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Simultaneous Contrast and Additive Designs in Olivier Messiaen's Opera, *Saint François d'Assise**

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ABSTRACT: Olivier Messiaen admired the painter Robert Delaunay for his use of simultaneous contrast in his pictures. As a composer, Messiaen claimed that he used the musical equivalent of simultaneous contrast when he structured his music. He regularly described how he would juxtapose colors and highlight them via their complements as his music unfolded. This article explores how simultaneous contrast functions as a structural principle in Messiaen's music by focusing on three compositional designs that are used in his opera *Saint François d'Assise.* Modeled on principles derived from the simultaneous contrast of colors in painting, these additive designs illustrate how Messiaen employs musical opposition in the opera to structure multi-layered textures and to shape passages governed by a single tonality.

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[1] Introduction

[1.1] Olivier Messiaen (1908-92) distinguished himself from many of his musical contemporaries by his passion for sound-color relationships, which are an integral part of his compositional approach and unite the disparate elements of his harmonic language. Despite the unconventional and mimetic nature of Messiaen's coloristic musings, there are consistent subtexts that characterize his approach to sound-color relationships in his music. First, chords evoke color associations in Messiaen's colored-hearing synesthesia.[(1)] Second, Messiaen's color associations are very consistent. Third, the *simultaneous contrast* of colors, derived from the painting world, is an important compositional analogy that influences Messiaen's harmonic approach. While discussing with Claude Samuel how he structured a musical work, Messiaen stated that he associated specific sonorities with specific colors and employed them like a painter, juxtaposing colors and highlighting them through their complements as the composition unfolded.[(2)]

[1.2] In his interviews, Messiaen consistently mentioned the work of Charles Blanc-Gatti (1890-1965) and Robert Delaunay (1885-1941) as significant influences on his compositional thinking. Messiaen admired the physiological aspects of Blanc-Gatti's synesthesia and noted how the colors in five of the Swiss artist's paintings that he owned moved and interacted like sounds.[(3)] As for Delaunay, Messiaen was impressed not only with the French painter's emphasis on color in his work but also with his use of simultaneous contrast. In fact, Messiaen preferred Delaunay over all other painters and declared the artist's work as "very close to what I see when I hear music."[(4)] As an example of Delaunay's work, let us consider *Hommage à Blériot,* painted in 1914 (Figure 1 [DjVu] [JPEG]). Louis Blériot (1872-1936) was an airplane builder and the first French pilot to fly across the English channel, a feat, accomplished on July 25, 1909, that made him a national hero in France. When viewing Delaunay's painting, we can discern airplanes, even the Eiffel Tower, but everything else is obscured by colored circles.

[1.3] One way Messiaen approximates simultaneous contrast in his music is to combine different musical layers in various ways. These compositional designs involve musical devices that take their cues from the use of color in abstract painting: by itself, a single color has no life of its own; only when it opposes other colors does it attain movement and expression. In an analogous fashion, when one musical layer opposes, for instance, another layer in a musical passage, it achieves a heightened sense of vibrancy through the opposition of its pitch materials, instrumental colors, or both with those of the other layer's. Similarly, the other layer is also enhanced by the same opposition of musical elements.

[1.4] In this article, a musical layer refers to either a textural layer that is part of a vertical density-space or a harmonic layer that suggests a hierarchy of structural levels. The term textural layer describes the quality of sound produced by its pitch content, timbre, or both. In Messiaen's music, especially in his later works, textural layers typically feature either pitch or timbral elements due to his tendency to treat various musical parameters as separately composable elements.[(5)] But pitch and timbre are also treated as closely allied in Messiaen's music, indeed to the extent that the frequency and character of a chord's sound become practically inseparable. In such cases, textural layers feature both pitch and timbral elements.

[1.5] The close association between pitch and timbre finds precedent in Messiaen's concept of *natural resonance,* which involves the use of notes, representing artificial harmonics, to enhance a given chord, resulting in the modification of the chord's timbre. As a consequence, harmony and timbre are united in natural resonance as chords are reconfigured sonically by timbral components. This union of harmony and timbre can be extended to include the relationship between a chord and its instrumental color (the quality of which is determined by the instrument's harmonic spectrum). The quality of a chord's sound may be linked equally to both the harmonic color arising from the chord's resonance elements as well as the chord's instrumental color. What emerges through this close connection between pitch and timbre is a single coloristic quality that is linked to the chord's sound.

[1.6] Since a textural layer embraces the elements of pitch and timbre, it can be interpreted from coloristic perspectives as opposing other layers in a musical texture. I interpret such multi-layered textures in Messiaen's music as arising from compositional schemes or, more specifically, *additive designs*[(6)] that are based on musical equivalents of simultaneous contrast. In an additive design, each layer of a musical texture is enhanced by means of its opposition to other layers, which intensifies the complete texture. This way of viewing a multi-layered musical texture differs, moreover, from a perspective involving stratification. In an additive design, emphasis is placed on how different layers of sound are combined to produce a musical texture and not on how a musical texture is divided into different layers of sound (as with stratification). Furthermore, considerable importance is placed on how different textural layers interact with one another, especially on how they enhance one another through pitch, timbral, or pitch and timbral contrast. When used in analysis, stratification leads one to focus more on a layer's content and less on its interaction with other layers in the musical texture. As posited in this article, I view the mutual

enhancement of colors through simultaneous contrast in painting as influencing Messiaen's structuring of multi-layered textures in his music. Such a connection between color and music suggests fresh ways of approaching Messiaen's works that are in keeping with his statements about how his melodies, harmonies, rhythms, and timbres behave like colors.[(7)]

