
RESEARCH ARTICLE

Rethinking Auditory-Visual Synesthesia: A Case Study of Messiaen's Synesthetic Behaviors

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ABSTRACT

Current existing scholarly researches on synesthetic music diverge into contrasting directions concerning color-hearing. One type of reference focuses on the theoretical analysis of sound-color correspondences in compositions. On the contrary, in opposition to restricted colorful delineation, the other type of research examines the synesthetic ideas in music from the interdisciplinary domain of musicology through a composer's imaginative utilization of cross-modal examples. This article takes Messiaen's music as the synesthetic example and elaborates on the different opinions between Jonathan Bernard's sound-color correspondences and B. M. Galejev's interpretation of color-hearing. Based on Mikel Dufrenne's "Phenomenology of the Aesthetic Experience" and Messiaen's interviews, the article explains the leading cause of the divergence between Bernard and Galejev's aesthetic experience. Besides, this research conducts an experiment that informally requests a non-synesthete audience to report their first impression of listening to Messiaen's synesthetic music. By observing the averaging response time of the participants, it proposes to rethink the meaning of visual-auditory synesthesia to the audience.

KEYWORDS

Olivier Messiaen, Synesthesia, Mikel Dufrenne, color-hearing, synesthetic music.

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1. Introduction

Synesthesia is the process in which a neurological stimulus from one sense through a direct appeal to another, resulting in a union of the five human senses. Olivier Messiaen's (1908-1992) music features contrasting elements; however, the multisensory idea is a coherent emphasis that governs his musical development throughout his life. Messiaen expresses his synesthetic ideas in music through symbolic titles and compositional methods, revealing a religious devotion and personal intersensory perception. Citing Messiaen's remarks in his own musical scores and his two books, *La technique de mon langage musical (Technique of my musical language, 1944)* and *Traité de Rythme, de Couleur, et d'Ornithologie (Treatise on Rhythm, Color, and Ornithology, 1949-1992)*, Jonathan Bernard further specifies Messiaen's sound-color correspondences in his research article "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in His Music" (Bernard, 1986). B. M. Galejev holds a contrasting point of view, pointing out the unclear distinction between synesthesia and cross-modal sensory association when considering most preexisting historical musical examples. Galejev believes that sound-color correspondences reflect a narrow-minded position. He takes most historical musical examples into account of intersensory interpretations to debate with the theoretical sound-color analyses being undertaken by many scholars in his article "The Nature and Functions of Synesthesia in Music" (Galejev, 2007). The subsequent sections will start with a discussion of Bernard and Galejev's divergence, followed by an exploration of the relationship between cross-modal imaginations and synesthetic perceptions. Ultimately, a further investigation of how the non-synesthete audience perceived Messiaen's music will be presented in this article to clarify the significant difference between an aesthetic subject and an aesthetic object.

2. Literature Review

Jonathan Bernard and B.M. Galeyev's divergence on Color-hearing is noteworthy. In the evaluation of synesthetic music, Bernard and Galeyev's respective theories originate from different views and subjective evaluations. Bernard analyzes Messiaen's synesthetic ideas by reading Messiaen's literary writings and musical scores, yet Galeyev emphasizes the hearing experience from a historical account of composers' musical compositions. Hence, Bernard's theoretical analysis of Messiaen's scores is based on his visual observation of Messiaen's composing elements in the score and Messiaen's doctrines. Numerous studies, for example, Grant Michael Sawatzky's article, master's thesis, "Olivier Messiaen's Permutations Symétriques in Theory and Practice" (Sawatzky, 2013), and Wai-Ling Cheong's research article, "Messiaen's Triadic Coloration: Modes as Intersion" (Cheong, 2004), utilize a similar analytical approach to analyzing Messiaen's compositions. Influenced by studies in the field of psychology, Jonathan Bernard concentrates on Messiaen's sound-color correspondences as in genuine synesthesia. In his elaboration, the colorful perception is a fusion of motion, image, and colors, similar to Messiaen's self-report (Marks, 1978).

