human perception and cognition – and their impact on the soul – are the true study of a musical aesthetic. Following musicians such as Leopold Mozart, CPE Bach, Johann Joachim Quantz, and especially Rameau, Herder believes that music does not start with harmony, but distinguishes between *resonance* - of which the overtone series and therefore harmony is a direct phenomenon, and *tone* – the quality of our experience of a sound. Herder creates a philosophical representation of *tone* with the help of Gottfried Wilhelm Leibniz's concept of the *monad*, which he calls *musical monadology*. In *Kalligone - On the Uncomfortable and Beautiful* published in 1800, Herder challenges the *Aesthetics* of Immanuel Kant from his *Critique of Judgement* (1790). He argues that the basis of the aesthetic ideal is not a metaphysical concept of form, but rather an individually felt human sensation. Herder's perspective redefines individual human perception, rather than an abstract mathematical understanding, as the quintessential instrument of aesthetic judgment which he calls the *clavichord of the soul*.<sup>6</sup> This perspective on timbre gives birth to a modern

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<sup>6</sup> Ibid.,

understanding of aesthetics in which timbre is defined as *musical aesthetic attention itself*.<sup>7</sup>

However, the origin of this perspective can be traced back to Herder's contemporaries, Friedrich Schiller, and Johann Wolfgang von Goethe.

A long and historic friendship and collaboration in Weimar between Herder, Schiller, and Goethe fueled a philosophical movement which is known today as the *Weimarer Klassik*.<sup>8</sup> These three artistic and philosophical giants strove to *synthesize* elements of Romanticism, Classicism, and Rationalism into what Schiller called *Rational Empiricism* because they believed that it was only through a genuine wedding of empiricism and rationalism that phenomena could be understood and not merely theorized. Through empirical experience, careful observation, and a methodological inquiry into phenomena, the *Weimarer Klassik* developed a 'phenomenological' conception and explanation of reality, as opposed to an abstract and transcendental explanation. They believed this to be possible through the mutually supportive work of careful empirical observation and rigorous ontological reflection. Schiller believed that only the purest and most expansive sensible perception with the most finely tuned and free powers of thought, or *Wahrnehmungsvermögen*, could lead to 'true scientific understanding.'<sup>9</sup> For Goethe, the goal of Schiller's true scientific understanding was to be able to perceive the unity of phenomena – how the individual part participates in the whole. He endeavored to understand what necessitates unity and how this unity could be cognized or *re-cognized*. As his methodology was developed through the practice of observation, Goethe began to question Kant's claim that a definite

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<sup>7</sup> Ibid.,

<sup>8</sup> *Weimarer Klassik* (1772-1805) was a German literary and cultural movement including Johann Wolfgang Goethe, Johann Gottfried Herder, and Friedrich Schiller, who worked to establish a new humanism out of a synthesis of Romanticism, Classicism, and the Age of Enlightenment.

<sup>9</sup> Emil Carl Wilm, *The Philosophy of Schiller* (Boston, Luce and Company, 1912)

knowledge of something is beyond our cognition. This became the central problem for him: how Kant could draw limits on cognition if Kant himself had never crossed these limits? Goethe challenged Kant's position to prove that it is possible to go beyond these limits.

During the Enlightenment, Cartesian-Newtonian rationalism split between experience and understanding. Immanuel Kant, in his *Critique of Judgement*, claims that "nature and freedom can only be unified in the hypothetical and unknowable supersensible substrate."<sup>10</sup> This hypothetical ideal eventually became the basis of the Idealism of George Frederic Hegel who claims in the opening of his *Aesthetics: The Idea of Artistic Beauty or the Ideal* "that the nature of man's duality and inner conflict is the opposition or contradiction between pure thought - the world of laws and their universality, and man's sensuous existence - feeling, the heart, and emotions."<sup>11</sup> Hegel goes on to argue that the highest truth which can resolve this duality into a single unifying ideal is Freedom. In an oversimplified trajectory, the path from Newton to Hegel through Kant is one of increasing opposition between polarities. An opposition which only human freedom has the potential or possibility to resolve. The early Romantics, including the *Weimarer Klassik* however, challenged this dualism of the Newtonian-Kantian project. Matter and mind, for them, were not two separate realities, but rather two sides of a single reality. While Kant claimed that the thing in itself is infinitely unknowable, Goethe and his colleagues believed that the very possibility of knowledge and philosophy depended upon an interconnected relationship or unity between self and the world, or as Schelling states: "Nature should be spirit

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10 Immanuel Kant, *Critique of Judgement*, 1790 (Cambridge University Press, 1998)

11 Hegel, George Frederic, Miller, A.W. *Aesthetics: The Idea of Artistic Beauty* (Oxford: University Press, 1977)

made visible, spirit the invisible nature.”<sup>12</sup> Thus, Herder, Goethe, and Schiller created a lateral scientific world-view that challenges the Cartesian-Newtonian-Kantian paradigm. However, the contemporary philosopher, Dalia Nassar, suggests that Goethe initially agreed with Kant concerning the gap between an idea and the experience of this idea. For Kant, this gap is due to the incongruity between the singularity of perceived individual experience, and the generality of the universal concept which we assign to this experience. This incongruity, for Kant, becomes the contingency of our knowledge and understanding. For Goethe however, the gap between experience and idea is not contingent on understanding, but on the difference between the temporal and spatial character of experience, and the non-temporal and non-spatial character of ideas. Goethe describes this as follows:

“The difficulty of uniting an idea with an experience presents obstacles in all scientific research: the idea is independent of space and time, while experience is bound by space and time. In the idea, simultaneous elements are intimately bound up with sequential ones, but our experience always shows them to be separate; we are seemingly plunged into madness by a natural process in which we are to conceive of something as both simultaneous and sequential.”<sup>13</sup>

Nassar goes on to show how successive and simultaneous temporal structures are ‘intimately connected’ in the idea but are ‘always separated’ in our experience.<sup>14</sup> How is it possible, if at all, to overcome this gap and unify the difference between an idea and an experience? In answering

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12 Susanna Lindberg, *The Legacy of Schelling's Philosophy of Nature* (Würzburg, Verlag Königshausen & Neumann GmbH, 2008)

13 Johann Wolfgang von Goethe, Rudolf Steiner, *Metamorphosis of Plants*, (Spring Valley, NY. Anthroposophical Press, 2008), 25

14 Dalia Nassar, *The Relevance of Romanticism: Essays on German Romantic Philosophy* (Oxford University Press, 2017), 15

this question, it is necessary to explore Goethe's scientific method and the paradigm which underlies his thinking in more detail.

