

## CHAPTER 1. INTRODUCTION

French composer Olivier Messiaen (1908–1992) experienced a physiological condition known as synesthesia, wherein his senses of sight and sound intermingled, causing him to see colors whenever he heard music. Although the experience was with him throughout his life, his sensitivity to his colored perceptions grew stronger over time. In writings from the later part of his career, Messiaen often stressed the primacy of color in his works: “More than the form, more than the rhythms and more than all the timbres, it is necessary to hear and to see sound-colors in my work.”<sup>1</sup> Given the emphasis that Messiaen placed on chordal coloration, understanding—to whatever extent possible—his synesthetic experience seems like a reasonable step toward understanding his compositional choices. This is particularly vital in regard to *musique colorée* (literally, “colored music”): those compositions and passages of compositions wherein, for Messiaen, the musical features were most conducive to the evocation of color.<sup>2</sup>

For decades, music theorists have grappled with decoding the sound-color correspondences of Messiaen’s synesthesia. Messiaen reported that his synesthesia was stimulated by chords, and described the complex colorations of many of his “special chords” (*accords spéciaux*) and “modes of limited transposition” (*modes à transpositions limitées*).<sup>3</sup> For example, one particular chord evoked “burnt-earth crystals, amethyst

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1. “Plus que la forme, plus que les rythmes, et plus que tous ces timbres, il faut entendre et voir dans mon oeuvre, des son-couleurs.” Olivier Messiaen, et al., *Hommage à Olivier Messiaen : novembre-décembre 1978* (Paris: La Recherche artistique, 1979), 64. See also Almut Rössler, *Contributions to the Spiritual World of Olivier Messiaen: With Original Texts by the Composer*, trans. Barbara Dagg, Nancy Poland, and Timothy Tikker (Duisburg: Gilles und Francke, 1986), 73, 129. Unless otherwise stated, all translations are mine.

2. Unless otherwise specified, in this dissertation the word “color” is used to denote color in the literal sense (perceived either visually or synesthetically) not color in any metaphoric sense, such as “tone color,” “timbral color,” “harmonic color,” or “orchestral color.” The word “coloration” (and the term “harmonic coloration,” in reference to chords) is used to describe the specific synesthetic evocation of a mode or chord.

3. Unless otherwise specified, in this dissertation the word “mode” is used to refer to one of Messiaen’s “modes of limited transposition,” not the Medieval church modes or any other sort of musical mode. The term “modal chord” is used to refer to any pitch-complex whose constituent members comprise a subset of a specific mode. The term “modal passage” is used to refer to a series of chords in the same

violet, clear Prussian blue, warm reddish chestnut, with stars of gold.”<sup>4</sup> So how exactly does a chord evoke a coloration? What features rendered one chord’s coloration different from another? Decoding the sound-color correspondences in *musique colorée* synesthesia poses many challenges, since Messiaen’s descriptions of harmonic colorations are idiosyncratic and sometimes contradictory. Nevertheless, I contend that behind *musique colorée* there is a discrete code, that this code is—to an extent—quantifiable, and that the quantification of this code offers significant insight into the study of Messiaen’s work.

### Outline of the dissertation

The principal goals of the dissertation are the quantification of the sound-color correspondences in *musique colorée*, the provision of a method to determine unknown harmonic colorations, and an illustration of how the study of Messiaen’s sound-color correspondences may reveal otherwise unobtainable insight into the structure of Messiaen’s music. The dissertation begins with an examination of synesthesia; it then presents a method, based on Messiaen’s testimonies, for determining unknown harmonic colorations. Messiaen’s coloristic harmonic resources are then examined. Finally, after presenting taxonomic harmonic and coloristic analyses, the coloristic content of Messiaen’s “Apparition du Christ glorieux” is examined.

Chapter 2 seeks to validate Messiaen’s synesthesia. Since the thesis of this dissertation is grounded on hearsay testimony of Messiaen, it is vital to establish that his condition was genuine and reliable—that Messiaen’s testimonies of musical color describe a real experience, rather than an arbitrary intellectual contrivance. The chapter begins by examining the artistic and literary fascination with cross-sensory perception in the late-

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mode. The word “modality” is used in reference to the five methods of sensory input (i.e., vision, hearing, taste, touch, and smell).