[1.7] Additive designs also comprise compositional schemes that are characterized by the simultaneous sounding of two structurally separate harmonic layers in a musical passage. While these harmonic layers are hierarchical in the sense that the layer closest to the musical surface (hereafter foreground) contains the pitch content of the layer operating at a deeper level of structure (hereafter background), the former is not derived from the latter through techniques of prolongation. Rather, the layers represent two concurrent strands of harmonic activity that are woven together to form the passage's musical fabric. The pitch content of the background defines the structure of the passage through strategically-placed chords that function as referential points of arrival or departure. The pitch content of the foreground colors the background with its more numerous chords, even to the extent of suggesting motion from one referential point to another. But more strongly, the opposition generated by the structurally distinct harmonic layers intensifies both the chords found in each layer as well as the color associations suggested by them. In fact, as I shall discuss later in this article, this type of additive design comes closest to resembling color schemes employed in painting.

[1.8] In this article, I examine the additive designs employed by Messiaen in his opera *Saint François d'Assise* (1975-83) to explore how simultaneous contrast functions as a structural principle in his music. *Saint François* is an ideal piece for this study, for it contains, according to Messiaen, all of his harmonic procedures and the colors that he envisioned for his chords.[(8)] I begin by considering the role simultaneous contrast plays in Delaunay's and Messiaen's artistic outlooks. Next, I categorize Messiaen's additive designs to lay the groundwork for a discussion of their use in the Angel's discourse of scene 3 (*Le baiser au lépreux*) and music of scene 5 (*L'Ange musicien*), two of the opera's most pivotal musical-dramatic moments. In my discussion, I focus on how Messiaen organizes pitch materials through the use of separate structural levels, contrasting harmonic types and timbres, and the structural connections and separations generated by simultaneous *pitch-timbre* relationships. Moreover, I consider the symbolic connotations suggested by each passage's sound-color harmonies and how they support the drama of their respective scenes.

[2] Simultaneous Contrast and the Artistic Outlooks of Delaunay and Messiaen

[2.1] Let us now consider some basic concepts in color theory. Colors are usually grouped into analogous and complementary categories (Figure 2 [DjVu] [JPEG]). Analogous colors are three or four colors that are adjacent on a color wheel, such as blue-green, blue, and blue-violet. Complementary colors are those hues that lie directly across from one another on the color wheel, such as red and green. Simultaneous contrast refers to the phenomenon of two colors differing in both *tone* (a color's relative degree of lightness or darkness) and hue when placed side-by-side . The amount of mutual enhancement depends on whether the colors are light or dark and analogous or complementary, with complementary colors producing the best effects. When the colors are complementary, they tend to brighten each other with no change in hue.

[2.2] The reciprocal enhancement of colors was first described by the nineteenth-century French color theorist Michel-Eugène Chevreul (1786-1889), who influenced many painters, particularly Delaunay.[(9)] Delaunay studied Chevreul's theories and those of the American color theorist Ogden N. Rood (1831-1902) and subsequently incorporated color contrast as a significant part of his painting approach.[(10)] His goal was to produce a pure painting style based on the interaction of contrasting areas of color. Instead of rendering perceived motifs into painted form, Delaunay rebuilt them through color contrast. Delaunay produced a series of paintings entitled *Discs* (1912-13) that were based on the color wheel, works that he regarded as major experimental efforts later in his life.[(11)] But Delaunay's approach to color harmony was different from Chevreul's in that Delaunay included *color dissonance,* that is, two colors that were neither analogous nor complementary, such as red and blue, as an expressive value within his work.

[2.3] For Delaunay, colors engage in a perpetual synchronous movement originating from simultaneous contrasts.[(12)] Termed *rhythmic simultaneity* by the painter, this movement is brought about by the slow vibrations of complementary colors and the faster vibrations of dissonant colors. In essence, a painting perceived simultaneously features multiple dimensions due to its different groups of colors. These colors oppose or neutralize one another, and the intensity of a single color's vibrations is dependent on both adjacent and distant colors in the painting. In sum, colors for Delaunay, as Max Imhdahl puts it, "play to and away from each other, now clashing and now harmonizing, catch and synchronize various actions in a kind of steady and unceasing simultaneity of systole and diastole."[(13)] These optical oscillations, moreover, are not mechanical

sequences but continuous motions and therefore reflective of real movement. Delaunay viewed such synchronous movements as representative of a philosophical universality in which the eye experiences the vital movement of the universe as a simultaneous action of separation and reunion.

[2.4] Figure 3 ([DjVu] [JPEG]), a reproduction of Delaunay's *Formes circulaires. Soleil n° 1* (1912-13), can be used to illustrate how rhythmic simultaneity functions in his approach to painting. Blue and orange are complementary colors that face each other across the circle. The complementary colors of red and green balance the opposition of blue and orange by their placement at opposite sides within the circle. The central yellow combines with the purple below it to form a near-complementary relationship. The dissonant colors of red and blue and orange and green separate themselves from the aforementioned complementary colors by their faster vibrations. In short, there are multiple color relationships occurring simultaneously.

