Liberation of the Senses: An Exploration of Sound-Color Synesthesia in the Music of Alexander Scriabin and Olivier Messiaen

By

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Abstract

Ascribing color to sound has long been a part of the music compositional lexicon. Performers, composers, and scholars have long relied upon descriptive vocabulary usually reserved for the visual arts. Those who regularly use colors as aspects of critical terminology do so to convey a desired effect, but how do we explain the various accounts of people with synesthesia who literally see, hear, feel, taste, or smell colors when they listen to music? For synesthetes, a stimulus experienced in one of the five senses triggers a response in another sense. Although numerous types of synesthesia exist, I will focus primarily on sound-color synesthesia and the various forms of written, audio, and visual art it has inspired. Synesthesia is not reserved for those persons who experience such psychological perceptions; many people without synesthesia are interested in the phenomenon. This thesis will define the main characteristics of synesthesia and compare the various modes of analysis scholars have presented on the synesthesia-inspired music of Olivier Messiaen (1908–1992) and Alexander Scriabin (1872–1914). Special attention will be given to the comparison of Scriabin's *Prometheus* (1911), a piece calling for the projection of colored light to accompany the music as a visual representation of the composer's subjective color palette, with selections from Messiaen's oeuvre featuring performance instructions described in terms of color. These analyses provide avenues for the comparison of Messiaen and Scriabin's color and tonal vocabularies, and form the basis of a new approach to analyzing their music using color.

Contents

Introduction

Ascribing color to sound has long been a part of the musical compositional lexicon. Performers, composers, and scholars have long relied upon descriptive vocabulary usually reserved for the visual arts. 'Tone' is defined linguistically in terms of bright and dark, its 'shape' round or flat; scales are interspersed with 'chromatic' pitches; and sopranos are categorized as coloratura. Those who regularly use colors as an aspect of critical terminology do so to convey a desired effect, but how do we explain the various accounts of people with synesthesia who literally see, hear, feel, taste, or smell colors when they listen to music? For synesthetes, a stimulus experienced in one of the five senses triggers a response in another sense. Although numerous types of synesthesia exist, I will focus primarily on sound-color synesthesia and the various forms of written, audio, and visual art it has inspired. Synesthesia is not reserved for those persons who experience such psychological perceptions; many people without synesthesia are interested in the phenomenon. These pseudo-synesthetes use evocative terminology to serve as a means of inspiration for artistic expression, in spite of the fact that they do not experience synesthesia themselves. For synesthetes, the colors perceived are unique to the individual and are consistent over time. In contrast, pseudo-synesthetes subjectively attach colors to stimuli.

This thesis will define the main characteristics of synesthesia and compare the various modes of analysis scholars have presented on the synesthesia-inspired music of Olivier Messiaen (1908–1992) and Alexander Scriabin (1872–1914). Special attention will be given to the comparison of Scriabin's *Prometheus* (1911), a piece calling for the projection of colored light to accompany the music as a visual representation of the composer's subjective color palette, with

selections from Messiaen's oeuvre featuring performance instructions described in terms of color. These analyses will provide avenues for the comparison of Messiaen's and Scriabin's color and tonal vocabularies, and will for the basis of a new approach to analyzing their music using color. In addition to the musical analyses, extra-musical iterations of synesthesia will serve to provide background and context as. This will include an exploration of artists who use synesthetic ideas as inspiration for their works including visual-artist Wassily Kandinsky (1866–1944), and French Symbolist poets Charles Baudelaire (1821–1867) and Arthur Rimbaud (1854–1891).

The following questions will be addressed in this thesis: What types of synesthetic experiences exist? Why has research on synesthesia and synesthetes experienced resurgence in recent decades? How have technological innovations benefited the study of synesthesia? How can the study of synesthetic experience and (pseudo-) synesthetes inform our understanding of the psychology of perception with regard to audio and visual art? The resurgent interest in the science of synesthesia in the current decade can be attributed to advancements in technology, specifically advances in medical imaging of brain activity. It is my expectation that examining synesthesia through various lenses will help to inform future musical analysis and provide insight into the tone color vocabularies of Messiaen and Scriabin.

Chapter One: Defining Synesthesia

For the majority of the population, sensation is neatly divided into categories of touch, taste, smell, hearing, and vision, otherwise known as the five senses.[1] However, the walls between our senses are not as solid as we generally believe, and for some, a given stimulus may produce a less-than-usual experience known as synesthesia. As John Harrison observed, "The word synaesthesia is a blend of the Greek words *syn,* meaning together or union and *aesthesis,* meaning sensation. This implies two or more sensations occurring simultaneously."[2] Synesthesia is defined as a neuropsychological trait in which the stimulation of one sense causes the automatic experience of another sense.[3] The definitive characteristics of a synesthete have become more specific over decades of clinical study, and the current scientific definition particularly stresses the involuntary nature and self-consistency of synesthetic associations.[4]

There are numerous types of synesthesia including but not limited to: *grapheme-color*—the perception of letters and numbers as being colored; *spatial-sequence*—sequences of numbers appearing as points in space; *sound-taste*—a sound producing a taste in the mouth of the listener; and *sound-color*—a sound producing a color in the mind of the listener. Synesthesia is exceedingly difficult to describe in words. This quality of ineffability is equally as difficult for

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[1] John Harrison, *Synaesthesia: The Strangest Thing* (New York: Oxford University Press, 2001), 1.
[2] Ibid., 2–3. Synesthesia is also commonly referred to as *audition colorée*, *Farbenlehre,* chromesthesia, photothesia, synopsia, and color audition.
[3] Ibid.
[4] Richard Cytowic, *The Man Who Tasted Shapes* (New York: G.P. Putnam's Sons, 1993), 61–89. Interest in the phenomenon peaked between 1860 and 1920 with the latest resurgence coinciding with the development of brain imaging technology. After the Second World War, interest in the subject faded and only resurfaced recently. Digital technologies of image and sound have created new research opportunity in this subject.

the synesthete to describe as it is for the non-synesthete to interpret.[5] The ultimate value in studying synesthesia can be measured by its ability to inform theories of so-called normal cognition. For Jamie Ward, "Synesthesia differs from most neuropsychological conditions in that it is a positive system and is found in members of the population, rather than looking for the absence of it." [6] Synesthesia is thought to be a genetically linked trait estimated to affect from two to five percent of the population.[7]

Despite extensive clinical study, an explanation of the precise neurological mechanics of synesthesia is not currently known; however, some aspects of the phenomenon can be explained. Synesthesia has similarities to normal multisensory perception, yet synesthesia is not the norm.[8] For synesthetes:

> An altered genetic profile may result in parts of the brain being strongly connected that would only be weakly connected in other people. Moreover, there may be a natural tendency for this altered connectivity to affect nearby regions [of the brain] rather than long distance as this is the general principle of how brains are wired.[9]

A hypothetical 'synesthesia gene' may promote connectivity between regions of the brain that are adjacent to one another.[10] Depending on the location in which the hypothetical gene is expressed, a particular type of synesthesia will occur, and because synesthetes often have numerous types of synesthesia, the hypothetical gene must therefore exert a widespread influence in the brain.[11]

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[5] Kevin T. Dann, *Bright Colors Falsely Seen* (New Haven: Yale University Press, 1998), 8. Detailed case studies on specific types of synesthesia include those by renowned neurologists Oliver Sacks and Richard Cytowic. See Oliver Sacks, *The Man Who Mistook His Wife for a Hat* (New York: Touchstone, 1985), Oliver Sacks, *Musicophilia: Tales of Music and the Brain* (New York: Vintage Books, 2007); and Richard Cytowic, *The Man Who Tasted Shapes*. (New York: G.P. Putnam's Sons, 1993).
[6] Jamie Ward, *The Frog Who Croaked Blue*. (London: Routledge, 2008), 129.
[7] Ibid.
[8] Ibid., 59.
[9] Ibid., 63.
[10] Ibid.
[11] Ibid., 66.

Synesthesia is unique to the individual, but it is automatic and self-consistent over time.[12] For example, a synesthete with *grapheme–color* synesthesia may always see the letter *R* as the same shade of purple. The response is automatic—synesthetes are not able to conjure a response at will because synesthesia is a matter of perception and not a matter of imagination. Experiencing synesthesia is generally memorable; oftentimes the response, for example perceiving colors in response to hearing a sound, is remembered more vividly than the stimulus itself, and in some respects synesthesia can act as a memory aid.[13] Synesthetes experience specific forms of emotional pleasure and displeasure in their responses just as non-synesthetes have emotional responses to such stimuli as flavor and color. The main point of difference for the synesthete is that two senses are joined in the response, creating a multisensory reaction that is stronger. For those experiencing sound-color synesthesia, behavior of the multisensory neurons in the brain impacts perceptual strength. Psychologist Jamie Ward describes how the combination of neurons impacts our perception:

> If one of the multisensory neurons is played a sound then it may produce ten nerve impulses. If it is shown a blob then it may produce twenty nerve impulses. However, if it played a sound and shown a blob together it may produce one hundred impulses. Thus the response is far greater than the sum of its parts. The multisensory neuron is acting like an internal amplifier that cranks up the volume of the sound and turns up the contrast on the image when the two co-occur. This is perhaps the main reason why multisensory perception is advantageous relative to fully segregated senses.[14]

Synesthesia exists in several forms and involves various combinations of senses, but not all types are multisensory. For example, a synesthete who sees colors when listening to music has audio-

[12] Dann, 1–17. There is evidence that synesthetic responses may decline as age advances.
[13] Ibid., 7. Although it is generally viewed as a favorable experience, synesthesia occasionally overwhelms the participant causing an interference with logical thought processes.
[14] Ward, 49.

visual synesthesia and has multisensory perception, whereas a synesthete seeing numbers or letters evoking color has visual-visual synesthesia.[15]

One of the most common forms of synesthesia is *grapheme-color*, the perception of letters and numbers as having color. Some synesthetes "see" words as having color, which is a second type of grapheme-color synesthesia. For this type of synesthesia, the spelling seems to impact the colors perceived. *Grapheme-color* synesthesia is complicated to study because many people claiming to have it are actually experiencing *pseudo-synesthesia*: false synesthesia. A stimulus may produce a *learned* response that is not consistent with the definition of genuine synesthesia. Because this response is learned, it may demonstrate consistency over time; however it is not involuntary in nature and can be conjured at will. Kevin Dann explains that "during the stage of mental development when synesthetic perception is most prevalent among the population as a whole (before age 7), nearly all objects of thought have an explicit objective dimension, but colors, letters, numbers, and words are particularly salient emotionally."[16]

Genetics therefore do not reveal the mystery behind typical associations because triggers for certain synesthetic responses seem to have been culturally learned.[17] Learning materials such as colored alphabet books and colorful childhood toys are examples of culturally learned triggers, and these sources have largely been discounted as a true source of synesthesia because of the nature of the color descriptions given by true versus pseudo-synesthetes. For pseudo-synesthetes, the letters A, B, and C most commonly elicit responses in primary colors in the color sequence red, blue, yellow. The colors synesthetes describe are idiosyncratic: specific and peculiar often including descriptors such as dirty, transparent, mixtures, and spotted. Each synesthete will have their own idiosyncratic choice of colors, and it is common for family of

[15] Ward, 61.
[16] Dann, 7.
[17] Ward, 63.

synesthetes to disagree on the "correct" colors for a given stimulus.[18] Although synesthetic responses are unique to the individual, identical responses to stimuli sometimes occur, but they are typically coincidental. As Kenneth Peacock summarizes, "since all human beings do not perceive external stimuli identically, no absolute correlation should be expected between the physical world and individual impressions of that world."[19] Early researchers recorded lists of stimuli and synesthetic responses, but became dismayed when a pattern of correspondence was not obvious.[20] Richard Cytowic posits that expecting synesthetes "to agree on what they sensed was evidently a major mistake."[21]

A theory regarding the commonality of colored letters and numbers among synesthetes may be due to the geographical proximity of the part of the brain recognizing the graphemes to the area that processes color, V4.[22] The experience of seeing is dependent on the function of the brain rather than exclusively the eyes.[23] The V4 region of the brain contains neurons that specialize in processing color taken in from the eyes. It is possible to perceive color that is not present in reality by stimulating the neurons in V4. Conversely, loss of the V4 region after trauma or stroke results in the inability to process color and only shades of grey are seen.[24] Under normal circumstances, the parts of the brain dedicated to vision are activated by input from the eyes, but under certain circumstances the visual areas of the brain may be activated from another region.[25] A multisensory activation can happen when consuming psychedelic drugs such as LSD, or can occur when the brain "re-wires" after trauma such as sudden blindness. It can also occur

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[18] Ward, 73.
[19] Kenneth Peacock, "Synesthetic Perception: Alexander Scriabin's Color Hearing," *Music Perception* 2, no. 4 (1985): 186.
[20] Cytowic, 59.
[21] Ibid.
[22] Ward, 63.
[23] Ibid., 49.
[24] Ibid., 29.
[25] Ibid., 29.

naturally as a result of genetic difference. [26] If V4 receives input from areas processing speech and vision, a result of "colored-hearing" synesthesia may be experienced, hereafter referred to as sound-color synesthesia.[27]

Naturally-occurring synesthesia seems to be genetically linked, whereas acquired synesthesia may arise temporarily after acquiring an eye injury or after taking drugs. For Ward, each of these causes "may manipulate the rules governing multisensory perception in different ways, albeit giving a similar outcome – synesthesia."[28] Those with naturally occurring synesthesia have a genetic component altering the wiring pattern in the brain causing geographically close areas to stay connected as the brain matures.[29] This may provide an explanation for the prevalence of certain types of synesthesia as well as give reason for common correlations.[30] Ward notes that the effects of synesthesia on the brain are not fully understood, due in part to the possibility of two different cognitive mechanisms, one slow- and one fast-acting, working together or against each other:

> Sometimes synesthesia appears after a few hours or days and at other times it appears to take months or years. There could be hidden connections in the brain that permit synesthesia if they are switched on, although normally they lie dormant. In other cases, a slower reorganization of multisensory pathways in the brain is likely, involving the creation of new connections.[31]

Ward has catalogued a list of common traits among synesthetes. Some of these traits make a case for the possibility of an inheritable "synesthesia gene." Ward finds the majority of synesthetes

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[26] Ward, 74. He adds, "Synesthetes who experience vision from music and other sounds come closest to the psychedelic world discussed by users of LSD, mescaline, and peyote. Their experiences consist of a wildly fluctuating flow of colors, shapes, textures, and movement that dance in time with the music; sometimes in a 3-D mist that comes towards them like walking through rain."
[27] Ibid., 29. In 1690, philosopher John Locke wrote of a blind man "who…bragged one day that he now understood what *scarlet* signified….It was the sound of a trumpet." In 1710, the first medical reference to synesthesia was made by ophthalmologist Thomas Woolhouse, who described "the case of a blind man who perceived sound-induced colored visions."
[28] Ibid., 60.
[29] Ibid., 62.
[30] Ibid., 62.
[31] Ibid., 62.

studied are female, at a ratio of five female to one male, who tend to have mothers also acknowledging synesthetic responses. They also commonly share the following traits: left-handedness, superior memory for verbal and auditory material, below average mathematic ability, and feelings of clairvoyance.[32] Subjects reported memory of synesthetic responses during childhood and expressed surprise that others did not experience the same response. The stigma of having a psychological abnormality causes a tendency toward shyness and offers one of many reasons as to why gathering data from synesthetes has historically been a challenge.

One of the defining characteristics of synesthesia is that, as mentioned above, the response occurs automatically and involuntarily. Many synesthetes claim, however, that they can reduce their synesthetic response by ignoring it and conversely enhance it by paying it attention.[33] Most synesthetes whom Ward interviewed do not experience each note of the music in isolation; instead the notes merge together forming an elaborate chain to which new lines are constantly added as the old links fade out into the distance to some vanishing point. Ward describes how when listening to music or speech, a synesthete "sees" the color of the sound on a screen defined relative to the head or body, or on some inner screen, whereas others experience the color emanating from the sound source itself.[34] Musical notes that are longer in duration tend to be longer in visual length--in other words a synesthetic association between time and space.

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[32] Ward, 135.
[33] Ibid., 82. "As one person puts it: 'It's kind of like looking at your own nose – if you try, you can see it clearly, but you don't walk around the whole time "seeing" your nose. But it's always there and you can see it, just that you don't unless you're attending to it.'"
[34] Ibid., 101.

Chapter Two: Visual Art, Theatre, Music, and Literature

Color Keyboards

Aside from the neurological phenomenon of synesthesia, interest in and fascination with the notion of correspondences between sound and color has a long history. Pseudo-synesthetes, those interested in the phenomenon without expressing the actual condition (including composer Alexander Scriabin) have invented new instruments to express a synthetic form of synesthesia, usually occurring in the form of color emitting keyboards.[35] The study of sound-color correspondence has an extensive history reaching back to Greek antiquity, when the speculations of influential philosophers and scientists Pythagoras and Aristotle led to a presumed analogy between the color spectrum and musical sounds.[36] Aristotle predicted a relationship between sound and color, and his theory on color-harmony associations provided impetus for the following generations of researchers including Isaac Newton.[37] In contrast to Aristotle, who believed light was essentially white or colorless, Newton demonstrated how light could be separated into a spectrum; he asserted that color is a sensation in the mind rather than an inherent property of the light itself in his treatise, *Opticks* (1704).[38] Together their theories provided impetus for countless musical inventions, theatrical productions, and colored light shows in the years to come.

The study of light, color, and sound correspondence sparked the interest of Louis Bertrand Castel (1688–1757), a Jesuit priest and French mathematician, who in turn built what is

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[35] Pseudo-synesthesia, or false synesthesia is covered at length in the Scriabin section beginning on page 20.
[36] Judith Zilczer, "Music for the Eyes: Abstract Painting and Light Art," in *Visual Music: Synaesthesia in Art Since 1900*, ed. Brougher, Kerry et al. (London: Thames & Hudson, 2005), 70.
[37] Han-I Wang, "Scriabin and Color, Kandinsky and music: synesthesia in Russia's silver age," (DMA thesis, (Manhattan School of Music, 2010), 15.
[38] Newton, Isaac, *Opticks*. (New York: Dover Publications Inc, 1979).

generally regarded as the first *clavecin oculaire*, or color organ, in 1725.[39] Castel's color organ demonstrated a systematic correlation of colors to pitches on the organ's keyboard. When a key was pressed, a candle-illuminated colored prism revealed its corresponding color. Ironically the instrument did not produce sound; instead it silently suggested the sound-color correspondence.[40] Castel imagined that through the mass production of his color organs he would bring about a new form of popular domestic entertainment. Unfortunately technological barriers prevented large-scale production of the instrument, and it remained a scarce inventor's workshop curiosity for half a century.[41]

Philosophers and scientists seeking to bring attention to sound-color correspondence continued to improve upon Castel's original design throughout the eighteenth and nineteenth centuries, and by the late nineteenth century, electric illumination and technological advancements enabled sound-color enthusiasts to design highly-sophisticated color organs.[42] British artist Alexander Wallace Rimington (1854-1918) developed a color organ for larger public demonstrations, owing to brighter electric illumination and a larger scale design.[43] A five-octave keyboard actively projected moving colored lights beamed from arc lamps through aniline-dyed filters onto a white curtain. Diaphragms, lenses, and stop controls allowed the performer to regulate the hue, luminosity, and purity of the produced colors.[44] Again, this color organ did not produce sound, but Rimington envisioned its performances accompanying live

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[39] Zilczer, 70. For more information of the *clavecin* instrument see Wilton Mason, "Father Castel and His Color Clavecin," *The Journal of Aesthetics and Art Criticism* 17, no.1 (September 1958): 103-116.
[40] Scriabin's color keyboard in *Prometheus*, the *tasteria per luce*, similarly did not produce sound when played. Its color production is discussed at length on page 11.
[41] Ibid. Illustrious showman P.T. Barnum commissioned one of Castel's color organs for his home.
[42] For more information regarding varieties of color organs see Bainbrige Bishop, *A Souvenir of the Color Organ, with some Suggestions in Regard to the Soul of the Rainbow and Harmony of Light*, (New York: The De Vinne Press, 1893).
[43] Ibid.
[44] Ibid. Rimington demonstrated his invention at St. James Hall in London in 1895. For more information on performances included color organs, see Peacock, "Instruments to Perform Color-Music," *LEONARDO* 21, no. 4 (1988): 397- 406.

music or alternatively interpreting music in a silent colored light show. In addition to functioning as a performance instrument, Rimington anticipated his invention would be used as an educational tool for the study of color mixture. He aimed to create a new form of art, "mobile color," by projecting moving colored lights onto a flat screen.[45] In 1912, Rimington published a book on his instrument and its aesthetic possibilities titled *Colour Music: The Art of Mobile Colour*.[46] A chapter from *Colour Music* appeared in prominent modern art collector Arthur Jerome Eddy's 1914 book, *Cubists and Post-Impressionism*, thus introducing color music into the lexicon of modernist art.[47] Rimington and his successors created a hybrid kinetic art by merging aspects of musical performance with the two-dimensional format of conventional painting.[48] Rimington's invention introduced the element of time to visual art and it also liberated color from form, an innovation proving enormously influential to light artists, modern painters, and poets alike.

Sound-Color Correspondence in Music and Visual Art

In the late nineteenth and early twentieth centuries, it was fashionable to create various forms of art using synesthesia as a source of inspiration. Evocations of synesthesia created striking imagery through unusual metaphorical linkages, and the influence of synesthetic

[45] Ibid., 71.
[46] Arthur Wallace Rimington, *Colour Music: The Art of Mobile Color*, (London: Hutchinson & Co., 1912).
[47] Arthur Jerome Eddy was a prominent first generation American Modern art collector who promoted new art movements and particularly championed works of Kandinsky and the German Expressionists. See: Arthur Jerome Eddy, *Cubists and Post-Impressionism.* (Chicago: A.C. McClurg, 1914), 140-147.
[48] Ibid. Between 1912 and 1930, American and European artists patented a variety of instruments that produced "color music". Few instruments survive, and they are known largely through archival photographs, films, and descriptions.

experience gained power through the juxtaposition of ordinarily unrelated associations.[49] The term visual music was first coined in 1912 by Roger Fry to describe works of visual art that "[gives] up all resemblance to natural form, and create a purely abstract language of form—a visual music."[50] Music had become a model for new artistic endeavors signaling a revolution in Western aesthetics:

> For many artists in the early twentieth century, music epitomized a new idea of what visual art could become. No longer content simply to reproduce the visible world, painters instead sought to endow the canvases with the emotional intensity, structural integrity, and aesthetic purity that they attributed to music.[51]

In Russian painter Wassily Kandinsky's treatise *On the Spiritual in Art* (1912), the author voiced the belief of many leading artists of his generation when he suggested "musical sound has direct access to the soul. It finds there an echo, for man 'hath no music in himself.'"[52] The belief that painting could emulate music inspired some of the most progressive visual art of the twentieth century. Among the first generation of European vanguard artists, few equaled Kandinsky in his complete assimilation of musical analogy to achieve abstraction in painting. Between 1909 and 1914, Kandinsky developed an aesthetic theory in conjunction with a large group of abstract paintings conceived as musical metaphors.[53] In his 1912 essay, "On the Question of Form," Kandinsky wrote, "sound is the soul of form…form is the outer expression of inner content."[54] Intellectuals and artists, particularly those affiliated with the Symbolist movement, considered synesthesia to be "a mystical vehicle to attain a higher reality or state of

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[49] Jeremy Strick, "Visual Music," in *Visual Music: Synaesthesia in Art Since 1900*, ed. Kerry Brougher (London: Thames & Hudson, 2005), 15.
[50] Zilczer, 25.
[51] Ibid.
[52] Ibid.
[53] Ibid., 31.
[54] *Der Blaue Reiter*, 1912. Also referred to as "On the Problem of Form".

consciousness."[55] Kandinsky was so certain of this outlook that he believed an art based upon multisensory aesthetic experience assured spiritual redemption.[56] create

Music served as a catalyst for abstract painting and, concurrently, sparked a parallel movement to create "color music" through the medium of light. Light artists sought to further liberate color from two-dimensional painting by devising an array of projection mechanisms. Some advocates of this musical analogy sought to redefine painting with the application of compositional elements from music. This was applied not only to the structure of their work but also to inspire the titles of their compositions. Some attempted to evoke sound, while others strove to create visual equivalences by exploring Newtonian correlations between the musical scale and color spectrum. Painter James McNeill Whistler (1834–1903) set out to capture music in such works as his *Nocturne in Black and Gold* (1875) and *Symphony in White, No. 3* (1867). Synesthetic British artist David Hockney (b.1937) visualizes colors he hears in a production's musical score as he designs and paints sets for the Metropolitan Opera.[57] The impetus for these various modes of this musical/visual art analogy was (and still is) the phenomenon of synesthesia.

