Pierre Mercure and the Contemporary: Reflections of Influence and Ideology in *Tétrachromie* (1963)

by

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Abstract

This thesis surveys, through his use of integrated serialism in *Tétrachromie* (1963), Pierre Mercure's interest in contemporary compositional ideologies as influenced by prominent composers with whom he came into contact through the 1950s and early 1960s. Although largely not recognised as a composer of serialism, Mercure (1927–1966) uses a complex system of serial preogranisation in *Tétrachromie*. In 1951, Mercure studied at the Tanglewood Institute with Luigi Dallapiccola, from whom he initially learned the twelve-tone method. The summer prior to composing *Tétrachromie,* he attended the Darmstadt *Ferienkurse* where he most notably studied with Pierre Boulez, Henri Pousseur, and Bruno Maderna. Numerous aesthetic ideologies that existed among these composers adhere to structural elements in *Tétrachromie*, including systems of intervallic control and row construction. In an analysis of *Tétrachromie,* the author discusses how Mercure may have created his 24-tone series, and how this series is applied through melodic, harmonic, and rhythmic means, using intervallic analysis, pitch-class-sets, and Klumpenhouwer Networks to garner information about the row. Each of the four sections of *Tétrachromie* has a unique combination of musical textures, each texture adhering to various levels of serial organisation based on the 24-tone prime row. The analysis also contains some remarks on style and aural response based on a recording of the work's only performance in 1964.

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INTRODUCTION

Typical of many composers active in the post-WWII period, French-Canadian Pierre Mercure (1927–1966) was cognizant of his role in the contemporary world and strove to have his creative work—especially that from the late 1950s to his death—represent modern life as he experienced it. He did this both practically, by using the most up-to-date and inventive compositional techniques, and ideologically, by surrounding himself not only with other forward-looking composers but also progressive visual artists, dancers, and authors from Montreal and abroad. He contributed to his immediate environment through his activities as a television producer of Radio-Canada International's television series *L'Heure du Concert* from 1954–1959, and as the organiser of the Semaine Internationale de Musique Actuelle in August of 1961. This thesis explores various intellectual and artistic currents of Mercure's time, which are expressed most clearly in his compositions of the early 1960s, among them *Tétrachromie*, the work with which I am concerned. *Tétrachromie* demonstrates contemporary compositional approaches such as integral serialism, aleatoric procedures, and electroacoustics.

Tétrachromie highlights Mercure's cosmopolitanism. Like many other Canadian composers, Mercure frequently went abroad to broaden his musical experiences and to learn from internationally recognised composers. Paris, his first trans-Atlantic destination, was a stop for Mercure in 1949, 1957, 1962, and 1965. He went to the United States twice, in 1951 to Boston and in 1957–58 to New York. In 1962, Mercure also

travelled to Germany and the United Kingdom, where he studied in Darmstadt and Dartington. In 1964, Mercure went to Paris as a representative of Radio-Canada in the Tribune internationale des compositeurs (organised by UNESCO).[1] He returned to Darmstadt again in 1965 for the summer program, specifically to study with Pierre Boulez. On January 29, 1966, Mercure was on vacation in France when he had a fatal vehicle collision.[2] His death shocked the artistic and musical community of Montreal especially, the tragic event described as "un grand départ" from the prime of his life and compositional career.[3]

While Mercure was exposed to and ultimately influenced by many international schools, he was also active in the local arts and music scenes in Montreal. He was, for example, the only composer to be associated during the late 1940s with Montreal's progressive artists group, *Les Automatistes.* The group was led by École de Meuble teacher and painter Paul-Émile Borduas and the main output of *Les Automatistes* was the self-published manifesto in 1948 entitled *Refus global*.

This manifesto combated conservative conformity and the rigid control of the arts in Quebec by Church and State, and promoted artistic freedom through automatic and "surrational" production techniques inspired by French Surrealism.[4] As a public decrial

[1] See Micheline Chayer, "Le fonds Pierre Mercure des archives nationales du Québec," vol. 1 (M.A. thesis, Université de Montréal, 1984), 17.
[2] Chayer, "Le fonds Pierre Mercure," 18.
[3] Mercure was described in the same article as one of the best young French-Canadian composers, and he is called a creator whose death must be mourned. See R. H-R., 1966. "Pierre Mercure: un grand depart." *Photo-journal* (9 February 1966), 33.
[4] The artistic style of the Montreal Automatists is often associated with Surrealist André Breton's concept of an automatic creative process, where artists express their impulses without any logical interception. In his "Comments on Some Current Words" that accompanied *Refus global,* Borduas identified three definitions of automatism as from Breton's writings: mechanical, psychic, and surrational. Borduas favoured the latter, which he defined as something that "indicates something above or beyond the rational possibilities of the moment. An act which is surrational today may be perfectly rational tomorrow. The surrational act takes risks with unknown possibility; reason reaps the benefits." See Borduas, "Comments on Some Current Words," in *Total Refusal: The Complete Manifesto of the Montréal Automatists,* trans.

of Québécois attitudes towards art and history, *Refus global* was successful in garnering public attention, and historian Ray Ellenwood proposes that the spirit of the manifesto planted some of the first seeds of what would become Montreal's Quiet Revolution in the 1960s.[5] Ellenwood writes that "the members of the Automatist group are now seen as forerunners in the Canadian avant-garde, not only in visual arts, where they were pioneers of non-figurative painting and among the first Canadian painters to gain world recognition, but also in literature, dance, design and architecture."[6] Although many of those associated with automatism continued their friendships and professional collaborations long after the publication of the *Refus global*, the manifesto also symbolised the end of *Les Automatistes* as a group. As a result of the radical nature of *Refus global,* the manifesto's signatories received considerable state disapproval, with the most vitriol directed at Borduas.[7]

At the time of *Refus global*'s publication*,* Pierre Mercure was collaborating regularly with *Les Automatistes*, but he did not sign the manifesto. Nevertheless, he supported their aesthetics of creativity and freedom of expression by continuing to work with dancers, painters, and poets of the Automatist group into the 1960s. In fact, from 1947 onward Mercure provided improvised and composed musical accompaniment to choreographies

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Ray Ellenwood (Holstein, ON: Exile Editions, 2009), 25–33. Ellenwood describes Borduas' surrational automatist paintings as neither illusory nor pictorial, but that they "refer to nothing but themselves, like a pebble." Ray Ellenwood, "The Automatist Movement of Montreal: Towards Non-Figuration in Painting, Dance, and Poetry," *Canadian Literature* 113/114 (1987), 18.

[5] Ellenwood, "The Automatist Movement of Montreal," 11.

[6] Ray Ellenwood, "Introduction," in *Total Refusal: The Complete Manifesto of the Montréal Automatists* (Holstein, ON: Exile Editions, 2009), ix.

[7] Ellenwood writes: "Within a month after *Refus global* appeared, Paul-Émile Borduas had been fired as an instructor at the École du Meuble because, as the official government letter to his principal said, 'his writings and the manifestos he publishes, as well as his state of mind, make him unsuitable for the kind of teaching we wish for our students'" ("Introduction," xv–xvi). Because of financial difficulties following his dismissal, Borduas' personal life deteriorated and he lived in exile in New York from 1953–1955, and then in Paris until his death in 1960. See François-Marc Gagnon, "Paul-Émile Borduas," in *The Canadian Encyclopedia* (Historica Canada, 1985–2014), http://www.thecanadianencyclopedia.ca/en/article/paul-emile-borduas/

by Automatist dancers Jeanne Renaud, Françoise Sullivan, and Françoise Riopelle, and attempted an operatic collaboration with playwright Claude Gauvreau.[8]

Mercure's work in Montreal also reached factions beyond *Les Automatistes,* with his work through Radio-Canada and *L'Heure du Concert* and his involvement in the Canadian League of Composers. Responding to Mercure's role as an ambassador of creativity and contemporaneity in this period, composer Udo Kasemets (1919–2014) wrote that Mercure

> did much to create in Montreal a spiritual atmosphere which is conducive to creative experimentation, in which performances of new music command a position of distinction and consequence. He inspired courage in his colleagues and curiosity among the audiences. Mercure was no ivory tower experimenter. His younger professional years were spent as a practicing musician, a bassoonist in the Montreal Symphony. In 1952 he became producer of musical programs for CBC French television network, a position he held until his death. His orchestral experience gave him an appreciation of the many complexities affecting practical performance and communication with the audiences. His early introduction to and continuous involvement with television made him the first Canadian composer to understand in depth the potential and implications of modern media. Consequently, no matter how unorthodox his compositions or how novel his techniques, Mercure never lost sight of what is possible for the performer to execute, is intelligible to the audience and is effective as a presentation.[9]

It was from an environment of courage and curiosity that Mercure composed his later works especially, works that utilised some of the most up-to-date electronic and aleatoric procedures, while also maintaining some neo-Classical influences from composers such as Stravinsky, Messiaen, and Ravel. His best-known works are his symphonic fantasy

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[8] For more information on the collaborations between Mercure and Automatist dancers, see Allana C. Lindgren, "Rethinking Automatist Interdisciplinarity: The Relationship between Dance and Music in the Early Choreographic Works of Jeanne Renaud and François Sullivan, 1948–1950," *Circuit* 21, no. 3 (2011), 39–53. See also Claudine Caron, "La musique de Pierre Mercure à l'affiche de spectacles de danse," *Circuit* 21, no. 3 (2011), 9–21 and Gilles Lapointe, "Livret et partition pour un opéra fantôme: le débat entre Claude Gauvreau et Pierre Mercure autour du *Vampire et la nymphomane,*" *Circuit* 21, no. 3 (2011), 25–35.

[9] Udo Kasemets, "Pierre Mercure," *The Musical Scene* (March–April, 1969), 10.

Kaléidoscope (1948), the orchestral and choral composition *Cantate pour un joie* (1955), and his multimedia radio cantata *Psaume pour abri* (1963). Mercure's oeuvre spans multiple compositional genres. For example, his *Structures métalliques I* and *II* (1961) are aleatoric compositions that combine an electronic tape with a performer moving among and striking metal sculptures. Other works such as *Incandescence* (1961) or *Manipulations* (1963) are tape compositions for dance. *Tétrachromie* (1963), the subject of my thesis, combines all of the media for which Mercure composed to this point – symphonic instruments, electronics, and movement.

Tétrachromie was a ballet commission from Ludmilla Chiriaeff, the founder and Director of Montreal's premiere ballet corps, Les Grands Ballets Canadiens. Mercure structured this work in four sections using programmatic elements that suggest the four colours, or seasons, of the human life cycle. For décor and costumes, Chiriaeff commissioned Automatist painter Jean-Paul Mousseau, who had been working with other media and in theatre design since the 1950s and who was "noted for his multimedia approach to creating thematic discotheque 'environments' in the 1960s."[10] Mousseau would thus have been an obvious choice for the realisation of this innovative, inter-arts project.

The work was intended for presentation at the inaugural event of the Place des Arts in Montreal in 1963, a performing arts centre that today is still the home of Les Grands Ballets Canadiens, the Orchestre symphonique de Montréal, and l'Opéra de Montréal. *Tétrachromie*'s premiere promised to provide an awe-inspiring display of contemporary style, blending the work of three of the most prominent artistic figures in Montreal at the

[10] *The Canadian Encyclopedia,* s.v. "Jean-Paul-Armand Mousseau" by Brian Foss (Historica Dominion, 2012).

time, but due to labour disputes, the festival was cancelled and the work was never presented in its complete form.[11] Keith MacMillan cites a 1964 performance by the Toronto Philharmonia (conducted by Mercure) as the premiere of the *musical* work of *Tétrachromie,* but there was no dance component to this performance. Since this performance, Mercure's original tape band has been lost, and so further opportunities to experience the work in its totality – and as Mercure envisioned it – are also lost. Fortunately, the concert was recorded, and a commercial CD[12] of that concert remains as the only extant aural representation of the work in its complete form with electronics.

In a recorded interview (date unknown) that begins Lyse Richer's 1989 radio documentary about Mercure, CBC journalist Janine Paquet questions Mercure about contemporary music and its tendencies toward exploring the possibilities of sound while avoiding rules of form. Mercure replied to her simply that "music has always been innovative, contemporary […] and it's important that it should stay that way."[13] Yet he also distinguished between modern and *contemporary* music—by which he meant *experimental* music—as is evidenced in the works he programmed for the Semaine Internationale de Musique Actuelle festival in 1961. Mercure's understanding of the term *'musique actuelle'* is relevant here. *Musique Actuelle,* often translated as "today's music," is described by Sophie Stévance as a term uniquely Québécois in comparison to both American Experimentalists (such as Cage, Wolff, Maxfield, or Brown) and European

[11] Keith MacMillan wrote that the reason for the festival's cancellation was a union dispute ("d'un conflit maintenant célèbre de juridiction syndicale"). See MacMillan, excerpts from the liner notes printed in *Le Compositeur Canadien* (August 1965), 29. This material was graciously brought to my attention by Ms. Tina Gervais at CMC Montréal.
[12] Pierre Mercure, "Tétrachromie," performed by Toronto Philharmonia Orchestra and conducted by Mercure, December 1964. Radio Canada International, *Anthology of Canadian Music: Pierre Mercure*, ACM 35 (Vancouver, BC: IRC Independent Record Consultants, 1990).
[13] Mercure, replying to Janine Paquet in an uncited interview, quoted in radio documentary prepared by Lyse Richer in October, 1989. In *Anthology of Canadian Music: Pierre Mercure,* trans. Alan Brown (1990), 29.

Avant-gardistes (such as Stockhausen, Xenakis, or Boulez).[14] Marie-Thérèse Lefebvre further described Mercure's distinction of *musique actuelle* as reflecting the integration of pluridisciplinarity in the then current American scene ("l'intégration du pluridisciplinaire sur scène et du courant américain"), thereby focusing on Mercure's concern for music with a broad range of contemporary styles.[15] The term *actuelle* encompassed for Mercure ideas and styles of *musique concrète,* electronic music, chance music, and Fluxus.[16]

Mercure was concerned with promoting the music and musical techniques of his day specifically because of their ability to remind audiences of their own time and place (that is, the 1960s). He believed that composers in the 1960s were continuously inventing new musical systems, instruments, and new sounds; and that this discovery of new sounds served, for him, a social function by creating new experiences for people.[17] Speaking about the Semaine Internationale, Mercure likened the compositional environment of 1961 to

> a renaissance of music unlike anything we have known for a very long time, since 1900, because the composer has all that at his disposal, he uses all that. He uses the solo instrument, he uses the orchestra, he uses tape, and sounds of nature, sounds produced by filtered music and recorded on tape, even sounds produced by sound generators, that is, electronic instruments, purely electronic, which didn't exist in nature, made by man. And it is the mixture of all this that makes up the wide and varied field in which the composer works today.[18]

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[14] See Sophie Stévance, "La construction du champ identitaire de la musique actuelle en Amérique du Nord: enquête sur la filiation avec la Semaine internationale de musique actuelle," *Circuit* 21, no. 3 (2011), 75–86.
[15] Lefebvre, in Stévance, "La construction du champ identitaire," 77. My translation.
[16] See Pierre Mercure, in "Table ronde de 1961 d*'Incandescence* de Pierre Mercure," transcribed by Mario Gauthier, *Circuit* 21, no. 3 (2011), 94.
[17] "Les compositeurs, à ce moment, inventaient continuellement; inventaient des systèmes de musique, inventaient des instruments. Ils trouvaient un chalumeau, ils inventaient toute la famille des chalumeaux. Ces gens-là inventaient des sonorités continuellement. On créait des hautes-contre et tout ça. On était en pleine période de création de sons. On s'occupait de son. Et après, c'est devenu une fonction. Une fonction qui s'est stéréotype et qui est devenue une fonction sociale. Mais je pense que la musique, à ce moment, était vraiment très près d'un Boulez que Jean Beaudet citait tout à l'heure, qui fait ses expériences de découvertes de sons." Pierre Mercure, "Table ronde," 95.
[18] Mercure, in Lyse Richer documentary (trans. Alan Brown), *Anthology of Canadian Music* booklet, 46.

Mercure's conscious preoccupation with his contemporary musical environment was not uncommon among progressive composers of his time. In particular, composers associated with the Darmstadt School were continuously reflecting on their current environment and the state of new music, with written works such as Adorno's *Philosophy of Modern Music* (1949) and "The Aging of New Music" (1955), Nono's "Historical Presence in Music Today" (1959), Boulez's *On Music Today* (1963), and theoretical works such as Umberto Eco's *The Open Work* (1962).[19] The spirit of these writings, the ideas to which Mercure was exposed when he went to Darmstadt in 1962, marked his artistic sensibilities immediately prior to his composing *Tétrachromie.*

For composer and musicologist Brent Wetters, the 1950s brought a decidedly "philosophical turn" at Darmstadt, in which composers not only reflected on their compositional philosophies, but also composed music *according to* these existing philosophies.[20] It is possible that Mercure also experienced a so-called philosophical turn during the 1950s after his involvement with *Les Automatistes*, at which point his music became progressively experimental. His compositions of the 1960s, however, exemplify a philosophical preoccupation clearly inspired by the creative atmosphere at Darmstadt.

Wetters attributes the shift at Darmstadt to Adorno's intermittent presence there from 1950 onward, as well as to his writings on modern music, most specifically *Philosophy of*

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[19] See Theodor Adorno, *Philosophy of Modern Music,* trans. Anne G. Mitchell and Wesley V. Blomster (London: Continuum, 2007); Adorno, "The Aging of New Music," in *Essays on Music*, trans. Richard Leppert (Berkeley, CA: University of California Press, 2002), 181–202; Luigi Nono, "Historical Presence in Music Today," trans. Bryan R. Simms, in *Composers on Modern Musical Culture: An Anthology of Readings on Twentieth-Century Music* (New York: Schirmer Books, 1999), 168–174; Pierre Boulez, *Boulez on Music Today*, trans. Susan Bradshaw and Richard Rodney Bennett (Cambridge, MA: Harvard University Press, 1971); Umberto Eco, *The Open Work,* trans. Anna Cancogni (Cambridge, MA: Harvard University Press, 1989).

[20] Brent Wetters, "Darmstadt and the Philosophical Turn," PhD diss. (Providence, RI: Brown University, 2012).

Modern Music (1949), "The Aging of New Music" (1955), and "Vers une musique informelle" (1961). Wetters describes the latter as Adorno's imaginings of "a music free of predefined 'forms', in which the form and content were fused in such a way that the work would be preceded by an *idea* of the work."[21] Adorno criticised any composition that blindly followed a system, arguing that this would be just another form of oppression and thus against the precompositional idea of freedom that he considered inherent to the creative process. In "Vers une musique informelle," Adorno ascribed value to music that has an idea, turning his attention "to prescription, outlining an idealised working method for new composition" while never actually suggesting a model to do so. Rather, Wetters writes, Adorno "accepts that music has become philosophical, but nevertheless clings to the idea that the particular philosophy must be immanent to the work in question."[22] One major implication of this approach is that, for Wetters, a new form of nominalism became necessary, wherein "all works bear such a small resemblance to a common type that a new name would be required for each new composition: each would stand on its own and be intelligible only on its own basis."[23]

Adorno seems to adopt a more resigned tone in his 1964 essay "Difficulties," which describes some of the difficulties experimental composers faced at the time. He sketches a specific fallacy of composers adhering to either the serialism of the Darmstadt school or the chance music of John Cage and American Experimentalism, noting that both extremes end up with an oppressive system that is "alien to the ego."[24] Adorno comments

[21] Brent Wetters, "Allegorical Erasmus: Bruno Maderna's *Ritratto di Erasmo*," *Cambridge Opera Journal* 24, no. 2 (2012), 171.
[22] Wetters, "Allegorical Erasmus," 172.
[23] Ibid.
[24] Theodor Adorno, "Difficulties," in *Essays on Music,* trans. Richard Leppert (Berkeley, CA: University of California Press, 2002), 658.

on a then recent tendency among composers to restrain their impulses: "that music is constantly moving, wanting to develop, but breaks off again as if under a spell. Whether this spell expresses the one that we live under, whether it, too, is a symptom of ego-weakness or compositional inadequacy, is something on which I would not like to pass judgment."[25] But in fact, Adorno *does* "pass judgment" on many of these composers, concluding that "music today sees itself faced with an alternative, that between the *fetishism* of the material and the process, on the one hand, and *unfettered chance*, on the other . . . one must ultimately ask whether it is not all becoming ideological nowadays." His final suggestion to composers is that "one must confront the possibility of [music's] falling silent non-metaphorically" and perhaps the only music that is still possible is that "which measures itself against this greatest extreme, its own falling silent."

The dichotomy between "the fetishism of the material and the process" and "unfettered chance" was not only a concern of Adorno's, but permeated much of the Darmstadt discourse beginning in 1958 when John Cage was present for the summer program. After Cage's lectures in 1958, the European avant-garde exploded in polemics trying to navigate the new philosophical position that Cage introduced (particularly the Eastern philosophies of chance). Luigi Nono was perhaps the most outspoken on this topic, when he penned his "Historical Presence in Music Today," a lecture delivered at Darmstadt in 1959. This lecture was first published in German translation in the journal *Melos,* and shortly thereafter it was translated to other languages in shortened versions.[26]

Nono rejected the fundamental ideals of Cage's style, suggesting that it is a style under which the creator can remove all "concern for the whys and wherefores" from the

[25] Adorno, "Difficulties," 660.
[26] Bryan Simms, "Luigi Nono (1924–1990)," in *Composers on Modern Musical Culture: An Anthology of Readings on Twentieth-Century Music* (Belmont, CA: Schirmer, 1999), 168.

ego, and thus be spared "a responsibility to his place in time, a responsibility that has now taken on considerable proportions."[27] He continues:

> *This* is a capitulation in the face of time, a cynical flight from responsibility, explainable only as the flight of one whose ambition (more or less hidden) for the aggrandisement of his ego has flagged on account of the defeats dealt him by history. Inwardly he has become small and poor, outwardly all the more reliant on an absolute "spirit of the age," which, so he hopes, will not threaten the prerogatives of his ego and deliver him from disgrace at the hands of time. It is a yearning for a naïve and everlasting innocence by those who feel guilty but will not consciously own up to it. They are only too willing to buy their way out of such necessities, ready to pay even with their own vitality of mind, even though they don't have much of this currency left to spend. It takes courage and power to recognize one's time and to decide in its favor.[28]

Nono found Cage's approach to music to be escapist at best, and at worst, blatantly ignorant to present societal and historical concerns. He describes Cage and those associated with him (or with his aesthetics) as being so drawn to the idea of freedom, which "arises when they allow instinct to supersede their capacity for analytic thought," while ignoring the "genuine idea of creative freedom—a consciously acquired capacity for identifying and facing up to the necessary demands of one's own time."[29] Christopher Fox describes Nono's "increasing frustration" with the way new music was being discussed at Darmstadt by his colleagues.[30] Nono lamented the fact that "the 'narrow' concentration on technical issues [specifically referring to Stockhausen's lecture entitled 'Sprache und Musik"] had meant that discussion of aesthetics had been ignored."[31] Nono viewed Cage's "supposed freeing of sounds as 'spiritual suicide'" and because many of his colleagues—particularly Stockhausen, Boulez, and Maderna—were also using

[27] Nono, "Historical Presence in Music Today," 171.
[28] Ibid.
[29] Ibid., 173–174.
[30] Christopher Fox, "Luigi Nono and the Darmstadt School: Form and Meaning in the Early Works (1950–1959)," *Contemporary Music Review* 18, no. 2 (1987), 124.
[31] Fox, "Luigi Nono and the Darmstadt School," 124.

elements of chance and aleatoric procedures, "Nono's attack on Cage could only be understood as an attack on them too."[32] With the breakdown of the Darmstadt School's camaraderie came increasing attempts to make sense of the current compositional environment both aesthetically and as it could relate to contemporary life.