[2.5] As evident from different sources, Messiaen demonstrated some knowledge of color theory.[(14)] He described the phenomenon of simultaneous contrast and pointed to its basis in scientific research, stating that the "eye manufactured complements before painters discovered them."[(15)] But more significantly, Messiaen asserted that simultaneous contrast and its musical counterpart, natural resonance, form two key elements of his approach to composition. Both stem from natural phenomena, one by means of the interaction of two colors placed side-by-side and the other from the resonance of a sounding body. Furthermore, Messiaen's use of natural resonance, which involves adding artificial harmonics to a given chord to modify its timbre, suggests an analogy with the complementary fringe effects produced by staring at a colored circle mounted on a white background. When one stares at such a colored circle, one will see the color's complement forming a halo around the circle's perimeter. In Messiaen's music, resonance elements can be considered as musical counterparts to these fringe effects in that they at times will generate (according to Messiaen) coloristic glows or halos above or below the chords to which they are added.[(16)]

[2.6] For Messiaen, because simultaneous contrast[(17)] affects the sense of vision and natural resonance the sense of hearing, they are interconnected phenomena. In other words, they integrate vision and hearing in his musical world. Indeed, this integration of vision and hearing is a significant element of Messiaen's discussions about the role of color in his music, more important, in fact, than the identification of a chord's color association. In Messiaen's view, when someone listens to his music, it is more important that the superior senses of vision and

hearing be connected in a manner analogous to the inferior senses of smell and taste; it is less important to see the same colors as he does. For him, when a person's vision and hearing are united, that person perceives a colored music that is dazzling in its effect and scope, a musical analogue, if you will, to the coloristic effects produced by medieval stained-glass windows.

[3] Messiaen's Harmonic Vocabulary: A Précis

[3.1] Before discussing the additive designs of *Saint Francois,* I shall explain the construction of the pitch collections developed by Messiaen that will be mentioned in my article (Examples 1-6). Messiaen's harmonic vocabulary can be divided into modal and non-modal categories. The *modes of limited transposition* form the modal category and are shown in Example 1 ([DjVu] [GIF]). The modes are seven symmetrical pitch collections that reproduce their original contents after being transposed a given number of times. This reduces the number of distinct transpositional levels from twelve to some smaller value. Mode 1 is the whole-tone collection (set class 6-35 [0,2,4,6,8,10],[(18)] mode 2 is the octatonic collection (set class 8-28 [0,1,3,4,6,7,9,10]), and mode 3 is a nine-note collection, set class 9-12 [0,1,2,4,5,6,8,9,10].[(19)]

[3.2] The *chords of transposed inversions on the same bass note, chords of contracted resonance,* and *turning chords* belong to the non-modal category. As shown in Examples 2-5, the chords of transposed inversions and the chords of contracted resonance arise from the modification of a dominant-ninth chord (V^9) by appoggiaturas.[(20)] The chords of transposed inversions consist of four different seven-note chords that are generated by replacing the third of a V^9 chord with its chromatic upper neighbor and by adding two appoggiaturas above the modified V^9 chord (Example 2 [DjVu] [GIF]). The altered V^9 chord is then cycled through three of its four inversions, with the appoggiaturas kept registrally above the V^9 in two of the three inversions. Each inverted form is then transposed to begin on the same bass note as the chord's root-position form (Example 3 [DjVu] [GIF]). The chords of transposed inversions on the same bass note are all members of set class 7-20 [0,1,2,5,6,7,9].

[3.3] The chords of contracted resonance consist of two seven-note chords that are produced by replacing the third of a V^9 chord with its chromatic upper neighbor (Example 4 [DjVu] [GIF]). The V^9 chord is then arranged in second inversion. Two notes representing *inferior resonance*[(21)] are placed one octave and a tritone and two octaves and a minor sixth below the bass note of the altered V^9 chord. This chord is preceded by a sonority consisting of five appoggiaturas and the same two notes of inferior

resonance (not shown in Example 4). In resolving to the altered V^9 chord, four appoggiaturas move by step whereas one ascends a major third. These two chords, members of set classes 7-Z36 [0,1,2,3,5,6,8] and 7-Z12 [0,1,2,3,4,7,9], respectively, are then rearranged registrally in the most compact way possible to reflect the "contracted" nature of their label (Example 5 [DjVu] [GIF]).

[3.4] Turning chords involve a group of three eight-note harmonies that produces a single complex of sound-colors. The complex is generated through the changing pitch and color contents brought about by the succession of the chords (Example 6 [DjVu] [GIF]). Messiaen compared the coloristic effects of turning chords to a translucent, opaline octahedron, or, more simply, rainbow-colored glass.[(22)] Each face of the octahedron has three possible variations of colored light that correspond collectively to three combinations of eight notes, which equal the twenty-four notes of the three turning chords. Through their succession, turning chords suggest a single column of sound-colors that "turns" while changing. According to Messiaen, a person who experiences a group of turning chords recalls only the cumulative effects of their succession ("le fruit des 3 accords"): a single complex of sound-colors dominated by one hue. Finally, the three harmonies constituting a turning-chord group are members of set classes 8-5 [0,1,2,3,4,6,7,8], 8-4 [0,1,2,3,4,5,7,8], and 8-14 [0,1,2,4,5,6,7,9].