The sensory fusion of synesthesia acted as a stimulating force for artists and philosophers in their search for a voice to bring them closer to the inner human psyche, and pioneers in the new field of psychology studied cases of synesthesia in an effort to understand human perception.[58] Tension between spiritual idealists and scientific positivists spurred conversation

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[55] Zilczer, 27. For the relationship between music and occult theories, see: Laurinda S. Dixon, "Art and Music at the Salons de la Rose and Croix, 1892-1897," in *The Documented Image: Visions in Art History*, ed. Gabriel P. Weisberg et al. (Syracuse, NY: Syracuse University Press, 1987), 165–186.
[56] Ibid,, 34.
[57] Ward, 128. George Gershwin (1889-1937), although not a synesthete, titled his famous 1924 composition *Rhapsody in Blue* [57] after learning of James McNeill Whistler's musically titled paintings. Formerly destined to be titled *American Rhapsody*, Gershwin effectively did the opposite of Whistler, and named a musical composition after a color.
[58] Zilczer, 27.

and thus furthered the development of a new art. Since the nineteenth century, the concept of *Gesamtkunstwerk* ("total artwork") has provided motivation for countless artistic experiments with synesthesia.[59] Interest in *Gesamtkunstwerk* by Symbolists and early abstractionists was synchronic with a boom of psychological publications on synesthesia (1880–1930). At the time, synesthetic associations were thought to result from a heightened state of aesthetic awareness, and this notion became essential to artists, writers, and musicians in the following century who sought to create works generating such associations for their audience.[60]

Arnold Schoenberg (1874–1951), composer-artist and significant contributor to the early development of visual music, bridged the gap between the Symbolist world of musical allusion and the realm of experimentation that would transform twentieth-century painting.[61] Schoenberg's foray into visual art coincided with a period of turmoil as he struggled to defend his revolutionary advance into atonality.[62] His series of abstract self-portraits, *Visions* (1909–11), created what art historian Judith Zilczer describes as "disquieting images of displacement."[63] Schoenberg believed music and visual art should be freed from imitative constraints, and in his 1912 essay, "The Relationship to the Text," he wrote:

> The external congruence of music and text, which reveals itself in declamation, tempo, loudness, has little to do with the internal congruence, and stands at the same level of primitive imitation of nature, as the copying of a model.[64]

Acting as leaders of progressive theatre, Kandinsky, Schoenberg, and their contemporary Claude Bragdon (1866–1946) imagined environmental-light works as part of theatrical productions.

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[59] A term first used in an 1827 essay by K.F.E. Trahndorff, but generally associated with German opera composer Richard Wagner's aesthetic ideals.
[60] Strick, 15. Synesthesia has since been proven to be neurologically driven rather than aesthetically driven.
[61] Zilczer, 27.
[62] Ibid., 30. For further reading on Schoenberg's experience as a painter see: Costa Meyer, "Schoenberg, Kandinsky, and the Blue Rider" (New York: The Jewish Museum; and London: Scala Publishers, 2003).
[63] Ibid. These portraits predate Schoenberg's gatherings with Kandisnky and the Blue Rider group.
[64] Arnold Schoenberg, "The Relationship to the Text," in Kandinsky and Franz Marc, eds., *The Blue Rider Almanac*, new documentary edition by Klauss Lankheit (New York: Viking Press, 1974), 102.

Kandinsky's 1911 stage production, *Der gelbe klang* ("The Yellow Sound,") included elaborate stage directions for colored lighting assuming prime importance in an otherwise plot-less stage composition.[65] Schoenberg incorporated colored-light projections into his opera *Die Glückliche Hand* ("The Capable Hand", 1910–13), and Bragdon pushed the boundaries of color music even further when he brought his "Evenings of Song and Light" shows into the great outdoors.[66]

The fusion between color and music posed problems for both its presentation and reception. The new genre of multimedia had led early practitioners to model their art on the world of music by merging aspects of theatrical and visual arts, and, instead of typical gallery venues, performances most often appeared in the concert hall and the theatre stage.[67] One such example includes Scriabin's Symphony Op.60, *Prometheus Poem of Fire* (1908–10) which contains a part for silent keyboard, the *tastiera per luce*. This instrument was specifically required to "play colors" in a counterpoint of light, bathing the audience in colored light as an equally important aspect of the musical performance. Its 1915 New York debut at Carnegie Hall featured lighting engineer Preston S. Millar's *chromola*, an instrument similar to Rimington's.[68] Due to technical difficulties, Scriabin failed to achieve his intentions with light projection on a flat screen at that performance, and critics were unimpressed.[69] Despite its poor reviews, the 1915 *Prometheus* concert opened the door for further multimedia exploration. The technological

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[65] Zilczer, 73. The piece was never put into production; however the manuscript appeared in *The Blue Rider Almanac*.

[66] Zilczer, 76. Bragon's Song and Light program occurred in Rochester's Highland Park September 30, 1915. Bragdon founded a group called The Prometheans with painter Van Dearing Perrine and artist Thomas Wilfred; together they worked to promote colored light as a medium for expression.[66] Wilfred subsequently designed a light program to accompany Nikolai Rimsky-Korsakov's *Scheherezade* (1888) with the Philadelphia Orchestra at The Academy of Music in 1926. His instrument, the *clavilux*, was similar in concept to Scriabin's *tastiera per luce* part in that it created a visual setting for the audience from a silent keyboard part. However, Wilfred's 1926 program notes dismiss an exact correlation between the music and color instead citing his wish to create an atmosphere around each movement rather than measure for measure correspondence.

[67] Zilczer, 71.

[68] Ibid, 72. Technical difficulties prevented the use of a light instrument at its 1911 premier in Moscow.

[69]Ibid. For more information on the premiere of *Prometheus*, see Clarence Lucas, "Color Music at Concert", *Scientific American Supplement*, no. 2060, 26 June, 1915.

design was far ahead of the times, and even to this day, artists and technicians alike have been driven to realize the almost technologically impossible performance of *Prometheus*.[70]

Synesthesia in Literature

Although not an entirely uncommon condition, synesthesia was rarely discussed in print perhaps due to the stigma of admitting a psychological abnormality.[71] References to synesthesia have also appeared in well-known literature including author E.T.A. Hoffmann's description of Dr. Johannes Kreisler in *Kreisleriana*: "the little man in a coat the color of G-sharp minor with an E-minor colored collar."[72] Interestingly, Robert Schumann based his composition *Kreisleriana*, Op.16, (1838) on Hoffmann's character, though he did not incorporate Hoffmann's tonal prompt into the score.[73] Two of the best-known examples of synesthesia appearing in poetry emanate from the French Symbolist movement, specifically poems by Charles Baudelaire and Arthur Rimbaud, who provided a window beyond the five senses within the already heady context of theosophy, numerology, and occult studies preoccupying the Symbolist movement.[74]

Spearheading the French Symbolist movement, Baudelaire created a stir in the scientific and literary communities with his poem "Correspondences" (1857) describing the overlap of sensory experiences including colors, perfumes, and sounds. Rimbaud's sonnet "Les Voyelles"

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[70] A performance of *Prometheus* complete with a fully functioning *luce* part was most recently undertaken by Anna Gawboy in 2006 at Yale University.
[71] One of the earliest publications on synesthesia outside of scientific literature includes Goethe's *Zur Farbenlehre* (1810).
[72] E.T.A Hoffmann, *E.T.A. Hoffmann's Musical Writings: Kreisleriana; The Poet and the Composer*, ed David Charlton, and trans Martyn Clarke.
[73] Peacock, 484.
[74] Cook, *Analyzing Musical Multimedia* (Oxford: Oxford University Press, 1998), 25.

(1871) describes specific correspondences pertaining to its namesake; vowel sounds, and also mentions correspondences between music and color.[75]

Vowels

A black, ***E*** white, ***I*** red, ***U*** green, ***O*** blue: vowels
One day I will tell of your latent birth,
A, black hairy corset of shining flies
That buzz around cruel stench,

Gulfs of darkness; ***E***, whiteness of vapors and tents,
Lances of proud glaciers, white kings, quivering of flowers;
I, purples, spit blood, laughter of beautiful lips
In anger or penitent drunkenness;

U, cycles, divine vibrations of green seas,
Peace of pastures scattered with animals, peace of the wrinkles
Which alchemy prints on heavy studious brows;

O, sublime Clarion of strange stridor,
Silences crossed by worlds and angels:
-***O*** the Omega, violet beam from His Eyes!

[Rimbaud, [1883] 1967, p.121.]

Correspondences

All nature is a temple whose living pillars seem
At times to babble confused words, half understood;
Man journeys there through an obscure symbolic wood,
Aware of eyes that peep with a familiar gleam.

Like endless echoes that from somewhere far beyond
Mingling, in one profound and cryptic whole unite,
Vast as the twinkling immensities of the night and light
So do all colours, sounds and perfumes correspond.

Perfumes there are as fresh as children's bodies, springs
Of fragrance sweet as oboes, green and full of peace
As prairies. And there are others, proud, corrupt, intense.

Having the all-pervasiveness of infinite things,
Like burning spice or resin, musk or ambergris,
That sing the raptures of the spirit and the sense.

Translated by Kevin Dann

[Baudelaire, [1857] 1936, p. 197]

The metaphysical stance of the Symbolists relays that "commonsense tells us that the things of the earth exist but very little, and that true reality lies only in dreams," thereby guaranteeing that future Romantic thinkers would approach synesthesia as a privileged form of perception due to its dream-like qualities.[76] Symbolists promoted the notion that a web of synesthetic correspondences caused the world to hang together in a meaningful fashion. During this time period, synesthesia was viewed as an extremely rare form of consciousness, even as an evolutionary advance in human perception.[77] Future depictions of synesthesia during this era, including Scriabin's *Prometheus*, would show that synesthetic performances were not

[75] Peacock, 484.
[76] Dann, 18.
[77] Ibid., 43.

universally comprehensible in portraying any reality beyond the physical. Synesthesia became caught between a Romantic interpretation of transcendent meaning and a denial that such a meaning existed.[78] The many Romantic artistic iterations of synesthesia furnished future generations with a great deal of material upon which to expand.

[78] Dann, 70.

Chapter Three: Scriabin

Synesthetic associations appeared in the arts and sciences at least half a century before Scriabin became interested in the phenomenon. Scriabin was one of many artists interested in synesthesia. During his lifetime synesthesia became a fashionable branch of psychology, and studies in associative perception appeared in medical journals characterizing the experience of certain individuals.[79] Composer Nikolai Rimsky-Korsakov publically discussed his own synesthetic correspondences in 1867, famously arguing with Scriabin and Rachmaninov about the predominant color in the cellar scene of Rachmaninov's *The Miserly Knight* (1904) at the Café de la Paix in 1907.[80]

Scriabin began work on *Prometheus* in 1908 during which time plans for *Mysterium*[81] were also taking shape. *Prometheus* (1911) was conceived as a somewhat limited experiment involving just two senses, visual (light) and audio (sound). *Prometheus* appears tame when compared to the spectacle planned for *Mysterium*, a piece conceived as an impossible, ritualized *Gesamtkunstwerk* that would trigger apocalypse through the use of a mythic symbolist libretto, multisensory stimulation through all five senses, and new tonal combination.[82]

Together with technician Alexander Mozer, Scriabin developed an electric color keyboard, the *tastiera per luce,* to perform the light part. The *luce* is separated into two parts functioning as the respective right-hand and left-hand keyboard parts on the grand-staff. From this point, I will refer to them as the fast *luce* (upper part) and the slow *luce* (lower part) parts

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[79] Peacock, 486.
[80] Ibid, 483. In Paris the composers discussed the connection between colors and keys, a concept unfamiliar to Rachmaninov. Rimsky-Korsakov claimed that the predominance of D major in the cellar scene indicated the color of gold.
[81] *Mysterium* was intended to be Scriabin's Magnum Opus, and he began working on it in 1903 but did not finish the piece before his death in 1915.
[82] Anna Gawboy and Justin Townsend, "Scriabin and the Possible," *Music Theory Online* 18, No.2 (2012), 83.

when referencing the individual parts. Scriabin intended the lights to brighten and dim according to the mood of the music;[83] however no dynamic indications were present in the *luce* part of the 1911 score, possibly because Mozer's instrument was not capable of such effects.[84] The instrument was withdrawn from the Moscow premiere due to technical difficulties, and so *Prometheus* entered the orchestral repertory as a "colorless" tone poem and has remained so for most of its performance history.[85]

For the majority of the piece's life, inadequate technology had prevented a full and proper realization of *Prometheus*. The performance venue plays a huge role in the reception of any work, especially so in the case of *Prometheus* as the "special effects" must be modified to fit the performance space. The expectation of the audience must also be taken into consideration for the concert hall, a place usually reserved as Gawboy puts it, for "the reverent appreciation of the music itself."[86] The classical theatre is not where one usually expects to find an all-encompassing performance with special effects reminiscent of a rock and roll concert. Highly educated listeners of classical music, those who are often granted authority to review these concerts, generally expect their musical experience to be free from distractions, including those with a high degree of spectacle.[87] In these instances, critics seem to favor a more subtle approach to lighting so that they may simply sit back and enjoy the music. If the lights are not effective in capturing the audience's attention, then the effect of light is unable to stand on equal footing with the music, something that was evidently not Scriabin's intention.

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[83] Leonid Sabaneev, "Scriabin's Prometheus," in *The Blaue Reiter Almanac*, ed. Wassily Kandinsky et all., trans. Henning Falkenstein, (London: Thames and Hudson): 131. See also: Gawboy and Townsend, 2.
[83] Gawboy and Townsend, 7-9.
[84] Ibid., 7-9.
[85] Ibid.,, 5-6.
[86] Ibid., 81.
[87] Ibid, 80.

Scriabin orchestrated *Prometheus* with what he personally defined as a "counterpoint of light," believing that the integration of colored light within his symphonic work would act as a "powerful psychological resonator for the listener."[88] While *Prometheus* exhibits the composer's conception of sound-color correspondence, the work cannot be fully appreciated without an understanding of Scriabin's aesthetics and the language he used to convey them.[89] The colored light part performed by the *Tastiera per luce* serves two functions: first, to indicate the array of colors to be projected in conjunction with the orchestra, and second, to indicate the transposition levels of the tone collections employed throughout the symphony. Although Scriabin's vision for *Prometheus* included the *luce* as an equally important member of the score, the light part has not always made it to the stage—even to this day the work is often performed without the *luce*. It may be argued that inclusion of the *luce* is both a matter of personal preference and technological capability; however a performance devoid of such an integral component does not fully realize Scriabin's intended artistic message. Multimedia performances of *Prometheus* including the *luce* rarely create an accurate realization of the score in part due to the sophisticated technical requirements called for, but also because designers sometimes completely disregard Scriabin's color indications in favor of designing their own interpretation, much like set design in opera, where a new set is created for each production.[90]

Scriabin's light part is written in standard musical notation and supplemented with lengthy prose detailing with a high level of precision the coordination of special effects with musical events. Most scholars have produced a reading of *Prometheus* which disregards the co-operational status of music and lights, largely ignoring Scriabin's desire to equalize the status of

[88] Peacock, 484. Quoted from an unpublished letter dated 18 January, 1922 from S.W. Pring to P.A. Scholes.
[89] Ibid, 486.
[90] Gawboy and Townsend, 1-2.

music and color.[91] Why else would his instructions be so precise? To my mind this is similar to analyzing vocal music without paying attention to the music's interaction with text. According to Gawboy, Scriabin's detailed score brings to the forefront a typically incidental element of performance, thereby making light equal to sound in the conceptual whole.[92]

The widely published 1911 orchestral score contained little performance instruction for the *luce* part as well as neglecting to provide instructions to translate the notation into colors. Various color translations of the *luce* notation have been produced, but each show conflicting realizations.[93] However, in 1913, Scriabin made copious notes for the *luce* in a version known as the Parisian score (widely considered the most definitive version of *Prometheus*). The Parisian score was unavailable until 1978, and due to its late debut, many misconceptions concerning the *luce* persisted.[94] Although designers today rarely use the Parisian score to inform their realizations, it nonetheless provides a wealth of information unavailable in the earlier published versions of *Prometheus*. The Parisian score provides a glimpse into Scriabin's creative mind, freed from the practical limitations of an actual performance.[95]

A common misconception alleges that the *luce* part was somehow related to Scriabin's alleged synesthesia because he was considered a true synesthete during his lifetime. We know from first-hand accounts of Scriabin's "synesthesia," however, that his tone-color associations were neither spontaneous, nor were his responses self-consistent over time, two characteristics pertinent to the modern clinical definition of synesthesia. Scriabin indicated a select group of

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[91] Cook, 37. According to Cook, Scriabin's use of musical symbols "subordinate colour to musical principles."
[92] Gawboy and Townsend, 3-4.
[93] Ibid, 7-9.
[94] The Parisian score was held privately by the Scriabin family until its release in 1978. It has not been published.
[95] Ibid, 8-10; 62. In the Parisian score, annotations for the *luce* can be categorized into five types: color modifiers, lighting intensity, quality of light, light imagery, and ritual or programmatic action. Even with access to the most current technology, the level of pyrotechnics Scriabin calls for in the Parisian score is not always achievable (e.g. on-stage fireworks). Until the invention of LEDs and lasers, many of the notated rhythms in the *luce* were impossible to realize accurately due to the required rapid speed of change.

pitches that he associated with particular colors—suggesting that the composer had some sort of synesthetic response to sound. Because his responses were not consistent over time, however, he cannot be called a true synesthete. Therefore most likely a pseudo-synesthete by today's medical standards, Scriabin's tone-color mappings were chosen with purpose for their musical, logical, aesthetic, and mystical effects."[96] Many opinions pertaining to the quality of Scriabin's color mappings still linger. Because the composer consciously sculpted his sound-color effects, perhaps his conception of sensory correspondences possesses qualities which are less complex and therefore more easily rendered than the nearly complex responses of a true synesthete. In 1915, Scriabin told British psychologist Charles Myers, "The color *underlies* the tonality; it makes the tonality more evident."[97] Parallel to these sentiments, Gawboy has placed a judgment on Scriabin's color mapping system by asserting that "Scriabin's carefully worked-out scheme turns out to be far more analytically interesting than hard-wired spontaneous mappings typical of true synesthetes."[98]

Prior to the release of the Parisian score in 1978, Leonid Sabaneev's account of Scriabin's tone-color correspondence was the best information available. Subtle variations in hue can be found when comparing Sabaneev's tone-colors with the Parisian score as shown in Figure 1; however Sabaneev supplied the origins of Scriabin's devised color system with a basic underlying premise: adjacent colors on the spectrum are correlated with closely related tonalities on the circle of fifths. Scriabin "naturally" associated only three colors with tones: the primaries—red, blue, and yellow corresponding with C, F#, and D respectively. The others he

[96] Sabaneev 1929, 267n1
[97] Gawboy and Townsend, 11-12. Emphasis in original.
[98] Ibid, 12.

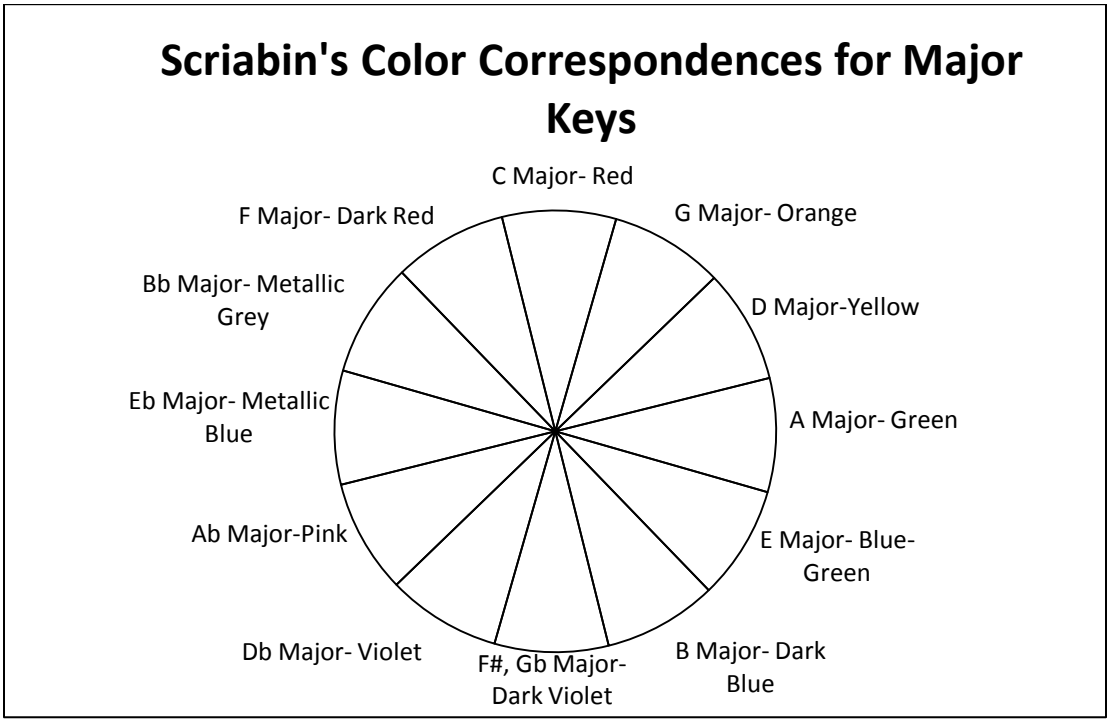
deduced rationally, stretching out the reds and blues over several key areas to complete the circle of twelve major keys as illustrated in Figure 2.[99]

Figure 1. Comparison of Scriabin's mappings between tonality and color as given in Sabaneev (1911) and the Parisian score manuscript (1913). Example 3 from Gawboy and Townsend, "Scriabin and the Possible," 15.

