AN INVESTIGATION OF THE *JEUX DE TIMBRES* IN CLAUDE VIVIER'S *ORION* AND HIS OTHER INSTRUMENTAL WORKS OF 1979–80

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An investigation of the *jeux de timbres* in Claude Vivier's *Orion* and his other instrumental works of 1979–80

Abstract:

In 1979–80 Claude Vivier wrote four essentially instrumental works which comprise an important phase in his compositional *oeuvre*—after completion of his only opera *Kopernikus* (14 May 1979), and before his trip to Europe in November 1980. During these 18 months Vivier strove to devise a new musical language of chord-colours ("*couleurs*"), based on a compositional substratum ("*jeux de timbres*") in three wholly instrumental works: *Orion* (6 October 1979) for orchestra; *Zipangu* (13 August 1980) for string orchestra; and *Cinq chansons pour percussion* (26 September 1980) for percussion group. In contrast, *Lonely Child* (5 March 1980) for soprano and orchestra introduces a modified version of frequency modulation (which I call additive synthesis) to produce *couleurs*, eliminating the *jeux de timbres* stage entirely. After his return to Montréal in early 1981, Vivier's musical language embraced additive synthesis as a way of producing chord-colours, beginning with *Prologue pour un Marco Polo* (1 March 1981).

The *jeux de timbres* (Vivier's highly idiosyncratic interpretation of *Klangfarben-melodie*) forms a crucial pre-compositional stage for the "*couleurs*" of the instrumental works in question. In *Orion* chord-colours are achieved through imaginative orchestral settings of the *jeux*. Two subsequent works use extra-notational techniques to produce chord-colours from their *jeux*: avant-garde techniques with crushed string sounds or *sul ponticello* effects in *Zipangu*, and performance-based outcomes of specified pitches with Balinese and Chinese gongs in *Cinq chansons pour percussion*. I examine sketch materials for the three pieces to extrapolate their various musical processes, especially the *jeux de timbres*, and to show that *Orion* presents the most intricate, yet clearest theoretical design.

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Preface

My introduction to Claude Vivier's music was hearing his orchestral masterpiece *Orion* in early 1996. The enticing unfolding of the slow opening harmony suggested of the beginnings of several Bruckner symphonies, the subject of my 1995 Master's thesis. Since I study both astrology and astronomy as hobbies (interests shared by Vivier), I decided to explore correlations between the musical attributes of *Orion* and astronomical data, and thus began analytical studies. I quickly became a devoted Vivier advocate.

This necessitated studying his contemporaneous instrumental works, and deciphering many relevant sketch materials. Probing and analysing Vivier's music has proven immensely satisfying. It has taken me near and far, to Banff, Toronto, Montréal, Amsterdam, Cologne, Paris, and Lisbon, attending concerts and festivals which featured Vivier's music, meanwhile retracing his own steps.[1] At home, I explored subjects of interest to Vivier, such as the poetry of Lamartine and of Hölderlin, the novels of Hesse, the basics of Russian historical philosophy, and the music of India and Bali (countries I have yet to visit).

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[1]My travels included: the *Banff Arts Festival*, featuring Claude Vivier's opera *Kopernikus* (Autumn Leaf Opera Company), August 2001; the 25th Gulbenkian *Encounters of Contemporary Music*, Lisbon, May 2001; *The Holland Festival*, sponsored by the government of The Netherlands and Guy Plamondon (Department of External Affairs, Canada), where I heard their programme "Rêves d'un Marco Polo" which featured Vivier's opera *Kopernikus* (directed by Pierre Audi) and Reinbert de Leeuw's arrangement of Vivier's unrealised *Opera fleuve* entitled *Marco Polo* (also directed by Audi), Amsterdam, June 2000; the exploration and investigation of the Marais district of Paris, where Claude Vivier spent his last two years of his life (1981–83), May 2000; a consultation with Jaco Mijnheer (former PhD candidate of Université de Montréal), regarding theoretical topics in Vivier's music, Bergen, The Netherlands, May 2000; and several consultations with Thérèse Desjardins (president of *Fondation Vivier*), Contrecoeur, Québec, 1997 to the present.

Vivier's life had some striking parallels to my own, making it easier to develop an understanding of the man. Like Vivier, I was born in a large city, but grew up in a smaller, unsophisticated community. I too faced difficulties realising my homosexuality in a restrictive environment. Music became my life-long enthusiasm and ambition too, although I have followed a far more conservative path as a music theory and history instructor.

I learned a great deal about Vivier's life, thoughts, and convictions from many of his friends and colleagues in Canada and Europe.[2] The foremost authority remains Thérèse Desjardins of Montréal, president of the *Fondation Vivier* (formerly *Les Amis de Claude Vivier*). Mme Desjardins was his closest friend and supporter since 1974 (after Vivier's return to Montréal following a two-year study in Europe), and continues to advocate his music in significant ways today. Her extensive collection of Vivier's sketches, news releases, personal letters and books has supplied me with invaluable information, both biographical and musical.

My dissertation will delve into Vivier's inimitable music, which inspired his Québec contemporaries and the next generation of Québécois composers. My central topic concerns his *jeux de timbres*, specifically its role and function in his engaging and intricate music. Above all, I trust my analyses will amply demonstrate my admiration of his quest for a new musical language.

---

[2]From Vancouver: David Gordon Duke, and Rodney Sharman. From Ottawa: Guy Plamondon. From Montréal: Walter Boudreau, Denys Bouliane, Marc Couroux, José Evangelista, Michel Gonneville, George Nicholson, John Rea, and Gilles Tremblay. From Europe: Pierre Audi, Harry Halbreich, Reinbert de Leeuw, Jaco Mijnheer, and Pascal Rophé. Many thanks to all!

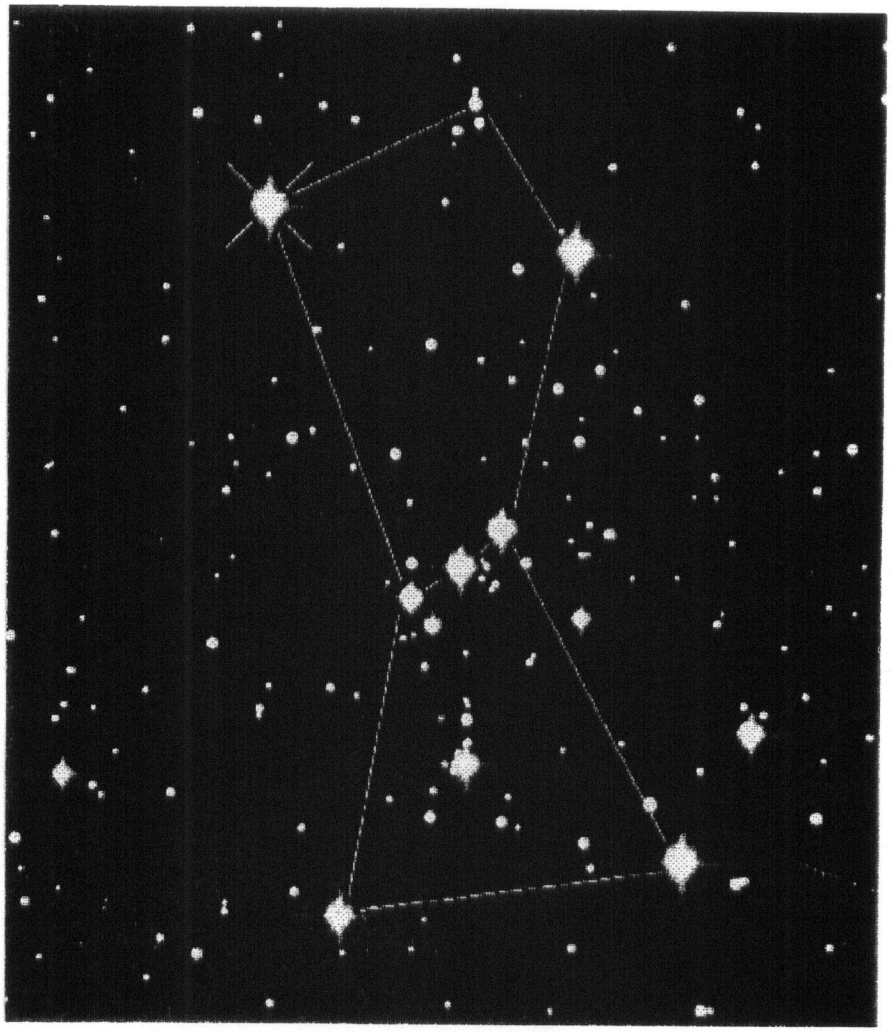
Acknowledgments

I extend my sincere thanks to Dr William Benjamin, my dissertation supervisor, who maintained forbearance and patience during seemingly endless revisions; and to the other members of my committee, Dr Richard Kurth and Dr John Roeder, who offered invaluable advice and criticism. I am grateful for Denis Plante, archivist at the Université de Montréal, who assisted with Vivier's original sketches and gave me permission to duplicate selected ones in this paper. Thanks also to the CMC centre both in Vancouver and Montréal, which procured the scores. I also gratefully acknowledge permission from Doberman-Yppan Publishers to duplicate the scores of *Zipangu* and *Orion* for this paper.

I am especially indebted to Thérèse Desjardins for her unfailing help and support. Without her guidance, advice, encouragement, and friendship, this paper could not have been completed. I also thank my partner David Bulmer for his constant support. David was always understanding of my frequent trips abroad and ceaseless typing at home. Finally I extend thanks to my family from Vancouver Island for their constant faith in me when even I occasionally had doubts.

Claude Vivier frequently summed up his musical and personal aspirations with the phrase: "always be in love." His strong belief in a universal love, and his remarkable musical imagination have inspired my ongoing analyses of his compositions. Like many friends and associates who expressed their appreciation for Vivier upon his death twenty years ago, I too offer my sincere gratitude. Without Vivier, I would not have explored the world in so many wondrous ways.

Frontispiece



Photograph of the Orion constellation,
outlining its seven principal stars

courtesy of NASA and the Space Telescope Science Institute

Introduction

0.1 *Biography*

We do not know exactly when Claude Vivier was born: he was placed at a Montréal orphanage on 14 April 1948.[1] Nor do we know exactly when he died: he was murdered several days before police discovered his body in his Paris apartment on 12 March 1983. Vivier's turbulent short life unfolded in unusual circumstances that shaped his unique musical career and personality. His untimely death brought him fame unmatched within his generation of Québécois composers.[2]

Vivier never succeeding in tracing his birth mother, despite a strong desire to locate her throughout adulthood.[3] He was adopted at the age of two and a half by a Québécois couple, Jeanne *née* Masseau (b. 1910) and Armand Vivier (1905–1988). Reportedly Armand was kind and genuinely loved Vivier, but Jeanne remained distant and cold.[4] Vivier's sister Gisèle (b. 1933), the natural daughter of Jeanne and Armand, had stronger nurturing instincts, and remained very close throughout his childhood.[5] Vivier discovered his homosexuality in

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[1]Québec churches were required to keep two copies of birth registers, one deposited annually at the office of the District Protonotary (often at a regional courthouse). This copy was entered in the civil register of vital records. In the case of orphans like Vivier, his birth-date was estimated by the orphanage for official records.
[2]Pascal Dolzan killed Vivier and two other gay men resident in the Marais district of Paris. It is believed there was an accomplice to Vivier's murder, but no individual was apprehended. Dolzan's exact motives (other than presumed homophobia) have never been discussed publicly.
[3]Canadian law changed in 1980, allowing adopted children the right to locate their natural birth parents through previously undisclosed government records. Vivier's search remained unsuccessful.
[4]The lack of a mother figure in Vivier's life contributed to the deep loneliness that haunted him throughout his life. These feelings surface in many compositions such as *Lonely Child* (autobiographical), and *Orion* (which, for some reason, briefly reminded him of his birth mother, according to his own program notes).
[5]Mme Desjardins has known Vivier's adoptive family since the 1970s, and understands its dynamics. A baby sister (b. 1930) died at three months, and there is a surviving brother named Marcel (b. 1932). Mme Desjardins remains in contact with Vivier's sister and mother.

elementary school, and came out at the age of 15 to his adopted parents. Unable or unwilling to cope with a gay teenager, they quickly dispatched him to a Catholic seminary, the Frères Magistre.[6] There, between 1965–67, Vivier achieved the first level of studies for the priesthood (i.e., became a postulant), and studied such classical subjects as Greek, Latin, and Christian theology. He learned a great deal about the mysteries and liturgy of Catholicism, but came to prefer music. Certainly Vivier found more understanding of culture with the brothers of the Catholic seminary than at his adopted parents' home, until he was expelled for unspecified "immature behaviour."[7]

Vivier studied music at the Conservatoire de Musique à Montréal (CMM) from 1967–71, notably composition with Gilles Tremblay (b. 1932), and piano with Irving Heller (b. unknown, approx. in the 1920s). Well-known Québécois composers Walter Boudreau (b. 1948) and Michel-Georges Brégent (1948–1993) were his classmates, and remained close friends throughout his brief life. Although extroverted and flamboyant, Vivier remained a disciplined and hard-working composer.[8] Among his first pieces written at the CMM are a two-movement string quartet (*Quatuor à cordes*, 1968), and a more ambitious work,

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[6]Québécois students could choose to attend public secondary schools, vocational schools, or classical college. See Roger Magnuson, *A Brief History of Quebec Education* (Montréal: Harvard House Ltd., 1980), 92. A *petit séminaire* is a segregated classical college for boys and girls. Besides the study of humanities and theology, the classical colleges have had an excellent tradition of music courses in Québec since the 17th-century. These institutions typically had large music rooms, auditoriums for concerts, and chapels for sacred works. Colleges with boarding facilities, like the one Vivier attended, gave ample opportunity for group rehearsals and other collaborative activities. Helmut Kallmann and Gilles Potvin, editors, *Encyclopaedia of Music in Canada* (Toronto, Buffalo, London: University of Toronto Press, 1992. 2d ed.), 276. Hereafter, this source will be abbreviated as *EMC2*.

[7]According to Mme Desjardins, the brothers at the seminary had difficulties with his homosexuality, and as they were quite fond of Vivier, were genuinely upset over their decision to expel him.

[8]For instance, at the Symposium for Student Composers at McGill University in 1969, Vivier interrupted a presentation by guest speaker and celebrated Canadian composer, Harry Somers. Apparently Somers attempted to communicate to the students in a mock bird language, and Vivier responded similarly. This is portrayed in the film produced and directed by Jonny Silver, *Lonely Child: The Imaginary World of Claude Vivier* (Québec: Silverfilm Inc., 1988).

Prolifération (1969, revised 1979). The latter work uses Ondes Martenot, piano, and percussion, plus a running conversation among the performers which gradually overtakes the music. Three other pieces written at this time employ voices, an early indication of his compositional predilection: *Ojikawa* (1968) for soprano, clarinet and percussion; *Musique pour une liberté à bâtir* (1968 or 1969) for women's chorus and orchestra; and *Hiérophanie* (1971) for soprano, winds and percussion.

Vivier finished his CMM studies in 1971. The success of his five completed works won him several Canada Council grants which enabled him to live in Europe from 1971 to 1974. He studied first with Gottfried Koenig (b. 1926) at the Institute for Sound Research in Utrecht, then with Karlheinz Stockhausen (b. 1928) and Hans Humpert (b. 1940) in Cologne. His first major composition, *Musik für das Ende* for 20 voices (Cologne, 1971) displays both his preference for vocal music and his obsession with death. The few electroacoustic works composed during this time were later downplayed by Vivier, who often called them his "random music," and he wrote no further purely electronic works. Two European works were performed in France by Paul Mefano's ensemble: *Désintegration* (Paris, 1972), for two pianos and six strings; and an unpublished work, *Deva et Asura* (Utrecht, 1972) for 15 winds and five strings. In Cologne in 1973, he wrote three purely vocal works (*Chants*, for seven women singers, *Jesus Erbarme dich*, for SATB, and *O! Kosmos* also for SATB). These choral works introduced further preoccupations: love, childhood, and spirituality. His concern for the meaning of text, whether spiritual or psychological, became a lifelong feature of his music. *Chants* (commissioned by the French Ministry of Culture) represents a ritual connected with death, a recurrent phenomenon that culminates in his opera, *Kopernikus* (1979).

His three years of study with Stockhausen (1972–74) prompted a new interest in development of monody, both for solo voice and for choir.[9] Characteristically Vivier shunned the major contemporary musical techniques of his time (particularly serialism) to create his own unique language. Two of Stockhausen's compositional approaches formed an integral influence: melodies with pitch-classes symmetrically arranged about a mid-point axis pitch, and a new monodic style prevalent in Stockhausen's music during the early 1970s. (These stylistic influences will be explored in subsequent chapters.)

Vivier returned to Montréal in late 1974 to assist the premiere of his *Lettura di Dante* for soprano and chamber ensemble by the Societé de Musique Contemporaine du Québec. The success of this work prompted the SMCQ to commission *Liebesgedichte* (1975), scored for four vocal solists (SATB), and a brass and wind quartet. 1975 and 1976 were highly productive years during which he taught at the University of Ottawa (one of the best-known bilingual universities outside Québec).[10] In 1975, Vivier wrote duos for flute and piano, violin and piano, and cello and piano; and solo works for piano and guitar, *Pianoforte* and *Pour guitare*. Vivier also wrote *Hymnen an die Nacht*, a work for soprano solo, accompanied by piano.[11] In 1976, Vivier wrote two of his largest works up to that time: *Liebesgedichte* for four mixed voices and winds, and *Siddhartha*, his first work for full orchestra.

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[9]Monody is a style of composition dominated by a single melodic line, or having a single melodic line as in monophonic texture. Examples of Stockhausen's monodic style from the early 1970s include *Indianerlieder* and *Inori*.

[10]The University of Ottawa/Université d'Ottawa was founded as a bilingual institution in 1848 as a Roman Catholic College. A Sacred School of Music was established in 1931, and despite many changes in the 1950s, still focused on church music. From 1965–69 the School of Music was disbanded, and in 1969 reopened as the Music Department (within the Faculty of Arts). Its mandate expanded to include all disciplines of music and performance. (*EMC2*, 1343.) Interestingly, one of the main thoroughfares through the University of Ottawa campus is named Copernicus, the central subject of Vivier's opera of the same name (*Kopernikus*, 1979).

[11]These pieces, along with *Pianoforte* (1975) and *Hymnen an die nacht* (1975), were submitted for the International Stepping Stone of the Canadian Music Competition (*Le concours de musique du Canada*).

Vivier's travels to the Far East, in late 1976 and early 1977, included Egypt, Iran, Japan, and Indonesia (particularly Bali), where he spent months studying the intricate *gamelan* music. This extensive journey marked an important compositional turning point, generating influences that impacted his instrumental music after his return to Montréal in 1977. The frenetic rhythms of the piano piece *Shiraz* (1977) are inspired by two blind singers he saw in an Iranian village of the same name. The intricate rhythmic patterns of *Pulau Dewata* (1977) and *Paramirabo* (1978) are both directly inspired by the rapid interlocking melodies of *gamelan* music (i.e., *kotekan*). The melody of *Zipangu* (1980), whose title derives from the ancient name of Japan, is actually inspired by the Carnatic music of southern India. Various Asian instruments are employed at strategic points in *Orion* (1979), specifically four Japanese large gongs and four Thai bells. The rhythmic features of *Cinq chansons pour percussion* (1980) are especially inspired by Balinese music, and its instrumentation is intended for Balinese gong racks (although conventional Western percussion may be substituted).

Vivier's vocal works from 1977–80 are either expressly autobiographical or personally significant. *Journal* (1977), for four solo voices and choir, is divided into four movements representing four important themes: *Childhood, Love, Death, After Death*. His landmark opera, *Kopernikus* (subtitled *Opera—ritual of death*), after his own libretto, was completed 14 May 1979, and first performed at the *Monument national* on 8 May 1980.[12] *Kopernikus* combines the same four themes in two acts, which feature a bizarre mix of characters including Merlin, an old witch, monks in a ritual, and Tristan and Isolde. Its austere story

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[12]Constructed in 1893, the *Monument national* is a four-storey building located on St Laurent boulevarde in Montréal, and has always been an important venue for cultural events. *EMC2*, 882. It was taken over by the *École nationale de théâtre* in 1971, and reopened to the public in 1993 following major renovations.

depicts an initiate named Agni, slowly discovering her path to another world beyond life and death. Vivier's *Lonely Child*, scored for soprano and chamber orchestra (March 1980, performed in early January 1981), was more successful, partly due to its autobiographical nature. The "lonely child" is of course Vivier himself, portrayed as an orphaned boy who finds comfort by forming a close friendship with a masculine fairy-world character named Tazio (possibly a reference to the adolescent character Tadzio from Thomas Mann's *Death in Venice*).

Vivier was very active in Montréal musical circles from 1977 to 1980. For a short time he was a Québec representative on the Board of Directors of the Canadian Music Centre. Working with José Evangelista at the Université de Montréal, he was a founding member of the novel and successful new music concerts called *Les Evénements du Neuf*. He worked with the Toronto contemporary music ensemble *Arraymusic*, and wrote ballet music for the Montréal dance group *Le Groupe de la Place Royale* (*Love Songs* and *Nanti Malam*, both 1977). The Vancouver Symphony Orchestra commissioned Vivier's *Lonely Child*, and various choral works (such as *Journal*, 1977) were performed and broadcast on the CBC radio by The Festival Singers of Canada, conducted by Elmer Iseler.

After a three-week trip to Europe in late 1980 to meet with French spectral composers Gérard Grisey (1946–1998) and Tristan Murail (b. 1947), Vivier's style again changed dramatically. His last works demonstrate a new level of complexity, attempting to create a musical language based on timbres alone. In Montréal during the first six months of 1981, he composed *Prologue pour Marco Polo* and *Bouchara*. The quest for a new musical language prompted his move to a new environment, and he relocated to Paris in June 1981, thanks largely to a two-year Canada Council grant. Ironically, given his new status as an expatriate,

the Canadian Music Council declared Claude Vivier "Composer of the Year" in 1981 for his continued and unique compositional achievements.

Vivier wrote his last few works in Paris, including a work for soprano and orchestra, *Trois Airs pour un opéra imaginaire*, and the choral work *Glaubst du an die Unsterblichkeit der Seele* (Do you believe in the immortality of the soul?). During the early part of 1983, Vivier concentrated on developing an *Opera fleuve*, which would combine seven of his works dating from 1977. He also planned a large work to honour Tchaikovsky, utilising full orchestra, eight soloists and dancers, to be entitled, "Tchaikovsky—A Russian Requiem."[13] Sadly, his efforts were halted by his untimely end in March 1983.[14]

0.2 *Four works in question*

According to the 16-page catalogue issued in 1993 by Doberman-Yppan (who hold the copyright to 13 of Vivier's works), Vivier composed a total of 49 works.[15] Almost half of this *oeuvre* uses voice or choir: five works are strictly vocal (mostly choral) and 13 are for solo voice (usually soprano) and chamber ensemble or solo instrument. There is one opera, *Kopernikus*, and one attempt at a combined choral/orchestral work (*Musique pour une liberté à bâtir* scored for women's chorus, percussion, piano, and Ondes Martenot). There are also two ballets which include voices. (As noted above, Vivier virtually disowned his handful of

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[13]Details of both works are contained in his last letter, sent to Phillipe Pelletier, dated 23 February 1983.
[14]Intriguingly, while the details of the *Opera fleuve* are contained only in a personal letter, one folder at the archives at the Université de Montréal contains 87 pages of notes, texts and scenes sketched for the "Tchaikovsky–A Russian Requiem." The work would have been completed near the end of 1984 in time for its premiere at the 1985 meeting of UNESCO in Paris.
[15]Jaco Mijnheer, translated by Elisabeth Wood, *Claude Vivier*, catalogue of works and biography (Québec: Les Éditions Doberman-Yppan, 1993).

purely electro-acoustic works.) There are only four instrumental solo works (two for piano, one for organ, one for guitar), but 17 for instrumental ensembles of various proportions, ranging from two players (typically piano and solo instrument) to chamber works of up to seven or eight players. Vivier wrote only two full orchestral works (*Siddhartha*, 1976 and *Orion*, 1979), plus one for string orchestra (*Zipangu*, 1980).

My dissertation focuses on the 18-month period following *Kopernikus* (May 1979) and preceding Vivier's second trip to Europe in late fall of 1980. During this time he wrote four chiefly instrumental works, inaugurating a new musical language based on fusing harmony and timbre (producing *couleurs*, which I call chord-colours) by composing out an underlying pre-compositional plan—the *jeux de timbres*. Although Vivier refers to the *jeu* in plural form, I will interpret the word in the singular, and loosely translate the term as a "set" (as in *jeu de clés*) or as a "stop" (as in *jeu d'orgue*).[16] More specifically, I will regard the *jeu* as a **series**, and will demonstrate that the *jeu de timbres* consists of a series of chords, one that harmonises each pitch-class of the principal melody of each work in a particular manner, according to recoverable theoretical principles.[17] The exact choice of pitches for each chord of the *jeu de timbres* series produces specific "proto-timbres." In this light, the *jeu de timbres* might be better translated as a "series of proto-timbral entities." In these compositions, what I call "chord-colours"—my translation of Vivier's *couleurs*—are an elaboration of the proto-timbral entities of the *jeu*. In other words, the *jeu* forms a pre-compositional first stage which, when elaborated in its compositional realisation, produces actual, complex timbral entities, or chord-colours.

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[16]The definition of the plural form of Vivier's term, "games of timbres," will be considered in the Conclusion.
[17]The terms *jeu d'orgue* and *jeu de timbres* are analogous in that an organ stop can consist of mixtures (i.e., adding intervals of thirds, fourths and fifths) similar to the interval content of the chords of a *jeu de timbres*.

Vivier's last compositions, which follow upon his three-week conferral with French spectral composers Grisey and Murail (26 November to 17 December 1980), have no *jeu de timbres* substratum underlying their *couleurs*. Instead, the vertical element is obtained through a "spectral calculation of the relationships between the bass note and the melodic note."[18] This particular technique, which I will refer to as "additive synthesis," is first attempted in *Lonely Child* (March 1980). Hence, Vivier's brief encounter with the French spectral composers apparently affirmed his initial attempts at this innovative technique. Having adopted it, he abandoned the intermediary stage of the *jeu de timbres*.[19]

My dissertation will focus on the three instrumental works that represent the penultimate stage of Vivier's compositional development: *Orion* (October 1979, full orchestra), *Zipangu* (August 1980, string orchestra), and *Cinq chansons pour percussion* (September 1980, percussion group). As I have explained, following his brief conferral with Grisey and Murail in late 1980, Vivier's musical language embraces chord-colours more consistently without the *jeu de timbres*, beginning with *Prologue pour un Marco Polo* (March 1981). Consequently, vocal works such as *Lonely Child* (March 1980) and those after 1980 will not figure significantly in my dissertation.

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[18]This brief explanation of "*spectres harmoniques*" is offered by distinguished Québec composer, Denys Bouliane, professor of composition at McGill University in Montréal. As Bouliane also explains, prior to the calculation of these "harmonics" Vivier roughly "harmonises" the melody with a second voice (i.e., a bass line). This technique of producing *couleurs* will be more fully explored in Chapter Six.

[19]Bouliane suggests further intriguing possible translations of *jeu de timbres*, including colourisation approach or colourisation techniques (since the *jeu de timbres* chords are used in various ways to create the more complex *couleurs*), and harmonic-timbral derivations or harmonic-timbral manipulations (since the *jeu de timbres* chords combine harmony and timbre to achieve the desired *couleurs*).

0.2 *Survey of relevant literature*

Very few analytical sources are directly pertinent. Most magazine and newspaper articles focus on Vivier's life and the (sordid) circumstances of his death. Two scholars have produced important analytical articles: Jaco Mijnheer from The Netherlands, and Canadian Peter Tannenbaum. Mijnheer has analysed the production of *couleurs* (i.e., chord-colours) in two later vocal works, *Lonely Child* (1980) and *Bouchara* (1981), as the basis of an alleged new musical language.[20] He also assisted Mme Desjardins in producing a critical chronology of all Vivier's compositions.[21] More generally, he has commented on aspects of Vivier's musical style for various CDs,[22] also writing about the composer's life.[23] Unfortunately he abandoned his doctoral work undertaken at the Université de Montréal during the 1990s for personal reasons. Tannenbaum published a fairly detailed analytical study of Vivier's overall musical style in a Canadian periodical,[24] and has delivered a musical paper on the musical processes in *Lonely Child* ("Modernism vs. Post-Modernism in the Music of Claude Vivier," ca. 1992). Tannenbaum's interest in Vivier was first reflected in a detailed account of the composer's life and music that he published soon after the composer's death.[25] Tannenbaum too gave up his musical studies in the early 1990s.

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[20]Jaco Mijnheer, "Het akkoord voorbij," *Maandblad voor Muziek* (January 1998): 10–15.
[21]Jaco Mijnheer and Thérèse Desjardins, "La chronologie des oeuvres de Claude Vivier: Historisation de la déshistoire," *Circuit: revue nord-amérique de musique du XXe siècle*, 2: 1/2 (1991), 17–29.
[22] Jaco Mijnheer, "A Journey into my very Essence," translated by Fiona J. Gale. Program notes for Philips CD 454 231-2, 1996.
[23]Jaco Mijnheer (see n. 15), 7.
[24]Peter Tannenbaum, "Claude Vivier Revisited," *SoundNotes* 1 (fall/winter 1991): 12–27.
[25]Peter Tannenbaum, "The Life and Death of Claude Vivier," *Magazine Open City* (October/November, 1983).

Two recent analytical publications about Vivier's music are noteworthy. Janette Tilley, a doctoral student at the University of Toronto, has published an online article discussing the importance of melody in Vivier's music,[26] and Jacques Tremblay has written an article on *Lonely Child,* analysing its musical processes.[27] At three conferences, I presented a paper about the musical correlates of astronomical data for the constellation Orion and the eponymous nebula in *Orion.*[28]

But the best information regarding his musical thoughts and processes comes, not surprisingly, from Vivier himself. One volume of *Circuit,* published by the press of the Université de Montréal, is devoted entirely to Vivier and consists largely of his own writings, mostly in French but occasionally in English.[29] While no personal letters are included, this volume consists of his earliest thoughts on music in general, and later comments on the music of Beethoven, Schoenberg, Stravinsky, and Bartók. It also contains his first attempt at an imaginary language (the text to *Ojikawa,* 1968, duplicated on page 48), one that he would later develop more fully. Vivier honours two of his former teachers in his writings: he briefly explains the music of Stockhausen, particularly "Mantra" (pp. 93–95); and writes a short letter in praise of Tremblay's influence on the occasion of the latter's fiftieth birthday. Some of his articles offer opinions on the contemporary musical and film scenes in Québec, but the

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[26]Janette Tilley, "Eternal Recurrence: Aspects of Melody in the Orchestral Music of Claude Vivier," *Discourses in Music,* 2: 2/1 (fall 2000). I wrote a response to Tilley's article for the same online magazine in 2: 2/2 (winter 2000/01).

[27]Jacques Tremblay, "L'écriture à haute voix: *Lonely Child* de Claude Vivier," *Projet Érudit–Circuit,* 11: 1 (2000), 45–67.

[28]Ross Braes, "Claude Vivier's *Orion,*" presented at the McGill University Graduate Symposium (February 1997), the Pacific Northwest Music Graduate Student Conference (October 1999), and the Theory and Analysis Graduate Students, King's College, London UK (May 2000).

[29]Claude Vivier, *Circuit: revue nord-amérique de musique du XXe siècle,* 2: 1–2, 39–135.

bulk of his writings in *Circuit* consist of program notes and texts for most of his works, arranged chronologically. There are particularly enlightening musical descriptions of countries he visited (for example, Bali in "Trois lettres de Bali," pp. 70–79) and the music that he studied (e.g., the role of music in *kabuki* drama in "Japon," pp. 68–69).

One final source is the archive of Vivier's sketches housed in the Université de Montréal. These were duplicated by Mme Desjardins (the executor of his estate) soon after his death, and the originals were sent to the Université de Montréal in the original folders received from Paris. There are a total of 103 folders, which include the musical sketches to all 49 works, many personal letters, student notes from CMM, Europe, and Bali, names and addresses of his contacts, and other miscellaneous writings (e.g., poems, critiques, commentaries). While the university has roughly itemised and numbered each folder for reference, huge discrepancies and mismatched papers make for frustrating research. Nonetheless, the sketch material is an invaluable resource for critically evaluating Vivier's music.[30]

0.3 Definition of *jeu de timbres* and *couleurs*

Vivier's writings contain intriguing attempts to clarify his *jeux de timbres* and *couleurs*, but one must search for them in unexpected places. The program notes to *Orion* contain enigmatic statements on the symbolism of the solo trumpet (which states the opening melody) as an instrument of death; the various manifestations of "beauty" in the music

[30]Vivier's sketches will eventually require extensive sorting and reorganising. Interestingly, there are a few sheets of music that belong to other composers, such as a personal gift of a sheet of Alexina Louie's chamber music inserted in one of the two folders for *Orion*.

(possibly a reference to the celebrated beauty of the Orion nebula); the fact that he imagines the Orion constellation upside-down in relation to standard representations, and the quasi-narrative significance of the six sections. Nowhere is there any direct reference to either chord-colours or *jeux de timbres*. But four years earlier on 6 October 1975, Vivier wrote a poem revealing his source of musical inspiration, that of the stars, one which also displays subtle metaphors of the new musical language he would later create:

> *J'irai vers la constellation*
> *des être mutants*
> *découvrir le secret de la mélodie vraie*
> *et de l'harmonie juste*
> *les yeux des planetes m'apprendrons*
> *les couleurs douces et les proportions amoureuses* (etc.)[31]

Here the constellation that reveals the "secret of true melody" to be the basis of pure harmony could be a metaphor for the *jeux de timbres*; the eyes which teach "gentle colours and loving proportion" suggest the chord-colours.

Vivier never settled on a particular term for the pre-compositional proto-timbral stratum. In his sketches "*jeux de timbres*" appears, as does "*Klangfarbenmelodie*," sometimes on the same page. His use of the latter term is a considerable departure from Schoenberg's notion of progressive reorchestration of a chord, or from Webern's orchestrational fragmentation of a theme. In using *Klangfarbenmelodie*, Vivier was apparently thinking of

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[31]I will go towards the constellation
of mutated beings
to discover the secret of true melody
and of pure harmony.
The planets' eyes shall teach me
gentle colours and seductive proportions
(Translation and emphasis mine)
Claude Vivier, *Circuit: revue nord-amérique de musique du XXe siècle*, 2: 1–2, 123.

a vertical expansion of melody into something quasi-timbral. I avoid the term *Klangfarbenmelodie* in connection with Vivier's technique, as it is liable to cause misunderstanding, and instead employ *jeu de timbres* throughout.[32] Again, I understand the *jeu de timbres* as an array of predetermined chords stemming from the principal melody (or scale) of each instrumental work.

Unlike harmonisation of melodies in a tonal sense, the *jeu de timbres* comprises a series of complex vertical sonorities, based on the essential pitches of the principal melody, devised before actually writing the work.[33] Vivier's "colours" are the result of modifying these pre-compositional chordal entities through various instrumental and textural techniques. The theoretical constructs behind the *jeu de timbres* involve one or more of the following: interval-classes, overtone partials, and mirror inversions. To summarise:

1) The basic pitches of the principal melody or underlying scale are "harmonised," and produce the *jeu de timbres*, a series of proto-timbral chords of various cardinalities and ordered interval-class sets. The word *jeu* indicates any systematic arrangement of added pitches applied to the basic melodic or scale pitches, and the qualification *de timbres* indicates that the harmonic colour of the chord will serve to undergird a subsequent textural elaboration. This stage will be fully investigated in Chapter One.

2) The resultant chords are applied in a variety of instrumental contexts and complex quasi-timbral effects, producing full-fledged timbral entities, or *couleurs*. This stage will be fully explored in Chapters Four and Five.

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[32]While the term "*jeux de timbres*" sometimes appears in his sketches, Vivier never used it directly in letters or interviews.

[33]Unlike Messiaen, Vivier does not conflate the concepts of chord (timbral entity) and colour.

The *jeux de timbres* used in *Orion*, *Zipangu*, and *Cinq chansons pour percussion* are essential for the formation of *couleurs* of these instrumental works, which stem from the chords of the *jeu*. What Vivier terms the *couleurs* of his later vocal works, beginning with *Lonely Child*, stem from the intervallic content between the melody and an added "bass;" their frequencies are fed into various algorithms to produce masses of quasi-harmonics. (See Chapter Six for a more detailed discussion of this technique, which I call "additive synthesis," and its role in the creation of *couleurs*.)

A principal distinction between these two types of chord-colours is the extent to which they are score-determined. The *jeu de timbres* forms the raw material of ingenious texturalisations of its underlying chord series to create a harmonic-timbral music. In *Orion*, numerous textural choices combine these chords in highly unusual ways; in *Zipangu*, the various distortions resulting from unconventional string techniques are significant contributors; and in *Cinq chansons pour percussion*, the specified pitches of Balinese and Chinese gongs have unpredictable content in terms of their harmonic and inharmonic partials. Thus, only the *jeu* themselves (the basic chords) are fully score-determined; the *couleurs* arise as a result of the manner and medium of performance. The *couleurs* of the vocal works, on the other hand, rely on invented upper "harmonics" and overtones to create harmonic-timbral music: in *Lonely Child*, for example, the numerous spectral calculations create the desired chord-colours. Thus, in the later works and in *Lonely Child*, the *couleurs* are more completely score-determined.

0.4 *Objectives*

I assert that the implementation of the *jeu de timbres* in the wholly instrumental works of 1979–80 (i.e., excluding *Lonely Child*) forms a crucial pre-compositional stage for its creation of *couleurs*. While there is no exact English equivalent of *jeu de timbres*, I will refer to it a series of chords, as many as fifteen per work. The subsequent stage of forming the particular *couleurs* (i.e., chord-colours) of each work involves elaborating/orchestrating the *jeu de timbres* chords in unusual and creative manners. I concentrate my analyses on *Orion* for a number of reasons. Having at his disposal a complete symphony orchestra and three percussion groups allowed Vivier the greatest range of timbral possibilities for creating of textures, instrumental groupings, and dynamic shapes. *Orion* is the single work to employ a *jeu de timbres* without introducing any extra-notational elements to produce its chord-colours. Above all, I believe *Orion* presents the most intricate, yet the clearest theoretical design of the *jeu de timbres* itself.

Chapter One will investigate the method and application of the *jeu de timbres* in the instrumental works of 1979–80: *Orion*, *Zipangu*, and *Cinq chansons pour percussion*. The following chapter will consider other basic musical elements—melody and form, modal/tonal implications, and rhythm—common in all four 1979–80 compositions.

Chapter Three will describe and analyse those sketches for *Orion* that pertain most crucially to its form, melody, and, above all, its harmonies (both the *jeu de timbres* chords and those derived from Vivier's notes on Asian metallophones). Of the roughly 80 pages of sketches extant, I supply numerous diplomatic renderings, with the originals duplicated in Appendix 2. I also offer a brief theory of *Orion*'s *jeu de timbres*, and analyse its application.

Chapter Four will examine aspects of the melody, form and the compositional deployment of the *jeu de timbres* in *Orion*, that is, its role in the creation of *Orion*'s *couleurs*. Various orchestral techniques and textures help create the chord-colours as elaborations of the *jeu de timbres*. Each of the six sections of *Orion* will be examined in turn, with occasional supplemental material deriving from the preceding chapters. Extra-musical considerations will be briefly examined, especially correlations with astronomical data pertinent to the constellation itself. The subsequent chapter will examine the role of the *jeu de timbres* in the creation of salient chord-colours in *Zipangu* and *Cinq chansons pour percussion*, and comparisons to *Orion* will be made whenever possible.

The final, sixth chapter will explore Vivier's production of *couleurs* based on the additive synthesis technique in *Lonely Child* and *Bouchara* (March 1981). This technique will be fully defined and analysed with reference to published analyses. Vivier's post-1980 views on his musical language will also be examined—especially his concepts of timbre, mass, and colour—in light of both his comments to Susan Frykberg[34] and the cover page of his incomplete opera, *Opera fleuve*.

To conclude, while Vivier's additive synthesis superseded *jeux de timbres*, I believe that what I designate as the *jeu de timbres*—most clearly and fully utilised in *Orion*, and to a lesser extent of the other two instrumental works of the 18-month period in question—constitutes a decisive and theoretically intriguing stage in Vivier's search for an innovative musical language based on *couleurs*.

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[34]Susan Frykberg, "Claude Vivier in Conversation," *Musicworks* 18 (winter, 1982): 8–9.

Chapter 1: *Jeux de timbres* in the instrumental works of 1979–80

Introduction

Each Vivier instrumental piece employs a different series of harmonies to create its potential chord-colours. In *Orion* and *Zipangu* the basic pitches of the principal melodies are "harmonised" to produce the *jeu de timbres*, a series of proto-timbral chords of various cardinalities and ordered interval-class sets. In *Cinq chansons pour percussion* the basic pitches of the underlying scale form the basis of two "harmonisations" for two quite different *jeux de timbres*. This chapter will explore theoretical issues pertaining to the *jeux* themselves, drawing on selected sketch materials housed in the Université de Montréal archives.[1] In subsequent chapters I will examine the how the resultant chords are applied in a variety of instrumental contexts and complex quasi-timbral effects, producing full-fledged timbral entities or *couleurs*. I will also consider some of the psychoacoustical properties of these chords, with particular focus on *Orion*.