Contrastingly, in disagreement with the exploration of fixed sound-color analogies in music, Galeyev notices the multisensory similarities in listening to most of the composer's compositions. In Galeyev's opinion, he assumes that the sound-color correspondences in musical works are unrealistic. He gives attention to the commonalities between auditory-visual synesthesia and cross-modal connection. Galeyev recounts how common pitch-lightness perceptions are shared frequently by both synesthetes and non-synesthetes. For instance, to the majority of people, the higher pitches tend to be accompanied by lighter colors, and darker colors in perception usually represent the lower pitches. Besides, it is empirically evident that many synesthetic behaviors have existed for as long as humans had lived and long before modern science undertook to evaluate synesthesia with experimental approaches in the field of neuroscience. There is no evidence whether the historical synesthetic examples have resulted from the learnable behavior of the imagination or from an involuntary cognition. Therefore, Galeyev considers the correlations of colors, and sounds, as well as the relevant link of emotional gesture, as cross-modal aspirations observable in most composers' musical works (Galeyev, 2007). With this standpoint, he opposes the concept of fixed sound-color correspondences. He holds that the concept of "color-hearing" is a fashion of compositional technique for new sound by composers (Galeyev, 2007). Based on the research gap mentioned above, Bernard and Galeyev's perspective of views thus serve as an entry point in this study to further explore the meaning of auditory-visual synesthesia in Messiaen's music.

3. Methodology

This research adopts three methods to study the issue of synesthesia and the aesthetic experience in Messiaen's music. First of all, this article will reassert Mikel Dufrenne's theory to claim that either the interpreter or the audience holds a different relationship with the music from that of the composer. Second, consciousness and unconsciousness within the compositional procedure will be discussed, as well as the hearing experience in terms of synesthetic music. Messiaen's interviews will be explored as evidence of his conscious manipulation of sound-color correspondences. Last, as mentioned above, an experiment will be presented at the end of this study to provide a result that helps us reconsider the significance of Messiaen's visualization of sound.

3.1 Mikel Dufrenne's *Phénoménologie de l'expérience esthétique*

Mikel Dufrenne's study *Phénoménologie de l'expérience esthétique* (1953) provides a detailed explanation of different aesthetics experiences in music in synesthetic studies. First, Dufrenne stresses the possible reality that music can be considered to be the nonrepresentational art of the matter of sound (Dufrenne, 1953). Most theoretical analyses of Messiaen's synesthetic ideas in music rely primarily on the visual analysis of musical scores, or on Messiaen's doctrines, without much or even any auditory engagement. The reading of a score does not possess as much momentum and movement as the real-time hearing experience does. Besides indicating the psychological characteristics of music aesthetics, Dufrenne points out, quite precisely, that aesthetic perception is constituted by the third party of the aesthetic object (Dufrenne, 1953). Each person has a different musical and aesthetic psychological mechanism from which the meaning of the aesthetic object is derived. In Dufrenne's theory, the nature of the aesthetic object is different from the depictable reflection of the spectators. In other words, considering a musician's conceptual structuring of a composition is not equivalent to feeling the compositional expression.

Furthermore, Dufrenne cites De Schloezer's opinion considering that a composer's relationship to his or her music is different from that of a listener to what he or she hears (Dufrenne, 1953). Likewise, the explicit significance of auditory-visual synesthesia exists; it neither represents nor imitates the composer's perception. For this reason, Messiaen's personal synesthetic perception can often remain mysterious and challenging to the non-synesthete audience. Specifically, scientific studies have shown that most populations are non-synesthetes, and this can hamper the perception of fixed sound-color correspondences in synesthetic musical works by the audience. As a result, the concept of "color-hearing" has various interpretations. Dufrenne's emphasis on imagination, consequently, plays an important role when analyzing and listening to Messiaen's synesthetic ideas in music. Dufrenne believes that the imagination constitutes the senses, is under the imminent control of understanding, and further develops the signification of signs perceived in the aesthetic experience (Dufrenne, 1953). Dufrenne's definition of the imagination suggests the main difference between synesthesia and imagination. What characterizes synesthesia is the nonintellectual intuition that possesses

both automaticity and instantaneity in reaction to stimuli. Imagination evolves as a cognitive process from optical ability to image association, influenced by life experience.