[3.5] Non-modal chords suggest a wider variety of color associations than the modes of limited transposition because of Messiaen's assignment of a unique set of colors to each of their twelve possible transpositions.[(23)] The more numerous color associations brought about by twelve available transpositions allow Messiaen more freedom to color his musical passages with a greater variety of sound-color harmonies. As for the modes, they suggest fewer color associations because of their inherent transpositional restrictions. Messiaen assigns one dominant color or set of colors to each transposition of a mode. Since chords representing a specific modal transposition will suggest the same transposition again after being transposed either upward or downward by three, four, or six semitones, the modes do not evoke the same level of coloristic variety as that evoked by non-modal sonorities. The number of potential modal color associations is reduced, furthermore, by Messiaen's favoring of modes 2, 3, 4 , and 6, which are the only modes for which he provides color associations,[(24)] over modes 1, 5, and 7 in his music. Indeed, this number is reduced additionally by Messiaen's favoring of modes 2 and 3 over modes 4 and 6.[(25)] In sum, the reduction in both the number of modes and transpositional levels used indicates an even greater difference between

the variety of color associations suggested by the modes and that suggested by non-modal sonorities.

[4] The Additive Designs of *Saint François d'Assise* and Two Introductory Examples

[4.1] I group the additive designs of *Saint Francois* into three categories: (1) *contrasting additive designs,* (2) *analogous additive designs,* and (3) *compound additive designs*. Contrasting additive designs include two simultaneous textural layers that emphasize an opposition of either pitch materials or pitch and timbre. I borrow the term "contrasting" from color theory to characterize the resemblance of this type of design to the combination of complementary colors (color opposites) in painting.[(26)] Like the simultaneous contrast of complementary colors, the musical contents of the two layers derive a more heightened intensity and expression when they oppose one another in musical passages. Analogous additive designs arise from the combination of two structurally separate harmonic layers that are governed by actual analogous-color relationships. More specifically, a background harmonic structure, normally a tonality, is enhanced by foreground pitch collections in conformity with the analogous-color scheme created by their respective color associations. Accordingly, I borrow the term "analogous" from color theory to describe the design's resemblance to the combination of hues in an analogous-color scheme in which a dominant color (represented by the tonality) is enhanced by its immediate neighbors (represented by foreground pitch collections) on the color wheel through simultaneous contrast.

[4.2] Compound additive designs are composed of several simultaneous textural layers that produce chromatically saturated pitch spaces. Because of this saturation, it is extremely difficult to perceive each layer's pitch content.[(27)] But if we consider the pitch materials of each layer as merging with their associated timbres[(28)] to form pitch-timbres and how these pitch-timbres are connected or separated simultaneously, then a sense of shape emerges in a compound additive design. These simultaneous relationships suggest, moreover, parallels with Delaunay's concept of rhythmic simultaneity, which describes the pervasive synchronous movement of optical vibrations generated by the juxtaposition of complementary and dissonant colors in painting. Pitch-timbres dwell in a self-contained sound space and mimic the rhythmic simultaneity of colors through musical relationships based on similarities or dissimilarities in pitch, timbre, or both. For example, two layers may be connected to each other by being linked with members of the same instrumental family, such as the violins and violas, and with similar pitch collections, such as modes 1 and 3.[(29)] They may diverge

simultaneously from a third layer that is linked with a different instrumental family, such as the woodwinds, and different pitch collections, such as a series of chords of transposed inversions. Thus, through various connections and separations, pitch-timbres exhibit varying degrees of integration and disassociation in compound additive designs, displaying, more often than not, high levels of disassociation.

[4.3] Before turning to the Angel's discourse in *Le baiser au lépreux* and music in *L'Ange musicien* in which analogous and compound additive designs will be discussed, respectively, let us consider two examples of contrasting additive designs in *Saint François*. Example 7 ([DjVu] [GIF]) illustrates a contrasting additive design composed of two textural layers that are pitch-class complements of one another. The example is taken from the third strophe of Brother Masseo's ornithology lesson in scene 6, *Le Prêche aux oiseaux*.[(30)] Messiaen acknowledged this use of pitch-class complementation as a type of simultaneous contrast derived from Delaunay in an interview with Almut Rössler:

I've noticed during the replaying [of] some of my works, that I'd unintentionally employed the well[-]known phenomenon of complementary colours, called 'simultaneous contrasts' in the painting world, and used most of all by Delaunay. An example: if I have a chord made up of seven notes, one also hears the other five which are missing – played by other instruments or in another register.[(31)]

[4.4] In Example 7 ([DjVu] [GIF]), Brother Masseo's melodic line is supported initially by chords drawn from mode 2:1 <0,1,3,4,6,7,9,10>[(32)] and a chord of transposed inversions on A (first inversion, represented by CTI_1/A {0,1,2,5,6,7,9}). The harmonic support moves to a series of turning chords followed by three statements of an eight-note chord, set class 8-16 [0,1,2,3,5,7,8,9]. Beginning with the last turning chord, 8-14 {8,10,11,0,1,3,4,5}, and proceeding through the three transpositions of 8-16, Messiaen employs a contrasting textural layer composed of the literal pitch-class complements of these chords.