"Tonality"	Sabaneev (1911)	Parisian Score (1913)
C	Red	Plain red
G	Orange-pink	Orange (red-yellow), fiery
D	Yellow	Sunny yellow
A	Green	Grass green
E	Glittering dark blue	Dark blue-greenish (light blue)
B	Similar to E	Dark blue with light blueness (light blue)
F♯/G♭	Dark blue, bright	Deep dark blue with a shade of violet
C♯/D♭	Violet	Pure violet
G♯/A♭	Magenta-violet	Lily colored (reddish)
D♯/E♭	Steely, with a metallic shine	Steely blue, metallic
B♭	Similar to E♭	Metallic leaden grey
F	Dark red	Dark red

[99] Ibid, 15-16.

Figure 2. Scriabin's Color Correspondences for Major Keys on the circle of fifths



Prometheus was the first large-scale composition in which Scriabin systematically avoided the use of major/minor tonality. The primary issue with analyzing color representation in *Prometheus* is that it is not composed using the major keys Scriabin had arranged on his "color wheel" of tonalities. Scriabin believed *Prometheus* was resistant to aural analysis, and it was the colors that would act as a guide through the harmonic changes.[100] Gawboy has implied that Scriabin's habit of structuring fundamental bass motions according to equal divisions of the octave suggests that he may have composed *Prometheus* with visual symmetries of his *luce* instrument in mind.[101] The *luce* instrument Mozer built for Scriabin consisted of twelve incandescent lights arranged in a circle corresponding to the twelve colors on Scriabin's circle of

[100] Ibid, 16.
[101] Gawboy and Townsend, 15-15.

fifths demonstrating traceable space through symmetry and distance.[102] Perhaps the circle was meant to create a paradox between distance and proximity, perhaps bringing to mind Gurnemanz's statement, "Here time becomes space," from Act I of Wagner's *Parsifal* (1882).[103] Gawboy suggests, that "the idea that the expressivity of the luce is due to color alone is analogous to the idea that the orchestra's expressivity is due to pitch alone." Instead, changes in dynamics, texture, and articulation underscore the work's dramatic and emotive content.[104]

Color aids in bringing forth long-range connections between key moments in *Prometheus*. Like Wagner's leitmotivs, Scriabin's "light motives" create multisensory connections between specific moments in the piece, while associative meanings are further accomplished through orchestration.[105] In contrast, for Cook, the *luce* duplicates "musical information through a direct translation to another medium without adding any additional information of its own," an analysis resting on the assumption that the *luce* is structurally unambiguous. [106] He sees little perceptual interaction between what is seen and heard and is therefore certain that *Prometheus* does not belong to the history of multimedia at all.[107] I will return to these conflicting views after considering the interpretations of Scriabin's technical language.

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[102] Ibid, 39-41.
[103] Richard Wagner, *Parsifal Libretto* (Milwaukee: G. Schirmer Inc.: 1986). Sung by *Gurnemanz* in Act I prior to the grail scene.
[104] Gawboy and Townsend, 69.
[105] Ibid, 72-73.
[106] Cook, 38.
[107] Ibid.

Analyzing Prometheus

The most debated topics on the analysis of *Prometheus* among scholars include the "Mystic chord," set identification and segmentation, color and spatial distance, formal structure, pitch organization, and the function of Scriabin's *luce* as it relates to all of the aforementioned themes. For Scriabin, *Prometheus* was to be more than a spectacle of sound. Gawboy proposes that by "combining sound and light in *Prometheus*, Scriabin could harness *Akâsa*[108] transforming a programmatic tone poem into an artwork that had real spiritual power."[109] Advertisements and program notes for early performances of *Prometheus* encouraged audiences to interpret Scriabin's program with knowledge of Helena Blavatsky's theosophical magnum opus, *The Secret Doctrine* (1888). Blavatsky emphasized the parallels between Prometheus, the semi-divine Titan who was tortured in punishment for bequest of fire to humankind with Jesus, the Christian "light of the world," and Lucifer, the "central energy of the universe."[110] A brief synopsis of *Prometheus* is sketched through the colorations in the slow *luce*, divided into seven stages precisely mirroring the seven part cycle of human development appearing in *The Secret Doctrine*—from spiritual (blue) in stage I to material (red) in stage VII. Only rarely are there instances of repetition occurring within *Prometheus*, but when they do appear, they are contained within stage V (yellow). At the closing of *Prometheus*, the narrative again returns to the spiritual, occurring once more in shades of blue and blue-violet. Adding to the programmatic drama, the chorus, seated among the audience, transcends the typical division between performers and spectators, a transformation of theatre into ritual. At the beginning of the final color stage, VII,

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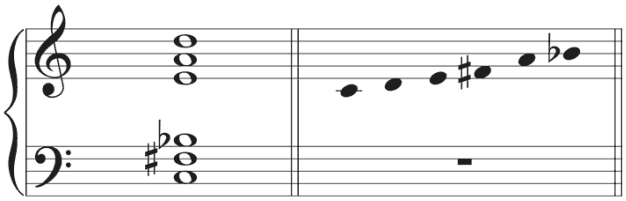
[108] According to Blavatsky, sound is the characteristic of *Akâsa;* it generates air, the property of which is touch; which becomes a product of the combination of color and light. See *The Secret Doctrine* (London: The Theosophical Publishing Company, 1888), 205.
[109] Gawboy and Townsend, 85.
[110] Blavatsky, 486, 245; Gawboy, 50.

the chorus chants three times the word "Eaohoaoho." Baker has noted that while scholars previously assumed this nonsense vowel-sound text to relate to symbolist poet Arthur Rimbaurd's "Vowels" (1883), the sound actually represents a mantra invoking an "eternal living unity" which appears in Blavatsky's *The Secret Doctrine*.[111]

The Mystic Chord

Scriabin's deep interest in the spiritual and mystical properties of music led to the creation of his famed Mystic chord (set class 6–34). The Mystic chord (Figure 3) functions as the collectional foundation upon which Scriabin based the majority of his later compositions. As a prominent collection in *Prometheus*, the Mystic chord has received much attention from music theorists, especially as a point of departure for determining formal structure and color organization. It has become outmoded in Western scholarship to produce analyses based solely on transpositions of the Mystic chord, and recent analyses (including those by Baker, Kallis, and Gawboy) have called into question the referential status of the Mystic chord, thus allowing for fresh interpretations of *Prometheus*.[112]

Figure 3. The Mystic chord, Ex. 5 from Gawboy, "Scriabin and the Possible," 19.



[111] James M. Baker, *The Music of Alexander Scriabin* (New Haven and London: Yale University Press, 1986), 69. Maria Lobanova has also commented on this similary and provides a glimpse of the blending of Scriabin's theosophical and symbolist inspirations. See: Gawboy and Townsend, 56.
[112] Gawboy and Townsend, 19–20.

Set class 6–34 appears in several forms over the course of *Prometheus*, but in its most basic structure, the Mystic chord comprises a series of superimposed stacked fourths. Despite its pervasive presence, 6–34 rarely occurs as a melodic motive; only through the combination of harmonic components and melody is the complete set formed. In the first published analysis of *Prometheus*, Sabaneev asserted that pitches in the fast *luce* serve as the fundamental bass analysis for the work, thereby dictating transpositions of the Mystic chord.[113] Baker (in agreement with von Gleich's analysis), has found that the component functioning as a "root" of 6–34 is nearly always present in the *luce*.[114] This pitch-class appears most consistently as the third element (in normal order); for example, the root of this mystic chord: (A, Bb, C, D, E, F#), [9,T,0,2,4,6] is C. The *luce* serves as a sort of continuo, providing a fundamental bass analysis for the entire piece.[115] In the most recently published analysis of *Prometheus*, Gawboy has corroborated these views by attesting that:

> The fast *luce* serves as an analytic guide to the musical surface, indicating the mystic chord transposition governing each passage. The *luce* provides a reliable means to track progressions of the Mystic chord based on root motion. [116]

Although 6–34 clearly saturates the texture of *Prometheus*, it is not necessarily audibly discernable. Anthony Pople has stressed that while 6–34 has been the most analyzed technical aspect of Scriabin's music, even appearing in Sabaneev's article in *Der Blaue Reiter*, the credibility of the motive ultimately depends on its presentation in the music. The vertical ordering of 6–34 does not appear consistently; however some orderings appear more frequently than others, particularly those alluding to a dominant harmony.[117] Thus far, Vassilis Kallis has

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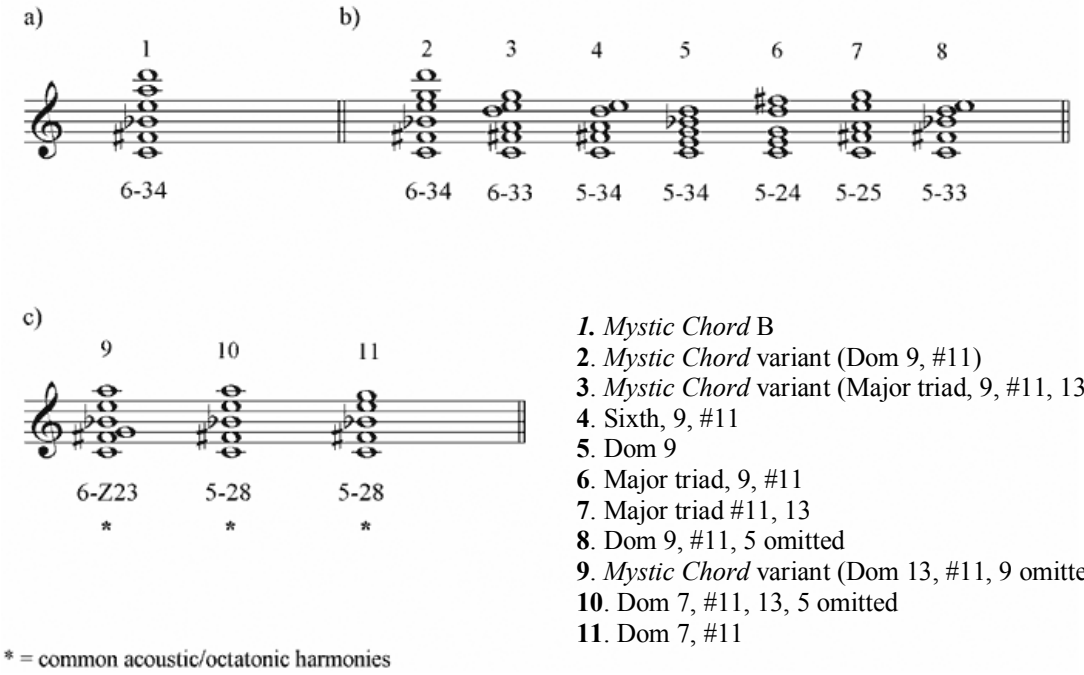
[113] Sabaneev 1974[1912], 134
[114] Baker, 258.
[115] Ibid, 259. When the bass motion does not coincide with the "root" progression, the logic of the progressions is sometimes difficult to decipher.
[116] Gawboy andTownsend, 26.
[117] Anthony Pople, S*kyrabin and Stravinsky 1908–1914* (New York: Garland Publishing, Inc., 1989), 216.

identified the most commonly occurring forms of mystic collections including extended dominant harmonies and mystic variants (Figure 4).

Knowledge of the Greek myth *Prometheus*, an illustration of the false duality between good and evil, may shed "light" on the slow *luce*, revealing a motivation not exclusively musical but also programmatic in spirit. The function of the slow *luce* has largely remained a matter of speculation from the beginning. Pople has suggested that the pitches of the slow *luce* form a sort of non-tonal *Ursatz*, a deep background scale for the work.[118] Cook in turn has found the slow *luce* to have no readily discernable relationship to the musical structure; rather its ambiguous nature conceivably allows for greater thematic flexibility, while the slow changing background colors impose a high-level grouping scheme.[119] For von Gleich, changes in the slow *luce* correspond to changes in musical texture and tempo as well as often aligning with restatements of important thematic material.[120] Following this propensity, Gawboy has indicated how "the slow *luce* then becomes a visual guide to large scale divisions of the work, just as the fast *luce* clarifies the harmonic rhythm."[121] Pople has cautioned that inconsistencies in the *luce* require careful explanation, although they can mostly be described via chromatic appoggiatura, neighbor tones, and other forms of dissonant pitches; thus the *luce* part is not a tell-all, but it is still informative in analysis.[122] While the purpose of the slow *luce* remains uncertain, it clearly both divides and defines essential material.

[118] Ibid. 246.
[119] Cook, 38
[120] Gleich, 71.
[121] Gawboy and Townsend, 49.
[122] Pople, 217.

Figure 4. The Mystic chord and common sets in Scriabin's atonal compositions.Ex. 8 from Kallis, "Principles of Pitch Organization in Scriabin's Early Post-tonal Period: The Piano Miniatures," 2.4.



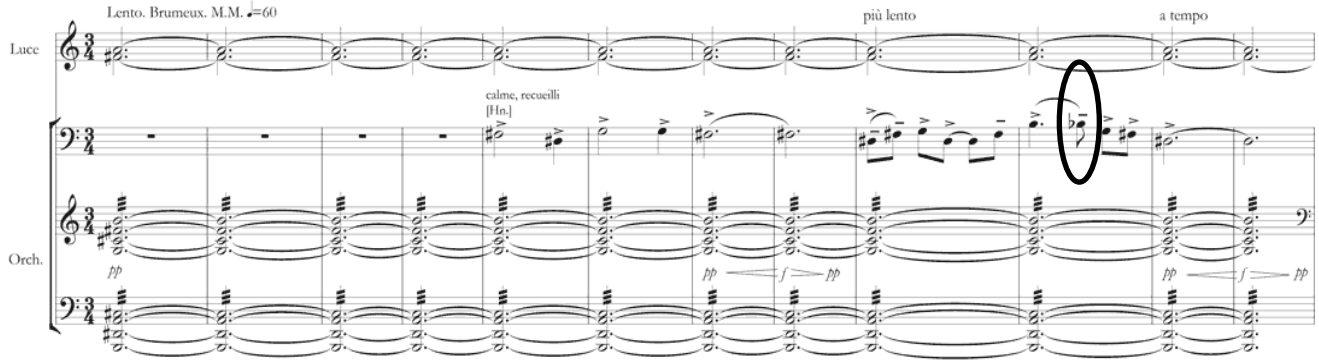
Segmentation and Set Identification

Segmentation and set identification are notoriously problematic in Scriabin's late music.[123] Pople has noted that assigning the Mystic chord to set class 6–34[013569] involves theoretical implications that do not necessarily align with Scriabin's usage, and this is particularly significant in cases of transposition where the root and orthography have been deemphasized.[124] He emphasizes that "transposition is the prime operator in moving mystic chords through Scriabin's color-coded gamut."[125] Gawboy stresses that to avoid obscuring important aspects of Scriabin's usage care must be taken with analysis employing integer

[123] Gawboy, 23.
[124] Pople, 24-25; 216-17.
[125] Gawboy and Townsend, 27.

notation chiefly because the Mystic chord's orthography is necessary in determining boundaries of segmentation.[126]

Figure 5. Reduced score from Prometheus, measures 1–12. Ex. 6 from Gawboy and Townsend, "Scriabin and the Possible," 21.



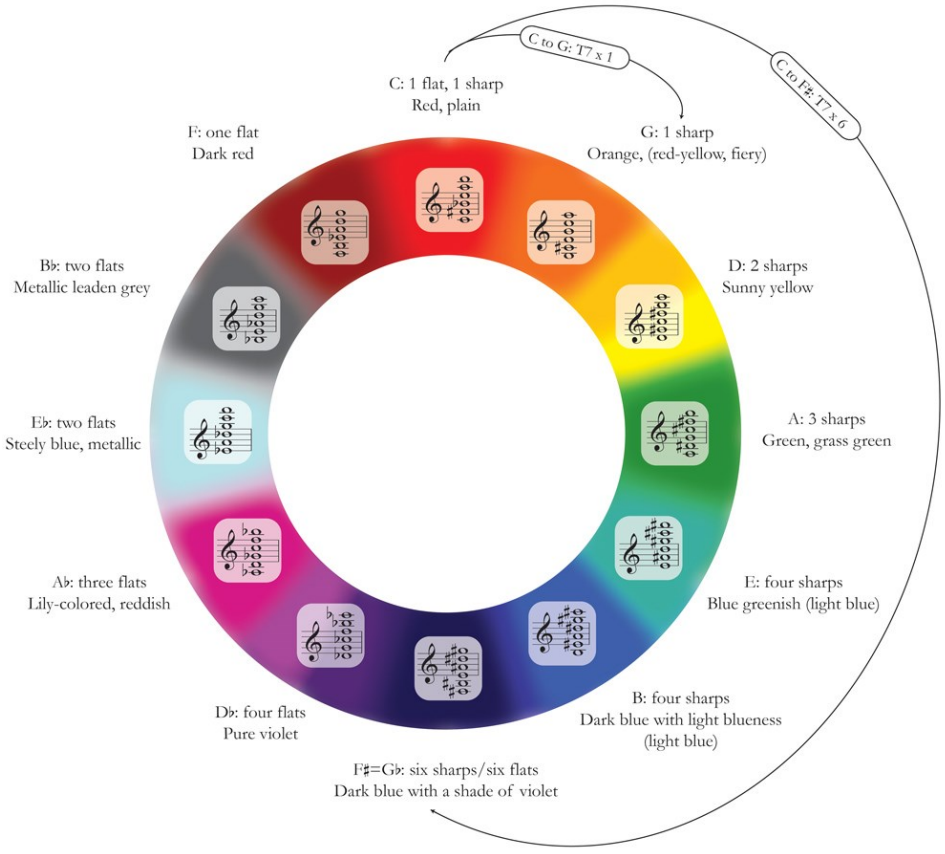
To illustrate this point, Pople, Baker, and Richard Taruskin have presented conflicting views on the opening twelve measures of *Prometheus*, centering specifically upon the function of a single pitch, B-flat, in the pitch organization (Figure 5).[127] Pople interprets mm. 1–12 as belonging entirely to the Mystic collection with the B-flat in m. 10 functioning as a non-collectional tone.[128] To contrast with a purely collectional analysis, Baker has reduced all pitch content {F#, G,A, B-flat, B, C#, D#} to integers, making Mystic set class 6–34 [013579] operational until m. 10 where the B-flat then modifies the entire collection to the slightly more chromatic 7–26 [0134579].[129] In a third view, Taruskin has analyzed the B-flat as the resolution

[126] Ibid, 26.
[127] Pople, Anthony, *Skyrabin and Stravinsky 1908–1914* (New York: Garland Publishing, Inc, 1989); Baker, James M, *The Music of Alexander Scriabin* (New Haven and London: Yale University Press, 1986); Richard Taruskin, "Catching up with Rimsky Korsakov," *Music Theory Spectrum* 33, no. 2 (2011): 101–118.
[128] Ibid, 22. For more examples of Pople's segmentations, See Pople, 219- 222.
[129] Ibid, 21. For more examples of Baker's serial interpretations, See Baker, Ch.9.

to an appoggiatura set up on the downbeat of m. 10. Although Taruskin admits to the presence of non-collectional tones, his reading allows for a thoroughly octatonic analysis through transformations of the mystic chord into octatonic subset [013479].

Gawboy and Townsend have found that color-tonality in *Prometheus* rests primarily on a balance of spectral colors, Mystic collections, and major keys on the circle of fifths. Shifts in color are dependent on the number of accidentals in the transpositions of the Mystic chord. Transpositions where four of six pcs (at T_6) are preserved are difficult to hear, but the *luce* provides visual aid to help comprehend these shifts (Figure 6). Substituting Mystic collections for major keys will distort but at the same time transform the classical correlations of tonal and spatial distance.

Figure 6. Scriabin's Mystic chord color wheel. Ex. 10 from Gawboy and Townsend, "Scriabin and the Possible," 32.

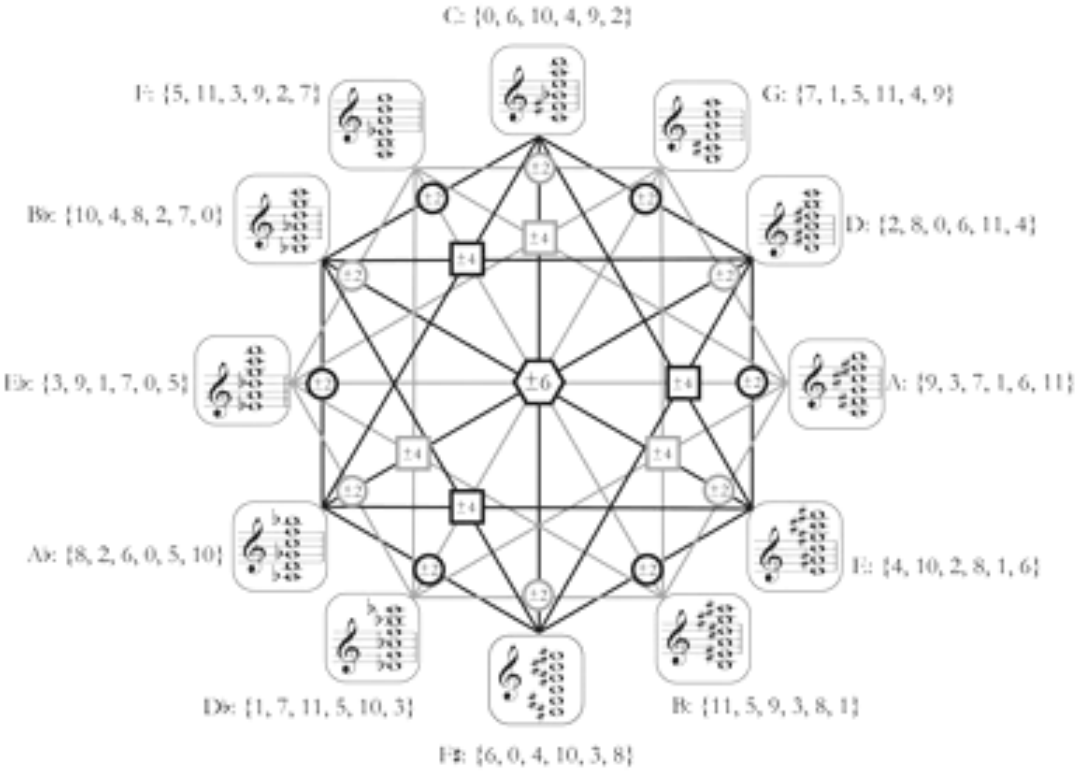


Color and Spatial Distance

In the Parisian score of *Prometheus*, Scriabin described the color of all flat-keys as having a distinctive metallic attribute. This means that a number of factors serve to determine changes of color in Mystic chord transposition including correlations between color and the type and number of accidentals, the special relationship between roots, and spelling. On the Mystic circle of fifths (Figure 7) every second step delivers maximum invariance (5 of 6 pcs are preserved).[130] The number of added accidentals makes it similar to tonal transposition on the circle of fifths where transposition by a fifth creates only one new pitch. This method of understanding tonal distance complements traditional conceptions of tonal distance based on pc invariance. Transposition of the Mystic chord up or down a fifth preserves only 2 of 6 pcs, making Scriabin's mystic arrangements based not on pc invariance, but rather on distinctive orthographies of transposition. Take for example the most transpositionally distant Mystic chord root-relations: C Mystic and F# Mystic. At T_6, four of six pcs are preserved, making the shift between collections difficult to sense audibly. Through vigorous training it may be possible to develop a highly-trained ear for detection of these subtle shifts, but it is more likely that the *luce* will supply visual representation of the sonic similarity.[131]

[130] Invariance refers to the properties of a set which are preserved under transformation. Maximum invariance is the largest number of common integers between sets.
[131] Gawboy and Townsend, 36.