4. “Cristaux de couleur terre brûlé, violet améthyste, bleu de prusse clair, marron chaud et rougeâtre, avec des étoiles d’or.” Olivier Messiaen, *Traité de rythme, de couleur, et d’ornithologie*, 7 vols. (Paris: Alphonse Leduc, 1992), V/2, 72; 513; 518. (Henceforth *Traité*.)

nineteenth and early-twentieth centuries; many artists and musicians of the time, inspired by contemporary scientific research into synesthesia, sought to create works that simulated the synesthetic experience. Modern theories of the etiology of synesthesia are then presented, as are a list of diagnostic criteria. Messiaen's own testimonies are compared against the criteria.

Chapter 3 defines *musique colorée* and explores nine of its features. For Messiaen, not all music was capable of evoking color. *Musique colorée* contains certain essential characteristics conducive to the evocation of color. Further, Messiaen was not always particularly sensitive to his synesthesia. His testimony suggests that his sensitivity to his synesthesia developed over the course of decades; changes in his compositional style reflect his increased sensitivity to synesthetic color.

Chapter 4 defines the sound-color correspondence as perceived by Messiaen. Messiaen spoke at length about how, for him, a single chord evoked simultaneously many colors. He also described the colorations of dozens of chords. A consistent method for defining Messiaen's sound-color correspondences can be established on the theory that each pitch class (pc) corresponded to a particular color, and that a chord's resultant harmonic coloration depended upon the interaction of specific pc colors. The chapter begins by establishing base colors of the twelve pcs; it then presents a method for determining unknown harmonic colorations.

Chapter 5 examines the two main harmonic categories of *musique colorée*: "modes of limited transposition" and "special chords." Special chords include: the "chord on the dominant;" the "chord on the dominant with appoggiaturas;" the "chord of resonance;" the "chord with contracted resonance;" the "chord in fourths;" the "turning chord;" and the "chord of total chromaticism." The structure, voicings, transpositions, inversions, and colorations of each mode and each chord are examined. The examination of voicing is particularly germane to the present study, because it is through such an examination that Messiaen's various classifiable harmonic structures can most readily be classified. The

chapter also presents reconstructions of the many charts (*tableaux*) devised by Messiaen to assist with composition. Messiaen's charts list the modes and special chords in all possible transpositions and inversions, and list their respective colorations.

Chapter 6 examines the coloristic content of a work by Messiaen: "Apparition du Christ glorieux," the first movement of the orchestral work *Éclairs sur l'Au-Delà* (1992). First, the work's program is presented. Using the method prescribed in Chapter 4, unknown harmonic colorations are determined; a taxonomic coloristic analysis is aligned with the harmonic analysis. Following a brief analysis of the movement's form, the coloristic content of the work is examined in detail.

Chapter 7 summarizes the contributions of the dissertation, and suggests opportunities for further research.

### **Sources of the dissertation**

The dissertation draws on sources from two main categories: studies of synesthesia; and studies of Messiaen's music. An important study of synesthesia is sensory psychologist Dr. Lawrence Marks's 1975 article, "On Colored-Hearing Synesthesia: Cross-Modal Translations of Sensory Dimensions."<sup>5</sup> The article represents the first major report on synesthesia since the 1930s and stands at the forefront of the modern renaissance of synesthesia research. Marks examines historical research into synesthesia in a search for common characteristics of synesthetic perceptions. The dissertation also draws on the writings of American neurologist and neuropsychologist Richard E. Cytowic. His most recent writings include *The Man Who Tasted Shapes*, which examines the characteristics of one synesthete, *Synesthesia: A Union of the Senses*, which is a comprehensive examination of synesthesia, and "Synesthesia: Phenomenology and Neuropsychology—A

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5. Lawrence E. Marks, "On Colored-Hearing Synesthesia: Cross-Modal Translations of Sensory Dimensions," *Psychological Bulletin* 82/3 (May, 1975), 303–331.

Review of Current Knowledge,” which summarizes all of his research on synesthesia.<sup>6</sup> Invaluable insight into synesthesia was also attained by personal interviews with synesthetes. Principal among the synesthetes interviewed for this dissertation were AF and LH, both—like Messiaen—organists with color-music synesthesia.