3.2 Messiaen's cross-modal aspirations and his coloration

Messiaen's synesthetic expression is formulated through his unique aesthetic beliefs, involving his cross-cultural inspirations of religion, mathematics, ornithology, and physics, as mentioned previously. First, Messiaen conveys profound spiritual meaning in his synesthetic concept. For example, according to Messiaen's discussion with Claude Samuel, Messiaen's term "stained-glass chord" possesses a rhetorical meaning recalling his impression of visits to the churches La Sainte Chapelle and La Cathédrale in his childhood (Messiaen & Samuel, 1986). This chord refers to any chord based on the dominant sonority, with a variety of variations also adding to it. In Catholicism, this particular coloration speaks of humanity and is symbolic of specific emotional effects, possibly influencing Messiaen's reflections on composition. Besides, Messiaen not only places a theological emphasis through this coloration but also reveals a mystic expression through the actual synesthetic title he chooses for some of his works, such as the orchestral piece, *Chronochromie (Time Color)* (1956-1960), his work for winds and percussion, *Couleurs de la Cité céleste (Colors of the Celestial City)* (1963), the composition, *Trois petites liturgies de la présence divine (Three Small Liturgies of the Divine Presence)* (1943-44), and the choral work, *La Transfiguration de Notre Seigneur Jésus-Christ (The Transfiguration of Our Lord Jesus Christ)* (1965-1969). Most of these works are in *Traité de Rythme, de Couleur, et d'Ornithologie (Treatise on Rhythm, Color, and Ornithology)*, which present and express religious prophecy and coloration simultaneously. Furthermore, Messiaen's compositions display the relationship between mathematics and music. His utilization of rhythmical counterpoint and symmetrical permutations are all constituted within the mathematical structure. Using a mathematical labeling system to create a new scope in which the musical elements are divided into measurable segments is also the trademark of Messiaen's generalized series (supersérie).

Messiaen's synesthetic examples are strongly associated with his modes of limited transposition, a method that was developed to create a unique sonorous effect and a visible structural permutation in symmetry. Messiaen's colorful designation of compositions contains three categories. The first type of Messiaen's coloration is named "monochromatic", symbolizing which supplies one sole color, such as "orange" or "yellow"; the second type is comprised of one complex uniform color, such as "grey-rose" or "flaming gold"; the last involves combinations of varying complexity in colors, such as "Stars in mauves, black, and white". Messiaen's mode 2, mode 3, mode 4, and mode 6 of limited transposition are associated with colorations. Mode 5 and mode 7 do not have coloristic indications because mode 5 is a part of both mode 4 and mode 6; besides, mode 7 contains and overlaps with mode 2, mode 4, and mode 6. Each of modes 2, 3, 4, and 6 have further various combinations of colors as the mode transposes. For example, the first transposition of mode 2 presents the dominant blue-violet color with the additional color of deep Prussian blue. The second transposition of mode 2 shifts to the dominant colors of gold and brown with the secondary colors of silver and ruby-red (Dukes, 2019).

3.3 Experiment

In order to investigate the perception of Messiaen's visualization of sound, this study involves an experiment in which fifty non-synesthete music major students (25 men and 25 women) listened to ten examples taken from Messiaen's *Huit Préludes (Eight Preludes)* (1928-1929) and *Catalogues d'oiseaux (Bird Songs)* (1956-8), respectively. The selected examples were "La Colombe" (mm.1-5), "Le nombre léger" (mm.1-5, mm.16-23), "Cloches d'angoisse et larmes d'adieu" (mm.1-8, mm.25-31), "Plainte calme", "Instants défunts" (mm.1-8), "Chant d'extase dans un paysage triste" (mm.25-31), "Le Merle bleu" (mm.1-23), and "Le Chocard des Alpes" (mm.28-32). The selected examples are applied to test the non-synesthete audience's imaginative perceptions of synesthetic ideas.

These ten musical examples, respectively, contain Messiaen's mode 2, mode 3, mode 5, and mode 6. Approved by the College of Music of Zhaqing University, the test involved fifty participants listening to Messiaen's fragmental musical examples from identical played by the same mp4 audio files from identical recording equipment, all of which was situated in a specialized audio-visual classroom on campus. Under controlled auditory conditions, the participants were gathered together, and the musical examples presented to them were in the same order. Being intermediate-level music-major college students, none of these participants had known of Messiaen or had heard his music previously, and, therefore, they were not aware of Messiaen's sound-color correspondences. In addition, they were informed to attempt to associate colors and other features with what they listened to by selecting the answers on a given matching sheet without knowing any information about the musical examples in advance. On the given sheet, the selected content was taken from fragments of Messiaen's written titles and Bernard's coloristic classification regarding Messiaen's music. In the selected musical examples, Messiaen's titles were intended by him to evoke a specific emotion, symbol, or color. Therefore, the chart given to each participant provided the characteristic features of ten pieces combined together on one page for selection. The participants were requested to choose corresponding emotional characteristics, geographical features or landscapes, and colors on the chart according to their aural impression of each musical sample.