Figure 7. Closely related Mystic chords on the circle of fifths Ex.9 from Gawboy and Townsend, "Scriabin and the Possible," 30.



Form

Most analyses of form reveal a lack of consensus over even the most basic structural events in the work, which has led to difficulties in pinpointing the formal articulation, especially a narrative based on sonata form.[132] Scholars presenting a reading of *Prometheus* in symphonic sonata form cannot deny the poor fit. Large-scale formal boundaries are obscured by a near-constant use of thematic transformation, and there is limited use of literal repetition. Pople has suggested avoiding sonata form in favor of a repetition-structure analysis model which would

[132] Gawboy and Townsend, 48. Pople discourages grouping *Prometheus* along with Scriabin's piano music and symphonies because issues of structural interpretation seem to prevent a convincing association; particularly when the sonata-form model is forced onto *Prometheus* without much cause.

help account for the slow-moving colors articulating the structure of *Prometheus* (mirroring the seven part cycle of human development appearing in *The Secret Doctrine*). For Pople, the frequent combination of thematic materials would make it problematic to assign passages a place in the structure of the piece. The repetition-structure model would allow for newly emerging segmentations to exist as a unit of content within its constantly changing surroundings- the smaller the context, the more related the material.[133] In Pople's analysis, pitch structures occurring in large sections (rather than mini-boundaries) show more precise correlation with changes in the *luce*, and generally, these color correlations only occur in the larger repeating sections.[134]

Baker's interpretation, by contrasting the overall formal procedure for *Prometheus* is based primarily upon transpositional development of material in a sonata form pushed to its utmost limits. He has argued that besides the three-part structure of the piece, the piano entrances throughout *Prometheus* further articulate its sonata design.[135] Baker views *Prometheus* as Scriabin's first atonal work, as there are fewer associations between its motives, formal divisions, and thematic content than can be seen in his previous compositions.[136] He finds that the bass functions as the primary agent of tonality, but only by implication; the chords are not tonal, yet they are not purely atonal either. The vestigial bass lends some continuity but does not provide the same functional harmonic platform as would retain in a Beethoven Sonata.[137]

While elements of Scriabin's orchestration may follow the models of Liszt, Wagner, and Tchaikovsky, for the most part Scriabin's orchestration is as original as are the motivic,

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[133] Pople, 243.
[134] Only one of Pople's the mini-boundaries coincides with a change in background color (m. 309). Specific pitch classes in the *luce* indicating a change in background color also have significance to the overarching pitch-structure of the piece; for example, linear orderings of WT 6-35 may project as dissonances with certain pcs.
[135] Baker, 239.
[136] Ibid, 215. By comparison, Kallis places Scriabin's first atonal work slightly earlier, beginning with his Op.58 Feuillet d'album (1940).
[137] Ibid, 261.

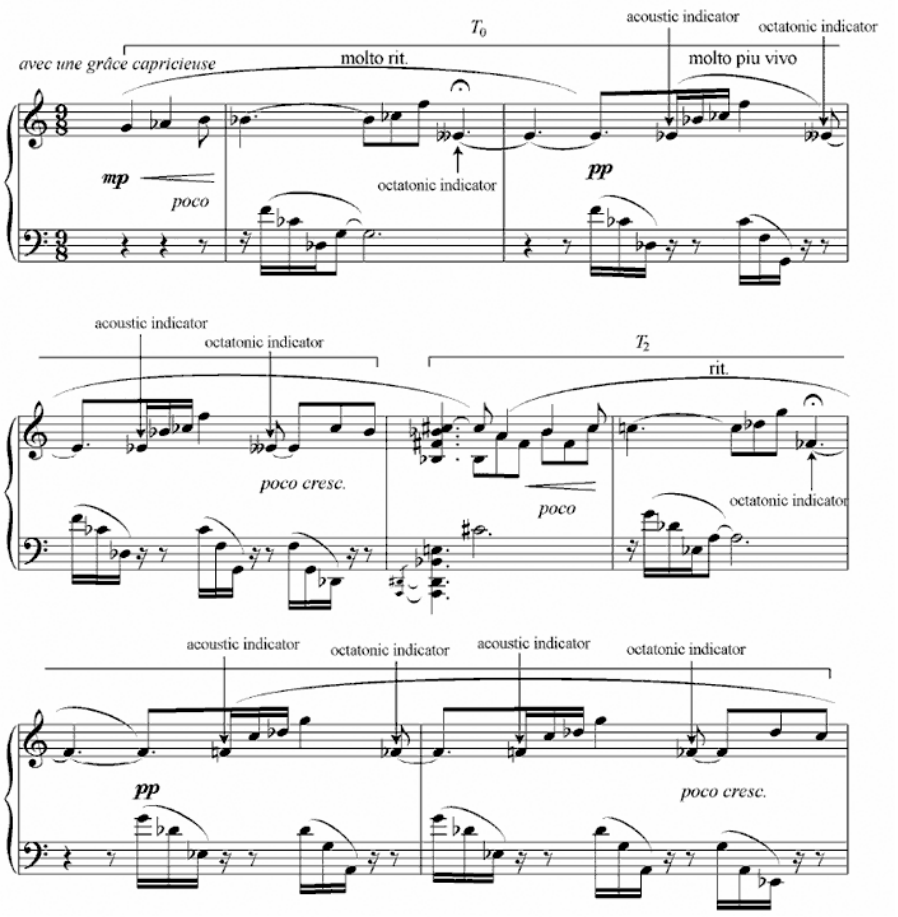
harmonic, and formal conceptions on the page. Scriabin's special effects draw attention to his unique orchestration as he toys with the listener's expectations in an unprecedented, unpredictable sequence of development. Orchestration provides the basic internal structure while irregular sequential accumulation is kept in check by consistent associated instrumental voicing. The orchestration additionally serves as a function of structure, reinforcing motivic development and contrapuntal combination. According to Baker, Scriabin's complex motivic treatments demand a large orchestral setting, something previously impossible in his piano works which could not afford such complex developmental procedures.[138] The colors of the lights further allow the contrapuntal colors to stand out.[139]

Additional Aspects of Pitch Organization

Issues of pitch organization in Scriabin's post-tonal repertoire have chiefly preoccupied scholars including Pople, Arion Kelkel, Fred Lerdhal, and most recently Vasilis Kallis. This period of Scriabin's composition is primarily defined by the use of non-diatonic sets including: 1) the acoustic scale, [024679T] a member of set-class 7–34 and the parent scale of the mystic chord; 2) the octatonic scale [0134679T], member of set-class 8–28; and 3) set-class 9–10 [01234679T], the nine-note superset arising from the union of the acoustic and octatonic scales. During his early post-tonal period, Scriabin's pitch organization was based on the interactions between the acoustic and octatonic scales within superset 9–10.

[138] Ibid, 252.
[139] Ibid, 252-257.

Figure 8. Scriabin, *Poème-Nocturne*, Op. 61, mm. 1–7. Ex. 9 from Kallis, "Principles of Pitch Organization in Scriabin's Early Post-tonal Period: The Piano Miniatures," 2.10.

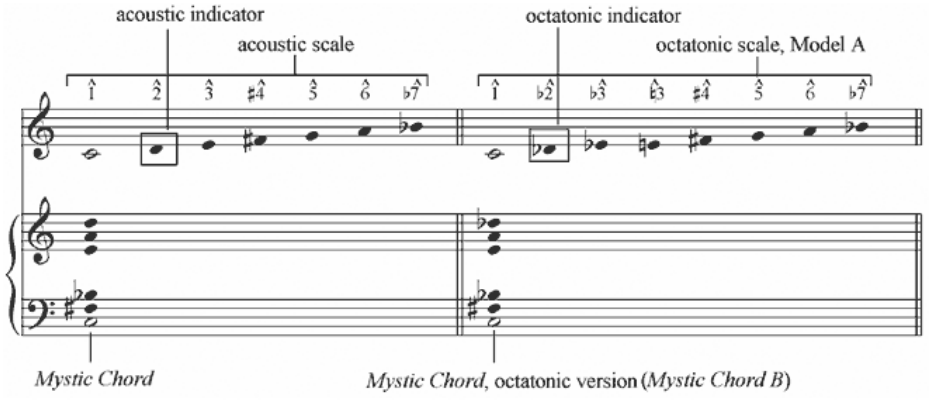


Scriabin's spelling tends to be functional, promoting parsimonious voice leading and pitch organization in what Kallis has described as Scriabin's "broad network."[140] Spelling substitutions promote cross-collectional interaction, especially with concern for the modal indicators. For example, when Scriabin allows one of the indicators to appear as a "new" pitch, a correlation between pitch content and transpositional interval is established (Figure 8).[141] Kallis has used Scriabin's pitch syntax in the early post-tonal period through the miniature piano pieces

[140] Vasilis Kallis, "Principles of Pitch Organization in Scriabin's Early Post-tonal Period: The Piano Miniatures," *Music Theory Online* 14, no. 3 (Sept. 2008), 3.1.
[141] Ibid, 3.9.

to inform his reading of the later post-tonal canon.[142] In the overall analytic history of Scriabin's post-tonal works, emphasis has been placed primarily on whole-tone content, largely ignoring the acoustic scale. Kallis has found that the whole-tone and acoustic are in actuality equally present, and the acoustic and octatonic scales (Figure 9) are connected through the variability of scale $\hat{2}$ ($\hat{2}$ in the acoustic and flat $\hat{2}$ in the octatonic).[143] These chromatic interactions occur within two forms of the mystic chord; set-class 6–34 and its octatonic version, Mystic chord B (set-class 6–z49).[144]

Figure 9. Pitch Organization in Scriabin. Ex. 2 from Kallis, "Principles of Pitch Organization in Scriabin's Early Post-tonal Period: The Piano Miniatures," 1.3.



The octatonic scale is invariant at four levels of transposition: T0, T3, T6, and T9, and Kallis has noted that the symmetrical properties of the scale persist within superset 9–10 as well. Cyclical application of T3 to 9–10 reveals not only the invariance of the octatonic component but also the introduction of the acoustic scale's $\hat{2}$. Any cyclical transposition of any superset 9–10 by interval-class 3 will preserve one form of the octatonic, and it will additionally produce four distinct forms of set class 9–10 and four distinct acoustic scales, each with its own $\hat{2}$ acoustic

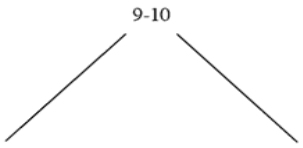
[142] Kallis, 1-1.3
[143] Ibid, 1.8-1.9.
[144] Ibid, 1.3.

indicator. When added to set class 9–10, the four acoustic indicators altogether produce the complete chromatic aggregate.[145] Through use of the octatonic and acoustic scales, Scriabin's method for pitch organization allows for both symmetry and maximum variant possibilities.

The acoustic scale, a major scale with raised $\hat{4}$ and lowered $\hat{7}$, in contrast is not invariant under transposition, and Scriabin tends to treat it similarly to the octatonic scale; through the use of dominant-type and extended structures with special emphasis on the Mystic chord (and its Mystic variants). Kallis has found a consistent correspondence between Scriabin's voicing of octatonic and acoustic structures, likely due to the emphasis on the Mystic chord as the harmonic foundation for pitch organization.[146] The acoustic and octatonic scales often interact by way of common subsets, creating both parsimonious voice-leading and direct conflict between indicators, $\hat{2}$ and flat-$\hat{2}$. Interactions between two pitches generally involve common subsets, and in general, the smaller the collection, the more ambiguous the "parentage." The far right column of Figure 10 details this attribute, displaying the common octatonic/acoustic mediators in the specific interaction process.[147]

[145] Kallis, 2.1-2.2.
[146] Ibid, 2.3-2.4.
[147] Ibid, 2.5.

Figure 10. Common subsets and supersets of set 9-10 in Scriabin. Figure I from Kallis, "Principles of Pitch Organization in Scriabin's Early Post-tonal Period: The Piano Miniatures," 2.5.



acoustic genus		octatonic genus	common subsets
6-34: *Mystic Chord*	$\hat{2} \leftrightarrow \flat\hat{2}$	6-Z49: *Mystic Chord* B	5-28: Dom 7, ♯11, 13, 5 omitted
6-34: *Mystic Chord* variant	$\hat{2} \leftrightarrow \flat\hat{2}$	6-30: *Mystic Chord* B variant	5-28: Dom 7, ♯11
6-33: *Mystic Chord* variant	$\hat{2} \leftrightarrow \flat\hat{2}$	6-Z50: *Mystic Chord* B variant	5-25: Major triad, ♯11, 13
5-34: Sixth, 9, ♯11	$\hat{2} \leftrightarrow \flat\hat{2}$	5-32: Sixth, ♭9, ♯11	4-27: Half-dim 7
5-34: Dom 9	$\hat{2} \leftrightarrow \flat\hat{2}$	5-29: Dom 7, ♭9	4-28: Dom 7
5-24: Major triad, 9, ♯11	$\hat{2} \leftrightarrow \flat\hat{2}$	5-19: Major triad, ♭9, ♯11	4-Z29: Major triad, ♯11
5-33: Dom 9, ♯11, 5 omitted	$\hat{2} \leftrightarrow \flat\hat{2}$	5-28: Dom 7, ♭9, ♯11 5 omitted	4-25: French 6th

With the exception of *Poéme Nocturne*, Op. 61, Scriabin's early post-tonal works are written in binary, ternary, or rondo part forms. The large structure exhibits development by means of motions away from and back to tonality, and contrast principally dependent on tonal/modal transposition. Cross-collectional interaction, a common technique to twentieth century composers, also provides an effective means for emphasizing each scale's "individual color" through its unique interval content. Scriabin rarely shifts between scales at the beginning of large sections, unlike Stravinsky and Debussy. The composer instead favors the subtle cross-collectional interactions accommodated by pitch invariance and degrees 2 and flat-2 chromaticism. Scriabin tends to contain entire collections or transpositions with the unit of a phrase, usually through motivic networks and melodic emphasis.[148] The 9–10 pitch gamut is rarely exceeded, but the entire chromatic sometimes unfolds over the span of the piece. This

[148] Kallis, 4.3.

structural chromaticism offers a means to overcome Scriabin's otherwise constrained pitch resources, while the larger blocks of tonalities can provide distinct sectionalizations of color.[149]

Analysis

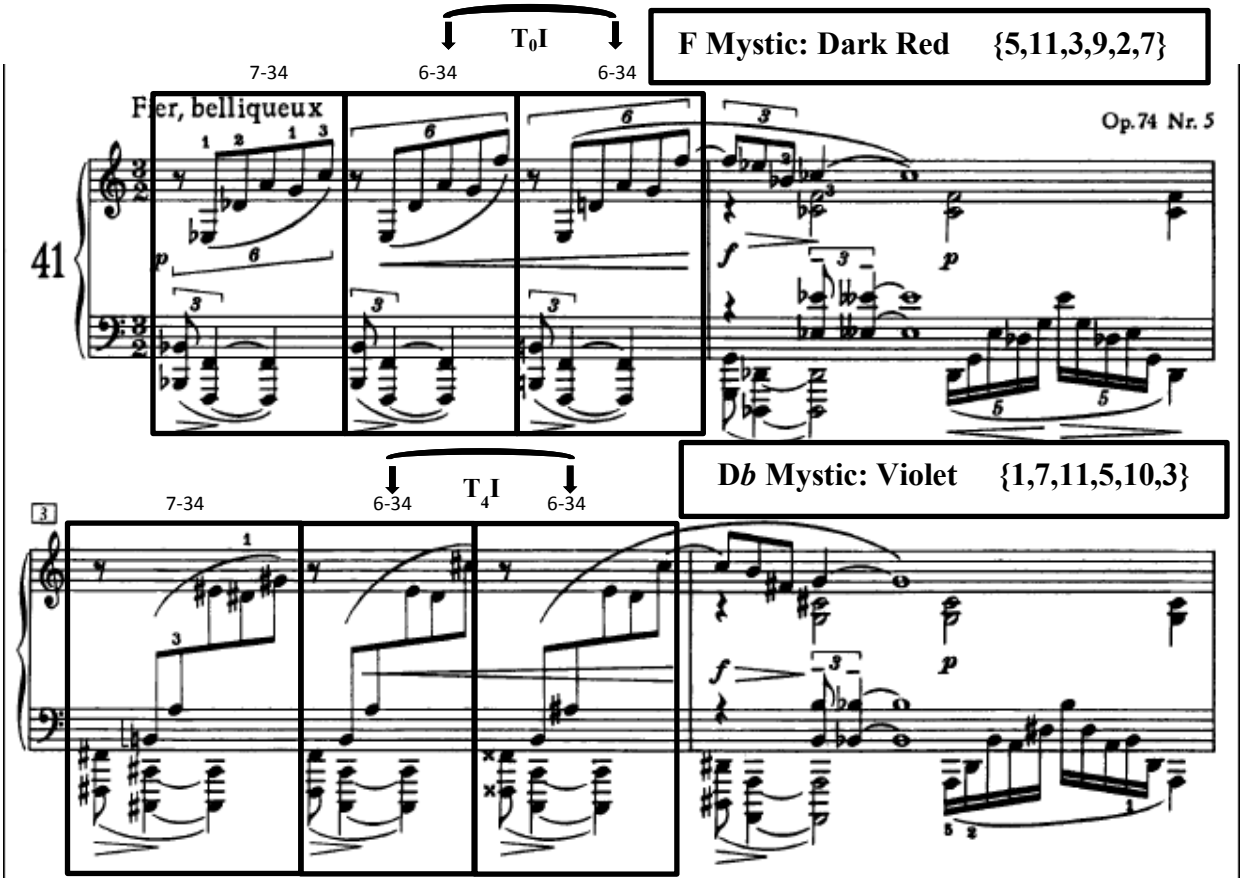
Consider these two arguments regarding use of the *luce* in performance: In support, the *luce* both triggers and illuminates changes, filling in for what the sound has disguised, in opposition, the lights appear dull in contrast to the music due to what seems like arbitrarily chosen colors which are dependent on mystic chord fundamentals. Does the *luce* matter? Do Scriabin's colors matter? The majority of performers and scholars would say that the music stands alone perfectly well. In 1915, Clarence Lucas reviewed the New York premiere of *Prometheus* and wrote that the lights had "no possible connection to the music" and "served to divert the senses of the audience from a too concentrated attention on the music."[150] This attitude has remained present even in modern scholarship. However, one cannot deny that performance with the *luce* is a spectacular feat.[151] I am suggesting that Scriabin's Mystic sets may be used as a springboard for synesthetic composition, specifically in Scriabin's post-tonal repertoire; a sort of "synesthetic key." Although Scriabin did not mark any indications of color in his music apart from *Prometheus* and *Mysterium*, it is possible that he composed his transitional and post-tonal repertoire with color in mind, perhaps even using it as a means to structure his music.

Scriabin's musical vocabulary transitioned from tonal to atonal between 1903 and 1914, and his piano preludes, Op. 31 through Op. 74 exemplify his preoccupation with Mystic A (6–

[149] Kallis, 4.4.
[150] Gawboy and Townsend, 79.
[151] For a modern performance with the luce see Gawboy at yale university video link youtube. https://www.youtube.com/watch?v=V3B7uQ5K0IU

34), Mystic B (6–z49), octatonic (8–28), and acoustic (7–34) during this period.[152] The Mystic chord appears regularly especially in Op. 67 and Op. 74, where Scriabin has treated both forms of the Mystic chord systematically through transposition and segmentation. Keep in mind that Scriabin's use of Mystic collections in the Preludes is not nearly as abundant as in *Prometheus*, and its applicability rests on a very small sample comparatively speaking. As an example, I have chosen Op. 74, No. 5 to demonstrate a promising procedure to analyze Scriabin's atonal music using specific root-based voicings of mystic chords to illustrate sectional boundary divisions based through Scriabin's Mystic circle of fifths "color wheel."

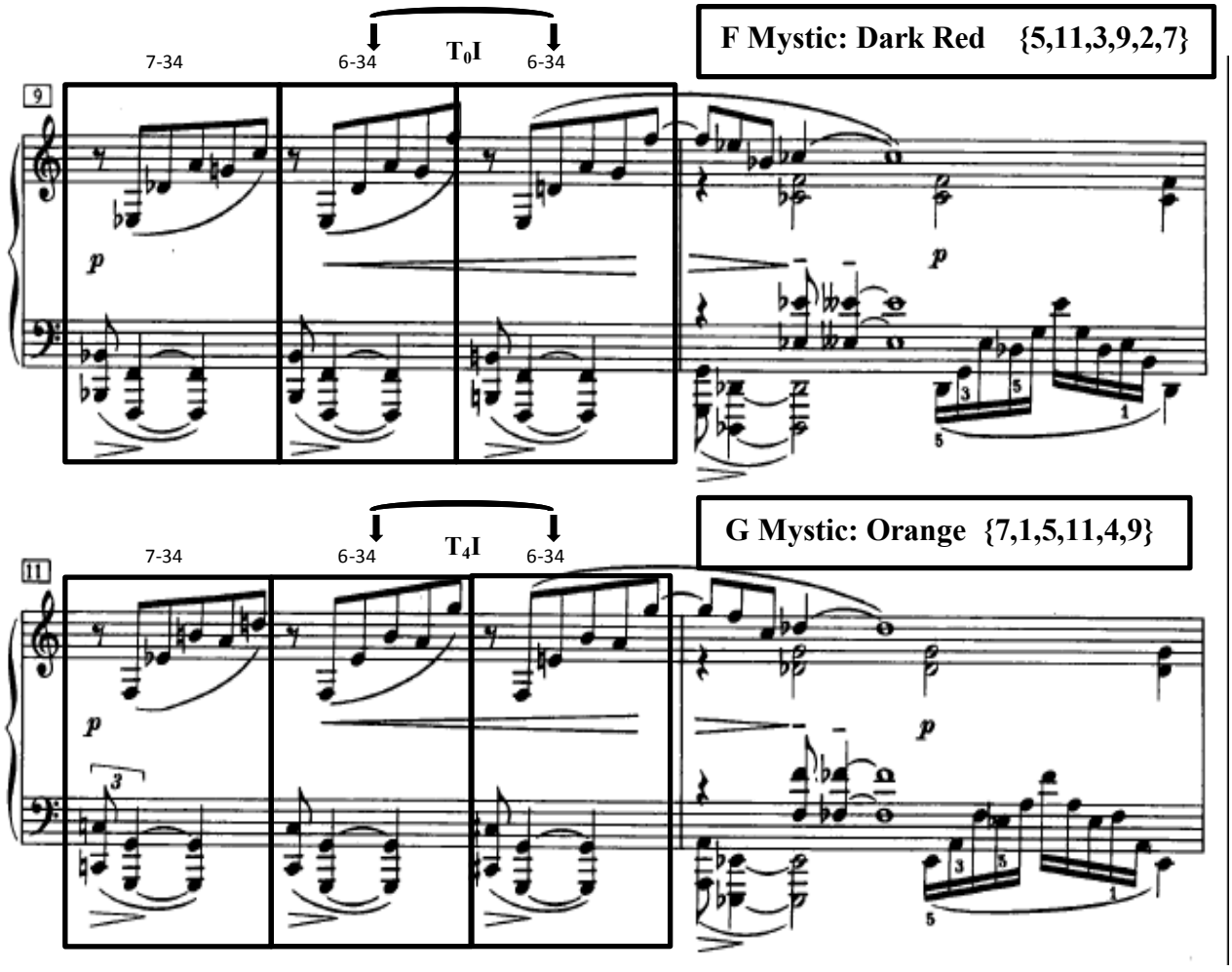
Figure 11. Scriabin Op.74, No. 5 measures 1–4.