There are many valuable resources on the music of Messiaen. Principal among primary sources are two lengthy treatises: *Technique de mon langage musical* and *Traité de rythme, de couleur et d’ornithologie*.<sup>7</sup> While *Technique* constitutes a systematic presentation of Messiaen’s musical language as of 1944 and provides detailed explanations of his compositional tools, it contains only general remarks about color. *Traité*, on the other hand, stands as a comprehensive collection of Messiaen’s theories after *Technique*. Messiaen worked continually on *Traité*—from 1949 until his death in 1992.<sup>8</sup> *Traité* contains many specific references to color; throughout the first five volumes are descriptions of the colorations of most of Messiaen’s special chords. The seventh and final volume of *Traité* will contain coloristic descriptions of all Messiaen’s modes and chords. Other primary sources (either authored or co-authored by Messiaen) include journal articles, album liner notes, score notes, and book-length interviews with Messiaen.<sup>9</sup>

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6. Richard E. Cytowic, *Synesthesia: A Union of the Senses*, 2nd ed. (Cambridge: MIT Press, 2002); Richard E. Cytowic, “Synesthesia: Phenomenology and Neuropsychology—A Review of Current Knowledge,” *Synesthesia: Classic and Contemporary Readings*, ed. Simon Baron-Cohen and John E. Harrison (Oxford: Blackwell, 1997), 17–39. Richard E. Cytowic, *The Man Who Tasted Shapes: A Bizarre Medical Mystery Offers Revolutionary Insights into Reasoning, Emotion and Consciousness* (New York: Putnam, 1993). Other excellent resources on synesthesia include: J. Gage, “Synaesthesia,” *Encyclopedia of Aesthetics*, 4 vols., ed. M. Kelly (Oxford: Oxford University Press, 1998), IV, 348–351; and Andrew D. Lyons, “Synaesthesia: A Cognitive Model of Cross-Modal Association,” *Consciousness, Literature and the Arts* 2/2 (July 2001).
  7. Olivier Messiaen, *Technique de mon langage musical*, 2 vols. (Paris: Alphonse Leduc et Cie, 1944). (Henceforth *Technique*.)
  8. *Traité* is being edited and published posthumously, under the supervision of Messiaen’s widow Yvonne Loriod. The first of seven volumes was published in 1992; at the time of this writing, only the first five volumes have been published.
  9. Shorter books by Messiaen include: Olivier Messiaen, *Conférence de Kyoto*, (Paris: Alphonse Leduc, 1988); Olivier Messiaen, *Conférence de Notre Dame* (Paris: Alphonse Leduc, 1978); Olivier Messiaen, et al, *Hommage à Olivier Messiaen: novembre-décembre 1978* (Paris: La Recherche Artistique, 1979). Journal articles include: Olivier Messiaen, “Gespräch mit Olivier Messiaen,” *Melos* 16/4 (April 1949), 101–104; Olivier Messiaen, “Matière-lumière, espace-temps, son-couleur,” *Preuves* 179 (January 1966), 39–41; Michael Murray, “An Interview with Olivier Messiaen,” *Diapason* 70/1 (No. 829,

Jonathan Bernard's article "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in His Music" is an important secondary source regarding the coloristic aspects of Messiaen's music.<sup>10</sup> Through an examination of modal harmonies and their respective colorations, Bernard seeks to identify general structural principles in the music of Messiaen. He applies various analytical techniques—such as pcset analysis and voicing analysis—and weighs their respective merits. While Bernard analyzes the music of Messiaen in terms of modal content only, the present dissertation extends Bernard's research by offering strategies to identify special chords.

The dissertation holds that the examination of voicing provides the simplest and most direct means of harmonic taxonomy for the music of Messiaen. Bernard, in his modal analyses of Messiaen's music, concludes that voicing analysis provides mixed results; however, voicing analysis can provide immediate and clear results when dealing with Messiaen's special chords.<sup>11</sup> In the dissertation, voicing analysis indicates a chord's consecutive intervals, listed from bottom to top. Intervals are measured in semitones; notation consists of numerals separated by commas and enclosed within angle brackets.<sup>12</sup>