Boulez's *On Music Today,* "written in Darmstadt for Darmstadt," is a text in which the composer presents problems and tendencies associated with composition in the early 1960s. It was a work that according to Jonathan Goldman was "doubtless meant to have been the first section of a multi-volume compositional treatise."[33] In the opening section "General Considerations," Boulez identifies the genesis of a musical composition, comparing it to a passage from Henry Miller's *Black Spring.* Boulez quotes Miller's discussion of an artistic masterpiece: "You may say it's just an accident, this masterpiece, and so it is! But then, so is the 23rd Psalm. Every birth is miraculous—and inspired. What appears now before my eyes is the result of innumerable mistakes, withdrawals, erasures, hesitations; it is also the result of certitude."[34] Boulez aligns Miller's prose directly with the compositional process, cautioning that "it is important to make sure that all the forks, twists and turns are integrated into the context: the momentary adoption of a result cannot be justified simply by its immediacy or by well chosen placing." Contrarily, Boulez adds, "the result [a composition] may obscure the true solution or break the internal cohesion, undoing the logic of co-ordination by refusing to be integrated with the whole."[35] Boulez asserts that although there may be a "deep-rooted antinomy" between

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[32] Fox, "Luigi Nono and the Darmstadt School," 125.
[33] Jonathan Goldman, *The Musical Language of Pierre Boulez: Writings and Compositions* (Cambridge and New York, Cambridge University Press, 2011), 31.
[34] Henry Miller, quoted by Pierre Boulez in *Boulez on Music Today,* trans. Bradshaw and Bennett (Cambridge, MT: Harvard University Press, 1971), 20.
[35] Boulez, *Boulez on Music Today,* 20.

small and large structures in the music, "they acquire, through their own particular lay-out, an autonomy of existence, a true centrifugal force."[36]

Boulez also maintained that, rather than subject one's music to the absurdity of over-complexity (to the point of what he calls "idiotic and vulgar exhibitionism"), "one's intellectual equipment" ought to be "firmly taken in hand if it is to be controlled and eventually made to create a new logic of sound-relationships."[37] He wanted there to be an intellectual reason for all aspects of a composition, not just blind adherence to either new or established means. Moreover, Boulez acknowledged the importance of experimentation, that new understandings must always be forged in order to make sense of musical relationships.

The search for new understandings was also considered by semiotician Umberto Eco in his book *Opera aperta,* in which he proposes a theoretical framework for interpreting modern art. First published in 1962, *The Open Work* (translated to English in 1989) was developed as a response to contemporary art, literature, and music and in his work, Eco frequently cites Boulez, Pousseur, and Berio among other composers closely associated with the Darmstadt School. In fact, Berio's compositions were "to provide for Eco a cardinal example when developing his theory of the *opera aperta*."[38]

Eco's concept of the open work is not only limited to works that invoke chance or indeterminacy (as might be the immediate association with the word "open"), but rather includes those works that are deliberately and systematically ambiguous and that convey many potential meanings (with no dominant idea) through radical innovation and

[36] Boulez, *Boulez on Music Today,* 20.
[37] Ibid., 26–27.
[38] *New Grove Dictionary of Opera,* s.v. "Berio, Luciano," by David Osmond Smith (Oxford University Press, 2007–2014).

contravention of established disciplinary rules. Traditional or classical art forms (which would not be considered open, by Eco's definition) tend to channel audience response in a certain direction, with set ways of understanding works created through conventional means of expression (and where there are contraventions, only within defined limits).[39] The difference between modern and traditional art, Eco suggests, is not a matter of aesthetic quality. Instead, "traditional art confirms conventional views of the world, whereas the modern open work implicitly denies them."[40] Moreover, a modern open work is one that invites more audience and public collaboration than traditional art, keeping an open dialogue surrounding the art's function "in relation to the world in which we live."[41] Eco argues that the "open work" occurs only within the modern context in which artists are aware of the implications of openness, and that rather than submitting "to the 'openness' as an inescapable element of artistic interpretation, [the modern artist] subsumes it into a positive aspect of his production, recasting the work so as to expose it to the maximum possible 'opening'."[42]

In "Series and Structure," a chapter included in the 1989 edition of *The Open Work* (but originally part of *La struttura assente*, published 1968), Eco compares structural thought with serial thought. In defining serial thought—"the philosophy that underlies post-Webern musical aesthetics"—Eco quotes Boulez:

> Serial thought has become a polyvalent thought process . . . As such, it is in complete contrast to classical thought, according to which form is a pre-existing entity and at the same time a general morphology. Here (within serial thought) there are no preconstituted scales—that is, no general structures within which a particular thought could inscribe itself. A composer's thought, operating in accordance with a particular methodology, creates the objects it needs and the form necessary for their

[39] See David Robey, "Introduction," in *The Open Work* (1989), *x–xi.*
[40] Robey, "Introduction," *xi.*
[41] Ibid., *xiii.*
[42] Eco, *The Open Work*, 5.

> organization each time it has occasion to express itself. Classical tonal thought is based on a world defined by gravitation and attraction; serial thought, on a world that is perpetually expanding.[43]

Eco describes Boulez's explanation in this excerpt as a "hypothesis of an oriented production of open possibilities, of an incitement to experience choice, of a constant questioning of any established grammar," and as "the basis of any theory of the 'open work,' in music as well as in every other artistic genre. The theory of the open work is none other than a poetics of serial thought."[44] Unlike classical tonal writing in which exist temporal expectations, serial composition creates "a state of continuous tension and permanent methodological doubt which alone can produce meaning."[45] Meaning is therefore not generated from a universal code but rather continuously finds itself within its own creation through the mediation of a listening body. Within the context of temporal expectation and its manifestation in serial composition, Eco cites Pousseur:

> Since the phenomena [that is, musical materials] are no longer tied to one another by a term-to-term determination, it is up to the listener to place himself deliberately in the midst of an inexhaustible network of relationships and to choose for himself, so to speak, his own modes of approach, his reference points and his scale, and to endeavor to use as many dimensions as he possibly can at the same time and thus dynamize, multiply, and extend to the utmost degree his perceptual faculties.[46]

From Pousseur's description, we understand that in listening to serial compositions, we choose our own interpretation based on external contexts (for example, how we are feeling on a particular day, how many times we have listened to the work in question, which instrument seems more prominent at any given time, and so forth); Eco explains further that the "multiple polarities" presented to the listener ensure no "absolute

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[43] Pierre Boulez, cited in *The Open Work,* 217–218. Original source *Relevés d'apprenti* (Paris: Seuil, 1966), 297.
[44] Eco, *The Open Work,* 218.
[45] Ibid., 232.
[46] Henri Pousseur, cited in *The Open Work,* 10–11. Original source "la nuova sensibilità musicale," *Incontri musicali* 2 (May 1958): 25.

conditioning center of references" and instead require the listener to acknowledge an "infinite variability of experience as well as the infinite multiplication of possible ways of measuring things and viewing their position."[47] He concludes that serial compositions therefore lend themselves to the "work in movement" which is "the possibility of numerous different personal interventions, but it is not an amorphous invitation to indiscriminate participation. The invitation offers the performer [or listener] the opportunity for an oriented insertion into something which always remains the world intended by the author."[48] Serial music is, for Eco, a clear example of an open work, a contemporary artifact that allows maximum interpretive freedom to both author and listener.

According to these definitions, the author's (or composer's) role in the "work in movement" is to propose "a number of possibilities" that have already been "rationally organized, oriented, and endowed with specifications for proper development."[49] For Eco, the work in movement "sets in motion a new cycle of relations between the artist and his audience, a new mechanics for aesthetic perception" and "far from being fully accounted for and catalogued, it deploys and poses problems in several dimensions."[50]

Based on the definitions given by Eco for the construction and development of an open work (or a "work in movement") and supported by Boulez and Pousseur, I have identified numerous ways in which Mercure adheres to this aesthetic. Many aspects of *Tétrachromie* are highly pre-organised and oriented for specific development in performance. These include the serial organisation of pitch and rhythmic aspects, as I

[47] Eco, *The Open Work,* 18.
[48] Ibid., 19.
[49] Ibid.
[50] Ibid., 22–23.

explore throughout this thesis. The concept of linear time is also controlled in terms of *Tétrachromie*'s performance; due to the piece calling for both live instruments and electronic tape, time constraints are necessary. Yet Mercure allows freedom to the performers to interpret musical material within the five-second intervals of the work's temporal frame, thereby encouraging performances to vary, and every listener to experience "the work in movement" as framed (or "intended") "by the author".

Mercure intended *Tétrachromie* to evoke the human life cycle, and a listener might perceive different biographical landmarks (changes in dynamics or intensity, for instance) with each new hearing, making interpretations of the work by individual listeners open and indeterminate. Repetitions may be heard differently, with relationships between instrumental timbres and the correlation of tape to live instruments effecting varied responses as to their meaning in this context.

In this thesis, I explore both the pre-organisation of *Tétrachromie* and my own interpretation of the existing recording of the musical score with tape. This is done first by considering the artistic environment of the 1950s and early 1960s, referring to aspects of serial, aleatoric, and electronic approaches to composition. These include European serialists Luigi Dallapiccola, Bruno Maderna, Luigi Nono, Luciano Berio, Pierre Boulez, and Henri Pousseur, American experimentalist Richard Maxfield, and *musique concrète* composer Pierre Schaeffer.[51]

In Chapter II, I analyse *Tétrachromie* from perspectives that I have developed in my study of Mercure's score and the recording. First, I describe general aspects of form and orchestration, and then I outline more specifically his construction of the serial row and

[51] Where possible, I have consulted writings by these individuals from around the time which Mercure would have met them or encountered their ideas, and the terminology used by them (or by other scholars about their works) is directly applied in my analysis of *Tétrachromie* in Chapter II.

how it and its permutations are applied throughout the work. Additionally, I discuss how each of the four sections of *Tétrachromie* is structured, including how the tape (from what I can hear in the recording) aligns with the score and my analysis.

CHAPTER I: INFLUENCES ON SERIAL STYLE AND AESTHETICS

Udo Kasemets wrote that Pierre Mercure "had all the gifts and qualities of a leader-figure: his mind was perfectly in tune with his times, his creative talents were far above average, his temperament was that of a determined fighter who sees to it that his dreams come true."[52] As we now know of Mercure, throughout his life he was determined to expand his artistic boundaries and increase his knowledge of contemporary artistic methods. His determination is evident in his many educational pursuits through the 1950s until his death.[53]

Mercure's first educational trip after leaving the Conservatoire de Musique du Québec à Montréal was to Paris in 1949. There he took composition lessons with Nadia Boulanger (1887–1979), but reportedly did not agree with her approaches and terminated his study soon after arrival.[54] He also spent time studying conducting with Jean Fournet (1913–2008) and orchestration with Darius Milhaud (1892–1974) and Arthur Hoérée

[52] Udo Kasemets, "Pierre Mercure," *The Musical Scene* (March–April 1969): 10.
[53] Although Mercure's early education at the Conservatoire de musique du Québec à Montréal in bassoon and conducting was important to his development, in consideration of the scope of my study, I focus more on Mercure's pursuits following his Conservatoire experiences.
[54] Personal communication with composer John Beckwith, who generously provided this information to me at the 2013 meeting of the Canadian University Music Society at the University of Victoria in Victoria, BC. Mercure similarly stated: "I had far greater pleasure in composing [aleatoric] works than in doing the homework prescribed by Nadia Boulanger. And she knew it. And she thought I wasn't a serious student. So I left her. I was discouraged because I didn't find what I was looking for." Mercure, quoted in radio documentary by Lyse Richer (trans. Alan Brown), in Radio-Canada International, *Anthology of Canadian Music* CD booklet, 39.

(1897–1986).[55] The majority of Mercure's time in Paris in 1949, however, was spent working "on improvisations, superimpositions of forms, and collective compositions with his [French-Canadian] composer friends Gabriel Charpentier, Jocelyn Binet, and Clermont Pépin."[56] Mercure returned to Montreal "still searching for new means of expression" because "the musical forms of past centuries no longer satisfied him."[57]

In 1951, on a scholarship from the Quebec government, Mercure travelled to the Tanglewood Institute at Boston University to study with the Italian twelve-tone composer Luigi Dallapiccola. Mercure's biographer Lyse Richer writes that after he worked with Dallapiccola, Mercure "was torn between a need for greater creative freedom and a need to organize, to see ahead, to construct. He finally rejected strict 12-tone writing because he saw in it a serious impediment to his flexibility as an artist."[58] It was not until later that Mercure became attracted to the innovations surrounding serialism as they were expressed in the writings of Boulez and others associated with Darmstadt.

Upon returning to Montreal after Tanglewood, Mercure spent much of his time working as a producer on the RCI programme *L'Heure du Concert.* Increasingly attracted to the possibilities of technology (no doubt inspired through his work in the television studios), he again travelled to Paris in 1957–58 to develop his techniques for electronic composition and *musique concrète* with Pierre Schaeffer and the Groupe de recherche musicale. After Paris, Mercure went to the United States to further study electronics with experimental composer Richard Maxfield, who was in New York at the time.

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[55] *Encyclopedia of Music in Canada,* s.v. "Pierre Mercure," by Lyse Richer (Historica Dominion, 2012), http://www.thecanadianencyclopedia.com/en/article/pierre-mercure-emc/
[56] *Encyclopedia of Music in Canada,* s.v. "Pierre Mercure" by Lyse Richer.
[57] Ibid.
[58] Ibid.

In 1961, Mercure organised the Semaine Internationale de Musique Actuelle, which he hoped would become an annual event. The festival was to be "based on three principles: the music heard was to be of the present, to link itself closely with the visual arts, and to represent faithfully experimental trends throughout the world."[59] Although it was only a one-time occurrence, it brought to Montreal many prominent composers from across North America and Europe, whether it was in person or in concert programmes.[60] In addition to lectures and round-table sessions, there were numerous concerts that featured nine world premieres of new compositions, including John Cage's *Atlas Eclipticalis*. Composers whose music was played in the festival included Cage, Edgard Varèse, Karlheinz Stockhausen, Mauricio Kagel, Christian Wolff, Luigi Nono, György Ligeti, Iannis Xenakis, Milton Babbitt, Richard Maxfield, Morton Feldman, and Pierre Schaeffer as well as Canadian composers Serge Garant, István Anhalt, and Mercure. Other prominent lecturers and performers were Earle Brown, David Tudor, and Yoko Ono.

In the summer of 1962, Mercure arranged another trip to Europe, this time not only to Paris but also to Salzburg, Darmstadt, and Dartington, attending summer programs at the latter two.[61] Jean Boivin writes of Mercure's time in Darmstadt, noting the courses in which Mercure was registered that included two seminars with Bruno Maderna ("Compositional Advice" and "Comparative Theory of Composition – The Middle Ages and New Music"), a course on instrumentation with Pierre Boulez ("Compositional

[59] *Encyclopedia of Music in Canada,* s.v. "International Week of Today's Music/Semaine international de musique actuelle," by Lyse Richer (Historica Dominion, 2012).
[60] Although Mercure's Semaine Internationale was only a one-time affair, Sophie Stévance notes numerous contemporary music events that occurred from 1968 through to the twenty-first century, which stemmed from Mercure's original efforts in 1961. See Sophie Stévance, "La construction du champ identitaire de la musique actuelle en Amérique du Nord."
[61] Lyse Richer radio documentary (trans. Alan Brown) in *Anthology of Canadian Music* CD booklet.

Possibilities of Instruments"), and a course on electronic composition with Hermann Heiss.[62] Boivin also speculates that Mercure assisted Henri Pousseur in his seminar "Toward a Generalised Periodicity." He was also initially registered for a seminar taught by Luigi Nono, but the Italian did not attend the program that summer. Instead, Mercure travelled to Dartington, England to work with both Luigi Nono and Luciano Berio.[63]

Even though Mercure studied and learned from so many different teachers, his compositions, as described by Udo Kasemets, used such techniques "in absolutely individualistic terms without falling under anybody's direct influence."[64] The present chapter, which focuses on both serialism and multimedia experimentation, sketches aspects of the compositional scene in which Mercure was immersed and that informed his approach to *Tétrachromie*.

1. Dallapiccola and the Darmstadt School: Mentors in Serialism

Even though Mercure first studied serialism in 1951 with Dallapiccola, the technique does not appear in any of his works preceding *Tétrachromie.*[65] The serialist composers who Mercure studied with or met in 1962 included Boulez, Pousseur, Maderna, Nono, and Berio. These composers, in conjunction with Dallapiccola, represent many of the ideas pertaining to serialism that were circulating at the time of Mercure composing *Tétrachromie*.

[62] Jean Boivin, "Pierre Mercure, Gilles Tremblay, et quelques autres compositeurs canadiens aux *Fereinkurse* à Darmstadt dans les années 1950 et 1960," *Circuit* 21, no. 3 (2011): 65.
[63] Ibid.
[64] Kasemets, "Pierre Mercure," *The Musical Scene,* 10.
[65] Mercure's two compositions (*Lignes et points* and *H_20 per Severino*) that followed *Tétrachromie* also feature serial techniques.

Dallapiccola began to refine his use of the twelve-tone method in 1947 when he reviewed René Leibowitz's book, *Schoenberg et son école*[66] and although his compositional journey was still in its early stages when Mercure studied with him in 1951, he understood serialism as something that was yet to develop further, writing in his essay "On the Twelve-Note Road" (1951) that "even if, today, we are too near to events to write a history of dodecaphony, it is certain that, within a decade or so, the twelve-note movement will find complete justification, even in the eyes of those who today oppose it."

In dodecaphony, Dallapiccola discovered a response to modern problems of artistic expression; namely, that serialism "made use of a new dialectic" where its difficulty was "not due to the large number of *dissonances* it contains" but more in its expression of "the composer's highest *ideal*."[67] This ideal was, for Dallapiccola, informed by his interest in modern literature at the time, namely James Joyce and Marcel Proust, showing him that "at bottom, the problems of all the arts are a *single problem*. The assonances [Dallapiccola] had noticed in Joyce had led [him] to realize that, in the use of a twelve-note series, the most careful and conscientious effort must be devoted to its *arrangement.*"[68] For Dallapiccola, not every note had exact equality, since time always intervenes and becomes the "fourth dimension" in the musical texture.[69] Similar to the tonic-dominant relationships in sonata form, the arrangement of a twelve-tone series facilitates what Dallapiccola calls *polarities* between notes, and each work has its own

[66] Dallapiccola noted that although he had been exposed to the music of the Second Viennese School earlier in his career, it was not until he read Leibowitz's book that he learned how the compositional method worked. Luigi Dallapiccola, "On the Twelve-Note Road," *Music Survey* 4, no. 1 (1951): 319.
[67] Dallapiccola, "On the Twelve-Note Road," 323 (emphasis in original).
[68] Ibid., 325 (emphasis in original).
[69] This is different from what Schoenberg believed about the non-hierarchical nature of the twelve-tone technique. Dallapiccola felt that with the addition time and dynamic dimensions, the equality of each pitch was automatically lost in the aural experience. See Dallapiccola, "On the Twelve-Note Road," 325.

basic polarity according to the intervals that are emphasised by the composer through the dimension of time.

If literature was a major influence on how Dallapiccola understood serialism, so too was his interest in early Italian counterpoint, particularly in the lyricism and polyphony of Monteverdi and Gesualdo.[70] In his first phase of serial writing (1942–1950), Dallapiccola integrated an historically-based lyrical Italian style with some techniques that Brian Alegant associates with a Webernian approach to serialism, using primarily linear row presentations, four-voice designs, and sparse orchestrations:

> The textures of the first-phase works are primarily polyphonic, and abound in such time-honored canonic devices as inversion, retrogression, augmentation, and diminution. These polyphonic sections are occasionally interrupted by brief monophonic and homophonic excursions, which tend to function as interludes.[71]

An example of Dallapiccola's use of serial polyphony is in the "Expositio" section of *Sex carmina alcaei* (1943) in which Alegant describes how "each *aggregate,* or total chromatic, is clearly delineated and coincides with—or, rather, articulates—the end of a phrase."[72] Dallapiccola used textual accents, rhythm, and the row aggregates to suggest a "three-measure hypermetric grouping" that becomes an audible and visual structural organisation.[73] Also in "Expositio," Dallapiccola follows classic dodecaphonic pitch organisation, creating a symmetrical registral axis around central tones. The first row of the section has pitches "positioned around the axis G4/G♯4 while those in the second row are oriented about G♯4 and A4."[74]

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[70] *Grove Music Online,* s.v. "Dallapiccola, Luigi," by John C. G. Waterhouse and Virgilio Bernardoni (Oxford University Press, 2007–2014).
[71] Brian Alegant, *The Twelve-Tone Music of Luigi Dallapiccola* (Rochester, NY: University of Rochester Press, 2010), 13.
[72] Alegant, *Twelve-Tone Music of Luigi Dallapiccola,* 14.
[73] Ibid.
[74] Ibid., 15.

Another aspect of pitch organisation used by Dallapiccola in *Sex carmina alcaei* is the importance of each rows' starting pitch(es). Alegant notes that in the "Expositio" section, "pitch class $C^{\#}$ is quite prominent insofar as it initiates rows P-1 and R-2 and frames the right-hand piano part."[75] These two rows are related by retrograde-T1 (or retrograde and transposition by semitone) and "the entire 24-note succession forms a mirror around the two quarter-note rests separating the phrases."[76]

Alegant also refers to *cross partitions,* or arrangements of "the pitch classes of an aggregate (or a row) into a rectangular design" in *Sex carmina alcaei.*[77] This technique, which involves segmenting the aggregate or row into smaller portions, allows for a vertical stacking (i.e., chords) of row material. The process allows for the tones within a vertical segment to be rearranged according to "slot-machine permutations" where the vertical dimension shifts to reveal a different configuration each time. In his discussion, Alegant drafts his own hypothetical 3 x 4 cross partition (shown in Figure 1.1), where order numbers 0 through 10 (t) and 11 (e) are juxtaposed onto the rectangular chart. He then applies different permutations to arrive at new variants of the order numbers (shown in Figure 1.2).[78]

Figure 1.1. Alegant's hypothetical 3 x 4 cross partition

0	3	6	9
1	4	7	t
2	5	8	e

[75] Alegant, *Twelve-tone Music of Luigi Dallapiccola,* 14.
[76] Ibid., 15.
[77] Ibid., 20.
[78] Ibid., 21. Both Figures 1.1 and 1.2 are excerpted from this source.

Figure 1.2. Alegant's four variants of the previous configuration

0	3	6	9	0	5	6	e	2	4	7	9	1	3	6	t
1	4	7	t	2	3	7	t	0	3	6	t	2	5	7	9
2	5	8	e	1	4	8	9	1	5	8	e	0	4	8	e

I return to cross partitions in my analysis of *Tétrachromie,* noting where Mercure diverges from the classic technique with a palindromic series of different-sized groupings.

Like Dallapiccola and many others of his time, Bruno Maderna first aligned himself with a post-Webernian serialism, but was also inspired to move in new directions by expanding his possibilities for manipulating the row. Theorists Veniero Rizzardi and Christoph Niedhöfer both introduce some of Maderna's pre-compositional techniques that involved strict control of intervallic content as well as mathematical permutations derived from the magic, or Latin square in contrast to more traditional matrix-based dodecaphonic procedures.[79]

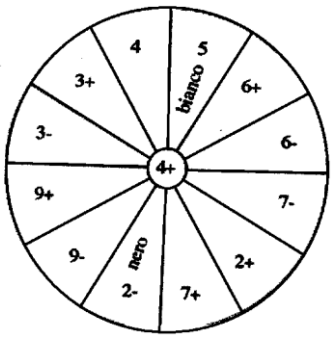
In the early 1950s Maderna began to use a process of "generation," where "the tone row was considered as the germ of a more complex pitch organization" that produced different pitch-class sets not necessarily present in the original row.[80] In order to harness further control of intervallic structures, Maderna conceived of "a system that enabled him to 'weigh' exactly the expressive quality" of the different intervals. Directly influenced by Paul Hindemith, this system is as Rizzardi explains, "a survey of the different degrees of tension generally ranging from the utmost relaxation of the perfect fifth (unison and

[79] See Veniero Rizzardi, "The Tone Row, Squared: Bruno Maderna and the Birth of Serial Music in Italy," in *Rewriting Recent Music History: The Development of Early Serialism 1947–1957,* ed. Mark Delaere (Leuven, Belgium: Peeters, 2011): 46; and Christoph Niedhöfer, "Bruno Maderna's Serial Arrays," *Music Theory Online* 13, no. 1 (2007).
[80] Rizzardi, 48.

octave are not considered) to the utmost tension of the augmented fourth."[81] Maderna categorised each interval according to its ability to create relaxation or tension, and used charts to carefully manage the quality of each interval and its relations with other interval types. Part of Maderna's adherence to Hindemith represents, according to Rizzardi, "a continuity with Maderna's earlier, pre-dodecaphonic work, and once again shows how strong he felt the connection to be between the contemporary progressive musical trends and the early music he still eagerly studied and transcribed."[82]

Figure 2 shows Rizzardi's reproduction of one of Maderna's Hindemith-inspired interval diagrams used for his *Composizione n. 2 per orchestra* (1948–49). In the chart, Maderna arranged all of the intervals from a minor second to a major ninth in a circular formation that shows opposing intervals around the augmented fourth. The chart, although resembling a mod-12 diagram, simply shows intervallic relations with major and minor intervals indicated by + and - symbols. The perfect fifth and minor second are directly opposed intervals in this chart, representing the most relaxed (5) and most dense (2-) harmonic results. Maderna labels these white ('bianco') and black ('nero'), respectively.