[4.5] The aggregates formed by the combination of these two layers can be analyzed as *chords of total chromaticism*. This non-modal chord type is often realized as either eight- and four-note or seven- and five-note harmonies that are literal pitch-class complements of one another. Example 8 ([DjVu] [GIF]) shows an analytical reduction of a chord of total chromaticism taken from Saint Francis' s dream of New Caledonia in *Le Prêche aux oiseaux*.[(33)] The chord consists of three superimposed triadic harmonies with added notes. The two bottom harmonies form set class 8-16 {3,4,5,6,8,10,11,0}, while the top harmony forms 4-16 {7,9,1,2}, the literal pitch-class complement of the eight-note sonority below. This

chord of total chromaticism not only matches the registral distribution of the last three aggregates of Example 7 ([DjVu] [GIF]) but also is similar in timbral make-up – all of these chords are sounded primarily by strings, horns, bassoons, flutes, and piccolos. But identifying the chord type that the aggregates of Example 7 might arise from is not pertinent here; rather, the focus should be on how these aggregates are generated. In other words, why does Messiaen combine two distinct textural layers that are not only literal pitch-class complements of one another but also sounded by different instrumental families (strings, horns, and bassoons vs. flutes and piccolos)? As evinced in the Rössler interview, I believe that these aggregates result from Messiaen's use of simultaneous contrast. On a canvas, a painter enhances a given color (e.g., red) by juxtaposing it with its complement (e.g., green), resulting in complementary afterglows around each color. In Example 7's contrasting additive design, the four-note chords in the top layer can be viewed as musical analogues to such complementary afterglows. Each of these chords intensifies the "chroma" of its respective eight-note chord in the bottom layer through pitch-class complementation and contrasting timbres.(34)

[4.6] Example 9 ([DjVu] [GIF]) shows a contrasting additive design composed of two active parts that is taken from the avian commentary on "perfect joy"(35) in scene 1, *La Croix* (R66:1-R73:11). The skylark II's harmonic support is distinguished by non-modal and modal pitch collections. The chords of transposed inversions govern the bird's flourishes with chords drawn from mode 3:3 <2,4,5,6,8, 9,10,0,1> serving as harmonic foil. A chord of transposed inversions on C♯ (first inversion, CTI_1/C♯ {4,5,6,9,10,11,1}), the passage's concluding chord, gives harmonic focus to the bird's chordal support, which includes other chords of transposed inversions (CTI_1/D♯ {6,7,8,11,0,1,3}, CTI_1/B♭ {1,2,3,6,7,8,10}, CTI_1/D {5,6,7,10,11,0,2}) that alternate with subsets from mode 3:3 (6-14 {1,4,5,6,8,9}, 6-15 {6,9,10,0,1,2}).(36) The harmonic content of the passage is indicative, furthermore, of the skylark II's music throughout the commentary. Chords of transposed inversions (especially the CTI_1/C♯) and, to a lesser extent, chords of contracted resonance (7-Z36 [0,1,2,3,5,6,8], 7-Z12 [0,1,2,3,4,7,9]) play important roles in defining the bird's flourishes. Mode 3:3 along with mode 3:2 <1,3,4,5,7,8,9,11,0> continues to serve as harmonic contrast to these chords. These modes are consistently represented by their subsets 6-14 [0,1,3,4,5,8], 6-15 [0,1,2,4,5,8], and 6-21 [0,2,3,4,6,8].

[4.7] The skylark I's harmonic support consists of trichords drawn primarily from set classes 3-1 [0,1,2], 3-4 [0,1,5], and 3-5 [0,1,6]. These trichords, moreover, are realized with wide interval spacings in pitch space. These chords distinguish themselves from the larger and more

tertian-sounding chords found in the skylark II's music. In addition, the skylark I's musical modules are shorter than their counterpart's, which intensifies the harmonic differences between the two pitch schemes. For example, 3-4 initiates three of the bird's gestures in the same amount of time taken up by one gesture in the skylark II's music. But in a certain sense, this is a logical consequence of the skylark I's more static harmonic content, for its modules must proceed at a faster rate to balance the slower but more harmonically varied modules of the skylark II. Finally, like the skylark II's music, the harmonic content of the passage is fairly indicative of the skylark I's music throughout the commentary.

[4.8] The two simultaneous textural layers of Example 9 ([DjVu] [GIF]) exhibit not only more internal harmonic contrast than Example 7 ([DjVu] [GIF]) but more timbral contrast as well: the skylark I's music is played by the xylos[37] and the skylark II's music by the woodwinds. As shown in Figure 4 ([GIF]), this timbral contrast was accentuated spatially by Messiaen in the 1983 performances of *Saint François* in Paris.[38] Messiaen had twenty-two woodwinds placed on a platform to the left of the stage and five mallet percussion instruments, which included the xylo ensemble, on a platform to the right of the stage. According to Messiaen, such an arrangement favored these two ensembles but minimized the strings.

[5] Analogous Additive Design: The Angel's Discourse, *Le baiser au lépreux*

[5.1] Let us now study the analogous additive design used in the Angel's discourse from *Le baiser au lépreux* (scene 3). The Angel's discourse is one of the most dramatic passages of *Saint François*. Indeed, Messiaen considered the words spoken by the Angel in scene 3 to be one of the opera's most important texts.[39] Reflecting God's intervention in the situation involving Saint Francis and the Leper,[40] the Angel appears behind a window and addresses the Leper with words adapted from 1 John 3:20: "Leper, your heart accuses you. But God is greater than your heart. He is Love, He is greater than your heart, He knows all. But God is all Love, and he who abides in Love abides in God, and God in him" ("Lépreux, ton coeur t'accuse. Mais Dieu est plus grand que ton coeur. Il est Amour, Il est plus grand que ton coeur, Il connaît tout. Mais Dieu est tout Amour, et qui demeure dans l'Amour demeure en Dieu, et Dieu en lui.").