1.1 *Orion*

Orion was the first of the four works in question, completed on 6 October 1979. Vivier's sketches show a series of 21 seven-note harmonies, each corresponding to one of the 21 basic melodic pitches of the opening melody. These harmonies are in turn used throughout

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[1]The relevant sketches for this discussion are duplicated from the archives at the Université de Montréal, file #34 (for *Orion*), file #68 (for *Zipangu*) and file #6 (for *Cinq chansons pour percussion*). See n. 1, chap. 3.

the work to augment the principal melody, sometimes singly, sometimes in combinations. They are created by first "harmonising" each melodic pitch below with three additional pitches resulting in three registrally ordered vertical intervals. (See Fig. 1.1 on the next page. The basic melodic pitches are indicated by whole notes on the second staff. The double-bar lines segregate the melody into its four constituent motives, which will be discussed in the next chapter). I will refer to each harmony by its numerical position in the sketches, as harmony 1 to 21. As well, while each tetrachord (i.e., melodic pitch plus lower trichord) has six component interval-classes, only the *ordered interval-classes* between registrally adjacent pitches (what I will term OICs below) are considered. These are indicated not just for the sake of my analysis, but reflect Vivier's markings on his sketches (see Chapter Three).

Once the lower notes are chosen below each melodic pitch, apparently in accord with the desired interval-class balances, three upper notes are added to each harmony, as an pitch-intervallic mirror of the lower notes. Interestingly, in Vivier's own program notes to *Orion* he comments that he has always viewed this constellation upside-down. The basic seven star pattern of Orion forms a mirror inversion with the two stars at the top inverted as the two stars below, and the three-in-a-row middle stars as an axis point of symmetry (refer to the Frontispiece for a photograph of the Orion constellation highlighting its seven main stars). The melody similarly forms the central and focal point for each of the 21 seven-note harmonies. While the actual pitch intervals are free from chord to chord (e.g. an ic 4 may be represented as a major third or a minor sixth), the intervallic choices remain consistent as the inversion is carried out within each chord. Repeating melodic pitches, though, are not assigned the same OICs.

Figure 1.1 – *Jeu de timbres* of *Orion*

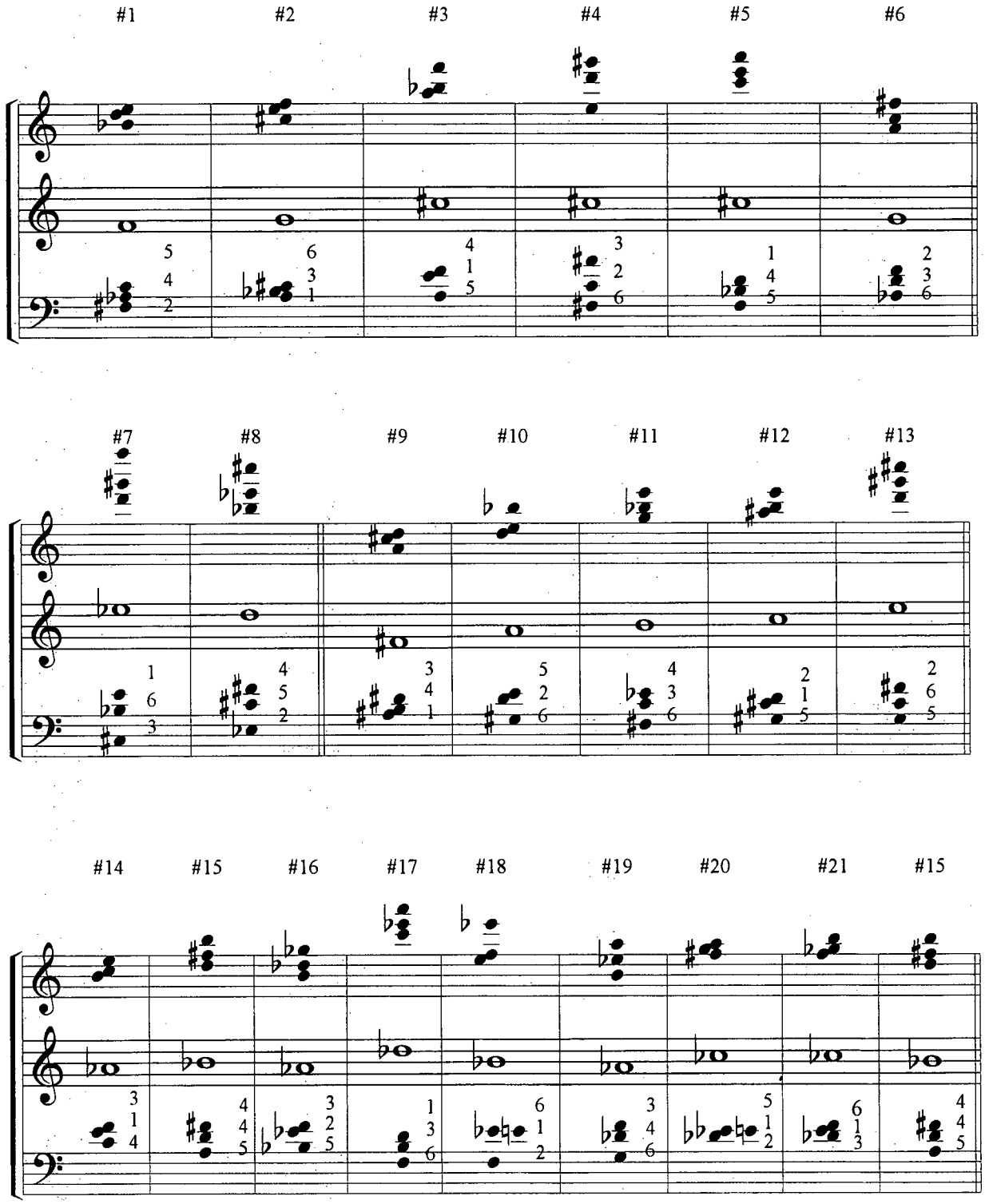


Table 1.1 below shows the OICs of the lower tetrachord of each harmony to better illustrate the interval-class aggregates described below. Please compare with the scored *jeu de timbres* (see Fig. 1.1) above. Up through harmony 14 the OICs of each successive pair of tetrachords contain all six possible interval-classes, in effect forming seven interval-class aggregates. (Coincidentally, the sum of the six interval-classes, 21, reflects the total number of harmonies employed for this *jeu* de timbres.) After the seventh pair (i.e., harmonies 13 and 14), the remaining seven harmonies do not pair off neatly as before. Specifically, the OICs of last seven harmonies results in, respectively, four and three instances of ic 1 and ic 2, ic 3 and & ic 4, and ic 5 and ic 6. In this way, the 21 harmonies attempt to more or less evenly distribute all interval-classes first with the seven pairs (harmonies 1–14), then with the remaining seven (harmonies 15–21).

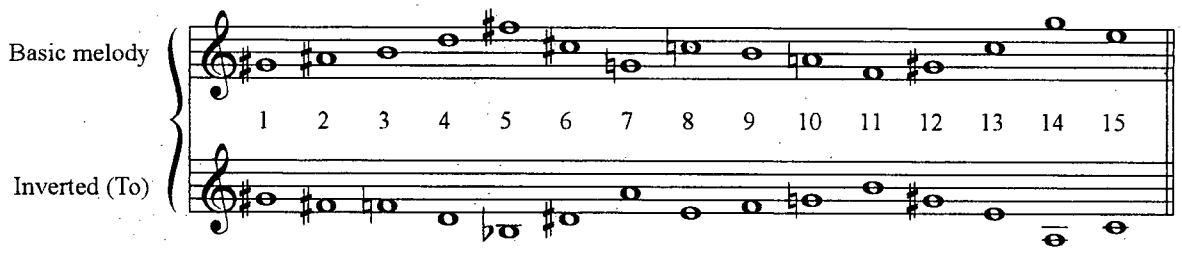
Table 1.1 – OICs of the lower portion of *Orion*'s *jeu de timbres*

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

1.2 *Zipangu*

Zipangu, finished on 13 August 1980, uses a *jeu de timbres* that incorporates a mirror inversion of the principal melody (see Fig. 1.2 below) as the basis of its *jeu*. The pitch-intervallic contents of *Zipangu*'s complete *jeu* (see Fig. 1.3, p. 24) do not invert along a melodic mid-point in the manner of *Orion*, nor does it use strict all-interval-class aggregates. Nonetheless, each harmony of *Zipangu* is associated with a pitch of the principal basic melody, with the melodic pitch forming the uppermost pitch of each sonority, not its middle element. Again unlike *Orion*, the *jeu de timbres* of *Zipangu* comprises in harmonies ranging from three to seven pitches.

Figure 1.2 – *Zipangu*'s basic 15 melodic pitches and its inversion



Two precomposed stages produce the complete *jeu de timbres* in *Zipangu* as shown in Figure 1.3 (see below, p. 24), which reproduces the relevant sketches. First, Vivier reduces the framework of the florid principal melody (starting on G♯4) to a series of 15 essential notes, which are then harmonised with major third intervals below each melodic note. Superimposed on this melody of thirds is an inverted version of the principal melody, starting also on G♯4, also harmonised with lower major third intervals. Both lines of major-thirds are

then combined to produce chords for the first stage of the *jeu de timbres*, what Vivier indicates as *les tierces* (compare Fig. 1.2 above, *Zipangu*'s basic 15-pitched melody and its inversion, with first system of Fig. 1.3 on the next page). For the second stage, the original melody is combined with another inverted version, starting a minor third lower (i.e., G♯4 begins the original melody, and F4 is the starting pitch of its inversion). Once more, both the original and inverted melodies are harmonised with lower major third intervals (see Fig. 1.3 below, middle system). The second stage of chords is then combined with the chords of the first stage, resulting in intriguing, complex harmonies of varying cardinalities and set-class types. The resultant harmonies of the final, third stage appear to use free octave displacements, fully realised on the bottom system of Figure 1.3, designated by Vivier as *superposé.* (See Appendix 3 for a full copy of the original sketch, labelled as sketch Z3, p. 250.[2]) Three chords are duplicated (chords 3 by 9, chords 1 by 12, and chords 8 by 13) resulting in only 12 *different* harmonies for *Zipangu*.[3] In spite of these duplications, I will refer to the ordered 15 harmonies of *Zipangu*'s *jeu de timbres* in later discussions of its chord-colours (see Chapter Five).[4]

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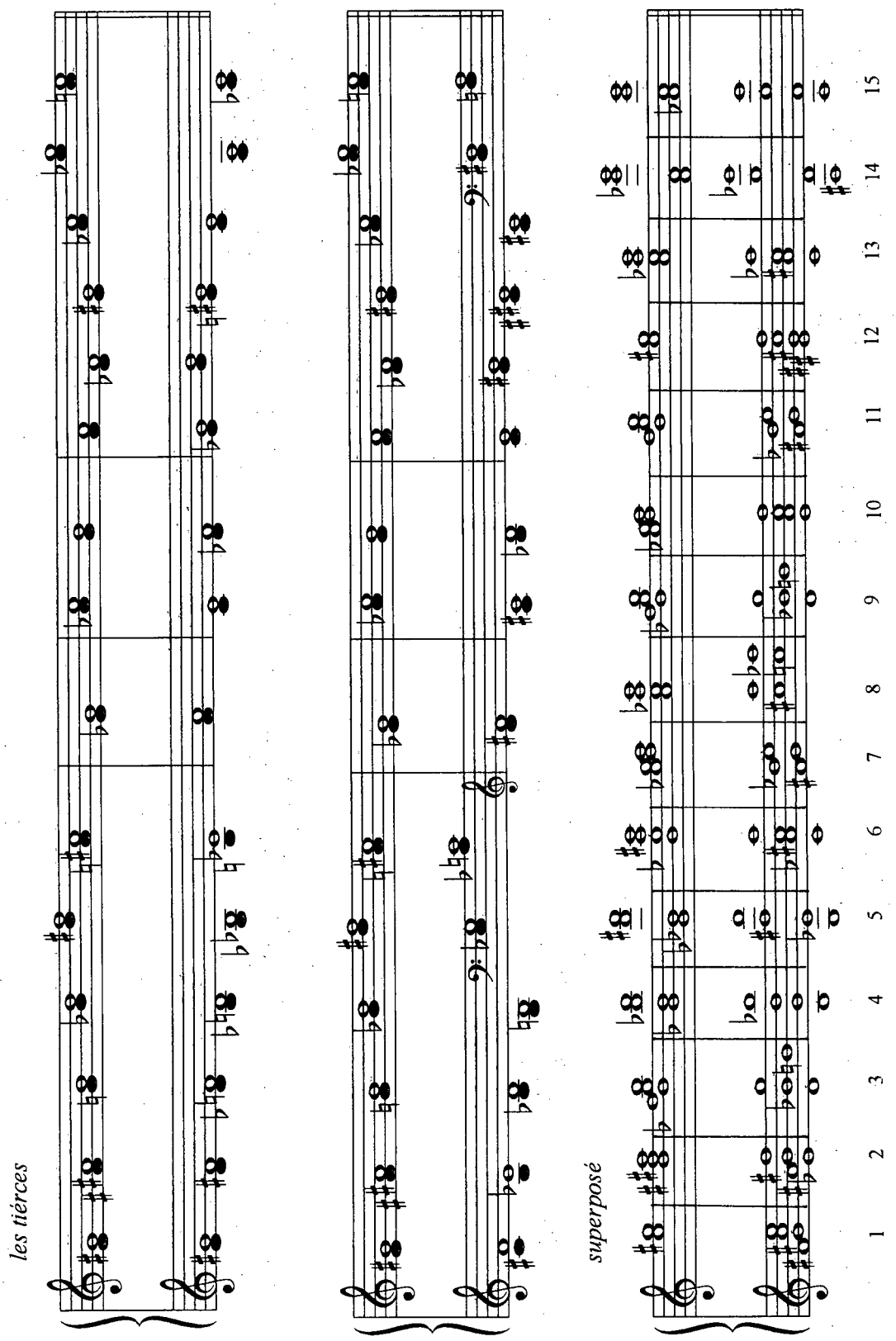
[2]My rendition of sketch Z3 is deliberately incomplete. I do not duplicate the bottommost portion of the sketch where Vivier writes the discrete pitches for each harmony of the third stage within a narrow range of pitches (C4 to E5). Vivier then calculates the number of pitches for each harmony, placing its cardinality on the top.

[3]Inside a box on the left margin of the original sketch is the phrase "*12 accords de Zipangu*," apparently added after Vivier discovered the duplicate harmonies.

[4]Interestingly, the harmonies in the first system contain subsets of one or the other whole-tone hexachord (specifically: 04, 048, 0246, or 0268), while the harmonies in the second system contain subsets of the 014589 hexachord, Forte set 6-20 (specifically: 0145, 0347 and 0158). Furthermore, the 6-20 hexachord is an all-combinatorial type based on all four basic twelve-tone operators, and has mirror-inversion characteristics (i.e., the set is symmetrical by reflection around a pitch-class axis). Whether or not Vivier was aware of the inherent qualities of both systems in producing the resultant harmonies of this *jeu de timbres*, his musical choices are strikingly inspired by whole-tone content and mirror-inversions.

Figure 1.3 – First three systems of sketch Z3: *jeu de timbres* of *Zipangu*

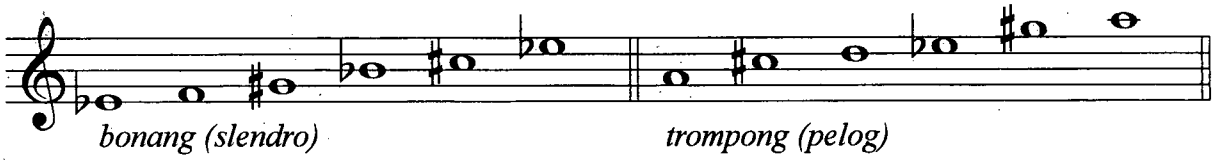


1.3 *Cinq chansons pour percussion*

Cinq chansons pour percussion, completed 26 September 1980, is scored principally for three Balinese *gamelan* gong racks: *bonang*, *trompong*, and *reong* (which Vivier rather imprecisely calls *gongs à mammelon* [sic], i.e., nipple gongs). It also employs two sets of *ceng ceng*,[5] one of which requires a bow, and one Chinese gong. The piece was composed for David Kent, a percussionist with the Toronto Symphony Orchestra who owned the required instruments. Interestingly, Vivier never heard a performance of the completed score and, according to Mme Desjardins, its instrumentation can change to approximate any instruments not easily accessible.

Cinq chansons has two series of *jeu de timbres*, the first of which is best described with reference to four precomposed stages. To clarify, the following three full-page figures (1.5, 1.6, and 1.7) duplicate relevant data from the original sketch material (copies of which are located in Appendix 4, pp. 252–255).[6] The first stage devises a 15-note scale that combines two scales derived from the pitches of the *bonang* and *trompong*. This new scale appears on the top staff of Figure 1.5 below, sketch CC1 (see n. 4). These two scales are typical south-east Asian scale patterns: the *slendro* and the *pelog*.[7] See Figure 1.4 below:

Figure 1.4 – *slendro* and *pelog* scales

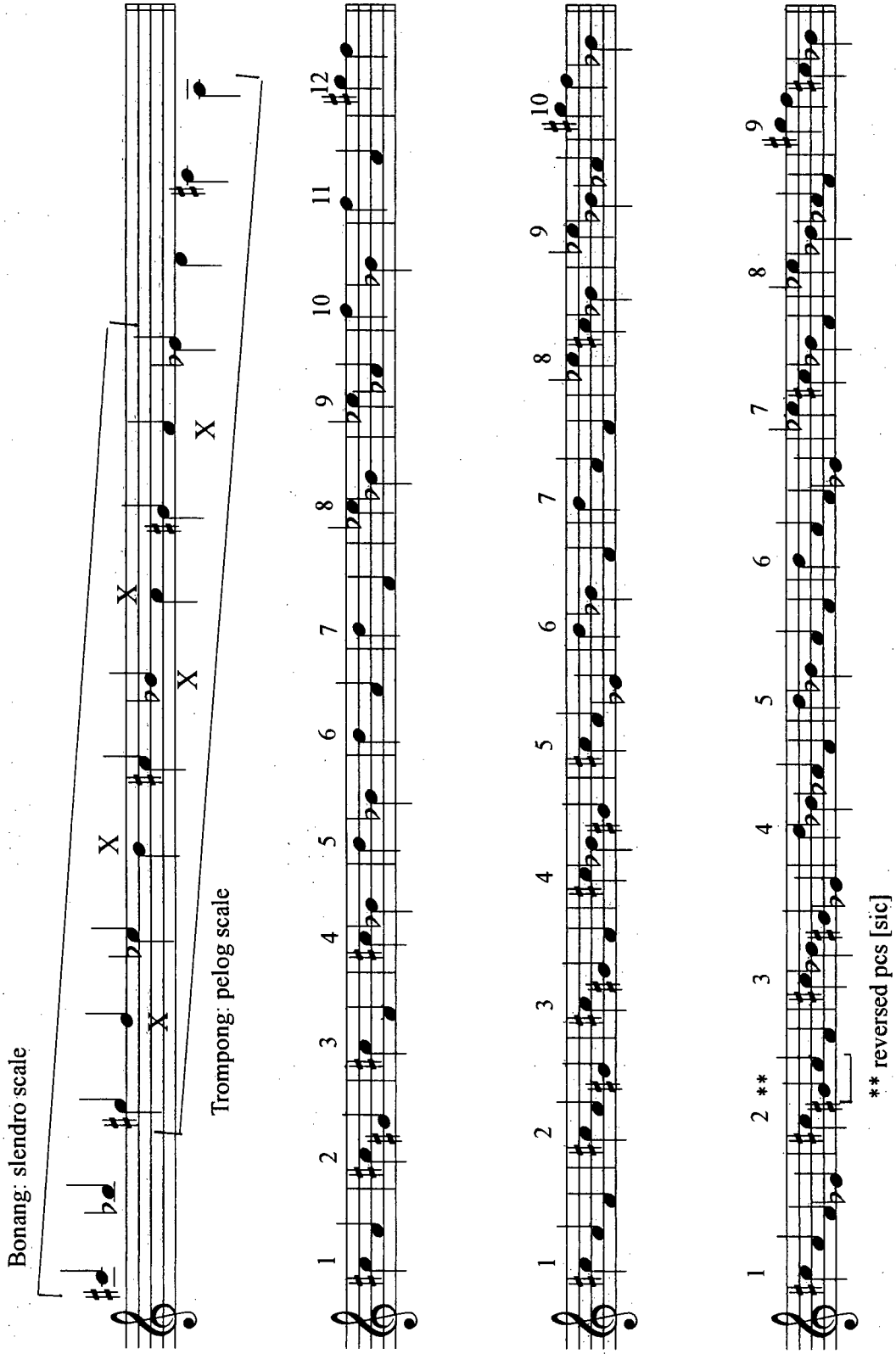


[5]Vivier calls these *changs*. The *ceng ceng* consists of a set of six small bronze cymbals mounted upside-down inside a wooden structure which are to be struck by two hand-held cymbals. One indication in the last song instructs the player to use a bow to make the *ceng ceng* resonate, hence the request for a bowing *chang*.

[6]I refer to my simplified renderings of the original sketches as CC1, CC2, and CC3, whereby the CC stands for *Cinq chansons pour percussion*. Various integers inscribed by Vivier in CC1 and CC3 may indicate durations of the individual songs, or perhaps the melodies within each, and the brackets and two coloured fermatas in CC3 may indicate choice of instruments.

[7]The *slendro* is characterised by a series of tones and approximate minor thirds, while the *pelog* is characterised by a series of semitones with approximate major third/perfect fourth intervals. The complete individual scales, as they appear in Vivier's notes, may be viewed on Fig. 3.14, p. 100.

Figure 1.5 – Sketch CC1: composite scale and components



The 'X's inside the upper and lower brackets of the composite scale in sketch CC1 (Fig. 1.5 above) indicate pitches not included in both scales (i.e., D5 and A4 are not included in the upper *bonang* scale, and F5, B♭4, and F4 are not included in the lower *trompong* one). As also shown, the range of each scale reflects the range of the bells: the *bonang* from E♭4 (which cannot extend down to C♯4) to C♯6, and *trompong* from A3 to G♯5. For the subsequent stages, all pitches but the uppermost C♯6 are employed.

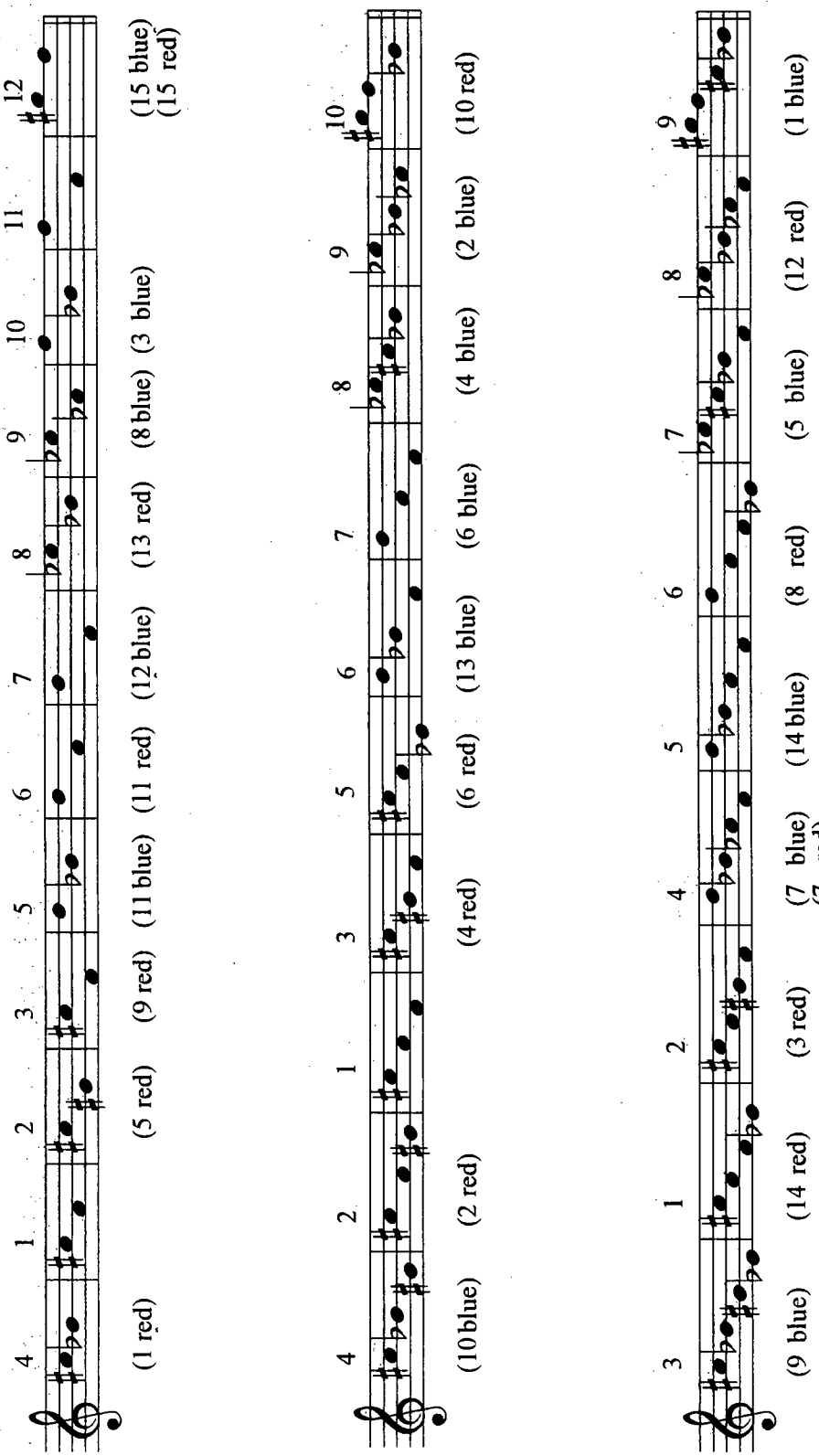
The second stage of the *jeu de timbres* forms three staves of subsets of two, three, and four pitches. These rows comprise the larger portion of sketch CC1, and are found below the composite scale. Consistently for each bar in each staff, five pitches from the composite scale are elected as the initial, uppermost ones: C♯5, D5, E♭5, F5, and G♯5. The pitch(es) added below also derive from the composite scale, and never extend below E♭4. Coincidentally, the pitches for all three staves, which range from E♭4 to G♯5, match those of the overlapping portion of the two original scales which form the composite.

Next, these 31 components (12 two-pitched ones, 10 three-pitched ones, 9 four-pitched ones) are copied onto another page, sketch CC2, which is transcribed in Figure 1.6 below (see p. 39).[8] Using blue and red pens, Vivier then circles two series of 15 components and connects them together in a seemingly haphazard manner from staff to staff. Each series is numbered 1 to 15. In two cases, an item occupies the same slot in both series: the seventh item, four-pitch component #4; and the last, fifteenth item, two-pitch component #12. Upon closer inspection, however, one sees that a mirror-like method of choosing the components

[8]For some unclear reason, the initial four components of rows one and two, and the initial three of row three have been reordered. Please compare the ordinal numbers as indicated in the upper left corner for each component between sketches CC1 and CC2.

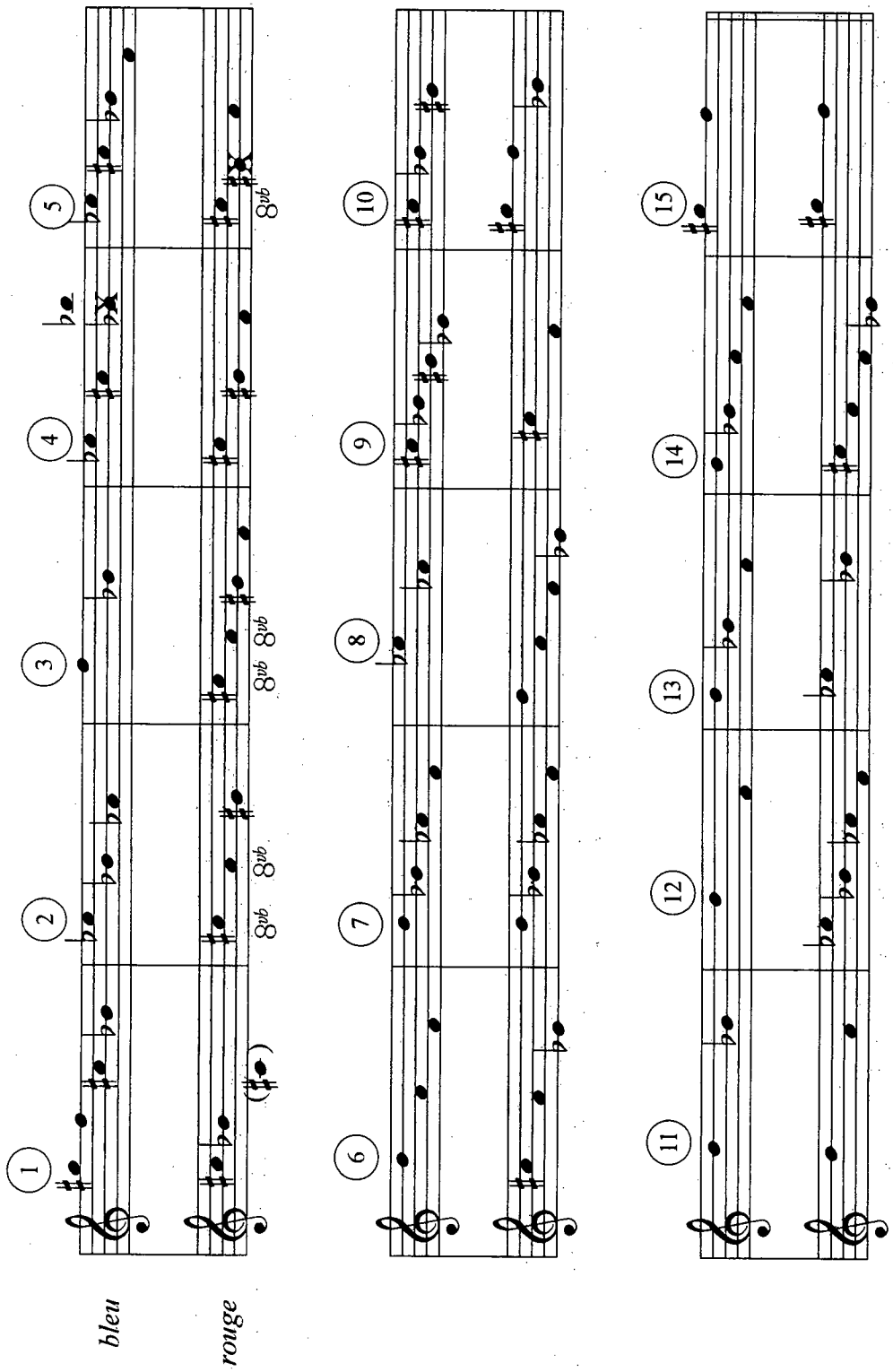
initiates both strings of components. Specifically, the first red component begins in the upper-left corner, while the first blue one begins in the opposite, lower-right corner. For the second component, both parts then move in inversion to one another to row two, and progress to the second component from the outer margins. Likewise, the third component is achieved with another move in inversion (red to row three, blue to row one), and again, progress to the third component from the outer margins. This mirror-like inversional method soon begins to break down, but is a formative (if inconsistent) element for its *jeu de timbres*.

Figure 1.6 – Sketch CC2: components organised by two colours



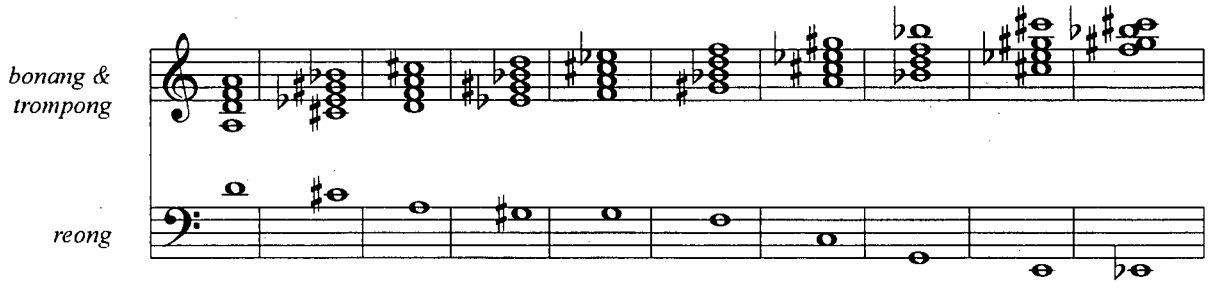
The final stage fashions the two coloured strings of components into 15 larger collections. This occupies sketch CC3, which is transcribed in Figure 1.7 on the next page. I have reordered the original 15 into three rows of five chords each, for clarity. Presumably due to the instrument ranges, Vivier also alters a few pitches: the bracketed C♯4 in chord 1 is a duplicate of the upper C♯5; the pitches of C♯5 and A4 in chords 2, 3, and 5 are played down an octave; and the lower pitch B♭4 in chord 4 is replaced with an upper B♭5. For no clear reason, Vivier changes pitch G♯4 in chord 5 to A4. Notably, the two staves of blue and red components as listed on sketch CC3 are not used to fashion chords, but rather to make motives used as the basis of the first three songs. A complete analysis of their application necessarily goes beyond the scope of this discussion.

Figure 1.7 – Sketch CC3: first *jeu de timbres* of *Cinq chansons pour percussion*



A second *jeu de timbres* is used exclusively for the fourth "song." The top part of the original sketch (CC4) transcribed in Figure 1.8 below, outlines a series of ten tetrachords, the pitches of which are again derived from the composite *bonang/trompong* scale. Placed underneath these chords is the scale of the *reong*. The latter is also used in the last "song," as a source of isolated melodic pitches or dyads, never of four-note combinations (i.e., tetrachords). Not surprisingly, each layer is intended to be performed by the appropriate instruments.

Figure 1.8 – Sketch CC4: second *jeu de timbres* of *Cinq chansons pour percussion*



The second *jeu de timbres* of *Cinq chansons* employs a far simpler series of harmonies. Starting with the lowest note of the composite scale, the A3, Vivier selects the other three notes by moving upwards through the scale, skipping over alternate pitches. Hence, the first chord (A3, D4, F4, A4) is formed by skipping over pitches C♯4, E♭4, and G♯4. The second chord then moves up to the next note in the composite scale, the C♯4, and repeats the same process to create another four-note chord. This entire process repeats through to the ninth chord. Finally, the tenth and highest chord is formed by combining the top four notes of the composite scale (F5, G♯5, B♭5, C♯6). Its application in the fourth "song" will be fully analysed in Chapter Five, pp. 202–206.

Chapter 2: Common musical attributes of the four works

2.1 *Melody and Form*

2.1.1 – Basic characteristics

The opening and principal theme in each of the four works in question is important for two reasons: 1) the melodic notes often form the axis point of inversion for each of the chords of the *jeu de timbres* (if present) and 2) the opening melody is immediately repeated in varied forms, resulting in an approximate theme and variations form. The latter aspect is not so clear in every piece. For instance, *Zipangu* presents its principal melody in its most basic form only in the final section, with the variations beginning at the outset of the piece. *Lonely Child*'s opening melody repeats twice: once in the middle, with considerable textural complexity, and in the final section where it is more plainly stated. Only *Lonely Child* uses intervening episodes between each principal thematic statement, termed by Vivier *Chant I-IV*, resulting in a loose rondo form (ABCADA). Specifically, section B has two melodies: *Chant I & II*; and section C has two melodies: the instrumental opening melody vocalised, and *Chant III*; while the D section is itself named *Chant IV*. In *Cinq chansons pour percussion* no silences demarcate each "song." Rather, new rhythmic and melodic materials signal division points between successive "songs." Of the four pieces under study, only *Orion* is in a straightforward theme and variation form: its opening melody clearly repeats for each of the five successive sections.

The manner in which Vivier varies the principal theme differs from piece to piece as well. There is a general tendency to frame each entire work with relatively plain statements of the principal melody, while statements during the inner sections are obscured in a variety of ways. Vivier engages the listener in an auditory game, in which one strives to recognise an essential melody submerged in a range of complex textures and timbres. For example, *Orion*'s principal melody divides into four separate motives. During the subsequent variations, these are sometimes restated simultaneously for a maximally complex sonority, at other times successively for a clearer texture. But *Lonely Child* and *Zipangu* both utilise innovative, contemporary string effects—uneven tremolos, exaggerated pressure *sul ponticello*, unspecified artificial harmonics—to obscure the essential melody. *Cinq chansons pour percussion*, on the other hand, has no principal theme that repeats to create variations or a rondo form. Instead, each of the five "songs" is distinct by virtue of different rhythms and drumming effects. While lacking an obvious form, the *Cinq chansons* share the same aesthetic goal as the other three pieces: to further Vivier's quest for sonic expression and colour.

Except in *Cinq chansons pour percussion*, the principal theme of each work is composed with constituent motives and completes a 12-tone aggregate, or very nearly so. *Orion* is the clearest example in these respects. Its motivic construction is indebted to Stockhausen's *Mantra* (1970).[1] As in Stockhausen's piece, Vivier creates a basic melody consisting of four individual limbs (i.e., motives), separated by periods of silence. Together these four motives form a twelve-tone aggregate with two repeated pitch-classes in the

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[1]See Jonathan Cott, *Stockhausen: Conversations with the Composer* (1973), 220–42.

fourth motive. *Lonely Child* has six motives instead of four, and they complete a 12-tone aggregate as of the fourth motive, several measures before the end of the entire melody. The melody of *Zipangu* is somewhat different. Instead of being comprised of individual motives separated by rest periods, its flowing melody is executed over a sustained pedal point E. It consists of two long phrases, with only eleven pcs stated. The D# is omitted, arguably to avoid a strongly tonal leading-note for the approximate tonic E.

Vivier typically balances a melody with respect to its registral span, along a mid-point axis. This too reflects Stockhausen's influence, recalling his *Tierkreis* (1975). Each of the 12 short pieces in *Tierkreis* (one for each sign of the Zodiac) is designed as a melody without accompaniment, and each uses a symmetrical pitch field. The entire range of *Orion*'s principal melody is only a major seventh, from F4 to E5, implying a mid-point axis of B♭4/B4. The complete range of the principal melody of *Zipangu* is a major ninth from F5 to G6, of which the mid-point axis is C6. While the range and mid-point axis of *Lonely Child*'s principal melody are similar to that of *Orion*—a major seventh from F3 to E4, with an axis between B♭3 and B3—the melody introduces occasional harmonic intervals (usually ic 4s or ic 5s), complicating the perception of a mid-point axis.

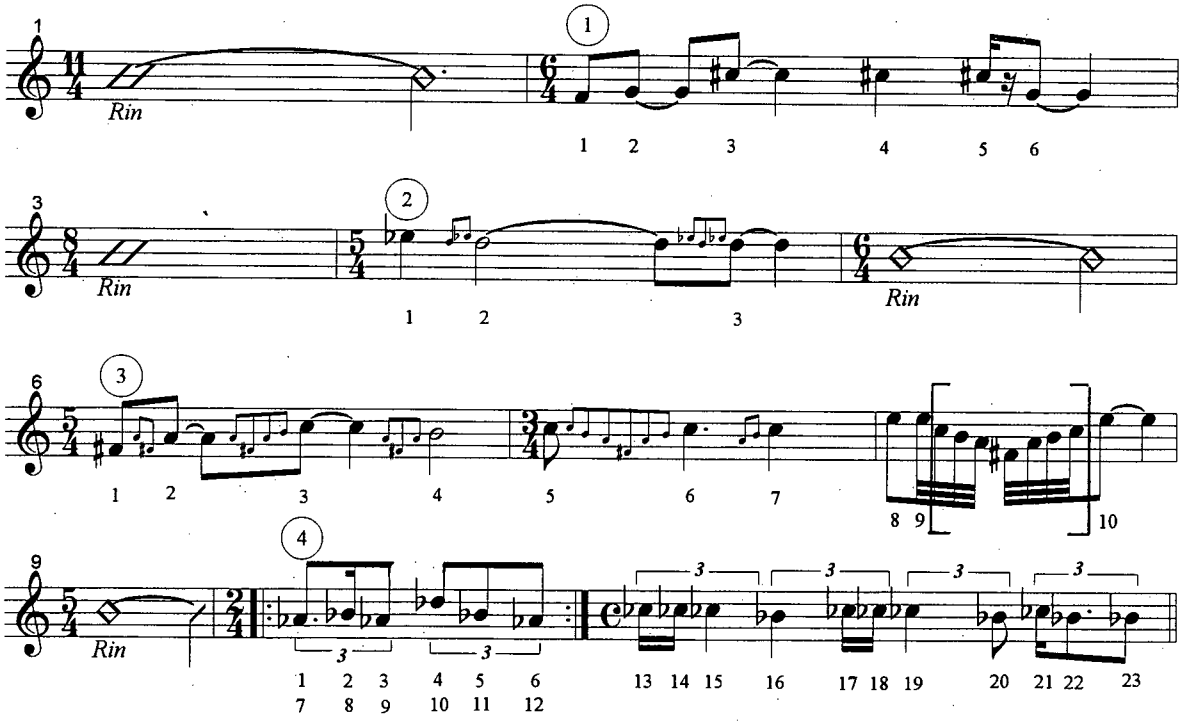
Sometimes the mid-point axis assumes an important quasi-tonal function. The mid-point axis of *Zipangu*, the C5, is the penultimate pitch of the first phrase of the melody, and resolves down a semitone to B4 as an extended *appoggiatura*, or a 6–5 suspension, over the pedal E, the arguable tonic. Its placement in the complete melody is at the half-way point, and it is given the longest duration of all melodic notes. Similarly, the approximate mid-point axis of *Orion*, B♭4, has strong tonal implications (as the following analyses will demonstrate). As well, the last two pitches of *Orion*'s principal melody are B♭4 and B4, and

are emphatically restated over and over in its final measure (see Fig. 2.1 below). Only *Lonely Child*'s approximate mid-point axis, B♭3, fails to have any tonal implications (for reasons explored below). *Cinq chansons pour percussion* will not be discussed further in this subsection because it lacks an initial principal melody for analysis.