In '*The Experiment as Mediator between Subject and Object*' Goethe describes his philosophy of science as the process by which "the human being himself, to the extent he makes use of his senses, becomes the most exact physical apparatus that exists."<sup>15</sup> In this method of science as art, the experiment becomes the mediator between nature, or the phenomena being observed, and the experimenter. Whereas Cartesian-Newtonian science defines 'expansion of knowledge' as a logical and linear evolution based on facts, Goethe's science defines the 'expansion of knowledge' as: "observing the transformation in natural phenomena over time and the resulting transformation, through this observation on the inner life of the experimenter."<sup>16</sup> Through his disciplined practice of observation, Goethe learned to discern what he called a 'hidden relationship' or *Geheime Verwandtschaft*. This relationship determines how one form of a phenomenon can transform into another form while remaining part of the underlying phenomena or *Ur-phänomen*. It is this organizing principle or *archetype* which guides the relationship of the parts: a virtual image or *Bild* emerging and re-emerging through the interaction between an experience and its idea. According to the Goethe scholar Frederick Amrine, Goethe's capacity to visualize this image or *Bild* is the ability to synthesize a particular experience with its related idea through what he calls 'noetic ideation' or *Denken*.<sup>17</sup> Thinking carried out as cognizance that is not only the function of that part of the brain used for mentation

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15 Frederick Amrine, Schmid, F. J. Zucker, H. Wheeler, *Goethe and the Sciences: A Reappraisal*. *Taxon* 38, no. 3 (1989): 445

16 Ibid.: 446

17 Ibid.: 440-41

or *Sinnen*, but one involving an act of creative imagination which he calls ‘the living imaginal beholding of Nature’ or *das lebendige Anschauen der Natur*. For Goethe, nature is always in constant movement and change (*morphosis*). To perceive the archetype of this change (*metamorphosis*) in nature requires the cultivated capacity of cognition (*Denken*) through the cognitive organ (*Gemüt*). These are different from the normal cognition used to perceive (*Sinnen*) based on the Intellect (*Sinn*).<sup>18</sup> Out of this understanding, Goethe developed two dynamic concepts which he used throughout his scientific work; one of Polarity (developed in his *Chromatology*) and the other of logical sequence or developmental transformation (used in his *Morphology*).

Goethe’s methodology of philosophical and scientific inquiry stands in contrast to the Newtonian and Kantian method which commences with an idea, applies this idea onto a given experience, and concludes that the idea, precisely because it is abstract, cannot depict the empirical given.<sup>19</sup> Goethe, on the other hand, begins with particular experience and strives to perceive and create, through the effort of his own imagination, something which defines this experience as an organizing principle or archetype. Goethe offers us the possibility of a synthesis between our idea and our experience. He describes this synthesis as the integration of thinking and perception: “my perception itself becomes a form of thinking, and my thinking a form of perception.”<sup>20</sup> For Nassar, Goethe’s Romantic Empiricism is ultimately both empirical and rational as it seeks to make conscious or explicit the idea in the observation. It does not remain only on the level of observation, nor does it eliminate reason. Rather, it synthesizes both and

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<sup>18</sup> Dalia Nassar, *Romantic Empiricism after the “End of Nature* (Oxford University Press Scholarship Online, 2014), 14

<sup>19</sup> Dalia Nassar, *The Relevance of Romanticism: Essays on German Romantic Philosophy* (Oxford University Press, 2017), 7

<sup>20</sup> Johann Wolfgang von Goethe, Steiner (ed 1908), *Metamorphosis of Plants*, (Spring Valley, NY. Anthroposophic Press, 2008), 25

creates something new. According to Nassar, Goethe describes how in an idea the sequential and simultaneous elements are intimately connected whereas in direct experience they are always separate. She asks whether it is possible to integrate an idea with experience if the idea is often contrary to the temporal structure of experience? Goethe responds that through the practice of *observation* it is possible to synthesize the two. Because the different stages of development in an organism pre-suppose and anticipate one another, the development of the various parts of the organism occur in a sequential relationship to each other. The possibility of a future stage of development is always inherent in an earlier phase.

Goethe's methodology involves learning to see the successive individual parts as a continual process of transformation over time in a single and simultaneous perception. The problem is that this perception cannot be experienced empirically through the senses. Rather, it evolves through the practice of *visualization* from memory.<sup>21</sup> By re-creating in our *mind's eye* the succession of individual parts we gradually learn to perceive what has taken place before us, but which remains invisible to the physical eye in the temporal moment. If we consider the phenomena in a developmental sequence and attentively follow the transition of *discontinuous images* backward and forwards, a *continuous imagination* is formed. We learn to discern the transition between parts; how each part relates to the others before and after it. By dissolving these transitions into one unified activity, this imagination gradually synthesizes the experience and idea.<sup>22</sup> Goethe's unique and powerful claim is that our perception transforms itself through imagination. He argues that perception always begins as something passive, while imagination

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21 Dalia Nassar, *Romantic Empiricism after the "End of Nature"* (Oxford University Press Scholarship Online, 2014), 29

22 Ibid., 21

can only be active. By activating our perception through imagination, Goethe proposes to diminish and eventually dissolve the gap between experience and idea – something which Kant maintained only hypothetically possible and which Hegel believed was only a reality through a realization of the ideal of freedom.