[5.2] The tonality of A major constitutes the music's background design (Figure 5 [GIF]). It is the musical analogue to the dominant color of an analogous-color scheme. In strophes 1, 2, and 4, A major is asserted by a first-inversion A-major triad that begins and ends each strophe. In strophe 3, Messiaen varies this background design by cadencing on an EMm$

chord, A major's dominant, producing an open harmonic movement that achieves closure in strophe 4.

[5.3] The music's foreground pitch collections are drawn chiefly from the second and third modes of limited transposition. These modes are the musical analogues to the subordinate colors that enhance the dominant color of an analogous-color scheme through simultaneous contrast. They are suggested by characteristic subsets and are positioned within the larger harmonic area of A major. In each strophe, modal subsets often combine to form a larger subset that is one note short of its parent scale. In strophes 1 and 2, which are virtually alike, subsets from modes 3:2 <1,3,4,5,7,8,9,11,0> and 3:3 <2,4,5,6,8,9,10,0,1> are juxtaposed to represent their respective parent collections (Example 10 [DjVu] [GIF]). After the opening A-major chord, Messiaen suggests mode 3:2 by inserting a characteristic subset, 6-15 {9,0,1,3,4,5}, into the passage. These two chords alternate before giving way to another modal subset, 6-21 {11,1,3,4,5,7}. At this point, Messiaen transforms 6-15 and 6-21 by a T_5 operation, engendering a move to mode 3:3 and a different harmonic area. (41) In both cases, these modal subsets result in 8-24 [0,1,2,4,5,6,8,10], a larger subset that is one note short of its mode 3 scale [0,1,2,4,5,6,8,9,10].

[5.4] Strophe 3 differs from previous strophes as mode 2:1 <0,1,3,4,6,7,9,10> is suggested by subsets 3-11 [0,3,7], 4-26 [0,3,5,8], and 4-Z29 [0,1,3,7] (Example 11 [DjVu] [GIF]). A four-chord succession consisting of three members of set class 4-Z29 followed by 3-11, the discourse's A-major chord, begins the strophe. The drive to each A-major chord in the succession, moreover, serves to polarize A major within the mode as well as to reinforce A major as the strophe's tonality. At the end of the strophe, 4-26 and two members of 4-Z29 combine to form 7-31 [0,1,3,4,6,7,9], the octatonic heptachord, which reestablishes mode 2:1's harmonic priority before the strophe's conclusion on the dominant of A major.

[5.5] The mode 2:1 harmonic area, labeled A in Example 11 ([DjVu] [GIF]), is followed by a contrasting harmonic area labeled B. Consisting primarily of the chords of contracted resonance and chords of transposed inversions, area B heightens the harmonic differences between strophe 3 and strophes 1 and 2. As mentioned above, the mode 2:1 harmonic area (A) returns before the strophe concludes on the dominant of A major. By enclosing these two non-modal chord types, mode 2:1 asserts itself as the more consequential foreground pitch collection of strophe 3.

[5.6] (Strophe 4 [R72:1-24] is an expanded version of strophes 1 and 2. The only tangible difference between it and the music's previous strophes

is the inclusion [beginning at R72:12] of a succession of chords of transposed inversions that is followed by two chords suggesting mode 3:3 {1,2,4,5,6,8,9,10}.)

[5.7] Despite the presence of other pitch structures, modes 2 and 3 are the featured foreground pitch collections in the Angel's music depicted in Examples 10 ([DjVu] [GIF]) and 11 ([DjVu] [GIF]). Among the transpositional levels of these modes, only 2:1, 3:2, and 3:3 contain A-major triads, thus their inclusion in the Angel's music is conditioned at first glance by the common tones they share with the tonality of A major. But more strongly, an analogous-color scheme connects these modes to A major when all of their colors are combined. For Messiaen, the key of A major is blue because its tonic triad, an A-major chord, suggests the same color in his synesthesia.(42) In the Angel's discourse, Messiaen chooses those modes whose color associations harmonize with the blue of A major. With the exception of gray, a color associated with mode 3:2, the blue-violet of mode 2:1, the mauve of 3:2, and the blue and green of 3:3 neighbor the blue of A major when considered on a color wheel. For its part, gray merges easily with this color scheme through its characteristic absorption of the strengths of its neighboring colors. Thus, through the simultaneous contrast of analogous colors, these modes enhance the tonality of A major from a sound-color perspective.

[5.8] The colors in the Angel's discourse suggest psychological connotations based on color perception and symbolism. Blue, blue-violet, green, and mauve reflect the cool side of the color spectrum and allude to the uniform, perhaps calm, nature of the Angel's message to the Leper. Because of the symbolic connotations of blue, A major, in its role as the discourse's tonality, reinforces the Angel's theological message about the truth of heavenly love. In Christian color symbolism, blue represents heaven and heavenly love because it is the color of the sky. It is also associated with truth because, as George Ferguson states, "blue always appears in the sky after the clouds are dispelled, suggesting the unveiling of truth."(43) While discussing color symbolism with Claude Samuel in 1967, Messiaen alluded to hyacinth, a bluish violet, as representing the truth of love in medieval color symbolism.(44) Thus, I interpret A major's association with the Angel's music in scene 3 as representing the truth of heavenly love in the opera's dramatic design.