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December 1978), 3, 5; Roger Nichols, "Messiaen: Roger Nichols Talks to the Composer, who is 70 on December 10," *Music and Musicians* 27/4 (December 1978), 20–22; Leonardo Pinzauti, "Gespräch mit Olivier Messiaen," *Melos* 1972/5, 270–273; Harriet Watts, "Canyons, Colours and Birds: An Interview with Olivier Messiaen," *Tempo* 128 (1979), 2–8; Olivier Messiaen, "Propos impromptu," *Le Courier musical de France* 8 (1964), 196–212. Longer interviews with Messiaen include: Antoine Goléa, *Rencontres avec Olivier Messiaen* (Paris: René Julliard, 1960); Claude Samuel, *Entretiens avec Olivier Messiaen* (Paris: Editions Pierre Belfond, 1967); Olivier Messiaen, *Musique et couleur: nouveau entretiens avec Claude Samuel* (Paris: Pierre Belfond, 1986); Olivier Messiaen, *Entretien avec Claude Samuel* (Erato ECD 75505, 1988).

10. Jonathan W. Bernard, "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in His Music," *Music Perception* 4/1 (Fall, 1986), 41–68. The article was later revised and published as "Colour" in *The Messiaen Companion*, ed. Peter Hill (Portland: Amadeus Press, 1994), 203–219.
11. Bernard, 49.
12. In the dissertation, the notation of harmonic voicing follows John Rahn's notation for ordered collections, as given in *Basic Atonal Theory* (New York: Schirmer Books, 1980), 21. Jonathan Bernard presents two methods of notating harmonic voicing in "Messiaen's Synaesthesia." Within musical examples, Bernard presents intervals in a column below the corresponding chord; within the body of the article, he lists intervals separated by commas. For example, a major triad in root position has the notation 4,3. Robert Morris presents a different notation in "Equivalence and Similarity in Pitch and their Interaction with Pcset Theory," *Journal of Music Theory* 39/2 (1995), 207–243. Morris uses the prefix "SP(X)" ("the spacing of the pset X"); intervals are separated by spaces and enclosed with square brackets. For example, a major triad in root position has the notation SP(X) [4 3].

For example, the voicing of a close-voiced major triad in root position is represented as  $\langle 4,3 \rangle$ ; the voicing of a close-voiced dominant-seventh chord in root position is represented as  $\langle 4,3,3 \rangle$ .

The notation for voicing variants in the dissertation easily accommodates variants of Messiaen's special chords.<sup>13</sup> Messiaen's special chords are defined by certain fundamental voicings; harmonic variants can be related to their respective fundamental voicings.

Example 1.1 illustrates the notation of voicing variants in the dissertation.

Example 1.1. Notation of voicing variants in the dissertation.

$\langle 2,2,7,8,6,4 \rangle$      $\langle 2,2,7,8,6,4 \rangle$      $\langle 2,2,7,8,6,4 \rangle$      $\langle [2],2,7,8,6,4 \rangle$      $\langle [2],2,7,8,6,4 \rangle$

The first chord in the Example is one of Messiaen's special chords—a “chord with contracted resonance” (CCR)—in its fundamental voicing; the other chords are variants of the first. The  $G\sharp 4$  in the second chord is an octave duplication of chord tone  $G\sharp 5$ . The duplication is indicated by a small notehead and is not reflected in the voicing analysis. The  $C\sharp 6$  in the third chord is an “added note” (*note ajoutée*). The added note is indicated by parentheses and is not reflected in the voicing analysis. The fourth chord lacks the low  $D\sharp 3$  of the chord's fundamental voicing. The interval from  $D\sharp 3$  to  $E\flat 3$ , ic2, is included in the

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13. In analyses of his own works, Messiaen indicated many instances of special chords with added notes, omitted notes, transposed notes, and doubled notes. See in particular *Traité*, V/2, pages 37, 71, 513–514, 518–519, 533 and 537. Harmonic variations may occur for a variety of reasons. A chord might be truncated or compressed (certain tones transposed by octave inwards, towards the interior of the chord) to avoid overreaching a prominent outer voice, or simply because the necessary notes lie outside of an instrument's range. A chord might contain octave duplications or what Messiaen referred to as “added notes” to reinforce or preserve a prominent melodic motive.

voicing analysis with square brackets placed around it; the ic2 is surrounded by square brackets in order to indicate that the interval is not present in the music. The fifth chord contains a combination of octave duplication G $\sharp$ 4, non-harmonic tone C $\sharp$ 6, and missing tone D $\flat$ 3. For each chord, the sequence of intervals in the voicing analysis is the same. The harmonic content of much of Messiaen's harmonic language is readily classifiable; voicing analysis provides a clear and consistent tool for harmonic taxonomy.