4. Results and Discussion

4.1 Consciousness or Subconsciousness

Theoretically, as long as the term "synesthesia" has been associated with thoughts, it has referred to the meaning of "consciousness". Thus, the psychological mechanism of nature or nurture becomes an important issue in terms of Messiaen's synesthetic behaviors. Concerning the conscious intention and unconscious perception for a synesthete composer like Messiaen, can either be presupposed by thoughts, or can one intuitively be preceded by the other in the compositional procedure or in musical aesthetics? Interestingly, Messiaen, in his conversation with Harriet Watts in 1978, took the complementary colors as an example, declaring that the color red and the color green are complementary to each other (Messiaen & Watts, 1979). If we stare at one of them for a long while and then move our sight to a white piece of paper, we will see its complementary color. This optical illusion is a common experience, even for non-synesthetes. Messiaen gave this example to suggest that a synesthete's sensory process still possesses similarities to a non-synesthete's. This means a particular visual sense of perception can be technically produced or guided. Therefore, it is believed that Messiaen's compositional process was highly conscious and influenced by his knowledge and well-cultured background.

In order to conduct further exploration of Messiaen's psychological status in his compositions, Messiaen's own explanations, stated in his interviews, deserve more attention. We are able to observe Messiaen's creative motivation and compositional approaches through the considerations of his most clarifying interviews, which occurred in 1967 and 1978, conducted respectively by Claude Samuel and Harriet Watts, who both extensively discussed color-hearing with Messiaen during these conversations. From Messiaen's own recollection, he achieved the presentation of sound-color analogies in musical pieces. Remarkably, Messiaen states that he was able to transform some of the visual receptions of images in his compositions. He also explained that, audibly, he perceived each musical note in colors automatically, while the tonal key did not exhibit coloration to him. Therefore, he devised the modes of limited transpositions to replace the tonality. Particularly, according to Bernard's summary of Messiaen's remarks, Messiaen's mode 1, mode 5, and mode 7 do not possess coloristic indications. His mode 1 consists of the regular whole-tone scale, and his mode 5, as mentioned previously, is a subset of other modes and consequently does not have a specific color. Puzzlingly, if mode 7 consists of too many colors to have a coloristic indication for its overlapping of other modes, mode 1, the regular whole-tone scale, suspiciously lacks coloration. Perhaps, Bernard says in his research, Messiaen was not affected by or stimulated by an external logic in the construction of his coloristic system. But according to Messiaen's statements, he did attempt to offer an explanation for his systematic design for the modes of coloration (Messiaen & Samuel, 1986).

The difficulty in recognising whether it is immanent synesthetic perception or social-cultural influences drives Messiaen to push forward his genius into creativity exists when we study his music. Messiaen expressed, in his interview with Harriet Watts mentioned above, that he was aware of the synesthetic paintings by several contemporary synesthete artists, such as Robert Delaunay, Wassily Kandinsky, and Mikalojus Konstantinas Čiurlionis. His music, similarly, delivers aesthetics involving the senses. Besides, scientifically, auditory-visual synesthesia merely occurs in one direction in most cases, which means a particular sound leads to a specific color or image, but the visual contact does not produce the same concurrent auditory sensory unison (Marks, 1978). This discovery is paradoxical to Messiaen's "stained-glass" chord and to another example of Messiaen's synesthetic works, his last symphony (*The Turangalila-Symphonie*, 1946-1948). This symphony was inspired by a tour of Bryce Canyon in Utah. Messiaen depicts the beauty and the birdcalls of Bryce Canyon, placing the images of them into the music along with the written coloristic indications (Messiaen & Watts, 1979). From the examples above, one can assume that what has been traditionally considered to be Messiaen's synesthetic ideas may have partially arisen from an organized process to construct the musical structure. Messiaen's colorful designation of his can be viewed as the re-creation of his personal perception along with his interests in the mathematical regularity of pitch-class sets and philosophical metaphor.