[6] Compound Additive Design: The Angel's Music, *L'Ange musicien*

[6.1] Let us now consider the compound additive design associated with the Angel's music in scene 5. In *L'Ange musicien,* Saint Francis is visited by the Angel, who paraphrases a passage from Saint Thomas

Aquinas' s *Summa Theologiae* regarding God and the nature of truth: "God dazzles us by an excess of Truth. Music carries us to God by an absence of Truth" ("Dieu nous éblouit par excès de Vérité. La musique nous porte à Dieu par défaut de Vérité."). (45) The Angel plays celestial music for Saint Francis, which allows the friar to experience the foretaste of heavenly joy that he had prayed for earlier in the scene.

[6.2] The design' s pitch-timbres suggest simultaneous connections and separations based on their relationships to C major, which is the tonality of the Angel' s music and the design' s center of gravity. C major is established immediately prior to the sounding of this compound additive design by a prolonged second-inversion C-major triad when the Angel first plays its melody (R86:1-R87:4). As with A major, the key of C major connotes white in Messiaen' s synesthesia because its tonic triad also suggests white. Since white connotes holiness and purity in Christian color symbolism, (46) I interpret the key of C major as representing the goal of Saint Francis' s progression of faith, which is defined by the fullness of grace, that is, complete holiness and purity, in his soul. Through its use in the Angel' s music, C major not only suggests the celestial joy that Saint Francis had asked for earlier in the scene but also connects *L' Ange musicien* theologically to *La mort et la nouvelle vie,* the opera' s last scene, which ends in C major. In this last scene, Saint Francis has reached the end of his spiritual journey. He prepares for his death and resurrection, anticipating the abundant grace and joy that he will experience in heaven.

[6.3] In Example 12 ([DjVu] [GIF]), I have identified eight pitch schemes and numbered them 1 through 8. (47) The strings feature three designs that involve modes 2 and 3 and connections to C major. As the Angel' s melody is sounded by three Ondes Martenot playing glissandos back and forth from C3 to C7, the first violins in design 1 play an ostinato of twelve chords in mode 3:1, while the violas in design 2 play eleven chords in mode 2:1. Each ostinato begins with a C-major chord and thus makes a connection to the Angel' s tonality. A melodic ostinato in mode 2:1 played by part of the cellos in design 3 starts later and runs its own course. Like its counterparts that display connections to C major, the ostinato begins and ends on pitch-class C.

[6.4] The flutes, clarinets, and xylos play pitch schemes (4-6) that are associated with the songs of the blackbird, robin, and nightingale, respectively. As shown in Example 13 ([DjVu] [GIF]), the blackbird' s song in scheme 4 is supported chiefly by pitch collections that are connected to C major through the placement of artificial harmonics above and below a C-major chord. But these pitch collections also suggest mode 3:1, which links the bird' s song to the music of the violins I. Unlike the

blackbird's song, the songs of the robin and nightingale in schemes 5 and 6 are not connected to C major or the modes of limited transposition – the robin's music is supported primarily by tetrachords that are subsets of the diatonic collection [0,1,3,5,6,8,10], and the nightingale's music is supported by trichords that suggest a chromatic harmonic field {8,10,11,0,1,2,3,4,5}.

[6.5] Both transpositions of mode 1 are also included in this compound additive design. In scheme 7, horns 1 and 3, doubled later by the English horn, bassoon 1, and tubular bells, sound dyads that establish mode 1:1, the whole-tone collection on C <0,2,4,6,8,10>. Later in the passage, scheme 7 includes C as a prominent note in its part, hence connecting its pitch materials to C major (see R89:5, 12–16). In scheme 8, the cellos and double basses play a scalar form of set class 7-33 {11,0,1,3,5,7,9}, a whole-tone superset, which is really mode 1:2 <1,3,5,7,9,11>, the whole-tone collection on C♭, with pitch-class C placed initially at both ends. This strand complements the mode 1:1 strand and likewise exhibits connections to C major through pitch-class C.

[6.6] The eight pitch schemes produce a predominantly whole-tone pitch space spanning C1 to G3 and a chromatically saturated pitch space from B♭3 to B7. Connecting both spaces is another – from C3 to C7 – outlined by the Angel's melody on the Ondes Martenot. Thus, there are three overlapping pitch spaces that feature different pitch-timbres. As I alluded to previously, the Angel's melody and tonality of C major are the design's center of gravity. Pitch-timbres give shape to the congested upper pitch space through a series of oppositions that are based on their relationships to C major, their similar or dissimilar timbres, and whether or not they are related to the modes of limited transposition. These pitch-timbres also interact with those of the lower pitch space based on the same considerations.

[6.7] The upper pitch space exhibits more activity than the lower due to its concentrated mixing of woodwind, percussion, horn, and string pitch-timbres. Within this space, the woodwind and xylo pitch-timbres, aside from their obvious differences in instrumental color, contrast collectively with the more homogeneous string pitch-timbres. While the blackbird's C-major-based chords bear abstract connections with the diatonic collections of the robin's song, these relationships are not as close as those exhibited by, for example, the violas and cellos that share mode 2:1 and connections to C major. The songs of both birds, moreover, contrast with the chromatic pitch field and timbre of the nightingale. Since the birds' pitch-timbres not only exhibit differences as a group but also tenuous connections to C major and the modes, they

separate themselves from the more closely-related pitch-timbres of the strings.

[6.8] The timbres that merge with mode 1:1 (English horn, bassoon 1, horns 1 and 3, and tubular bells) display diverse relationships with the foregoing pitch-timbres. They are connected to string pitch-timbres through their pitch associations (mode 1:1 and C major) but distance themselves through timbral associations. On the other hand, they are closer to the woodwind and xylo pitch-timbres from timbral perspectives but more distant from pitch perspectives (clarinets and xylos).