2.1.2 – *Orion*

Orion's principal melody is first stated as a trumpet solo (see Fig. 2.1 below); its four constituent motives are delineated by intervening rests of varying durations, their beginnings are intoned by a stroke of a *Rin*, a large Japanese gong.

Figure 2.1 – Principal melody of *Orion*, mm. 1–11



Specifically, Motive 1 begins after an 11-beat rest period, and consists of six melodic notes stated over a six-beat measure (m. 2). An eight-beat rest period follows, after which Motive 2 is stated, consisting of three main melodic notes (i.e., excluding the grace-notes)

stated over a five-beat measure (m. 4). At measure 5 there is another rest period of 6 beats followed by Motive 3, consisting of ten melodic notes (i.e., excluding the grace-notes and the extra 32nd-notes of the second E5 in m. 8) stated over three measures totalling 11 beats (mm. 6–8). Finally, after a five-beat rest period in measure 9, Motive 4 is stated over three measures (mm. 10–11, but measure 10 is repeated), totalling 23 melodic notes over eight beats. The melody is thus stated over seven measures with four preceding or intervening rests. The melodic notes that comprise the melody total 42, and the total quarter-note duration of all four motives is 30 quarters. The rests, which themselves total a value of 30, bring the entire duration of the first section to 60 quarter-notes, lasting exactly one minute at the tempo M.M. = 60. The pitches of each of the four motives of *Orion* are as follows:

1) <F4, G4, C♯5, G4>

2) <E♭5, D5>

3) <F♯4, A4, C5, B4, C5, E5>

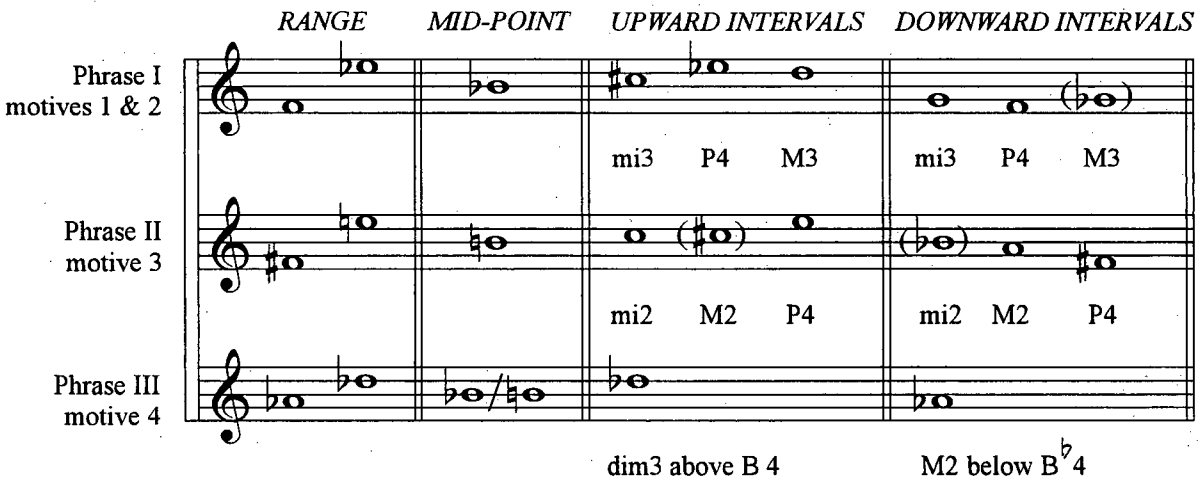
4) <A♭4, B♭4, D♭5, C♭5, B♭4>

Each of the four constituent motives presents part of the 12-tone aggregate, completed by the first two pcs in the fourth motive. Two pitches of the final motive duplicate pitches stated in motives 1 and 3, but in the score they are written as enharmonic equivalents. Specifically, the D♭5 and C♭5 respectively restate the C♯5 of Motive 1 and the B4 of Motive 3.

As discussed earlier, the melody exhibits overall symmetry about a mid-point axis, in this case, B♭4/B4. The intervallic ambitus of the melody is the same for the first two motives combined as for the third one (both a minor seventh), but it narrows considerably in the last motive, a perfect fourth. Furthermore, both the upper and lower extremities of the melodic contour gradually converge on B♭4. In fact, B♭4 is the goal tone of this melody,

not only because it is the final pitch, but for other reasons that I will demonstrate in more detail. In the table below, I have combined motives 1 and 2 together as they more closely balance each of motives 3 and 4 in terms of duration. As well, this pairing makes certain observations of symmetry clearer. In other words, I regard these four motives as constituting three larger phrases. Table 2.1 below demonstrates the symmetrically arranged intervals both above and below the three phrases' respective mid-point axis.

Table 2.1 – Range, mid-point axis, and intervals of *Orion* melody



N.B. Parentheses indicate unrealised pitches

Interestingly, the "missing" pitch of one phrase, which would have counterbalanced its presented lower or upper components, is used in the following phrase. For example, the G♭4 "missing" in phrase one as a potential lower ic 4 along the mid-axis B♭, serves as the initial pitch of phrase two. Likewise, the implied pitches C♯5 and lower B♭4 of phrase two, along the mid-point axis B4, are then stated in the final motive/phrase, with the upper C♯5 enharmonically altered to D♭5. In Table 2.2, the mid-point axis of phrase three is the dyad {B♭4, B4}. Hence, the upper and lower pitches, D♭5 and A♭4, are respectively two semitones above or below this dyad. Table 2.1 above illustrates the balance of upper and

lower elements along a near-exact mid-point axis from phrase to phrase, and also the overall focussing on B♭4/B4, in terms of contour. The contour formed by the lowest melodic notes of each phrase rises steadily towards this goal-tone (F4–F♯4–A♭4–*B♭4*), while that formed by the uppermost ones descends to the same goal-tone (E♭5–D5– E5–D♭5–*B♭4*). Both upper and lower contour lines are thus loosely inversionally related.

2.1.3 – *Zipangu*

The principal melody of *Zipangu* (see Fig. 2.2 on the next page) is based on a series of 15 melodic pitches. Unlike those of *Lonely Child* and *Orion*, this melody is not neatly stated in a series of motives separated by rests, nor are the 15 basic melody notes presented in left-to-right order without repeats. Rather, this melody is constructed along the lines of an Indian *raga*: the first few pitches are stated, then others are gradually added until all 15 notes have been stated. The rhythms of the melody are also somewhat uneven and rhapsodic, suggesting Carnatic *tala* rhythms[2] or perhaps those taught by Messiaen.[3] The presence of a pedal E throughout the opening melody, acting as a drone, adds another and crucial Indian element.

It is helpful to view this melody in four phrases, each progressing further along a complete 15-note basic melody (see Fig. 2.2 below). The pitch-classes of the basic melody is a close 12-tone aggregate less the pc D♯, the traditional leading-tone for the goal-tone and apparent tonic, E. Compare the score of the principal melody of *Zipangu* with that of Figure 2.3 on page 41 which displays the melody segmented into the four suggested phrases.

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[2]Joep Bor, ed. *The Raga Guide: A Survey of 74 Hindustani Ragas*, accompanying booklet to a 4-CD collection (Nimbus Records) with a detailed introduction to ragas located online at: www.wyastone.co.uk/url/world/raga. This source is used in the following discussion comparing Vivier's principal melody of *Zipangu* with various theoretical aspects of Indian ragas.

[3]He would have learned about Messiaen's "Hindu" rhythms from his composition teacher at the Conservatoire in Montréal, Gilles Tremblay, who used Messiaen's theoretical principles in his analysis classes.

2.3 on page 41 which displays the melody segmented into the four suggested phrases.

Figure 2.2 – Principal melody of *Zipagu*, mm. 1–40

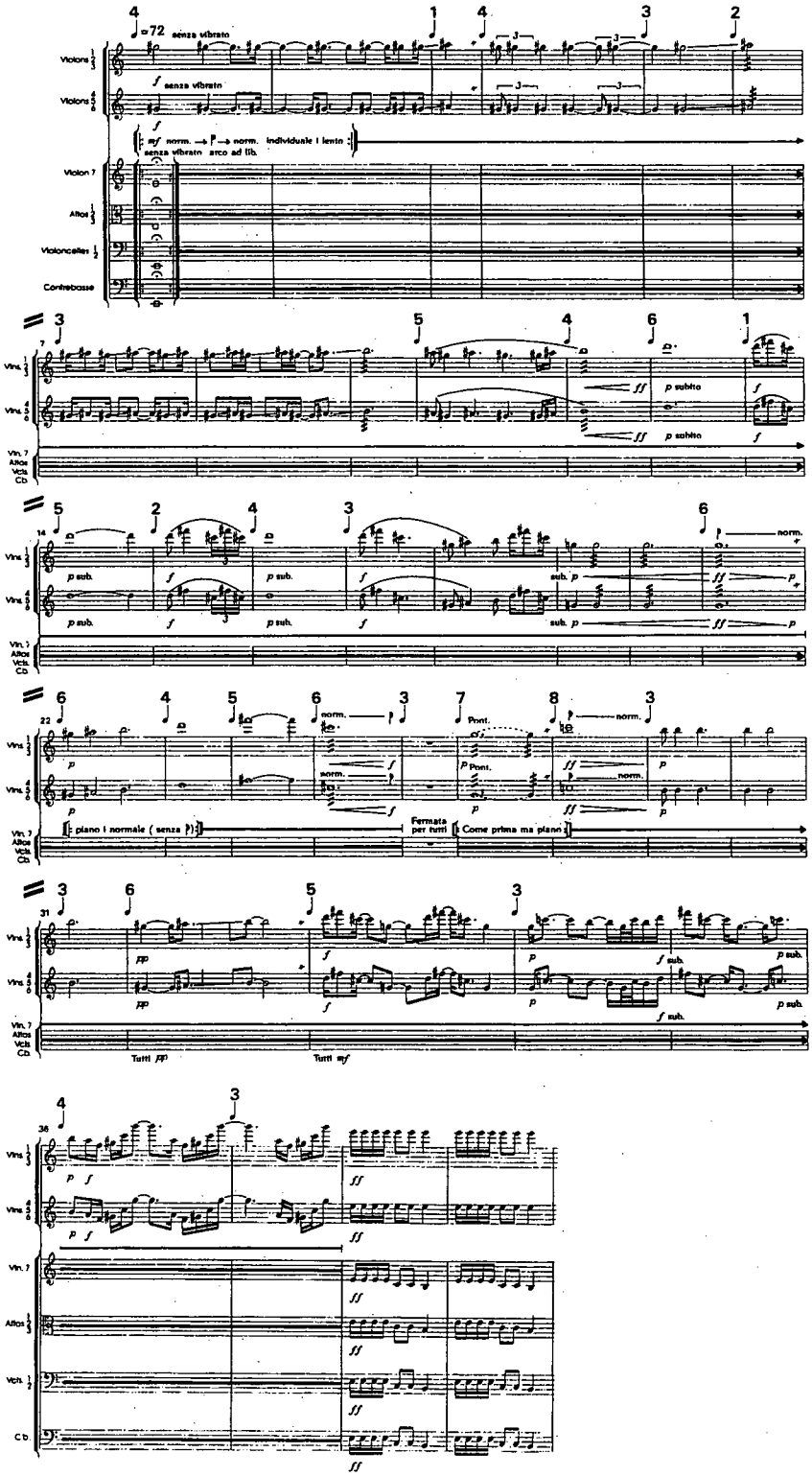
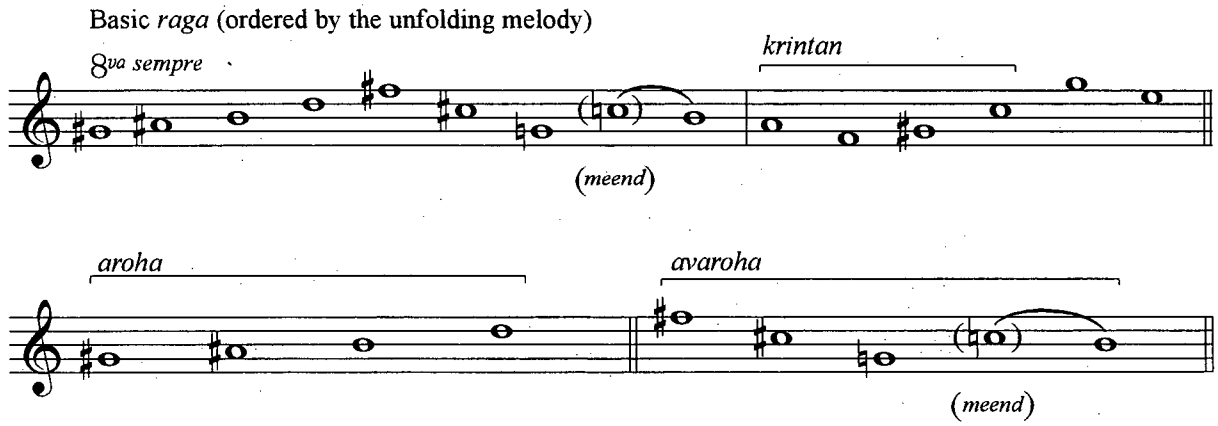


Figure 2.3 – Segmentation of principal melody of *Zipangu*

Phrase one:	mm. 1–11	<G♯5, A♯5, B5>
Phrase two:	mm. 12–21	<D6, F♯6, C♯6> (phrase one pitches restated in m. 18), then ends on G5
Phrase three:	mm. 22–31	all seven pitches of phrase 1 and 2, then finishes with <C6, B5>
Phrase four:	mm. 32–39	all prior pitches, then <A5, F5, G♯5, C6, G6> then ends on the goal-tone E6

Whether or not Vivier's simulated eight-note *raga* was inspired by an actual Indian one, it follows aspects of traditional usage. Figure 2.4 below shows the complete *raga* evident in the first three phrases (i.e., the notes up to the bar line on the first staff). It is a *sankira*-style mixed *raga*,[4] in which various pitches of the basic *raga* have both natural and sharp forms, evident in the descent to G♮4 (altered from the initial ascent from G♯4), and the descending pcs C♯5 and C♮5. Another feature of this *raga* is the semitone slide from C♮5 to B4. In *sitar* music this pitch variation is typically called a *meend*, achieved by pulling the string to produce an upper pitch, somewhat akin to Western *appoggiatura*.

Figure 2.4 – Vivier's invented *raga* and its components



[4]Joep Bor, ed. (*op. cit.*, p. 40).

The overall melodic shape of the principal theme of *Zipangu*, a so-called *chalan*, is composed of a series of motives or *pakads*. Unlike the basic motives of *Lonely Child* and *Orion*, the first *pakad* <G♯5, A♯5, B5> always repeats, alternating with new material adding more and more *pakads* until the entire *raga* is first formed. Furthermore, the pitches <G♯5, A♯5, B5, D6> form the *raga*'s ascent (the *aroha*), and the pitches <F♯6, C♯6, G5, then C♮6 as *meend* to B5> form its descent (the *avoroha*).

Some of the longer pitches of the melody create important structural moments. The G5 in mm. 19–21, at 12 beats, is the longest pitch of the melody. It acts as a point of a melodic cadence for phrase two, having reached the lowest point of the *avohara*. A quasi-resolution is achieved with the G♯5 occurring on the downbeat of measure 22, the beginning of the third phrase which repeats the opening *pakad*. Also, as noted above, the C6 in measure 28 which is eight beats long, forms a *meend* to the B5 in mm. 29–31, which is nine beats long. The C6 is the second longest pitch of the melody, and serves as the end-point to phrase three.

The fourth and final phrase, mm. 32–39, has two discrete parts. First, the entire eight-note *raga* is presented in mm. 32–35, after which there is a concluding gesture in mm. 36–39. There are five new pitches in mm. 36–37, <A5, F5, G♯5, C6, G6>, which complete the near 12-tone aggregate of the basic melody, short of the last pitch, E6. Moreover, the duration of each of the first four of these pitches is successively shorter by a sixteenth-note value. These four sixteenth-notes lead each time to a fifth and highest pitch of the entire melody, G6, which is sustained. The four sixteenth-note grouping is indicative of another *sitar* effect called the *krintan*, accomplished by producing several pitches in rapid succession with a single stroke of the string. The last pitch, E6, is the goal-tone of the melody, and is six quarter notes in duration, in mm. 38–39.

The bisection of the melodic range of the principal melody of *Zipangu* strongly resembles that of the principal melody of *Orion*. While in *Orion* the inversional axis of each of three phrases was considered, only two larger segments need to be considered in *Zipangu*: the eight-note *raga* used in the first three phrases (excluding the C6 *meend*), and the concluding *krintan* figure. See Table 2.2 below.

Table 2.2 – Basic attributes of the phrases of *Zipangu* melody

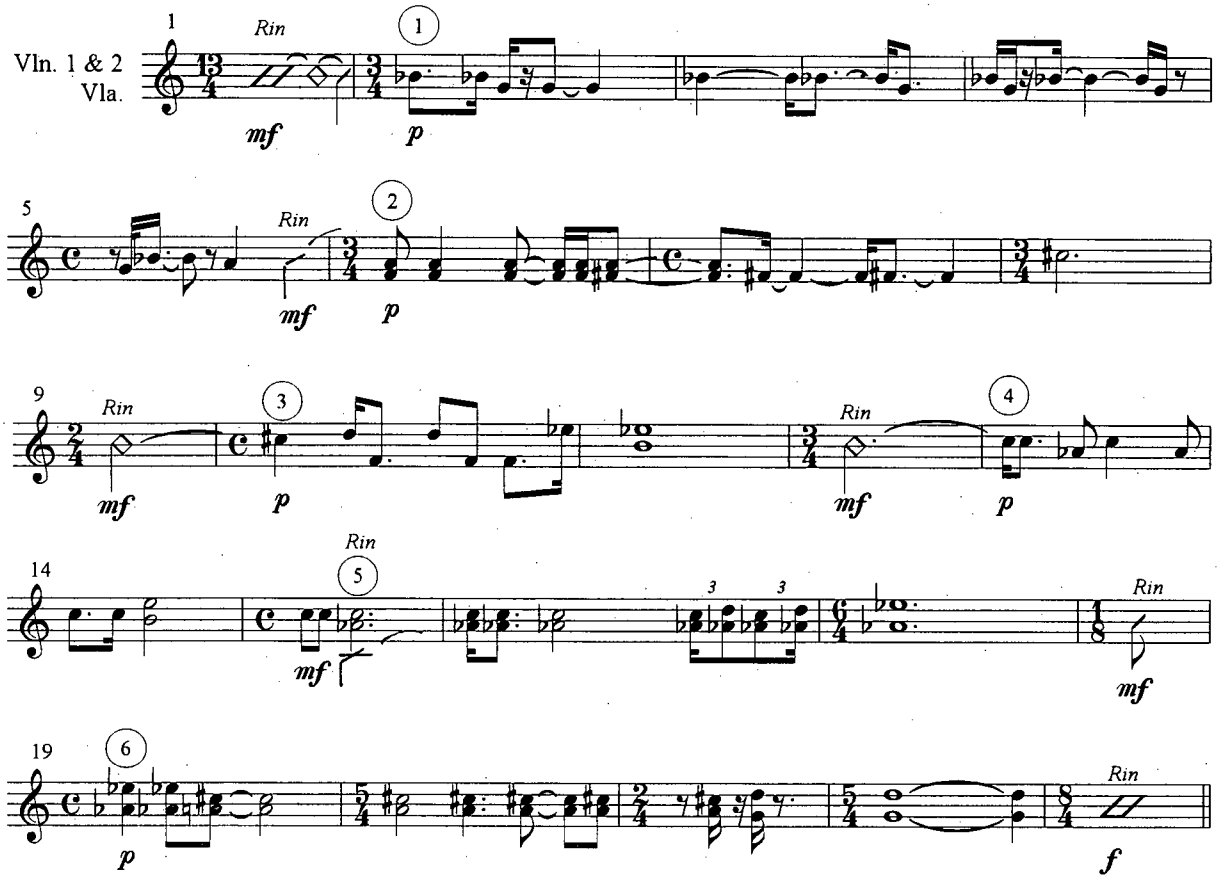
RANGE	MID-POINT	RESTING-TONE
G♯5–F♯6	C♯6	B5
F5–G6	C6	E6

Here, the mid-point moves down by semitone to the "dominant" of the goal-tone E (that is, to B), and not toward the goal-tone itself, as in *Orion*. The bass line of the last two measures of the melody moves away from its sustained E3 pedal with a concluding <E3, C3, B2> gesture, stated once per measure. In this manner, the C to B descent is strongly emphasised. See the closing two measures of the melody (Fig. 2.2 above, p. 40).

2.1.4 – *Lonely Child*

The principal melody of *Lonely Child* is superficially similar to that of *Orion* (see Fig. 2.5 on the next page). Both pieces introduce a series of motives of varying lengths with intervening rests, and both begin with a period of rest before the first motive is stated. Both pieces incorporate the single stroke of a Japanese bell, the *Rin*, at the beginning of each rest period, and both employ motives preceded or separated by rest periods of varying lengths.

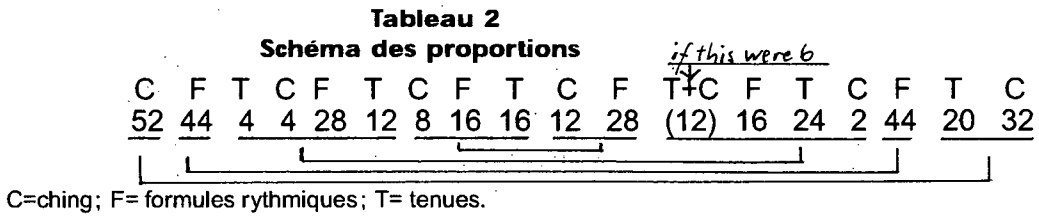
Figure 2.5 – Principal melody of *Lonely Child*, mm. 1–23



In *Lonely Child* there are six phrases with seven rest periods. The rest periods begin with *Rin* attacks consistently marked *mf*, while the melodic phrases are consistently marked *p*. Other than the initial attack, it is not clear from the score whether the listener is intended to hear the successive *Rin* attacks as endings or as beginnings of phrases. Most of the *Rin* rest periods are demarcated by their own measures, and thus appear separate, but the second *Rin* attack follows the first motive at the end of measure five just after its last three notes, thus appearing more as an ending. More confusingly, the fifth *Rin* attack has no time-span of its own, and instead coincides with the beginning of Motive 5. There are some symmetries, albeit distorted ones, and non-retrogradable rhythms in the durational values of the *Rin* periods, the phrases, and the last notes or intervals for each motive. Figure 2.6 below

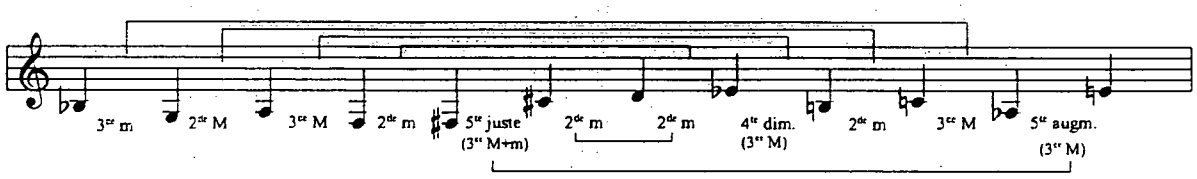
is duplicated from a recent article by Jacques Tremblay.[5] The 'C' refers to the *Rin* (for "*ching*"), 'F' refers to the phrases (for "*formules rythmiques*"), and 'T' refers to the last note/interval of each motive (for "*tenues*"). N.B. The values for each of these three components are measured in sixteenth-notes.

Figure 2.6 – Proportional scheme of various durations (after Tremblay)



The intervals created by the melody, mostly seconds and thirds, also exhibit approximate symmetries, as Tremblay illustrates. His example is reproduced in Figure 2.8 below.[6] His brackets connect melodically similar or identical intervals, but lack measure numbers which would have made this figure clearer. For example, the first melodic interval in mm. 2–4, a minor third (B♭3 to G3), is symmetrically close to the major third of m. 13 (A♭3 to C4).

Figure 2.7 – Symmetries of principal melody of *Lonely Child* (after Tremblay)



[5]Jacques Tremblay, "L'écriture à haute voix: *Lonely Child* de Claude Vivier," *Circuit*, vol. 11/1 (2000), 50. I have altered Tremblay's *"Tableau 2,"* adding the underlying brackets that show durational symmetries.
[6]*Ibid.*, 50.

However, Figure 2.7 does not elaborate on the occasional intervals of the melody which are symmetrically balanced from the beginning to the ending. For instance, a harmonic major third in measure 6 (A3 with F3), is parallel to the major third (A♭3 with C4) in mm. 15–16, approximately six measures from the end; as well, the perfect fifth melodic ascent of F♯3 to C♯4 (mm. 7–8) is closely symmetrical with the perfect fifth harmonic interval of A♭4-E♭5 (m. 17), also seven measures from the end. Please refer to the score of *Lonely Child* (Fig. 2.5 above, p. 44) to trace these symmetrically placed intervals.

The melodic axis-point of the melody of *Lonely Child* is B♭3 (or more exactly B♭3/B♮3), and is not as strongly engaged as in *Orion*, because the six disparate phrases do not consistently use the B♭ as an axis point. Motive 1 begins with B♭3, but its three pitches (G3, A3, B♭3) centre around A♭3/A3; Motive 2, with a span of F3 to C♯4, centres around A3; the third motive, with a span identical to that of the first two motives of *Orion*, F3 to E♭4, centres on B♭3. The next two phrases of *Lonely Child*, which respectively span A♭3 to E4 and A♭3 to E♭4, centre approximately on the C4, and the final motive, which spans G3 to E♭4, centres on B3.

Here, unlike in *Orion*, the approximate melodic axis point does not form the goal-tone, and unlike in *Zipangu*, it is not a significant melodic pitch. Rather, the goal-tone of the melody of *Lonely Child* is G3, the lower pitch of the final open perfect fifth. This goal-tone is strongly intimated in the opening motive, where the initial B♭3 descends to the G3. In the closing measures as well, the cadential formula creates a strong and satisfactory resolution to the G3.

2.2 *Modal/tonal implications*

2.2.1 – Vivier's "cadence"

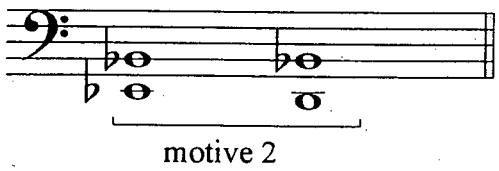
An intriguing feature of the three instrumental works is their modal/tonal directionality. The repeating melody and its variations affirm their arrival points (which I call goal-tones), sometimes predicted by the axis pitches of the constituent motives as discussed above. Only the *Cinq chansons pour percussion* does not fit this description because of the non-repetitive nature of the five "songs," and the lack of a tonal centre due to the erratic acoustical properties of the percussion. In the other three pieces, tonal centering is achieved in four distinct manners: melodic goal-tone, melodic axis point as emphasised by motivic treatment, Vivier's favoured "cadence," (perfect fifth progressing to minor sixth), and harmonic overtone series at strategic points.

Orion has a clear tonal direction to the pitch B♭, suggested from the very outset of the principal melody. The three-fold thematic statement not only has B♭4 as the approximate axis pitch of the entire melodic range from F4 to E5 (as discussed above on p. 38, along with Table 2.1), but B♭4 is also the last pitch. The arrival of B♭4 as the final pitch is made more emphatic by the thrice repeated closing motive, C♭4 to B♭4, in the final measure of the melody (m. 11). This sounds very much like an *appoggiatura*. As well, a gradual descent of the three-in-a-row repeated pitches common to all three phrases reinforces B♭ as a goal-tone. Specifically, Motive 1 of phrase one has C♯5 repeated three times. This begins halfway through Motive 1, that is, the first of the three C♯5s begins at the third of the six melodic notes that comprise this motive. Similarly halfway through the second phrase

(Motive 3) the fifth of the ten melodic notes is the first of the three-in-a-row repeated pitches. It is C5, a semitone lower than the C♯5 of Motive 1. Finally, halfway through the last phrase/motive (at note 12 of a total of 23) is another three-in-a-row formation, this time on C♭4, a further semitone below. The three-in-a-row motivic cell common to all three phrases indicates the goal-pitch B♭4 (C♯5–C5–C♭5–*B♭4*).

When the melody is repeated for the last time, in the section Vivier refers to as "the melody based on two intervals," the final two pitches of the melody are harmonised as a perfect fifth interval (B♭2 with E♭2) leading to a minor sixth (B♭ 2 with D2). This <perfect fifth, minor sixth> formula (seen in Fig. 2.8 below) is a plagal-like Vivier "cadence," common not only at other moments in *Orion*, but also in passages of *Zipangu* and *Lonely Child*. Another "cadence" in *Orion* that asserts B♭ as the 'tonic' is in the second section, which Vivier terms as the "first development of the melody." There, an extended B♭2 pedal is sustained throughout the entire section with the two pitches of the second motive (E♭2 and D2) repeatedly stated below in the manner of a bass (5–6) suspension. This further clarifies B♭ as quasi-tonic.

Figure 2.8 – Cadence from *Orion*, m. 31

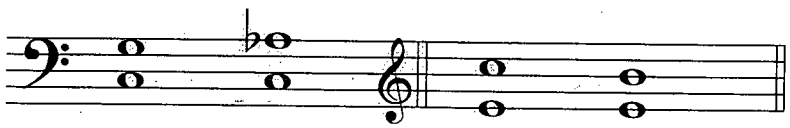


In *Zipangu* (see Fig. 2.2 above, p. 40) the overall tonal direction to E is quite obvious from the outset of the melody because E is a pedal tone throughout its initial statement. As noted above, the melodic axis pitch, a C5 *meend*, forms an *appoggiatura* to the perfect fifth

above the sustained E, the B4, at the halfway point of the melody, in m. 28. Near the end of the melody, at mm. 34–36, where there is a repetitive motive that spans F5 to G6, this same pivotal C functions as a centre of pitch symmetry.

The <perfect fifth, minor sixth> cadence is also used at key moments in *Zipangu* (see Fig. 2.9 below), sometimes in inverted and reversed form, as a <major third, perfect fourth> cadence. This occurs notably at the end of the opening melody (mm. 38–89), where the pedal E is transferred to the upper strings while the lower strings state the pitches <C3, B2>. The resultant intervals between the lower pitches and the upper pedal (a major third and a perfect fourth) are inversions of Vivier's standard cadential intervals, and are also reversed in order. In another passage (mm. 99–113), the first part of the third variation of the opening melody for solo violin, the original cadential formula is employed with a different central pitch. Specifically, the prevailing accompaniment intervals are a minor sixth between C3 and A♭3, and the perfect fifth from C3 to G3. This recalls the intervallic content of the *appoggiatura* semitone C5 to B4, over the E pedal in the opening melody. Here the intervals are stated over a sustained C pedal. There is a tonal shift down a third to the C, but the violin solo that is stated over these intervals is centred instead on a conflicting C♯5. While the cadential gesture disappears at m. 114, the tonal conflict is resolved after the violin solo ends, as the section concludes on a sustained G♯3 (mm. 127–134), the dominant of C♯.

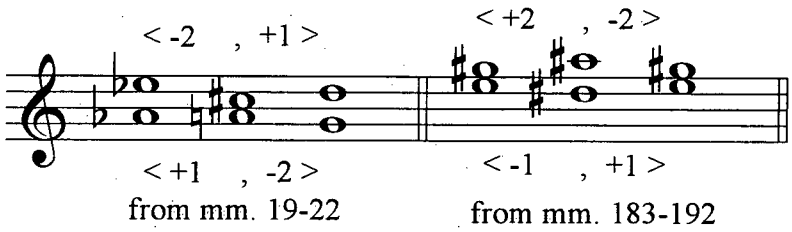
Figure 2.9 – Cadences from *Zipangu*



from mm. 99-113 from mm. 28-31

Lonely Child's opening melody and supporting bass line create a series of intervals, mainly thirds and sixths. The last segment of the opening melody reveals an intriguing cadential formula, in which perfect fifths alternate with major thirds, or *vice versa* (see Fig. 2.10 below). The manner in which this unfolds suggests a strong allegiance to the power of semitone resolution. Specifically, the closing measures of the opening melody (mm. 19–23) begin with an open fifth interval, A♭-E♭, which shifts to a major third, A-C♯ (note the semitone shift from A♭ to A), which in turn progresses to a final perfect fifth, G-D (once more, note the semitone shift C♯ to D). This cadential intervallic gesture appears again, this time moments before the end of the work, from measures 181–194. Here the major third E-G♯ alternates repeatedly with the perfect fifth interval, D♯-A♯, but uses only a single semitone shift (E to D♯), unlike the previous cadence, where there are two.

Figure 2.10 – Cadences from *Lonely Child*



2.2.2 – Linking gesture to final section

The latter cadential passage is striking because the final major third interval is sustained over a solo bass playing low E, along with its overtone series (mm. 192–94), a feature that recalls *Zipangu* and *Orion*. In *Lonely Child*, the last pitch of the bass's overtone series is the 11th partial, A♯, which is the enharmonic equivalent of B♭, the pitch that

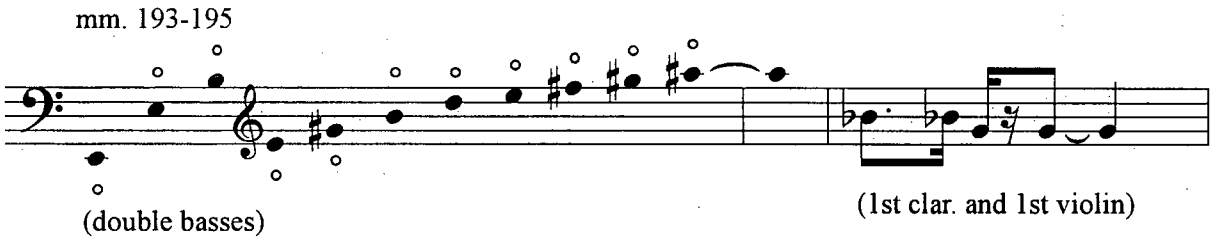
immediately begins the final section (see Fig. 2.11a on the next page). Similarly, a seamless construction is used at the end of the penultimate section in *Zipangu*, as shown in Figure 2.11b on the next page. The top resting note of the arpeggiated melody, the G♯5, becomes the first pitch of the principal melody's return at m. 229.

Another linking gesture between the penultimate and final sections is the upwards shift of a minor third. In *Lonely Child* the overtone series on E in the closing measures of the penultimate section leads to a harmonic shift of a minor third upwards to the apparent tonic of G, the goal-tone (if not tonic) of the opening melody (see Fig. 2.11a below). In *Zipangu* the arpeggiated overtone series rests on the upper G♯5, a common pitch-class with that of a long sustained open fifth in the double basses (C♯2-G♯2). This open fifth is sustained from mm. 212–228, whereupon it suddenly breaks off, and rises a minor third to an open octave E at m. 229, the beginning of the final section (see Fig. 2.11b below).

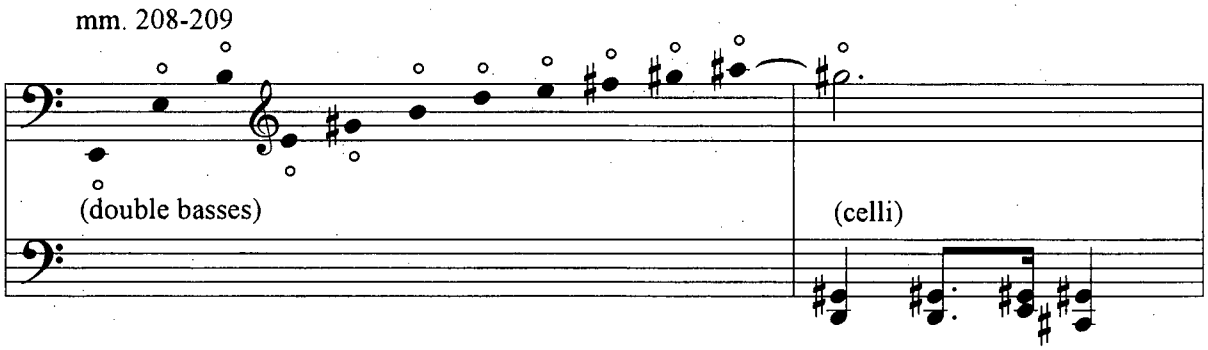
Orion's penultimate section introduces two pedal points throughout: a pedal E♭2 along with the overtones freely arpeggiated in the basses, and a pedal D2 along with its own overtones similarly arpeggiated. Both pedal tones sound with another upper pedal B♭2, thus conforming to the <perfect fifth, minor sixth> cadential formula. While there is no interconnecting upper partial of the overtone series leading to the next melodic event, as is the case with *Zipangu* and *Lonely Child*, there is a third-related progression present from the end of the fifth section to the beginning of the last section. Specifically, the minor sixth interval D, B♭ (m. 167), indicative of tonic B♭ at the end of the fifth section, rises a minor third to D♭, as suggested by the opening major third interval (D♭, F) of the final section (m. 169). See Figure 2.11c on the next page.

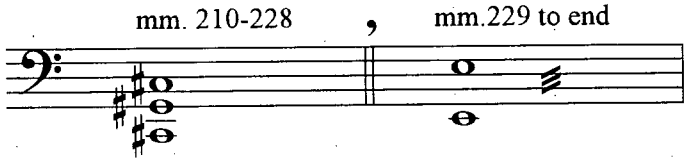
Figure 2.11 – Linking gestures

2.11a – from *Lonely Child*

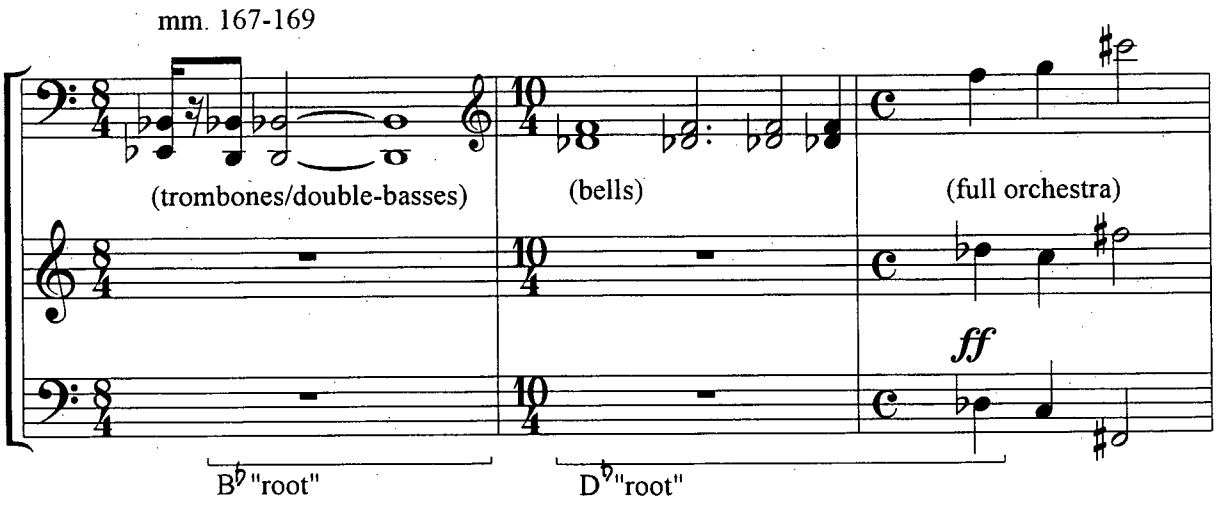


2.11b – from *Zipangu*





2.11c – from *Orion*



2.3 *Rhythm*

2.3.1 – Incremental and diminishing rhythms

Incremental rhythms are a key feature of Vivier's style, vividly present in his opening melodies except for *Cinq chansons pour percussion*. For example, in *Zipangu* the opening seven repetitions of the initial G♯5 decrease by sixteenth-note durations from an initial half-note value through to the ending sixteenth-note value (omitting 4 sixteenths = quarter-note), all within the first two measures (4/4 metre), after which there is a rise to A♯5 in measure three (see Fig. 2.12a below). When the same two-note motivic cell repeats in mm. 4–6, G♯5 now repeats just six times, again with incremental rhythmic values, this time progressing from an initial value of a single eighth-note triplet to a half-note in successive triplet eighth-note increments. In another passage, mm. 12–19, high D6 repeats three times, each time diminishing in quarter-note values, from its initial six beats to a whole note (see Fig. 2.2 above, p. 40). The longest example of incremental rhythm occurs over seven measures (mm. 22–28), where the opening eight melodic pitches are repeated (see Fig. 2.12b below). Their durations increase in quarter-note increments, from a quarter-note to a breve.