[152] See Appendix A.

As was the case in *Prometheus*, the Mystic collection does not appear as melodic material in Op.74 No.5, rather the collection is attained only by the sum of melodic and harmonic components. When identifying the root of Mystic chords, it is imperative to use normal form rather than prime form because normal form preserves Scriabin's language and provides a means to differentiate between types of Mystic chord spelling so that color may be correctly identified.

Figure 12. Scriabin Op. 74, No. 5 Measures 9–12.



Op. 74, No. 5 is divided into two sections in a binary form: section A m. 1-9 and section A^1 m. 9-17. Throughout these seventeen bars, Scriabin employs acoustic set 7–34 and Mystic set 6-34 as his primary motivic vocabulary, (including related subsets). Sets 7–34 and 6–34 always occur together within the same phrase: first with a statement of 7–34 directly preceding two repetitions of set 6–34 (see Figure 11). This construction occurs twice in section A (m. 1 and m. 3) and twice in section A^1 (m. 9 and m. 11).

In m. 1 b. 2, 6–34 {1, 3, 5, 7, 9, 10} is the transposed inversion of m.1 b.3 {2, 3, 5, 7, 9, 11} at T_0I. In m. 3 b. 2 6–34 {9, 11, 1, 3, 5, 6} is the transposed inversion of m. 3 b. 3 6–34 {10, 11, 1, 3, 5, 7} at T_4I. In the A^1 section, m. 9 b. 2 produces an exact repetition of the content in m. 1, however m. 11 is different: m. 11 b. 2 6–34 {3, 5, 7, 9, 11, 0} is the transposed inversion of m. 11 b. 3 6–34 {4, 5, 7, 9, 11, 1} at T_4I.

Figure 13. Boundaries of color in Scriabin Op. 74, No. 5

Measure	6-34 Normal Order	Color
M.1	(2, 3, 5, 7, 9, 11)	Dark Red
M.3	(10, 11, 1, 3, 5, 7)	Violet
M.9	(2, 3, 5, 7, 9, 11)	Dark Red
M.11	(4, 5, 7, 9, 11, 1)	Orange

On beat three in each of these measures, the current mystic collection corresponds with one of Scriabin's Mystic chord colors based on its root. In m.1, the collection is F Mystic, which Scriabin has indicated is the shade Dark Red. In. m. 3, the collection is D-flat Mystic, which is

Violet. The Mystic collection in m. 9 is F mystic, Dark Red once again, and then moves to G Mystic, Orange in m. 11. Scriabin begins the A section in Dark Red, and as a restatement of material at T_8, he travels to Violet. The division of form, A^1, begins once more with a restatement of pitch content in Dark Red, and he travels by T_2 to Orange (Figures 6 and 13).

A similar procedure may be applied to all of Scriabin's atonal compositions employing Mystic vocabulary as a method to find Scriabin's partiality for certain colors as well as structural divisions produced through color in his music. Although I have focused exclusively on iterations of 6–34 to illustrate color in this example, with further research it is plausible to also incorporate the related Mystic sets for example, 6–z49 and acoustic set 7–34 into a color-themed analysis. In instances where assigning subsets to particular collections is unclear, Pople's repetition structure model will provide clarity.

Chapter Four: Messiaen

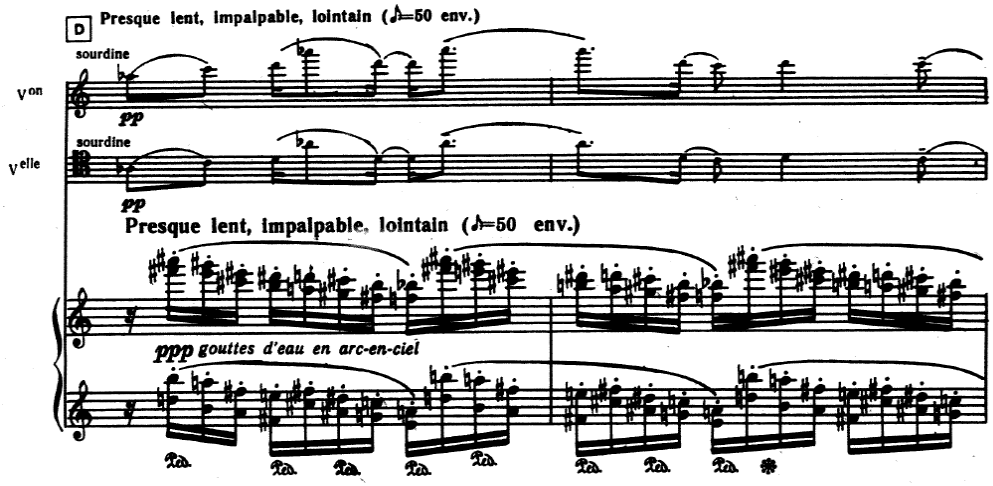
Messiaen, unlike Scriabin, was a true synesthete, and his use of color is conceptually different. In 1979, Messiaen revised his priorities of construction, placing primary emphasis on color rather than rhythm.[153] Messiaen's colors were linked to a self-described "sound-complex" rather than to an association of isolated tones. His self-consistency with colors enabled him to compose with a conscious color palette, and his ability to control the colors in the music played an integral role in his compositional technique. Published color descriptions occurring both within and accompanying the music clearly demonstrate the composer's synesthetic affliction. Messiaen's first public acknowledgement of his use of color appeared as a passing reference in the second movement of the *Quatuor pour la fin du temps* (1941), *Vocalise, pour l'Ange qui annonce la fin du Temps* (rehearsal D) where "the gentle cascade of blue-orange chords" is noted in the piano part (Figure 14).[154] The importance of color to his compositional process was not widely known until his interviews with Claude Samuel were published in the mid-1960s. In these sessions, Messiaen revealed much of what we have come to identify as Messiaen's "sound," including his affinity for birdsong, rhythm, modes, and spiritual expression.

Messiaen's consistency is quantifiable and has therefore supplied analysts with a means to inventory correlations between sound and color with intentions of determining the governing principles of his color palette. Yet because we are dealing with a sensation rather than a physical manifestation, occasionally we are left only with presumptions about his intentions. However, in these instances, it is usually possible to infer the color of most sonorities due to the vast amount

[153] Jonathan Bernard, "Colour," in *The Messiaen Companion*, ed. Peter Hill (London: Faber, 2009), 203.
[154] Although this description is not included in the published scores, Messiaen described this color effect in *Technique* on p. 71.

of documentation Messiaen ultimately assembled.[155] Although the composer wrote a great deal on his musical innovations, there remain a substantial number of components which still elude us. Perhaps it was his intent not to divulge his secrets, or perhaps he intended to focus his audience to the spiritual and mystical powers of music that encompassed his being rather than on technical details. As Jonathan Bernard suggests, "some mysteries, as any devout Catholic knows, are meant only to be contemplated, not penetrated."[156]

Figure 14. Excerpt from Messiaen *Technique: Quatuor pour la fin du temps* (1941), *Vocalise, pour l'Ange qui annonce la fin du Temps*, rehearsal D.



Technique de mon Langage Musical
By Olivier Messiaen
Quatuor pour la fin du temps (1941), *Vocalise pour l'Ange qui annonce la fin du Temps*

Edition Musicales

[155] Bernard, 1995, 205. As is the case for most synesthetes, Messiaen's color correspondences display an internal consistency, but more uncommonly, he experienced color responses both while listening to and reading music.
[156] Ibid, 217. Bernard suggests that it is possible to "see" as Messiaen with a great deal of aural training; however the responses would be learned and not genuine as they would be for a person with synesthesia.

Color

Colorations in Messiaen's scores appear in two general senses: those indicating precise correspondences between colors and sonorities including *Sept Haïkaï* (1962) and *Coulers de la cite celeste* (1963), and those displaying generalized color correspondences including *Vingt Regards sur l'Enfant Jésus* (1944), *Catalogue d'oiseaux* (1958), and *Chronochromie* (1960). Bernard has suggested that:

> If Messiaen's color responses are consistent, then we should be able, without seeing the colors directly, to identify the similarities between the sonorities which for Messiaen correspond to the same color or color complex- and furthermore, of course, to pinpoint the features of these sonorities that differentiate them from those corresponding to other colors.[157]

Technique de mon langage musical (1944) describes in precise detail the sonorities that Messiaen works with, and they are generally readily classifiable as categories of sounds.[158] Particular sound combinations create a wide range of color responses, and the colors are not constructed logically, unlike Scriabin's spectral ordering, as befits the involuntary nature of a true synesthetic response.

Messiaen applies three basic types of color labels in his scores: 1) monochromatic-those which supply one sole color such as "green" or "red"; 2) a uniform but complex color such as "blue-orange" or "grey-rose"; and 3) combinations of varying complexity such as "orange, grey, and milky-white."[159] Bernard has compiled a table of Messiaen's color correspondences as they have appeared in interviews, notably those with Samuel (1967) and Goléa (1960), as well as in published notes made independently by Messiaen. This is by no means a master list, and it does not account for the ample sections of music without color data, leaving us to question why

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[157] Jonathan Bernard, "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in his Music." *Music Perception,* 4, No.1 (1986), 43.
[158] Ibid, 44.
[159] Ibid, 44.

Messiaen labeled only some areas and not others. Bernard has focused on Messiaen's modal transpositions but he has not included Messiaen's later works in his list (Figure 15). Many of the later works include techniques only recently analyzed.[160]

Figure 15. Modally based coloration in Messiaen's compositions. Table 2 from Bernard, "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in his Music," 47.

Modally Based Coloration in Messiaen's Compositions

Mode	Composition, Movement	Color(s)
2(1)	*Préludes*, V	Violet-purple
	Vingt Regards, V	Blue-violet
	Catalogue, VII	Rose and mauve
	Catalogue, VII	Red and violet
	Couleurs (R75)	Blue-violet
2(2)	*Préludes*, I	Violet
	Vingt Regards, V	Blue-violet
	Vingt Regards, XIII	Gold and brown
	Vingt Regards, XVII	Gold and brown
	Vingt Regards, XVII	Rose and mauve
2(3)	*Canyons*, IV	Green
3(1)	*Vingt Regards*, XIII	Orange, gold, milky white
	Catalogue, VII	Orange
	Couleurs (after R75)	Orange, gold, milky white
	Canyons, VII	Orange and gold
	Canyons, VII	Orange, gold, milky white
3(2)	*Préludes*, I	Orange
	Vingt Regards, XIII	Grey and mauve
	Canyons, IV	Grey and gold
	Canyons, XII	Grey and gold
3(3)	*Préludes*, V	Blue-orange
	Préludes, VIII	Blue-orange
	Vingt Regards, XVII	Blue and green
	Catalogue, IX	Blue-green
	Canyons, VIII	Blue
	Canyons, XII	Blue and green
3(4)	*Préludes*, VIII	Green-orange
	Vingt Regards, XIII	Orange, red, with a bit of blue
	Canyons, VII	Orange striped with red
4(3)	*Canyons*, IV	Yellow and violet
4(4)	*Vingt Regards*, V	Deep violet; white with violet design; purple violet
	Vingt Regards, XVII	Violet veined with white
4(5)	*Catalogue*, VII	Mauve
	Catalogue, VII	Violet; deep violet
	Couleurs (R76)	Violet
	Canyons, IV	Violet
4(6)	*Vingt Regards*, VII	Carmine red reflections; purplish blue; grey-mauve; grey-rose
	Canyons, VII	Carmine red; purplish blue; mauve; grey-rose
6(1)	*Catalogue*, VII	Golden
6(2)	*Canyons*, IV	Brown, russet, orange, violet
	Canyons, VII	Brown, russet, orange, violet
6(3)	*Vingt Regards*, V	Transparent sulphur yellow with mauve reflections and little patches of Prussian blue and brown purplish-blue
6(4)	*Vingt Regards*, VII	Vertical bands: yellow, violet, black

[160] See Wai-Ling Cheong's work on color chords and parallel chord series discussed below on page 59.

Modes of Limited Transposition

Messiaen's modes of Limited Transposition, named due to their symmetrical properties enabling complete replication of content when transposed beyond a certain pitch level, provide us with the most reliable color correspondences in Messiaen's music.[161] Developed sometime around 1930 (or possibly short before), the modes were among the core elements of Messiaen's unique harmonic language. Though color is not discussed in Messiaen's *Technique de mon langage musical* except in passing, four modes listed here possess color associations: Mode 2 (8–28) the octatonic collection, Mode 3 (9–12) the complement of the augmented triad, Mode 4 (8–9), and Mode 6 (8–25).[162] Mode 5 and Mode 7 have no color associations for Messiaen because Mode 5 is a subset of both Modes 4 and 6, making its inclusion redundant. Mode 7 is a 10-note superset of all other modes with the exception of Mode 3. Mode 7 may be either too colorful or on the contrary devoid of color as Messiaen has referred to the total chromatic as producing grey or black effects.[163] None of the color modes is either a subset or superset of any of its associates; however they all have numerous subsets in common.

Color identities are tied to each of the modes as well as to their transposition levels. The modes each contain a dominant color or colors as well as diverse secondary colors, and at certain transpositions, the dominant color becomes trumped by another.[164] Messiaen's modes are not the only component producing color. In *Technique*, he references the "chord on the dominant," also known as the "stained-glass chord" as giving the impression of many simultaneous colors. His

[161] Bernard, 45.
[162] I have referenced Strauss's terminology here as a substitution for Bernard's for the sake of continuity with my own analysis.
[163] Ibid, 46.
[164] Ibid, 46.

"chord of resonance" and "chords of superior and inferior resonance" are also associated with colors but will be discussed later in the chapter.[165]

Messiaen's preference for and treatment of certain modes changed over his career. The modes of Limited Transposition first appeared in the preface of *La Nativité du Seigneur* (1935) and again in *Technique* (1944). Little changed between these publications concerning the philosophy behind the modes; however while in *La Nativité* only four modes were listed, the number expanded to seven in *Technique* due to the addition of modes which are transposable six times.[166] The ordering of the modes is altered in the latter publication, and although Messiaen did not provide specific reasons for the change, he indicated that the number of transpositional levels per mode played a role in the decision.[167] Adding to Bernard's summary of the modes, Wai-Ling Cheong observed that in *Technique*, Messiaen found Modes 4 and 7 to be less interesting simply because they have the greatest number of possible transpositions (6 each).[168] His interests lay first with Modes 2 and 3, then later shifted to Modes 4, 5, and 6.[169] In *Technique*, Messiaen tends to identify the modes with colors harmonically rather than melodically.[170]

Messiaen's works from the 1960s, including *Chronochromie,* tend to be less modal than his earlier music. During this decade, he turned to a less confining musical language even inventing his own chord types. His proclaimed "complex of sounds" is not exclusively modal for two reasons: 1) the color combinations used for his invented chord types bear little to no resemblance to previously collected modal associations; and 2) Messiaen spoke of twelve

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[165] Bernard, "Colour*"*, 211.
[166] Wai-Ling Cheong, "Messiaen's Triadic Colouration: Modes as Interversion," *Music Analysis* 21, No. 1, Olivier Messiaen (1908–92) Anniversary Issue (2002), 57.
[167] Ibid.,.
[168] Ibid, 58.
[169] Ibid.
[170] There are exceptions to this preference, including the melody plus accompaniment style in *Vocalise, pour l'ange qui announce la fin du temps* (1941).

possible transpositions each for the chord types each with a distinct array of colors. These things cannot be accomplished with the modes alone due to their namesake's "limited" nature.[171]

Problems with Modal Analysis

In *Chronochromie*, Messiaen lists groupings of colors at the beginnings of sections, but refrains from identifying direct colorations for each of the chords. In these ambiguous situations, Bernard has suggested employing an analytical hierarchy for determining direct color correspondences: 1) mode-transpositional quality; and 2) chord spacing. According to Bernard, modal transpositional quality takes precedence in all contexts, but occasionally subsets will substitute for the complete modal collection. In these instances, subsets must remain tied to specific pitch content.[172] Pc set identity is especially useful when both spacings and superimpositions occur simultaneously. Just as modes have characteristic subsets, so too are the characteristic spacings formed by chords formed within modal transpositions.[173] For Bernard's second point, in cases where there is no identifiable modal quality, spacings override pc content and become the significant indication of color.[174] Spacing provides insight into "characteristic chords" of modal transpositions and also into specific colors evoked by specific sounds.[175] Bernard has noted that two different spacings of the same set may correspond to two different colors; conversely, two different sets (by superimposition)[176] may correspond to the same color.[177] Messiaen sees his

[171] Bernard, "Colour", 212.
[172] Bernard, "Messiaen's Synesthesia," 67.
[173] Ibid.
[174] Ibid.
[175] Ibid.
[176] Superimposition is the combination of two or more pc sets, chords, or modes on top of one another.
[177] Ibid.

modes as being "at once in the atmosphere of several tonalities, *without* polytonality."[178] Therefore, modal borrowing does not disrupt color identity any more than it interferes with the current modal transposition; the qualities of the modes remain intact despite the intrusion of foreign pitches.[179] In a 1995 sequel study, Bernard's view on modal intrusions has changed to reflect that modes used in close proximity of a stratified texture may exert influence on one another in an unpredictable way.[180]

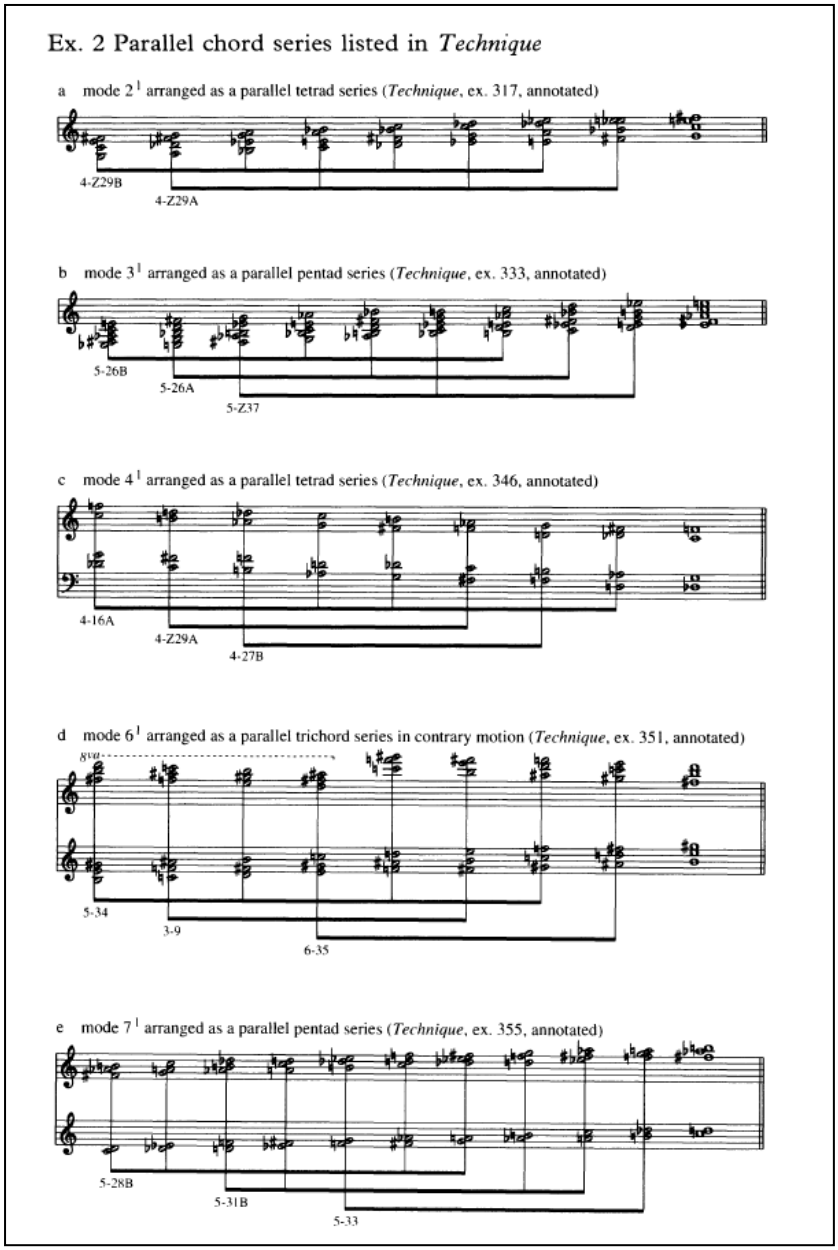
Invented Chord Types

Messiaen's fondness for the modes eventually shifts to incorporate a new system, his parallel chord series. The parallel chord series is listed in the prefaces to *La Nativité*, *Technique*, and *Liturgies*. While *Technique* is the most comprehensive of the taxonomy, *Liturgies* contains a few narrowly defined differences, notably regarding an expansion of the pentad series into the hexad series.[181] There are no explanatory notes in either of these references regarding the color effects of these series, and so the underlying rationale remains elusive.[182] In contrast to Bernard's analysis of chord spacing and modal transposition as the primary indicator of color mode, Cheong has produced analyses favoring the parallel chord series (Figure 16).[183] Cheong has established that for Messiaen, different transpositions of the same mode will evoke different colors, and color perception is affected not only by the intervallic structure of the individual

[178] Claude Samuel, *Conversations with Oliver Messiaen*, trans. Felix Aprahamian (London: Stainer & Bell Ltd, 1976), 19.
[179] Bernard, 56-57.
[180] Bernard, "Colour," 206.
[181] Cheong, "Messiaen's Triadic Colouration," 62.
[182] Ibid, 63.
[183] Ibid, 76.

mode, but also by groupings of specific pitches.[184] She has offered that the short time span of the parallel series conceivably created a way for Messiaen to achieve a vivid display of colors.[185]

Figure 16. Parallel chord series as listed in Technique. Ex. 2 from Cheong, "Messiaen's Triadic Colouration: Modes as Interversion," 55.



[184] Cheong, "Messiaen's Triadic Colouration," 76.
[185] Ibid.