[6.9] All of the previous pitch-timbres exhibit relationships with pitch-timbres active in the whole-tone pitch space. Since they include cellos, double basses, and bassoons 2 and 3, the lower space's pitch-timbres intersect coloristically with the upper space's instrumental families. Their mode 1:2 coupling and connection to C major, furthermore, distance them from the pitch contents of the robin and nightingale, connect them with that of the blackbird and the strings, and link them closely with the mode 1:1 strand of the horns and lower woodwinds. Since they are mode 1:1's complement and, when combined together, form the aggregate, the mode 1:2 pitch-timbres both oppose as well as complete their modal counterpart.[(48)]

[6.10] The passage's large-scale context lies rooted in a harmonic duality involving C major. Through their connections to C major, pitch-timbres in the upper and lower pitch spaces reinforce the central pitch space's tonality and symbolic importance. On the other hand, pitch-timbres not connected to C major balance the emphasis on the design's center of gravity. In sum, this compound additive design, unlike many others in *Saint François,* exhibits more integration than disassociation among its pitch-timbres. Different pitch-timbres link up with one another to form various strands of musical continuity that lend shape to the Angel's music.[(49)]

[6.11] Figure 6 ([GIF]) summarizes the foregoing discussion.

[7] Conclusion

[7.1] In this article, I have considered how simultaneous contrast functions as a structural principle in Messiaen's music by exploring the additive designs of *Saint François d'Assise.* I have argued for analogies between a painter's use of color and Messiaen's use of musical layers involving pitch and timbre. By studying Messiaen's musical materials from coloristic perspectives, especially those involving contrast, I

believe that we can increase our understanding about their combination, interaction, and movement. Focusing on a single chord and color association is to focus on an amorphous entity. Messiaen's chords and colors, as well as other musical elements, achieve movement and expression through oppositions rooted in simultaneous contrast.

[7.2] My approach to sound-color relationships differs from the work of other scholars who have written on the subject of Messiaen and color. While my approach emphasizes simultaneous contrast and includes musical applications that encompass pitch, timbre, or both with general connections to color, other scholars have either (1) attempted to access Messiaen's synesthetic responses to understand how he structures his music or (2) explored general correspondences between color complements and his harmonic practice.[(50)] While Messiaen's synesthesia drives his compositional approach, we should not assume that analytical approaches to the role of color in his music have to be driven by perspectives derived from neuropsychology, or, for that matter, comparisons with Scriabin. Rather, sound-color relationships in Messiaen's music should be viewed from the perspective of simultaneous contrast. As I stated at the outset of this article, Messiaen compared the way he structures his music to the way a painter structures colors on a canvas (see paragraph 1.1). Both of their approaches to color involve the mutual enhancement of their materials through simultaneous contrast; the distinctive characteristics associated with a particular musical entity or color are secondary considerations. In other words, a painter juxtaposes two complementary colors on a canvas because they intensify one another to an appreciable degree, not because they lie directly opposite one another on a color wheel. Similarly, Messiaen combines, for example, two chords in his music because they enhance one another from sound-color perspectives, not because both chords define larger harmonic areas or happen to be literal pitch-class complements that form an aggregate. Aggregates and larger harmonic areas should be viewed as by-products of Messiaen's more fundamental use of simultaneous contrast and not as fundamental constructs that determine harmonic activity on the musical surface.

[7.3] Since simultaneous contrast plays an important role in Messiaen's musical thinking,[(51)] I believe when analyzing his music that we should focus on the ways in which it is manifested in his works. The examples offered in this article are but a few of many possible applications to the composer's music. For example, many of Messiaen's harmonic structures, particularly his non-modal ones, consist of either a tertian structure that is enhanced by artificial harmonics or two superimposed tertian structures.[(52)] In either case there is an interaction between two opposing elements, with each element assigned one color or a set of colors.

One element will either be absorbed by the other element, resulting in its dominance by the other element in terms of both sound and color, or there will be a balanced interplay between the two elements, producing a harmonic structure that derives its sonic intensity from the interference of two equally competing but different harmonic spectra.

[7.4] Examining the ways in which the connection between vision and hearing is expressed in Messiaen's music is essential when trying to grasp his compositional designs. It is through this connection that Messiaen creates his music, which gives him an indication of what it would be like to experience his conception of eternity where a person's senses of vision and hearing will be united, not separated. While I regard the composer's colored-hearing synesthesia to be real and not the product of a bizarre temperament, I view Messiaen's descriptions of his sound-color harmonies from more distant vantage points when considering his compositional designs. Assigning precise musical correlations to Messiaen's statements about the colors of his chords may prove to be an impossible task because of the personal nature of his synesthesia. Although we will certainly find correlations between the composer's harmonies and color associations, these correlations will ultimately be inexact and hence reflect sound-color relationships in broad terms.[(53)] Sound-color relationships in Messiaen's music are based on the connection between vision and hearing, represented in his compositional aesthetic by simultaneous contrast and its counterpart in music, the natural resonance of vibrating bodies. Whether by the interaction of one sound-color harmony with another, or by interactions involving different musical parameters, simultaneous contrast is connected to the process of transformation, enjoyed most by Messiaen as a composer.[(54)] Thus, to increase our understanding of how Messiaen structures his music, we should focus on the various ways he transforms his musical materials, particularly on the ways dynamic relationships are generated by his use of simultaneous contrast.

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