Figure 2.12a – *Zipangu*, mm. 1–6

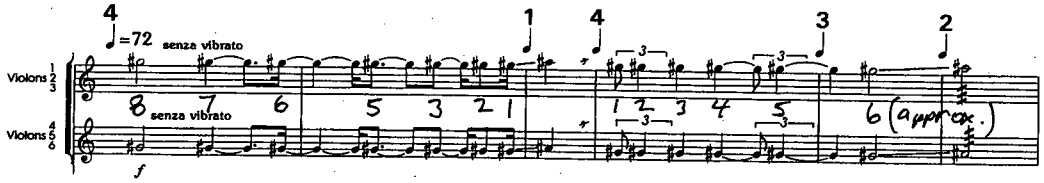
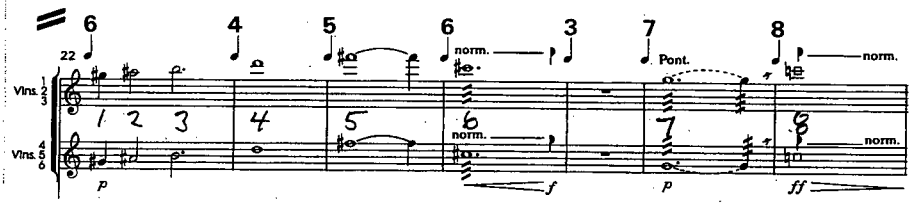
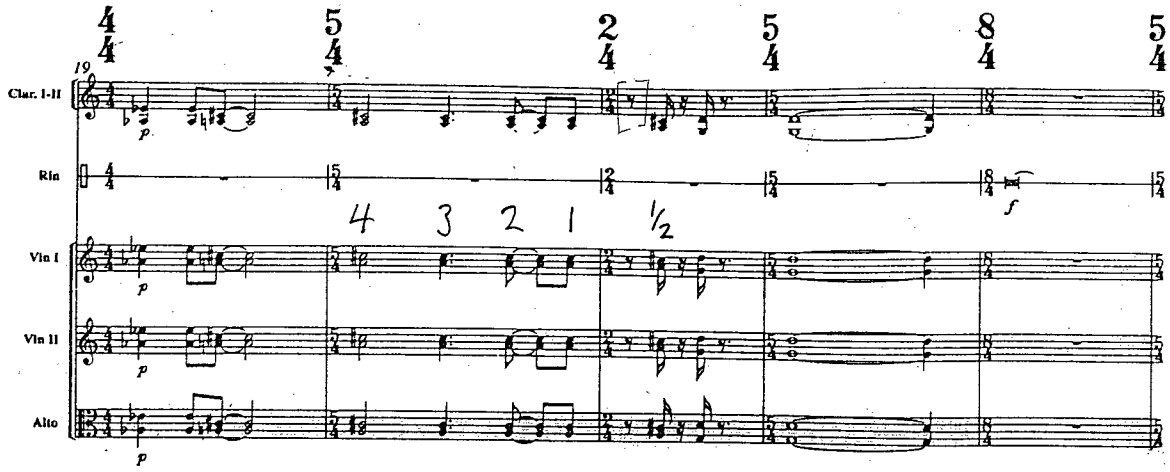


Figure 2.12b – *Zipangu*, mm. 22–28



Lonely Child contains fewer specific examples of incremental rhythm within the basic instrumental melody. Instead Vivier employs a free-flowing rhythm of varied durations, typically sixteenth-note values and their multiples. Only in the closing measures of the instrumental melody before the voice enters (*Chant I*) do we find clear incremental rhythms. The values of the (A, C♯) dyad reduce by one eighth per note, until the cadential (G, D) is reached. This is an instance of the "Vivier cadence" discussed above: reduce by one-sixteenth per note, at least until the final cadential (G3, D4) is reached. See Figure 2.13.

Figure 2.13 – *Lonely Child*, mm. 19–23



Lonely Child employs diminishing rhythms to highlight structural moments. For example, between the first vocal passage (*Chant I*) and the second (*Chant II*, which, unlike the other vocal passages, restates the opening instrumental melody), an instrumental transition (mm. 67–77) consisting of perfect fifth intervals is played in alteration between the horns and bassoons. These repetitive cells vary in sixteenth-note duration from ten sixteenth-notes to one. In another transition, this time between the third vocal passage (which immediately follows *Chant II* without a break) and the fourth (*Chant IV*), the single strokes of the *fortissimo* solo bass drum decrease in quarter-note values from an initial ten quarter notes down to one.

At times incremental rhythms noticeably highlight the text. For example, in *Chant IV* (mm. 159–161), each of the five syllables of the words *sublime Tazio*, is lengthened by quarter-note increments from a single quarter-note value to a value of five quarter-notes (see Fig. 2.14a below). The music before and after exhibits very different rhythms, made up mostly of combinations of sixteenth- and eighth-notes. Later in the same passage, a number of rhythms reduce to the rhythmic proportions of 1:2:3. Notably in measure 174, on the words *mon enfant*, the three note values increase from quarter-note to dotted-half. In the following measures, other brief instances of 1:2:3 occur in measure 176 (located at end of the word *étoiles*, and *au ciel*). See Figure 2.14b below.

Figure 2.14a – *Lonely Child*, mm. 159–161

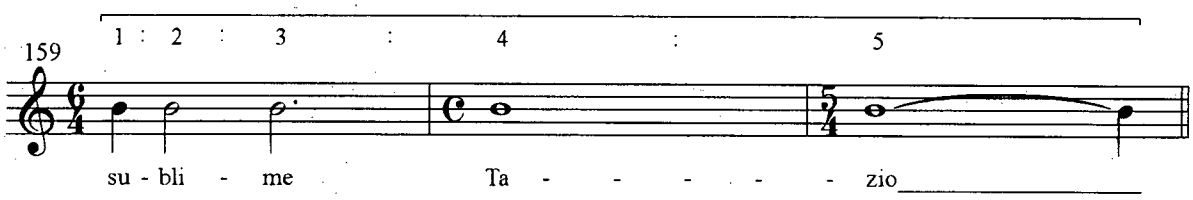
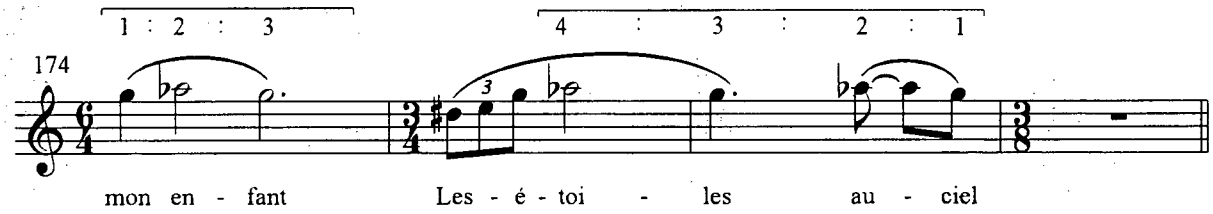


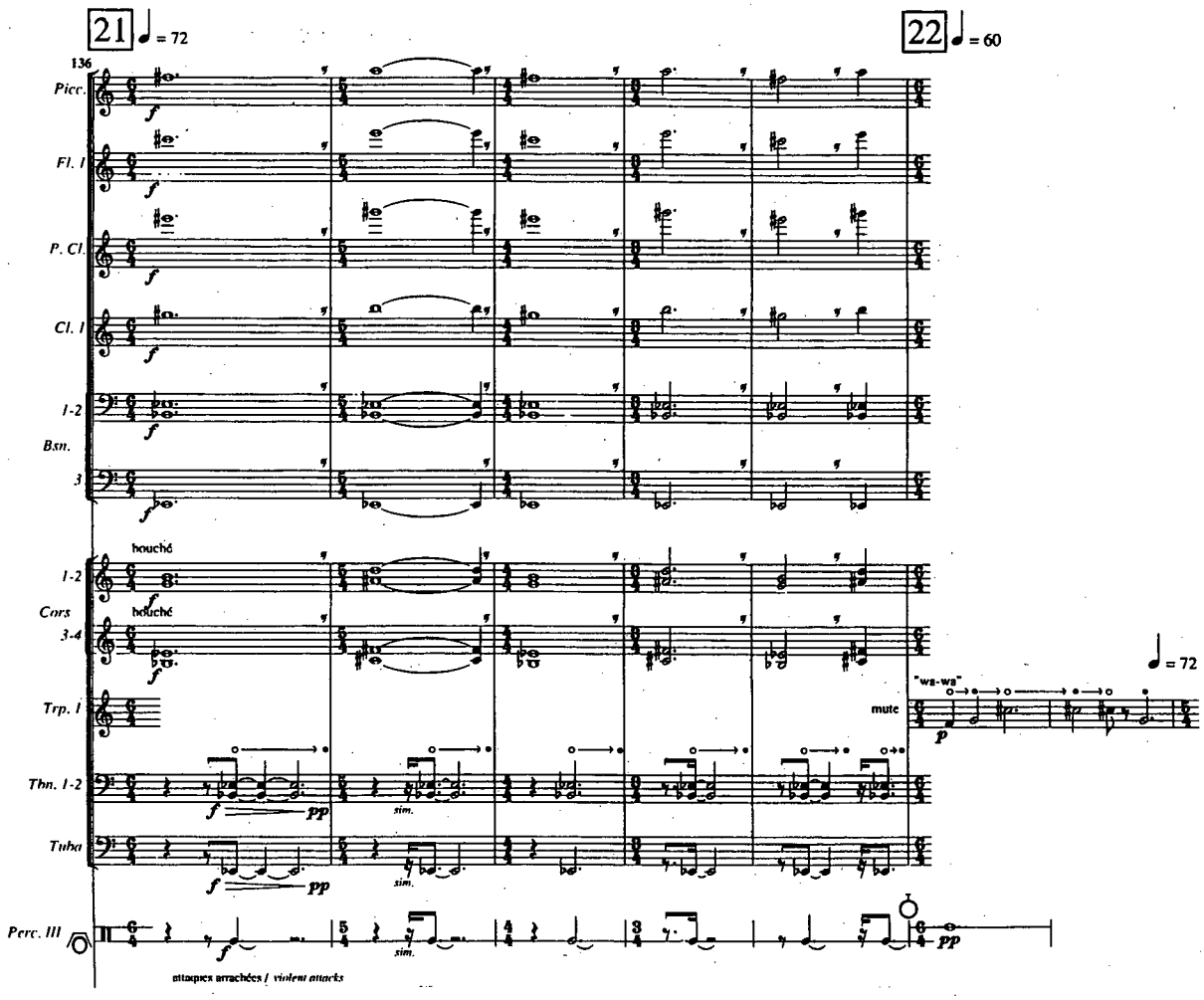
Figure 2.14b – *Lonely Child*, mm. 174–180



Orion also uses incremental rhythms, which are occasionally employed to demarcate the beginnings of sections. For example, the second section, which Vivier calls the "first development of the melody about itself," uses a two-part canon based on 1:2:3 incremental rhythms. (I will examine this passage more closely in Chapter Four, pp. 116–119.) Other parts of *Orion* utilise diminishing proportional rhythmic patterns. One instance occurs at the

beginning of the fifth section, which Vivier calls the "memories of the melody," (mm. 136–168, rehearsal numbers 21 to 26) valued at 6:5:4:3:2:1 (see Fig. 2.15 below). This passage begins with an eight-note sonority stated by winds, horns and strings, which alternates with a transposition a minor third higher, each time shortening the original dotted whole note value (i.e., six quarter-note beats) by quarters, leading to a single quarter note value. (Since the strings double the winds, they are omitted below to save space.)

Figure 2.15 – *Orion*, mm. 136–142



The lower brass, percussion and harp follow each eight-note chord with an open fifth interval of E ♭2-B ♭2 (marked *attaques arrachées/violent attacks*) at time-units successively shortened by a sixteenth, and at shorter distances from the preceding chord: the open fifth interval begins six sixteenth-notes after the first chord of six quarter-note beats; five sixteenth-notes after the second chord of five quarter-note beats; finally occurring just one sixteenth-note after the sixth chord, of one quarter-note beat.

Together, the two eight-note chords and accompanying open fifth interval, both based on 6:5:4:3:2:1, create a refrain for the fifth section. This refrain alternates with the four motives of the basic melody, each stated in turn by the solo trumpet. Each time the refrain returns, its duration shortens: the first refrain is 21 quarter-note beats (mm. 136–140), that after Motive 1 is fifteen beats (mm. 143–146), that after Motive 2 is ten beats (mm. 149–152), and that after Motive 3 is five beats (m. 160). After Motive 4 is restated, only the open fifth remains, absent the eight-note sonorities.

More importantly, the 6:5:4:3:2:1 proportional rhythm forms the rhythmic basis of a second melody, which I call the fifth motive of *Orion*. This is introduced at the third section, which Vivier calls the "second development of the melody about itself." This new melody begins at rehearsal number 10, and is stated over seven measures (mm. 57–63) by the percussion (scored for four small nipple gongs). The entire melody is 21 quarter-note beats in duration, demonstrating the 6:5:4:3:2:1 proportional rhythm. This passage is more fully discussed in Chapter Four, pp. 164–165.

Vivier uses a percussion solo with diminishing proportional rhythm as a transition in *Orion*. This occurs between the end of the fifth section and the beginning of the final, sixth section, the so-called "melody on two intervals." Unlike the solo bass drum strokes of

the second transition in *Lonely Child,* which take up several measures (in which the intervening rests diminish in quarter-note decrements, and the metre changes every measure in successively diminishing upper numbers), the corresponding transition in *Orion* consists only a single measure (m. 168) written in 10/4 metre. There the solo bells use a 4:3:2:1 proportional rhythm in quarter-note decrements (see Fig. 2.11c above, p. 52).

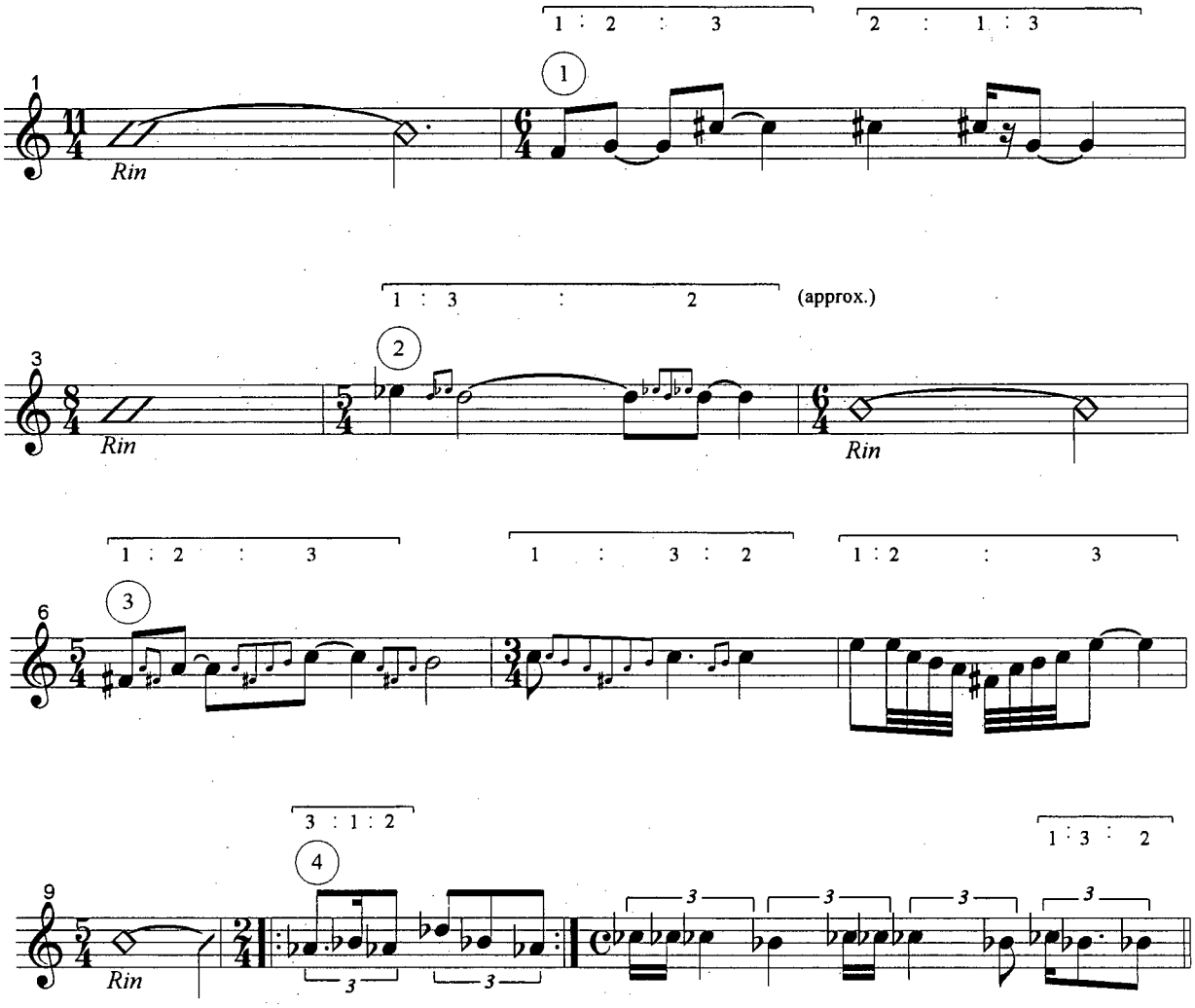
Many low-level instances of 1:2:3 proportional rhythms occur in *Orion*, particularly in the opening melody. Nearly every three-note segment of the melody has this particular proportion in one of its six permutations. Below is a table of the durational ratios of each motive.

Table 2.3 – Proportional rhythms of *Orion*'s principal melody

Motive 1	1:2:3, 2:1:3
Motive 2	1:3:2 (approx.)
Motive 3	1:2:3, 1:3:2, 1:2:3
Motive 4	3:1:2 (repeats), 1:3:2

Since the set (1, 2, 3) has six permutations, it is intriguing to note that no ordering used ends in 1 (e.g.. 2:3:1 or 3:2:1). Vivier avoided rhythms ending with a relatively shorter duration, since they lack the terminal agogic accent that closes off a segment. Instead, he favours ending on a 3, having four instances of 1:2:3, and one instance of 2:1:3. The other four patterns end with a value of 2. See the opening melody below (Fig. 2.16 on the next page), which indicates the ratios in Table 2.3 above every cell of each motive.

Figure 2.16 – Principal melody of *Orion* and its proportional rhythms



2.3.2 – Impact of numerology

Vivier took an intense interest in numbers and numerology, especially the Fibonacci series. This is most evident in the durations of his music's segments. For example, in *Zipangu*, the second to last section uses an extended pedal tone, C♯2-G♯2 (mm. 212–228) throughout, over which short motivic restatements occur. The durations of the rest periods between these thematic occurrences, during which the open fifth is maintained, are significant. At measure 214 the pedal is sustained for 13 quarters, at measure 216 for 8 quarters, at measure 221 for 5 quarters, and at measure 228 for 8 quarters. In *Lonely Child*, the opening melody begins with 13 quarters of silence, and ends with 13 again (5 quarters last pitch + 8 quarters silence). More noticeably, the beginning of *Cinq chansons* uses durational periods of 21, 13, 8, and 5.

The number 21 appears in many forms in *Orion*: the 21 harmonies of the *jeu de timbres*, the 21 quarter-note duration of the *Thai* melody in the "second development of the melody," and the 21 quarter-note duration of connective or introductory passages (those with a E♭2-B♭2 pedal, e.g., mm. 115–116). The sum of 21 can be achieved in two different ways: as the seventh term in the Fibonacci series (1, 2, 3, 5, 8, 13, 21); and by addition of the integers 1 through 6. The latter is evident as a diminishing rhythm of 6:5:4:3:2:1 or an incremental rhythm of 1:2:3:4:5:6. For example, the rhythmic structure of the *Thai* melody is loosely based on a 6:5:4:3:2:1 proportion (see Chapter Four, pp. 138–139). As briefly explored above, the fifth section, the "memories of the melody," makes use of the same proportions. Furthermore, the rhythms representing the ratio 1:2:3 are repeatedly used throughout the canons at the beginning of section two, the "first development of the melody" (see Chapter Four, pp. 116–119), and in other passages that employ canons.

The duration of 21, represented as a Fibonacci series term, is evident at the beginning of the fifth subsection of the third section, the "development of the melody," in mm. 106–107, and again at the beginning of the fourth section, the "meditation on the melody," in mm. 115–116, where both times the pedal E♭2-B♭2 is sustained for 21 beats, subdivided as two measures of 8 and 13. Sometimes, smaller values of the Fibonacci series are used, such as the sum of 13, evident in the fourth section, where it is the duration of the added two-part trumpet canon in mm. 124–126 (4 + 5 + 4); or the sum of 8, evident near the end of the section, the vocalised "*hé-o*" motive (3 + 5), first heard in m. 132. As well, the sixteenth-note two-part canon based on Motive 1 at rehearsal 14 (mm. 88–90) has a total duration of 13, the sum of 8 + 5.

The number 21 occurs most meaningfully with the total number of harmonies utilised for the *jeu de timbres*. The concern for all-interval aggregates (formed by pairing harmonies 1 to 14 together, with 21 OICs in the remaining seven harmonies), also represents 21 as the sum of the six interval-classes. As will be later analysed, the first sustaining four-note harmony of the opening measures (mm. 1–11) consists of one instance of each of the six interval-classes by itself, which again form the sum of 21.

2.4 *Texture*

Because the elaboration of the *jeu de timbres* into chord-colours is a primary aspect of texture in all three instrumental pieces, the dimension of texture will not be surveyed here. Instead, I will treat it in detail in Chapter Four (*Orion*) and Chapter Five (*Zipangu* and *Cinq chansons pour percussion*). *Lonely Child* will not be further analysed because its *couleurs* are created without the *jeu de timbres* substratum, and it relies instead on additive synthesis for its resultant textures.

Chapter 3: The sketches for *Orion*

Introduction

An examination of the sketches for *Orion* is crucial to understanding compositional processes not discernable from the completed score. As Patricia Hall's establishes in her work on the sketches for Berg's *Lulu*, ". . . sketches are most helpful for highly defined theoretical systems, which, because of their complexity or unapparent relationships, we do not yet fully understand."[1] Since Vivier's music is neither very well-known nor understood, certain properties of his music become apparent only when the sketches are scrutinized.

A file containing 88 pages of sketches, marked "Orion," is stored in the *Division des archives* at the Université de Montréal;[2] copies are held at the *Fondation Vivier* in Contrecoeur. Some pages also refer to *Lonely Child*, *Zipangu*, *Cinq chansons pour percussion*, and an incomplete work, *Chants Noël.* Vivier's sketches are in some disarray—they are not systematically organised or numbered, and only two of the 88 pages are actually entitled "Orion"—making it a challenge to determine which are actually relevant to the work.[3] Deciphering the complete sketches for *Orion* will therefore require a systematised and methodical reorganisation of all extant documents.

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[1]Patricia Hall, *A View of Berg's* Lulu *through the Autograph Sources* (Berkeley and Los Angeles: University of California Press, 1997), 11–12.

[2]As described in the *Guide par séries et sous-séries de fonds Claude Vivier* (Provenance #235) under series D (composer), sub-series D4 (compositions): *outre les manuscrits des oeuvres et quelques partitions éditées, on trouve également des jeux de parties, des textes des notes diverses, des esquisses et des analyses.* This sub-series consists of 68 files, and mostly contain notes, sketch materials, and scores for his 49 compositions, organised alphabetically (not chronologically). File #34 consists of sketches relevant to *Orion*, and is the source of those discussed in this chapter.

[3]The files are arranged by Vivier himself, and the archives at the Université de Montréal has respected his original order of all materials, regardless of their disorganised content.

Most of the sketches are not on staff paper, but ordinary letter-sized or legal-sized paper; sometimes half-inch graph paper is used, especially for devising the three-part canons. Many sketches concern minutiae regarding choices of instrumentation, timings and tempi for specific segments, working out of canons, and other matters not directly applicable to my analysis. Often they are incomplete, indicating attempts subsequently dropped from the completed score. Several sketches consist of purely numerical data, possibly to indicate durations of various sections or exact rhythms for various canons.

My discussion of selected sketches for *Orion* will concentrate on its formal structure, opening melody, and pervasive harmonies, particularly those of its *jeu de timbres*. With two exceptions my renderings of these sketches are diplomatic transcriptions of the originals (copies are located in Appendix 2, pp. 238–247). Sketch M1 (see 3.2.1 below) is not transcribed because Vivier's markings are fairly clear, and is not duplicated in Appendix 2. As well, because sketch J4 (see 3.3.4 below) is very detailed, its contents have been divided over three pages.

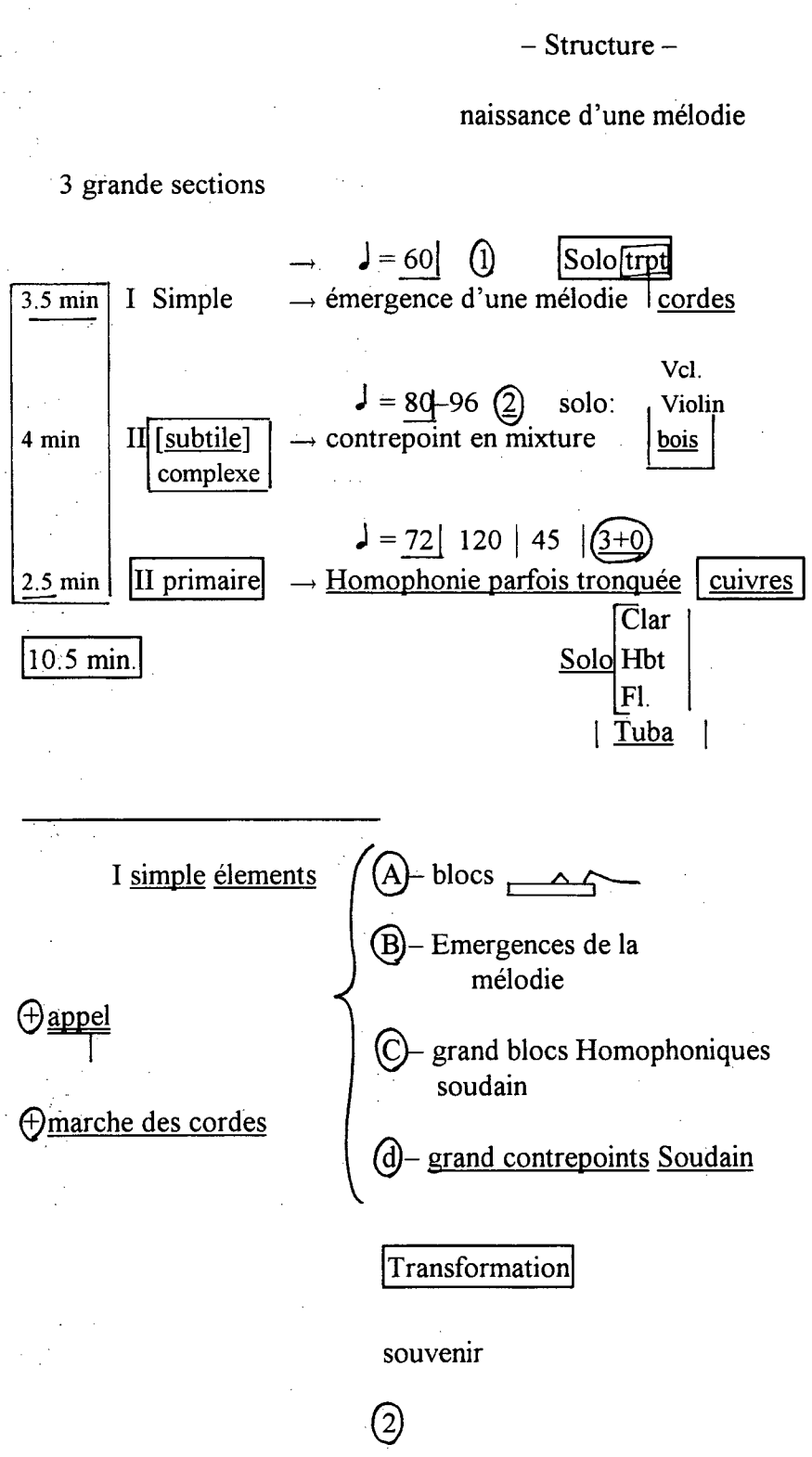
3.1 *Structure*

Three sketches lay out the formal structure of *Orion* (which I have designated S1, S2, and S3). The first (see 3.1.1 below) is the earliest one, as it drafts an overall plan for the work (originally for three sections, expanded to six in the completed score), and lists various musical elements later incorporated. While the latter two sketches (see 3.1.2 and 3.1.3 below) draft specific details of the first two sections of the score, some of the elements of sketch S1 are transferred and expanded.

3.1.1 – Sketch S1

Sketch S1 is written on two 11 x 14 pages in portrait format, labelled as pages 2 and 3 (page 1, presumably a title page, is missing). The first page is headed *"– Structure – naissance d'une mélodie."* Blue ink is used for most text, but the timings on the top left margin of page one are in pencil, and the instruments listed on the top right of page 2 are in red ink. See Figure 3.1 over the next two pages (cf. Appendix 2, p. 238).

Figure 3.1 – Sketch S1



II subtile contrepoint

contrepoint médiéval [ens. par ensemble

bois: 2 fl | 1 fl, 1 clar, 2 haut | 1 cor angl, 3 bsn | 4 cors

2 clar

contrepoint à 4 voix [a larger number 3 overstrikes the 4]

[parfois doublé — cordes: gr. contrepoint à 5 voix – indépendant

les bois avec de long arrêts en ₀

parfois être encontre harmoniques]

cuivres: ponctuation, enflement du contrepoint à 1 – 2 voix

Proportions abstraction

III primaire grand choral

avec des déphasages (2 voix)

cordes vs. cuivres

Bois

4 cors vs. 2 trpt 2 trbn

bois vs. cordes

couleur énergie

③

Sketch S1 projects a form in three principal parts which Vivier terms *3 grande sections.*[4] The top of page 1 (left side) names these sections: *simple*, *subtile* on top of *complexe,* and *primaire*. Timings for each part are listed in the left margin inside a box, which, judging from the darker pencil, may have been added later. The first part ("*simple*") is of particular importance, as Vivier expands it through the succeeding sketches. Halfway through the first page he outlines component elements of the *simple* part: a) *blocs*, which could indicate units of silence or motives (perhaps pertaining to the melody); b) *emergence de la mélodie*, which is self-explanatory; c) *grand blocs Homophoniques soudains*, sudden homophonic large units; and d) *grand contrepoints soudains*, sudden large sections of counterpoint. Only the first two of these components survive, as such, in the final score, where they make up the first of an eventual six sections. Below these four elements Vivier indicates 'transformation' enclosed in a box, and below this, 'souvenir.' These words may hint at other large divisions in the completed score, such as the fifth section, which Vivier calls *souvenir de la melodie* or "memories of the melody."

The second page of the S1 sketch projects the other two *grande sections*. The second *grande section* ("subtile") corresponds roughly to basic attributes of the second section of the score (mm. 12–56). For instance, the word *contrepoint* appears at the top of the page, underlined for emphasis, and is repeated immediately below with the added adjective 'medieval.' This *subtile* part, as Vivier terms it, indicates various groups of instruments which correspond to Vivier's choices of instrumentation for canons in the second section, especially in mm. 12–23 and mm. 32–39. The *gr. contrepoint à 5 voix—indépendent* refers

[4]I will refer to Vivier's 'sections' in this sketch as 'parts,' reserving the term 'section' for my analysis of major subdivisions of the completed score.

to the overall five-layered texture of the second section, in mm. 32–56 (further analysed in Chapter Four).

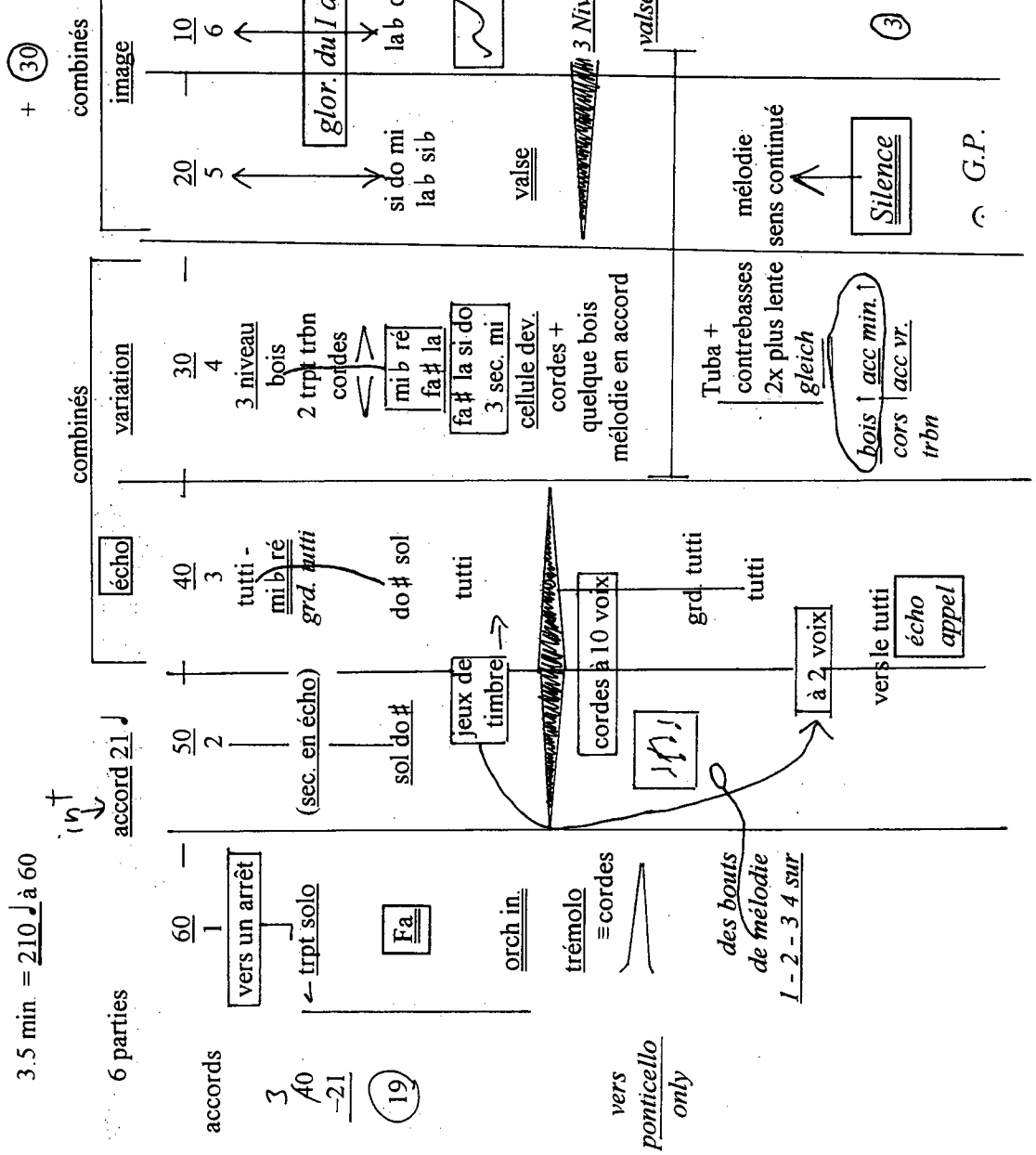
The third *grand section* on page two of sketch S1 specifies a *grand choral avec des déphasages (2 voix)*, which does not appear in the third section in the score. Rather, it relates to the music of the fifth section, which Vivier calls the "memories of the melody." Both the tempo marking of quarter-note = 80 and the approximate timing of 2 ½ minutes, indicated on the first page of sketch S1, correspond to the fifth section of the completed score. The word *déphasage* refers to a texture characterised by phase difference, that is, those associated with canons or canon-like textures.

The connection of Part I to the completed score is quite apparent. The "*simple*" part of sketch S1 is given a metronome indication of quarter-note = 60, the same as the beginning of the completed score. The emergence of the melody is assigned to solo trumpet with strings, as in the first section of the final score (mm. 1–11). However, the length of "3.5 min." does not correspond to that of the first section of the actual score, which is only 1 minute (60 quarter notes at M.M.= 60). This length is specifically associated with the opening section in the subsequent sketches, and the design of sketch S1 is abandoned.

3.1.2 – Sketch S2

Sketch S2 is written on an unlabelled 11 x 14 page in landscape format, headed "3.5 min = 210 à 60." It is mostly written in blue ink, but comments along the left, right and bottom margins are in a lighter blue ink and slightly larger script (presumably added later). See Figure 3.2 on the next page (cf. Appendix 2, p. 240).

Figure 3.2 – Sketch S2



Sketch S2 corresponds in overall length, but only in the content of its initial segment, to the first large division ("*simple*") of sketch S1. It uses six columns to project a structure of six segments. The timing on top of sketch S2 indicates its total timing as 3.5 minutes = 210 quarters at M.M. 60, resulting in a total timing of 210 seconds. The six segments relate by decreasing increments of 10 seconds, specifically lasting 60 + 50 + 40 + 30 + 20 + 10 (= 210) seconds. These six individual lengths (underlined) are placed at the top of each column, underneath which are the total number of chords in each section (indicated by *accords* written in the left margin), from 1 to 6. For example, the first subdivision has a duration of 60, and by virtue of the integer 1, is assigned a single chord. The second subdivision is 50 beats in length, and has 2 chords; the third is 40 beats in length with 3 chords, and so on. In total, 21 chords were planned.

The series of solfège syllables correspond to the basic melody halfway down the page, and the total number of melodic pitches in each subdivision approximates the total number of chords for that subsection. However, there are only 19 basic melody notes for the 21 assigned chords, as subdivision three and six have one less melody note than the stipulated number of chords. As compared to the completed melody, there is a repeated C♯ missing in the third subdivision, and the final pitch B♭ is missing in the sixth subdivision.

Interestingly, the timings listed at the top of each column (60, 50, 40, 30, 20, 10), reflect the 6:5:4:3:2:1 numeric ratio used as a proportional rhythm later in the score, as described in Chapter Two. At some stage Vivier changed his mind about the lengths of two

of the subdivisions: 1) the third, originally 40 (marked *écho* above) is changed to 21,[5] and 2) the fifth and sixth subdivisions (together marked *image* above the numbers) are bracketed and labelled as *combinés*, while the number 30 (= 20 + 10) encircled in bold ink above. While the third and four subdivisions are similarly bracketed and labelled as *combinés*, respectively marked as *écho* and *variation,* they remain separate entities in sketch S3. A number of markings at the bottom of S2 were evidently added at a later stage. They are indicated on the original sketch in a different pen, and I use italics in my transcription to show these additional markings. They reveal supplementary compositional strategies for the music corresponding to the segments of the sketch. In the final score, the first two sections (mm. 1–56) correspond in length to the music projected in S2, but their contents depart from these implied in S2, particularly the features indicated by these italicised markings.

3.1.3 – Sketch S3

Sketch S3 is written on an 11 x 14 page in landscape format, with the same header as sketch S2, along with "*rapport entre accomp et dir. du* [sic] *mélodie harmonisée.*" It is labelled by a capital letter A in the upper right corner, but no page B follows. This sketch is mostly in red ink, with a few additional markings in blue ink. See Figure 3.3 on the next page (cf. Appendix 2, p. 241). Please note: many details in my rendering are not perfectly aligned as in the original sketch due to the limitations of my word-processor.