Goethe's epistemology, therefore, challenges our idea that knowledge is only representational and that the known object (phenomenon) remains passively receptive to the active knowing subject (human). Goethe's view implies that the act of knowing is not morally neutral, but that it always involves a specific ethical demand, namely the demand to remain open to being transformed by what is known. The knower, in other words, is in a relationship of obligation to what is being known: an obligation to know in the right way. This, in turn, implies that the knower must be open to transformation "in order to intimate properly that which is being asked to be known."<sup>23</sup> Thus, the act of knowledge is a process which always carries an obligation to what is known, an obligation which affects both the knower and the known. This obligation cannot exist apart from the particular phenomenon, for it is only in seeking to understand that we are transformed. In other words, to know responsibly and to be transformed are only possible when there is a particular ontological reality demanding to be known in a particular way. The epistemological act of knowing is not separate from the ontological reality of knowing, and the two are ultimately connected to a specific situation with a particular ethical demand and a moral responsibility.<sup>24</sup>

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23 Dalia Nassar, *The Relevance of Romanticism: Essays on German Romantic Philosophy* (Oxford University Press, 2017), 34

24 Dalia Nassar, *Romantic Empiricism after the "End of Nature"* (Oxford University Press Scholarship Online, 2014), 17

### III. GOETHE

*“All things come into being through the conflict of opposites,  
and the sum of things flows like a stream...  
Nothing endures but change.”*  
- Heraclitus

Johann Wolfgang von Goethe, considered by many to be Germany’s most celebrated poet and writer, devoted considerable energy during his lifetime to scientific research. He considered his treatises on color theory, anatomy, and botany, including ‘*The Metamorphosis of Plants*’ and *Theory of Color*, to be of equal, or even greater significance, to his literary works.<sup>25</sup> In a new introduction to *The Metamorphosis of Plants*, Gordon L. Miller describes the poet-scientist’s oeuvre in the following way: “To promote not only a greater but also a deeper knowledge of the natural world, Johann Wolfgang von Goethe envisioned a fuller integration of the poetic and scientific sensibilities that would provide a way of experiencing nature both symbolically and scientifically - simultaneously.”<sup>26</sup> For Goethe, this integration between art and science is ultimately, in Miller’s own words, a synthesis between “Romanticism and Modernity.”<sup>27</sup> This integration of art and science found expression in Goethe’s aesthetic theory of organicism which would eventually become the central aesthetic and philosophical paradigm connecting the nineteenth and twentieth centuries. Goethe himself believed in the long-term universal

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<sup>25</sup> Johann Wolfgang von Goethe, *Metamorphosis of Plants/Versuch die Metamorphose der Pflanzen zu Erklären* (Gotha, Ettinger, 1790). Also published in Goethe’s complete scientific writings: *Zur Morphology*. Goethe essentially discovers the homologous nature of leaf organs in plants. Although the British vertebrate anatomist Sir Richard Owen is generally credited with first articulating a definition of the word "homology" in 1843, it is clear that Goethe had already arrived at a sophisticated view of homology and transformation more than fifty years earlier.

<sup>26</sup> Gordon Miller, *The Metamorphosis of Plants* (Cambridge: MIT Press, 2009), x.

<sup>27</sup> Ibid., xi

application of his discoveries when he writes that: “when a few big formulas are achieved, they all must be One; everything arises out of the One and lead back again to the One.”<sup>28</sup> Any discussion on Goethe, therefore, must begin with the understanding that underlying all of his work – both artistic as well as scientific is a universal principle of polarity. For the scientist as much as the artist, the point of departure for any creative process is the acknowledgment of a polarity which is the necessary pre-condition for creation, transformation, and evolution to take place. This process then gives birth to something which is different from the polarity out of which it is created. This is, in oversimplified terms, the essence of Goethe’s scientific and artistic paradigm.

Goethe’s *Metamorphosis of Plants* presents a vision of the human-nature relationship which places the human being neither in opposition to nor in unity with nature. It describes a process of detailed observation and imaginative reflection which creates a mutually dynamic relationship between the observing subject - the human - and the observed object, Nature. In 1787, Goethe first articulated this finding: “It has become apparent to me that within the plant organ we ordinarily call the leaf - a true Proteus is concealed, which can hide and reveal itself in all formations. From top to bottom, a plant is all leaf, united so inseparably with the future bud that one cannot be imagined without the other.”<sup>29</sup> In this statement, Goethe is not equating the whole plant with a single leaf. What unifies the plant is not its structure, but rather the principle of formation and development in each part of its structure. If the plant’s parts are perceived next to one another, then, according to Goethe, one can begin to recognize a morphological continuity between the parts in which each part assumes a form that is a modification or progression of the

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28 Ibid., xii

29 Ibid., xiv

whole.<sup>30</sup> Goethe articulates two primary principles which govern this process of metamorphosis.<sup>31</sup> The first is the principle of polarity expressed in *expansion* and *contraction*.

This process, developing throughout the lifecycle of a plant, follows seven stages:

- i. Seed – contraction
- ii. Seed leaves and stem leaves – expansion
- iii. Stem/calyx – contraction
- iv. Flower/petals – expansion
- v. Reproductive organ: stamen/pistil/ovaries – contraction
- vi. Fruit – expansion
- vii. Seed – contraction

The second principle which develops throughout these seven stages of expansion and contraction is the principal of intensification which Goethe calls *Steigerung*. With each alternating phase, the expansion or contraction intensifies towards the final goal of reproduction in the fruit and seed.

In observing the development of plants, through their morphological continuity along a triple axis of contraction, expansion, and progression, Goethe arrived at a universal image or what he called an archetype for the development of the plant; the internal unity of coherence which defines the plant.<sup>32</sup> Inherently connected to its growth and development, each part of the plant becomes an expression of a particular stage or phase of this developmental process. The unity which emerges over time and is realized in and throughout the plant's transformation or metamorphosis, from seed to seed - through its seven stages of development— is the essence of the archetype. This archetype of the transformation of the lifecycle of the plant can be observed in the development of the plant's most visible part - the leaf.

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<sup>30</sup> Ibid., 7

<sup>31</sup> Johann Wolfgang von Goethe, ed. R Steiner, *The Metamorphosis of Plants* (Spring Valley: Anthroposophic Press, 2008), 29

<sup>32</sup> Ibid., 30-32

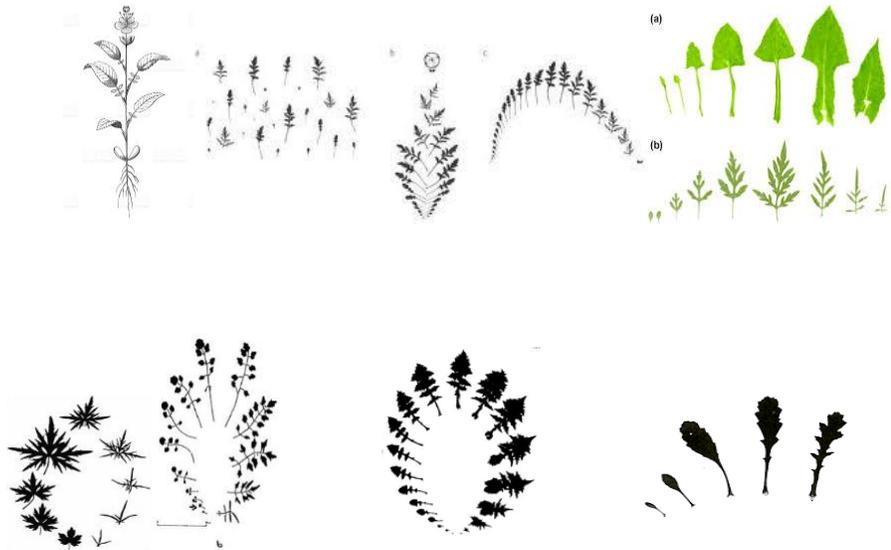


Figure 1: Illustration of Goethe's archetype of the plant in *The Metamorphosis of Plants* in the development: expansion, contraction, and intensification of the leaves.