Typically a series of this type would appear in an orderly, scalar format, but that is not how it is presented in Messiaen's music; instead, a re-ordering of chords is created in what Cheong terms a meandering gesture.[186] In some cases, the illusion of order is created by selecting only certain chords from the series. Messiaen refers to these selected groupings as "pedal groups," and they are found fairly regularly in his compositions ranging from the 1930s to the mid-1940s. The pedal groups serve as structural markers, establishes cadential functions, and are often treated in rhythmic canon and superimposition.[187] Cheong has noted that the superimposition of different series creates a collage possibly linked to the color effects Messiaen describes in the notes for *Liturgies*.[188]

Despite its recurrent appearance, Messiaen has only written about the use of the parallel chord series in conjunction with Modes 2 and 3 due to the triadic structures seemingly typical for the chords of these modes.[189] Triads form the basis of each arrangement in the series although Messiaen never explicitly confirms this. A similar scheme is applied to the Mode 4 tetrad series [0, 4, 7, 10], the Mode 6 trichord series [0, 4, 7], and the Mode 7 pentad series {0, 4, 7, 10, 11}.[190] Cheong has compiled a master list of the Mode 2 parallel tetrad series extended to all typical chords and series (Figure 17).

All modes include a referential structure which Cheong has configured in Figure 17. Mode 6 is especially unique due to the ability of its eight pcs to be absorbed into a conventionally spelled {0, 4, 7, 10, (1 or 2)} with added minor sixth or tritone.[191] With such expansive series, the involvement of major triads is inevitable, albeit with two exceptions. Modes

[186] Cheong, "Messiaen's Triadic Colouration," 64.
[187] Ibid.
[188] Ibid, 65.
[189] Ibid.
[190] Ibid ,66.
[191] Ibid, 68.

1 and 5 are the only modes containing incomplete major triads, and as such do not appear in Messiaen's listed series.[192] All forms of the listed series contain at least one chord type delineating the referential structure of that mode.[193] With the exception of Modes 2 and 3, the parallel chord series appears infrequently, but when it does appear, it is exclusive.

Figure 17. A triadic reading of the typical chords and listed seriesTable 2 from Cheong, "Messiaen's Triadic Colouration: Modes as Interversion," 67.

Listed series	Chord type (no. used)	Triadic reading
mode 2 typical chord	5–25A	[0, 4, 7] + 6 + 9
mode 2 parallel tetrad series	4–z29B (4)	[0, 4, 7] + 6
	4–z29A (4)	[0, 4, (7), 10] + 9
mode 3 parallel pentad series	5–26B (3)	[0, 4, 7, 10] + 8
	5–26A (3)	[(0), 4, 7, 10, 2] + 6
		[0, 4, (7), 10, 1] + 8
	5–z37 (3)	[0, 4, 7] + 8/9
mode 3 parallel hexad series	6–15B (3) typical chord	[0, 4, 7, 10] + 8 + 11
	6–21B (3)	[(0), 4, 7, 10, 2] + 6 + 8
		[0, 4, (7), 10, 1/2] + 8
	6–14B (3)	[0, 4, 7] + 8/9 + 11
mode 4 parallel tetrad series	4–16A (4)	nil
	4–z29A (2)	[0, 4, (7), 10] + 9
	4–27B (2)	[0, 4, 7, 10]
mode 6 parallel trichord	5–34 (4)	[0, 4, 7, 10, 2]
series in contrary motion	3–9 (2)	nil
	6–35 (2)	[0, 4, (7), 10, 2] + 6 + 8
mode 6 parallel octad series	8–25 (8)	[0, 4, 7, 10, 1/2] + 6 + 8
mode 7 parallel pentad series	5–28B (4)	[0, 4, (7), 10] + 6 + 9
	5–31B (4)	[0, 4, 7, 10, 1]
	5–33 (2)	[0, 4, (7), 10, 2] + 6
		[0, 4, (7), 10, 2] + 8
		[0, 4, (7), 10] + 6 + 8

A linear view of the parallel chord series displays the alternation of different chord types while a vertical view shows systematic re-orderings of pcs. Re-orderings occur when a sequence

[192] Cheong, "Messiaen's Triadic Colouration," 69.
[193] Ibid.

of chords follows the mode in strict order.[194] After the structure of one chord has been set, the vertical arrangements of pcs remain fixed and "outside" chords (of different intervallic content) intervene in an orderly circulation. The number of times a chord type recurs depends primarily on the number of possible transpositions for that mode and secondarily on the type of chord structure engaged. Each mode contains a recurring interval pattern, and each voice must transverse it.[195] Any irregularity in a parallel chord series, such as a sudden leap, can cause the series to change through permutation to another parallel chord series.

Figure 18. A comparison of the referential structure of the modes. Table 3 from Cheong, "Messiaen's Triadic Colouration: Modes as Interversion," 68.

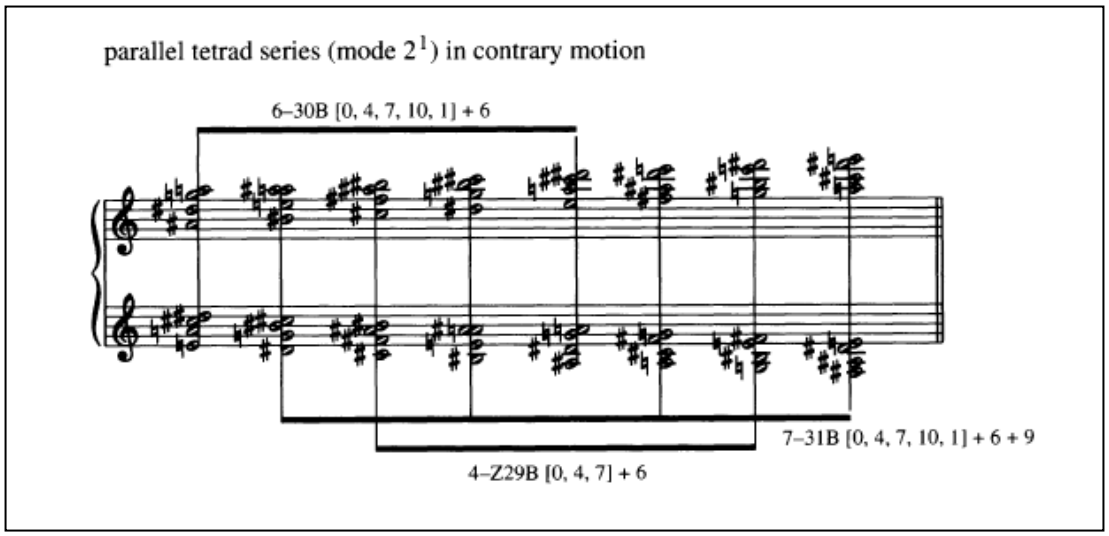
	Mode	Referential structure
1	[C, D, E, F♯, G♯, A♯]	[E, G♯, (B), D, F♯] + A♯ + C
2	[C, D♭, E♭, E, F♯, G, A, B♭]	[C, E, G, B♭, D♭] + F♯ + A
3	[C, D, E♭, E, F♯, G, A♭, B♭, B]	[C, E, G, B♭, D] + F♯ + A♭
4	[C, D♭, D, F, F♯, G, A♭, B]	[G, B, D, F, A♭] + D♭
5	[C, D♭, F, F♯, G, B]	[G, B, (D), F] + D♭
6	[C, D, E, F, F♯, G♯, A♯, B]	[E, G♯, B, D, F/F♯] + A♯ + C
7	[C, D♭, D, E♭, F, F♯, G, A♭, A, B]	[G, B, D, F, A♭/A] + D♭ + E♭

Within a parallel series a network of vertical and linear orderings creates a complex sequence including multiple pedals. Pedals are normally fixed, but the superimposition of repeating pedals creates orderings that are vertically produced, making any resulting simultaneities form a sequence similar to the rotating chord types.[196] Although Messiaen did not use interversion in his own terminology, he likened this effect of contrary motion to the closing of a fan, allowing for certain chords to appear more frequently and thus making the passage

[194] Cheong, "Messiaen's Triadic Colouration," 71.
[195] Ibid.
[196] Ibid, 72.

sound more tonally centered.[197] Interversion is a permutation scheme that manipulates the order of repeating elements including both pitches and durations in a constantly shifting cycle of pcs. Interversion typically occurs with other interversions as a large collective pedal rather than in isolation (See Figure 19).[198] As Cheong has noted, Messiaen's treatment of modes as interversion is most complex when a parallel series occurs in contrary motion.[199] In these instances, the parallel chord series creates an undeniably graphic effect in the score through fixed spellings and spacings. Spellings highlight the individual structures within a modal identity and instances of variant spellings applied to a mode seem to adapt faithfully to a graphic presence rather than occur by sheer coincidence.[200]

Figure 19. Parallel tetrad series (mode 2^1) in contrary motion. Ex.8 from Cheong, "Messiaen's Triadic Colouration: Modes as Interversion," 74.



[197] Cheong, "Messiaen's Triadic Colouration," 74. See Messiaen's note to *Méditations sur le mystère de la Sainte Trinité* VIII (1969)
[198] Ibid, 72. *Île de feu* II (1949) contains the earliest illustration of interversion.
[199] Ibid, 74–75. Along similar lines, Messiaen placed particular emphasis on the "dominants" of the modes through the use of repetition in what Cheong calls his "quest for the triadic." Keep in mind however that any dominant implications are usually blurred due to the presence of added notes.
[200] Ibid, 76.

Traité de Rhythme, de Couleur, et d'Ornithologie

Messiaen attached as much importance to his invented chord types as to his modes of limited transposition. In contrast to the prevalent discussion of the modes in secondary literature, the invented chords had never, until recently, been treated systematically. Wai-Ling Cheong's 2003 publication currently stands as the first and only one of its kind. A small number of the invented chord types have made fleeting appearances in Messiaen's writings including his Mystical chords in the preface to *Livre du Saint Sacrement* (1984) and the carillon chords in *Vingt Regards*, but as rarities, their makeup is not central to his invented vocabulary. [201] However there are four chord types that appear to gain prominence in his later works; having been previously unidentified prior to the publication of *Traité de Rhythme, de Couleur, et d'Ornithologie* (1992) (hereafter referred to as *TRCO*), there is reason for a thorough examination of their importance. The four types are as follows: the chords of contracted resonance (CCR), the chords of total chromaticism (CTC), the revolving chords (RC), and the chords of transposed inversion on the same bass note (CTI).[202]

Although Messiaen is characteristically straightforward in the use and application of his compositional vocabulary, the procedure for the invented chords remains shrouded in mystery. Messiaen first introduced the names of these chords in his interview with Samuel,[203] and unfortunately due to deviations in the translated English editions, inconsistencies of nomenclature have prevailed.[204] With publication of *TRCO* in 1992, terminology now stands

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[201] Messiaen's mystical chords are not to be confused with Scriabin's mystic chord (6-34).
[202] Wai-Ling Cheong's abbreviations .
[203] Samuel, 1976.
[204] Wai-Ling Cheong, "Rediscovering Messiaen's Invented Chords." *Acta Musicologica* 75, Fasc. 1 (2003), 87. Confusion especially arises between the terms "chords on the dominant" and "chords of transposed inversions." According to Cheong, Bernard mistakenly treats these terms as different chord types. In vol. 5 of *TRCO*, Messiaen lists two types of CCR, but neglects to explain their distinction.

corrected; however terminology alone does not clarify all uncertainties regarding the genesis of the chords.[205]

Messiaen labeled the majority of the colored chords in his pieces composed in the 1960s including those appearing in *Chronochromie* (1960), *Sept Haïkaï* (1962), and *Couleurs de la cite Céleste* (1963), but he neglected to define the specific colors they evoke in structural terms; all that is evidenced is that they are clearly non-modal.[206] In *TRCO* Vol. III, Messiaen has provided a series of chord tables for CTI, RC, and CCR (type 1)[207] in connection with the layers of chords in *Chronochromie*, these tables provide a basis upon which to compare structural variants. See Figures 20 and 21.

Figure 20. Chord names and set names. Table 1 from Cheong, "Rediscovering Messiaen's Invented Chords," 89.

CTI (chords A, B, C and D)	7-20A
RC (chords A, B and C)	8-5A, 8-4B, 8-14B
1st CCR (chords A and B)	7-Z36A, 7-Z12
2nd CCR (chords A and B)	6-Z19B, 6-Z43A
CTC	8-16A

[205] Cheong, "Rediscovering Messiaen's Invented Chords," 88.
[206] Ibid, 87–88. Cheong has indicated that Messiaen touched on the identities of both CCR and RC in *Technique* and CTI in *La Nativité* without formally identifying the chord types and she has suggested that the nomenclature for these chords was introduced belatedly to their use.
[207] In vol. V of *TRCO*, Messiaen lists two types of CCR, but neglects to explain their distinction.

Figure 21. Messiaen's chord tables in *TRCO*, vol. III, p 85-88. Ex.1 from Cheong, " Rediscovering Messiaen's Invented Chords," 89.

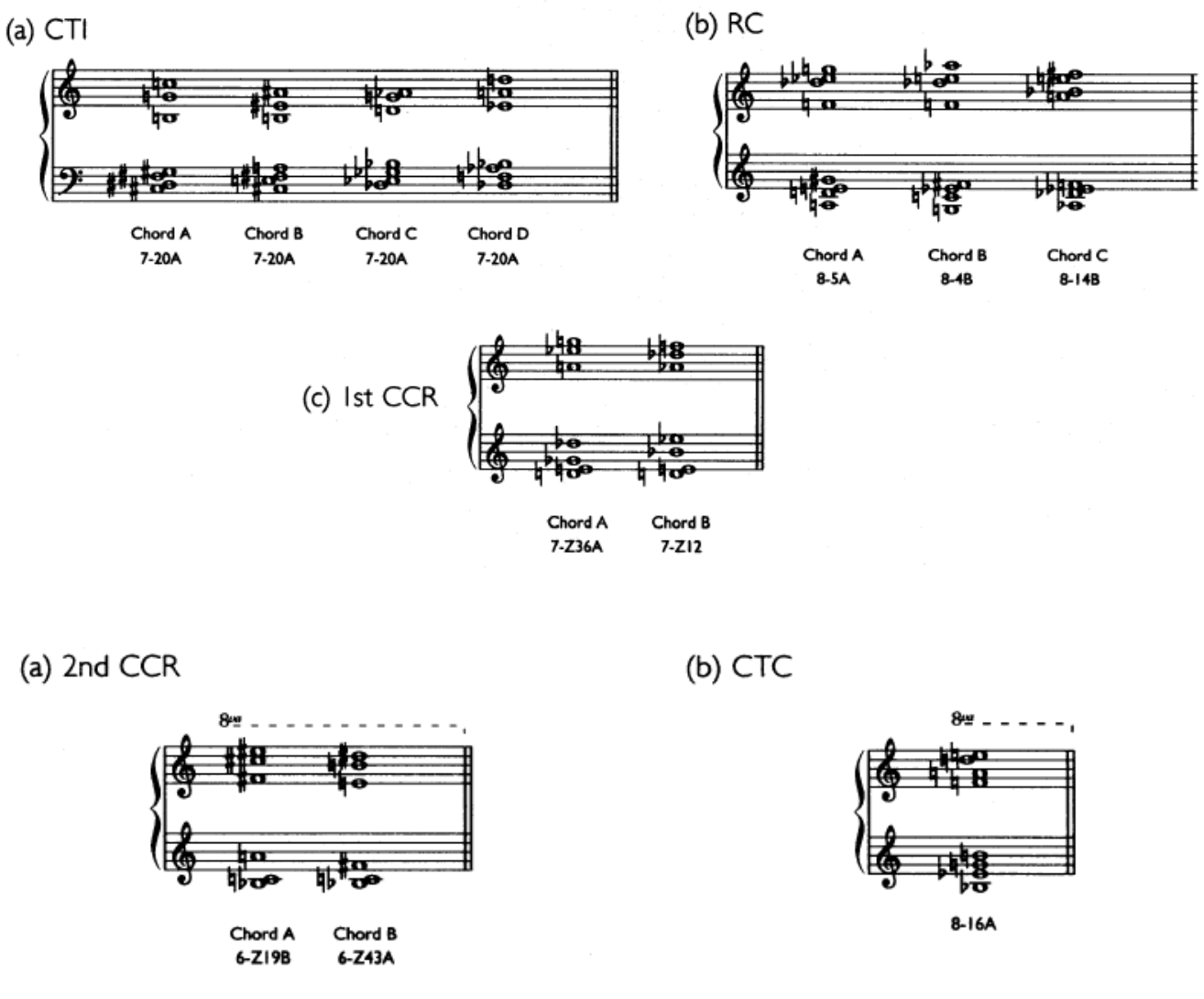
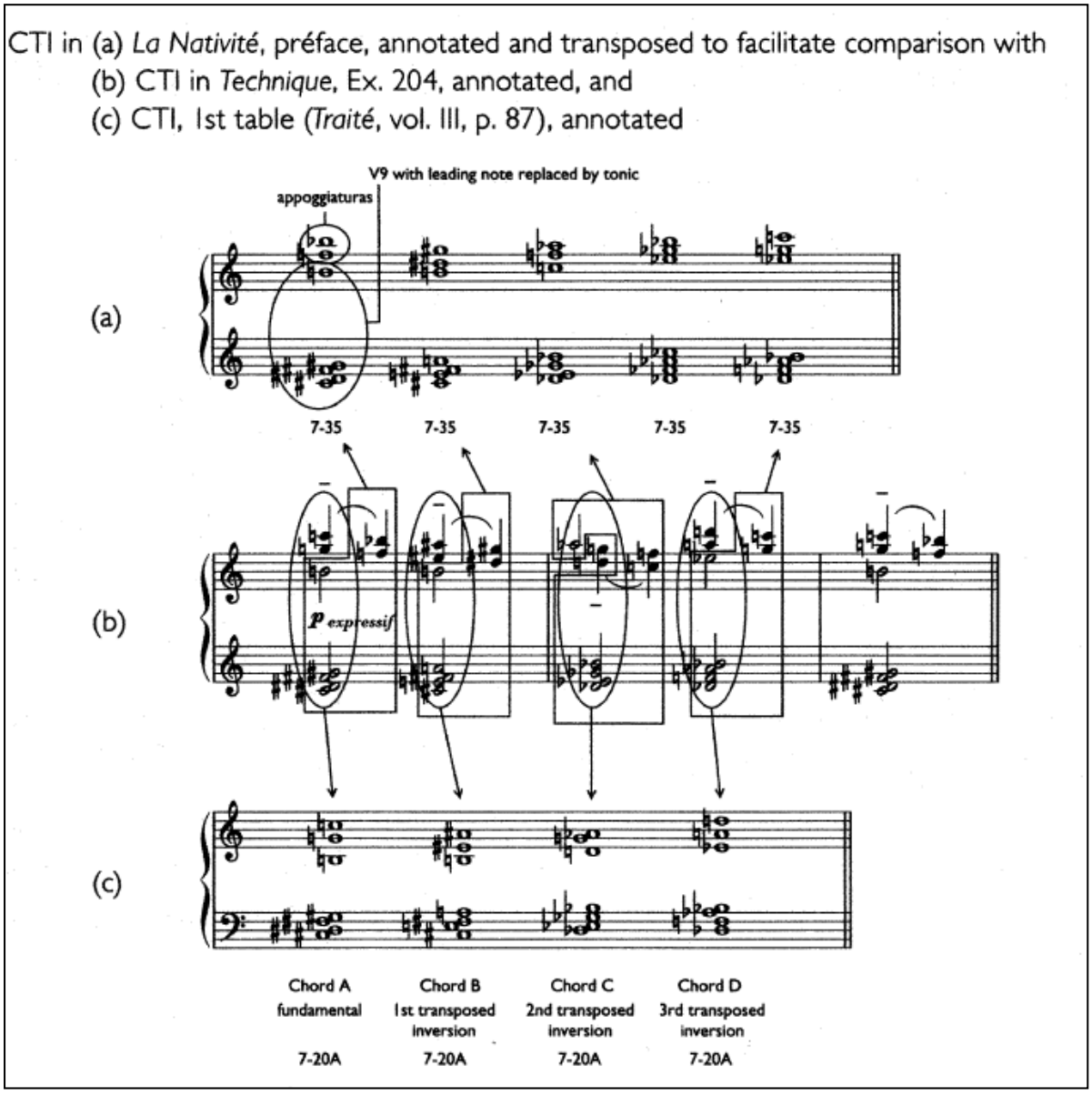


Figure 22. Chords of Transposed Inversion in *La Nativité*, *Technique*, and *TRCO*, Vol. 3. Ex. 3 from Cheong, "Messiaen's Invented Chords," 91.

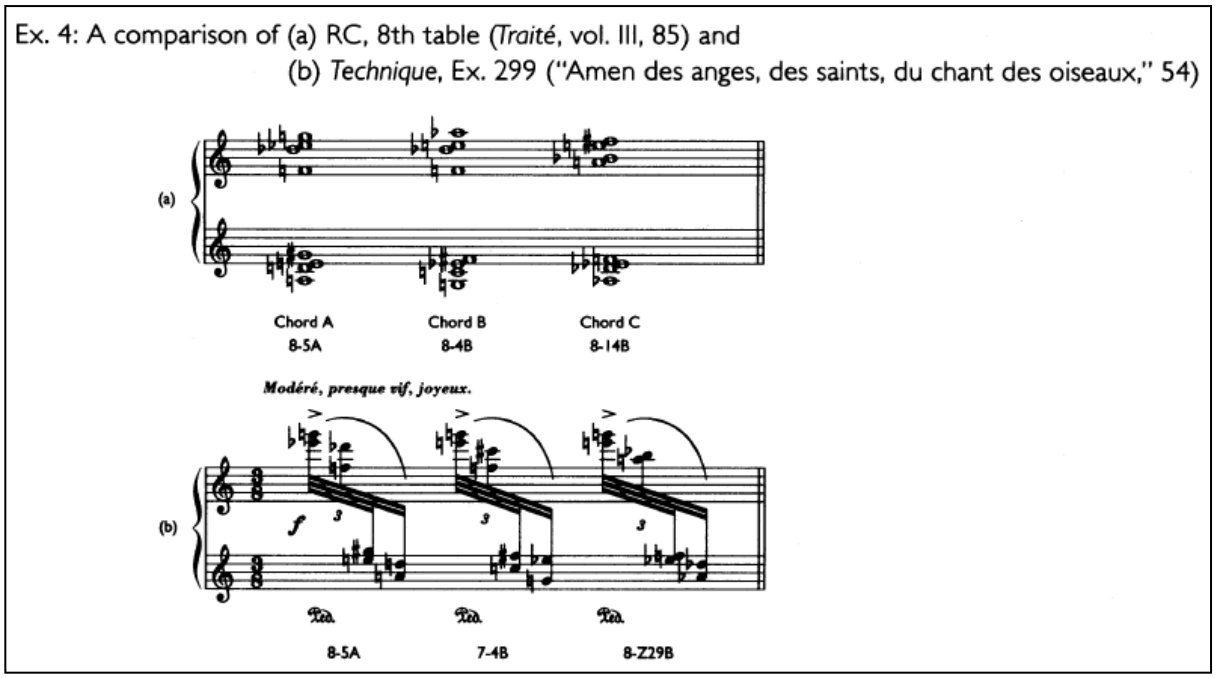


Over a span of fifty-seven years, Messiaen's commentary reflecting the development of CTI has appeared in three sources, all with inconsistencies (Figure 22). In the preface to *La Nativité*, CTI is displayed as a progression of five chords with the same bass note. In contention with customary inversion procedure, in which the bass note moves to the top of the chord while

the remaining notes orderly cycle down one position, Messiaen retains the same bass note while the upper chord members perform the inversion.[208]

In *Technique*, the progression shrinks from five to four chords (the tertian inversion is omitted). Cheong has indicated that Messiaen scholars have neglected to notice that this tertian inversion recurs as chord B in CCR (type 1). Cheong has also found that CTI and CCR are commonly juxtaposed within a section of music, though Messiaen never made note of this.[209] Furthermore, in *TRCO* the dominant character of CTI has been played down (due to the extra set of appoggiaturas) in order to highlight the transposition as a primary factor in the formulation of the progression.[210]

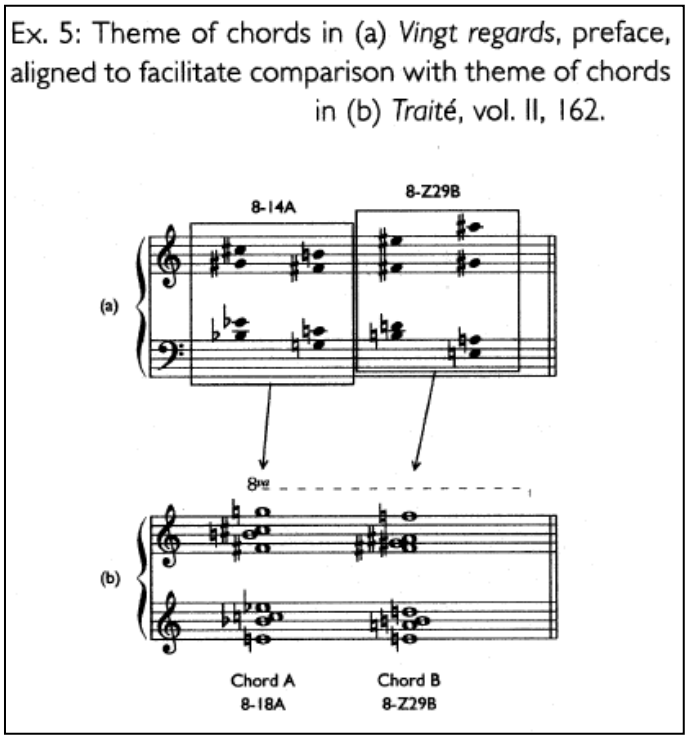
Figure 23. A comparison of Rotating Chords in *TRCO*, Vol. III and *Technique*. Ex. 4 from Cheong, "Rediscovering Messiean's Invented Chords," 93.