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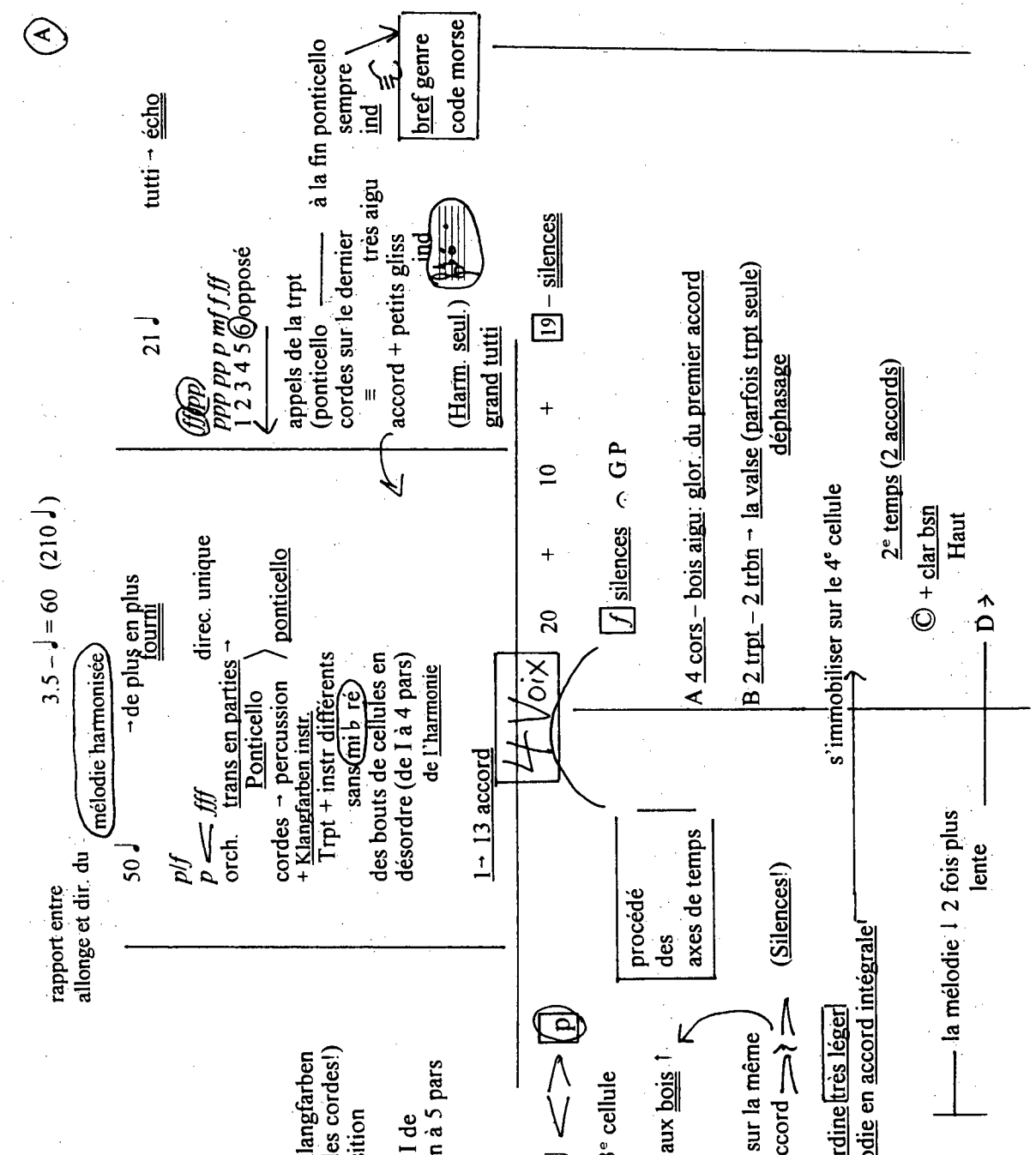
[5]21 represents the difference of 40 (the durational value of the third subdivision) and 19 (the total melodic pitches in this sketch). This calculation is indicated on the left margin of the sketch, with the difference 19 circled next to the series of solfège pitches.

Figure 3.3 – Sketch S3



Sketch S3 presents a more detailed structural plan for part of *Orion*. More specifics are given than in sketch S2, making it easier to draw comparisons between this sketch and the completed score: orchestrational indications (instruments and specific playing directions), the numbers of harmonies, dynamic choices, and specifics for various layers of music. Sketch S3 corresponds clearly to the first two sections of the score, as demonstrated in Table 3.1 over the next two pages. Note the Roman numerals on the leftmost column, which refer to the five subdivisions as indicated in sketch S3. In summary, the first subdivision relates to first section of the score, "the presentation of the melody" and the succeeding four subdivisions relate to second section, "the first development section."

Table 3.1 – Attributes of sketch S3

Sketch S3 subdivision	Notations in sketch S3	Attributes of passage in score	Measure numbers
Indications for SECTION ONE (mm. 1–11)			
I	• 60 [quarter-note beats] • *mp* [dynamic] • orch: *cordes* + *Klangfarben* • Trpt: exposition • *dev. Accord I à 5 parts*	• Refers to first 60 quarter-note beats of score, *mp* dynamic • Trumpet melody with strings •Uses chord 1, five parts	• mm. 1–11 duration: 60 quarters
Indications for SECTION TWO, rehearsal 2 to 4 (mm. 12–26)			
II	• 50 [quarter-note beats] • *de plus en plus fourni* • *p* cresc. *fff* • *trans. en parties direc.unique* • *cordes → percussion* • Trpt + instrs. *différents* • *des bouts de cellules en désordre* •(*de I [accord] à 4 pms de l'harmonie*) •*1 → 13 accord*	• approximate length of 50 quarters • Overall texture thicker & thicker •Overall dynamics *p* to *fff* •Written with three-part canons •Strings, percussion, trumpets •Based on first three chords of *jeu de timbres*, lower five notes of each. Doesn't use chords 1–13.	• mm. 12–23 duration: 39 quarters • mm. 24–25 duration: ten quarters, twice as fast as before • m. 26 duration: six quarters, *a tempo* • total of 50 quarter-note beats at M.M. = 60
Indications for SECTION TWO, rehearsal 4 to 5 (mm. 27–31)			
III	• 21 [quarter-note beats] • *tutti → écho* • 1 2 3 4 5 6 *opposé* • *appels de la trpt (ponticello cords sur le dernier)* • *à la fin ponticello* • *accord+petits glis. très aigu* • (*Harm. seul.*) • *grand tutti* • *Bref genre code morse* Notated on side B♭4 whole note with E♭5 and D5 above	• 21 quarters • Horns & strings oppose winds • Suggested proportional design not present here. • Trumpet 'calls' also absent. • Chords 4–6 used • High winds with morse-code rhythm, but no *glissandi.* • Strings use some ponticello, but more uneven tremolos • *Grand tutti* only for lower brass and strings. Uses indicated notes	• mm. 27–30 duration: 16 quarters (tutti and echo) • m. 31 five quarters

Indications for SECTION TWO, rehearsal 5 to 6 (mm. 32–39)			
IV	• 30 [quarter-note beats] *var. sur las 3e cellule* [sketch indicates four layers] a) *un déphasage aux bois* b) *trpts trmb var. sur la même cellule en accord* [open/closed mutes indicated] c) *cordes: la mélodie en accord intégrale* [above: *soudine très léger*] d) Tuba, Cb [basses], contre bsn To side: *la mélodie 2 fois plus lente*	• Winds in tight canon • Third motive present in trumpet only (no trombone), with open/closed mute • strings repeat entire melody with *jeu de timbres* (no mutes) • Tuba and lower instruments continually restate the two interval grand tutti, with morse code-like rhythms	• mm. 32–39 duration: 30 quarters exactly
Indications for SECTION TWO, rehearsal 6 to 10 (mm. 40–56)			
V and VI	• 20 + 10 + 19 [number in box] – silences • silences [fermata] G P [sketch indicates four layers] a) *4 cors – bois aigu: glor. du premier accord* b) 2 trpt – 2 trbn *la valse (parfois trpt seule)* [underneath: *déphasage*] c) + clar bsn hbt [above] *s'immobiliser sur le 4e cellule* [and also:] *2e temps (2 accords)* d) [arrows indicate continuation of d) from subdivision IV]	• Grand pause refers to sudden silence following this section • horns and high winds restate the entire melody harmonised with chord 1 untransposed • solo trumpet restates Motive 4 (no trb.), and no canon present • plus sign means strings continue with added clarinet, bassoon and oboe (bassoon part continues 4th layer). Also restates the entire melody as in layer a) also with chord 1, but here in transposed form • lower instruments same as before • No indication in sketch of harp or extra percussion present.	• mm. 40–56 • [For winds and strings] mm. 40–42: seven quarters episode (rehearsal 6 to 7) mm. 43–46: Motive 1 (rehearsal 7 to 8) mm. 47–53: Motive 2 & 3 (rehearsal 8 to 9) mm. 54–56: Motive 4 (rehearsal 9 to 10) • [For solo trumpet] Motive 4 throughout •[For lower strings] two interval grand tutti, still with morse code-like rhythms

The six subdivisions of the second sketch become just five in the third sketch, S3. Not only does the third subdivision have a duration of 21, but the fifth subdivision is 49, not 30 (20 + 10 *combinés* in sketch S2). 49 is the sum of the combined durations of subdivisions five and six in sketch S2 (=30), and the duration subtracted from the third subdivision when it was shortened to 21. (i.e. 40 less 21 = 19). Curiously, the difference of 19, labelled as 19 + *Silences*, coincides with the number of melodic notes, which may have influenced Vivier's decision to reduce the original duration of 40 by 19.

Additional notations were made on sketch S3 at a later date, in a second, lighter blue ink. The most enigmatic is the phrase below the header, "*rapport entre accomp et dir. du* [sic] *mélodie harmonisée*" (relationship between the accompaniment and direction of the harmonised melody).[6] Since this appears to refer to the sketch as a whole, Vivier may have jotted it down as a mnemonic afterthought. A more significant indication is *glor.* [*glorification*] *du I accord*, written in larger script over the fifth and sixth subdivisions. This refers to the first chord restated at this point in the score (mm. 43–56).

While other sketches pertain to the remaining four sections of the completed work, the three discussed here demonstrate the origins of *Orion*, at least its first two sections. The first "grande section" of sketch S1, is elaborated in the subsequent two sketches in layers of musical decision making, pertaining to: durations, orchestration, chords, and texture choices. The remaining sketches in file #34 do not generally delve in as much detail about its structure, but some will be examined in context of my analysis of *Orion* in Chapter Four.

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[6]The word *accomp* [sic] is difficult to make out, as it may be read as *allonge* (extension). But as my analysis will demonstrate, *accomp* is appropriate, as Vivier is always concerned with how the basic melody is harmonised.

3.2 *Melody*

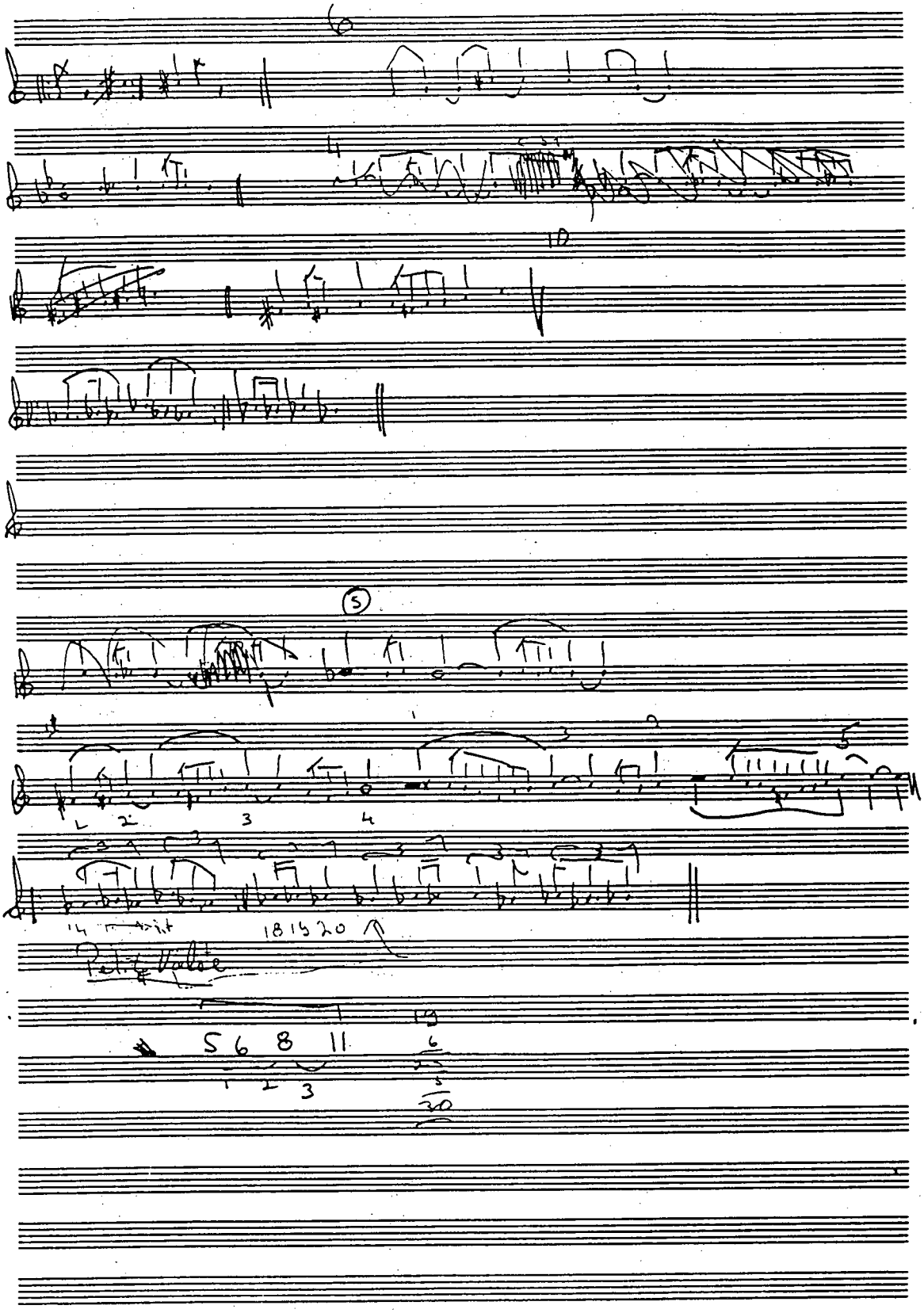
There are three sketches especially relevant to of the principal melody of *Orion*, which I have designated M1, M2, and M3. (I have avoided duplicating other less significant sketches because none expresses the melody in its entirely.) The first (see 3.2.1 below) is hastily written and partially scratched out, but nonetheless contains the basic motives. The second (see 3.2.2 below) neatly drafts all four motives and specifies their durations, dynamics, and basic attributes (marked as subtitles) with different pen colours. The third (see 3.2.3 below) presents an overall plan of motive and rest durations, as well as specific dynamics and string techniques that survive into the completed score.

3.2.1 – Sketch M1

Sketch M1 is written on an 11 x 17, 16-stave page, in pencil. The upper half of this sketch shows a rough working out of the four motives, and the lower half a more detailed rendering, including the grace-notes of the second and third motives and the triplet-rhythms of the fourth. Integers written in blue (presumably added later) show the total durations for each motive. Finally, the four durations of the motives (5, 6, 8, 11) and underneath, the differences between each successive pair (1, 2, 3),[7] are indicated in pencil at the bottom of the page. See Figure 3.4 on the next page. Because Vivier's markings are fairly clear, I did not create a diplomatic rendering, nor did I duplicate this sketch in Appendix 2.

[7]That is, the difference between the durations of 5 and 6 is 1, 6 and 8 is 2, and 8 and 11 is 3.

Figure 3.4 – Sketch M1

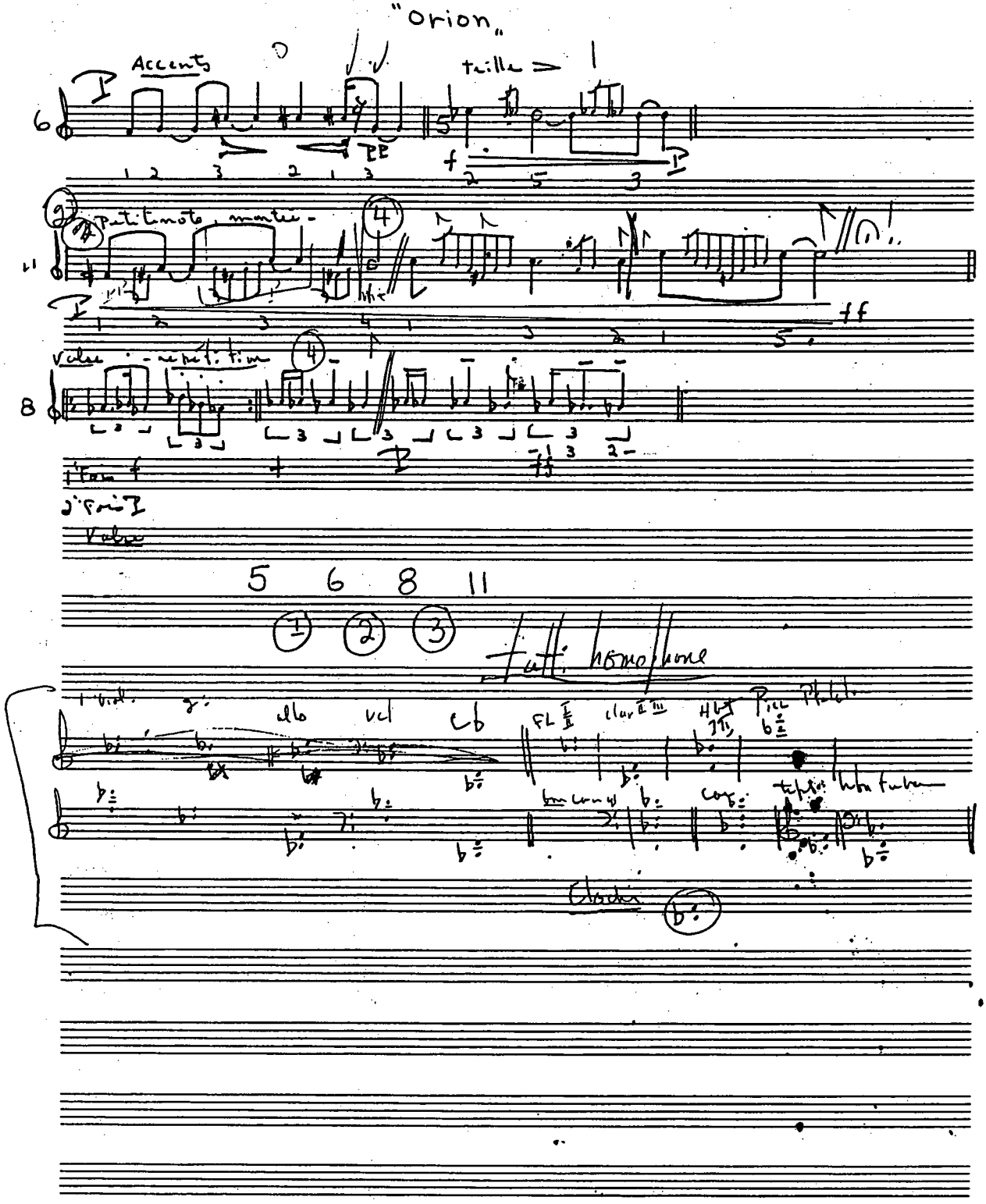


Sketch M1 contains a first draft of the melody of *Orion*. The original plan for a 19-note melody is altered in sketch S2 and the melody expanded to 21 notes. This is evident from the numbering of the pitches of the last motive, identified as a "*Petite Valse*," from 14 to 20. The last, unnumbered pitch is B♭4, and this brings the total to 21 melodic notes, the number used in the actual score. These basic details are transferred to the subsequent sketch M2.

3.2.2 – Sketch M2

Sketch M2, entitled "Orion," is written on an 11 x 17, 16-stave page, with melody in black ink, division points between each motive in pencil, and the durations of and name for each motive (e.g. "*accents*," "*trille*," etc.) in blue ink. The eighth-note durations of most melodic pitches are written underneath in red. Figure 3.5 on the next page is duplicated from Vivier's own sketch, as his writing is fairly clear, nor is this sketch listed in Appendix 2. Note that since the motives, as ordered in the melody, form the duration set <6, 5, 11, 8>, their differences may not be equally apparent in the experience of the music.

Figure 3.5 – Sketch M2



In sketch M2, the four motives are more neatly written than in sketch M1, complete with rhythmic values, dynamics, and grace-notes (for motives 2 and 3). Interestingly, this sketch gives names to its four motives, as Vivier's mentor Stockhausen did in *Mantra* (1970). Motive 1 is labelled "*accents*," motive 2 "*trille*," motive 3 "*petite note, montée*," motive 4 "*valse*," along with "*répétition*" as the first 2 beats of triplet notes repeat. As noted above, durations (measured in eighth-notes) are written underneath many of the melodic notes and the duration of each motive is indicated in blue at its inception, in most cases measured in quarter-notes. An exception is the third motive, whose duration indicator of 21 [sic] is measured in eighth-notes. The '21' should actually be a 22, making the third motive equivalent in length to 11 quarter-notes. Indicated at the bottom of the page, as in sketch M1, is a summary of the total quarter-note durations for all four motives: 5 for the first motive, 6 for the second, 8 for the fourth, and 11 for the 22 eighth-notes of the third. Below these integers (5, 6, 8, and 11), and between each successive pair of durations, the differences of 1, 2, and 3 are indicated and individually circled. The eighth-note durations of most melodic pitches are written underneath in red. Note that since the motives, as ordered in the melody, form the duration set <6, 5, 11, 8>, these differences may not be equally apparent in the experience of the music.

3.2.3 – Sketch M3

Sketch M3 is written on an 11 x 14 page in landscape format, with 60 ♪ written at the top centre in pencil. The uppermost left corner indicates durations of the motives and intervening rest periods. The larger central portion of the page indicates the same eight durations, with pitches of accompanying strings placed above, and five rows of additional instrumentation below. See Figure 3.6 on the next page (cf. Appendix 2, p. 242).

Figure 3.6 – Sketch M3

Sketch M3 contains the finishing details (dynamics, string techniques, *Rin* attacks) for the completed score. The separation of the four melodic motives by one preceding and three intervening rest periods is briefly worked out on the uppermost left side of sketch M3. Notably, the rest periods are not moments of actual silence, but rather moments when the melody ceases while the strings maintain their sustained note(s) for the prescribed durational period. The central, larger portion of the sketch duplicates these eight durations, and on top displays the actual pitches of the strings. Below the durations are five rows of additional information, specifying (in descending order): the selected string tremolos, the dynamics, the five Japanese *Rin* attacks, and the trumpet motives, with intervening rest periods. The unfolding pitches of the accompanying strings, marked above the durational integers, form the lower four pitches of chord #1 (F4, C4, A♭3, F♯3) along with D3, T_7I of the first pitch of the melody.[8] On the lowermost two rows the trumpet motives are sparsely indicated rhythmic incipits of two or three notes, placed between the rest periods indicated with *fermatas*.[9] The five percussion attacks on the Japanese *Rin*, which announce the beginning of the piece, and the beginning of each subsequent motive are indicated with whole notes and *laissez vibrer* slurs.

Minor sketches devoted to the creation of the melody typically concern only one of the motives, and work out its durations or pitches. These are mainly on plain paper, not score. Sketches M1, M2, and M3 pull the preliminary information of the minor sketch material together to form a definite, workable melody. While the melody can easily be

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[8]As will be discussed in Chapter Four, the D3 is the first note of the melody transposed and inverted at T_7I.
[9]Only the first two rest periods actually use a *fermata* sign, but the intention of the blank gaps of the next two rest periods is obvious.

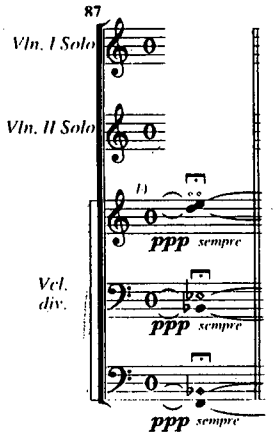
compared to Stockhausen's *Mantra*, it goes further in balancing the durations of the motives with the rest periods. The special string techniques and the attention to the Japanese *Rin* create a characteristic sound unique to Vivier.

3.3 *Chords*

There are four relevant sketches for the chords in *Orion*. The first three (see 3.3.1, 3.3.2, and 3.3.3 below) concern the creation of the *jeu de timbres*, the pervasive 21 proto-timbral harmonies (which I have assigned J1, J2, and J3 to reflect their relevance to aspects of the *jeu de timbres*). The fourth sketch (see 3.3.4 below) contains notes from which three other important harmonies originate (which I have designated AM1 because it is based on the pitches and scales of various Asian metalophones). As with the above sketches of structure and melody, numerous less significant sketches are not discussed, mostly because they do not contribute enough information on how the harmonies are formed.

The first three sketches below reveal the evolution of the 21 chords that constitute *Orion*'s *jeu de timbres*. Before I explain the sketches in detail, I must define what I call a Lydian harmony, as it forms the basis of many important sections in the work. This harmony is an inverted form of a set-class 4-Z29 tetrachord (0, 1, 3, 7), forming an all-interval-class set with an interval vector of [1,1,1,1,1,1]. I call this a Lydian harmony because its pitches (B♭, D, E, and F) form the 1, 3, 4, and 5 degrees of a Lydian mode. Figure 3.7 below shows one example from the near-exact mid-point of the work, here played in artificial harmonics.

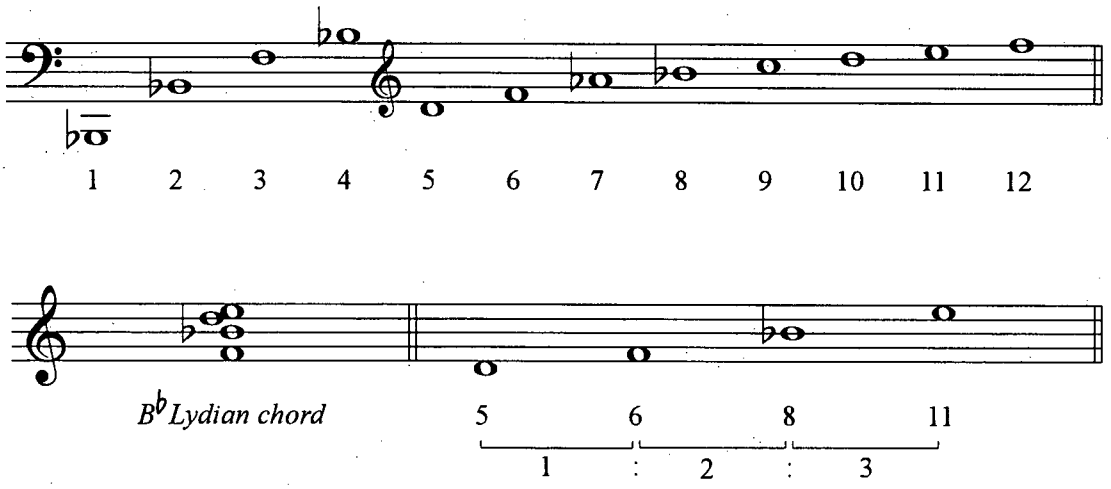
Figure 3.7 – Lydian harmony, m. 87



The same kind of supporting harmony is used in the first section, mm. 9–11, but in mirror inversion (i.e., the same intervals employed in upside-down fashion). It is also the predominant harmony used to harmonise melodic motives in the latter part of the second section, mm. 43–56; and the prevailing harmony in the middle of the "second development of the melody," mm.87–97, where the headmotive of the opening melody returns (i.e., <F, G, C♯>). In fact the pitches of the B♭Lydian harmony are derived from the four motives of the opening melody: respectively, the initial pitch of motive 1, F4, and the final pitches of the subsequent motives, D5, E5, B♭5.

What makes this harmony so special is that its four pitches may be taken to represent the 5th, 6th, 8th, and 11th overtone partials of B♭, the goal-tone of the melody. Other sketches outline overtone series, suggesting that Vivier may have been thinking of this set in terms of B♭ and its overtones. Note that the integers 5, 6, 8, 11 also match the four durations of the motives and rest periods, and that the series of overtone numbers may be represented as the series of differences—between successively chosen overtones—1, 2, 3. See Figure 3.8, on the next page, which demonstrates this particular association.

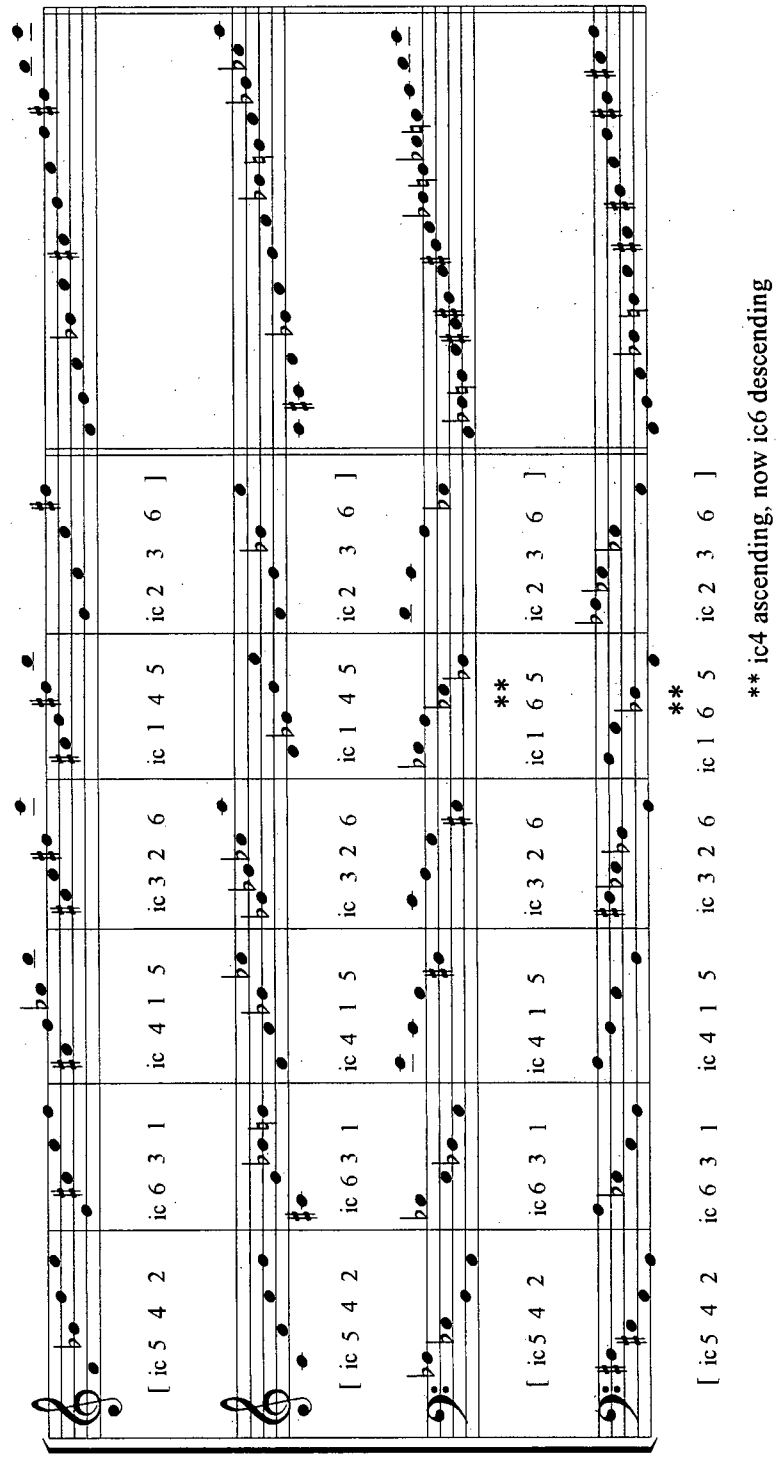
Figure 3.8 – Overtone series of B♭ and resultant Lydian harmony



3.3.1 – Sketch J1

Sketch J1 is written on an 11 x 17, 16-stave page in black ink, top half only. It consists of a series of four rows of pitches divided into six columns of four pitches each, and another larger measure to the right of each row repeating all the pitches in that row, arranged as a scale. See Figure 3.9 on the next page (cf. Appendix 2, p. 242).

Figure 3.9 – Sketch J1

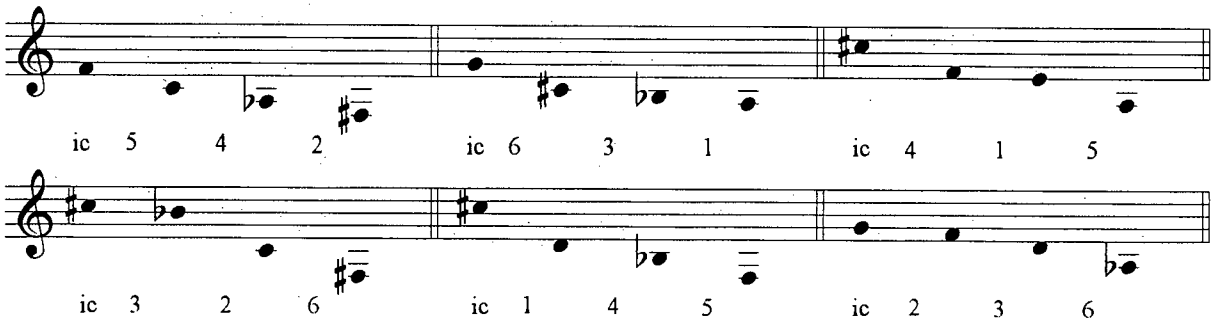


The Lydian harmony is the first harmony in sketch J1, which lists potential chords and larger collections. This sketch shows four lines of notation, each consisting of six four-note sets in series. Each line then combines the pitches of these six tetrachords to produce the scale at the right end of the line. These scales are used in the actual score, which will be analysed in Chapter Four. The inscribed integers under each tetrachord in the middle of each staff are my addition, and indicate the melodic intervals from one pitch to the next. These integers reflect ordered interval-classes (OICs), the first row of which reflect those of the first six harmonies of the *jeu de timbres* (see Fig. 1.1, p. 20), and their initial pitches state the first six notes of the principal melody: <F4, G4, C♯5, C♯5, C♯5, G4>.

Furthermore, the lower three lines are generated from the first, upper line. Specifically, the first tetrachords on each of the four lines mostly have the same ordered interval-class (OIC) content.[10] The first two lines realise these intervals ascending, while the lower two lines realise these intervals descending. As well, the starting pitches of the lower three lines are different from that of the first line. Interestingly, the four starting pitches reading down form an ordered set with OIC <5, 4, 2> (i.e. the Lydian harmony), identical to that of the first chord in each row. This correspondence holds for the starting pitches of the chords in each column: in each case the starting pitches of the chords in a column form a chord with the OIC of the sets in that column, as indicated in Figure 3.10 below.

[10]The lower two lines of the fifth column alter the ic 4 ascending to ic 6 descending, for no apparent reason.

Figure 3.10 – Chords formed by starting pitches in each column of sketch J1



The tetrachords of sketch J1 account only partly for the 21 basic harmonies of *Orion*, but some of the principles established carry over to subsequent sketches. All the harmonies are built on pitches of the principal melody. The Lydian harmony is favoured by frequency and primacy of placement. A chord is understood as representing an OIC, and the formation of interval-class aggregates determines chord-type successions. Inverted (in fact, mirror-form) chords are used along with transposed forms. The chord-derived scales on sketch J1 are not finally used in *Orion* in any significant way.[11] But the scale at the right of the first line is transferred to a later sketch (sketch J4), the significance of which will be explained in Chapter Four.

3.3.2 – Sketch J2

Sketch J2, written in pencil on an 11 x 14 page in portrait format, shows two boxes of integers arranged in vertical groups of three. See Fig. 3.11 below (cf. Appendix 2, p. 244). The top larger box interconnects various groupings of integers (omitting Vivier's arrowed links in my transcription), especially those with similar numerical content. The narrower, lower box summarises these groupings.

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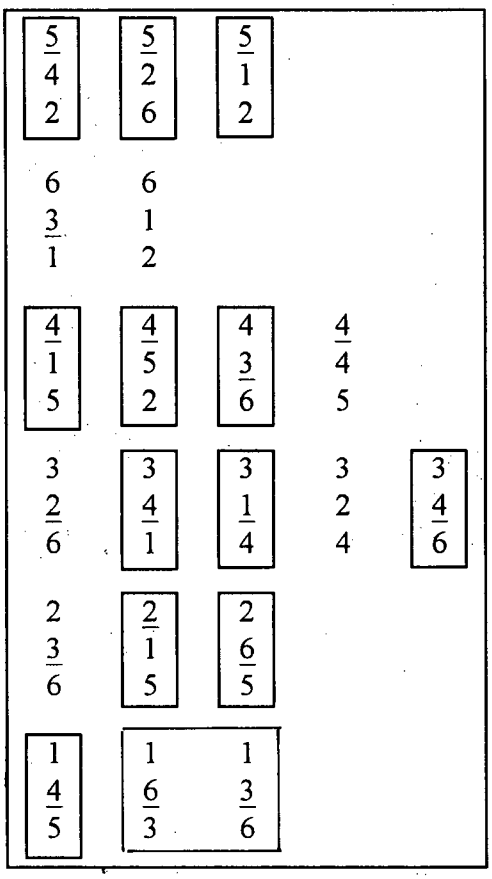
[11]There is one passage in the "second development of the melody" where the horns use the fourth scale as a series of roots.

Figure 3.11 – Sketch J2



5 4 2
5 2 6
5 1 2
6 3 1
6 1 2
4 1 5
4 3 6
4 4 5
3 2 6
3 4 1
3 2 4

Sketch J2 is a series of vertically arranged three-digit patterns representing potential interval-class content of various unpitched harmonies. Vivier presumably used J2 in writing out the pitch content of J1. Specifically, the leftmost column of three-digit numbers in the uppermost larger box of sketch J1 matches the OICs of the first row of sketch J1, except that the fifth and sixth components are reversed.[12] The individually boxed three-digit components within the upper larger box are not fully duplicated in the lower narrower box of 11 three-digit components. Also, the function of the underlined digits in the three-digit sets of the upper box is unclear. It is clear, though, that the eleven vertically arranged three-digit OICs in the lower box are selected from among those in the larger upper box. These OICs follow an intuitive theoretical premise, and are used for the creation of nearly all of the 21 *jeu de timbres* harmonies. See section 3.4 below, *Formation rule for ordered interval classes (OICs)*, for more specific information on why Vivier selected these eleven.

3.3.3 – Sketch J3

Sketch J3 (see Fig. 3.12 on the next page, and refer to Appendix 2, p. 245) is written on an 11 x 17, 16-stave page, mostly in pencil, with brackets above in black ink. The final pitch on the sixth stave (A2), presumably in bass clef, is in red ink. Penciled details at the very bottom seem unrelated to the chords, and are rather difficult to decipher. My rendering of this sketch is not a diplomatic one, as the harmonies are evenly spread over two systems, unlike in the original, where they are on one.

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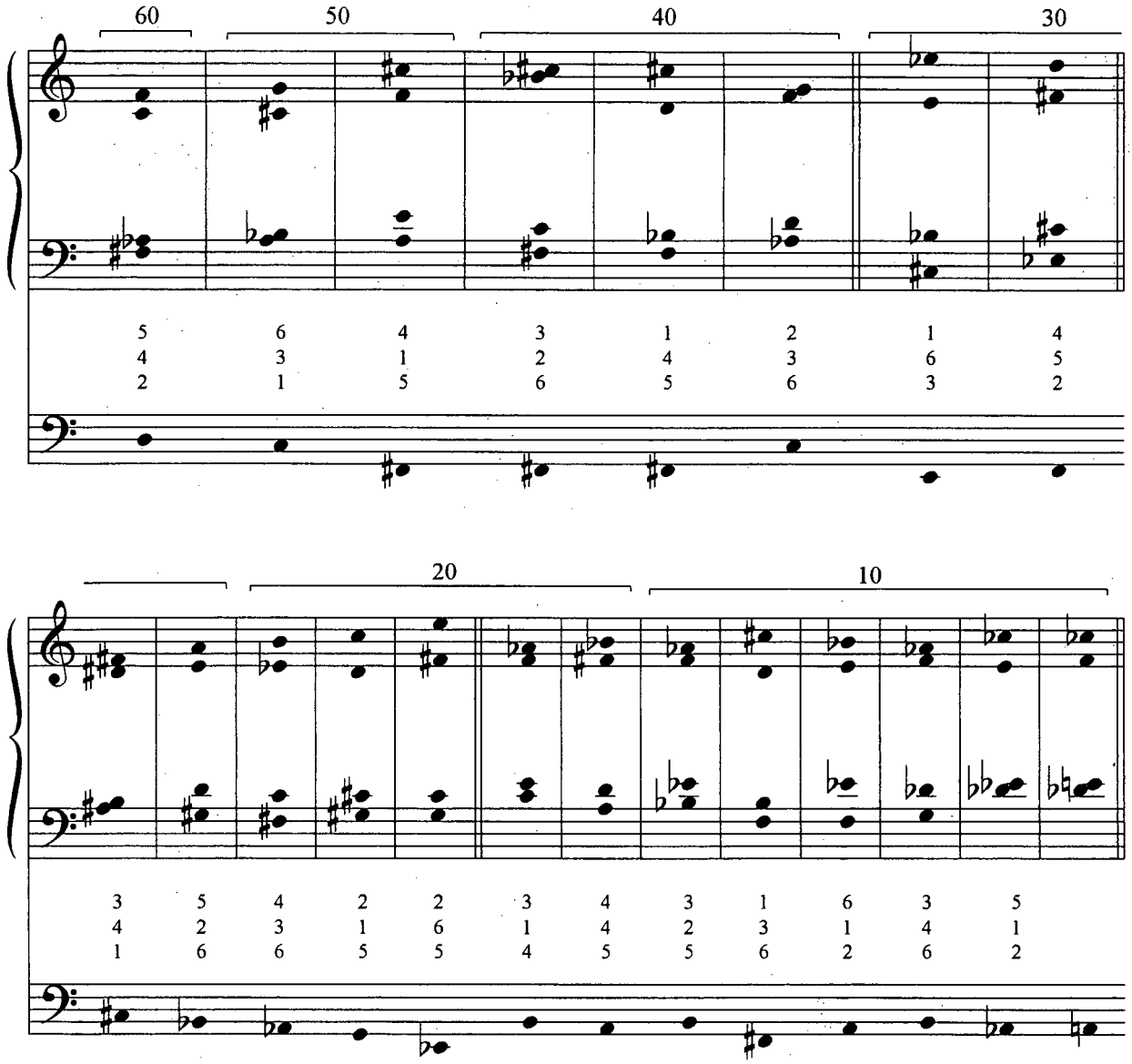
[12]Of course, the possibility can't be ruled out that sketch J1, and not J2, was written first. Either way, sketch J2 contains OICs unrelated to J1, but used for other chords, as other sketches show.