Figure 2. Madernian interval chart, reproduced by Rizzardi[83]

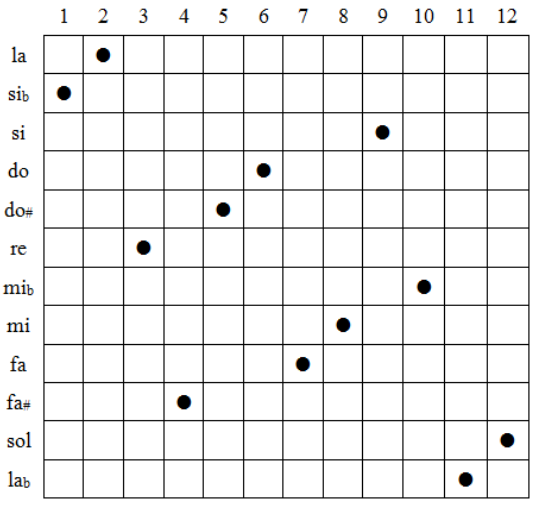


[81] Rizzardi, "The Tone Row, Squared," 48.
[82] Ibid.
[83] Ibid., 48–49.

Rizzardi suggests that, up to the mid-1950s, both Maderna and Luigi Nono used this method of charting "for the purpose of selecting and regulating the use of the pitch-class sets derived from the permutations."[84]

By the mid-1950s, Maderna began to expand upon the twelve-tone system even further, now attempting to transform "the tone row into a different entity altogether," one that is "capable of giving new directions to the compositional process."[85] He did this by applying "squares" and "shifting techniques" to a single row, instead of using the row to create a matrix with forty-eight permutations.[86] Maderna's shifting technique consisted of the use of magic or Latin squares to determine degrees to which a single twelve-note row is manipulated across twelve consecutive charts. He began by plotting a row on a single 12 x 12 chart, where each chromatic pitch is represented on the vertical axis (in ascending order), placing the order numbers (1–12) on the horizontal axis of the chart. Figure 3 shows an example of this plotting technique, excerpted from Rizzardi's discussion.

Figure 3. Maderna's prime row sketch for *Improvvisazione*, reproduced by Rizzardi[87]



[84] Rizzardi, "The Tone Row, Squared," 50.
[85] Ibid.
[86] Both Rizzardi and Niedhöfer use the terminology of "shifting technique" to refer to Maderna's methods.
[87] Rizzardi, 51.

Following the initial plotting of the row, Maderna would construct a magic square of twelve letters, which were replaced by corresponding numbers.[88] These numbers were then used to shift the pitch classes to different positions on subsequent charts, allowing for a total of twelve pitch arrays, including the original row. Rizzardi describes the contents of each new permuted square, which could contain any of the following: "1) repeated dots/notes in the same row (horizontal) 2) two or more dots/notes in the same column (vertical), and 3) entire rows or columns of empty boxes."[89] What results, then, is a series of row permutations based on an original twelve-tone row that occasionally contain repeated or missing pitches.

With an alternate mode of permuting the row, Maderna's shifting technique allowed for his complete control of the pitch content in a work while, because a single row could then contain duplicate or missing pitch-classes, permitting expressive and melodic freedom. To add to his complex system, Maderna would sometimes use more than one series as the basis for permutations, as well as different sizes of number tables (no longer just 12 x 12), more complex and sometimes serialised rhythmic structures, and by adopting what he called "filter technique[s]," in which the pitch-class and rhythmic structures could be adjusted "by shortening or eliminating individual pitch classes or by breaking longer note values into shorter ones."[90] One example of this is a nine-tone pattern generated from one of four different series created for *Musica su due dimensioni* (1958).[91]

[88] Niedhöfer, "Bruno Maderna's Serial Arrays," paragraph 4.
[89] Rizzardi, 54.
[90] Niedhöfer, paragraph 20.
[91] Ibid., paragraph 22.

Belgian composer Henri Pousseur was also interested in finding new ways to arrange pitch through new intervallic structures through the 1950s. Pousseur frequently used what he called "indistinct octaves," made up of minor ninths and major sevenths, as a basic intervallic structuring element in his works with the purpose of displacing the octave to form rich harmonies within the serial framework. In the "Impromptu" movement of Pousseur's *Exercises* (1956), Paul Griffiths describes Pousseur's use of "harmonic fields," where he places "whole-tone intervals less than an octave (major 2nd, major 3rd, tritone, minor 6th, minor 7th) together with one or more pitches forming intervals of a major 7th or a minor 9th with the pitches of the whole-tone intervals."[92] What Pousseur created by doing this, was "an elegant technique through which chords may be made to echo and shadow one another as one harmonic field merges into the next" with pitches that could act as common tones in traditional voice leading (only at a semitone/indistinct octave rather than unison).[93]

Pousseur also applied his idea of "fields" to rhythmic notation in a response to the "problematic notation of complex rhythm" that was increasingly important to composers in the late 1950s.[94] Relating rhythm to his concept of indistinct octaves, Pousseur felt that "it is the quality, not the quantity, of the difference which is important . . . and it should therefore be possible to rethink the communication of qualitative differences in the rhythmic sphere. This depends on the participation of the performer, for if the spirit rather than the letter of the law is what matters, it follows that the performer must fully

[92] Griffiths, *Modern Music*, 93.
[93] Ibid.
[94] See M. J. Grant, *Serial Music, Serial Aesthetics: Compositional Theory in Post-War Europe* (Cambridge: University of Cambridge Press, 2001), 141.

understand what is expected."[95] In order to solve these issues of rhythmic notation practically, M. J. Grant indicates that there are two main categories proposed by Pousseur: the first of "larger-scale rhythmic units whose total length is exactly quantified while their internal members are relative to each other" and the second category of "units in which the component rhythms are in an unchanging proportion but whose total duration is relative to those around them."[96] Both of these rhythmic unit categories identified by Grant can be used to describe various aspects of rhythm in *Tétrachromie*, which I do in my analysis in Chapter II below.

Another composer integral to the environment at Darmstadt which Mercure experienced in 1962 was Luigi Nono. During the 1950s, Nono expanded his musical language with great concern for the ordering of intervals within a serial row, and began to create "the series which presents all the intervals within the octave in expanding order," becoming a "so-called 'wedge' series."[97] Nono paralleled Maderna in many of his endeavours to expand upon serialism through the shifting technique. According to Martin Iddon, through the 1950s he "pursued increasingly complex and doctrinaire approaches to serialism, layering multiple control systems on top of one another."[98]

While Luigi Nono's serial style became increasingly complex into the 1960s, so too did his political ideologies, his works being far more politically charged than many of his colleagues at Darmstadt.[99] An example of Nono's political compositions is his opera *Intolleranza* (1960–61), which Griffiths writes was "the first opera by a member of the

[95] Grant, *Serial Music, Serial Aesthetics,* 141.
[96] Ibid.
[97] Christopher Fox, "Luigi Nono and the Darmstadt School," *Contemporary Music Review,* 119.
[98] Martin Iddon, "Serial Canon(s): Nono's Variations and Boulez's Structures," *Contemporary Music Review* 29, no. 3 (2010), 267.
[99] See Nono's 1959 lecture, "Historical Presence in Music Today," trans. Bryan Simms, 168–174.

1950s avant garde, and a work which projects on to the stage that spirit of revolt against bourgeois thinking which its composer had seen as inherent in the new serialism."[100] Grant also alludes to Nono as a "notable exception" to the "common belief in the non-political stance of serial composers" and their music that is "situated in the abstract space of the composer's own expressive desires, with no reflection beyond that self."[101] Elsewhere, Grant notes that although Nono's work *Il canto sospeso* was heavily criticised for his serialisation and fragmentation of the text, the work does not, for her,

> require such instances of semantic clarity to get its message across: the music itself is utterly sad. This is to suggest that there is a semantic level to this music which is much more direct than in other serial compositions – in other words, that a specifically non-musical emotion can be portrayed; and it is worth considering exactly why this is the case, especially since this may also explain why Nono's music has been received in a much more positive manner than many other serial works.[102]

Perhaps, for Mercure, his interest in Nono's music was as much a political and emotional attraction as it was for musical techniques. Mercure's pursuit of Nono, I would think, was more to witness the *spirit* of the latter that infused his music with emotion and political relevance.

Mercure was inspired to attend the Darmstadt summer program in 1962 by the revolutionary and utopian musical ideologies of Pierre Boulez. Goldman describes Boulez's 1963 publication *On Music Today* as a work that displays "the confidence of a musician still thoroughly convinced of the structuring capabilities of the series," and this

[100] Paul Griffiths, *Modern Music,* 148.
[101] Grant, *Serial Music, Serial Aesthetics,* 21.
[102] Ibid., 203–204.

confidence was that of an "avant-garde composer whose world-view has not been shaken by self-doubt."[103]

One of the main tenets of *On Music Today* was to advocate integral serialism; that the series could always serve as a basis for musical composition in all aspects of sound including pitch, duration, dynamics, and timbre.[104] Boulez's theory was highly influenced by his previous studies in mathematics, and draws on mathematical and "scientistic" perspectives, bringing him to a structural view of music via the "precise definition and rigorous formalization of the basic materials of music elements, and the laws which govern their concatenation" which, at the time, "was considered one of the more pressing problems of contemporary music theory."[105]

Often considered his quintessential serial work, Boulez's *Structures 1a* is an example of the rigorous applications of integral serialism. Grant introduces her discussion of *Structures 1a* by summarising a famous complaint about serialism lodged by Iannis Xenakis, who was resistant to "serialism's use of polyphony, since the resulting texture masked the combination of different voices."[106] Stockhausen's suggested answer to this question was "to remove the voices so completely from their original voice-function—their 'register'—that they simply become inextricable threads in a net; and this net can of necessity be heard only as such and as a whole, not as an addition of voices."[107] The issue for Grant is how polyphonic voices are heard in "statistical structures; they are not audible as such, particularly when, as in the case of *Structure 1a*, there is little timbral

[103] Goldman, *The Musical Language of Pierre Boulez*, 31.
[104] Ibid.
[105] Ibid., 35.
[106] Grant, *Serial Music, Serial Aesthetics,* 150.
[107] Stockhausen, quoted in Grant, *Serial Music, Serial Aesthetics,* 150.

distinction between voices; the 'voices' laid out in the score do not come to the fore when listening."[108]

In the following chapter, I observe that Mercure's composition is almost entirely made up of individual voices, or threads, each presenting its own "melody." The basic historical polyphonic ideal is superseded in serial compositions such as *Structures 1a* and, as we will see, in *Tétrachromie* where individual threads are less important than the larger web that is created through parameters of sound such as timbre, duration, and register.

2. *Musique concrète* and the Aleatoric Multimedia Work

As we know, prior to composing serial music Mercure was associated with such other experimental styles as Automatism, aleatory, and electronic composition. By the mid-1950s, the technique of magnetic tape composition was becoming popular among many experimental composers, and Mercure was no exception. In 1957–58 when Mercure studied with Pierre Schaeffer at the *Groupe de recherches musicales* (GRM) studios in Paris, he learned of Schaeffer's ideologies regarding technological composition that were rooted in the recording, rearrangement, and manipulation of sounds recorded by microphones.

The GRM (which was, at the time, called the *Groupe de recherches de musique concrète*) was founded in October 1951 by Schaeffer as an extension of his radio work

[108] Grant, 150.

with Radio-Télévision française.[109] The idea of experimenting with recorded musical sounds grew quickly in this period, attracting many already-established composers such as Pierre Boulez and Olivier Messiaen, as well as numerous student composers from across Europe, North America, and East Asia.[110] At first, Schaeffer's interests lay in the arrangement of pre-recorded sounds using primarily three different methods, which were discovered, according to Marc Battier, through multiple attempts and "happy accidents."[111] Schaeffer's first method involved "the alteration and transformation of time" where

> the techniques are derived from the use of a turntable, including segmentation (removal), acceleration, slowing down, reproduction of sound back-to-front, application of dynamic envelope using level potentiometer, and repetition of a fragment (the closed groove or loop).[112]

This initial phase provided the raw material for what would become *musique concrète.* Following the first manipulations of recorded sounds would be the "transformation of texture and timbre" that involved cutting "the attack of a sound so that only the resonance or the sustain fragment can be heard," thus "masking" the original timbre of the materials.[113] This second stage also involved the application of filters designed to manipulate the sound even further, the ultimate goal being altered perceptions of the sound. The third (and final) process for creating some of the first examples of

[109] It is possible that Mercure's work with the *L'Heure du concert* television program at Radio-Canada International inspired him to work with Schaeffer in France. Coincidentally, both composers had backgrounds in radio and television production.
[110] Marc Battier, "What the GRM Brought to Music: From *musique concrète* to Acousmatic Music," *Organised Sound* 12, no. 3 (2007): 193–194.
[111] Battier, "What the GRM Brought to Music," 194.
[112] Ibid.
[113] Ibid., 195.

musique concrète involved "spatialisation, that is, multi-channel diffusion" where any given piece could use three or more tracks for recording.[114]

In his discussion on the development of GRM, Battier describes some of the main considerations given by Schaeffer and others who were involved in the Paris School. Of these, *gesture* became a main factor in compositional practice, where "in order for the music in process of gestation to find its sound shape, the composer draws from a repertory of actions, controls, manipulations, synchronisations and so on."[115] By taking this approach to electronic composition, the end result of a work of *musique concrète* was not only because of the sounds and manipulations applied therein, but also because of the "gesture and invention" done by the composer.[116]

As an extension of this, Battier also suggests that a pre-compositional consideration of *form* is necessary in the creative process. For example, he notes that Schaeffer associated some of his first experiments in *musique concrète* with abstract painting, wanting "to compose a concrète music that expresses the equivalents of matter and form from the standpoint of abstract painting."[117]

Although my study does not focus on Mercure's electroacoustic style aside from basic aural observations, many of the processes of *musique concrète,* particularly those of gesture and form, connect directly to how Mercure composed *Tétrachromie*. During the late 1940s when Mercure worked amongst *Les Automatistes* in Montreal, he was interested in composing in a way that resonated with automatism and spontaneity but did not fully subscribe to the ideals presented in the *Refus global.* Jean-Paul Mousseau (the

[114] Battier, "What the GRM Brought to Music," 195.
[115] Ibid., 197.
[116] Ibid.
[117] Schaeffer, quoted in Battier, 196. Original source Pierre Schaeffer, *À la recherche d'une musique concrète* (Paris: Seuil, 1952), 115.

visual artist involved in *Tétrachromie*) suggested in 1972 that Mercure's aesthetic views did not grow closer with those of *Les Automatistes* until later.[118] In fact, in 1961, Mercure stated that he tried to find within music that which others have discovered in painting and literature.[119] Through the 1950s however, Mercure was also interested in the possibilities that technology held for composition, and because he worked with Radio-Canada as a producer, he would have had access to such equipment as was used by Schaeffer and the Paris School.

Following his study period with Schaeffer, Mercure went to the United States to work with American composer Richard Maxfield, who is "acknowledged as the first teacher of electronic music techniques in the USA."[120] Maxfield is a widely recognised figure in American experimental music, and his influence on Mercure was significant in the latter's creation of increasingly complex works which used various forms of electronic composition—those using concrete and synthetic sounds to create entirely electronic as well as pure electroacoustic works. By 1961, Maxfield (among others in the USA including Cage, Stockhausen, and Varèse) was devoted to creating works solely for acoustic instruments with pre-recorded tape (which many composers were also doing in Europe), to be realised together in live performance.

In August 1961, Maxfield attended Mercure's Semaine Internationale de Musique Actuelle. Three of Maxfield's works were presented at this festival: *Piano Concert for*

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[118] See discussion in Allana C. Lindgren, "Rethinking Automatist Interdisciplinarity," *Circuit*, 41.
[119] "J'essayais de trouver en musique ce que ces individus avaient trouvé en peinture et en littérature." Pierre Mercure in Lindgren, "Rethinking Automatist Interdisciplinarity," *Circuit* 21, no, 3 (2011), 41. Original source Diane Lefebvre and Lyse Richer-Lortie, "Face à l'automatisme," in *Compositeurs au Québec. Pierre Mercure,* ed. Lise Laplante (Montreal: Centre de musique canadienne, 1976), 11.
[120] *Grove Music Online,* s.v. "Maxfield, Richard (Vance)," by Stephen Ruppenthal (Oxford University Press, 2007–2014).

David Tudor (which had its world premiere at the festival), *Dromenon,* and *Steam.*[121] These works exemplify many of the approaches that Maxfield used in the late 1950s and early 1960s, which he outlines in an essay published in La Monte Young's *Anthology of Chance Operations.*[122] In the essay "Music, Electronic and Performed," Maxfield describes his aesthetic for electronic music in its various forms (pre-recorded, live improvisation, and tape with acoustic instruments), and defends the composer of the electronic medium against accusations of rigidity (because the composer's work, the recording, eliminates the need for performer or audience, becoming "the terminal object of creation"). He writes that

> A rigid structure is a property rather than a fault. Writing, painting, and sculpture preserve fixed shapes, while theatre, dance, and sculptural mobiles are intended to change in certain respects from time to time. The creator normally selects his medium or usage according to his intentions as to fixity or flux.[123]

Later in the same essay, Maxfield reminds the reader that "music by nature moves in time" and can therefore "project its rigidity only upon second hearing," meaning that if one only hears a piece of music a single time, it cannot realistically sound rigid even if it is constructed with the utmost rigid techniques.[124]

Maxfield addresses another common accusation against electronic composition; that it removes the human element of performances which audiences appreciate, and through tradition, have come to expect. This issue immediately presents a place for resistance to a music that does not involve the live element of risk; that is, "this perilous condition

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[121] For more information on programming of the Semaine Internationale, see Appendix 1 in Johanne Rivest, "La représentation des avant-gardes à la Semaine internationale de musique actuelle (Montréal, 1961)," *Canadian University Music Review / Revue de musique des universités canadiennes* 19, no. 1 (1998): 64–66.
[122] Richard Maxfield, "Music, Electronic and Performed," in *Anthology of Chance Operations* (New York: La Monte Young and Jackson Mac Low, 1963), 87–93.
[123] Maxfield, "Music, Electronic and Performed," 88.
[124] Ibid.

wherein the final act of creation depends on such exigencies of the moment as states of digestion, nerves, mood, how the audience and performer get along together and the like."[125] For Maxfield, to combine a live performer with a pre-recorded electronic tape is to bridge the dilemma of working with new technology while not completely abandoning the conventional and expected aspect of live performance. Maxfield describes his creative process for *Piano Concert for David Tudor* as an example of this new approach where "basic to the composition . . . is the consideration of the distinctive stage personality of the soloist who will be seen, heard, felt during the music."[126]

In his essay, Maxfield describes *Dromenon,* a ballet or "concert music for music, dance, and lights." Maxfield writes that "the visual focus [in *Dromenon*] is upon two independent media: modern dance and a composition of lighting" and the "aural counterpart [that] presents two opposing sources of activity: the instrumental ensemble and synthetic sounds on tape."[127] *Dromenon* also includes a performance score that indicates "time areas (in numbers of seconds)."[128] Several of these descriptions of Maxfield's experimentalism resonate with *Tétrachromie* through its use of tape and visual concepts. Although Mercure's score for *Tétrachromie* does not indicate specific lighting, its colour imagery was still likely intended to provide a major visual component in combination with the choreography.[129] While Mercure never provided a detailed description of the tape that accompanied *Tétrachromie,* through listening to its recording

[125] Maxfield, "Music, Electronic and Performed," 89.
[126] Ibid., 91–92.
[127] Ibid., 93.
[128] Ibid.
[129] One could presume that such details of lighting and other portrayals of colour might be included in Mousseau's designs for the *Tétrachromie* production, should his sketches ever be discovered through archival research.

(as discussed below in Chapter II), it seems to use similar methods as what Maxfield describes for *Dromenon:*

> The tape parts contain the same durational areas of density and tessitura, except structured in a different permutation. Its texture is kept transparent so as not to mask the instrumental forces, but its timbres mostly complex and strident, so as to compete with them in richness and brilliance.[130]

Although Maxfield, a composer of fluxus works and improvisations upon certain composed instructions, was not interested in serialism, many of the composers at Darmstadt with whom Mercure studied in 1962 *did* combine serial methods with electronic media.

Much of the interest of Darmstadt composers in aleatoric procedures were, as we know, a result of John Cage's first visit to the program in 1958. His formidable presence inspired many of the European composers to begin experimenting with chance operations and aleatoric compositions, and these were often combined with electronic manipulation or serial organisation (or both) which already existed as an established mode of musical experimentation in Europe. Examples can be found in works from the late 1950s and early 1960s by Stockhausen, Pousseur, Maderna, and Boulez.

By 1960 Pousseur was seeking "to achieve greater immediacy of communication by experimenting with the transformation of an intelligible spoken text, and with the rich signifying potential of electronic sound" in his works *Electre* (1960) and *Trois visages de Liège* (1961).[131] Then, in his theatrical work *Votre Faust* (composed between 1960 and 1968), Pousseur worked on a way to utilise "elements of musical language that might

[130] Maxfield, "Music, Electronic and Performed," 93.
[131] *New Grove Dictionary of Opera,* s.v. "Henri Pousseur," by Pascal Decroupet. Oxford Music Online.

initially seem to be in opposition" in somewhat of a collage-like integrated fashion.[132] In the early 1970s, Pousseur wrote of 'recent' music (specifically mentioning Stockhausen's *Hymnen* and Berio's *Questo vuol dire che*) as "the organizer of a space for cohabitation, where all previous musical acquisitions (or parallel ones, for it is clear that original lexicological discoveries are always possible) may find their most suitable places, existing together and contributing to a *new corporate harmony.*"[133] Pousseur's reference to the "corporate" in this context was to the use of "divergent materials as a model of a utopian order among men" and he was actively pursuing the same things in his own compositions at the time, with an inclination towards variation as a unifying element.[134]

Griffiths suggests that Pousseur aligned his ideals with both sides of the supposed Schoenberg–Stravinsky divide, praising the "stylistic polyphony" of Schoenberg who used forms and models from the past. At the same time, Pousseur felt that closed systems ("whether tonal or serial") are "the expression of a restrictive society, and it is the composer's duty to demonstrate that constraints may be lifted without music falling into the anarchy of Cage's world, that harmonic order is possible without a fixed hierarchy."[135]

Maderna also pursued a polystylistic approach to composition. Wetters describes Maderna's compositional output as eclectic, but "not so much as a genre as the necessary requirement for music that is truly autonomous." According to Niedhöfer, Maderna believed that "musical expression should be grounded in structural frameworks that in

[132] *New Grove Dictionary of Opera,* s.v. "Henri Pousseur," by Pascal Decroupet. Oxford Music Online.
[133] Quoted in Griffiths, 213. Original source Henri Pousseur, *Musique/Sémantique/Société* (Tournai, 1972), 75–76.
[134] Griffiths, *Modern Music,* 213.
[135] Ibid., 215.

some way reflected life in its continuous development and mutation."[136] In this pursuit (for musical expression through structural frameworks), Maderna was led to numerous different styles and approaches. Because he never directly described his compositional philosophy, researchers have been left to make their own suggestions as to how he implemented these, basing their findings on evidence in his music. Wetters, for example, suggests that Maderna

> believed that, as a musician, what he had to say should be expressed within the work itself; he did not state that composers should abstain from making statements, but argued that they should make them *musically.* If composers had a compositional philosophy, it should be found in their works, their practical activity, not in any kind of accompanying text.[137]

Wetters goes on to describe implications of the presence of Adorno at Darmstadt, particularly regarding *Philosophy of New Music,* where Adorno directly identifies the dichotomy in twentieth-century music between Schoenberg and Stravinsky, in which "the middle road is the only one that does not lead to Rome."[138] Because of this, Wetters concludes that

> Darmstadt composers nevertheless continued to seek the same 'glory of Rome'. . . Just about every composer at Darmstadt seemed to be vying for the title of 'the next Schoenberg' or (to a lesser extent) 'the next Stravinsky.' What happens if a plurality of composers all try to pave the next road to Rome? In the end, the Darmstadt phenomenon was not a unified event, but a site of eclecticism, with Maderna sitting happily in the middle while the more ideologically inclined composers swarmed at the periphery. He was the composer who struck a middle path; or, more precisely, he did not strike a path at all. When presented with a fork in the road he went, or perhaps wandered, straight on.[139]

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[136] Niedhöfer, "Bruno Maderna's Serial Arrays," paragraph 2.
[137] Wetters, "Allegorical Erasmus," *Cambridge Opera Journal,* 174.
[138] Adorno, quoted in Wetters, "Allegorical Erasmus," 175. Original source: Theodor Adorno, *Philosophy of Modern Music,* 7.
[139] Wetters, 175.

By not ‘striking a path’, Maderna remained a constant, non-abrasive personage at Darmstadt. I believe that Maderna had something that resonated with Mercure. Mercure was also interested in relaying real life through sophisticated, structured means, but like Maderna, those means came from many different influences and incorporated numerous schools of compositional philosophy.