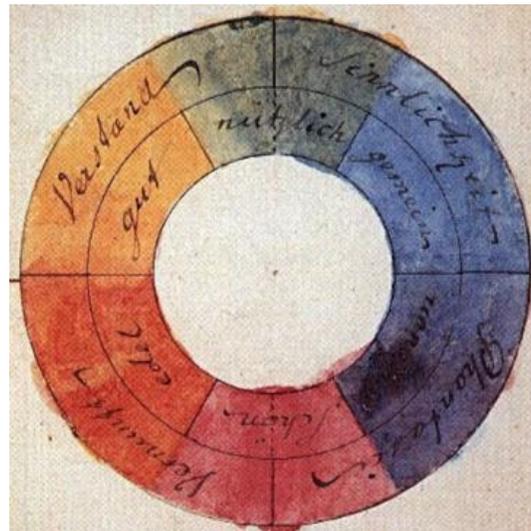


Figure 2: Goethe's Color Wheel

Similar to his *Metamorphosis of Plants*, Goethe's *Theory of Colors* (*Zur Farbenlehre*) published in 1810 is founded on as similar universal archetype of polarity. In his preface to the *Theory of Colors* Goethe explains how, in developing the *Theory*, he strove to apply the principle of *polarity*, a proposition that belonged to his earliest convictions and was integral to his entire

study of nature.<sup>33</sup> Until this time it was generally acknowledged, as Isaac Newton had shown in his *Optiks* published in 1704, that colorless or white light was made up of the component colors which refract at different frequencies when directed through a prism. Goethe, however, wrote after his own discovery that:

“along with the rest of the world I was convinced that all the colors are contained in white light; no one had ever told me anything different...But how I was astonished, as I looked at a white wall through the prism, that it stayed white! That only where it came upon some darkened area, it showed some color, then at last, around the windowsill, all the colors shone... It didn't take long before I knew there was something significant about color to be brought forth.”<sup>34</sup>



Figure 3: Newton's prism experiment

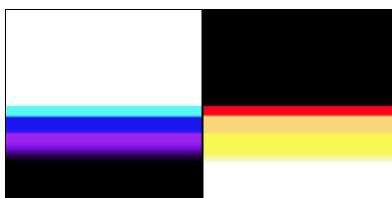


Figure 4: Goethe's dark and light color spectra

<sup>33</sup> Karl Robert Mandelkow: Goethe's Briefe (*Goethe's Letters*). 2. edition. Vol. 2: Briefe der Jahre 1786–1805 (*Letters of the years 1786–1805*). Christian Wegner publishers, Hamburg 1968, p. 530. "Das für Goethe's gesamte Naturbetrachtung konstitutive Prinzip der Polarität gehört zu seinen frühesten Überzeugungen..., an denen er niemals irre geworden sei (Brief an Schweigger, 25. April 1814). Im Vorwort zur *Farbenlehre* wird es als *Hauptabsicht des gegenwärtigen Werkes* bezeichnet, dieses universelle Prinzip auch *auf die Farbenlehre anzuwenden*." (Italics mark citations that may only slightly have been adapted to the descriptive sentence regarding the grammar.) Translation: "*The principle of polarity, that is constitutive for all of Goethe's study of nature, belongs to the earliest of his convictions..., that he had never lost faith in (letter to Schweigger, April 25, 1814). In the preface to the Theory of Colors, it is called the main intention of the work at hand to apply this universal principle also to the theory of colors.*"

<sup>34</sup> Goethe, Goethe's Werke, Weimar: Hermann Böhlau, 1887–1919, II. Abtheilung: Naturwissenschaftliche Schriften, Bd. 4, pp. 295–296

Unlike Newton and his contemporaries, Goethe did not see darkness as an absence of light, but rather as polar to, and interacting with light, in order to create color. According to Rudolf Steiner, in Newton's view, the light which streams into a dark space has no resistance from the darkness to overcome it. Goethe however, pictured to himself that light and darkness related to each other like the north and south pole of a magnet. The darkness can weaken the light in its working power. Conversely, the light can limit the energy of the darkness. In both cases, color arises.<sup>35</sup> The central contribution of Goethe's discovery is that our human experience and perception of color results not from light alone, but from an interaction between light and darkness. Yellow is a light which has been dampened by darkness; blue is a darkness weakened by light. The art/painting term for this is the Italian word for light-shadow *Chiaroscuro*.

For Goethe, the highest degree of light, such as that of the sun, when seen through the medium of the atmosphere slightly thickened, appears to us as yellow. If the density of such a medium is increased, or if its volume is greater, we see the light gradually become a yellow-red hue, which at last deepens to a deep crimson red. The archetype of this is the sun-set on the horizon. If on the other hand darkness is seen through a semi-transparent medium, which is itself illumined by a light striking on it, a blue color appears: this becomes lighter and paler as the density of the medium is increased, but on the contrary, appears darker and deeper the more transparent the medium becomes. The archetype of this atmospheric light phenomena is the blue

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35 Steiner, Rudolf (1897). *Goethe's World View, Chapter III The Phenomena of the World of Colors*. (published in German as *Goethe's Weltanschauung*) "[Rudolf Steiner Archive: Steiner Books GA006](#)". Archived from the original on 2012-09-03. Retrieved 2012-10-23.

sky. For Goethe, “all fact is really theory. The blue of the sky reveals to us the basic law of color. Search nothing beyond the phenomena, they themselves are the theory.”<sup>36</sup>

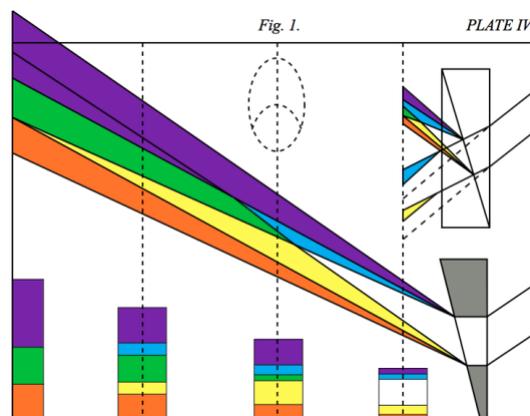


Figure 5: Goethe observed that color arises at the edges, and the spectrum occurs where these colored edges overlap.