4.2 Perception of Messiaen's sound based on Dufrenne's theory of aesthetics experience

If Bernard and Galejev's theories provide the basis for conceptualizing Messiaen's diverse inspirations in compositions, we are able to develop the ongoing discussion of Messiaen's music based on Dufrenne's theory to a greater extent. Dufrenne points out that a piece of artwork must possess meaning or speak of something significant to the audience. Generally, a person's musical perception is conscious, as it involves thoughts as well as emotions. The generally-held understanding of an aural object is the abstract feeling for the first identification, but then the recognition of sound leads to the question of what the origin of the sound is. In other words, the identifiable sound depends on the existing object and needs describable and perceptible depiction. Therefore, to the non-synesthete audience, without Bernard's references, Messiaen's synesthetic music does not present coloration. However, Messiaen's regular utilization of modes creates an aural coherence in the auditory experience that provides a classification for repetitive sound. Thus, to the non-synesthete listeners, Messiaen's musical structure at a conscious level constitutes a phenomenal shape and an external manifestation of variant chordal combinations, which aids listeners in receiving access to synesthesia. Towards this, in the section of this article which immediately follows, the results of an experiment will be offered. It was conducted and designed to test the non-synesthete audience to Messiaen's music by observing how they were able

to perceive the basic synesthetic character or essence of each Messiaen’s musical example audibly. These musical examples and the average response time in the experiment are listed below in the chart:

Musical Examples	Average Response Time
“La Colombe” (“The Dove”) (mm.1-5)	1.47 minutes
“Le nombre léger” (“The Light Number”) (mm.1-5)	2.04 minutes
“Le nombre léger” (“The Light Number”) (mm.16-23)	2.06 minutes
“Cloches d’angoisse et larmes d’adieu” (“Bells of Anguish and Tears of Farewell”) (mm.1-8)	2.35 minutes
“Cloches d’angoisse et larmes d’adieu” (“Bells of Anguish and Tears of Farewell”) (mm.25-31)	2.49 minutes
“Plainte calme” (“Calm Complaint”) (mm.1-16)	3.31 minutes
“Instants défunts” (“Instant Death”) (mm.1-8)	2.13 minutes
“Chant d’extase dans un paysage triste” (“Song of Ecstasy in a Sad Landscape”) (mm.25-31)	2.89 minutes
“Le Merle bleu” (“The Blue Merle”) (mm.1-23)	2.25 minutes
“Le Chocard des Alpes” (“The Alpine Chough”) (mm.28-32)	1.22 minutes

Table 1: Ten musical examples selected from Messiaen’s *Huit Préludes* and *Catalogues d’oiseaux* are applied to test the non-synesthete audience’s imaginative perceptions of synesthetic ideas.

Observing from the result of the experiment, participants correctly identified the symbolic poetically features in 39.8% of trials. Most of these participants needed a second hearing to decide on their answers. None of them was absolutely confident with what they perceived when listening to the musical example at the first hearing. Besides this, the average response time lasted clearly longer than a very immediate perception or reaction. This suggests that the participants were “thinking about”, “trying to correlate”, or attempting to “guess” the possible answers rather than very freely “perceiving” the images. Observing the correct responses, 76.5 % of those answers were correct concerning the sound of bells and birdcalls. Both coloration and images from the examples were barely detected through the experiment’s aural experience, although the participants all agreed that all of the musical examples shared dissonance, which primarily associates the musical sounds with either lighter or darker “feelings”. The sonorous timbres of many of the excerpts and also the dramatic intensity of sound were significant for the participants’ association of the musical excerpts with visual images in their own imagination.

5. Conclusion

Through exploring Bernard and Galeyev’s studies, reading Messiaen’s interviews and Dufrenne’s thesis, and considering the experimental results, this study suggests rethinking auditory-visual synesthesia. In summation, Messiaen’s visualization of sound is evidentially comprised of intrinsic synesthetic perception, as well as the acquired imaginative motivation of compositional skill. One can observe that each individual’s cultural environment is equally relevant to his or her unconscious phenomenal perceptions of musical aesthetic experience. Hence, Messiaen’s structural conceptualization of synesthetic perception was intuitive and intellectual. This understanding makes cultivating the meaning of auditory-visual synesthesia beyond coloristic indications meaningful.

This study has attempted to address that the concept of the interactions of the human senses, being itself as complicated as coloration, offers each person more possible ways to experience the artistic expression of musical aesthetics. The coloration is inseparable from the sophistication of affection and possesses psychological signification to the composer or audience, extending beyond its physical nature. Both compositional procedure and listening experience have an emotional status that continuously stimulates musical creativity, productivity, and introspection. Therefore, the discussion of auditory-visual synesthesia should not be limited to one particular aspect. If the study present here is any indication, there is yet much to be explored about the unison of the human senses. How the synesthete audience experiences the sound-color correspondences in Messiaen’s music is open for

further discovery. It is hoped that the interactive mechanism of co-sensors in musical creativity might be uncovered through continued engagement from both neuropsychological and psychological studies.

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