CHAPTER II: ANALYTICAL OBSERVATIONS OF *TÉTRACHROMIE*

As mentioned in the introduction to this thesis, the only remaining documents for *Tétrachromie* are Mercure's original hand-written score and a recording of its first and only live performance by the Toronto Philharmonia in 1964. Another difficulty arises beyond the scarcity of resources on this work: the two sources (score and recording) do not match. The most obvious evidence of the disparity between the two documents is the length of the work. In the score, each measure is marked by five seconds, the entire composition totalling fourteen minutes exactly. Contrarily, the recording lasts only nine minutes and fifty seconds—more than four minutes would appear to have been cut from the manuscript for performance.[140] While the two documents do not correlate in terms of timing, these sources in conjunction offer tremendous opportunities for analysis and exploration of Mercure's compositional style and performance intentions. Upon listening to the recording, it is clear that at least one minute is reduced from the score by cutting most of the first page. *Tétrachromie*'s dense texture (with both acoustic and electronic sounds) and fast aural rhythm makes it nearly impossible to compare the documents in order to determine further cuts. And so, for the purpose of my thesis, I regard primarily

[140] Micheline Chayer indicates that, contained within two folders related to *Tétrachromie* in the Fonds Pierre Mercure, there are four different manuscripts for this work. The lengths of these manuscripts vary in page length from fourteen to eighteen pages (the manuscript circulated by the Canadian Music Centre is eighteen pages long). It is possible that a shorter version of the score was used for the Toronto performance. See Chayer, "Le fonds Pierre Mercure des archives nationales du Québec," 394.

the written score, acknowledging that continued listening has aided and solidified some of my analytical findings, and I refer to the recording when helpful.

Although *Tétrachromie* is acknowledged by some authors who have written about Mercure, they normally only do so in passing and in relation to other works from the same time period (that is, post–1961). The silence around this work could be a result of its impossibility for revival as a concert piece, given the loss of the composed tape part.[141] Yet if one was to perform the work without its tape, going against Mercure's written instructions on the first page of the score (that the electronics must be audible at all times in performance), I believe that *Tétrachromie* would still be a fascinating concert work due to its complexity and aesthetic beauty.

Tétrachromie is based on four (*tétra*) colours (*chromie*) which represent "a life cycle of the four ages of man: Green for the springtime of life, Yellow for the brilliance of summer, Red for the season of ripeness presaging decay, and White for the oblivion which marks the completion of the cycle."[142] In the ensuing chapter, I discuss basic parameters of the work, beginning with questions of orchestration and form. I then identify aspects of Mercure's organisational systems in a discussion of the row and its characteristics, which determine the basic structure of much of the pitch and rhythmic content of the composition. Finally, I describe in detail each section of the work, referring to structural aspects as well as intensity, density, and frequency aligning with my listening experience of the recording.

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[141] Chayer also notes that in the Fonds Pierre Mercure, there is a box containing fifty-nine tape bands (dating up to 1968) with recorded works, interviews, and testimonies. It would be worth attempting to match one of the tapes to the Philharmonia recording of *Tétrachromie*, in the event that the original tape was never lost but only misplaced or mislabelled. Chayer, "Le fonds Pierre Mercure," 93.

[142] Programme note description of *Tétrachromie* in CD booklet for *Anthology of Canadian Music: Pierre Mercure,* 22.

1. Orchestration and the Tape

Tétrachromie is an electroacoustic composition with magnetic tape and live instruments: appearing on stage is a wind trio of clarinet, saxophone, and bass clarinet, and four percussionists who play on two marimbas, two xylophones, vibraphone, cymbals, bells, and chimes, while other instrumental and electronic sounds (which presumably includes "two series of 24 drums each, more or less tuned to the semi-tones in a two-octave range"[143]) are heard in the pre-recorded tape prepared in the Radio-Canada electronic music studio in Montreal. The percussion instruments provide both melody and rhythm, with a mixture of metallic and organic sounds from the vibraphones, cymbals, marimbas and drums, while the reed instruments counter the bright sounds of the percussion with rich and rounded tones.

There are six main musical textures heard in *Tétrachromie,* each with its own instrumentation. These are 12-note chords, a cymbal pattern, linear row canon, vertical row chorale, tremolo, and melodic tuplets. The linear row canon texture is only played by the wind instruments (clarinet, bass clarinet, and saxophone) and it is these instruments' sole part.[144] The remaining textures are played by the percussion instruments. The two twelve-note chords are played by two vibraphones, cloches, and crotales in a single strike that is left to sound over six measures. The cymbal pattern is played by two sets of five different sounding cymbals. The remaining three textures (chorale, tremolo, and melodic tuplets) are played by the keyboard-based percussion instruments: marimbas, vibraphones, and xylophone.

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[143] Description from notes written by Keith MacMillan in *Le Compositeur Canadian* (August 1965), 29. This material provided to me graciously in February 2013 by Ms. Tina Gervais of the Centre de musique canadienne in Montreal.

[144] At mm. 57–75, the winds play similar linear row material but in rhythmic homophony, creating a chorale-like texture. See Figure 24.

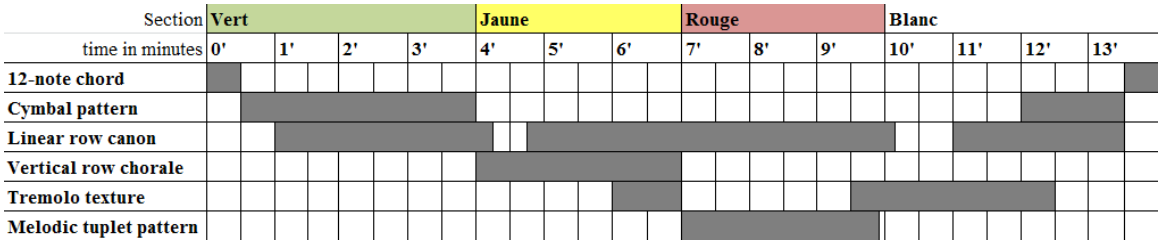
The two series of drums mentioned above are not written into the surviving score. However, they are audible in the recording so could have been added to the final version of the score, or more likely they are part of the tape track, which appears to utilise both electronically produced sounds and concrete sounds. It is informative here to consider a 1961 round-table discussion (transcribed in 2011), where Mercure discusses tape composition and the different ways in which a tape can be produced. He describes his process as utilising "the sounds of nature, for example, or sounds from musical instruments, but treated with means of electroacoustics which are now at our disposal, whether it is the magnétophone, filters, etc."[145] In this quotation, Mercure speaks specifically of techniques regarding *musique concrète* and the filtering of natural sounds, and the possibilities that arise with such means of expression. From what I have been able to determine through listening to the recording, there are identifiable concrete sounds (flute-like timbres, for example), but there are also sounds more likely produced electronically such as low atmospheric noises, science-fiction-style "beeps", and other high-pitched sounds.

[145] Pierre Mercure, in Gauthier, "Table ronde de 1961," 91. "Et c'est sûrement depuis mon premier contact avec la musique concrète, à Paris, en 49, [que j'ai ressenti] des résonances avec les sons concrets, c'est-à-dire [avec] les sons, […] autres que ceux produits par les instruments de musique; les sons de la nature par exemple, ou les sons des instruments de musique, mais traités avec les moyens électroacoustiques qui sont maintenant à notre disposition, qu'il s'agisse du magnétophone, de filtres, etc. De ça est sortie la musique électronique, qui a donné encore d'autres possibilités, et je pense qu'un compositeur, maintenant, ne peut ignorer ces facilités à sa disposition et, tôt ou tard, s'il est de son temps, s'y intéresse, sinon s'y adonne passionnément." My translation.

2. Considerations of Form

Adorno suggested in "Vers une musique informelle" that the ideal working method for new composition requires a philosophical or aesthetic idea that precedes composition. A product of this idea was the increased importance of nominalism, the descriptive naming of compositions. Mercure's title *Tétrachromie* already gives us a hint regarding the composition's form.[146] Literally "four colours," the work is in four sections and each section is identified by a specific colour: Green, Yellow, Red, and White. Table 1 shows the amount of linear time and space devoted to each section and the six main musical textures that occur throughout the work (as described above). Time in minutes (indicated by the score) is represented in columns, and each textural category has its own horizontal row, shaded where in the composition each texture occurs. From this table, we can see that the internal sections (Jaune and Rouge) are shorter in duration than the Vert and Blanc sections, but that they contain most of the more dominant musical material: the linear row canon, tremolo texture, and melodic tuplet pattern are faster and louder in these sections than are the cymbal or twelve-note-chord textures.

Table 1. Formal overlay of time and thematic disposition in *Tétrachromie*



We can also see in the chart that there is no clear break between sections, but rather a continuous horizontal progression; a spectrum, so to speak. Indeed, the separation of

[146] *Tétrachromie* is not the only of Mercure's compositions that has a descriptive title. *Triptyque* (1959), *Structures métalliques I* and *II* (1961), *Manipulations* (1963), and *Lignes et points* (1964) all provide the interpreter with some indication of the work's organisation and its potential form.

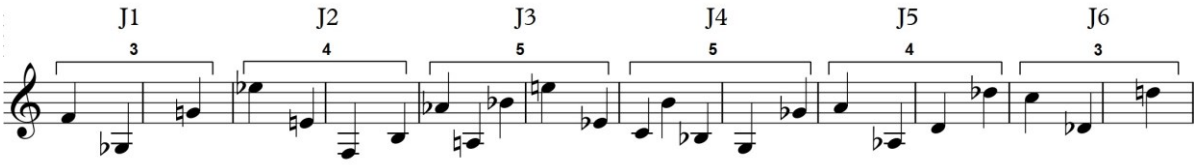
sections is blurred texturally as well, and when Vert changes to Jaune, linear canon material is carried over into the Jaune section. A similar overlap of canon material also spans the Jaune to Rouge and Rouge to Blanc section breaks. The tremolo texture also does this between Rouge and Blanc. The result of these continuous harmonic, textural, and melodic progressions is an organic growth of musical material, gradually building with no strict lines of division.

The basic form of the work is otherwise quite simple in that the four interconnected sections present a quickening and intensifying structure through the middle, with quieter and slower structures at the beginning and end. Like the life cycle it is intended to evoke, *Tétrachromie* has a trouble-free beginning, an increasingly complex and disorienting middle, and an unravelling end.

3. Characteristics of the Row

The primary tool for Mercure's pre-organisation of *Tétrachromie* is integral serialism, based on a twenty-four-tone prime row P_F. This prime row is first shown in its complete form beginning at measure 12 (thirty seconds into the composition) in the clarinet. Figure 4 shows the complete row as it appears in the score. The notes that comprise the row come from a two-octave ambitus, meaning that each pitch-class is doubled across the span of the row.

Figure 4. Prime row with articulation groupings, mm. 12–23



Along the top of the staff in Figure 4 are groupings of 3, 4, and 5 pitches (shown by brackets) that Mercure himself wrote into the score. These groupings indicate an important palindromic pattern that I discuss in further detail in Section 3 (Groupings) below. Each grouping is also labelled J1 through J6, designations that are vital later in the analysis.

That Mercure's row has twenty-four tones instead of the standard twelve is a unique feature of this work and one that may be explained only if there are any sketch materials indicating how he chose to set and serialise pitches from two octaves instead of one.[147] As will be shown in more detail later in the analysis, each half of P_F contains only nine different pitch-classes (with three pitch-classes occurring twice). It is possible that Mercure arrived at two complimentary twelve-note patterns to be used together as a twenty-four-note row through square permutations similar to Maderna's magic squares, which he then treated in a standard dodecaphonic method, generating transpositions, inversions, and retrograde forms from a matrix.

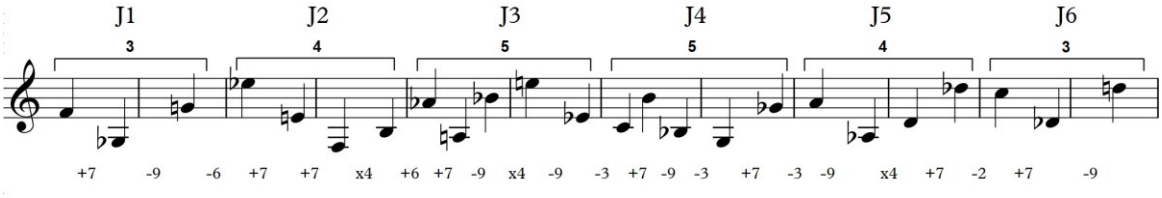
i. Melodic intervals and shape

In the previous chapter, I briefly explored various forms of intervallic control that were being used by members of the Darmstadt school. Figure 5 restates the previous

[147] According to Chayer, there are compositional plans and sketches as well as different stages of manuscripts for *Tétrachromie* housed in the Fonds Pierre Mercure at the National Archives of Quebec. Chayer, "Le Fonds Pierre Mercure des Archives nationales du Québec," pages 58 and 394.

example of P_F, but also shows the melodic intervals created between each note. Major intervals are indicated by a +, minor by a -, and augmented intervals (i.e. the tritone/augmented 4th) by an x.

Figure 5. Prime row with labelled melodic intervals and groupings, mm. 12–23



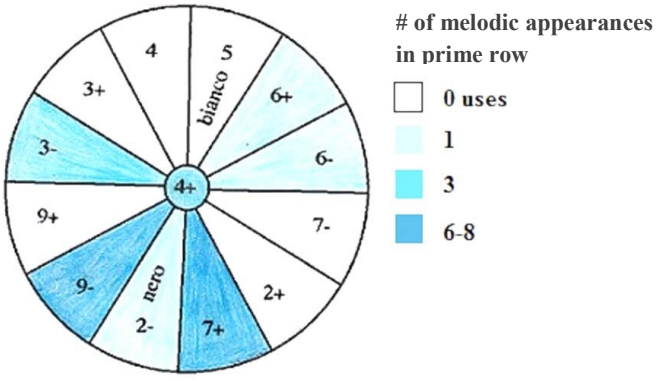
As we can see from Figure 5, Mercure writes large leaps between tones throughout the row, with the majority of intervals being indistinct octaves (major 7ths and minor 9ths discussed previously in reference to Pousseur) and tritones. Interestingly, apart from J1 and J6, J4 is the only grouping that does not contain a melodic tritone. Instead, it has a minor 3rd and is the only grouping to have an interval other than indistinct octaves and tritones: all other minor 3rds, major/minor 6ths, and the minor 2nd occur *between* groupings. If registral concerns are put aside, the major 7ths and minor 9ths both have the quality of a semitone. Yet the dissonance that is created by so many modified semitones and tritones is actually less noticeable due to the frequent octave leaps, leaving the sound to be "indistinct" with more of a registral bandwidth effect than melodic dissonance.

Mercure also alternated the indistinct octaves in his row with some whole-tone intervals. His whole-tone intervals are primarily restricted to tritones and one major 6th, but they offer a balance to the indistinct octaves. Later in this chapter I describe how in the Jaune section of *Tétrachromie,* Mercure sets each row in the percussion section as a succession of six chords (instead of in linear melody), and the vertical setting recalls an evolving field of harmony via connections made by indistinct octaves. There is also a

homophonic passage played by the wind instruments where, although each voice is playing an independent melodic row, the vertical sonorities and voice leading—of primarily indistinct octaves balanced by tritones—create harmonic fields.

The interval control at play in Mercure's construction of the row also recalls Maderna's system of determining and comparing intervallic tension and relaxation as shown in Figure 2. The melodic intervals in Mercure's prime row (see Figure 5 above) are more predominantly taken from the "nero" side of Maderna's interval chart. Figure 6 shows Maderna's diagram again but with areas of the chart shaded according to frequency in the prime row for *Tétrachromie.* The spaces with no shading (3+, 4, 5, 7-, 2+, and 9+) do not occur in Mercure's row. Those with light blue shading (6+, 6-, and 2-) occur once within the row and are generally non-prominent as they exist only between groupings. Two of the three minor 3rd intervals are also used between groupings. The remainder of the intervals used in the row, with the exception of a minor 3rd, form a triangular pattern between minor 9th, augmented 4th, and major 7th, reaffirming the balance between minor 9ths, major 7ths, and the neutral tritone.

Figure 6. Madernian interval chart demonstrating Mercure's use of intervals



From Mercure's frequent use of tension-creating intervals such as the major seventh and minor ninth, it seems evident that he was focused on constructing an intervallically balanced row.

Where Mercure has set the row melodically, it is always in a polyphonic texture between two, three, or four voices. These melodic settings occur in the linear row canon, tremolo, and melodic tuplet textures (recalling the six main textures outlined in the formal timeline in Table 1). Often, subsequent rows in a single instrument are related by tritone transposition or inversion plus transposition of a semitone, as is explained in greater detail below in the section analyses. The frequency of tritone and semitone relationships suggests that Mercure's system incorporates consistencies that span multiple parameters including row construction, choice of permutations, rhythm, and harmonic structures.

ii. Register and number sequence

In Figure 7.1, I have rearranged all of the pitches from the prime row to an ascending chromatic sequence labelled 1 through 24. Figure 7.2 then represents the prime row (from the clarinet at m. 12), using the same numerical system established in 7.1. The numerical sequence that emerges is important to the following analysis, as it outlines the unvarying structure of registral control that appears in all permutations of the row. I return to this numbering system when considering how the row figures rhythmically in *Tétrachromie,* though it is also useful to consider this number sequence in terms of melodic designation—the notes being controlled by register in addition to pitch.

Figure 7.1. Chromatic ambitus of prime row, mm. 12–23

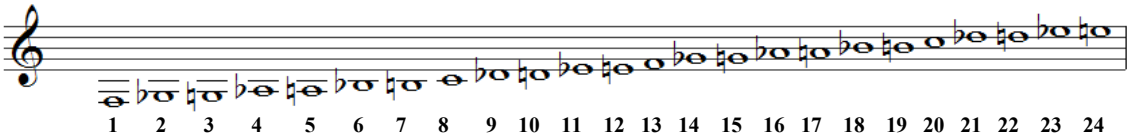
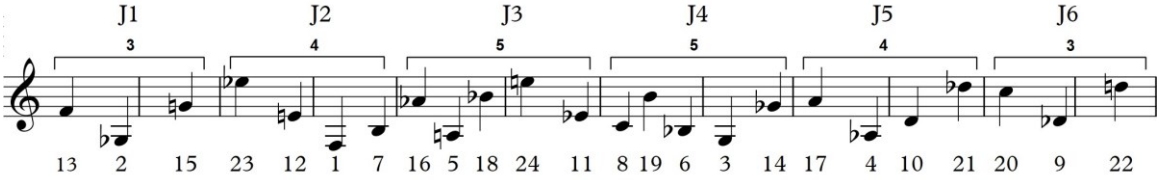


Figure 7.2. Prime row with registral numbering, mm. 12–23



Isolating the numerical sequence of the prime row (P), Table 2 shows a retrograde (R) form of this sequence as well as its inversion (I) and retrograde-inversion (RI) forms. The inversion was determined by subtracting each P number from the total 25 (for instance, the first number in the P series is 13; the difference of 13 from 25 is 12, and so forth). From a compositional perspective, these numbers make it possible to apply any permutation of the row to its corresponding numerical sequence in order to get a formula for dispersing the pitches across a two-octave range.[148]

Table 2. Prime, retrograde, inversion, and retrograde-inversions of number sequence

	J1			J2				J3					J4					J5				J6		
P	13	2	15	23	12	1	7	16	5	18	24	11	8	19	6	3	14	17	4	10	21	20	9	22
R	22	9	20	21	10	4	17	14	3	6	19	8	11	24	18	5	16	7	1	12	23	15	2	13
I	12	23	10	2	13	24	18	9	20	7	1	14	17	6	19	22	11	8	21	15	4	5	16	3
RI	3	16	5	4	15	21	8	11	22	19	6	17	14	1	7	20	9	18	24	13	22	10	23	12

While the above numeric sequences are important for determining the shape of the melody in a row, they are even more integral to how Mercure orders tuplet types in the Rouge section, where each percussionist follows one of the number sequence

[148] Although I have not checked every row in *Tétrachromie* to see how closely Mercure adheres to the system, the rows that I *have* checked consistently follow the sequence.

permutations to determine how many notes are played per measure. For example, the xylophone begins the Rouge section with a twelve-note tuplet, followed by twenty-three notes, ten notes, a duplet, and so on following the inversion (I) sequence. Mercure therefore uses a specific registral formula (pertaining to the numerical sequences outlined above) to determine the melodic characteristics of each row permutation (i.e. how the pitches from a two-octave range are set melodically). This also forms the basis for rhythmic gestures as will be described below in reference to the Rouge section, where the rhythmic tuplet musical texture is comprised of tuplets with one to twenty-four notes played in a single measure, creating a rhythmic structure in which internal rhythms (the tuplets) vary within larger-scale quantified units (each measure).

iii. Pitch groupings and pitch-class-set analysis

Having already considered what the prime row offers in terms of melodic intervals and register, the third row characteristic is that of groupings. The process of grouping a row into trichords, tetrachords, or hexachords has been a standard dodecaphonic device since the Second Viennese School, so it is not surprising that Mercure also creates groupings within his twenty-four-tone row. As we saw in Figures 4 and 5 however, Mercure's row is divided into a palindromic sequence of trichord–tetrachord–pentachord–pentachord–tetrachord–trichord (3–4–5–5–4–3). When setting the row melodically, these groupings are often not structurally significant: the row is played straightforwardly from start to finish with little emphasis given to the groupings.[149]

[149] In the Vert and Blanc sections, the groupings do figure in some of Mercure's rhythmic organisation, despite the groupings being primarily a harmonic device. In these sections, each grouping is always spread out over two measures (and therefore over ten seconds). Trichords have one measure of one note and a second measure of two notes (or vice versa), tetrachords have two measures each with two notes, and

However, while these groups do not figure very strongly in any melodic or horizontal consideration of the row, they are vital to the vertical row presentation (in a chorale texture) throughout the entire Jaune section, in which each group is stacked vertically to create a progression of six chords per row. The result is an obvious change in the soundscape from the melodic material that dominates every other section of the work to shifting harmonic fields.

Mercure's vertical setting of the row's groups can be presented as cross-partition variants. Taken from chorale material in measures 48–58, Figure 8 presents four variants of the vertical row groupings, using the row's order numbers 0 to 23 (not to be confused with the registral numbering system determined above). They are represented with the lowest sounding notes on the bottom and highest on the top of each grouping.

Figure 8. Cross-partition variants in Mercure's rows P_F, RI_E, R_A, and I_{Ab}, mm. 48–58.

P_F					
2	3	10	13	20	23
0	4	9	16	17	21
1	6	7	12	19	22
	5	11	14	18	
		8	15		

RI_E					
1	5	8	15	18	22
2	4	9	12	17	23
0	6	11	16	19	21
	3	7	14	20	
		10	13		

R_A					
0	3	10	13	20	21
2	6	7	14	19	23
1	4	11	16	17	22
	5	9	12	18	
		8	15		

I_{Ab}					
1	5	8	15	18	22
0	6	11	14	19	21
2	4	7	12	17	23
	3	9	16	20	
		10	13		

In each chordal sequence in the Jaune section, the first trichord always contains row order numbers 0 through 2; the following tetrachord contains 3 through 6, and so on. The four examples in Figure 8 represent each permutation type (P, RI, R, and I) and by comparing the individual examples, we notice that the P and I rows are arranged in reverse order: the lowest note in each chord in P_F becomes the highest note in I_{Ab}, etc. The RI and R rows are similarly flipped. Aside from two instances where these vertical

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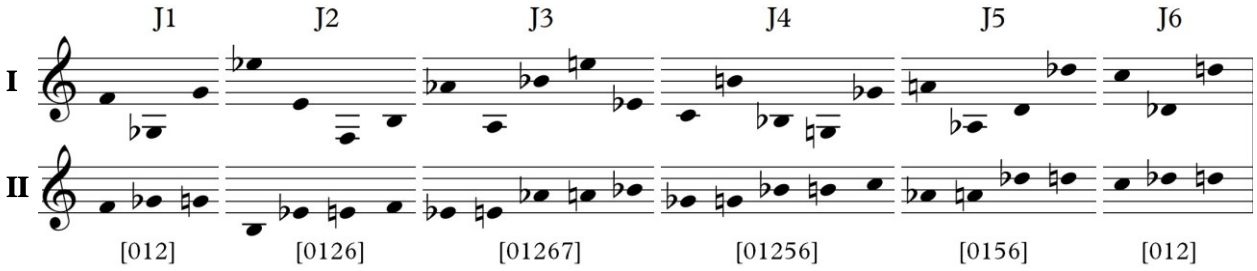
pentachords have one measure of three notes and a second of two notes (or vice versa). In one instance at the end of Vert and beginning of Jaune (mm. 43–50), the rows are written such that each measure contains one grouping, and each half of a row is bracketed by Mercure with a ratio 12:15 (meaning, twelve notes played over fifteen seconds) with instructions of accelerando and rallentando. See Figure 18 for this segment.

orderings are different (in P_A at mm. 58–60, order numbers 19 and 20 are reversed and in R_F in mm. 69–71, order numbers 8 and 7 are reversed), Mercure used only these four basic configurations of the row's groupings.