Figure 3.12 – Sketch J3

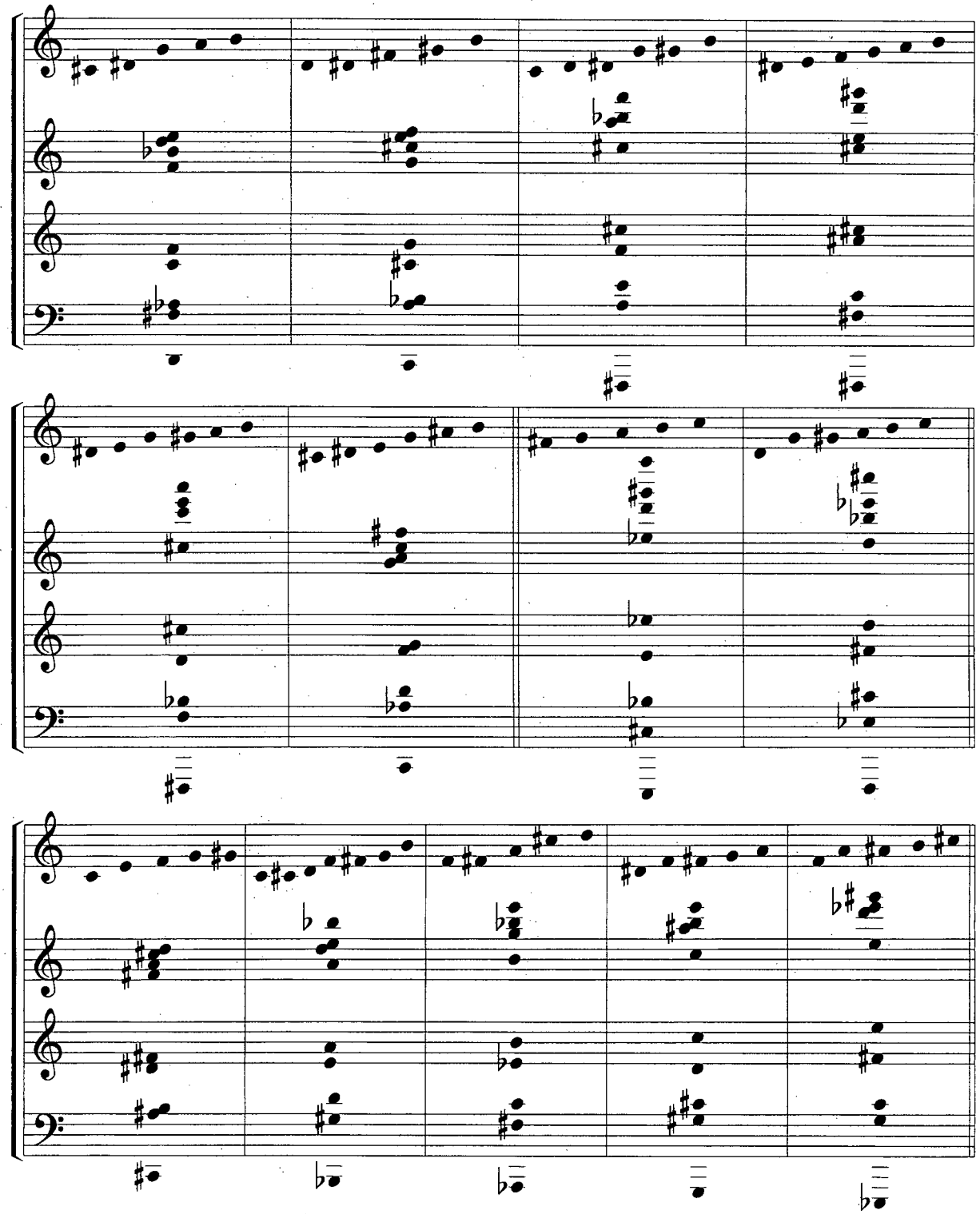


Sketch J3 contains all 21 melodic pitches, each of which serves as the top note of a four-note sonority, here written in SATB fashion. The OICs and resultant pitches are calculated in top to bottom order, and all integers are duplicated from Vivier's original sketch. The sketch segments the 21 harmonies into six subdivisions, which correspond to the six originally planned subdivisions, along with durational values decreasing from 60 down to 10 as earlier discussed with regards to sketches S2 and S3. The OIC for each chord is labelled below, and the basic melody in inversion (T_7I) is sketched below on a third staff where the bass clef must be assumed. These harmonies are fundamental for sketch J4, the final step in creating the *jeu de timbres*.

3.3.4 – Sketch J4

Sketch J4 is written on an 11 x 17, 16-stave page. The upper ten staves contain the chords of the *jeu de timbres*, and the lower six contain the three "*arrêts*." Black ink is mainly used throughout except for the first and tenth staves, where the notations are in red ink. Three unrelated chords on the second system, seventh stave, are in blue ink. See Figure 3.13a on the next two pages (the top half) and Figure 3.13b on the subsequent page (the bottom half). The original sketch J4 is duplicated on a single page in Appendix 2, p. 246.

Figure 3.13a – Top half of sketch J4



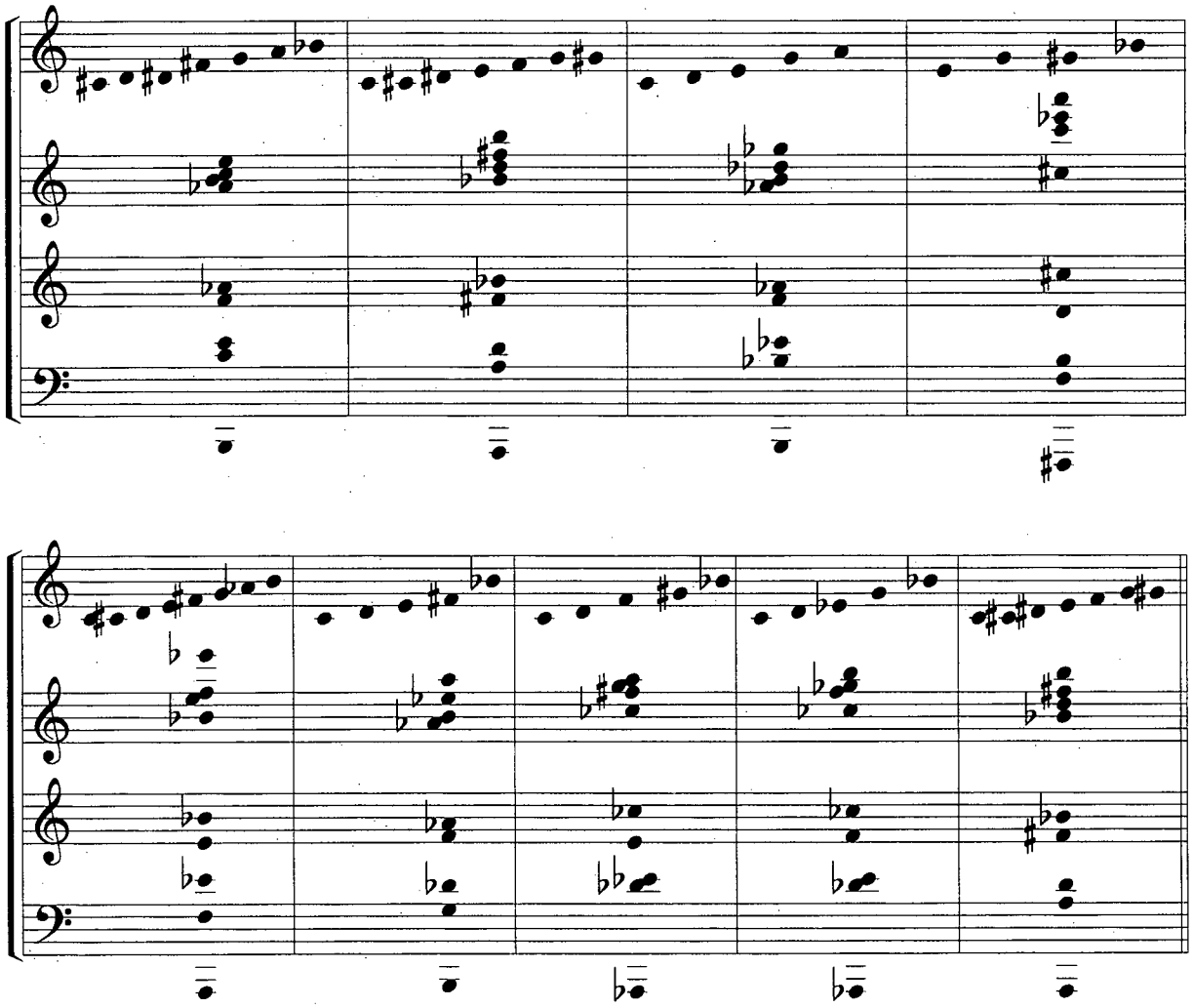
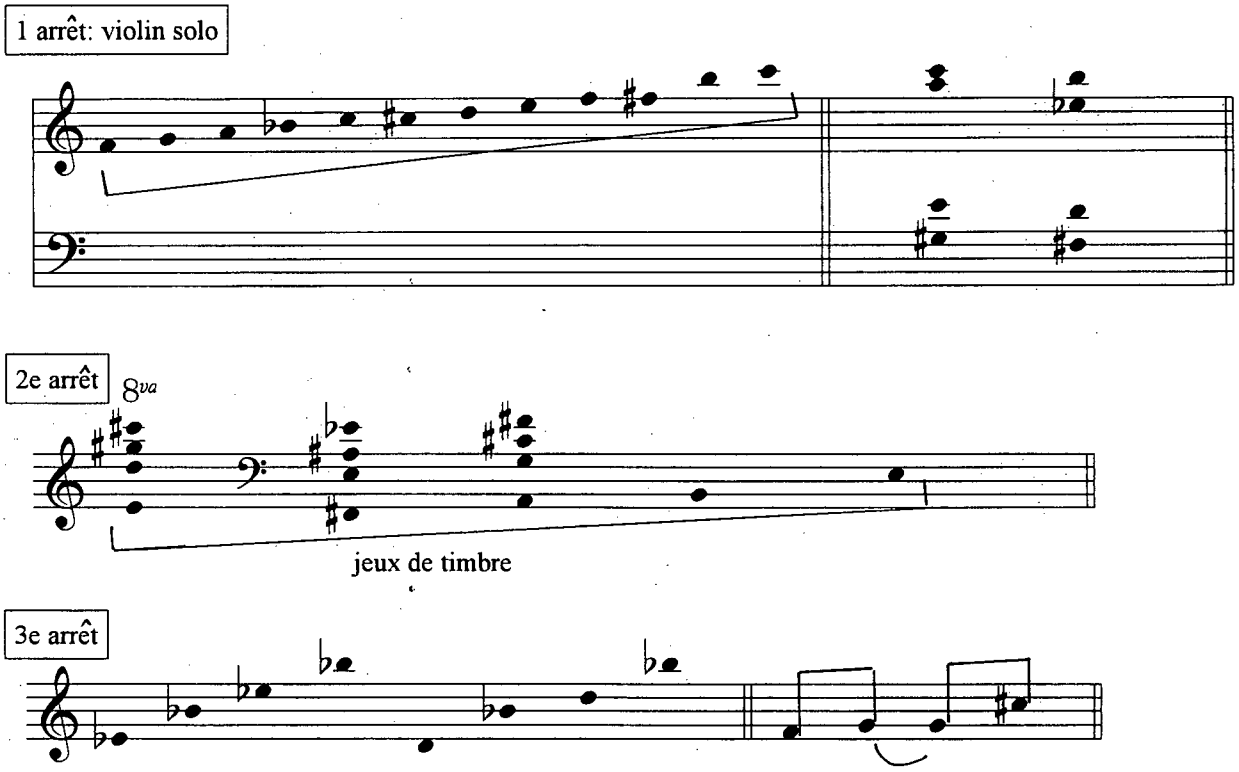


Figure 3.13b – Bottom half of sketch J4



In sketch J4 Vivier notates 21 symmetrical seven-note sonorities. The pitches of the basic melody serve as the centres of these chords. Excluding the lowest bass notes on the bottom system, the chords are displayed on the second, third, and fourth staves of the sketch (formed into a system); and on the sixth, seventh and eighth staves (part of a second system that also includes the tenth staff). While 22 chords are actually found on the sketch, the final, twenty-second chord is identical with the fifteenth; there are only 21 *distinct* chords (see Fig. 1.1, p. 20). These are the result of combining mirror-related chords, built around a melody pitch, using the same OIC in inversion. On the topmost staff the complements of the seven-note chords are notated, although they are never used in the completed score. The fourth staff contains, along with the two bottom pitches of each seven-note chord, the inversion of the basic melody, two octaves and a minor third below the first melody pitch, F4 (i.e., at T_7I, exactly like the bottom pitches of sketch J3). Interestingly, only the first three notes of the inverted form of the melody occur in the score, forming the lowest part of the three five-note harmonies used in the canons for the second section (see Chapter Four, pp. 116–119). Other than as revealed in this instance, it is uncertain what Vivier's intentions for this inverted melody form may have been.

It is important to note that, while the six OICs of sketch J1 form chords 1 to 6 in sketch J4, the exact pitches specified by the OICs of sketch J1 are not consistently deployed in sketch J4. Chords 1, 2, and 6 of sketch J4 use the same intervals and resultant pitches as J1, while chords 3, 4, 5 invert some (but not all) intervals of sketch J1, resulting in different pitches. Consequently, the ranges of the seven-note harmonies on both sides of the central melodic pitch is greatly expanded from an interval of a seventh (chords 1, 2, and 6) to a minor 13th (chords 3, and 5), and a perfect 12th (chord 4). The manner in which Vivier

realises the pitches of the OICs either as smallest interval forms or as larger, inverted intervals is not consistently employed in the 21 chords of sketch J4.

The three *arrêts*[13] at the bottom of sketch J4 refer to three apparently crucial features of *Orion*. The first refers to the scale, here the same one used at the end of the first line of sketch J1. Vivier may have considered this scale important in the early stages of planning *Orion*, as the pitches of the first motive of the basic melody are derived from this scale (F♯4, G4, C♯5), although those of the subsequent motives are not. However, the first order indicates a violin solo, not found in *Orion*.[14] The second presents the first OIC from the *jeux de timbres* (an inverted Lydian set) and shows it in a wide intervallic arrangement, similar to those of many other chords in the *jeu de timbres*. The third shows the semitone-related pitches E♭4 and D4 with a pedal B♭4 on top, and are duplicated an octave higher. This formation suggest musical ideas for the fourth section, the "meditation on the melody," analysed in Chapter Four.

The 21 chords are not incorporated in the completed score as the earlier structure sketches S2 and S3 indicate (i.e., chord one for the first subdivision, the next two chords for the second subdivision, and so on). However, all 21 chords are sometimes used to harmonise respective melodic pitches when the basic melody is restated, resulting in a fully harmonised melody. This occurs in both development sections, specifically mm. 32–39 in the second section ("the first development of the melody"), and mm. 64–86 in the third section ("the second development of the melody"). These passages will be fully analysed in the subsequent chapter.

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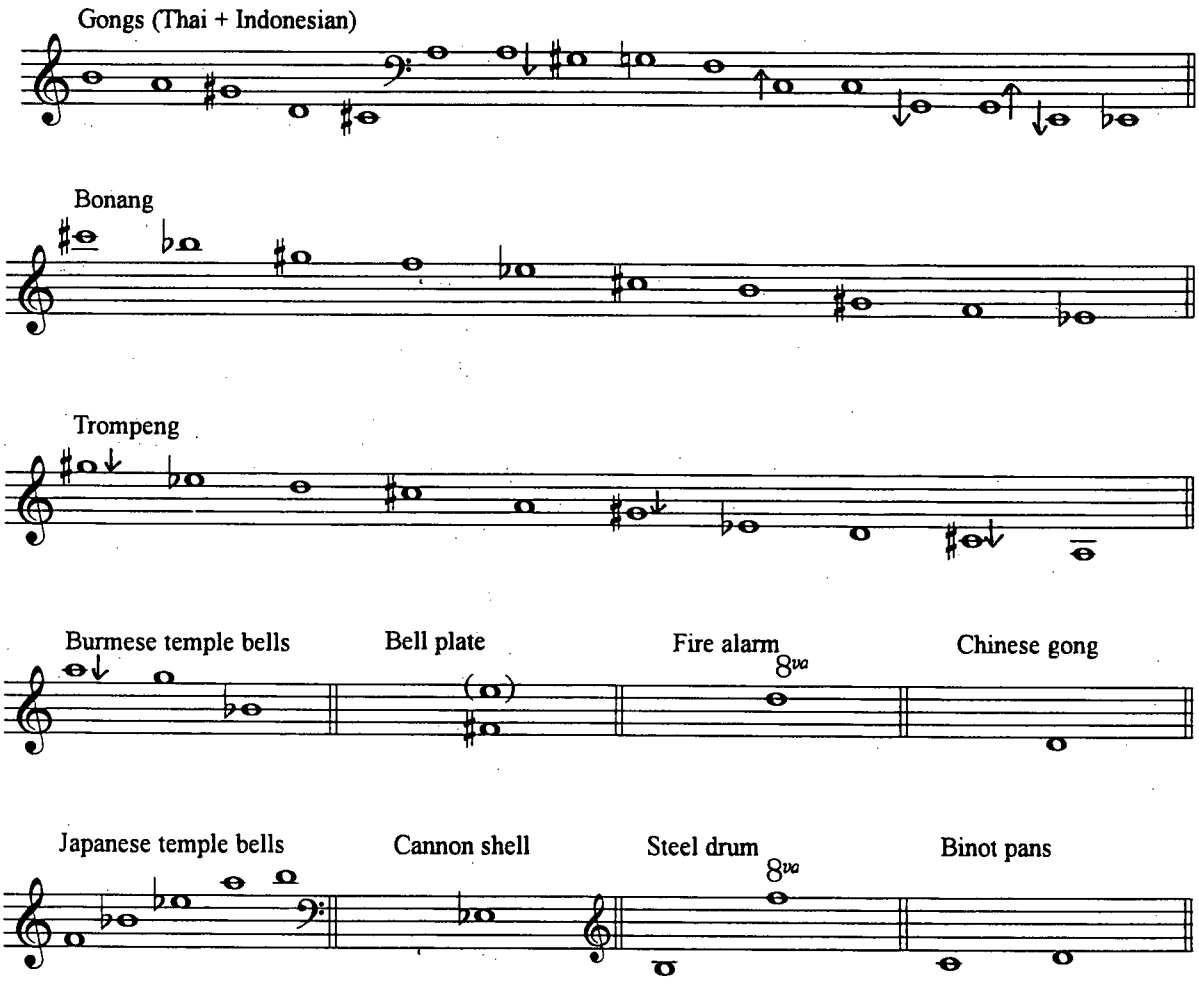
[13]I interpret the word *arrêt* as 'order' or 'decree.'

[14]Only the first three pitches of the melody are used as a violin solo in the near-exact middle at mm. 87–90, here used in canon with a second violin solo.

3.3.5 – Sketch AM1

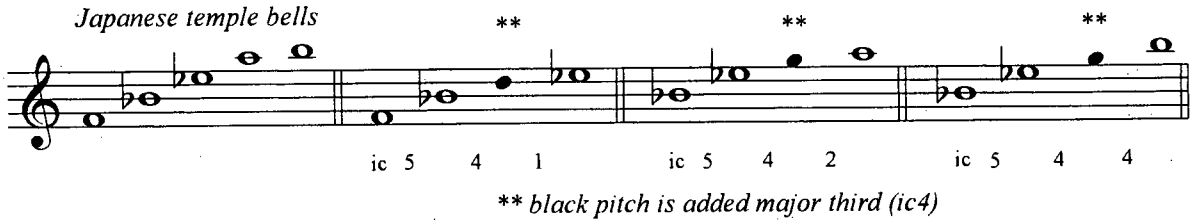
Sketch AM1 is the only sketch used for two different works—*Orion* and *Cinq chansons pour percussion*—whose application will be discussed below. This sketch is written on what appears to be a 8.5 x 11 lined paper in portrait format (presumably from a spiral-bound notebook) due to markings on the left edge. The original copy has been misplaced, so I cannot comment on the type of ink or pencil used, nor completely ascertain the paper size. Only the top five staves are duplicated in the attached rendering of this sketch, as the remaining staves are not relevant to my analysis for either composition. See Figure 3.14 on the next page (cf. Appendix 2, p. 247).

Figure 3.14 – Sketch AM1



Sketch AM1 contains some of Vivier's notes on Asian metalophones, which were probably written in Bali in 1977.[15] It lists, amongst other things, a five-element set, representing the pitches of Japanese temple bells (see fifth staff, first measure). Vivier selects three subsets of three pitches from this set, and adds an extra major third interval to produce three new sonorities. The lowest interval of each is a perfect fourth which, with the added major third, produces a major triad in second inversion. Finally, one additional upper pitch completes each chord. These chords are never inverted, as they always occur in the same narrow registral arrangement.[16] See Figure 3.15 below.

Figure 3.15 – Three major-sounding tetrachords



** *black pitch is added major third (ic4)*

Typically these chords are used in combination, or with transposed versions of the same chord to create seven-or eight-note sonorities. For example, the second chord (identical to the Lydian harmony) is coupled with its own simultaneous transposition, creating a complex seven-note sonority. This chord harmonises the basic melody near the end of the second section (mm. 43–56), moving in parallel motion with the melody. Additionally, the

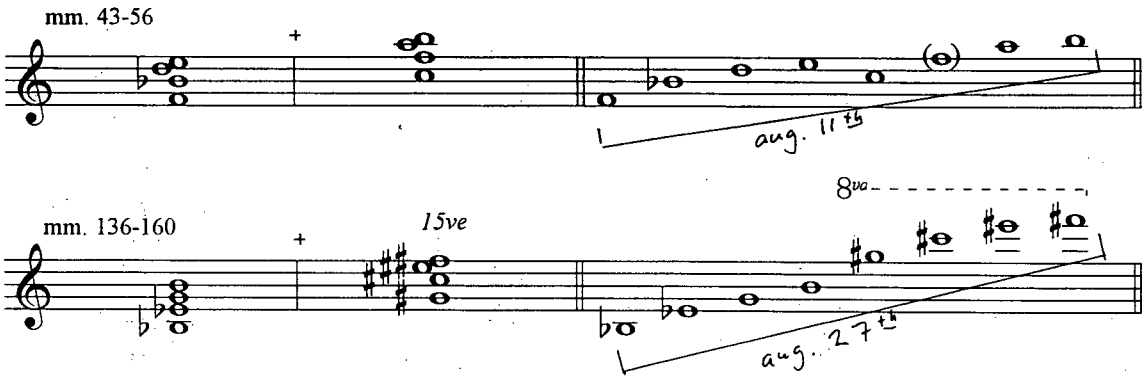
[15]Vivier's class notes (possibly written in Bali, where he studied *gamelan* music for three months) inspire more than just these three chords in *Orion*. For instance, the scales of the gongs (Thai and Indonesian) and the *bonang* and *trombong* form the basis of scales for *Cinq chansons pour percussion*. The inspiration of the Japanese temple bells in *Orion* is clear, since its instrumentation includes the very same bells. Also, the first two pitches of the bells as indicated in the sketch are exactly the two pitches for chord 1 (i.e., F4 and B♭4).

[16]Vivier would likely find these chords easy to work with at the piano, at which he composed every morning.

registral span of this double Lydian chord, an augmented 11th, emphasises the tritone interval (ic 6), despite its characteristic as an all-interval chord. See Figure 3.16 below.

The remaining two tetrachords are combined to create an eight-note chord, used in the fifth section, mm. 136–160. Unlike the double Lydian chord, this chord does not follow the basic melody. Instead it shadows the first two pitches of motive 3 (here as F♯6 and A6), which alternate throughout this passage. As the melodic pitches shift back and forth, the chord moves in parallel motion. Strikingly, its wide registral span (approximately three and a half octaves) is achieved not by rearranging the pitches over the registral space, but by simply situating the two tetrachords two and a half octaves apart.[17]

Figure 3.16 – Two eight-note sonorities (based on tetrachords of Fig. 3.15)



In summary, the ten sketches analysed in this chapter represent substantial stages in the development of *Orion*'s formal structure, principal melody, and essential harmonies. Many clues to Vivier's creative (if eclectic) mind are revealed. Some of the remaining 70-odd sketches will be briefly discussed in support of my analysis of the complete score of *Orion* in the following chapter.

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[17] Curiously, this same two-chord sonority returns in the last measure of *Orion*, but with the chords placed just half an octave apart.

3.4 *Formation rule for ordered interval-classes (OICs)*

Because I placed so much emphasis on *Orion*'s *jeu de timbres*, due to the extent of relevant sketch material (see sketches J1, J2, and J3 above), I devised a formation rule for ordered interval-class classes (OICs). The validity of this rule shows that Vivier's intuitive musical choices are based on theoretical principles, and are not arbitrary. The rule also makes clearer some symmetries in the overall design of the 21 harmonies. I derived the formation rule for ordered interval-classes through careful analysis of the eleven OICs located in the lower box of sketch J2.

FORMATION RULE

Given three interval-classes (ics), and the four conditions listed below, only ten OICs are possible. These ten and their permutations determine the lower four notes of 19 of the 21 fundamental seven-note sonorities used in *Orion*. The remaining two sonorities use non-conforming OICs. There are four conditions for OIC-class formation:

Condition 1:
- maximum sum of ics in an OIC is 13
- minimum sum of ics in an OIC is 8
- a sum of 12 is invalid since it replicates the initial pitch at the octave

Condition 2:
- if the sum of the ics is 11 or 13, then ic 1 is not employed
- if the sum of the ics for the ics is 8, 9, or 10, then an ic 1 must be incorporated

Condition 3:
- two of the three ics *must* differ by 1, and the ics that differ by 1 must be adjacent in the (rotatable) set, that is, first place and second, second place and third, or third place and first
- one pair of adjacent ics in the class can differ by 1
- N.B. ic 6 may be followed/preceded by ic 1 (e.g., <3 1 6> or <6 3 1>)

Condition 4:
- two pairs of ics can differ by 1 if they are adjacent in the (rotatable) set as described in condition 3, and if they also conform to conditions 1 and 2
- only OICs <5 4 4> and <6 1 2 > fully conform

CONFORMING OICs

Given these four conditions, I establish ten prime OICs, listed from the largest interval to the smallest (see Fig. 3.17 below). These correspond to the first ten of eleven three-digit components listed in the lower box of sketch J2. The last one listed, OIC <3 2 4>, breaks condition 2 since it does not incorporate an ic 1 (despite the sum of its three ics being 9), and hence does not conform (nor is it used). Various permutations of these OICs are also possible, and are further explored on the next page.

Figure 3.17 – Ten prime OICs

1. <6 5 2>
2. <6 4 3>
3. <6 3 2>
4. <6 3 1>
5. <6 2 1>
6. <5 4 4>
7. <5 4 2>
8. <5 4 1>
9. <5 2 1>
10. <4 3 1>

NON-CONFORMING OICs

Besides OIC <3 4 2>, two other OICs do not conform to the above four conditions:

1. <5 3 2> breaks condition 2, for since the sum of its ics is 10, it needs an ic 1. Used as rotated OIC <3 2 5> for chord 16.

2. <5 3 1> breaks condition 3, as neither adjacent pair of ics results in an ic 1. Used as rotated OIC <5 1 3> for chord 21.

PERMUTATIONS OF OICs

Most prime OICs have six permutations, except for prime OIC 6 which has only two. No clear system of selection is apparent, and rather reflects intuitive choices instead. Here below is a table of all ten primes and their permutations, with the ones Vivier uses for the *jeu de timbres* indicated by **boldface type and underlining**.

Table 3.2 – Permutations of prime OICs

Prime OIC 1: <6 5 2> 6 2 5 5 6 2 **5 2 6** **2 6 5** 2 5 6	*Prime OIC 6:* <5 4 4> 4 5 4 **4 4 5**
Prime OIC 2: <6 4 3> 6 3 4 4 6 3 **4 3 6** 3 6 4 **3 4 6**	*Prime OIC 7:* <**5 4 2**> 5 2 4 **4 5 2** 4 2 5 2 5 4 2 4 5
Prime OIC 3: <6 3 2> 6 2 3 3 6 2 **3 2 6** 2 6 3 **2 3 6**	*Prime OIC 8:* <5 4 1> 5 1 4 4 5 1 **4 1 5** 1 5 4 **1 4 5**
Prime OIC 4: <**6 3 1**> 6 1 3 3 6 1 3 1 6 **1 6 3** **1 3 6**	*Prime OIC 9:* <5 2 1> **5 1 2** 2 5 1 **2 1 5** 1 5 2 1 2 5
Prime OIC 5: <6 2 1> **6 1 2** 2 6 1 2 1 6 1 6 2 1 2 6	*Prime OIC 10:* <4 3 1> 4 1 3 **3 4 1** **3 1 4** 1 4 3 1 3 4

Vivier uses only two permutations for seven prime OICs (1, 2, 3, 7, 8, 9, 10), three permutations for prime OIC 4, and one for prime OICs 5 and 6. With the addition of the two non-conforming OICs, the grand total of OICs employed is 21. Each OIC forms the basis of one of the 21 seven-note sonorities, but not in the order of the OIC chart above, nor in the top-to-bottom order as indicated in the lower portion of sketch J2. Rather, other considerations determine the ordering of OICs in the music, among which are concerns for symmetrical design and the formation of all-interval-class aggregates.

What is striking about the ten prime OICs is their near-perfect chiastic symmetry. Specifically, the first prime OIC complements the tenth, i.e. <6 5 2> and <4 3 1> form an all-interval aggregate. Similarly the second prime OIC complements the ninth and so on. Only the middle two primes, OICs 5 and 6, do not form a perfect all-interval aggregate, and coincidentally, admits only one distinct rotation, unlike the other OICs. Moreover, the four complementary pairings (prime OICs 1 and 10, 2 and 9, 3 and 8, and 4 and 7) are employed side-by-side in the twenty-one chords as ordered in the music. See Figure 3.18 below.

Figure 3.18 – Prime OICs and apparent symmetries

Prime OICs 1 and 10 (<6 5 2> and <4 3 1>)

USED FOR: chords 10 and 9, but rotated as OIC <5 2 6> and OIC <3 4 1>
chords 13 and 14, but rotated as OIC <2 6 5> and OIC <3 1 4>

Prime OICs 2 and 9 (<6 4 3> and <5 2 1>)

USED FOR: chords 11 and 12, but rotated as OIC <4 3 6> and OIC <2 1 5>
chords 19 and 20, but rotated as OIC <3 4 6> and OIC <5 1 2>

Prime OICs 3 and 8 (<6 3 2> and <5 4 1>)

USED FOR: chords 4 and 3, but rotated as OIC <3 2 6> and OIC <4 1 5>
chords 5 and 6, but rotated as OIC <2 3 6> and OIC <1 4 5>

Prime OICs 4 and 7 (<6 3 1> and <5 4 2>)

USED FOR: chords 2 and 1, *exact* same OIC 4 and OIC 7 (i.e., these two are *not* rotated)
chords 8 and 7, but rotated as OIC <4 5 2> and OIC <1 6 3>

Chapter 4: Melody, form, and chord-colours in *Orion*

Background

Completed on 10 October 1979, *Orion* was premiered just four days later by the Orchestre Symphonique de Montréal under Charles Dutoit. Vivier's enigmatic programme notes describe the work as being in six sections, and offer a peculiar explanation of its repetitious nature: "*Éternel retour, comme dans l'histoire avec un grand H, qui attend toujours avec impatience le retour de ses saints rédempteurs et de ses dictateurs.*"[1] Since the six sections are neither named in the score nor correlated by the composer, I outline their dimensions below (the translated subtitles are duplicated from Vivier's program notes).

Section one: "statement of the melody," mm. 1–11

Section two: "first development of the melody," mm. 12–56

Section three: "second development of the melody," mm. 57–114

Section four: "meditation on the melody," mm. 115–135

Section five: "memories of the melody," mm. 136–168

Section six: "melody based on two intervals," mm. 169–182

Vivier's texts for earlier works typically express a poetic and mystical view of the cosmos, and frequently invoke numerology.[2] Intriguingly, his notes for *Orion*, as published

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[1]"Eternal recurrence, like history with a capital H, always impatiently awaiting the return of its hallowed redeemer and of its dictators."Claude Vivier, *Orion* (Québec: Les Éditions Doberman-Yppan, 1990), 1.

[2]For example, "Conversation" from *Nanti Malam* (ballet and voices, 1977): "In a dream I saw 7 wise men –they had a very important discussion./ Sometimes they would stop talking, sometimes they spoke together/ Sometimes some of them would sing strange melodies/Sometimes they would suddenly sing melodies altogether/In the middle of a very tense conversation they would freeze their voices on a chord./I think there were some earthlings among them but I think most came from other realms./I guess they spoke about problems of celestial mechanism of music./I felt alone." Claude Vivier, *Circuit* (1991) 2: 2–1, 88–89. From *Journal* (1977): "The Merlins from all dimensions of the Universe gaze at you and love you. Your eyes are

by Doberman-Yppan, do not refer directly to the constellation, but instead describe the eponymous nebula, one of the few visible to the naked eye: "Beauty, pure beauty, sorrowful beauty, cosmetic, lacquered beauty or wild, monstrous and sexual beauty." Vivier's interests in the cosmos and numerology result in various suggestive correlates between astronomical data and musical choices.

Pertinent aspects of each of the six sections of *Orion* will be examined: melody, harmony, texture, and durations. Extra-musical considerations are incorporated, in regards to the Orion constellation and nebula. Above all, the role and application of *jeux de timbres* will highlight my analysis, particularly in relation to the creation of the *couleurs*.

4.1 *"The statement of the melody"*

The Orion constellation serves as a multiple source of several correlates: its total number of seven principal stars; its three-in-a-row star formation comprising Orion's "belt;" its mirror-symmetry along the "belt" as an axis point (i.e., top to bottom), with two stars on top (Orion's arms), and two below (his legs); and its lateral symmetry (i.e., right to left), with the central star of Orion's "belt" as a pivot on a vertical axis. The Orion nebula, located just below the "belt," also serves as a source of correlates: its classification as Messier number 42;[3] and its central four-starred configuration (the "Trapezium").

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no longer eyes but starry openings upon fabulous constellations. Your ears perceive the subtle vibrations of the bodies, celestial temporal planes grow within you .The seven fundamental stars shall guide you towards, Eternal, eternal, contemplation, contemplation. Come, let's go!" *ibid.*, 87. Finally, in his opera *Kopernikus* (1979), the unnamed baritone cries to the central character, Agni: "*Tu entendras la musique d'Orion et les harmonies mystiques des Sept Sages les habitants du troisième cercle forgent des mélodies si pures que les anges pleurent!*" *ibid.*, 106.

[3]Charles Messier, a famous 18th century French astronomer, catalogued over two hundred nebulae.

The seven main stars of the constellation presumably determined the choice of a seven-measure melody (less measures of rests).[4] The overall design of the seven stars—two lower stars, three-in-a-row middle stars, two upper stars—suggests the first phrase (i.e., Motives 1 and 2 combined), with F4 and G4 as the lower "stars," the thrice repeated C♯5s as the three-in-a-row middle "stars," and the E♭5 and D5 as the upper "stars." This correspondence is admittably approximate, as the upper notes are far closer to the thrice-repeated C♯5's than the lower ones.

The mirror and lateral symmetry of the opening melody is evident visually in the two-page layout of motives and rest periods in the completed score. (See Fig. 4.1 over the next two pages.) The overall duration of the two-page melody is 60 quarter-note beats, each page containing 30 quarter-note beats.[5] The total duration of the four motives, without the rests, is 30 beats, also the total duration of the rests. The motives and intervening rests are elegantly balanced between both pages. Specifically, the opening 11-beat rest is followed by the six-beat Motive 1 on page one, counterbalanced by the six-beat rest and 11-beat Motive 3 at the top of the next page. The subsequent eight-beat rest and five-beat Motive 2 are in turn counterbalanced by the five-beat rest and eight-beat Motive 4 at the bottom of the next page.[6] Finally, the supporting harmony, fully realised in measure nine (i.e., one measure before the last motive), consists of an inverted Lydian harmony plus D3 (the initial note of the melody inverted at level T_7I, used in the subsequent section). In other words, the first basic Lydian harmony as listed in his sketches, (i.e., <F4, B♭4, D5, E5> at T_0) is inverted along F4, resulting in <F4, C4, A♭3, F♯3>.