[208] Cheong, "Rediscovering Messiaen's Invented Chords," 91-92.
[209] Ibid., 92.
[210] Ibid.

Both RC and CCR appear in *Technique* but are not labeled or discussed in any of the secondary literature (See Figure 23).[211] Cheong has referred to Messiaen's preface to *Vingt Regards* in which he defines a "theme of contracted chords" as the basis on which the RC are constructed.[212] In *TRCO* Messiaen lists two important series of chords from *Vingt Regards* that appear in a contracted from in *Turangulîla-Symphonie* (1948) and *Cinq Rechants* (1948) (Figure 24). Two tetrachords (a) are absorbed to become two distinct octads (b). Cheong does not supply further information on RC, but has noted the earliest known use of RC appears in *Visions* (1943).[213]

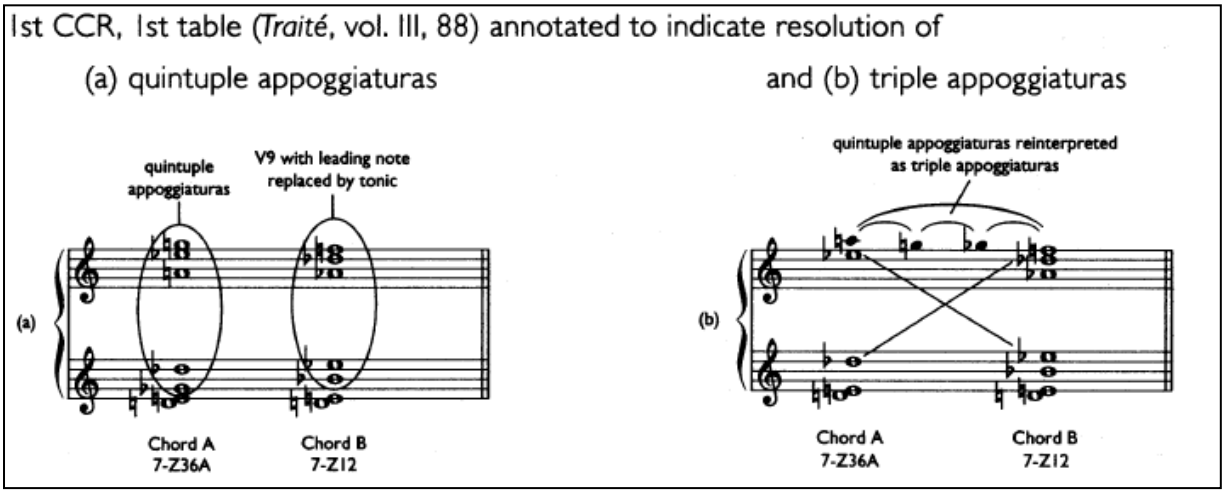
Figure 24. Theme of contracted chords. Ex. 5 from Cheong, " Rediscovering Messiaen's Invented Chords," 94.



[211] Cheong, "Rediscovering Messiaen's Invented Chords," 92.
[212] Ibid, 93. In the RC series, a perfect fourth is always maintained in the lowest register.
[213]Ibid, 96.

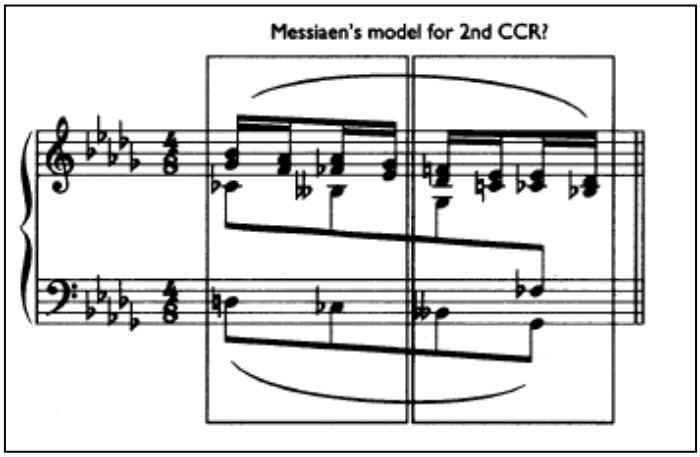
Two types of CCR appear in *TRCO* vol. V that are not fully explained. In *TRCO* vol. III, Messiaen describes CCR (type 1) as being a V9 chord with added appoggiaturas, without a leading tone, and contracted inferior resonance.[214] A slightly differing description appears in vol. II where he describes quintuple appoggiaturas, a V9 chord with leading tone replaced by tonic, and contracted inferior resonance underlying the two chords (Figure 25).[215] Messiaen has offered conflicting details on CCR (type 2) as well, but Cheong has pieced together a promising classification of sequencing alternating dim7 and V7 chords closely resembling Debussy's *Reflets dans l'eau*, m. 14 (Figure 26); and as she has also noted, borrowing materials from other composers is characteristic of Messiaen's modus operandi.[216]

Figure 25. Two types of Chords of constricted resonance. Ex. 8 from Cheong, "Rediscovering Messiaen's Invented Chords," 97.



[214] Cheong, "Rediscovering Messiaen's Invented Chords," 94. Inferior resonance is Messiaen's term for low notes, usually a dyad, added to resonate with a distinct sound complex.
[215] Ibid, 96.
[216] Ibid, 98.

Figure 26. Model for Chords of Constricted Ressonance, type 2. Debussy, *Reflets dans l'eau*. Ex. 8 from Cheong," Rediscovering Messiaen's Invented Chords," 97.



The history and structure of the fourth chord type, CTC, remain unidentified even in *TRCO*. Befitting its name, examples of this type consist of a combination of octads and tetrads resulting in a statement of the total chromatic.[217] Cheong has suggested that Messiaen's concern with chromatic completion though complementation results in a seldom interpreted serial approach to color.[218] Messiaen revealed to Samuel that the presence of the complete aggregate results in a greyish effect.[219] Cheong has insightfully suggested that this drab color acts as a background though which Messiaen's vivid display of colors pour fourth as incomplete collections leap from the page.[220] Interestingly, the spacing of these four invented chord types remains largely consistent, as evidenced by the approximately three hundred chords in *Chronochromie*.[221] As Cheong has suggested:

> The identity of these chords is not only a question of different pc set, but that their spacing also assumes significance. All these chord layers, together with the three

[217] Cheong, "Rediscovering Messiaen's Invented Chords," 98.
[218] Ibid, 101.
[219] Samuel, 241.
[220] Cheong, 102.
[221] Ibid, 100.

> chord tables listed in *TRCO*, Vol. III [and V] enable us to work out all sixty chord tables, twelve each for CTI, RC, CTC, and CCR.[222]

Chronochromie

Chronochromie (1960) represents the culmination of Messiaen's mature compositional techniques including birdsong, color, and rhythm, a mélange preoccupying the majority of his works from 1953 onward. Along with the major works of this period including *Eclairs sur l'au-delà* (1988–1992) and tableau six from *Saint-François d'Assise*, *Chronochromie* represents the peak of composed audible complexity in Messiaen's music.[223] Three techniques are brought together in this piece demonstrating Messiaen's "charm of impossibilities," something that seems to defy rationalization in that we cannot perceive it aurally: 1) symmetrical permutations involving 7-8 note harmonies based on thirty-two values commonly referred to as color-chords; 2) birdsong from two continents; and 3) three types of color chords.[224] Understanding the mechanisms within *Chronochromie* is dependent upon how the individual techniques are deployed, and Bauer notes the difficulty of moving from a simple description to a hermeneutic understanding of Messiaen's music. John Milson adds, "Relatively easy as it is to define and describe the technique of Messiaen's musical 'language', the extent to which it genuinely operates as a musical 'language' is expressive both of the concrete and the spiritual, and independent of the verbal exercises that Messiaen provided, remains a moot point."[225]

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[222] Cheong, "Rediscovering Messiaen's Invented Chords," 100. See 103–105 for Cheong's tables.
[223] Amy Bauer, "The Impossible Charm of Messiaen's Chronochromie," in *Messiaen Studies*, ed. Robert Scholl (New York: Cambridge University Press, 2007) 145.
[224] Ibid, Also referred to as the "power of impossibility." The multitude of technical information invites us to project our understanding onto a wider plane; to experience feelings of abstraction.
[225] Ibid, 146. See also: John Milson, Organ Music 1' in Peter Hill (ed.), *The Messiaen Companion* (London: Faber and Faber, 1995), 62.

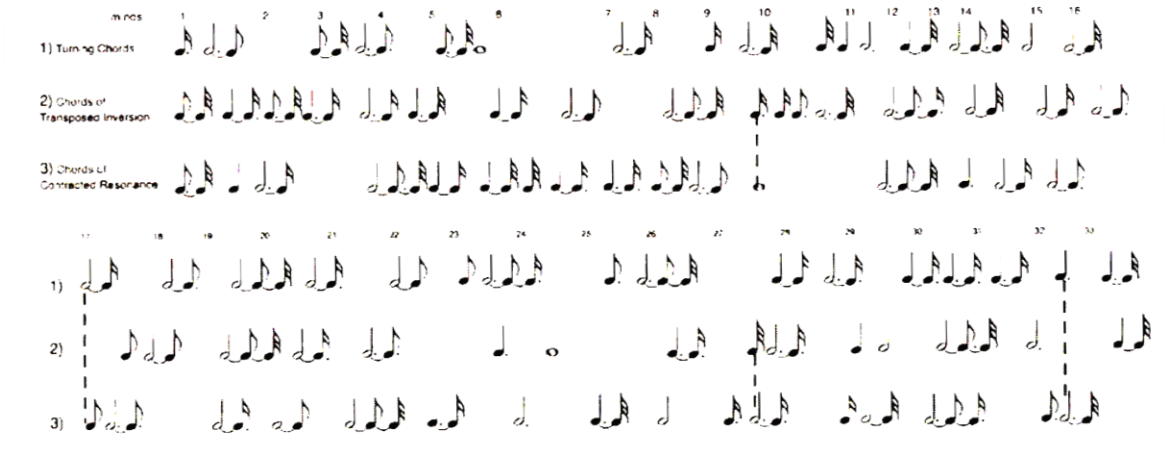
The difficulty in analyzing the "power of impossibilities" lies both with the rhythmic palindromes and towering chromatic chords, the latter of which includes the three forms previously discussed: RC (which Bauer calls turning chords), CTI, and CCR.[226] These chromatic chords appear in nine distinct but unvaried voicings, and although theoretically available at all transpositional levels, Messiaen in fact limits his usage to 65 of 108 possible forms.[227] Nine non-symmetrical sonorities operate in combination with a 32 member durational series, and by placing limits on his materials, Messiaen increases tension between restrictions of cyclic materials and their variation.[228] It is generally accepted that restrictions of this nature do not appear in Messiaen's earlier compositions, but it may be that they are not easily identified.[229]

The *Strophes* of *Chronochromie* combine three types of modal sonorities saturating chromatic, registral, and timbral space.[230] Each permutation moves asymmetrically beneath percussion accents and French birdsong. The *Strophes* contain one continuous isorhythm and when permutated and juxtaposed, correlations with metric movements found in Ancient Greek lyric poetry and choral song surface.[231] Early Greek lyric poetry featured a great variety of metrical patterns and line length, but did not distinguish between poetry and song. The elaborate extant meters include hymns specifically addressed to the gods extolling the virtues of nature.[232] Early surviving choral works including those by the poet Alcman refer to the Greek legend that

[226] I have adopted Cheong's terminology for the sake of continuity.
[227] Bauer, 145.
[228] Ibid, 147.
[229] The English translated edition of *TRCO* vol. VII may reveal more on this subject as it is currently conflated with discrepancies in French language material.
[230] Ibid.
[231] Ibid.
[232] Ibid, For more information on meter in Greek poetry, see C.M. Bowra, *Greek Lyric Poetry* (Oxford: Oxford University Press, 2001), p.6.

all music originated in imitation of birdsongs.[233] This is pertinent given that mystical Christianity and nature (birdsong) are the pillars of Messiaen's philosophical approach to music.[234]

Figure 27. Juxtaposed symmetrical permutations in *Strophe I*. Fig 7.2 from Bauer, "The Impossible Charm of Messiaen's Chronochromie," 150.



In *Strophe* I-IV, four French birdsongs played by eight instruments provide melodic structure while also highlighting and coloring the slower-moving symmetrical permutation scheme.[235] Messiaen refers to this process as 'minting' (*le monnayage*). In the final section, *Epôde*, the symmetrical permutations and chord cycles are taken over by the free-rhythm of twenty-one individual birdsongs.[236] Messiaen first employed symmetrical permutations in *Quatre Etudes de rhythme* (1949). According to Bauer, Messiaen begins with a chromatic scale of durations in which order and duration are equivalent. He then re-orders the durations according to a pattern that begins in the middle and works outward.[237] This pattern is used as an algorithm to generate succeeding permutations by mapping each new series according to the

[233] Bauer, 147. See also: Bowra, 29–30.
[234] Allen Forte, "Messiaen's Mysterious Birds" in *Messiaen Studies* ed. Robert Sholl. (Cambridge, UK: Cambridge University Press, 2007), 101.
[235] Bauer, 148.
[236] Ibid.
[237] Ibid.

original permutation.[238] The "charm of impossibilities" comes from the limitations produced by the algorithm, and the series is limited based on the ability of cycles to map onto each other.[239] This permutational algorithm achieves balance between repetition and variety. Four-fifths though the cycle, both order and duration merges on a dotted-sixteenth note, though this is not plainly audible (Figure 27).[240]

At the time of Bauer's 2007 publication, Messiaen's work had been primarily analyzed in modal and diatonic harmonies, and with the exception of Cheong's recent analysis, altogether ignoring the color chords which dominate his music. Regarding *Chronochromie* specifically, the difficulty of analysis is enhanced due to the nebulous employment of three permutations of Messiaen's invented chord types. In agreement with Cheong, Bauer has found that Messiaen supplies little explanation regarding the use and derivation of these chord types, and furthermore neglects to indicate color specifications for each type. There is hope that with the publication of the English translation of *TRCO*, there will at last be a clarification regarding the use and equivalence of these color harmonies to those employed previously by the composer. According to Cheong, *TRCO* vol, III should supply all pertinent information to construct the later chord tables alluded to in vol. VII; however it will likely not illuminate their use.[241]

Bauer has pieced together her own interpretation on the invented chords including generalizations about their usage in *Chronochromie*. The rotating chords (RC) maintain both fixed spacing and register, representing the upper partials and occupying the highest register of a stratified texture (Figure 28).[242]

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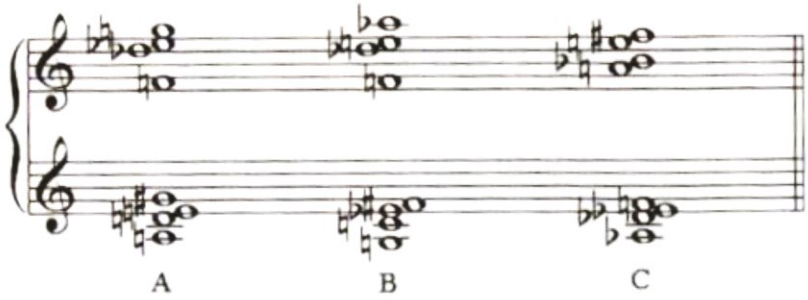
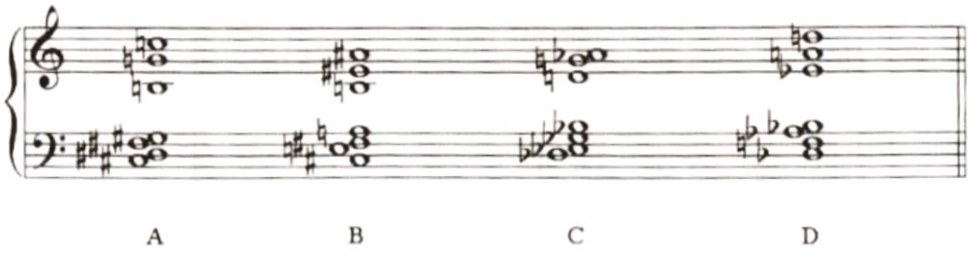
[238] Bauer, 148.
[239] Ibid.
[240] Ibid, 150.
[241] Ibid, 151. Bauer does not specify which Cheong source this comment appears in.
[242] Ibid, 152.

Figure 28. Messiaen's eighth table of turning chords (RC) from *TRCO* Vol. III and VII. Fig. 7.3 from Bauer, "The Impossible Charm of Messiaen's Chronochromie,"152.



The chords of transposed inversion over the same bass note (CTI) typically occupy the middle region in a stratified texture. The third of a V9 chord built on C# is replaced with its note of resolution, a semitone above, F#3. The ninth is displaced down an octave to D#3 while two appoggiaturas are placed at a compound tritone and compound major seventh over the root. G4 and C5 remain fixed while the chord is transposed in first, second, and fourth inversions (Figure 29).[243]

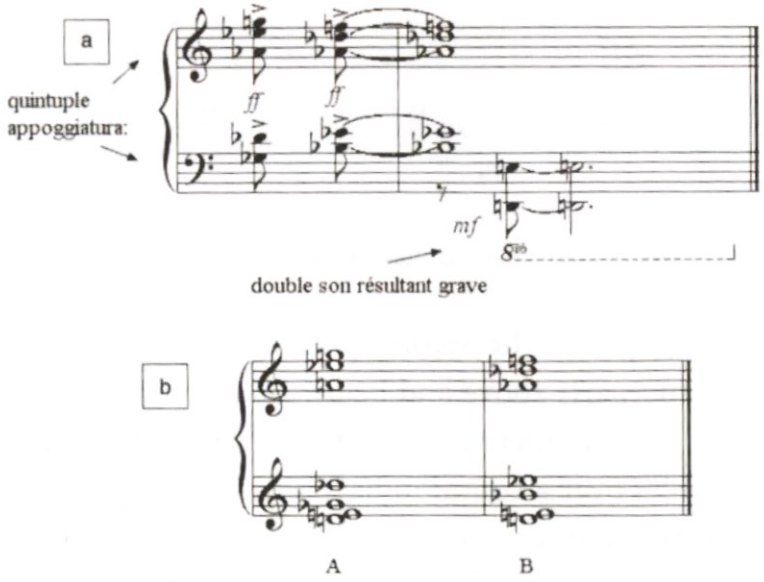
Figure 29. Chords of transposed inversion on the same base note. Fig. 7.5 from Bauer,"The Impossible Charm of Messiaen's Chronochromie,"153.



[243] Bauer, 153.

The chords of contracted resonance (CCR) consist of a V9 chord built on E-flat with the third of the chord replaced with a fourth above the root (A-flat). This chord type generally occurs at the bottom level of a stratified texture (Figure 30).[244]

Figure 30. The chords of contracted resonance. Fig. 7.6 from Bauer, "The Impossible Charm of Messiaen's Chronochromie,"154.



All three chord types share features that are important in Messiaen's late works: they are neither transpositionally nor inversionally symmetrical and appear only in transposition at specific pitch levels.[245] Symmetrical chords are restricted to pc foundation in each category. Symmetrical chords duplicate their pitch content at one or more levels of transposition or inversion, but the color chords allow the most pitch variety: 36 possible RC, 48 possible CTI, and 24 possible CCR. Each of these chords may appear in Messiaen's works as a dominant (function) type. In *Chronochromie*, however, they serve a non-harmonic function forming a

[244] Bauer, 154.
[245] Ibid.

network of associated relationships tying color to intervallic relationships and register.[246] In *TRCO* vol. VII, the composer supplies transposition tables for each of the three chord types, yet they do not clearly translate into the pattern of transpositions in *Strophe* I since there is no evident functional scheme.[247] In *TRCO*, vol. III, Messiaen describes three RC as having a "global effect" of pale yellow streaked with white, black, and grey, with green spots.[248]

Further complicating matters in *Strophe* I is the comparatively even interval distribution between chord types CTI and CCR, each featuring a major second as the lowest interval making aural identification virtually out of the question.[249] Bauer notes that the chromatic saturation of pitch-space challenges us to hear individual chord successions, yet we are conscious of the 'color of time' as separate strands of percussion highlight each individual chord layer.[250] The permutations and complexities of harmonic and rhythmic activity create a psychological shadow of the underlying multiplicity Messiaen has created. But can we ever interpret categorically? Is this simply an internal experience for Messiean himself?

TRCO vol. III accounts for nearly every detail of *Chronochromie's* composition, and yet it seems a nearly impossible feat to decipher all of Messiaen's language. Perhaps it is his intent to give detailed instruction of the score and leave us to investigate the "spiritual mystery." In her conclusion, Bauer provides a new philosophical lens for analyzing Messiaen's music. She offers the concept of territorialization, coined by French empiricist philosopher Gilles Deleuze, as a new approach by which to analyze the conceptual relationships within *Chronochromie*. Deleuze was occupied by relations between and among things, immanence, and the empirical real. Bauer posits, "Deleuze conceived music as that which materially, in an open system of difference in

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[246] Bauer, 155.
[247] Ibid.
[248] Olivier Messiaen, *Traité de Rhythme, de Couleur, et d'Ornithologie*, Vol. III, (Paris: Alphonse Leduc, 2001), 85.
[249] Bauer, 155.
[250] Ibid, 159.

conjunction with nature, territorializes the world it inhabits."[251] Music as a territory connects history, culture, and physical sound with the individual. In *Chronochromie*, Bauer presents these sources as the radical contingencies at the surface: birdsong, the symmetrical permutations, and the color chords.[252] Birdsong establishes the bird's environment, its territory, and interactions within its realm—including a song shaped by its environment.[253] Territories created through birdsong occur in conjunction with time. Again to invoke Deleuze's concept, time is divided into *Chronos* (becoming) and *Aion* (being).[254] *Chronis* and *Aion* bind the relationship between rhythm, sonority, and form; the units upon which birdsong territories are created.