Mercure's grouped row structure in *Tétrachromie* lends itself to pitch-class-set analysis, where in atonal music theory, it is common to investigate underlying musical and mathematical structures from smaller surface observations (like, for instance, trichords, and tetrachords). Returning to the prime row, in Figure 9 I have extracted each grouping in the first stave (I) and rearranged the pitches to normal order (the closest chromatic distance in ascending order) in the second stave (II). I have determined five different pitch-class sets that are generated from the six groupings in the row. They are [012], [0126], [01267], [0156], and again [012]. Like the groupings in previous examples, each set is labelled J1 through J6.

Figure 9. Prime row groupings in melodic and normal order.



There is an additive and subtractive effect from set to set: [012] becomes [0126] with an added tritone, which then becomes [01267] once another semitone is added (creating another tritone). Then the semitone is shifted to a different location (this time inside the tritone) to create [01256], a semitone subtracted to [0156], and then the set undergoes a shift and subtraction again to return to [012]. On removing the strict melodic arrangement of each grouping (in order to put the pitches in normal order), we observe at least two

semitones in each set and, in the four internal sets, at least one tritone (the 0–6 and 1–7 intervals). These intervals are shown in Table 3, which displays the interval vector of each pitch-class set – the interest here being the first (number of semitones) and last (number of tritones) values in the vector.

Table 3. Interval vectors of pitch-class sets J1 to J6

	Pitch-class set	**Interval vector**
J1	[012]	<2,1,0,0,0,0>
J2	[0126]	<2,1,0,1,1,1>
J3	[01267]	<3,1,0,1,3,2>
J4	[01256]	<3,1,1,2,2,1>
J5	[0156]	<2,0,0,1,2,1>
J6	[012]	<2,1,0,0,0,0>

When observing the row in its melodic form at the beginning of this chapter, I noted that the fourth grouping (J4) did not contain a tritone (as articulated in melodic succession), while the other groups (excluding J1 and J6) did. This is because the tritone in the [01256] set is isolated to the 0 and 6 which correlate melodically to the C and G♭ at the beginning and end of the group. The tritone is therefore still present within the group as a whole and, when the group is presented as a single chord, the tritone between the C and the G♭ becomes evident.

In the early 1990s, music theorists Henry Klumpenhouwer and David Lewin began to publish their research on how to expand pitch-class-set (pcset) analysis to the point of relating non-identical pcsets by determining transformations and isographies through series of networks called Klumpenhouwer Networks, or K-nets.[150] The different pcsets in

[150] See Henry Klumpenhouwer, "A Generalized Model of Voice-leading for Atonal Music," Ph.D. diss. (Ann Arbor, MI: Harvard University, 1991) or David Lewin, "Klumpenhouwer Networks and Some Isographies That Involve Them," *Music Theory Spectrum* 12, no. 1 (1990): 83–120.

Mercure's row for *Tétrachromie* (as identified in Figure 9 and Table 3) provide a good opportunity to utilise the K-net formula to arrive at a greater understanding of how these sets are heard, especially when played as chords in the Jaune section. With J1 and J6 bookending the row, being identical to each other, and containing only semitone relationships, I have removed them from the following analysis in order to consider the central tetrachords and pentachords, J2 through J5.

From J2 through J5, one can extract two different trichord sets that are common to each set. These are [015] and [016], demonstrated in Tables 4.1 and 4.2. In some cases, there is more than one possibility for a [015] or [016] trichord. J2 only ever has one option and J5 always has two. The pentachords J3 and J4 have either two or three manifestations of the [015] and [016] trichords. In Tables 4.1 and 4.2, the pcsets are displayed in reverse order so as to match the pitches' normal order (for the sake of simplicity, the set has not been reversed from its normal order). The pitches are given in the form of their letter names instead of integers, to reduce confusion by multiple systems of numeration and to more easily translate to K-net diagrams in the following figures. Similarly, to simplify future figurations, I have chosen which of the multiple possibilities I would use in further analysis. My choices, displayed in bold text, were made by selecting the notes that maintain the same direction of ordering as in the [0126] tetrachord (J2), and that avoid the $B^{\flat}$ (which, melodically, is the middle note of both pentachords and forms somewhat of an axis of symmetry).

Table 4.1. [015] trichords extracted from J2 to J5 groupings

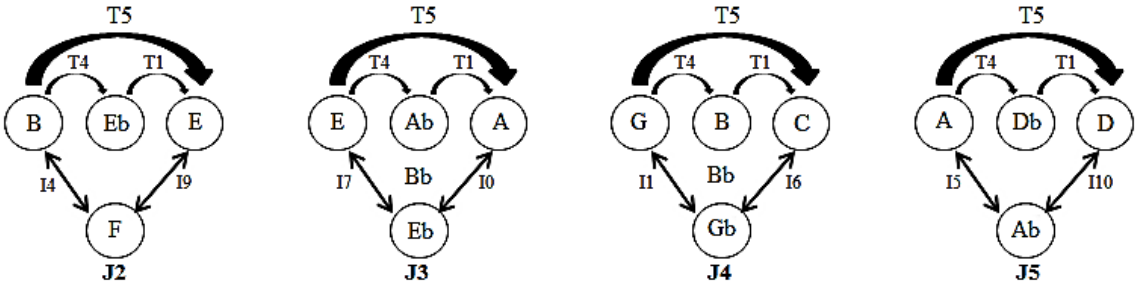
	J2				**J3**					**J4**					**J5**			
pcset	6	2	1	0	7	6	2	1	0	6	5	2	1	0	6	5	1	0
normal order	B	E♭	E	F	E♭	E	A♭	A	B♭	G♭	G	B♭	B	C	A♭	A	D♭	D
[015] options	**5**	**1**	**0**		**5** 0	1	**1** 5	**0**		5 0	**5** 1	1 5	0 **1**	**0**	0	1 **5**	5 **1**	**0**

Table 4.2. [016] trichords extracted from J2 to J5 groupings

	J2				**J3**					**J4**					**J5**			
pcset	6	2	1	0	7	6	2	1	0	6	5	2	1	0	6	5	1	0
normal order	B	E♭	E	F	E♭	E	A♭	A	B♭	G♭	G	B♭	B	C	A♭	A	D♭	D
[016] options	**6**		**1**	**0**	 **6** 0	6 1	 **1**	1 **0** 6	0	0 **6**			1 **1**	6 **0**	0 **6**	1	 **1**	6 **0**

Starting with the [015] trichords in Table 4.1, I have chosen to use the following combinations as corresponding pcsets: [B – E♭ – E], [E – A♭ – A], [G – B – C], and [A – D♭ – D]. Figure 10 shows these four sets with the chosen [015] pitches forming the top nodes of a parachute K-net diagram. The remaining note in the case of the tetrachords is placed below to form the bottom node of the parachute. In both of the pentachords, the B♭ has been left floating inside the parachute, not as a node at all, so as to transform the set into a tetrachord. The diagrams are labelled on the bottom from J2 to J5, and all transposition and inversion relationships between nodes are identified on each diagram.

Figure 10. [015] tetrachords represented in K-net diagrams



In each of the four diagrams above, there is a total transposition of T5 between the first and third nodes, with T4 and T1 making up the inner relationships. To relate the bottom nodes of the diagrams to the initial [015] trichord, we must discover the value of the inversions between the separate nodes, and in order to determine a specific inversion, each pitch must be translated into its integer (understanding that C=0). Because the pitches are all different, the resulting inversions are unique to each diagram: J2 has an I4 between B and F (found from B=11 and F=5, 11 + 5 = I4), and an I9 between E and F. In J3, I7 relates E and E♭, and I0 relates A and E♭. G and G♭ are related by I1 in J4, and C and G♭ are related by I6. Finally in J5, I5 relates A to A♭ and I10 relates D to A♭.

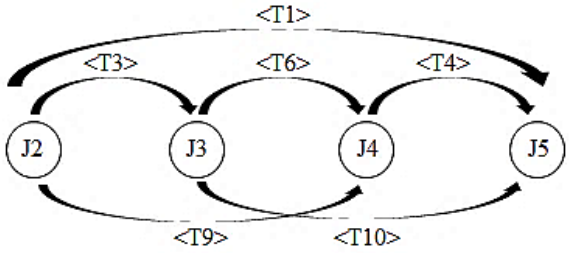
Since the transpositions are identical through each diagram, they do not actually tell us much in terms of relating the individual sets. Therefore, we must look at the inversion vectors to determine larger-scale automorphisms that will relate separate sets. As we can see in the previous example, the J2 tetrachord contains inversions I4 and I9. J3 contains I7 and I0, J4 contains I1 and I6, and J5 contains I5 and I10. By extracting the I values and finding the difference between two identical chart positions, the left-most column in Table 5 identifies the common connection between each parachute diagram. In order to

get from one tetrachord to the next, we must isolate the variable that connects both I positions (labelled *n* in each calculation). In every case, *n* becomes the automorphic transposition between tetrachords. Figure 11 rearranges the bolded information from Table 5, showing the organic flow of these four groupings.

Table 5. Automorphisms between each [015] tetrachord, J2 through J5

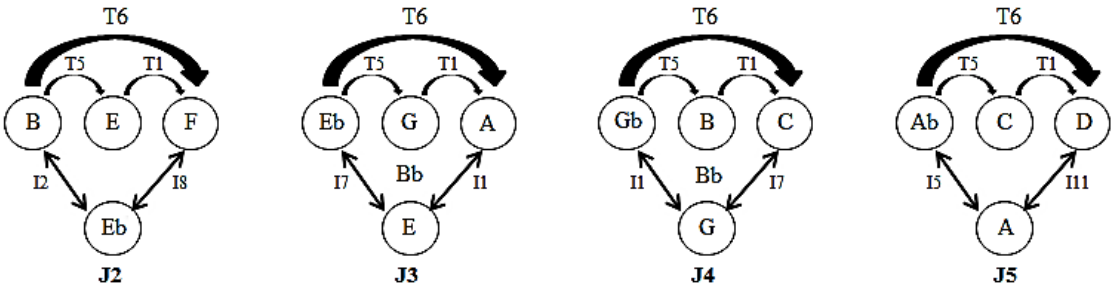
J2 and J3	$4 + n = 7$ $9 + n = 0$	$n = 3$	**<T3>**
J2 and J4	$4 + n = 1$ $9 + n = 6$	$n = 9$	**<T9>**
J2 and J5	$4 + n = 5$ $9 + n = 10$	$n = 1$	**<T1>**
J3 and J4	$7 + n = 1$ $0 + n = 6$	$n = 6$	**<T6>**
J3 and J5	$7 + n = 5$ $0 + n = 10$	$n = 10$	**<T10>**
J4 and J5	$1 + n = 5$ $6 + n = 10$	$n = 4$	**<T4>**

Figure 11. Visual representation of [015] automorphisms



Before making any conclusions, let us recall that it was also possible to create K-net diagrams from the [016] trichords as identified in Table 4.2. The following examples go through the same process as was just completed with the [015] isolations. The notes I have chosen in Table 4.2 for the [016] sets are [B – E – F], [E♭ – A♭ – A], [G♭ – B – C], and [A♭ – D♭ – D]. Figure 12 provides these sets rearranged into K-net parachute diagrams.

Figure 12. [016] tetrachords represented in K-net diagrams



As previously, the top three nodes of the parachute produce identical transpositions between each tetrachord: T5, and T1, and T6 overall. Additionally, there are different inversions connecting the bottom node of the parachute. This time, as we will see in Figure 13, these inversion numbers yield not only transpositional automorphisms (as was the case with the [015] sets), but also inversional automorphisms, which are discovered by adding identically-located I numbers to produce the same variable *k*. All automorphisms between [016] parachute diagrams are presented in Table 6.

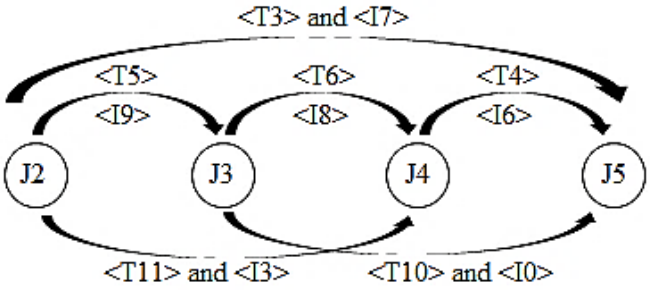
Table 6. Automorphisms between each [016] tetrachord, J2 through J5

J2 and J3	$2 + n = 7$ $8 + n = 1$	$2 + 7 = k$ $8 + 1 = k$	$n = 5$ $k = 9$	**<T5>** **<I9>**
J2 and J4	$2 + n = 1$ $8 + n = 7$	$2 + 1 = k$ $8 + 7 = k$	$n = 11$ $k = 15$ (3)	**<T11>** **<I3>**
J2 and J5	$2 + n = 5$ $8 + n = 11$	$2 + 5 = k$ $8 + 11 = k$	$n = 3$ $k = 19$ (7)	**<T1>** **<I7>**
J3 and J4	$7 + n = 1$ $1 + n = 7$	$7 + 1 = k$ $1 + 7 = k$	$n = 6$ $k = 8$	**<T6>** **<I8>**
J3 and J5	$7 + n = 5$ $1 + n = 11$	$7 + 5 = k$ $1 + 11 = k$	$n = 10$ $k = 12$ (0)	**<T10>** **<I0>**
J4 and J5	$1 + n = 5$ $7 + n = 11$	$1 + 5 = k$ $7 + 11 = k$	$n = 4$ $k = 6$ (18)	**<T4>** **<I6>**

Figure 13 shows these transpositional and inversional automorphisms rearticulated in a flow chart similar to Figure 11. Comparing the two automorphism flow charts (Figures 11 and 13), we see that in both cases of [015] *and* [016] arrangements, the transposition between J3 and J4 is <T6>, between J4 and J5 is <T4>, and between J3 and J5 is <T10>.

This tells us that there is consistency within the system no matter what trichord is chosen to relate the pitch-class sets. However, the [016] option yields more information (in that, there are both transpositional and inversional automorphisms as compared to only transpositional in the [015] diagrams).

Figure 13. Visual representation of [016] automorphisms



Because the conclusions made in the last few examples are dependent on the pitches from the prime row, the results would be different for each row permutation. However, in both Figures 11 and 13, we observe a <T6> automorphism between J3 and J4, the central groupings in the row, suggesting a symmetricality around the tritone transposition at the centre of the row, between the two halves of the row. We also know that, in the original order of the row, the pentachords always have matching central pitches ($B^{\flat}$), and we can base somewhat of an axis of symmetry around these pitches.

iv. The matrix

In *Tétrachromie,* Mercure uses almost every permutation of the prime row, P_F. Table 7 presents the complete 24 x 24 matrix, constructed from P_F. To visually simplify the matrix, I give the pitches in integer form (where C=0) rather than letter names, but the rows themselves are labelled according to letter names to avoid complicating intervallic relations. This way, the starting pitch for all prime and inversion rows is also the letter-

name given to their retrograde forms (example: R_F is a retrograde of P_F, not starting with but ending on an F). Because of the sheer size of the row and accordingly, the matrix, it quickly becomes quite unwieldy and creates a problem for presentation.

Table 7. 24-tone matrix for *Tétrachromie* (with colour coding)

	I_F	I_{Gb}	I_G	I_{Eb}	I_E	I_F	I_B	I_{Ab}	I_A	I_{Bb}	I_E	I_{Eb}	I_C	I_B	I_{Bb}	I_G	I_{Gb}	I_A	I_{Ab}	I_D	I_{Db}	I_C	I_{Db}	I_D	
P_F	5	6	7	3	4	5	11	8	9	10	4	3	0	11	10	7	6	9	8	2	1	0	1	2	R_F
P_E	4	5	6	2	3	4	10	7	8	9	3	2	11	10	9	6	5	8	7	1	0	11	0	1	R_E
P_{Eb}	3	4	5	1	2	3	9	6	7	8	2	1	10	9	8	5	4	7	6	0	11	10	11	0	R_{Eb}
P_G	7	8	9	5	6	7	1	10	11	0	6	5	2	1	0	9	8	11	10	4	3	2	3	4	R_G
P_{Gb}	6	7	8	4	5	6	0	9	10	11	5	4	1	0	11	8	7	10	9	3	2	1	2	3	R_{Gb}
P_F	5	6	7	3	4	5	11	8	9	10	4	3	0	11	10	7	6	9	8	2	1	0	1	2	R_F
P_B	11	0	1	9	10	11	5	2	3	4	8	9	6	5	4	1	0	3	2	8	7	6	7	8	R_B
P_D	2	3	4	0	1	2	8	5	6	7	1	0	9	8	7	4	3	6	5	11	10	9	10	11	R_D
P_{Db}	1	2	3	11	0	1	7	4	5	6	0	11	8	7	6	3	2	5	4	10	9	8	9	10	R_{Db}
P_C	0	1	2	10	11	0	6	3	4	5	11	10	7	6	5	2	1	4	3	9	8	7	8	9	R_C
P_{Gb}	6	7	8	4	5	6	0	9	10	11	5	4	1	0	11	8	7	10	9	3	2	1	2	3	R_{Gb}
P_D	7	8	9	5	6	7	1	10	11	0	6	5	2	1	0	9	8	11	10	4	3	2	3	4	R_D
P_{Bb}	10	11	0	8	9	10	4	1	2	3	9	8	5	4	3	0	11	2	1	7	6	5	6	7	R_{Bb}
P_B	11	0	1	9	10	11	5	2	3	4	8	9	6	5	4	1	0	3	2	8	7	6	7	8	R_B
P_C	0	1	2	10	11	0	6	3	4	5	11	10	7	6	5	2	1	4	3	9	8	7	8	9	R_C
P_{Eb}	3	4	5	1	2	3	9	6	7	8	2	1	10	9	8	5	4	7	6	0	11	10	11	0	R_{Eb}
P_E	4	5	6	2	3	4	10	7	8	9	3	2	11	10	9	6	5	8	7	1	0	11	0	1	R_E
P_{Db}	1	2	3	11	0	1	7	4	5	6	0	11	8	7	6	3	2	5	4	10	9	8	9	10	R_{Db}
P_D	2	3	4	0	1	2	8	5	6	7	1	0	9	8	7	4	3	6	5	11	10	9	10	11	R_D
P_{Ab}	8	9	10	6	7	8	2	11	0	1	7	6	3	2	1	10	9	0	11	5	4	3	4	5	R_{Ab}
P_A	9	10	11	7	8	9	3	0	1	2	8	7	4	3	2	11	10	1	0	6	5	4	5	6	R_A
P_{Bb}	10	11	0	8	9	10	4	1	2	3	9	8	5	4	3	0	11	2	1	7	6	5	6	7	R_{Bb}
P_A	9	10	11	7	8	9	3	0	1	2	8	7	4	3	2	11	10	1	0	6	5	4	5	6	R_A
P_{Ab}	8	9	10	6	7	8	2	11	0	1	7	6	3	2	1	10	9	0	11	5	4	3	4	5	R_{Ab}
	RI_F	RI_{Gb}	RI_G	RI_{Eb}	RI_E	RI_F	RI_B	RI_{Ab}	RI_A	RI_{Bb}	RI_E	RI_{Eb}	RI_C	RI_B	RI_{Bb}	RI_G	RI_{Gb}	RI_A	RI_{Ab}	RI_D	RI_{Db}	RI_C	RI_{Db}	RI_D	

Even though the pitch displacement over two octaves is a vital step in Mercure's melodic setting of the rows, I have opted against determining register within the matrix. Thus it would seem as though there are two identical forms of every row. In order to decrease the visual complication (if ever so slightly), the matrix is colour coded with only one form of each duplicate row highlighted. The colour coordination is such that the columns (I and RI series) are coloured blue and the rows (P and R series) are coloured

red.[151] Where both column and row coincide, it is coloured purple. The text that is shaded in grey (instead of bold black) indicates pitches in a duplicate series.

4. Serial Organisation and Aural Characteristics by Section

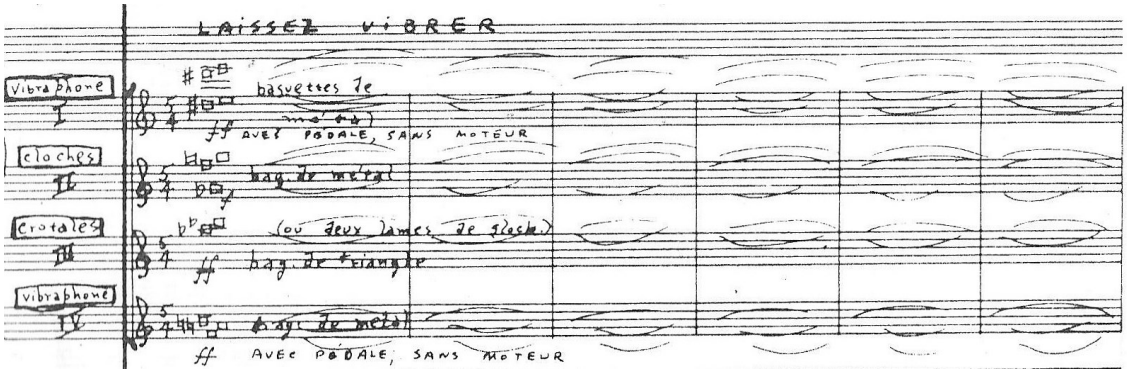
For the remainder of this chapter, I discuss the individual sections of *Tétrachromie*. I refer to the rows determined by the matrix in Table 7 when describing the row constructs in each musical texture identified in Table 1: 12-note chord, cymbal pattern, linear row canon, vertical row chorale, tremolo texture, and melodic tuplet pattern. In order of appearance in each section, I describe the serial organisation of these musical textures and also comment on how the tape track might interact with what is in the score. Most references to timing are to written times in the score (provided alongside measure numbers) and I clearly state when I specifically refer to the recording.

i. Vert

Tétrachromie opens with a fortissimo twelve-note chord from two vibraphones, cloches, and crotales. The chord, shown in Figure 14.1, does not create a twelve-tone chromatic aggregate, but represents the pitches from the first half of P_F: F – G♭ – G – E♭ – E – F – B – A♭ – A – B♭ – E – E♭. The first three notes of the series are played in the cloches, the first vibraphone plays both E♭ – E dyads, while A♭ and B♭ are sounded by crotales, and the second vibraphone plays the remaining F, A, and B.

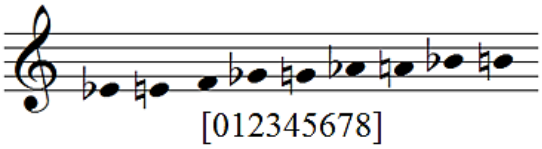
[151] This colour coordination is maintained in further analytical figures, where different row types are correspondingly labelled in blue (I and RI) or red (P and R) ink.

Figure 14.1 Opening twelve-note chord, mm. 1–5



In this chord, the nine different pitch classes (with three notes doubled at the octave) form, when reduced, an ascending chromatic scale from E♭ to B, with the first three notes doubled. Figure 14.2 shows the nine pitch classes of Figure 14.1 reduced to a "chromatic nonamirror," or nine-note pcset constructed from an ascending chromatic scale.[152]

Figure 14.2. Chromatic nonamirror created by opening 12-note chord



Following the initial strike, the chord is left to sound until it dissipates and the soundscape changes to the next texture, yet it is almost as if the surprise from the loud and unexpected chord is etched in the audience's memory as the "big bang" that begins the life cycle.

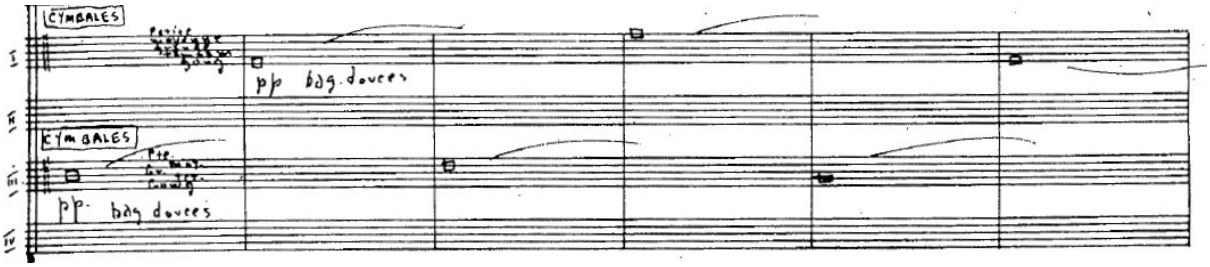
Immediately after the attack of this chord, the electronic sounds of the tape track emerge and take over the aural experience. In the Toronto recording, I hear short sounds that have the quality of a water drip (both high and low frequencies), with a strong attack and a softer after-effect (similar to the sounds in Hugh Le Caine's *Dripsody* from 1955).