Bernard addresses the important question of why anyone should be interested in Messiaen's synesthesia.<sup>14</sup> Given that synesthetic percepts are idiosyncratic, what does one gain by knowing what colors Messiaen saw? The answer lies in the fact that the study of sound-color facilitates the formulation of a general theory of harmonic structure in the music of Messiaen; moreover, since, for Messiaen, sound is so closely linked to color, any attempt at a general theory of harmonic structure must necessarily be founded upon a study of color. While Bernard envisions a generalized theory of harmonic structure based upon "characteristic interval content and order," the dissertation posits a theory based on absolute pitch, color-sets, and a harmonic taxonomy based on voicing analysis.<sup>15</sup>

### **Contributions of the dissertation**

Messiaen was not the only twentieth-century musician with synesthesia, but he was perhaps the only well-known composer with color-music synesthesia. Hungarian composer György Ligeti (b. 1923) claims to possess chromatic-graphemic synesthesia. Accordingly, he associates keys with colors due to the evocations of the respective letter designations. For example, the key of D minor suggests—not "evokes"—brown because for him the letter D evokes brown.<sup>16</sup> American composer Michael Torke (b. 1961) has a

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14. Bernard, 43.

15. Bernard, 68.

16. György Ligeti, *Ligeti in Conversation* (London: Eulenburg Books, 1983), 58.

color-duration synesthesia wherein days of the weeks and months of the year evoke colors. British painter David Hockney (b. 1937) uses his music-color synesthesia as a guide when constructing sets for operas and ballets. For American linguist and amateur composer Sean Day, music evokes colors; however, whereas Messiaen's synesthesia was stimulated by pitch, Day's synesthesia is stimulated by timbre.

Messiaen often emphasized how important it was for listeners to appreciate the color inherent in his works. He said, "To understand the timbres, the harmonies and the sound-complexes of my music you must love color. You must be sensitive of color, and if possible you must understand the connection between sound and color."<sup>17</sup> An appreciation of color is helpful to understanding Messiaen's compositional method, particularly as his synesthesia influenced his composition. Messiaen said:

For me, certain sound-complexes and certain sonorities are linked to color-complexes, and I use them in full knowledge of this. . . I use them as colors, juxtaposing them and putting them in relief against each other, as a painter stresses a color through its complement.<sup>18</sup>

By surveying his charts of modes and special chords and their corresponding colors, Messiaen could select individual chords and compose a harmonic succession with a particular colored effect.<sup>19</sup> Messiaen believed other people were capable of appreciating colors in his music; he was convinced that he could convey the coloristic content of his music to the listening public.<sup>20</sup> It is hoped that the dissertation's attempt to define the sound-color correspondences within *musique colorée* will contribute to a better understanding of Messiaen's work and a greater appreciation of his compositional method.

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17. Nichols, "Messiaen," 20.

18. "Certains complexes de sons et certaines sonorités sont liés pour moi à des complexes de couleurs et je les emploie en connaissance de cause. . . [J]e les utilise comme des couleurs, en les juxtaposant et en les mettant en valeur les unes par les autres, comme un peintre souligne une couleur par sa complémentaire." Samuel (1967), 38–39.

19. Messiaen described using such a procedure during the composition of "Strophe I" (the second movement of *Chronochromie*). Messiaen, *Traité*, III, 87.

20. Rössler, 54.

Fortunately, Messiaen spoke at great length about his synesthetic experiences; his extensive writings make possible a thorough study of the sound-color relationship in his works.

Finally, it is hoped that the dissertation contributes to the study of synesthesia itself. Most recent research in the field of synesthesia pertains to neurophysiology, neuropsychology, etiology, and characteristics common to all types of synesthesia. However, there has been little research into the phenomenology of synesthesia. Further, there has been little recent research into how the elements of a stimulus (e.g., numbers, letters, pitches) interact and influence the totality of the synesthetic response. It is my hope that the dissertation's attempt to decode the sound-color correspondences of Messiaen's synesthesia may stimulate research into other individuals' synesthetic experiences, thus providing groundwork for a comprehensive study of the phenomenology of synesthesia.