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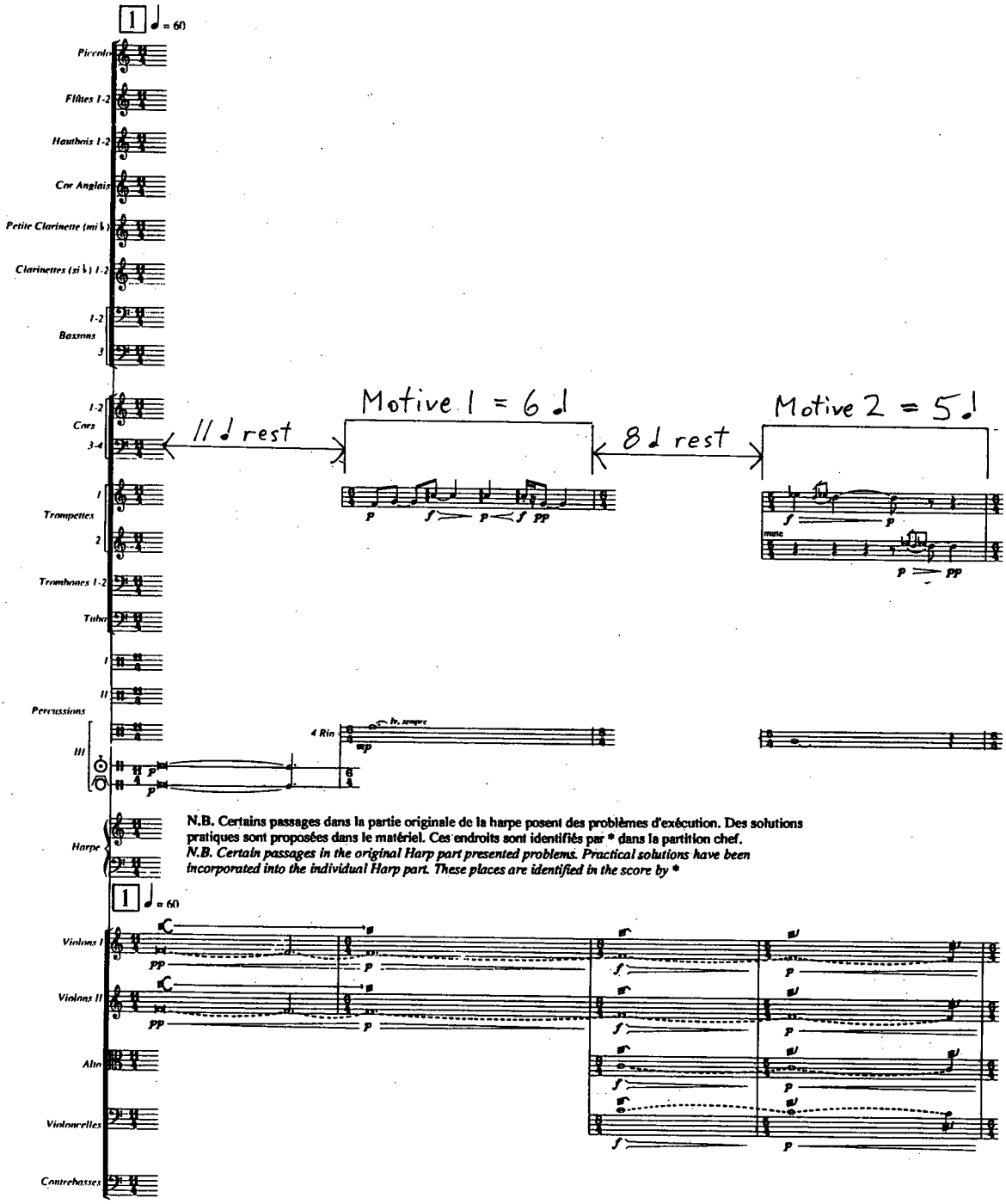
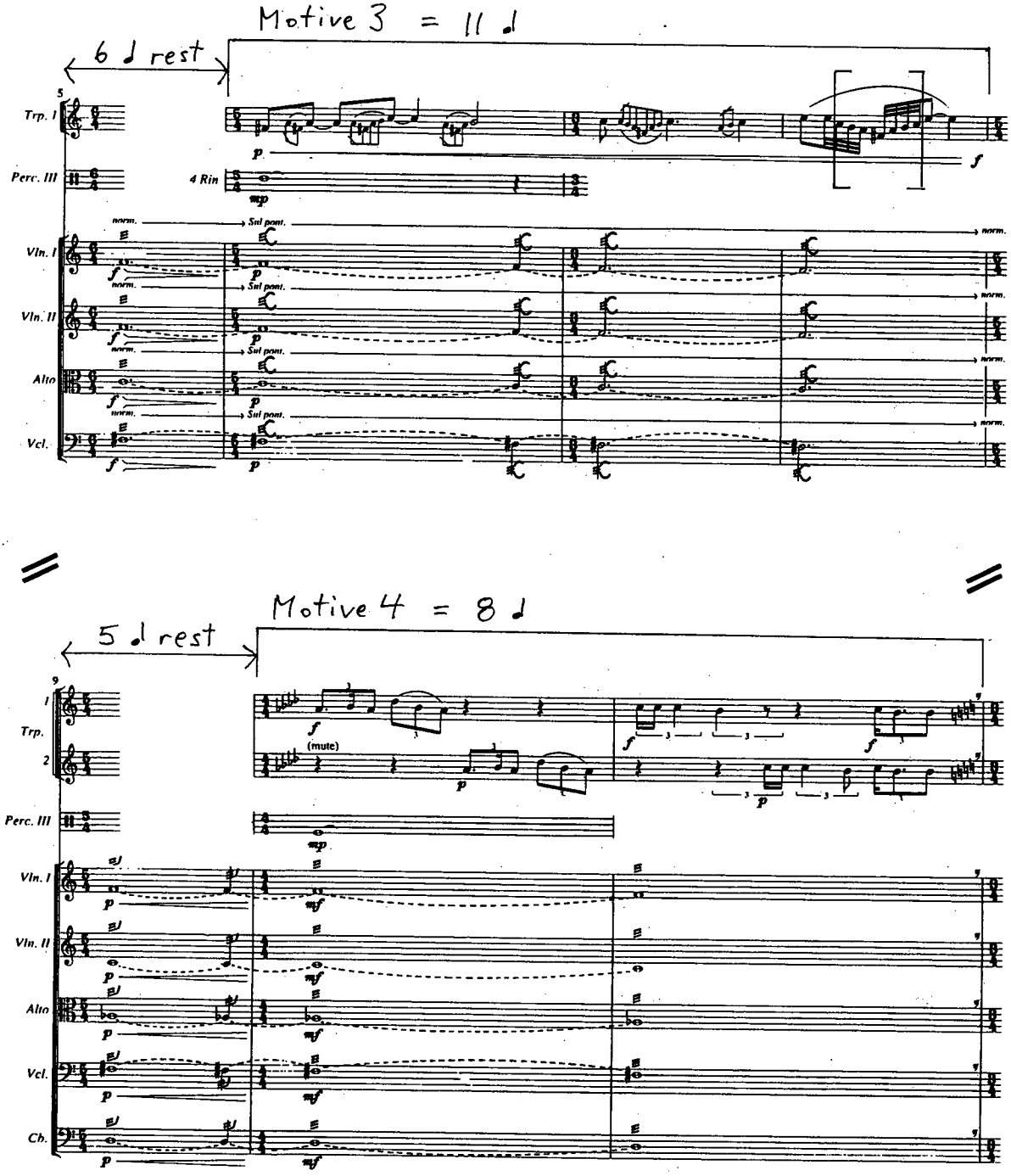
[4]The number seven has significance in other Vivier works: the number of performers of *Nanti Malam* (seven dancers, seven singers) and *Kopernikus* (seven instrumentalists, seven singers).

[5]However, the motives appear unevenly matched from page to page, as the first two motives are stated in a single system on the first page, while Motives 3 and 4 are on separate systems on the second page.

[6]The durations of motives and rest periods were planned along with the construction of the melody itself. See the discussion of sketch M3 in the previous chapter.

Figure 4.1 – Principal melody of *Orion*, mm. 1–11



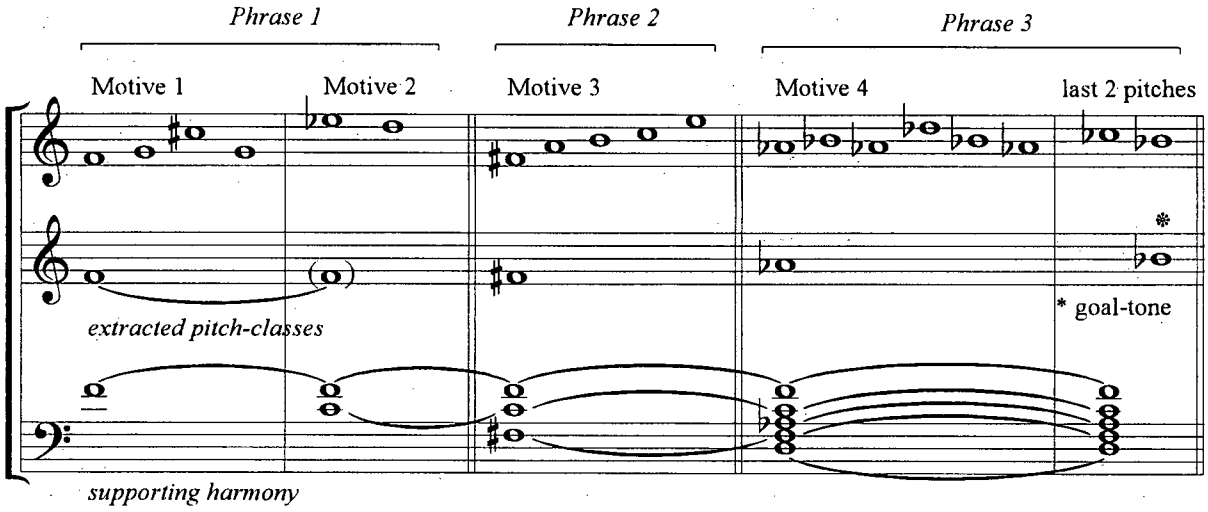

Motive 3 = 11 ♩
6 ♩ rest
5
Trp. I
Perc. III
4 Rin
Vln. I
Vln. II
Alto
Vcl.
norm.
Sul pont.
Motive 4 = 8 ♩
5 ♩ rest
9
1
Trp.
2
(mute)
Perc. III
Vln. I
Vln. II
Alto
Vcl.
Cb.

The number three, suggested by the three-in-a-row star formation (i.e. Orion's "belt"), is important in several ways in the opening melody. I have already shown how the four motives constitute three larger phrases (Motives 1 + 2 = first phrase, Motive 3 = second phrase, Motive 4 = third phrase), which express a 3:1 ratio on a broader level (phrases to melody); and how their contour patterns leading to the goal tone B♭4 involve three directed melodic elements (see Chapter Two, pp. 37–39). The number three is also reflected in the fact that the harmony that accumulates in the lower strings, below successive phrases of the melody (see Fig. 4.2 on the next page), extracts three pitches from that melody as part of its content. In the first phrase, the supporting harmony begins with a single pitch, F4, which is also the first pitch of the opening melody. After motive 1 is stated, the supporting harmony adds a lower C4 (i.e., a perfect fourth below) one measure before Motive 2. The supporting harmony of the second phrase (i.e., Motive 3) adds F♯3 to the existing perfect fourth, which creates a new, three-pitched harmony spanning a major seventh interval. This F♯3 doubles the opening F♯4 of Motive 3, which loosely outlines a half-diminished seventh harmony, <F♯4, A4, C4, E5>. Interestingly, the total melodic span of the first two phrases combined (F4 of the first phrase to E4 of the second phrase) matches that of the sustaining harmony at this point, also a major seventh, but in inversion (from initial F4 down to F♯3).

The final motive (i.e., the third phrase) begins by adding pitches A♭3 and D3 to the supporting harmony, creating a five-note sonority. Melodically similar to the second phrase, Motive 4 begins with a pitch an octave above the A♭3 in the sustained harmony. However the entire melodic range of this motive narrows considerably to a perfect fourth, from A♭4 to D♭5, loosely reflected by the sustained pair of supporting pitches, D3 and A♭3. A♭4 is

clearly the focal pitch-class of the third phrase.[7] The lowest note, D3, has little impact on the melody at this point, but instead begins a transposed version of the melody used for the next section. Significantly, then, the accumulating chord in the strings extracts three prominent pitch-classes from the three successive phrases—F4, F♯4, A♭4—perhaps suggesting a movement towards the goal-tone of B♭4, the final pitch of the principal melody.

Figure 4.2 – Three extracted pitch-classes and supporting harmony



A pattern of thrice-repeated pitches is evident in each of the three phrases, referring again to Orion's three-starred "belt." The durations of the notes of these patterns consistently express a rhythmic proportion of 1:2:3 in various orders, as follows:

Table 4.1 – 1:2:3 in the thrice-repeated pitches of each phrase

First phrase	Motive 1, m. 2	3x C♯5	3:2:1
Second phrase	Motive 3, m. 7	3x C5	1:3:2
Third phrase	Motive 4, m. 11	3x C♭5	1:2:3 (loosely)

[7]An invented key signature of four flats is used for Motive 4. It indicates the four flats used for the tetrachord of Motive 4 (i.e., A♭4 to D♭5).

The same 1:2:3 proportion organises the rhythms of other three-note segments of the melody in one of three ways, as demonstrated in Chapter Two (see Table 2.3, p. 58).

The total numbers of melodic pitches and motives in the opening melody are influenced by correlates of the Orion nebula. For instance, the 21 basic melodic pitches are represented in the finished score by 42 notes (less the grace-notes of Motives 2 and 3, and extra 32nd-notes of Motive 3, m. 8), and relate to the classification number of the nebula. As well, the central four-starred configuration of the nebula (the "Trapezium") suggests the four constituent motives of the melody. Since the basic melody repeats for the five subsequent sections, I interpret the associated motives as the musical nebula (read: central source) for *Orion*.

In the following sections, I will concentrate on salient musical properties, especially instrumental contexts and complex quasi-timbral effects which produce full-fledged timbral entities to create Vivier's ultimate musical goal: chord-colours or *couleurs*.

4.2 *"The first development of the melody"*

The brief outline on the next few pages describes the four subdivisions of the second section. A more detailed discussion of these subdivisions follows.

- Subdivision 1: development of Motive 1

  Based on the first three notes of Motive 1 (F4, G4, C♯5), this subdivision has three successive two-part canons. The three melodic pitches are harmonised with *jeu de timbres* elements one to three. The duration of the subdivision is 56 quarters (51 at MM = 60, and 6 at *presto possible*), which roughly corresponds to the duration of 50 as indicated in sketches S2 and S3.

- Subdivision 2: development of Motive 2

  This subdivision is based on the last three notes of Motive 1 <C♯5, C♯5, G4> and the two melodic pitches of Motive 2 <E♭5, D5>. The two motivic cells are pitted one against the other in the form of a musical echo, and their respective pitches are harmonised by the *jeu de timbres*, chords 4–6 (for Motive 1) and 7–8 (for Motive 2). The last measure of this subdivision (m. 31) introduces the *grand tutti* for the double basses and lower brass, and uses the two intervals as indicated on sketch S3. The duration of this subdivision is 21 quarters, which represents the remainder of the originally sketched duration of 40 shown on sketches S2 and S3, once 19 quarters are removed (see Chapter Three, p. 76).[8]

- Subdivision 3: development of Motive 3

  This subdivision closely follows the four layers as indicated in sketch S3. The topmost layer has a phase-difference (*un déphasage*)[9] for upper winds; the second layer presents the basic Motive 3 in the solo trumpet; the third layer restates the entire melody in muted strings (*la mélodie en accord intégrale*); and the fourth layer states the *grand tutti* intervals (derived from Motive 2, first introduced in m. 31). Its total duration is 30 quarters, which matches the plan in S3.

- Subdivision 4: development of Motive 4

  While the musical layers remain largely the same, this subdivision introduces a new accompanying texture of harps and secondary winds in triplet figures. Also, this subdivision adopts the same four-flatted invented key signature as Motive 4 of the opening melody. Measures 40–42 do not introduce any important motives, and thus act as a seven quarter-beat episode. The duration of the remaining music matches that of the originally sketched 49, or 20 + 10 + 19 'silences.' The winds, however, do not engage in a *déphasage*, but restate the principal melody harmonised by the double Lydian harmony as described in the last chapter.

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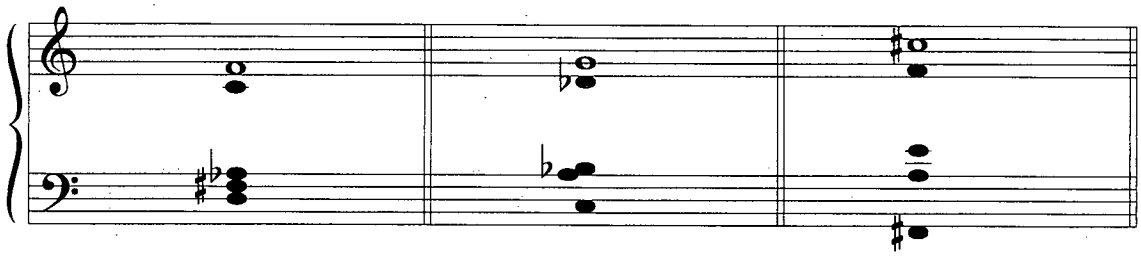
[8]The 19 'silences' are then placed into the final subdivision of this section to yield a total of 49 quarters (20 + 10 + 19 'silences). Compare with sketch S3, which breaks down the music of the first two sections of score into five subdivisions (one for "the presentation of the melody" and the next four for this section).

[9]I understand *un déphasage* as a canon-like texture (phase difference) where the distance between the participating parts is not always consistent, and their pitches may be approximated from one part to another.

4.2.1 – Subdivision 1, mm. 12–26, rehearsal 2 to 4

This subdivision contains three five-note harmonies, based on the first three harmonies of the *jeu de timbres*. These are built on the notes of Motive 1 <F4, G4, C♯5> as centre pitches. This motive is presented in untransposed form throughout this subdivision. The chords employ only the bottom portion of the harmonies, that is, the central melodic pitch and the three harmonic pitches added below (see Fig. 4.3 below). Additionally, a fifth, lower part is added, the pitches of which are derived from the principal melody inverted at a transposition level of 7 (i.e., T_7I). The extra lower pitches for these harmonies are, respectively, <D3, C3, F♯2>.

Figure 4.3 – Three five-note sonorities for canons, mm. 12–23

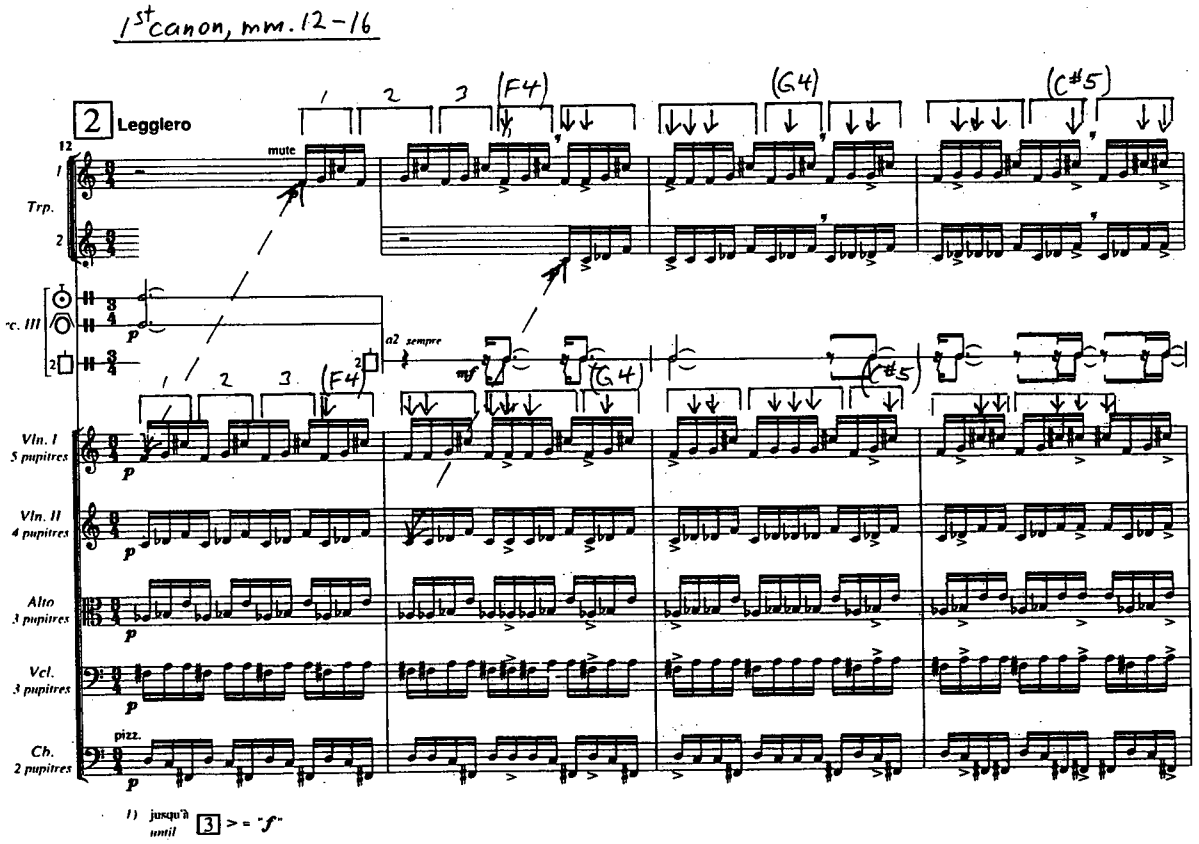


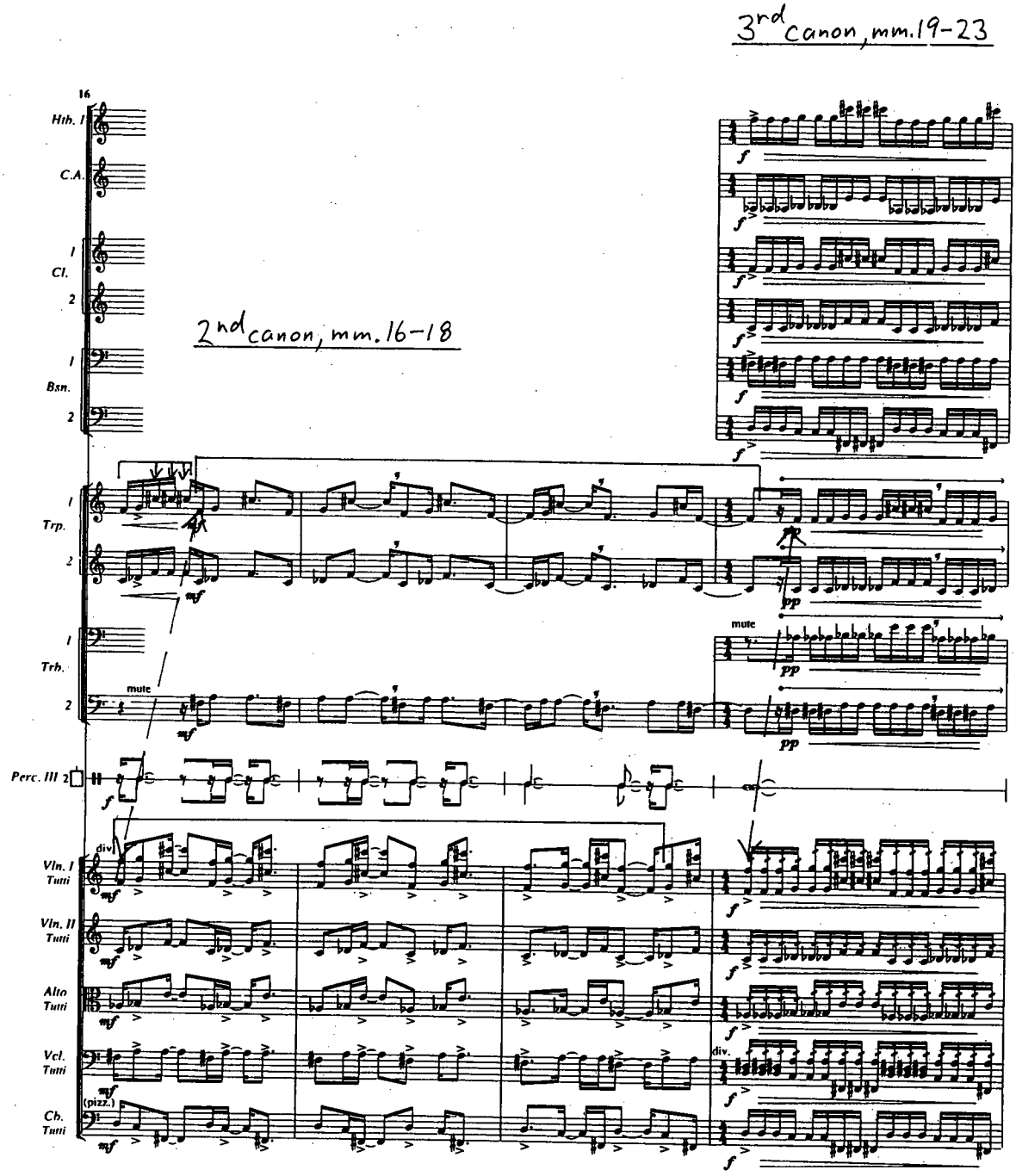
Three two-part canons occur in this subdivision, beginning with one at rehearsal 2 (m. 12) between the two trumpets (with their own independent parts) and the strings (which play *tutti*). See Figure 4.4 over the next two pages. Noteworthy is the rhythmic intensification across the three canons. In the first, there is a temporal distance of **eight** 16th-notes between the strings, which function as the *dux*, and the first trumpet, the *comes*. This canon unfolds in mm. 12–15. A second canon presents the same two groups of instruments at a distance of **five** 16th-notes. Finally, a third canon completes this subdivision, from mm. 19–23, with the same two parts now at a distance of just **three** 16th-notes.[10] While the strings implement the three accompanying five-note harmonies throughout this subdivision, the brasses successively add lower pitches of the *jeu de timbres* chords, completing only four-note harmonies (i.e.,

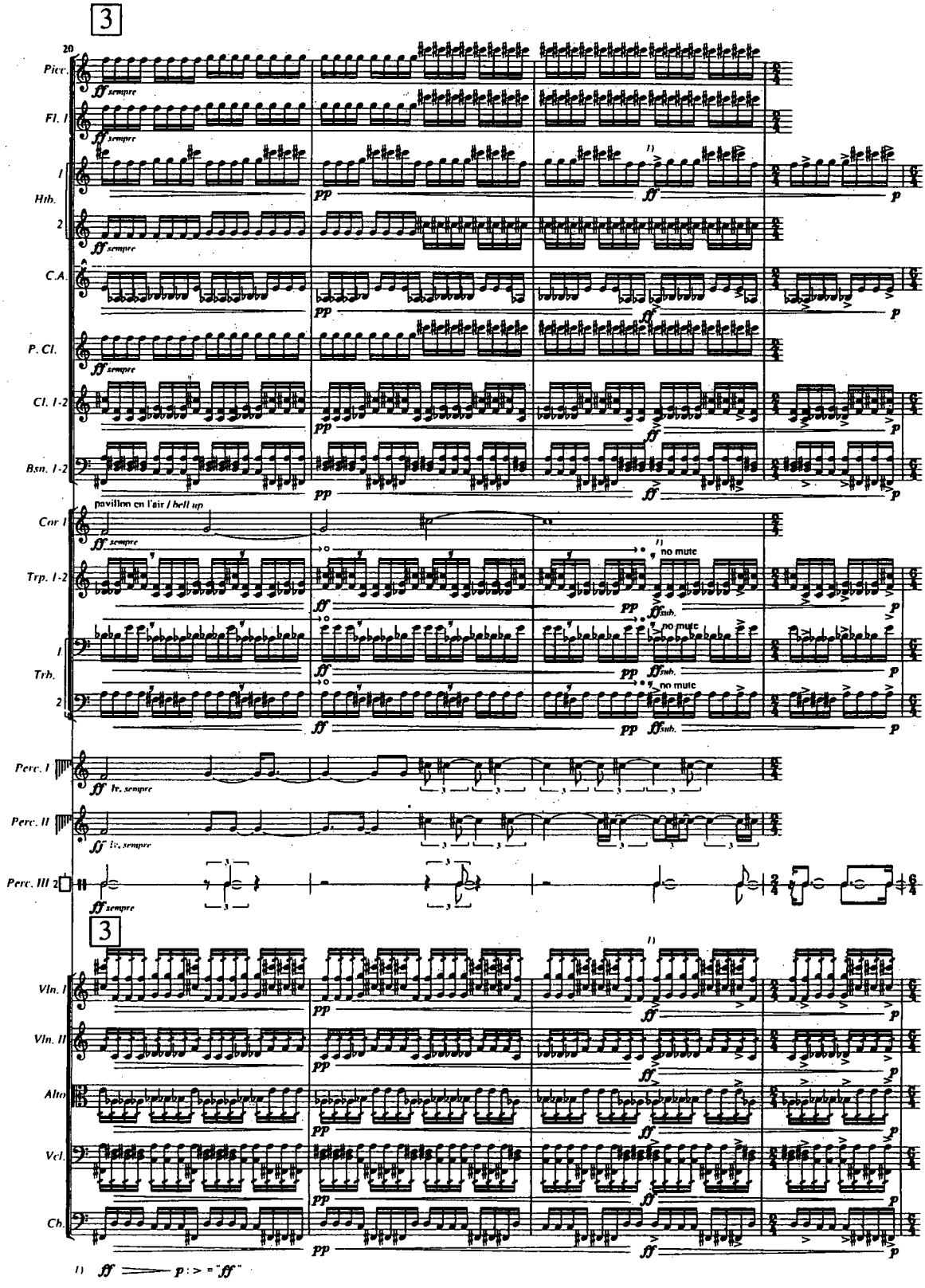
[10]Note the attention to the Fibonacci series, indicated by the boldface type, i.e., 8, 5, and 3.

without the lowest pitches as derived from the basic melody at T_7I). Specifically, the first trumpet states the uppermost note of the three harmonies, thus beginning the first canon. The second trumpet follows exactly one measure later, adding the next lowest pitch for each of these three harmonies. Then, the second trombone adds the lowest pitch of each four-note harmony, beginning at the fifth 16th-note of measure 16. Lastly, the first trombone completes the tetrachords with its lowest pitches, starting at the third 16th-note of measure 19.

Figure 4.4 – Score of mm. 12–23




3rd canon, mm.19-23
2nd canon, mm.16-18
16
Hth. I
C.A.
1
Cl.
2
1
Bsn.
2
1
Trp.
2
1
Trb.
2
mute
Perc. III 2
Vln. I
Tutti
Vln. II
Tutti
Alto
Tutti
Vcl.
Tutti
Cb.
Tutti
(pizz.)
div.
mute

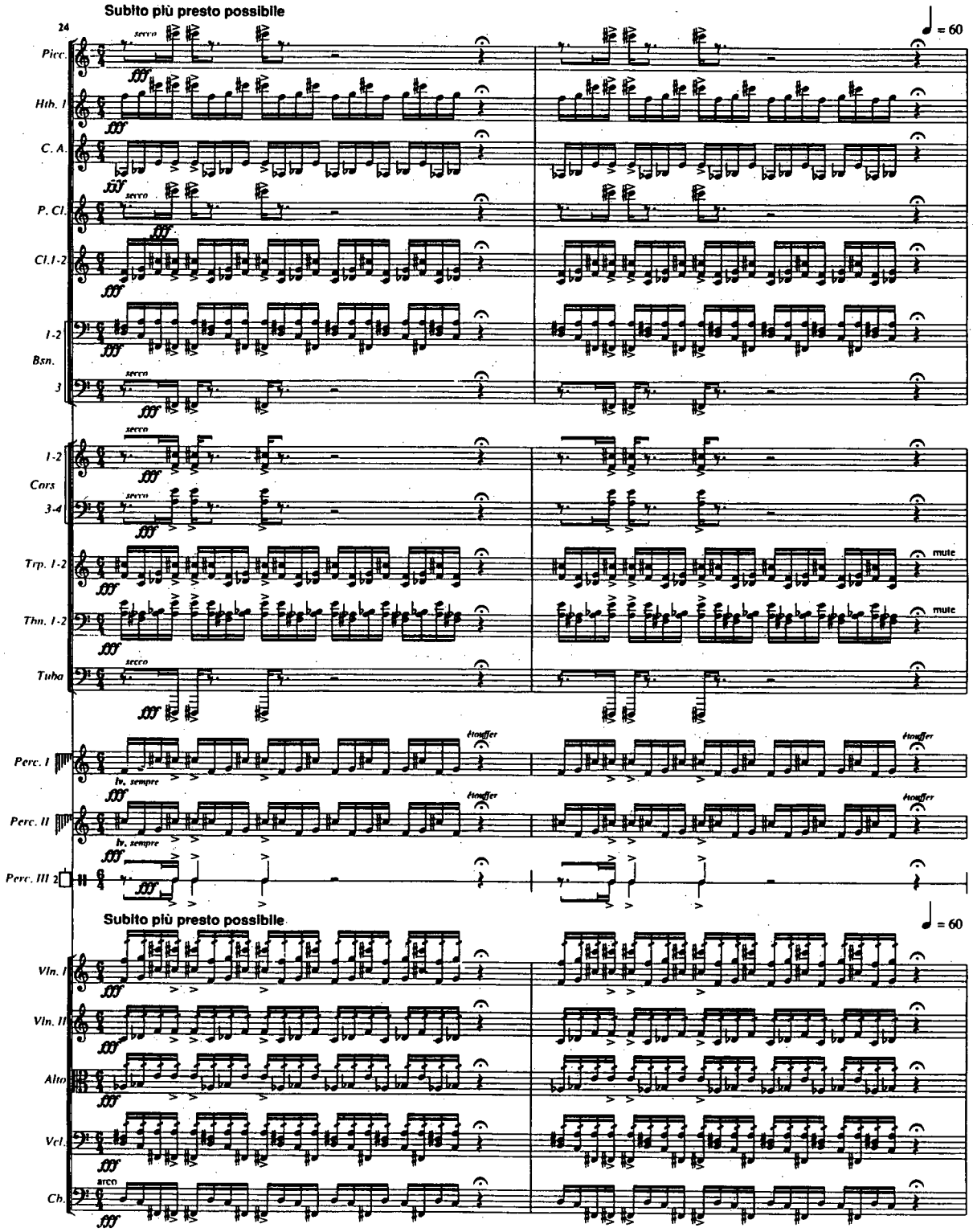

3
Picc.
Fl. 1
Htb.
C.A.
P. Cl.
Cl. 1-2
Bsn. 1-2
pavillon en l'air / bell up
Cor 1
Trp. 1-2
no mute
Trb.
Perc. I
Perc. II
Perc. III
Vln. I
Vln. II
Alto
Vcl.
Cb.
1) ff p : > = "ff"

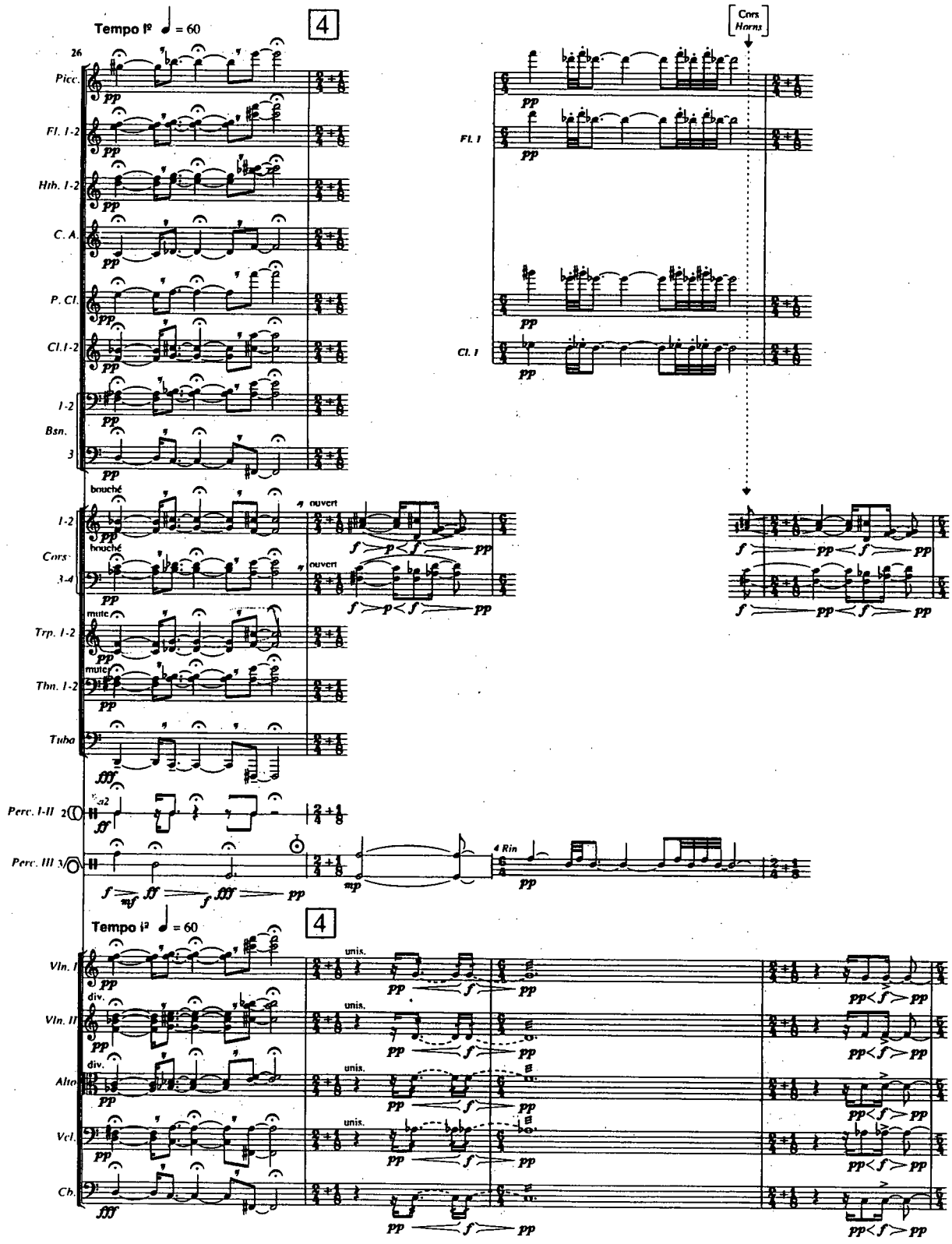
Wind instruments are used to double the string parts at measure 19, the beginning of the last canon. As a result the orchestration is far more dense for the third canon, pitting the combined group of strings and winds against the brasses. Strikingly, dynamics are exchanged between these two large groups from measure to measure. For example, the strings and winds are *forte* and then *decrescendo* to *piano* in measure 19, whilst the brasses reverse these dynamics. In measure 20, the dynamics and *decrescendi* and *crescendi* are exchanged, and this alternation continues in subsequent measures. These dynamic effects, along with the two-part canon at a distance of just three 16th-notes apart, create a far more complicated texture than is found at the beginning of this section. In fact, Vivier suggests this plan in his sketch of the structure (cf. sketch S3, p. 72), where he writes this section should become *de plus en plus fourni* (more and more thick). Yet the music is based on relatively simple materials— the first three pitches of Motive 1—along with *jeu de timbres* harmonies 1 to 3 and inverted melody bass. At the end of the last canon, from mm. 20 to 23, additional instruments enter (piccolo, first flute, second oboe, piccolo clarinet, first horn). These state the three-note cell of Motive 1 in augmented form, with durations of half-notes, whole notes, and dotted whole notes. This group of instruments stands out because their durations are subdivided into repeated sixteenths. The repetitive sixteenths fit the 16th-note rhythmic pulse of the ongoing canon below. In the same measures, the percussion follow this particular three-note cell, but they slightly stagger their parts to suggest increased activity. Refer to Figure 4.4 above.

The two measures that follow the third canon (mm. 24–25) repeat the three harmonies for the entire orchestra at the loudest dynamic (*fff*), and with a suddenly faster tempo marking (*subito piu presto possibile*). Each of these two measures of 6/4 metre ends on a quarter-note rest *fermata* to heighten the tension. Up to and including these measures the total duration is 51 quarter-note beats, closely matching the intended 50 quarter-note duration of the original sketch.

Measure 26 finishes the entire subdivision. It is marked by a return to M.M. = 60, but is still in 6/4 metre. Here, the three chords are presented one last time in successively slightly longer durations (seven 16th-notes, nine 16th-notes, ten 16th-notes), complete with a *fermata*. The three tam-tams offset these durations by simply striking a quarter-note, half-note, and dotted-half note (1:2:3), each time successively louder. Oddly, the tuba, double basses, and percussion continue their *fff* dynamics, while the remaining instruments are marked *pianissimo*. Undoubtedly, the lower instruments are meant to play louder to emphasise the lowest pitches of these harmonies, the three melodic pitches at T_7I. Aside from one small instance in the next subdivision, this inverted melody is used nowhere else in the piece. Figure 4.5 presents the score of mm. 24–26 over the next two pages, as well as the first three measures of the subsequent second subdivision (Vivier's "*écho*"), mm. 27–29.

Figure 4.5 – Score of mm. 24–29




Tempo I
= 60
4
Cors
Horns
Picc.
Fl. 1-2
Hb. 1-2
C. A.
P. Cl.
Cl. 1-2
1-2
Bsn.
3
Fl. 1
Cl. 1
bouché
ouvert
Cors
3-4
mute
Trp. 1-2
Tbn. 1-2
Tuba
Perc. I-II
Perc. III
4 Rin
Tempo I
= 60
4
Vln. I
Vln. II
Alto
Vcl.
Cb.
div.
unis.

4.2.2 – Subdivision 2, mm. 27–31, rehearsal 4 to 5

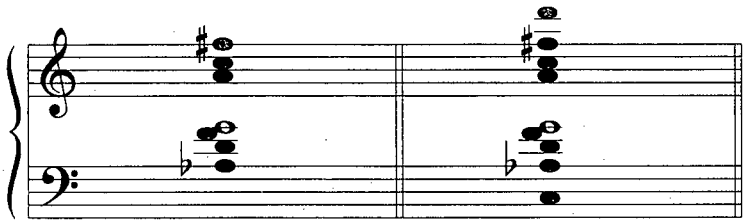
This subdivision contrasts with the previous and the subsequent ones by its comparatively sparser texture and shorter duration of 21 quarters (see Fig. 4.5 on the previous page, which shows the first three measures of this subdivision). Where the preceding subdivision focused on the first three-note cell of Motive 1, this one uses two different motivic cells: the second three-note cell of Motive 1 <C♯5, C♯5, G4>, and the two-note cell of Motive 2 <E♭5, D4>. Two groups of instruments state these cells in alternation: 1) horns, which state the second cell of Motive 1 along with strings, which only enter on the last pitch G4, and 2) the upper winds (flutes, piccolo, upper clarinets) and *Rin*, which repeatedly state the two-note Motive 2. The accompanying harmonies closely match those of the corresponding *jeu de timbres* harmonies 4 to 8, with a few slight differences. First, the horns state just the bottom four-note portion of harmonies 4 to 6, as in the previous section, with the first horn presenting the melodic centre pitches (m. 27 and m. 29). When strings enter on the 6th harmony, an added lower fifth pitch is incorporated, the double-bass C3, which again stems from the inverted form of the original melody.[11] The upper winds employ the top four-note portion of harmonies 7 and 8 (m. 28 and m. 30), while the lowest wind part, the first clarinet, states the two-note Motive 2 untransposed.