[152] See Larry Solomon, "Table of Pitch Class Sets" (1997/2005), http://solomonsmusic.net/pcsets.htm

These tape sounds immediately adjust the ear to a more pointillistic soundscape than the harsh chord that begun the work, as if the sound is assembling itself from disjointed areas. This is where, in the recording, we hear the clarinet opening with P_F, and the vibraphone, saxophone, and bass clarinet following in canon.

In the score, however, there is a minute of intermittent time between the twelve-note chord and the entrance of the clarinet. At measure 6 (thirty seconds into the score), a cymbal duet begins with one cymbal strike per measure, alternating measures between the two players (each using a set of five differently sized cymbals). In Figure 15, we observe that Mercure has assigned a specific cymbal to each line on the staff (in the top – I – and third from top – III): these are petite, moyenne, grande, tam tam, and gong.

Figure 15. Beginning of cymbal texture, mm. 6–11



I have assigned roman numerals *i* through *v* to each cymbal (with *i* being the gong on the first staff line in Fig. 15, and *v* the "petite" cymbal on the fifth staff line). Table 8 provides a representative map of the four percussion parts from the beginning to the end of the cymbals (mm. 6–52). As evidenced in Figure 15, percussionists I and III play the cymbal pattern, the two parts alternating one cymbal strike per measure. Considering both parts as one, there are twenty-four cymbal strikes before the pattern occurs again in retrograde. The twenty-fourth cymbal is the "petite" (*v*) cymbal in m. 29, played by percussion I. This cymbal also serves as the central point of the palindrome, thus being

the first value in the next sequence of twenty-four cymbal strikes. Some patterns emerge in the individual parts. For instance, percussion I frequently alternates between *iii* and *iv* ("moyenne" and "grande") while percussion III has dyad repetitions *ii* and *ii* (tam tam) as well as *i* and *v* (gong and "petite").[153]

Table 8. Percussion map for cymbal sequence, mm. 6–52

m.	6					12						18			(21)			24							
I		*i*		*v*		*i*		*iii*		*iv*		*iii*		*iv*		*i*		*iv*		*iii*		*iv*		*v*	
II																vibraphone plays I_G in canon texture									
III	*iii*		*iv*		*ii*		*ii*		*i*		*v*		*ii*		*ii*		*iii*		*i*		*v*		*ii*		
IV																									

m.	30			(33)		36						42						48							
I		*iv*		*iii*		*iv*		*i*		*iv*		*iii*		*iv*		*iii*		*i*		*V*		*i*			
II																			vibraphone chorale (P_F)						
III	*ii*		*v*		*i*		*iii*		*ii*		*ii*		*v*		*i*		*ii*		*ii*		*iv*		*iii*		
IV				vibraphone plays I_{Db} in canon texture															vibraphone chorale (P_F)						

Table 8 also shows what is played by percussion lines II and IV, both on vibraphone. At m. 21, percussion line II joins the wind instruments in the linear canon texture (described in further detail below) playing row I_G. At m. 33, percussion line IV takes over the canon texture while playing I_{Db}. Measure 48 marks the beginning of the Jaune section, at which point both percussion lines II and IV simultaneously play the pitches of P_F in chorale formation (see discussion of Jaune below).

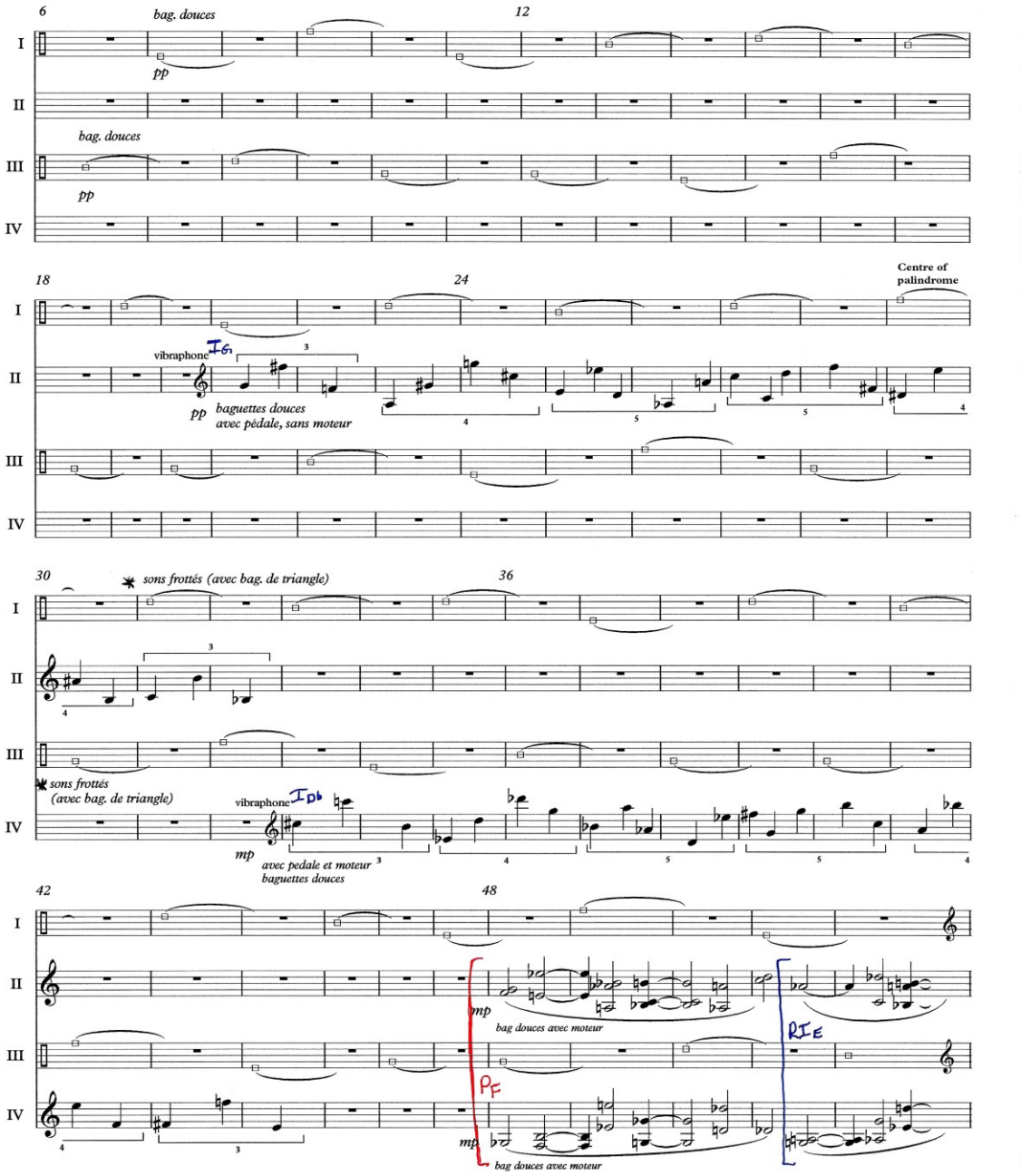
Figure 16 shows the same material as in Table 8, now as it appears in the score with Mercure's dynamics and performance instructions. The centre of the palindrome is identified at the end of the second system in the figure (m. 29). For the cymbal strikes

[153] Given Mercure's attention to detail in every other aspect of this work, I suspect that the arrangement of the cymbals in this section follows a specific system, however I have not been successful as yet in 'cracking the code' to Mercure's compositional intentions. What is clear is that there is symmetry and palindrome in effect, as well as some adherence to the twenty-four-tone structure, all of which we see in other parts of *Tétrachromie*.

that immediately follow m. 29, we can observe in the third system a change in performance instruction: Mercure initially asks for soft mallets on the cymbals, but for the second part of the palindrome he indicates that the percussionists make "sons frotté" or "rubbing sounds" with triangle beaters (marked in Figure 16 with asterisks). This change would create a more metallic and obscured sound as compared to the first twenty-four cymbal strikes with soft mallets. At the same time as the percussionists change to triangle beaters, Mercure provides instruction for the tape realisation (not shown in Figure 16). He writes: "échelle progressivé [*sic*] de densité" and, with the entrance of percussion IV vibraphone at m. 33, Mercure adds "augmenter l'amplitude progressivement jusqu'à la septième minute."[154] The centre of the cymbal palindrome therefore marks the point at which the Vert section begins its crescendo into Jaune and through to the seventh minute.

[154] See page 3 in the *Tétrachromie* score.

Figure 16. Percussion score during cymbal section, mm. 6–52



The vibraphone parts in percussion II and IV are components of the linear row canon texture which also begins in the Vert section, as we know, with P_F in the clarinet at m. 12. The canon in this section is in four parts played by the clarinet, saxophone, bass clarinet, and vibraphone; each instrument playing individual series (identified in the matrix) which

span twelve measures. There are three measures between the entry of each row (shown by the first clarinet and bass clarinet entries in Figure 17), and every instrument plays two rows, one immediately following the other. Figure 17 also includes written instructions from Mercure, for the wind instrumentalists to ensure their tone mixes well with the electronic tape and to avoid giving the impression of rigorous meter prior to m. 48 (beginning of Jaune). Table 9.1 shows the pattern of row entries between mm. 12 and 44, and Table 9.2 shows the same section with the rows represented as a timeline.

Figure 17. Beginning of canon section, mm. 12–17[155]

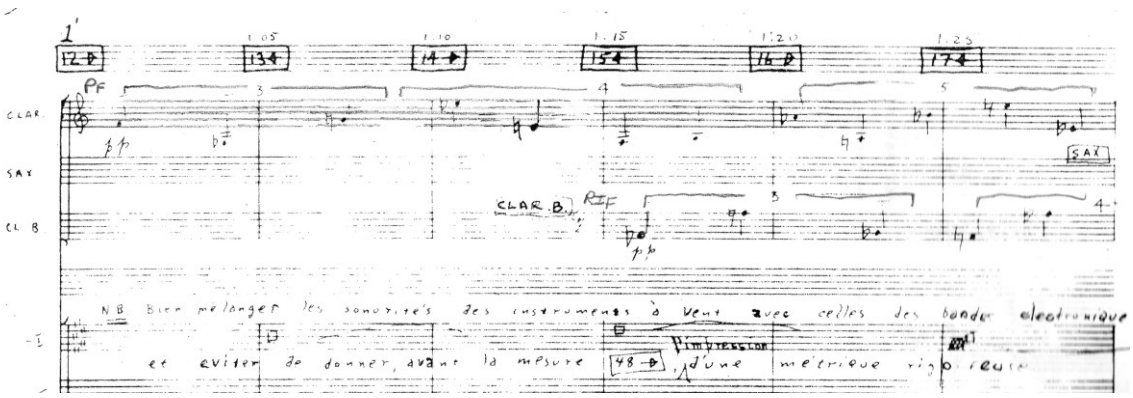


Table 9.1. Row series used in canon, mm. 12–44

Measures	Instrumentation	Row
12–23	clarinet	P_F
15–26	bass clarinet	RI_F
18–29	saxophone	R_G
21–32	vibraphone	I_G
24–35	clarinet	P_B
27–38	bass clarinet	RI_B
30–41	saxophone	R_{Db}
33–44	vibraphone	I_{Db}

[155] Although the imaging quality is poor, Mercure's instructions can still be made out: "N.B. Bien mélanger les sonorités des instruments à vent avec celles des bandes électroniques et éviter de donner, avant la mesure [48→], l'impression d'une métrique rigoureuse." See *Tétrachromie* score, page 2.

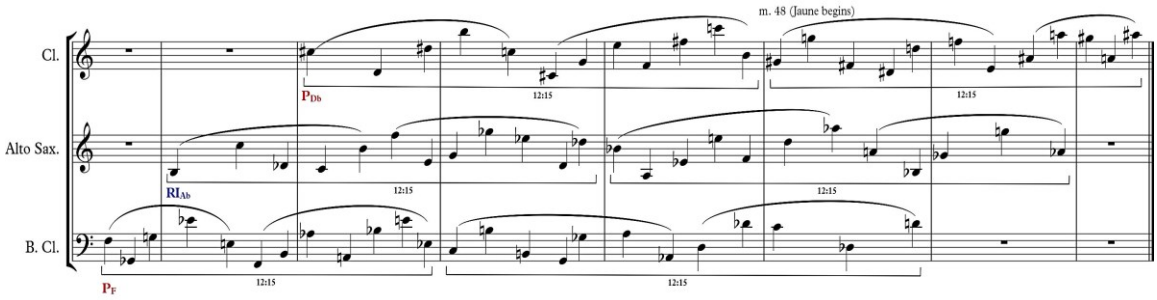
Table 9.2. Linear representation of canon, mm. 12–44

	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Clar	P_F												P_B																				
Bass clar				RI_F													RI_B																
Sax							R_G												R_{Db}														
Vibr										I_G												I_{Db}											

As we can see from these two charts, Mercure uses all four types of row permutation (i.e. transposition, inversion, retrograde, and retrograde-inversion) in the Vert canon material. The clarinet and bass clarinet voices are paired (in terms of their row starting pitches), as are the saxophone and vibraphone. Each voice plays from the same basic root pitch as their pair, only in retrograde-inversion. For example, P_F in the clarinet is followed by RI_F in the bass clarinet, and R_{Db} in the saxophone is followed by I_{Db} in the vibraphone. Another connection between the rows is that the consecutive rows played by a single instrument are separated by tritone transposition. So, P_B in the second part of the clarinet (measures 24–35) is transposed from P_F by an augmented fourth. The same is true for the other instruments. The tritone, which we have also seen to be prominent in the construction of the prime row, is here an example of larger-scale melodic organisation.

Between measures 44 and the beginning of the Jaune section, there is another brief canon figure, but this time presenting only one row per instrument, and now just clarinet, saxophone, and bass clarinet. The rhythm here is faster-paced and drives the shift from one section to the next. Figure 18 shows how the three rows associate with one another. This time, the canon has only one measure between entries, and each row only spans six measures as opposed to twelve in the previous canon. Each of the previously established groupings (of 3, 4, or 5) is accorded one measure.

Figure 18. Three-part canon passage, mm. 43–50



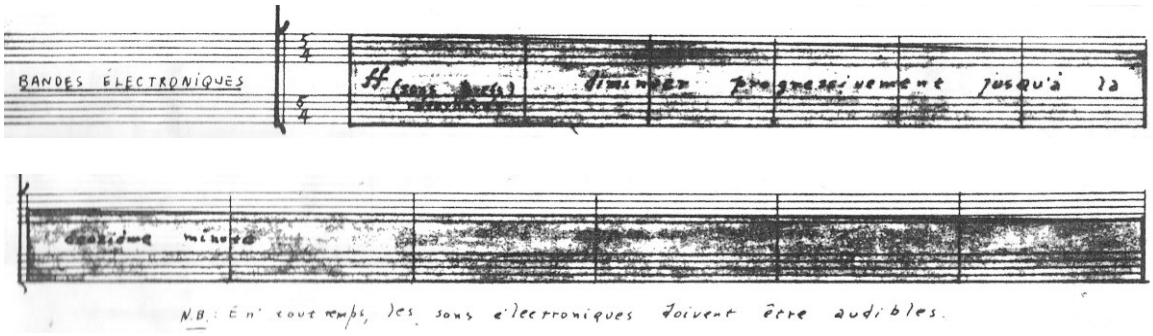
Another method of grouping that Mercure suggests in the above passage is groups of 5 and 7. Each row is divided into four groups with slur lines marking out 5–7–7–5. In no other part of *Tétrachromie* does Mercure suggest groupings of 5 and 7, nor does he indicate a 12:15 ratio (suggesting 12 notes per 15 seconds) on any other half-row.

The passage in Figure 18 is unique not only for its method of grouping the notes in the series but also for its rhythmic emphasis on the 3–4–5–5–4–3 grouping structure. In no other canon material in the composition is the row so compartmentalised. This excerpt also happens over the boundary between Vert and Jaune, the second section of the composition beginning halfway through the clarinet's P_{Db} presentation, at which point Jaune's chorale material begins.

The overall effect of Vert is that of growth, a metaphoric image also implied by *Tétrachromie*'s programme notes suggesting that Vert is the "springtime" of one's life. As mentioned previously, the piece begins forcefully with the twelve-note chord but immediately softens to disassembled electronic sounds, cymbals struck at a *pianissimo* dynamic with soft mallets, and the wind instruments with dampened vibraphone also playing *pianissimo*. Similarly, the electronic tape representation provided by Mercure in the score shows a *fortissimo* entrance (at the same instant as the 12-note chord) that

progressively diminishes for the first two minutes. Mercure's tape representation is shown in Figure 19.

Figure 19. Visual representation of electronic tape, mm. 1–11

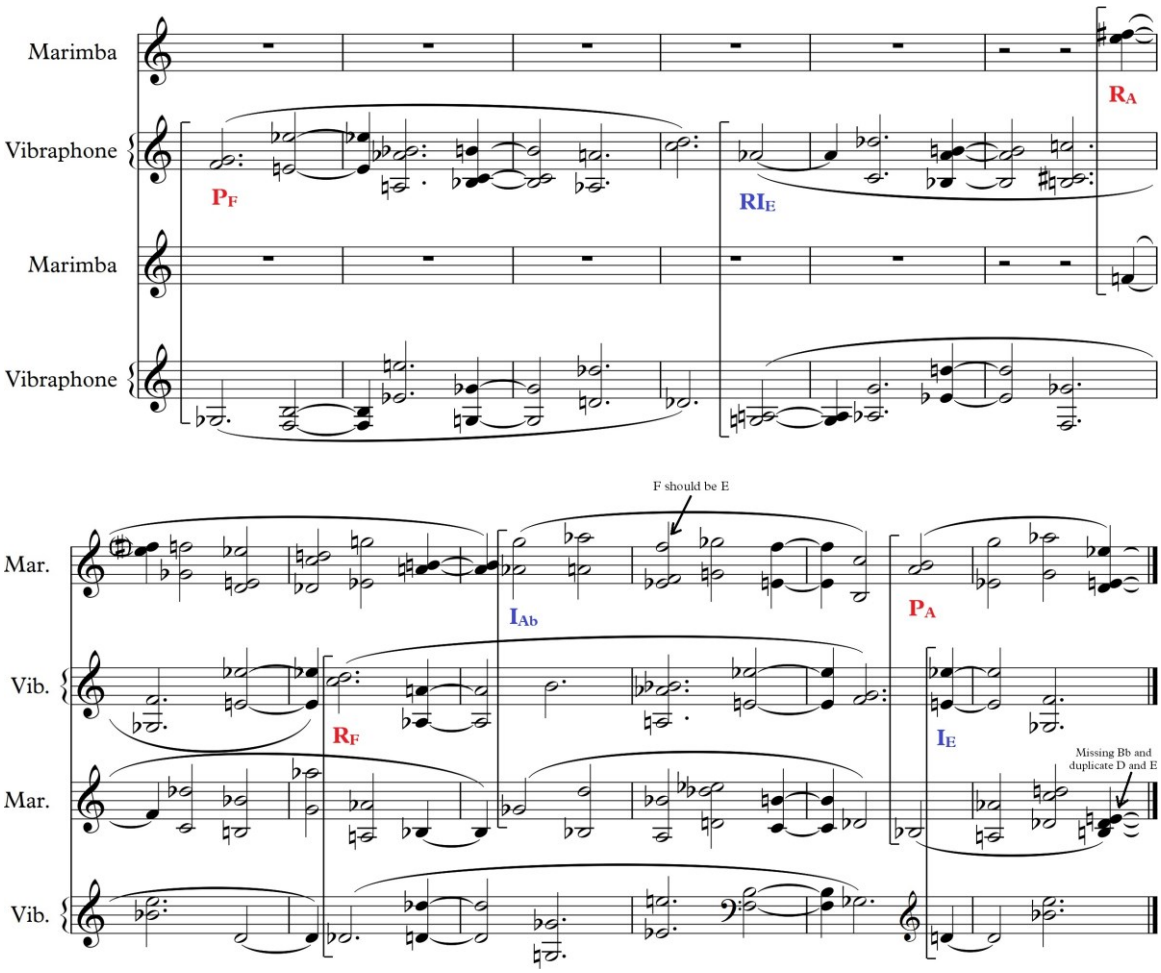


The height of Mercure's tape illustration, which presumably refers to amplitude, steadily decreases to almost nothing at m. 28 (2:20), and then begins its crescendo with the winds and cymbals at m. 30. In the recording, the electronic sounds are highly evident from the first measure, becoming sparser with the entrance of the canon material. The tape seems to almost disappear completely from the soundscape until the chorale texture begins in Jaune, approximately three minutes into the recording.

ii. Jaune

As we know, the "Vertical row chorale" indicated in Table 1 is solely relegated to the Jaune section and is played by the pitched percussion instruments (two vibraphones and two marimbas). Figure 20 shows the first twelve measures of the Jaune section (timing: four to five minutes) in the vibraphones and marimbas. At measure 51, when the canon material shown in Figure 18 has ended, the reed instruments rest for just fewer than six measures before beginning the next canon section (described below).

Figure 20. Percussion chorale, mm. 48–59.[156]



The vibraphones begin the Jaune section with the prime row, P_F, which is played between the two instruments in a series of six chords. The first and last chords in the series consist of only three notes (two in the upper voice and one in the lower voice). In the second and fifth tetrachords, both vibraphones play two notes, and in the middle (third and fourth) chords, the upper voice plays three notes while the lower has two, to

[156] I have indicated in the marimba parts of Figure 20 two instances of "wrong" notes, or notes that do not coincide with the matrix. While there are similar errors in other moments in the score, the nature of the wrong notes are fleeting, suggesting little beyond a simple error in Mercure's charts. In this example, there is an F where Mercure should have written an E in the upper voice on the first pentachord in I_{Ab} at m.57. Then, in the last chord of the excerpt there are two extra notes in place of one missing, making a duplicate D–E dyad in place of a B♭.

form pentachords. The disposition of notes is flipped for the trichords in the next row presentation (RI_E), with a dyad played in the lower voice and monad in the upper.

The marimbas enter in the last second of m. 53 in the first system of Figure 20 (so, at 4:29) beginning R_A between the two voices. They play at a diminished rhythm (of two beats/seconds per chord) from what the vibraphone rhythm where each chord sounds for three beats/seconds.

Within the sample given in Figure 20, a pattern of row types emerges. In the vibraphones, P_F and R_E are followed by their retrograde forms R_F and I_E. The marimbas, which begin when the second vibraphone series is already nearly complete, play R_A and I_{Ab}, followed by P_A. Beyond the excerpt, this part becomes increasingly more complex, as shown in Figure 21. The first difference in complexity is that after P_A is played in the marimbas, the rhythm is condensed again to dotted-quarter-note durations (one and a half seconds each). The second difference is in the method of pitch and row organisation. Figure 22 isolates measures 61–63 from the marimbas only, indicating how the serial organisation differs from anything established up to that point.