In *The Inner Nature of Color* J Leonard Benson describes the two spectra of Goethe's Color Theory. Benson begins by stating that no prismatic scale, including Newton's experiment with the *camera obscura*, can occur without the cooperation of both light and dark. In Newton's experiment, the closed wall of the dark chamber around the hole through which he shone a light ray was the darkness necessary for the 'refracted' colors to appear on the opposite wall. Goethe discovered in his experiments that the light/dark relationship determined a polar reversal in the order of the colors when there was stronger light (white) than darkness (black/shadow) and vice-versa. Furthermore, he found that by manipulating the prism he could then mix the polarity in the middle colors to create a new third color: green - where dark dominated, and magenta - where light dominated. These relationships are the 'dark' and 'light' spectra. The first spectrum is the

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<sup>36</sup> Quoted in translation in: Hughes, Peter (1992). "Performing Theory: Wittgenstein and the Trouble with Shakespeare". *Comparative Criticism*. 14: 85.

‘dark spectrum’ – which produces green and the second is the ‘light spectrum’ which produces magenta.

Figure 6: A direct comparison between Newton’s and Goethe’s Theory of Color

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

	and reflection.	
Analysis	White light decomposes into a spectrum of all colors.	There are only two pure colors—blue and yellow; the rest are degrees of these. Citation: (Theory of Colors, Volume 3, Paragraph 208/209)
Synthesis	Just as white light can be decomposed, it can be put back together.	Colors recombine to shades of grey.
Particle or wave?	Particle	Neither, since they are inferences and not observed with the senses.
Color wheel	Asymmetric, 7 colors	Symmetric, 6 colors

To stay true to his own perception, without resorting to an explanation, was the essence of Goethe's scientific method. Ludwig Wittgenstein, in his *Remarks on Color* –in part as a reflection on Goethe's work describes that what Goethe provided in his *Theory of Colors* was really not so much a theory, as much as a *rational and psychological description* of color.<sup>37</sup> While the theory of Newton and his successors is based on excluding the color-seeing faculty of

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37 Wittgenstein

the eye, Goethe founded his theory on the eye's experience of color.<sup>38</sup> Goethe's critique of Newton is ultimately not an attack on reason or science, though it has often been portrayed in this way. His critique maintains that Newton had mistaken mathematical imagining as the pure evidence of the senses. While Goethe tried to define the scientific function of imagination: to interrelate phenomena once they have been meticulously produced, described, and organized ... his reification of darkness was rejected by modern physics as both Newton and his followers all defined darkness as an absence of light. However, Newton's particle theory was later combined with Huygen's wave theory to show that color is the visible manifestation of light wavelengths which physicists today attribute to the corpuscular and undulatory character of light—comprising the wave - particle duality. In the final analysis, according to Schopenhauer's *On Vision and Colors*, Goethe's *Theory of Colors* delivers what is promised by its title: *Data for a Theory of Color*. Important, complete, and significant data, rich material for a *future* theory of color. He did not, however, undertake to furnish the theory itself; hence, as he himself remarks and admits on page xxxix of the introduction, he has not furnished us with a real explanation of the essential nature of color, but really postulates it as a phenomenon, and merely tells us how it originates, not what it is. The physiological colors ... he represents as a phenomenon, complete and existing by itself, without even attempting to show their relation to the physical colors, his principal theme. ... it is really a systematic presentation of facts, but it stops short at this. It is my personal conviction that one of the future possibilities for the continuations of Goethe's *Color Theory* can be found in the "Rose of Temperaments" (*Temperamentenrose*), an earlier color wheel study

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38 Ernst Lehrs, *Man or Matter* Archived 2014-01-10 at the Wayback Machine, retrieved January 10, 2014

from 1798/9 by Goethe and Schiller, matching twelve colors to human character traits and grouped into the four temperaments.

German	English	Symbolism
Purpur	Magenta (or purple) see below	<i>Schön</i> (beautiful)
Rot	Red	
Gelbrot	Orange	<i>Edel</i> (noble)
Orange		
Gelb	Yellow	<i>Gut</i> (good)
Grün	Green	<i>Nützlich</i> (useful)
Blau	Blue	<i>Gemein</i> (mean, common)
Violett	Violet	<i>Unnöthig</i> (unnecessary)
Blaurot		

Figure 7: Rose of Temperaments

This grouping is taken up by Benson in his work on the Inner Nature of Color and the Four Elements Theory. Without going into extensive detail, Benson traces the historical, aesthetic, and phenomenological relationships between the ancient Greek cosmology of the four elements (Earth, Water, Air, Fire) with their primary phenomenological processes (combustion, rarefaction, liquefaction, condensation) and their polarized qualities or characteristics (hot/cold, wet/dry). With these, he builds a considerably elaborate and nuanced framework for an understanding of the *Four Elements Theory* in relationship to the four temperaments (choleric, melancholic, sanguine, phlegmatic), four directions (North, South, East, West), and ultimately – four ‘primary colors’ which he defines as Red, Yellow, Blue, Green/Magenta – depending on the process/spectrum involved.

#### **IV. ASDR & Timbre**

Is it possible to use Goethe's principle of polarity and Benson's four elements theory to discuss musical timbre? We know that the two primary factors in identifying the timbre of any sound are the quality of its beginning or attack and the nature of its unfolding and ending - or sustain/decay/release. This can be expressed using the acronym ASDR (Attack, Sustain, Decay, Release). When the beginning and end of any given sound are removed, it becomes increasingly difficult for us to identify its timbral or tonal source. In this paper, I would like to propose the possibility of relating the beginnings (or attacks) and endings (sustain/decay/release) of notes as a potential Goethean polarity or continuum for discussing timbre, and I suggest that Beethoven left us clues in the manuscripts that show us that he was thinking about this in his work.