Bauer divides time into three types: 1) the refrain, part of pulsed time, marks out a musical territory in which impulses relate to external events; 2) a time which marks the temporality of a form in development; and 3) structure formation. As Bauer has pointed out, "*Strophe* I is ordered by symmetrical permutations and the permutations in turn are constrained by the seven-part formal design.[255] According to Deleuze, composers must "deterritorialize" the refrain through a diagonal relationship between the harmonic vertical and the melodic horizontal.[256] Messiaen's "deterritorializations" are especially personal, relying not upon the calculated juxtaposition of received and natural elements, but rather on his own "colored" hearing of birds in nature.[257] Messiaen further releases non-pulsed time by using his own

[251] Bauer, 161.
[252] Ibid, 162.
[253] Ibid, This establishes a difference between the birdsong "style" which is shaped by its environment and a regional style such as the Hindu *Deçi tâlas* appearing in Messiaen's earlier works which functions in a deterritorialised method.
[254] *Chronos* is pulsated time; *Aion* is the moment of time i.e. the time of events.
[255]Ibid, 163.
[256] Ibid.
[257] Ibid.

transcriptions of birdsong. His interpretations become something beyond music while at the same moment his music becomes the bird.[258] As Messiaen has stated:

> The musician possesses a mysterious power: by means of his rhythms, he can chop off time here and there, and can even put it together again in the reverse order, a little as though he were going for a walk through different points of time, or as though he were amassing the future by turning to the past, in the process of which, his memory of the past becomes transformed into a memory of the future.[259]

Bauer equates Messiaen's non-pulsed time to the same freedom attained by the free use of twelve tones in twentieth-century musical modernism.[260] Deleuze suggests, in a perception similar to Cheong's colors emerging from greyness, that the durations of rhythms could represent specifically sonorous colors upon which "visible" colors are superimposed.[261] The rhythmic "minting" of subdivisions of beats is one of the most direct representations of a time-color relationship. As motives converge and diverge, the dispersal of birdsong influences our perception of a permutation scheme.[262] Messiaen's exploration of the "charms of impossibilities" creates something tangible from the abstract. After discovering a rich history of rhythmic technique not fully realized by Beethoven, and further developed by Stravinsky, Messiaen advanced the idea of living, breathing music and the theatrical potential of philosophical music. Messiaen's confidence in what cannot be seen or heard but felt is validated in his preface to *Un Vitrail et des oiseaux*: "But the Birds are more important than the tempi, and the colours [sic] more important than the birds. More important than all the rest is the aspect of the invisible."[263]

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[258] Bauer, 163.
[259] Ibid, 164. See also: Almut Rößler,*Contributions to the Spiritual World of Oliver Messiaen*, trans. Barbara Dagg and Nancy Polland. (Duisburg: Gilles & Francke, 1986), 41.
[260] Bauer, 164.
[261] Ibid.
[262] Ibid., 166.
[263] Ibid, 167. Messiaen preface to to *Un Vitrail et des oiseaux.* Paris: Le duc, 1986.

Analysis

Visual animations of synesthetic responses have received appealing reactions from non-synesthetes.[264] Is it essential for the audience to experience the artist's synesthesia through an artificially created medium in order to fully understand their work? Could the visual animation of Messiaen's music allow the audience to experience what Messiaen experienced through synesthesia? How can color inform analysis? Is it possible to determine the characteristic pitch spellings and spacings of a composer through analyses incorporating color? Although much compelling research has been made formulated Messiaen's compositional vocabulary, many scholars have shied away from analyzing instances where Messiaen is unspecific about color in his music. The scholarship of Wai-Ling Cheong on chord coloration and Jonathan Bernard on modal coloration has provided a strong foundation upon which to build analyses for a significant amount of repertoire where Messiaen has ambiguously referenced color. There is hope for forthcoming scholars to produce convincing analyses to infer color in pieces where Messiaen has made no reference of color whatsoever. Below I provide an analysis of Messiaen's piano prelude, *La colombe*, *The Dove*, using modal colors to inform my analysis.

Messiaen composed his set of eight preludes in 1928 while under the tutelage of Paul Dukas. These *Préludes* were composed with an obvious homage to French Impressionist composer Debussy, whose own *Préludes* were published not quite a decade earlier. Closely resembling Debussy's models is Messiaen's pervasive use of the octatonic scale. Furthermore, like Debussy, Messiaen assigned narrative titles to each prelude, some being more tangible than others. For example, *La colombe, The Dove*, depicts a bird, while *Les sons impalpables dé rêve, The Intangible Sound of a Dream*, is less concrete. The piano preludes do not contain

[264] Ward, 129.

performance instructions describing color in the music. I have chosen the first prelude in the set, *La colombe*, to infer possible colorations in the score from what has been assembled of Messiaen's color-associated vocabulary.

La colombe is a binary structure with two exactly repeating A sections, (m. 1–10 and m. 10–20) plus a three measure codetta (m. 21–23). Messiaen has used primarily octatonic vocabulary (set 8–28) and 8–9 throughout the piece. These sets each appear in *Technique* as two of his color modes, Mode 4 and Mode 6. I have used Bernard's mode-based color analysis and Messiaen's chapter on the Limited Modes of Transposition in *Technique* to infer a plausible color scheme for this piece (Figure 31).

Figure 31. Possible colorations based on mode and pitch-class set in Messiaen's, *La colombe*.

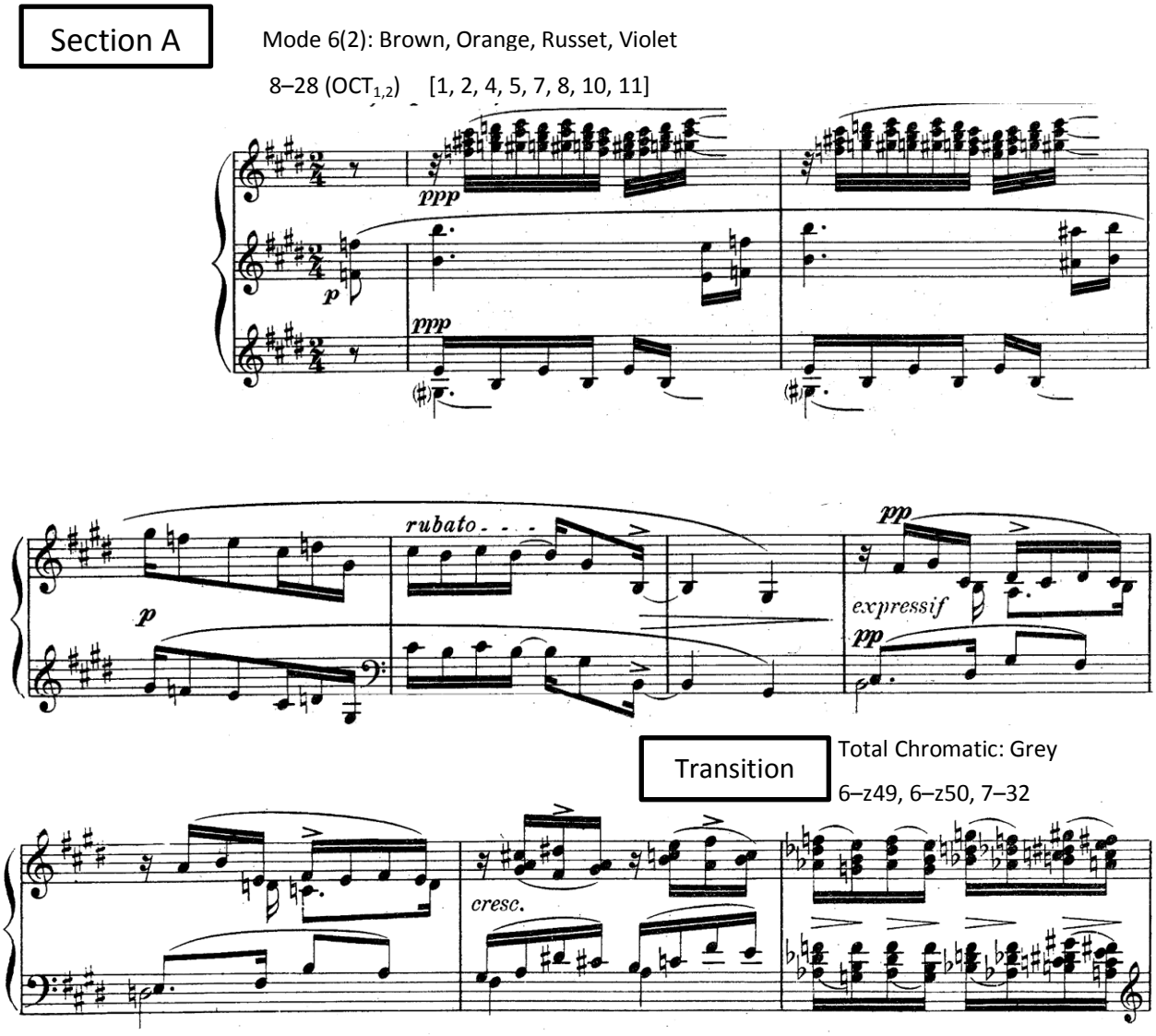
Measures	**Set**	**Type**	**Mode/Transposition**	**Colors**
M.1–10	8–28	OCT 1,2	6(2)	Brown Orange Russet Violet
M. 9–10	Total Chromatic	_	_	Grey
M.11–18	8–28	OCT 1,2	6(2)	Brown Orange Russet Violet
M. 19–20	Total Chromatic	_	_	Grey
M. 21–23	8–9	_	4	Violet

From Bernard's research, it is evident that Mode 6(2) is associated with colors brown, orange, russet, and violet in combination, and these are likely the colors associated in m. 1–8 and

m. 11–18. Messiaen has referred to the total chromatic collection as a mixture of colors producing a grey-colored sound. In the two measures of transitional chords dividing the binary structure, together sets 6–z49, 6–z50, and 7–32 form a statement of the total chromatic in m. 9-10 and 19-20. Perhaps for Messiaen, the unstable nature of the transitional material is represented by the anonymity of the color grey. A brief statement of set 8–9, Messiaen's Mode 4, in the codetta (m. 21–23) ought to be approached as exclusively violet in color according to Bernard's taxonomy. My reading of these final measures does not include pc 3 and 4 in m. 21. Instead pitch-class 3 functions as a neighbor tone to pc 1, and pc 4 (in the bass) provides a tonal center for the end of the prelude but distracts from the octatonic collection employed throughout the prelude.

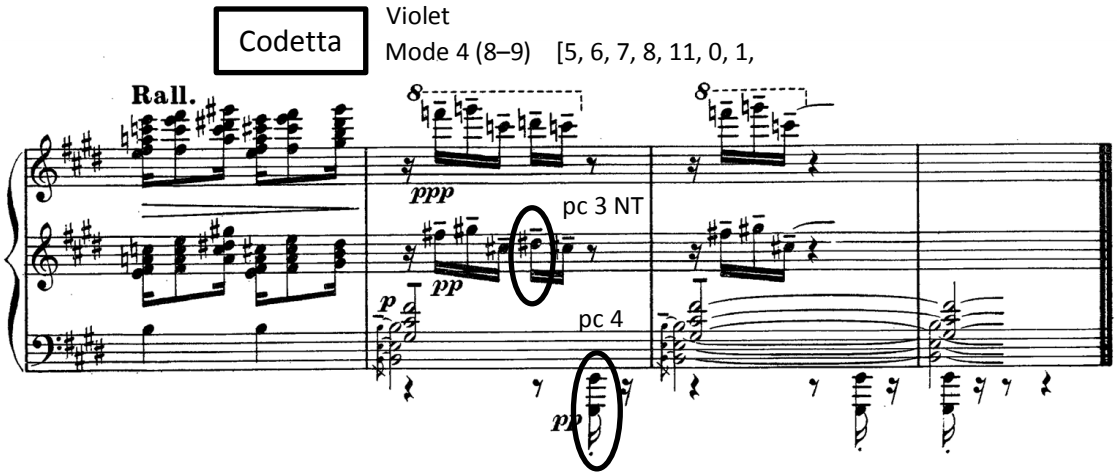
Messiaen begins with highly concentrated colors: brown, orange, russet, and violet, and then travels to a saturated chromatic grey. In the second half, Messiaen again begins with brown, orange, russet, and violet before again returning to grey, and as the dove floats upwards in the codetta, Messiaen envelops the dove in a shade of violet as it disappears into the sky. Perhaps the prelude's title, "The Dove", in combination with the color violet, a symbol of penance, reflects Messiaen's Catholic faith.

Figure 32. Section A colorations. Olivier Messiaen, *Préludes pour piano, La colombe*, m. 1–9.



Préludes pour piano, La colombe
By Olivier Messiaen

Figure 33. Codetta coloration. Olivier Messiaen, *Préludes pour piano, La colombe*, m. 20–23.



Préludes pour piano, La colombe
By Olivier Messiaen

Final Conclusion

The fascination with sound-color correspondence has persisted from Greek antiquity to the present, and attempts to create synesthetic art through various mediums has been motivated by a desire to find representation freed from the limitations of conventional artistic languages. Besides providing entertainment value, one of the goals of art is to present an aesthetic message, and notably those who succeed in communicating ideas of universal importance are lauded as great artists.[265] A work of art is viewed as a statement of the artist's ideas expressed in their idiolect, and due to the highly personal nature of its design difficulties emerge when interpreting this art. Ethnomusicologist Kenneth Peacock summarizes this observation, in that "all human beings do not perceive external stimuli identically, no absolute correlation should be expected between the physical world and individual impressions of that world."[266]

In his book *Analyzing Musical Multimedia*, musicologist Nicholas Cook described the obstacles involved in analyzing works of multisensory perception. As Cook suggests, to analyze something as multimedia is to commit to the idea that there is a perceptual interaction between the smaller parts which together form a whole.[267] According to Cook, synesthesia provides hints as to what multimedia is not. In a multimedia work, the similarities between the parts are not important but it is the differences which are revealing.[268] In this sense Messiaen's music is not multimedia, but the composer himself has suggested in his interviews with Claude Samuel that the music we hear is only half of the multimedia experience imagined, a type of one-dimensional

[265] Peacock, 485.
[266] Ibid., 486.
[267] Cook, 24.
[268] Ibid., 29.

shadow of a multi-dimensional whole.[269] Because multimedia is not simply externalized synesthesia, creating a realization of the composer's synesthetic perceptions is remarkably complex. If a truly accurate realization were possible, Cook imagines that such a rapid display of color would produce an almost blindingly blurry effect.[270] The audience would be unable to differentiate the velocity of stimuli, and the demonstration would be ineffective and likely overwhelming.

In the two short preludes analyzed here in this paper Messiaen and Scriabin have each incorporated color-related note collections echoing the sectional divisions within the musical form of each composition. In my reading of these pieces, I have found that each composer, regardless of their synesthetic/pseudo-synesthetic status, has produced an effective narrative involving color and sound. Although Messiaen's real synesthetic response to sound may have produced more analytically complex colorations, Scriabin's creatively designed pseudo-synesthetic color representations were equally stimulating. Both composers have created something more than a simple pictorial representation on the page; they have created a powerful multisensory experience—one that is amplified through programmatic motivation in Scriabin's case, and something more abstracted and hidden in Messiaen's. In Scriabin's music, colors are discernible to performer and audience alike, whereas in Messiaen's compositions, the listener is not directly aware of the color prompts in the score, and it is up to the performer to interpret and convey the composer's vision. Messiaen and Scriabin have each produced explicit representations of the fusion between sound and color.

Among the composers of "color music," Scriabin in particular was preoccupied with creating meaningful color associations. Scriabin's *Prometheus*, a heavily publicized occult

[269] Cook, 30.
[270] Cook, 30.

interpretation of synesthesia, was viewed by many as an expression of the composer's "psychic sight." This view has mistakenly perpetuated the belief that Scriabin was a true synesthete. Although this detail makes little difference regarding the enjoyment of Scriabin's music, it nonetheless categorizes *Prometheus* as a synesthesia-inspired composition. Scriabin's long-range programmatically depicted color schemes inherently contrast with Messiaen's more generalized thematic colorations which govern the content of short passages. Messiaen revealed little about his synesthetic perception until late in life, and even then only in private interviews. Although synesthesia was essential to Messiaen's artistic identity, other components of his compositional aesthetic (such as his non-retrogradable rhythms and modes of limited transposition) were more prominently discussed, perhaps due to their absoluteness. Messiaen's descriptions of color serve both as prompts for the performer and as data for the analyst. For future Messiaen scholars, it is not a matter of finding evidence of the composer's synesthesia, but rather of discerning the patterns of self-consistency comprising the multitude of color schemes found within the composer's oeuvre.

Synesthesia is a phenomenon at the edge of both scientific and artistic exploration. It continues to draw our attention as a transcendental language while at the same time revealing the incompleteness of our understanding of human perception. A multimedia presentation accompanying a synesthetic production both embraces and alienates the audience in a demonstration of private artistic idiolect. The inherent strangeness of synesthetic art brings intrigue and invites spectators to join in on a stimulating experience, even if it is beyond their comprehension. The experience of the artist and spectator will never to be mutually shared. There has long been interest in synesthesia-based forms of art, and now that we possess the technological means to interpret scientifically and produce artistically the complexities of the

synesthetic response, a compelling movement in multimedia is upon us. This movement has the potential to produce evocative productions, and with it well-informed analyses in all areas of the fine arts.

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Claude Debussy

Reflets dans l'eau, (Reflections in the Water), solo piano (1905)

George Gershwin

Rhapsody in Blue, solo piano and jazz band (1924)

Olivier Messiaen

Prélude pour piano, La colombe (The Dove), piano (1928)

La Nativité du Seigneur (The Lord's nativity), organ (1935)

Quatuor pour la fin du temps (Quartet for the end of time), violin, cello, clarinet, piano (1940–1941)

Trois petites Liturgies de la Présence Divine (Three small liturgies of the Divine Presence), women's voices, piano solo, ondes Martenot solo, orchestra (1943–44)

Vingt regards sur l'enfant-Jésus (Twenty gazes on the Christ-child), piano (1944)

Turangalîla-Symphonie, piano solo, ondes Martenot solo, orchestra (1946-48)

Cinq réchants (Five Chants), 12 singers (1948)

Quatre études de rythme: Île de feu II (Four studies in rhythm: Fire Island II), piano (1949–1950)

Catalogue d'oiseaux (Bird catalogue), piano (1956–58)

Chronochromie (Time-colour), orchestra (1959–1960)

Sept haïkaï (Seven haikus), solo piano and orchestra (1962)

Couleurs de la cité céleste (Colours of the Celestial City), solo piano and ensemble (1963)

Méditations sur le mystère de la Sainte Trinité (Meditations on the mystery of the Holy Trinity), organ (1969)

Saint-François d'Assise (St. Francis of Assisi), opera (1975–1983)

Livre du Saint Sacrament (Book of the Holy Sacrament), organ (1984)

Eclairs sur l'au-delà (Illuminations of the Beyond), orchestra (1988–1992)

Sergei Rachmaninov

The Miserly Knight (*Skupoi rytsar*), opera (1904

Arnold Schoenberg

Die glückliche Hand (The Hand of Fate) Op. 18, a ‘drama with music’ (1910–1913)

Robert Schumann

Kreisleriana Op. 16, solo piano (1838)

Alexander Scriabin

Feuillet d'album, Op. 58, solo piano (1910)

Prometheus: The Poem of Fire, Op. 60, orchestra (1910)

Mysterium (1903–1915, unfinished)

Appendix A

Scriabin Piano Preludes 1903-1914: Set-class Inventory

Op. #	*Total Measures*	*Significant Sets*	*Measures Employed*	*Other Sets Employed*
Op. 74 no. 1 (1914)	16	7-26, 7-z12	4, 2	6-15
Op. 74 no. 2	17	6-z50, 7-z18	7, 5	6-z49, 6-5, 7-4
Op. 74 no. 3	26	8-12, 8-28, 7-31	6, 4, 7	7-31
Op. 74 no. 4	24	8-19, 6-20	5, 6	7-31, 7-z18, 8-28
Op. 74 no. 5	17	7-31, 6-34	5, 4	7-34, 6-z49, 5-28
Op. 67 no. 1 (1913)	35	6-34, 7-31, 6-21, 5-19	8, 19, 6, 6	6-z50, 6-30
Op. 67 no. 2	35	7-19, 7-16	24, 9	8-14, 6-27, 6-z29
Op. 48 no. 1 (1905)	20	5-28, 5-24	12, 3	5-20, 5-23, 5-27
Op. 48 no. 2	8	6-z40, 6-z19	2, 2	5-27, 6-z46, 5-25, 8-11
Op. 48 no. 3	23	8-27, 6-z19	4,7	8-22, 8-21, 8-18, 8-17
Op. 48 no. 4	24	8-22	6	8-20, 8-26, 8-6
Op. 39 no. 1 (1903)	32	8-18, 8-4	8, 6	8-20, 8-z29
Op. 39 no. 2	28	8-27, 8-12	9, 5	8-z29, 8-3, 8-26
Op. 39 no. 3	14	7-34, 7-35	5, 5	7-10
Op. 39 no. 4	16	7-34	3	7-20
Op. 37 no. 1 (1903)	31	7-27, 5-27	19,19	8-26
Op. 37 no. 2	20	8-28	20	X
Op. 37 no. 3	32	6-32, 6-33	7, 7	6-z47, 5-27, 8-11
Op. 37 no. 4	20	7-34	5	5-26, 5-27
Op. 35 no. 1 (1903)	22	7-35, 7-32, 7-23	4, 4, 3	5-28, 5-35, 7-2, 7-3
Op. 35 no. 2	36	8-22, 8-2, 6-z25	11, 6, 6	6-z23, 8-17, 8-z15, 7-3
Op. 35 no. 3	126	8-27, 5-25, 8-5, 7-35	12, 6, 16, 24	6-18, 6-z43, 8-20
Op. 33 no. 1 (1903)	20	8-22, 6-32	6, 6	7-35, 5-35, 6-27
Op. 33 no. 2	29	8-22	29	X
Op. 33 no. 3	12	6-15, 6-z43	4, 6	6-z25
Op. 33 no. 4	20	8-12	2	8-11, 8-22, 8-29, 8-13, 8-z29
Op. 31 no. 1 (1903)	35	8-26	18	7-34,7-35
Op. 31 no. 2	24	8-26	19	6-z43
Op. 31 no. 3	24	6-z43	14	8-24, 7-30, 7-31, 7-32, 8-18, 6-18
Op. 31 no. 4	18	7-35, 8-4	2, 3	7-15, 5-20