Figure 21. Chorale, mm. 60–71[157]

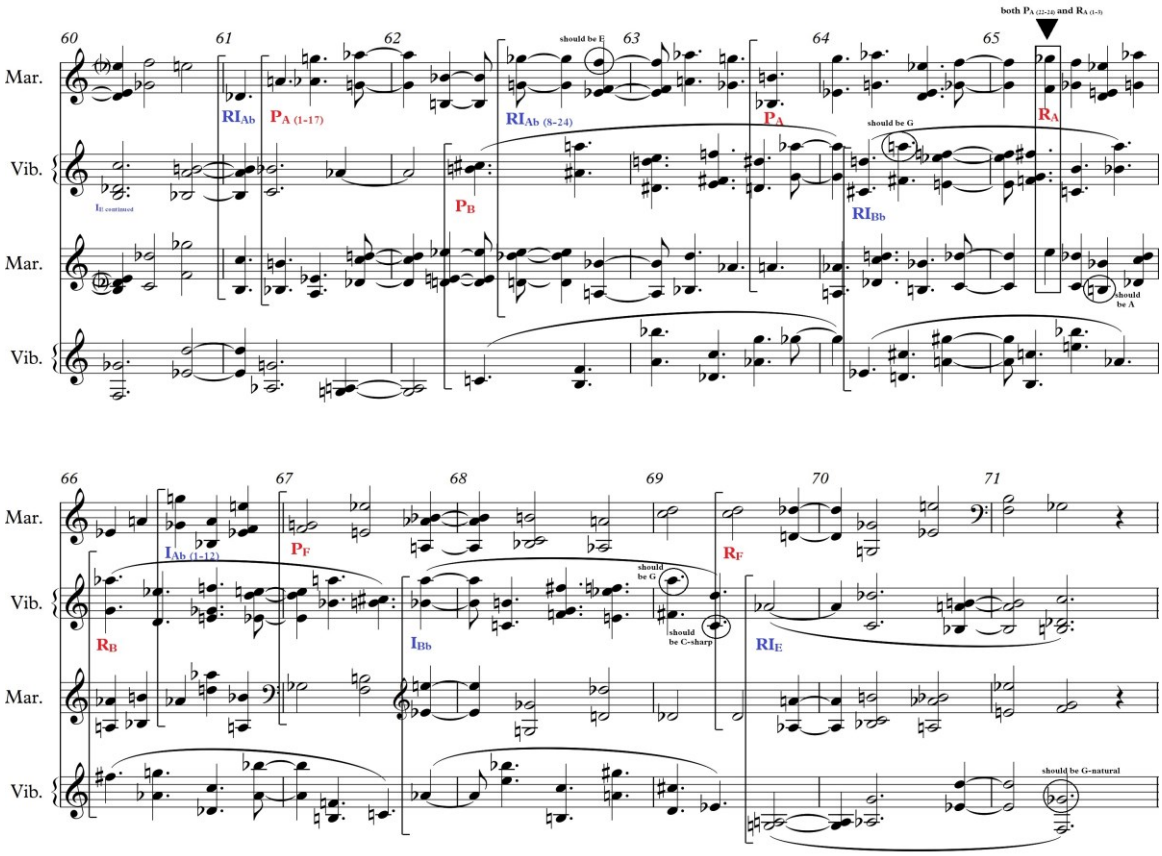
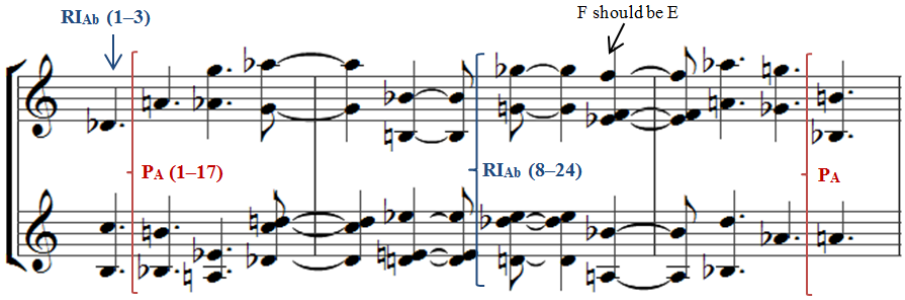


Figure 22. Excerpted marimba passage, mm. 61–63



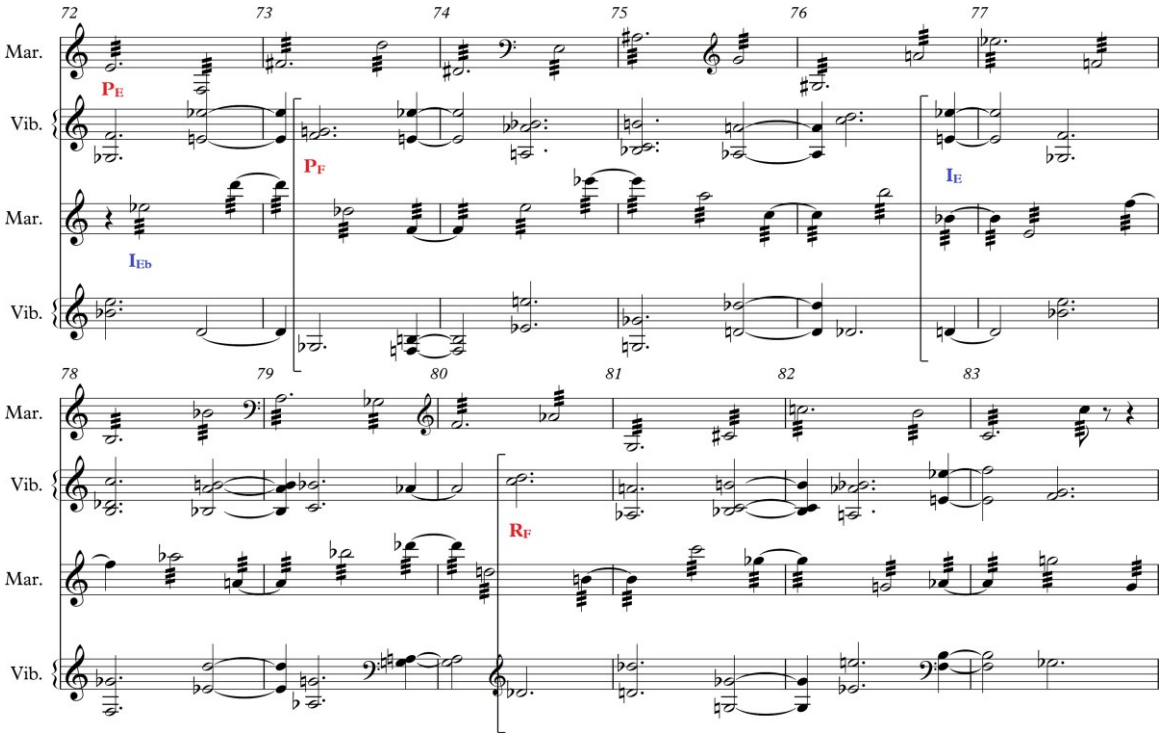
According to the pattern of rows established in Figures 20 and 21, this portion should adhere to a RI_{Ab} series but the row is interrupted immediately after the first trichord by

[157] Figure 22 also identifies the same "wrong" note (F) that was noted in the I_{Ab} series in Figure 20. The register is exactly the same for this supposed wrong note in both of its instances, which makes it seem more likely that Mercure made the change if not purposely then because of a possible mistake in his own charts. At m. 66 (three measures later), again in the marimba, the first half of I_{Ab} is played, and this time instead of the wrong note F, there is the correct E.

part of P_A (the row that immediately precedes Figure 22). The first seventeen notes of P_A are presented, until the D–E–E^b–B–B♭ pentachord in the middle of the m. 62. It is then followed by the latter part of RI_{Ab} (order numbers 8 through 24, the first trichord and tetrachord absent). Aside from these small idiosyncrasies, Mercure's row pattern through the chorale section continues as expected. In the vibraphones, from the beginning of Jaune up to and including m. 72 (the half-way point of Jaune), P_F–RI_E–R_F–I_E are followed by P_B–RI_{Bb}–R_B–I_{Bb}–RI_E. The marimba pattern, despite the two instances of incomplete or interrupted rows, goes thusly: R_A–I_{Ab}–P_A–[RI_{Ab}]–P_A–R_A–[I_{Ab}]–P_F–R_F. This section therefore has three different root-note pairings: in the vibraphones, there are rows with main notes F and E, and B and B♭; and in the marimbas, A and A♭ with the prime row and its retrograde to finish the sequence.

At m. 72, the marimbas change from playing the chorale texture to the tremolo texture. The first marimba plays P_E and the second marimba plays I_{Eb} (related to each other by inversion and semitone transposition). They begin at a piano dynamic and crescendo until the end of the section, and their rhythms are offset three against two. As shown in Figure 23, each measure in the first marimba has two dotted-half notes, while in the second marimba, each note is a half note, but because it begins on the second beat of m. 72 (while the first marimba starts on the first beat), its rhythm is tied over the bar lines. While the marimbas play tremolo, the vibraphones continue the chorale texture with P_F beginning in m. 73, followed by I_E in m. 76, and R_F again in m. 80.

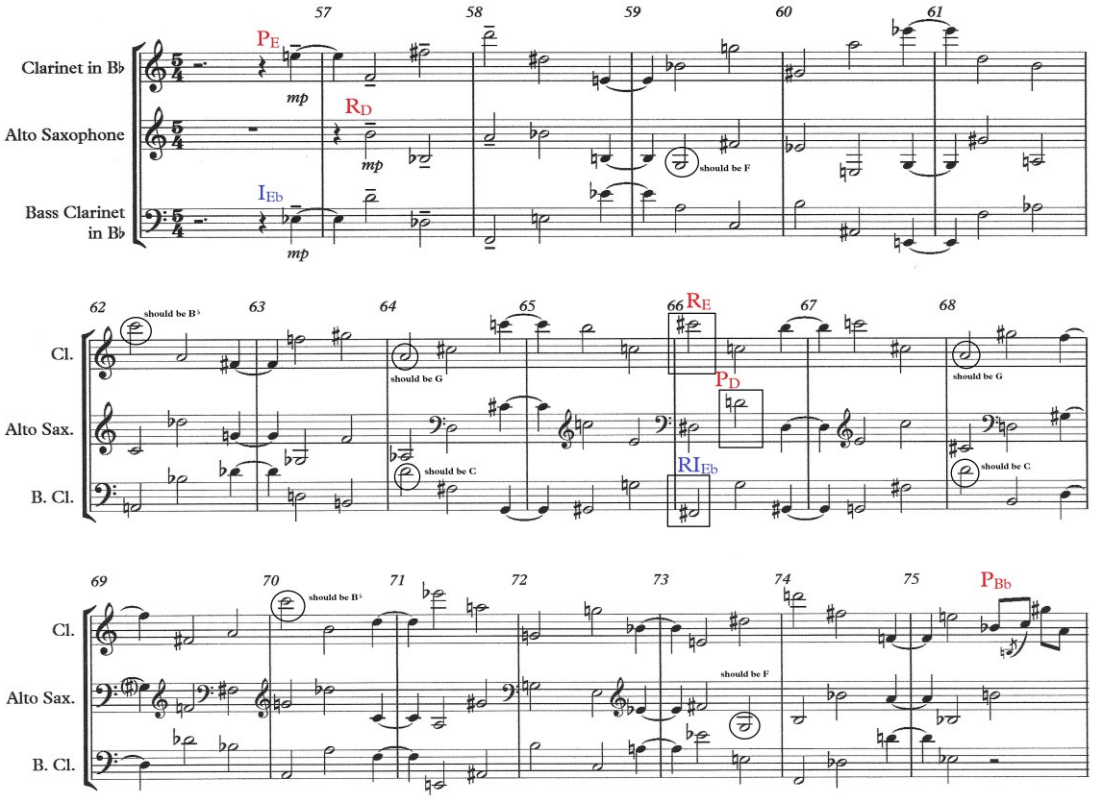
Figure 23. Marimba tremolo with vibraphone chorale, mm. 72–83



Near the beginning of Jaune, the clarinet and bass clarinet start together at the anacrusis to m. 57, and are followed by the saxophone two beats later (on beat two of m. 57). As shown in Figure 24.1, all three wind instruments play in the same rhythm as the marimbas (that is, in half-note durations), but are off the beat, aligning occasionally with the vibraphones that play in a three-beat rhythm. The wind instruments are playing in homorhythm instead of in canon, making this the only time in all of *Tétrachromie* that the winds play anything other than the canon material. Each instrument plays two complete rows between mm. 57 and 75. The rows Mercure selects for this section are in retrograde pairs: the clarinet plays P_E and R_E, the saxophone R_D and P_D, and the bass clarinet I_{Eb} and RI_{Eb}. At m. 66 (indicated in the Figure with square brackets), the last notes of P_E, R_D, and I_{Eb} serve as a pivot and the first note of the corresponding retrograde row. The individual lines in mm. 57–75 maintain exact palindromes, with no variation to pitch registers or

rhythmic values within a single instrument.[158] However, the vertical sonorities do *not* create a palindrome due to the saxophone rows being offset. The chords are therefore different in mm. 66–75 than they were in mm. 57–66.

Figure 24.1. Homorhythmic section in winds, mm. 57–75[159]



The segment shown in Figure 24.1 is particularly interesting in terms of the harmonic fields that are created from parallel melodic rows. Figure 24.2 displays each of the twenty-four different chords from this section, maintaining the original octave registration. While we already know that each row contains numerous melodic indistinct

[158] Even in the saxophone, where the clef notation frequently changes, Mercure maintains the same octaves in different spellings. See, for instance, the treble-clef A♭3 in m. 64 as compared to the bass-clef G♯3 in m. 68.

[159] As in the previous example, there are some "wrong" notes used by Mercure, which are consistent in both halves of this section. The error, according to the row as determined in the matrix, is in the saxophone at mm. 59 and 73, where a written G should be an F. Similarly in the clarinet at mm. 62 and 70, a written C should be a B♭ or an A♯. At mm. 64 and 68, both the clarinet and bass clarinet have a wrong note: A should be G and B should be C, respectively.

octaves, we can also observe indistinct octaves through voice crossing in Figure 24.2. In fact, every chord progression except for two (marked with square brackets and asterisks) has at least one indistinct octave, indicated throughout by dotted slur lines. Other intervals, identified by solid slur lines, consist of six tritones scattered throughout the example, as well as minor 2nds, major 6ths, minor 3rds, and one minor 6th.

Figure 24.2. Pitch reduction and intervals in winds, mm. 57–66

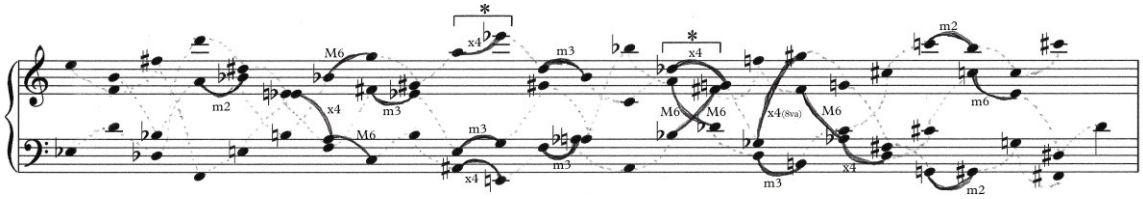
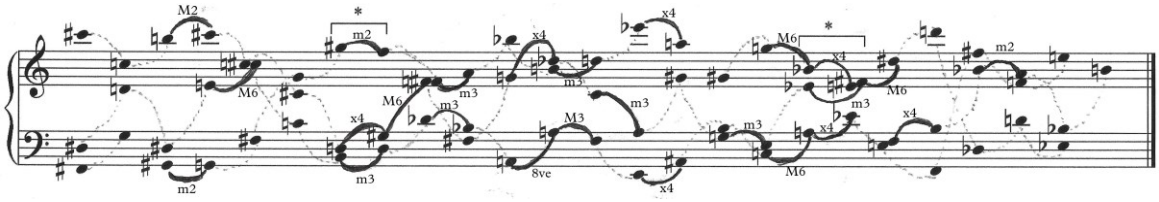


Figure 24.3 shows the second half of the section, beginning with the penultimate chord of Figure 24.2. Similar to the previous figure, Figure 24.3 again shows indistinct octaves (joined by dotted slur lines) interspersed with tritones, minor 2nds, minor 3rds, and major 6ths. There is also one perfect octave (8ve), one major 3rd, and one major 2nd. The soundscape is not palindromic as the row material is, and the result is that the entire section from mm. 57–75 moves as a field.

Figure 24.3. Pitch reduction of winds chorale, mm. 66–75

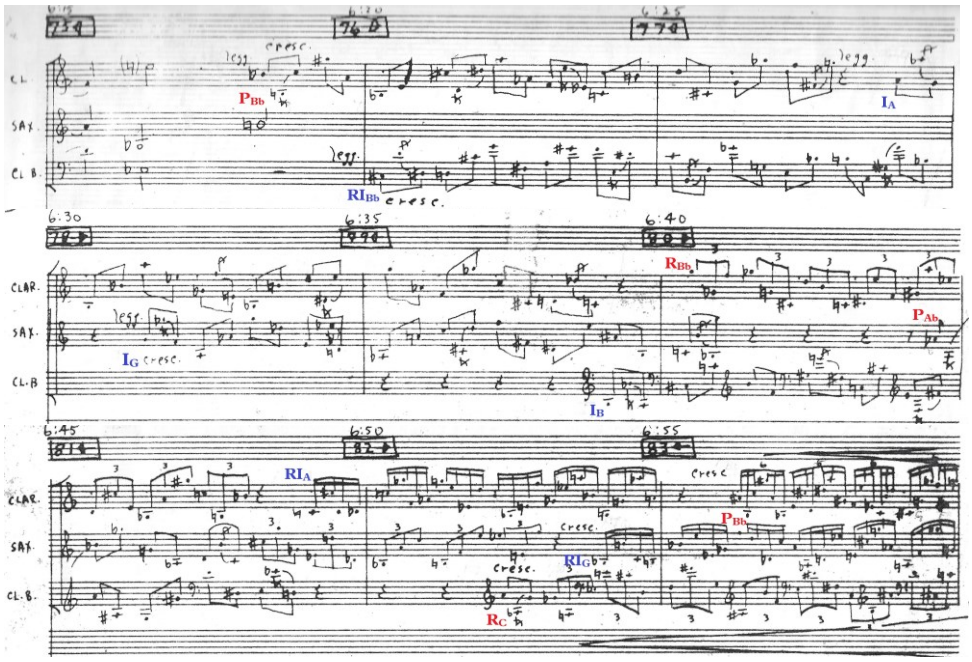


Beginning immediately after the harmonic fields at the end of m. 75, the clarinet and bass clarinet resume linear canon material with gradually increasing tempo (due to rhythmic diminution) and continual crescendo. They are joined by the saxophone in m. 78. The rhythmic tempo begins with eighth-note durations (ten per measure), using grace

notes to create the instances where a triplet is needed instead of a duplet (adhering to the 3- and 5-note groupings discussed above).[160]

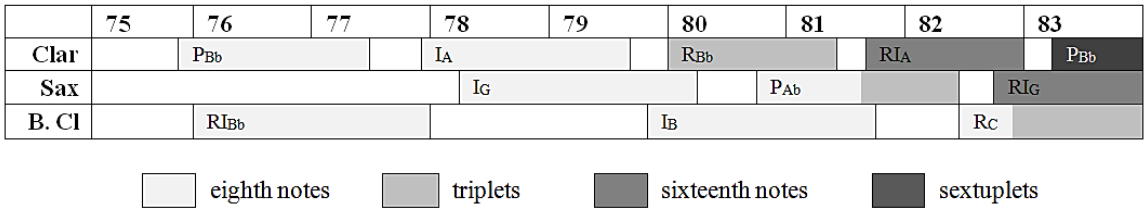
The rows that begin the new canon section in Figure 25 are P_{Bb} and RI_{Bb}. The clarinet begins a new row on I_A at the end of m. 77, and is followed by the saxophone with I_G in the same rhythm, and then by the bass clarinet at m. 80 with I_B. The rhythm then begins to intensify gradually in each instrument starting with the clarinet changing to triplet rhythm in m. 80, followed by the saxophone part-way through m. 81. At the end of m. 81, the clarinet changes to sixteenth notes, while the bass clarinet enters with triplets in the middle of m. 82. Leading into m. 83, the saxophone starts a new row with sixteenth-note rhythm, while at m. 83, the clarinet plays one final row in sextuplet rhythm. Table 10 represents the row forms played between m. 75 and 83, using shading to highlight the rhythmic values assigned to each row permutation.

Figure 25. Score excerpt of canon, mm. 75–83



[160] The pattern for P and I row permutations thus includes a triplet (3), two duplets (4), one triplet and one duplet (5), one triplet and one duplet (5), two duplets (4), and one triplet (3). For R and RI permutations, the pattern is reversed.

Table 10. Row permutations, rhythm, and orchestration for canon, mm. 75–83



On the recording, the Jaune section begins at 3:00 and ends at approximately 4:57. During the two minutes of its performance, the dynamic is mostly soft, with the marimba and vibraphones providing a steady beat every half-second. When the winds enter at m. 56 (about 3:40 on the recording) with their chorale formation, the harmonic soundscape is intensified but maintains a steady rhythm. The winds continue the half-note rhythm while at m. 62, the percussion intensifies with shorter durations. At m. 72 (about 4:30) at the entrance of the tremolo texture in the marimbas, the aural experience changes, becoming more urgent. This urgency is further increased when the clarinet, saxophone, and bass clarinet change from chorale to the accelerating canon in m. 76 (4:45).

The tape track carries over from Vert with quiet, electronically manipulated sounds (which could be described as eerie, scratching noises). The tape intensifies in amplitude and density with sine tones fading in and out. These sounds accelerate at m. 72 at the entrance of the tremolo and they continue to grow, adding to the intensifying textures in the winds and percussion and becoming steady noise by the end of Jaune.

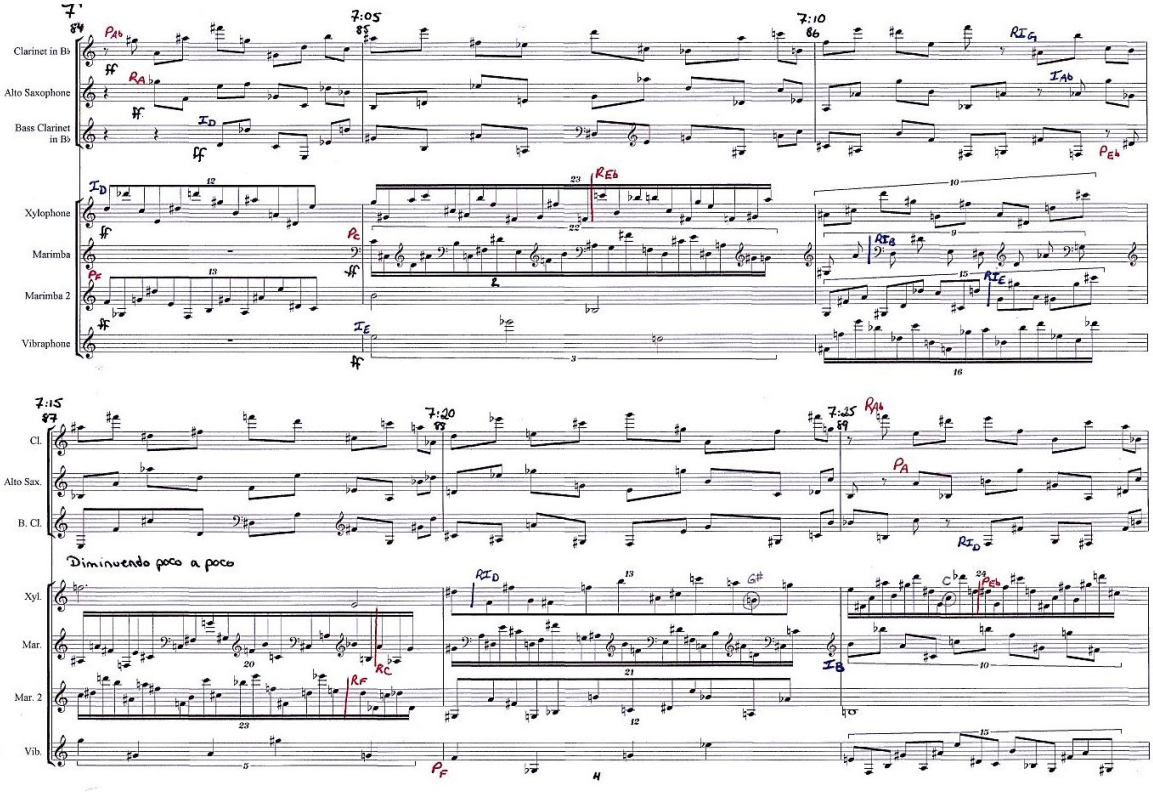
iii. Rouge

At the start of the Rouge section, the somewhat soothing sound of the chorales and tremolos give way to what is the most aurally dominant musical texture of the entire composition: the melodic tuplet patterns, an example of which is shown in Figure 26. The

strength of this texture is not only in its rhythmic momentum but also in the cascading melodies that play simultaneously, making use of the row and its permutations but now much faster and louder than at any other point in the piece.

The canon texture, which had been rapidly accelerating at the end of the Jaune section, immediately settles into a steady eighth-note rhythm of two notes per second (each row, then, lasting about twelve seconds). In Figure 26, I label each row according to where it begins in both winds and percussion.

Figure 26. Canon and tuplet textures, mm. 84–89



As we can see in the example, the percussion rhythm is irregular, with each instrument playing a different number of notes per measure. The tuplet values are determined by the numerical sequences that were shown in Table 2. The xylophone and second marimba begin the tuplet texture at m. 84 (see Figure 26) with the I and P permutations of the number sequence. In the following measure, the first marimba and

vibraphone begin their own R and RI numerical tuplet sequences. Table 11 shows the numerical sequences that are used to form the rhythmic patterns through the entire Rouge section.