ADSR related to articulation and dynamic in Beethoven's expressive markings:

- I. Articulation (Attack)
- II. Dynamic (Sustain)
- III. Swells (Sustain/Decay)
- IV. Slurs/Beaming (Sustain/Decay/Release)

#### **V. BEETHOVEN'S EXPRESSIVE MARKINGS**

Beethoven greatly developed and expanded a system of notating articulation and dynamics from his predecessors. A detailed recent examination of his manuscripts, however, suggests the possibility that he may have evolved a much more highly sophisticated and nuanced system than has ever been published or analyzed. It is known that Beethoven usually wrote out the notes (pitched rhythms) of his works first, often returning with a colored wax pencil or different colored ink to mark in articulations, dynamics, dynamic changes, note-beaming, and

slurs. This indicates the possibility that he considered this a separate creative process from the harmonic/melodic/rhythmic compositional process. I will consider this second step as Beethoven's 'timbral' compositional process. An extensive research over many years led by Nicholas Kitchen of the Borromeo String Quartet at The New England Conservatory of Music in Boston of the manuscripts facsimiles and first editions of the complete string quartets, piano Sonatas, and Symphonic works shows us that Beethoven may have evolved a system of notation which includes many more gradations of dynamics that are currently printed. It also demonstrates that he developed the same degree of nuance in his articulation markings, a highly nuanced system of dynamic modulation and a form of slurring as an indication of descriptive phrasing rather than prescriptive bowing (such as was used by his contemporaries). However, this highly nuanced and differentiated system for notating timbral elements was usually lost in the streamlined printing of the first edition publications of his works.

“What I have discovered working closely with Beethoven's manuscripts is that he employed a far more elaborate system of expressive markings in his manuscripts than we see in print. By "expressive markings" I mean all the markings which communicate with the player how the notes should be played to achieve expression: this includes beaming of notes, ties of notes, staccato and articulations, slurs, swells, dynamics, changes of dynamics including continuation marks, and words denoting character. This more complex system is evident in the great majority of his manuscripts after Op. 30, and the elaborateness of his use of these markings increase with time so that the manuscripts of works such as Op. 123, 125, 126, 127, 130, 131, 132, 133 and 135 have the highest levels of complexity. Editors in general have treated these as insignificant variants of basic markings.”

- *Nicholas Kitchen, Borromeo Quartet, New England Conservatory of Music, Boston.*

Taking just one of multiple possible examples from Kitchen's analysis: when "fo", "for" or "forte" appear in the manuscript, editions have treated these all as equivalent to "f". In contrast, Kitchen does not consider "fo", "for" and "forte" to be equivalent. He finds that a wide range of subtle distinctions is represented through the detail of the way Beethoven writes these expressive markings in his manuscripts. For Kitchen these markings are helpful in understanding

the expressive landscape of each work on both the small scale and large scale. In preparing his editions of Op. 130, he takes a "diplomatic" approach to representing the expressive markings in the manuscript. This approach is similar to the approach scholars take when they create a "diplomatic" rendition of Beethoven's sketches. In these renderings, the pitch content and the spatial content of the sketch page are preserved but they are put into a more legible form. In his own edition, Kitchen focus is on the accurate representation of the expressive marks. His hope is to allow players and scholars to more easily discuss and evaluate the content of these markings. As of now, if one does not read the manuscript directly, there is no way to know that this wider variety of expressive marks even exists.

### **i. Articulation (attack)**



Figure 8: Articulation (attack)

Different energies of articulation are often used simultaneously, and this will create a particular voicing because of the different energies, but it does not mean that instruments play different lengths. Also, these energies are completely independent of dynamic - so one can have Long Line Staccato in pianissimo or a dot in fortissimo. In connection to dynamics, it is possible some of Beethoven's techniques of differentiation for staccato were inspired by Haydn. In his manuscripts, Haydn uses at least 3 types of staccato: Dot, Medium Line Staccato and Long Line Staccato. See Appendix for examples from Kitchen's analysis of Beethoven's expressive articulation markings in his manuscripts.

### **ii. Dynamics (Sustain)**

In his manuscripts Beethoven uses a wider spectrum of dynamics than what we see in print. In piano dynamics, he works with the letter or letters "p" by employing horizontal lines on the stem or stems: either 2 lines, 1 line, or no line. In forte dynamics, he chooses how many of the letters of the word "forte" to use: "f", "fo", "for" or "forte"; and how many letters of "fortissimo" to use: "ff", "ffmo" or "fortissimo". Noticing one related use of the horizontal lines that Beethoven puts on "p", there is a mode of abbreviation that Beethoven uses when he notates "Allegro": he puts "All" and then "o" with two horizontal lines beneath the "o", resulting in the mark "Allo//". Regarding how many letters of a dynamic he includes, Beethoven may have taken some inspiration from Haydn. In Haydn's manuscripts, when he wants a special emotional quality in one or more parts, he will mark "pianiss." instead of just "pp". For Beethoven, in almost all opus numbers after Op. 30 there is active use of dynamics that incorporates single and double underlines on the stems of the letter "p" for piano dynamics and various numbers of letters used for the writing of the words "forte" and "fortissimo". There is also a pair of special opposite marks: the "ffmo" mentioned above has its opposite, "ppmo". The meaning of the lines on the stem of the letter "p" are related to emotional intensity: one line has some emotional intensity, two lines have much more emotional intensity. The underlines do not change the volume level of the playing. An imperfect analogy might be that adding one line is like adding the mark "dolce" and adding two lines is like adding the mark "espressivo".

The spectrum of Beethoven's dynamics uses in his manuscripts after Op. 30:

work):

*ppp//*  
*ppp/*  
*ppp*  
*pianissimo*  
*ppmo*  
*pp//*

*pp/*  
*pp*  
*p//*  
*p/*  
*p*  
*mezzo piano*  
*mezzo forte*  
*poco forte*  
*f*  
*fo*  
*for*  
*forte*  
*ff*  
*ffmo*  
*fortissimo*  
*fff*

See Appendix for examples from Kitchen's analysis of Beethoven's expressive dynamic markings in his manuscripts.

### iii. Slurs/Beaming (Sustain/Decay)

Often it is not easy for the performer to know easily what these eccentricities mean, but there is no question that we are participating in a process where Beethoven is searching for means to express the curiosities of his detailed sound imagination. Even if we do not have an exact and easily expressed logic, we must work with the eccentricities and allow them to affect the complexity of our own vision.