Table 11. Numerical sequences used for percussion tuplets, mm. 84–119

	m. 84/85	m. 108	m. 114
Xyl	**I** 12-23-10-2-13-24-18-9-20-7-1-14-17-6-19-22-11-8-21-15-4-5-16-3	**R** 22-9-20-21-10-4-17-14-3-6-19	
Mar	**R** 22-9-20-21-10-4-17-14-3-6-19-8-11-24-18-5-16-7-1-12-23-15-22-13		vib. tremolo
Mar	**P** 13-2-15-23-12-1-7-16-5-18-24-11-8-19-6-3-14-17-4-10-21-20-9-22	**RI** 3-16-5-4-15-21-8-11-22-19-6	
Vib	**RI** 3-16-5-4-15-21-8-11-22-19-6-17-14-1-7-20-9-18-24-13-22-10-23-12		mar. tremolo

As we see in Table 11, the xylophone begins with the I sequence, starting with a tuplet of twelve notes in the first measure, going on to a 23-note tuplet in the next measure, ten notes in the following, and so on until it reaches a triplet in m. 107. The xylophone then plays the first eleven members of the R sequence, playing tuplets of twenty-two notes through nineteen, between mm. 108 and 119. In a similar fashion, the second marimba begins at m. 84 with a tuplet of thirteen notes, followed by a duplet and then a tuplet of fifteen, thus beginning the Prime number sequence. Like the tuplets played in the xylophone, this first complete sequence in the second marimba ends in m. 107, and is followed immediately by the first eleven numbers in the RI sequence, up to m. 119. Both marimba and xylophone then have one measure of rest before the Blanc section which begins in m. 120. The first marimba and vibraphone begin together at m. 85 and both only complete one numerical row sequence (R and RI, respectively) before stopping the tuplet material (at the end of m. 108) without doing an extra half-sequence as do the xylophone and second marimba.

When the first marimba and vibraphone stop at m. 109, they have five bars of rest before beginning melodic material again in the tremolo texture. For the listener, the entire

tuplet section (mm. 84–119 in the score and approximately 4:58 to 7:00 on the recording) sounds as if almost random, and with the players using soft mallets, the aural result is less harsh and more just filled with sporadic movement.[161]

Table 12 identifies each melodic row played in the percussion throughout this section (mm. 84–119), including both the tremolo and tremolo textures. The chart is separated in the same way as Table 11, marking the points at which there is a change in organisation.

Table 12. Melodic row material in Rouge percussion, mm. 84–119

	m. 84/85	m. 108	m. 114
Xyl	I_D – R_{Eb} – RI_D – P_{Eb} – I_E – R_F – P_F – RI_E – R_F – I_E – P_F–RI_E – R_F	$RI_{E\ (7–24)}$ – P_F – RI_E – P_F – I_E – R_F – $RI_{E\ (1–7)}$	
Mar	P_C – RI_B – R_C – I_B –I_{Eb} – P_F – RI_E – R_F – I_E – P_C – I_B – R_C – $I_{B\ (1–12)}$		**Vib** I_B
Mar	P_F – RI_E – R_F – P_F – RI_E – R_F – I_E – P_F – RI_E – R_F – I_E – R_F – $I_{E\ (1–18)}$	$P_{F\ (13–24)}$ – I_E – R_F – RI_E – P_F – $I_{E\ (1–22)}$	
Vib	I_E – P_F – RI_F – R_{Gb} – I_F– R_F – I_E – R_{Gb} – RI_E – P_F – RI_F – R_F – $I_{E(1–11)}$		**Mar** P_C

Similar to other sections of *Tétrachromie,* the rows played by the percussion instruments in Rouge seem to outline a few dualities in semitone relationships of root pitches. For instance, the duality of E to F is frequently present in all voices (and exclusively in the second marimba), as seen in Table 12. Other dualities to observe are D – E♭, B – C, and F – G♭.

In the canon (with the clarinet, saxophone, and bass clarinet), the rows are similarly organised, but with different prominent pitch dualities. Table 13 shows the sequence of melodic row permutations used throughout Rouge for the winds. The dualities that emerge in this section are G – A♭, C – D♭, A♭ – A, D – E♭, and A – B♭. Although P_F constantly occurred throughout Rouge in the percussion tuplets and tremolos, it does not

[161] With all seven instruments simultaneously playing different rhythmic tuplet sequences and independent melodic row series within, it is no wonder that the aural effect seems sporadic. In the two minutes it takes one percussionist to work through a numerical sequence, it will have played three hundred notes (by the sum of each number in the sequence).

appear in the canon material until the end of the section with the saxophone and then the clarinet, the latter playing in a quicker rhythm as if a vibrant memory of the start of the Jaune section, in the midst of an overall rhythmic deceleration.

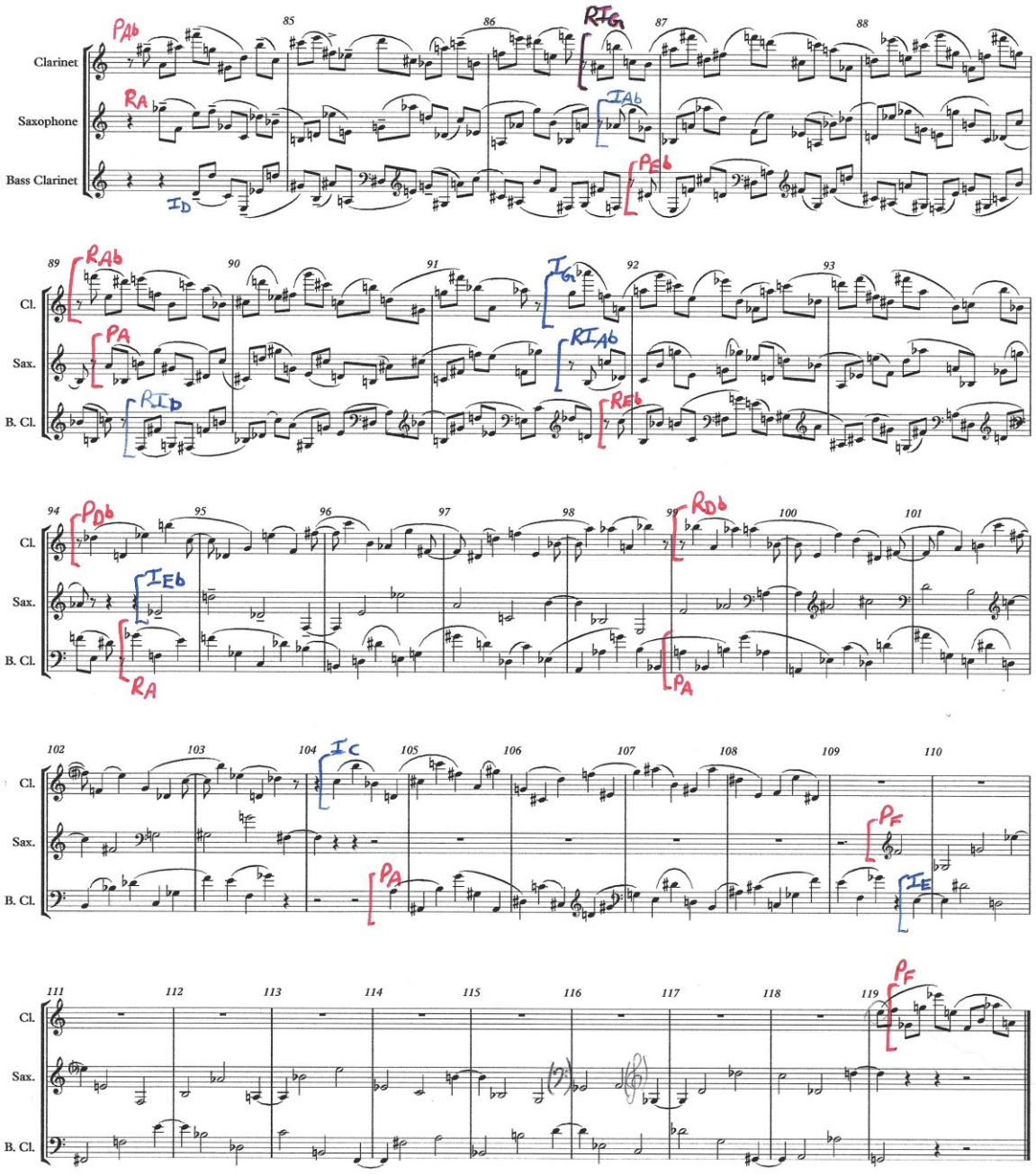
Table 13. Melodic row material and rhythm in canon, mm. 84–119

m. 84	86	89	91	94	99	104	109	119
Clar	P_{Ab}	RI_G	R_{Ab}	I_G	P_{Db}	R_{Db}	I_C		P_F
Sax	R_A	I_{Ab}	P_A	RI_{Ab}	I_{Eb}			P_F	
B. Cl.	I_D	P_{Eb}	RI_D	R_{Eb}	R_A	P_A	P_A	I_E	

eighth notes quarter notes half notes

Figure 27 shows the full Rouge canon section as it appears in the score. It begins with all three voices playing in an eighth-note rhythm until m. 94. Then, the clarinet and bass clarinet play in a rhythm augmented to quarter notes, while the saxophone plays in half notes. This pattern continues until m. 104 when the saxophone stops and the clarinets continue in quarter-note rhythm. At m. 109, the clarinet stops and the saxophone re-enters, followed by the bass clarinet both in half-note rhythms. At the penultimate measure of the section (m. 119), the saxophone and bass clarinet stop while the clarinet re-enters to play a single iteration of the prime in eighth notes, transitioning to the Blanc section. This gesture recalls the trailing transition from Vert to Jaune, when the clarinet continued its pattern until the third measure of Jaune.

Figure 27. Canon in Rouge, mm. 84–119

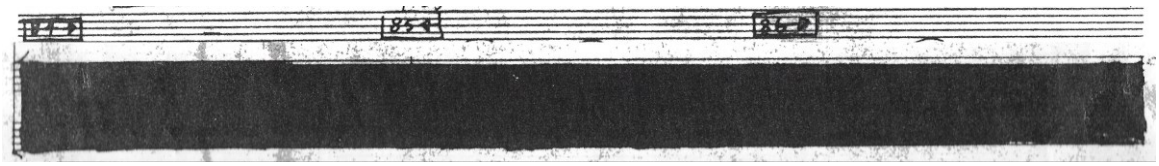


It is also noteworthy that, throughout the entire canon part in Rouge (in Figure 27), Mercure adds slurs and tenutos (shown in the first two measures of the figure) to highlight the row groupings of 3, 4, and 5. For the groups of five, there is always a two-note slur followed by three, then another three and another two. The tetrachords are

always slurred in groups of four and the trichords in three. By starting each grouping with a tenuto, Mercure ensures that, even at the smallest melodic level, the performers can maintain one of main structures of the composition (the 3–4–5–5–4–3 palindrome).

Mercure indicates at the start of Rouge, that the section is "très rythmé." This is heard clearly in listening to the Toronto Philharmonia recording, where there is an abrupt change from the harmonic atmosphere created in Jaune to the driving rhythm of Rouge. The section begins at a *fortissimo* dynamic in all voices, with the electronic track (as represented in the score) a solid black bar of amplitude (see Figure 28). While a wall of shading such as in Figure 28 does not provide much indication as to the contents of the tape, it does suggest that Mercure wanted this to be the loudest and most dramatic moment of the work. At the start of m. 84, the tape representation occupies two full staves of the manuscript paper. By the end of m. 86, that amplitude is slightly smaller and it continues to gradually decrease through the entire section.

Figure 28. Tape representation at the start of Rouge, mm. 84–86



The only other indication of the tape track provided in the score is at m. 102 where Mercure writes "autres sons soutenus," suggesting that there are sustained sounds in the tape. The soundscape of Rouge (in the recording) is dominated by the marimbas and xylophones, but one can hear similar electronic noise (high-pitched sine tones and other percussive noises) as was heard in the Jaune section. The drum sequence mentioned previously enters at 5:30 on the recording, and become more aggressive at 6:00, presumably at approximately m. 108 (in the score) when the first marimba and

vibraphone stop playing the tuplet pattern. Measure 108 is also the point at which Mercure indicates for all instruments to *diminuendo sempre*. Indeed, from this point, the previous sense of urgency established at the beginning of Rouge continually retreats to a recapitulation of the tremolo pattern at m. 114, preparing the listener for the final section of the piece which begins at around 7:00 on the recording.[162]

iv. Blanc

The Blanc section opens as we know with the latter part of the P_F row in the clarinet (which began in the final measure of Rouge), but the row stops three notes before its end, missing the last C, D♭, and D. After the clarinet is finished, the wind instruments (and the canon texture) rest for eleven measures—or fifty-five seconds—and begin again at m. 132. At this point, the saxophone re-enters and is followed by the bass clarinet three measures later, and clarinet three measures after that. The rows played by the wind instruments from this point until the end of the work are the retrograde forms of what they played in the Vert section. Table 14 shows the rows identified in the Vert section as compared to those identified in the Blanc section.

Table 14. Comparison of canon rows from Vert to Blanc

	Vert		**Blanc**	
	mm. 12–32	mm. 24–44	mm. 132–149	mm. 144–161
Clarinet	P_F	P_B	R_B	R_F
Bass clarinet	RI_F	RI_B	I_B	I_F
Saxophone	R_G	R_{Db}	P_{Db}	P_G
Vibraphone	I_G	I_{Db}	----	

[162] The beginning of the Blanc section is difficult to determine, as the recording does not sound like it has any rest in the canon material like there is in the score from mm. 120–132. It is possible that this portion was cut for the Toronto performance.

Even though the vibraphone does not play the canon material in the Blanc section as it did in Vert, there is still a clear reversal of the organisation at the beginning of *Tétrachromie*. The instruments enter in reverse order, and play the retrograde forms of the rows they played previously. The saxophone begins the Blanc canon, where in Vert it was the last of the three to enter. Similarly, the clarinet played the first melodic material (on the prime row) in *Tétrachromie,* and also plays the last melodic material in the work, with the retrograde of the prime row.

The percussion instruments, also playing melodic material in the tremolo texture, carry over from the Rouge section in the vibraphone and marimba, which are joined at measure 120 by two xylophones. The xylophones begin new rows (P_F and I_E) at measure 120, while the vibraphone and marimba continue their I_B and P_{Db} series from Rouge. As in the Jaune section with the chorale texture, one pair of percussion instruments plays in dotted-half-note rhythm while the other pair plays in half notes, resulting in a three-against-two cross-rhythm. Table 15 shows the rows used by the vibraphone, marimba, and xylophones in the Blanc section until their exit at m. 149. Once again it is evident that Mercure uses row forms related to each other through retrograde or inversion, plus or minus one semitone in transposition.

Table 15. Tremolo row material in percussion, mm. 114–149

	114	**120**	**126**	**132**	**138**	**144**	**149**
Xyl		P_F		I_E			
Mar	P_C		R_C		R_C		
Xyl		I_E		P_F			
Vib	I_B		RI_B		RI_B		

At m. 150, two percussionists restart the cymbal patterns from the Vert section. A much shorter section this time, the cymbals adhere to the first six elements in the two

patterns that were established in Vert (see Table 8 and Figure 16). They end at m. 161 (the same ending spot as the clarinet), and in m. 62, there is another twelve-note chord (shown in Figure 29.1) in the same form as the one that begun the composition. The difference between this chord and the one at the beginning is its pitch content, using the *last* twelve notes of the prime row (where the first chord used the first half of the row). This creates another chromatic nonamirror (see Figure 29.2) similar to the one shown in Figure 14.2.

Figure 29.1. Closing twelve-note chord, mm. 162–167

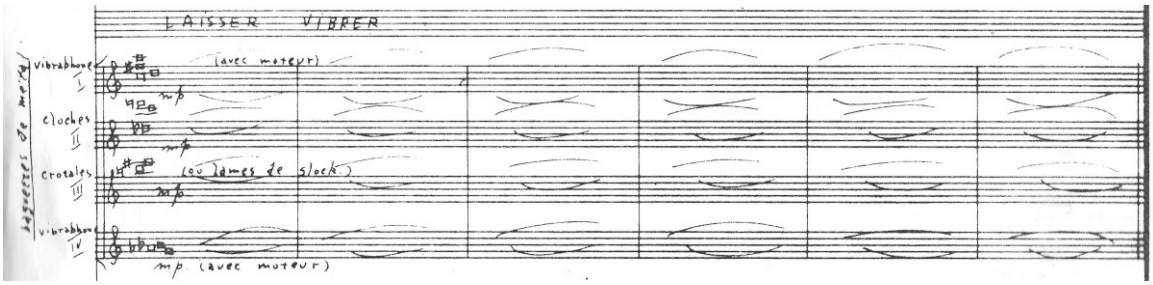
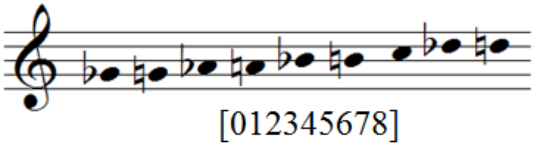


Figure 29.2. Chromatic nonamirror created by closing 12-note chord



Although the twelve-note chord at m. 162 is marked at a *mezzo piano* dynamic, it is still as aurally surprising as the opening twelve-note chord with its *fortissimo* entrance. This is because, from the final portion of Rouge and for the entire Blanc section, there is a steady decrescendo and thinning of overall texture and density. Instead of "sons soutenus" in the tape, Mercure marks on the tape representation "sons brefs réverbérés" at m. 138. Without the vibraphone playing canon material with the winds, the cymbal pattern in Blanc is easier to hear than it was in Vert. The final few seconds after the last

twelve-note chord begins to dissipate, some pointillistic melodic sounds (including notes reminiscent of a flute) from the tape continue to the end of the recording.

5. Some Further Analytical Observations and Conclusions

The differences in the mirrored structure of Vert to Blanc are important to an overall phenomenological consideration of *Tétrachromie.* The composition does not simply return to the point at which it began, most obviously in the fact that the piece opens with a twelve-note chord strike, but closes as the final twelve-note chord dissipates. Of course there are elements of retrograde used in Blanc but it is not a mirror image of the opening section, due to the presence of the percussion tremolos, the absence of the vibraphone in the canon, and a shortened cymbal section. These differences call into question the idea of life cycle as implied in the programme notes that accompany the recording. *Tétrachromie* has elements of cyclical form but I venture to describe it as a single event that, like a human life, grows, ages, and then declines.

In this chapter, I have outlined many of the large-scale formal structures of *Tétrachromie* while also relating those structures to internal relationships of pitch-class and registral control. *Tétrachromie* demonstrates considerable precompositional intent on Mercure's part, but the work also permits aleatoric interpretation by the performers, particularly in the Vert and Blanc sections where the rhythm is loosely based on full measures instead of individual beats. Expressive elements such as slurs, tenutos, and constant crescendos and decrescendos transform a strictly serialised composition into a poetic piece. Mercure's use of techniques such as intervallic control, harmonic fields, row

permutations, and *musique concrète* exhibits his eagerness to combine elements of some of the most technically and aurally demanding music of his time, while still inspiring active listening and interpretation.

CONCLUSION

Tétrachromie reflects Mercure's period of artistic and ideological development during the early 1960s. With particular reference to influences from European composers associated with the Darmstadt School, Mercure demonstrates his interest in capturing the contemporary via the numerous compositional approaches appearing in *Tétrachromie*. By the 1962 when he began to move away from strictly electronic composition (following the Semaine Internationale de Musique Actuelle) to combine his interest in technology with acoustic compositional techniques, Mercure produced three complete works (and one unfinished) in a mature style that reflects his most avid professional and artistic pursuits in realising the music of his time. These interests include the spontaneity of gesture in Automatism (evidenced in *Tétrachromie* and *H_20 per Severino*), *musique concrète* and tape composition (*Psaume pour abri, Tétrachromie,* and *Lignes et points*), collaboration with dancers and painters (*Tétrachromie*), and media and broadcasting (radio cantata *Psaume pour abri*). All four works represent a flexibility of expression using various seemingly rigid compositional systems. Further inquiry to these four works and their reflection of Mercure's developing mature style would be a valuable direction on which to expand my present research.

Mercure strove to create aesthetic beauty beyond that of emotion and romance, and was drawn to compositional trends of his day such as *musique concrète*, various styles of American Experimentalism, and Darmstadt School serialism. In Lyse Richer's radio documentary (produced in 1989), Mercure is quoted making specific reference to how

sound exploration (especially the works of Edgard Varèse) contributed to the music of his time:

> What is most characteristic of today's music is the beauty of sound as such, the beauty of musical form as such. We find this, for example, in Webern. We began to find it in Debussy, I'd say, outside the emotional, erotic, and other contexts. We have begun to love the sonic object as pure beauty, as aesthetic beauty.
>
> Varèse, for example found in nature – and I don't mean nature in the romantic sense of fields and meadows, but in the nature of a street sound, a siren . . . because he found this was a beautiful sound, he would incorporate it into his orchestral works. For someone who refuses to see in music anything but the recognition of feelings, this siren makes him think of a passing ambulance. For Varèse, it's a beautiful sound that he incorporates into other sound, and it then happens that he will ask monsieur the violinist and monsieur the cellist to play differently from the way he played before. He may ask him to play long passages without any indications, because he wants a pitch of sound, a cello quality which, in the whole, in the abstract object he is creating, becomes sonic beauty, a beauty that can be fulgurating, frenzied, disconcerting, but a beauty that is beyond any romantic emotional context. This whole aesthetics was to bring great changes with it…[163]

We can infer from this quotation that Mercure was clearly interested in furthering Varèse's devotion to exploring the nature and aesthetics of sound, and that he adopted a similar goal of producing sonic beauty. The effects produced by the percussionists in *Tétrachromie* (for example, vibraphone played with and without the damper pedal and motor, different types of mallets, and cymbal techniques) add to the beauty of this work by creating moments of resonance, solemnity, frenzy, and even discomfort.

Tétrachromie reflects ideas of row construction and permutation that suggests aspects of registral axes, cross-partitioning, flexible rhythms, intervallic control, and an explorative energy consistent with his artistic *milieu* both at Darmstadt and within the broader scope of 1960s experimentalism in general. Mercure described his working process in such a way that suggests a certain freedom within the compositional structures

[163] Mercure, in Lyse Richer radio documentary (trans. Alan Brown), 43.

that he employed: "I first establish my lines of force: this is the essential creative part. Then I set my sound parameters: duration, intensity, timbre, frequency, density. Then I write *what my imagination dictates*."[164] Mercure's imaginative approach to his work allowed him to enter into the realm of serial thought, the techniques of which Eco describes as the "construction of new structured realities."[165]

For Eco, the practice of the work in movement "allies itself openly and self-consciously to current trends in scientific method and puts into action and tangible form the very trend which aesthetics has already acknowledged as the general background to performance." Further, "these poetic systems recognize 'openness' as *the* fundamental possibility of the contemporary artist or consumer."[166] In *Tétrachromie*, Mercure created a wholly individual work that embodies his many artistic pursuits as a performer, producer, conductor, and enthusiast "not of modern but of contemporary music."[167] Mercure composed *Tétrachromie* on a commission that, as it was a dance and visual art production, aligned with his compositional activities as a collaborator with Automatist dancers and painters in 1948. In scenario, therefore, *Tétrachromie* reflects Mercure's earliest creative voice in Montreal, while in precompositional organisation and his manipulation of sonic materials (both electronic and acoustic), the work demonstrates Mercure's interest in aesthetics encountered through the 1950s with Pierre Schaeffer and Richard Maxfield, and in 1962 while at the Darmstadt summer program.

This study grew from my desire to research music composed for ballet in Montreal during the 1950s and 1960s, and to expand upon existing research on Mercure and his

[164] Mercure, in Lyse Richer documentary (trans. Alan Brown), 43. Emphasis added.
[165] Eco, *The Open Work,* 227.
[166] Ibid., 22.
[167] Mercure, in Richer documentary, 19.

music. Upon closer investigation of *Tétrachromie*, my findings suggested that there was much to discover in this work in terms of serialism, leading my research down other interesting paths of study. Further information about Mercure's pre-compositional plans as well as Mercure's aesthetic thoughts in general could be contained within the Fonds Pierre Mercure in Montreal. Such archival information would provide additional nuance to many of the speculations I put forth in this thesis. A more complete analysis of *Tétrachromie* would further consider the aural experience, on which I touch only briefly here. Because *Tétrachromie* was, as far as I am aware, the first of only three forays into serial composition Mercure attempted, its position as what might have been a turning point in his compositional oeuvre (had he lived to carry on this work) deserves attention in further studies.

Tétrachromie is an example of Mercure's developing mature style, a style that never fully emerged before his fatal car accident in late January of 1966, but one that was greatly inspired by the music and general discourse of musical expansion and sound exploration of his time. His budding interest in serial music, discovered through close analysis to respond to an interest in the work of contemporary avant-gardists with whom he came into contact, reveals an artist fully engaged in exploring a variety of responses to contemporary aesthetics and ideologies, the first evidence of that inquiry being *Tétrachromie*.

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