Figure 9: Slurs



See Appendix for examples from Kitchen's analysis of Beethoven's expressive slurring and beaming markings in his manuscripts.

### v. Expressive swells (decay)



### Figure 10: Expressive Swells

Beethoven makes active use of expressive swells: the swell up "<", and the swell down ">".

Single expressive swells up or down are represented very accurately in print, but when they are in pairs, "<>", there seems to be a very clear distinction for Beethoven between swell pairs that connect "<>", and pairs that do not connect "<>". Beethoven will even correct swell pairs to reinforce the part that connects them. These distinctions are not preserved in print except in some early editions. See Appendix for examples from Kitchen's analysis of Beethoven's expressive swell markings in his manuscripts.

## VI. BEETHOVEN'S CAVATINA

Ever since E. T. A. Hoffman's celebrated review of the Fifth Symphony, Ludwig van Beethoven's music has been associated with the archetype of the ideal of freedom. This Promethean narrative emerges out of a few works of Beethoven's middle period and casts a long and singular shadow over the rest of his work and much of the Western musical cannon persisting even to our present day. In music scholarship, this shadow can be likened to the aesthetic preoccupation with abstract form and empirical analysis. In the final chapter of his book *Beethoven & Freedom* written in 2018, Daniel K L Chua, describes a moment in Beethoven's music that transforms its listener not through the magnitude of a Beethovenian-Promethean act of heroic autonomy, but rather through the fragility and vulnerability of alterity. In the 4<sup>th</sup> movement of the String Quartet op. 130 titled *Cavatina* – meaning tone or song, Beethoven inserts an eight-measure 'interruption' which he marks as '*Beklemmt*,' – to be choked or squeezed. Chua makes the claim that this moment is like a wound or opening for otherness to

enter; and thereby redefines our understanding of Beethoven's music, not as an expression of heroic individuality, but through its relationship to Otherness – what he calls a 'gift' of alterity.

Given the philosophical context of this work, it is interesting to note the meaning of the name Cavatina (song). The question that this work poses, in terms of the alternation between the timbre of the individual voices vs the composite sound of the group, is the question of individuality/center vs group/periphery. This is the musical polarity of this movement – brought to the extreme between the outer sections of the Cavatina and its inner heart - *beklemmt*.

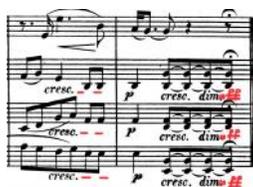


Figure 11: the final measure of Cavatina

Final measure of this movement is a written-out breath: Beethoven demands of his notation a specific psychosomatic motion of intense emotive force, one that disrupts the respiratory rhythms of the lungs. The breath is asymmetrical; first a sharp intake of air (*cresc.*), then suddenly a suspension (*piano*), followed by another gasp *cresc.* before allowing the ribcage to sink back (*dim.*) to a point of rest (*pp*).” For Daniel Chua, this final breath of the Cavatina is itself a consequence of severe respiratory symptoms in the middle of the movement where a sudden change of mood and mode takes the music into another world.

“The Cavatina reveals the most intimate and vulnerable side of Beethoven in a lyrical outpouring that seems to flow from the deepest wellspring of human experience. Beethoven even confided to a friend that every time he thought of this piece, it brought tears to his eyes. In the middle section of this 66-measure movement, he marks *Beklemmt* (meaning choked), as the first violin plays a series of fragmentary utterances, rhythmically at odds with the triplet *ostinato* played by the three lower instruments. Music's most natural impulse – to spin itself out in

melody – seems to be in serious danger, as if the singer of the Cavatina’s song has lost their way. This section is in C-flat major, a key which lies beyond the normal harmonic spectrum and which, in a sense, exists only in relation to other keys. Enharmonically it may seem identical to B major, but not in the hands of string players sensitive to the nuance of its color and to the context in which the key is reached: by a slow, simple stepwise descent from the home key, E-flat, to D-flat, and finally to C-flat. The coda of the first movement of the *Eroica* Symphony, composed more than two decades earlier, descends similarly, but from E-flat to D-flat, and then to a bright and assertive C-major. After the middle section, the Cavatina's tender aria returns, but the movement that follows, the *Grosse Fugue*, smashes all preconceptions about melody, harmony, and structure. The main theme of the fugue is a series of huge, vaulting leaps with jagged rhythmic contours. Here the fragmentation of melody, only hinted at in the two preceding movements, irrevocably changes the musical landscape in an unruly masterpiece that catapults its listeners to the frontier of Modernism.”– *Eugene Drucker, Emerson String Quartet, 2019*. See Appendix for an annotated score of the Cavatina.

*Beklemmt* is Beethoven’s marking for these 8 bars of breathless stuttering. Exactly what is said is hardly relevant, since the first violin appears barely able to speak; choking on its own words. The lyricism which opened the movement is reduced to a wheezing, as if the diaphragm, which regulates the long phrases in the outer sections of the Cavatina, has erupted into spasmodic twitching. The delayed phrases and reiterated gestures indicate that there is a kind of stickiness at the back of the throat which prevents the notes from articulating themselves on time; they are syncopated, disrupted by the tiny gasps of air that become increasingly breathless (from 16<sup>th</sup> – 32<sup>nd</sup> note rests), so that what is said comes out as half-spoken sentences or just as isolated, stuttering syllables. These para-linguistic markings are the articulation of what

Immanuel Lévinas would call the ‘sensorial content’ of suffering. And yet this sensory appeal is simultaneously distanced by the formal disruption of the *beklemmt* section; the enharmonically remote key is a shock. Instead of informing the structure, the material de-forms it. In this disjunction of the Cavatina, we are confronted by the suffering of an unknown gaze that ‘wants to be gazed upon.’ However, order for this gaze to be human, this seeing and giving cannot be a unilateral act but a relational one: it takes two to be human. Levinas would found an ethics on such an exposure which he calls alterity: The suffering and vulnerability of the sensible *becomes the ‘other in me.’*<sup>39</sup> In this way, Chua describes the essence of the Cavatina as the very relationship of otherness which Goethe strives for in his observation and study of color.

#### **A timbral-color analysis of the 8-measure *beklemmt* section of the Cavatina**

Having described in general the various philosophical and theoretical backgrounds of this paper, I will now connect the various pieces to describe in detail the timbral analysis of the *beklemmt* section of the Cavatina included in the appendix. See Appendix for timbral color analysis of *beklemmt*. I will begin by restating the analytical thesis of this paper: Goethe’s principle of polarity: Goethe expresses this principle as the expansion and contraction of plants, inhalation and exhalation of organisms, and as the dynamic interplay between light and dark in his color theory. Goethe also describes this polarity in his unpublished *Theory of Music* which he worked on for much of his life and which hung over his wash bin where he could read it daily. In his *Theory of Music*, Goethe’s presents the primary polarity (expansion/contraction or light/dark) as the dynamic relationship between the archetypes of tonal expansion in major and tonal contractions in minor. He writes

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<sup>39</sup> Daniel KL Chua, *Beethoven and Freedom*

“As the major tone arises out of the monad, it also has the same effect on human nature, and it drives it toward the object, to activity, into the widths of the periphery. Similarly, the minor tone arises out of the monad drawing together, concentrating, driving toward the subject.”

While it may seem odd to arrive at this conclusion after such a long exploration and discourse on tone color and musical timbre, I have, after a week of working on the Cavatina with the Juilliard String Quartet and the past 4 months with the Emerson Quartet, come to the same conclusion as Goethe did. Even though he may not have realized it completely, I believe that he is not completely wrong when he attributes the harmonic qualities of major and minor as describing the largest possible polarity in musical timbre. Therefore, I wish to propose whether harmony, tonal or atonal, serial, or modal, is and always has been a function – maybe even a kind of amplification – of musical timbre? In my analysis and experience of playing the 8 measures of the *beklemmt* section of the Cavatina, it is the harmony, the movement from consonance through dissonance and again to consonance which creates the largest and most meaningful range of timbral transformation and narrative. While this is not the answer I was expecting to find in this project, it is the answer which has emerged. I have also discovered that all of Beethoven’s expressive markings analyzed by Kitchen in the manuscripts are there to help intensify and heighten the timbral tension and colors already present in the harmonic narrative of this music.

Furthermore, similarly to Goethe’s primary polarity of expansion and contraction, or light and dark; in musical timbre, this polarity can also be expressed in the musical gestures of crescendo and diminuendo. While these are traditionally only considered as dynamic markings, they imply much more than volume. A crescendo almost always implies an expansion, a feeling of growth, reaching, opening up, and focusing. In terms of color and timbre, it almost always implies an increase in the lightness, brightness, or luminosity of tone, warming of tone color, and

an expansion of the length and wetness/sustain of notes. Rarely does a crescendo (or hairpin swell) imply a closing, darkening, or shortening, of tone. While the degree and color of intensification may change and transform in the process, it is almost always a movement outwards and upwards towards light and activity. Similarly, a diminuendo or decrescendo is almost always a movement in the other direction. My analysis of this eight-measure phrase is a timbral analysis using only changes in color to depict the timbres of each instrumental voice and harmony. The colors used in the analysis are the four primary colors indicated by Benson in Goethe's dark and light spectrums: Blue, Yellow, Red, and Green/Magenta (or Violet). Green for the expansive, brighter, and major timbres, and magenta/violet for the contractive, darker, and minor timbres. These colors are also indicators of the four expressive markings described through ASDR.

Goethe begins his color theory by claiming that yellow and blue, as the colored hues of light and dark, are the two primary colors and that all other colors emerge out of this polarity. I have chosen to use this polarity to show the contrast between the single solo violin voice and the three lower voices. Using blue as the tonic (base timbre) of E flat in the first measure, the bass line descends, and the lower three strings become darker from blue to indigo and violet. However, what begins in measure 40 as a possible E flat unison in the 3 lower strings is completely transformed. The dark timbre of the music is lifted by the G flat entrance in the first violin, creating a modulation of the harmonic center to C flat major. As previously mentioned by Gene Drucker this moment defines not only the entire movement but the entire quartet – whose home key is B flat -as C-flat is the Neapolitan, Beethoven's favorite key/modulation, of the entire quartet. However, C-flat is a key which is not harmonically available on string instruments. It is an enharmonic/other-world timbre or harmonic color. In this moment, Beethoven has specifically

used harmony, the harmonic modulation from E flat to C flat (a key completely foreign not only to the tonic but to the instruments playing the music, in order to create a timbre and tonal experience that is from another world. The color possibilities of the recitative violin solo in this new key, spoken and gasped, are possible on the lower (IV and III strings) and then on the upper strings of the instrument, giving this short pleading, inner prayer – an emotional range second to none in timbral range, intensity, and vulnerability. The solo voice's entrance, therefore, moves through both of Goethe's Spectrums – from yellow – golden orange – through the green – and eventually to the violet. A small hairpin in measure 45 indicates an important timbral shift – marked by the A flat 6 chord on the third beat which repeats in the following measure. The timbre and color of these chords become more persistent, impassioned, and pleading, as the climactic moment of truth approaches. In this moment, the individual and the group, represented by the two different spectrums of colors – modulated through their opposing schemes and arrive together at the climax with Beethoven's expressively marked *cresc.* hairpin and double hairpin arrival at measure 47. This arrival is now in red for all voices, before resolving together in violin/blue. In the space of only 7 measures, one simple phrase, Beethoven has taken us through a complete timbral color cycle – from the dark spectrum of blue and green, through the light spectrum of yellow and red, climaxing with an collective arrive in red and magenta, before returning back to the blue/green of the opening.

See appendix for the following:

Kitchen's full annotated score

Beethoven's manuscript facsimile

Colored diagram of timbral analysis – Vukovich

## VII. CONCLUSION: The Great Fugue

Beethoven is searching for the space between and within a single note ... an attempt to divide the smallest musical particle he knows. The double note figure of the Cavatina now becomes the fugue subject. In the Grosse Fugue, this double-note gesture becomes the principle theme of one of this most cosmic and explosive of works ever to be written. Timbre in this work exists in a relationship to polarity. Beethoven developed this continuum on the scale of the entire work: a quintessential musical polarity. Complete intimacy and vulnerability in the Cavatina are followed by an outburst and emotion to the universal in the splitting of the Atom.



In this final act of courage, Beethoven realized one of the most difficult of human task. Through the course of the long Fugue, Beethoven takes the pain of the Cavatina, which begins as anger and violence at the start of the Fugue, and transforms it, by the end, through forgiveness into joy.

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Nicholas Kitchen's manuscript facsimile scores – goog drive:

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<https://mail.google.com/mail/u/0/#search/nicholaskitchen%40nicholaskitchen.com/QgrcJHrnzJrr>

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