Two more events signify the end of this short subdivision. Following the last statement of Motive 2 in the winds in measure 30, the strings state harmony 6 on the last quarter-note beat, without horn doubling. Here also, the strings employ a much denser nine-note chord, consisting of the full seven-note harmony 6, the lower C3, (from inverted melody at T_7I) and,

[11]That is, the G4 of the original melody here inverts at T_7I as C3.

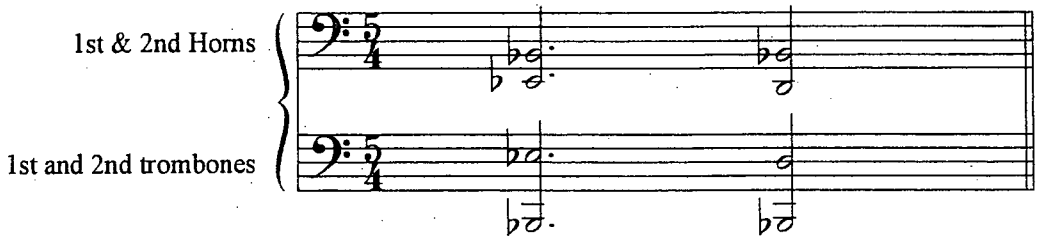
counterbalancing this pitch, an upper D5. Notably, both the C3 and D5 are both a minor sixth from the extremities of the original seven-note chord, which maintains the symmetry around the melodic pitch G4. See Figure 4.6 below.

Figure 4.6 – Chord 6 and the nine-note version at measure 30/5



The other event that signals the end of this subdivision, as Vivier's sketches indicate (cf. sketch S2, p. 69 and sketch S3, p. 72) is the *grand tutti* in measure 31. This is the two-interval gesture described in the previous chapter,[12] but here placed in a lower register. Oddly, the whole orchestra does not state these intervals, i.e., it is not an orchestral *tutti*. Instead, the *tutti* consists of only the horns, trombones, celli and double basses, which use gentle dynamics ranging from *piano* to *pianissimo* with slowly unfolding *cresc.* and *decresc.*. Furthermore, the two intervals, first stated in measure 31, continue throughout the next two subdivisions, from rehearsal 5 through 10, forming a 26-measure pedal. However, measure 31 sounds more as an ending because of the suddenly slow tempo marking, *tempo molto ritenuto*. See Figure 4.7 below, and the full score on page 130 (Fig. 4.9).

Figure 4.7 – *Grand tutti*, m. 31



[12]The *grand tutti* consists of two-intervals, E♭2-B♭2 to D2-B♭2, originally sketched three octaves higher.

4.2.3 – Subdivision 3, mm. 32–39, rehearsal 5 to 6

This subdivision has four independent layers of music:

1) The upper winds engage in canon at a distance of five 32nd-notes, based on five harmonies, 9 to 13. Also, the brass highlight key moments of the winds' canon with 16th-note 'accents,' based on the same harmonies.

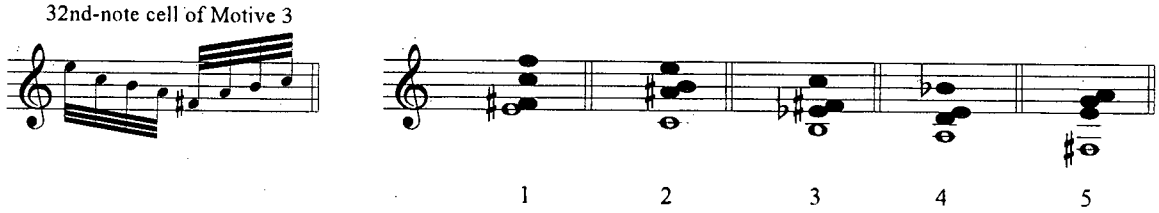
2) The solo trumpet states Motives 3 and 4, varying between open and closed mute positions.

3) The strings restate the melody harmonised by all 21 *jeu de timbres* harmonies

4) The double basses, and lower brass repeatedly restate the two-interval *grand tutti*, first stated in measure 31, throughout this subdivision.

This is perhaps the most complicated texture in the entire piece, an excellent example of what Vivier personally described as "counterpoint."[13] The four independent strata of music are indicated in his sketches S2 and S3. The first layer consists of a two-part canon (a *déphasage*) for two wind groups, while the brasses restate one of the *jeu de timbres* harmonies as a 16th-note accented chord every time the upper canonic voice returns to its uppermost pitch. The motive for the canon is based on the 32nd-note cell at the end of Motive 3, and is harmonised with three upper parts. Figure 4.8 below demonstrates this motive and resultant five harmonies below.

Figure 4.8 – Five tetrachords employed in layer 1



[13]In Vivier's interview with Susan Frykberg (see Chapter Six), he explains the horizontal element in his music as a kind of non-traditional counterpoint. He rationalises counterpoint as the art of combining two of three melodies with significant "coming together points" in a texture. I argue that in practice Vivier superimposes distinct layers of motivically defined material.

The chords used in the wind canon appear to be derived indirectly from the *jeu de timbres*. The ordered interval-classes (i.e., OICs) for each of the five different chords making up this motive match those of harmonies 9 to 13, in reverse order. Coincidentally, the second and fourth chords of the motive have pitches identical to those in the *jeu de timbres*; the others, however, invert an occasional interval.

Canon chord 1) OIC <2 6 5>, matches harmony 13
2) OIC <2 1 5>, matches harmony 12 (same pitches)
3) OIC <4 3 6>, matches harmony 11
4) OIC <5 2 6>, matches harmony 10 (same pitches)
5) OIC <3 4 1>, matches harmony 9

The two groups that create the two-part canon for this subdivision are:

Group I : Piccolo, first flute, first oboe, first clarinet, Percussion I

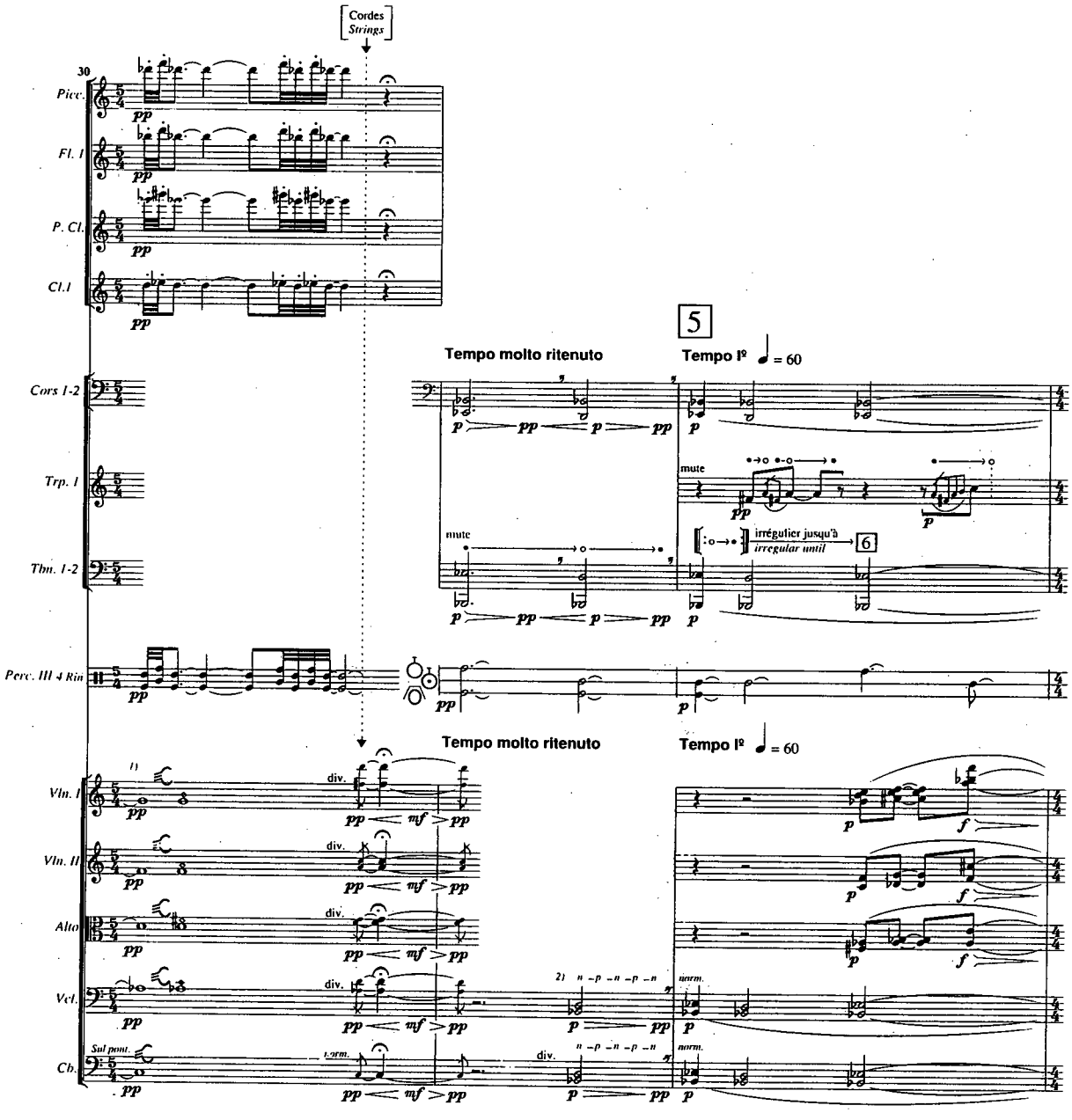
Group II: Second flute, E♭ clarinet, second oboe, second clarinet, Percussion II

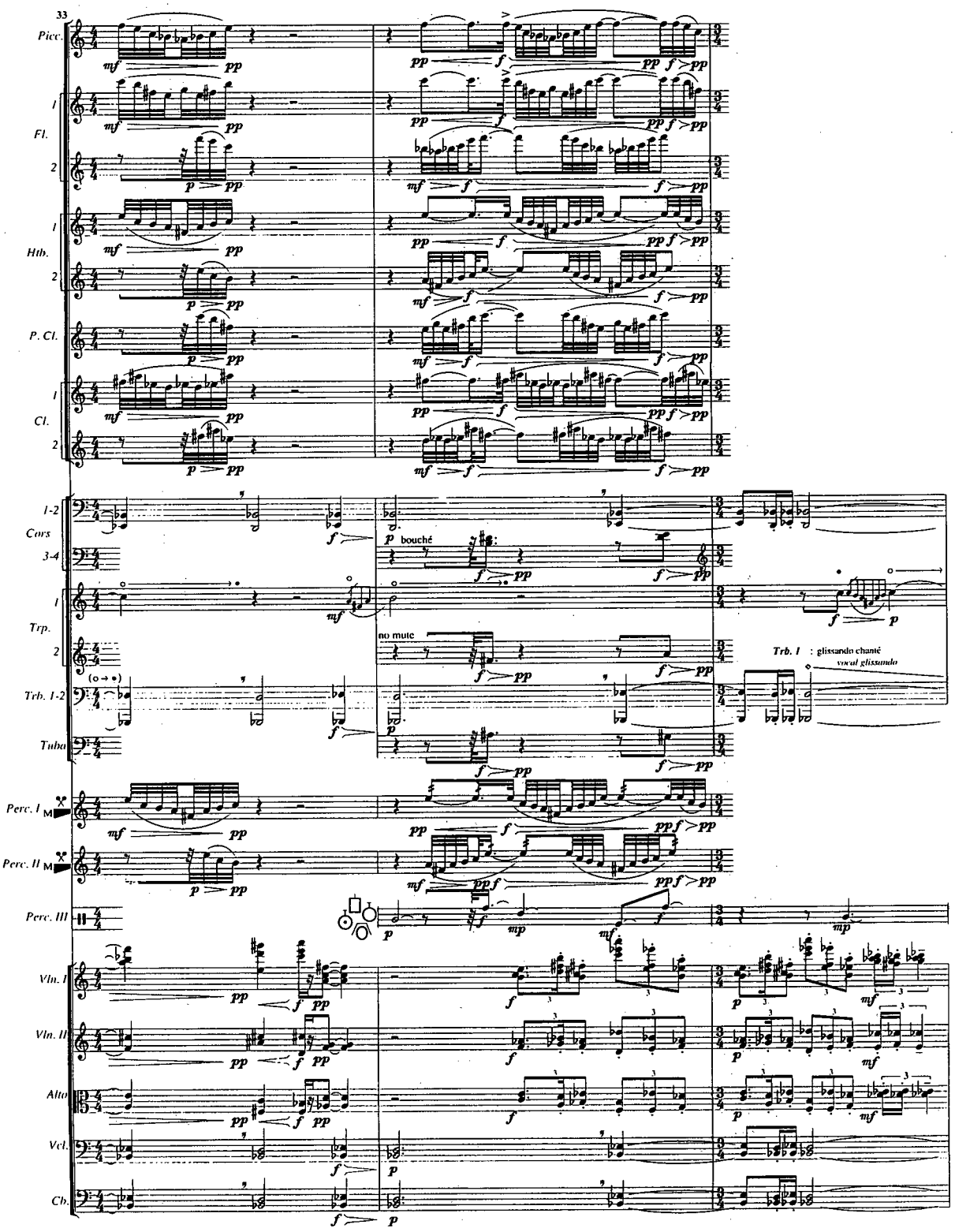
These two groups state the harmonised melody at a distance of five 32nd-notes. Each time the melodic high note is stated (the E4 and its chord) the length of this pitch reduces in 32nd-note decrements from seven 32nd-notes (measure 34) to one 32nd-note (see the last two 32nd-notes of measure 38); after which the high note increases in 32nd-note increments until the canon abruptly halts at measure 40 (rehearsal 6, the beginning of the next subdivision).

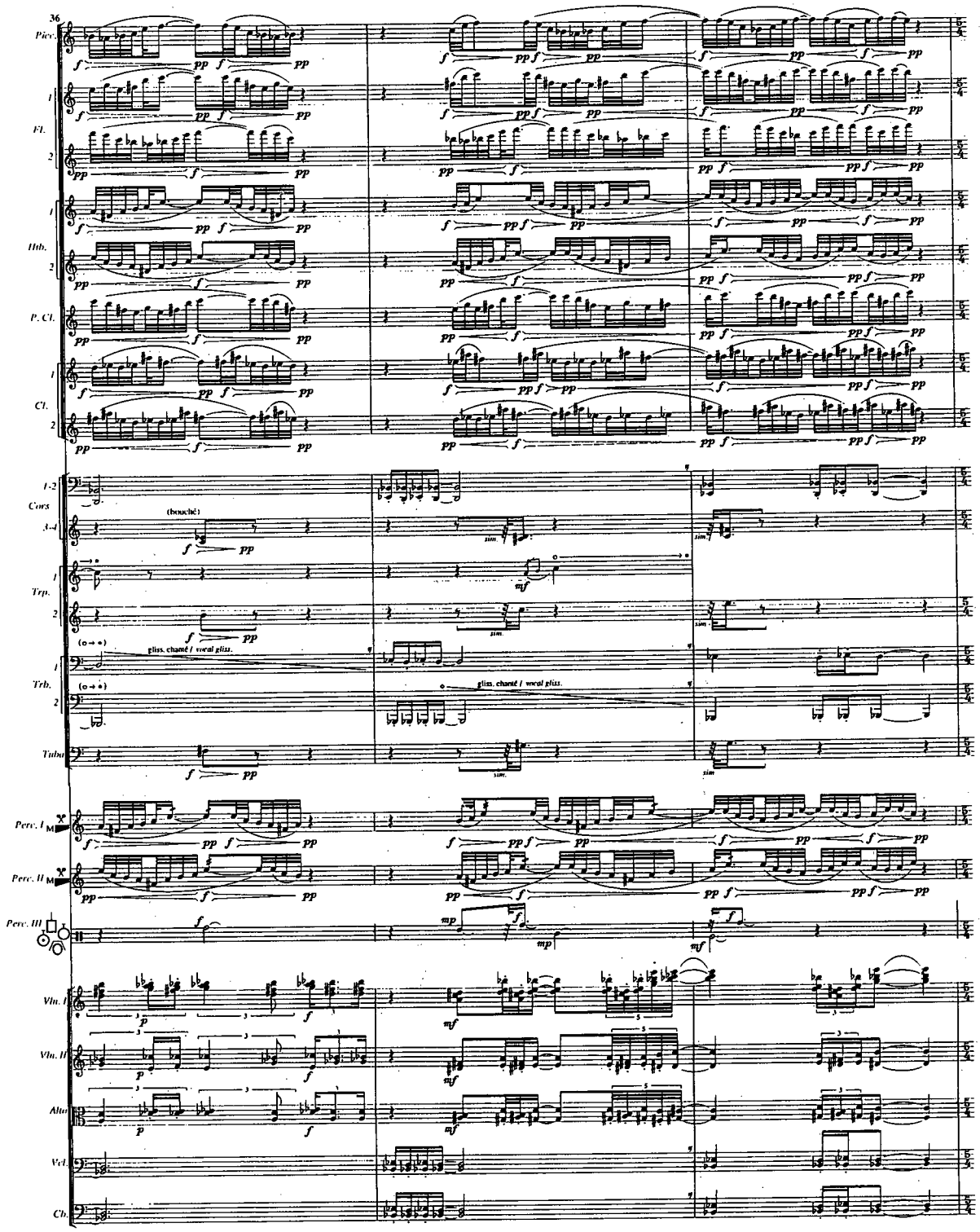
Each of the five times the second group states its highest chord in mm. 33–39, the brasses (3rd and 4th horns, 2nd trumpet, tuba) add, as punctuation, one of harmonies 9 through 13 in succession, in 16th-note durations. In measure 39 there is a marked increase in the frequency of the highest chord's appearance, and this results in an increased number of punctuating chords. This culminates with every 32nd-note being punctuated for the fifth and last quarter-note duration, using harmonies 13 through 9 and then back to 13. Lastly, the dynamics for the two canonic groups generally alternate loud to soft, but notably only the

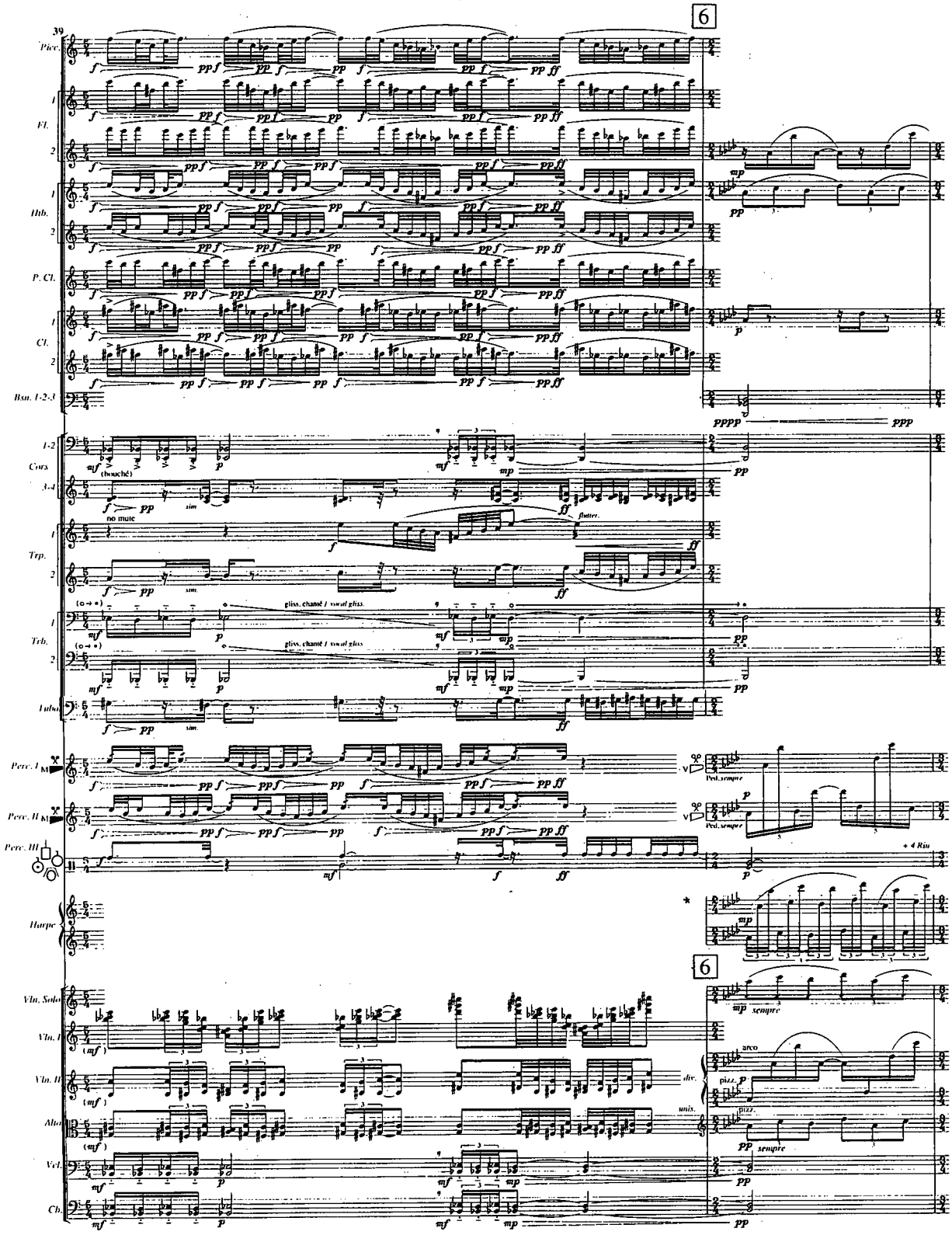
second group states its high pitches *forte* to match the punctuated brass chords. In the first group, the high pitches are *piano*. Figure 4.9 over the next four pages presents the score of the complete subdivision, and include the last two measures of the previous subdivision.

Figure 4.9 – Score of mm. 30–40




33
Picc.
Fl.
Hth.
P. Cl.
Cl.
Cors
Trp.
Trb. 1-2
Tuba
Perc. I
Perc. II
Perc. III
Vln. I
Vln. II
Alto
Vcl.
Cb.
bouché
no mute
Trb. 1 : glissando chanté
vocal glissando


36
Picc.
1
Fl.
2
1
Hbn.
2
P. Cl.
1
Cl.
2
1-2
Cors
3-4
1
Trp.
2
(bouché)
gliss. chanté / vocal gliss.
1
Trb.
2
(o → +)
Tuba
Perc. I
Perc. II
Perc. III
Vln. I
Vln. II
Vla.
Vcl.
Cb.


39
Picc.
Fl. 1
Fl. 2
Hbn. 1
Hbn. 2
P. Cl.
Cl. 1
Cl. 2
Bsn. 1-2-3
1-2
Cors
3-4
Trp. 1
Trp. 2
Trb. 1
Trb. 2
Tuba
Perc. I
Perc. II
Perc. III
Harpe
Vln. Solo
Vln. I
Vln. II
Alto
Vcl.
Cb.
6
6
(bouché)
no mute
flutter.
gliss. chanté / vocal gliss.
Ped. sempre
+ 4 Rin
sempre
arco
pizz.
div.
unis.

The second layer of subdivision 3 is a statement of Motive 3 for solo trumpet. This incorporates increasingly longer rests after each statement of a melodic pitch, or pair of pitches. The effect of employing closed and open mute distorts the melody, and veils its presence. In the final measure of this subdivision, measure 39, the last portion of Motive 3 is played without a mute, that is, the last three high E5s and the 32nd-note flourishes.

The third layer of this subdivision restates the constituent motives of the principal theme in the strings as follows:

Motive 1) mm. 32–33, original durations
Motive 2) *not stated*
Motive 4) mm. 34–36, original durations
Motive 3) mm. 37–39, stated in 2:1 diminution

As indicated, Motives 3 and 4 are in reverse order to that of the original melody. As well, while Motive 2 is absent in this layer, it is relegated to the lowest, fourth layer as part of the *grand tutti*. Returning to the third layer, all 21 harmonies of the *jeu de timbres* are utilised here, and each is stated together with its respective melodic pitch. The upper part in the *divisi* second violins restates the principal melody untransposed. The lower second violin part states the next lower pitch of each harmony, and the violas state the next two lowest pitches. As for the uppermost three pitches, the ones that mirror the lower ones along the melodic focal point (in the upper second violins), these are stated in the first violins played *divisi*. The dynamics for the third layer alternate from *piano* to either *mf* or *f* roughly every two quarter-notes until mm. 37–39, where *mf* is then maintained.

The lowest instruments form the fourth layer, the *grand tutti* described earlier. They employ a pedal for this subdivision, and for the next, as the pedal continues unabated until rehearsal 10. The four types of instruments—lower horns, trombones, celli, double basses—play in tandem throughout, with no canon or conflicting dynamics.[14] Only the trombones add a further timbral quality, as they are instructed to freely use open and closed mutes. The rhythmic durations of this layer do not appear to generate significant patterns, which generally consist of quarters, halves, and dotted halves, interspersed with two-, three-, or four-note sixteenth patterns. Interestingly, the sixteenths suggest morse code-like rhythms, as marked on sketch S3 (i.e., *bref genre code morse*, in the right margin).

Overall, the third division presents music of widely varying rhythmic durations, dynamics, and motives, all designed to obscure and enhance the restatement of Motive 3 of the principal melody in the solo trumpet. However, the presentation of Motive 3 appears to be a secondary component in context of the complex texture. In fact, the combined effect of the layers contributes to an important aesthetic property of the section—its transformation of chords into chord-colours. These vertical formations appear more as synthesised timbres than as stacked intervals and chords. This is achieved partly by restating the five harmonies associated with the five pitches of Motive 3, both as the *forte* punctuating brass chords, and to a lesser extent as the chords in the canonic winds, based on the OICs of these sonorities. Together, these strands present a blurred image of these five harmonies. Arguably, the chord-colours are also a product of Vivier's notion of counterpoint—the overlapping of simultaneous chord-layers—brilliantly achieved in this subdivision.

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[14]In fact, their overall dynamics are independent of the upper layers.

4.2.4 – Subdivision 4, mm. 40-56, rehearsal 6 to 10

This final subdivision of the second section presents Motive 4 in the solo trumpet, whose part has the invented 4-flat key signature associated with this motive in the opening melody. Before this motive is presented, the texture abruptly changes at measure 40, with most of the upper winds and brasses ceasing, except for those in the *grand tutti,* which continues unabated. Here, a new accompanying stratum is employed, scored for second flute, second oboe, solo violin and violas, along with new percussion instruments, the harp and the vibraphone, all of which employ the four notes of Motive 4 (A♭, B♭, C♭, D♭). These instruments are grouped together, each given its own rhythmic figures, which results in a complex polyrhythmic texture.[15]

Motive 4 for solo trumpet is presented in a series of shorter cells, similar to those of the solo trumpet melody in the last subdivision. Here too, the various cells are interspersed with increasingly long rest periods. Figure 4.10 below summarises the total durations of the rest periods (indicated by R) and motives (indicated by M) in quarter-note increments, starting at measure 40.

Figure 4.10 – Durations of rest periods and motives

3R 2M 4R 2M 5R 2M 7.5R 2M 13R 1M

[15]Specifically, the second oboe, solo violin and viola state eighth-note triplets, while the harp matches their notes with broken octaves in 16th-note triplets. Next, the vibraphones state interlocking quintuplet figures (5:1 quarter-note), and the second violin and second flute execute regular 16th-note figures (4:1 quarter-note).

The 21 harmonies of the *jeu de timbres* are not employed in this subdivision; only the first harmony, the Lydian tetrachord, is used. But the principal melody is restated, with its four motives, and each note forms the basis of a Lydian tetrachord. Two simultaneous groups apply two transpositions of the Lydian harmony, moving in parallel motion. Specifically, the celli and horns present the untransposed version harmonised with the Lydian chord; and the uppers winds and first violins present the transposed version (at level T_7), with the same harmony. See the chart below, showing where the motives occur (and compare with the complete score in Appendix 1, pp. 226–237):

Motive 1) mm. 43–44, beginning at rehearsal 7

Motive 2) mm. 47–48, beginning at rehearsal 8

Motive 3) mm. 50–53

Motive 4) mm. 54–57, beginning at rehearsal 9

These motivic statements usually occur during the rest periods for Motive 4 in the solo trumpet, except in mm. 43–44. There, Motive 1 returns, harmonised by the double Lydian harmony, but at the point the motive reaches its repetitive C♯s, the first two triplets of Motive 4 are restated (m.43, beat 3 to m. 44, beat 1). Also, dynamic primacy fluctuates between the accompanying group and that of the *jeu de timbres* (i.e., playing the double Lydian harmonies). At times, the accompanying group is marked *forte* over the *jeu de timbres* group's *pianissimo*, as with the return of Motive 3, in mm. 50–53. At other times, such as the return of Motive 2, in mm. 47–48, the accompanying group remains in the background, while the other group is more prominent.

To summarise, the second section, with its four subdivisions, presents the *jeu de timbres* in a number of novel ways, generating more complex textures, with emphasis on vertical structures. In the first subdivision, only harmonies 1 to 3 are prominently used in tandem with the first three-note cell of Motive 1. The threefold canon, based on the initial cell of Motive 1 (F4, G4, C♯5), creates a dynamic and forceful sounding music. The second subdivision, the shortest of all four, presents a suddenly quieter texture, loosely based on Motive 2, and employs harmonies 4 to 8. The third and densest subdivision, not only presents all 21 harmonies of the *jeu de timbres* along with the basic melody, but highlights harmonies 9 to 13 with punctuating chords and with the upper winds treated canonically. In the last subdivision, a series of double Lydian harmonies is presented, based on the first harmony of the *jeu de timbres*, for another restatement of the entire melody. The dense masses produced in the four subdivisions transform the *jeu de timbres* chords into chord-colours. In the next section, Vivier attempts yet more unusual ways of achieving chord-colours.

4.3 *"The second development of the melody"*

The third section exhibits new ways of incorporating the *jeu de timbres* in a further effort to create unique chord-colours. Vivier introduces a new, fifth motive (what Vivier calls a Thai motive), which appears three times, resulting in a rondo-like form. The episodes restate the principal melody with a variety of harmonic, and rhythmic and/or canonic devices. I will explore each of the five subsections, designating the Thai motive as subdivision (A), and the connecting music as episodes (B) and (C). For further reference for the following analysis, the complete score of the third section is duplicated as Appendix 1.

Overview of "the second development of the melody"

- Subdivision 1 (A1)

  This subdivision introduces the new Thai motive for solo percussion (mm. 57–63); its duration is 21 quarters.

- Subdivision 2 (B)

  The principal melody is restated, incorporating the full *jeu de timbres* for its four motives and implementing a new oscillating-style texture (mm. 64–86); its duration is 91 quarters. This is followed by a contrasting short two-part canon based on first three-note cell of Motive 1 (mm. 87–90); its duration is 13 quarters (i.e., 8 + 5).

- Subdivision 3 (A2)

  This subdivision introduces another statement of the Thai motive for percussion and solo violin, the latter with added melodic pitches (mm 91–97); its overall duration is, again, 21 quarters.

- Subdivision 4 (C)

  Here the principal melody is restated, but its melodic pitches are harmonised by the Lydian harmony. As well, *jeu de timbres* harmonies 1 to 13 are used as punctuating chords, as in section 2, subdivision 3; its duration is 30 quarters. This is followed by a contrasting perfect fifth interval in the lower basses (mm. 106–107); its duration is 13 quarters (i.e., 8 + 5), exactly the same duration as the coda to subdivision 2.

- Subdivision 5 (A3)

  This subdivision marks the third and last statement of the Thai motive (mm 107–114). Its melody (solo violin) is harmonised in the strings with three additional pitches, but strikingly not from the *jeu de timbres*; its duration is, again, 21 quarters.

4.3.1 – Subdivision 1 (A1), mm. 57–63, rehearsal 10 to 11

Stated over seven measures, the Thai motive is presented by four Thai nipple gongs of approximate pitch, arranged smallest to largest to produce highest to lowest pitches. It stands out in strong contrast with that of the previous and subsequent sections, partly because of its *piano* dynamic and new rhythms, but more strongly through its unique instrumentation. This new, fifth motive has intriguing rhythmic properties. Notably, it is segmented into six smaller cells, which correspond to a proportional ratio of 1:2:3:4:5:6, measured in quarter-note increments. Transcribed from a relevant sketch, the numerals under the Thai motive in Figure 4.11a below, whether circled or not, indicate the quarter-note durations of each of its six motivic cells; as well, the underlined digits 1 to 6 on the upper left side reflect the proportional ratio. In the score (see Fig. 4.11b) the Thai motive is identical to the sketch, but is placed on a four-lined staff to notate the four Thai gongs, and adds bar-lines in 3/4 triple metre. The brackets below Figure 4.11b show the six segments with the same proportional ratio as the original sketch. (Notably, the ties across the segments obscure the overall incremental scheme.) Vivier seems to have organised groups with several pulses, of which the second is always accented, not the first, as might be expected. The first segment has four sixteenths, the second four eighths, while the remaining ones are measured in quarters. Accent marks under the staff in Figure 4.11b below show where the accented beats are located.

Figure 4.11a – Thai motive according to Vivier's sketch

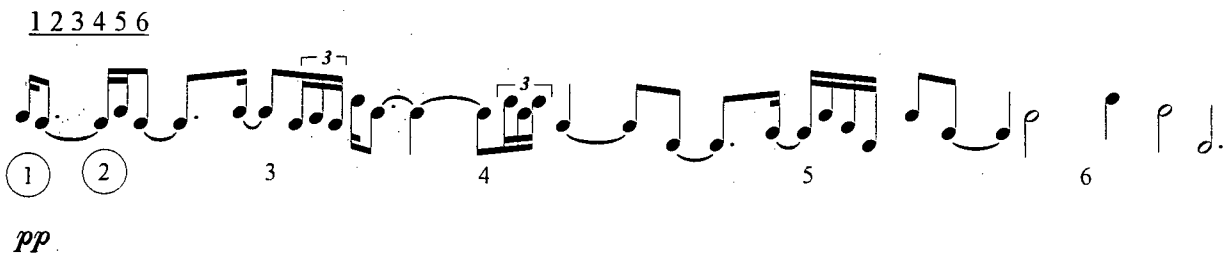
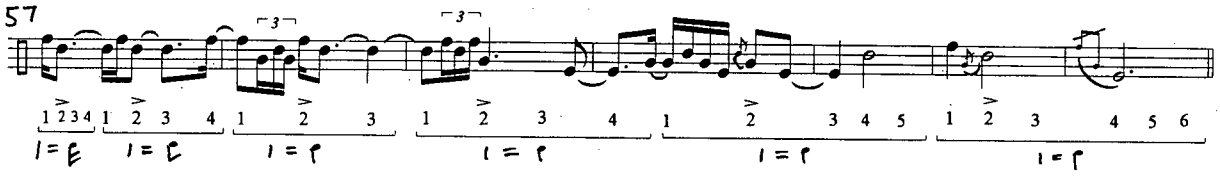


Figure 4.11b – Thai motive in the completed score, mm. 57–63



4.3.2 – Subdivision 2 (B), mm. 64–86, rehearsal 11 to 14

In the second subdivision (which I regard as the first episode), the four constituent motives of the principal melody form the basis of four shorter parts (discussed below), the durations of which are remarkably well-balanced from phrase to phrase. The Roman numerals on the left below correspond to the three phrases of the principal melody.[16] As with the first phrase (which combines the first two motives) the initial duration of 33 is the total of parts one and two, with their respective durations specified in parentheses.

I	Part one, mm. 64–67/2 (i.e., beat 2 of m. 67)	
	Part two, mm. 67/3–71	Duration: 33 (14 + 19)
II	Part three, mm. 72–79	Duration: 33
III	Part four, mm. 80–86	Duration: 25

The overall dynamics of this episode help to demarcate the three broader phrases, each of which starts *piano* and ends *fortissimo*. As well, breath-marks indicate the ends of two phrases, specifically at the end of measure 71 (phrase one) and measure 79 (phrase two). A quarter-note rest with a *fermata* marks the end of phrase three (m. 86); at this exact moment a sustained and untransposed Lydian harmony is introduced *ppp*. This forms the supporting harmony for the next subsection (that is, subsection A2). The textures of this subdivision form

[16]The four parts here are analogous to the four motives of the melody. In other words, Motives 1 and 2 form parts one and two (for phrase I); Motive 3, part three (for phrase II) , and Motive 4, part 4 (for phrase III).

the densest music in *Orion*, many of which use a *déphasage*. These textures often consist of three layers of music, and approximate canons, or exact ones, with very close distances between each entry, sometimes as close as a sixteenth-note.

–Part one, mm. 64–67/2

The manner in which the principal melody unfolds in the first part is quite striking. From mm. 64–67/2 the first five pitches of the Motive 1 are employed, along with selected additional pitches from corresponding harmonies of the *jeu de timbres*. While the overall dynamic for this subdivision is *pp* (except the initial *f*), the melodic pitches have a contrasting dynamic of *mf*. Initially, only the first pitch below the centre pitch of each *jeu de timbres* is used (e.g., C4 for melodic pitch F4, and D♭4 for melodic pitch G4), but by the end of this subdivision nearly all the chordal pitches are used (e.g., F3, B♭3, D4, C6, and E6 for the fifth melodic pitch, C♯5). Three layers of music present the melodic pitches and respective chordal pitches at varying entry times. N.B. all wind parts and the second *divisi* of the first and second violins begin on the fourth beat of measure 64.

Layer I: first marimba, first violins (first *divisi*), flutes

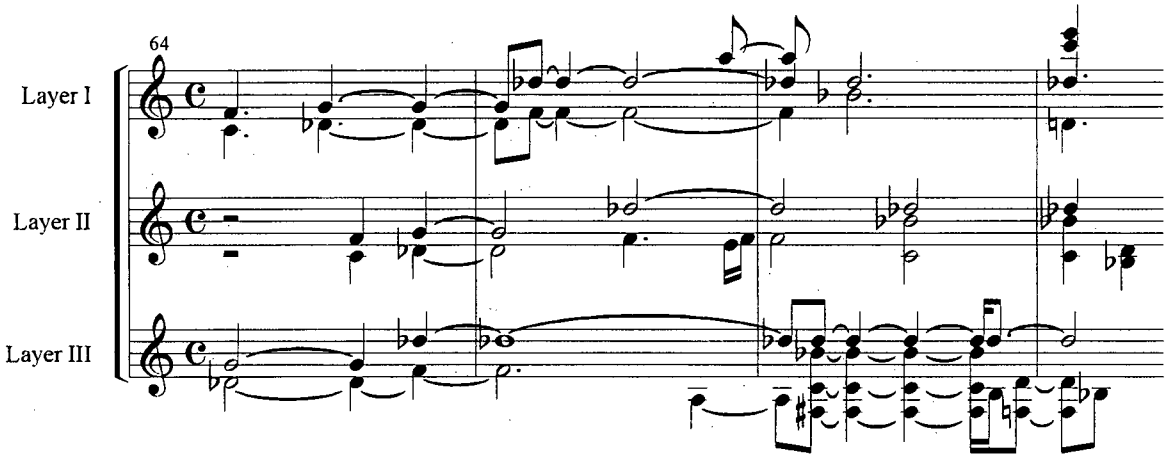
Layer II: harp, second violins (first *divisi*), oboes

Layer III: second marimba, violas, clarinets

The first two pitches of Motive 1 (F4 and G4) are presented by layer I, starting on the first beat of measure 64, with layer II following two quarter beats later. Layer III also starts on the first beat of measure 64, but with the second and third pitches of Motive 1 (G4 and C♯5, here notated as D♭5). In this way, no single layer dominates the texture of this part. The texture becomes increasingly dense as the melodic pitches, with their respective chordal

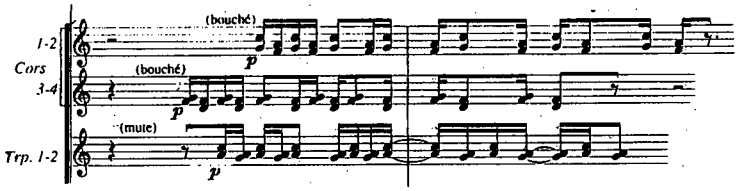
pitches, occur more often. Figure 4.12 below shows a reduction of mm. 64–67/2.

Figure 4.12 – Reduction of mm. 64–67/2



Completing the first part, the last pitch of Motive 1 (i.e., the G4) is stated in muted horns and trumpets, from mm. 67/2 to 68/3. The G4 comes with two pitches that stem from its respective *jeu de timbres* harmony, a lower and an upper pitch. This brief passage has rhythms similar to that of the previous measures, and is executed in a tight three-part canon with entries separated by eighth-notes (two pairs of horns and a pair of trumpets). The third and fourth horns begin, with pitches F4 and D4 added to the melodic pitch G4; the trumpets follow, with C5 and A4 added to the G4; then the first and second horns follow, with C5, A4 and F4 added to the G4. Figure 4.13 below shows this brief passage.

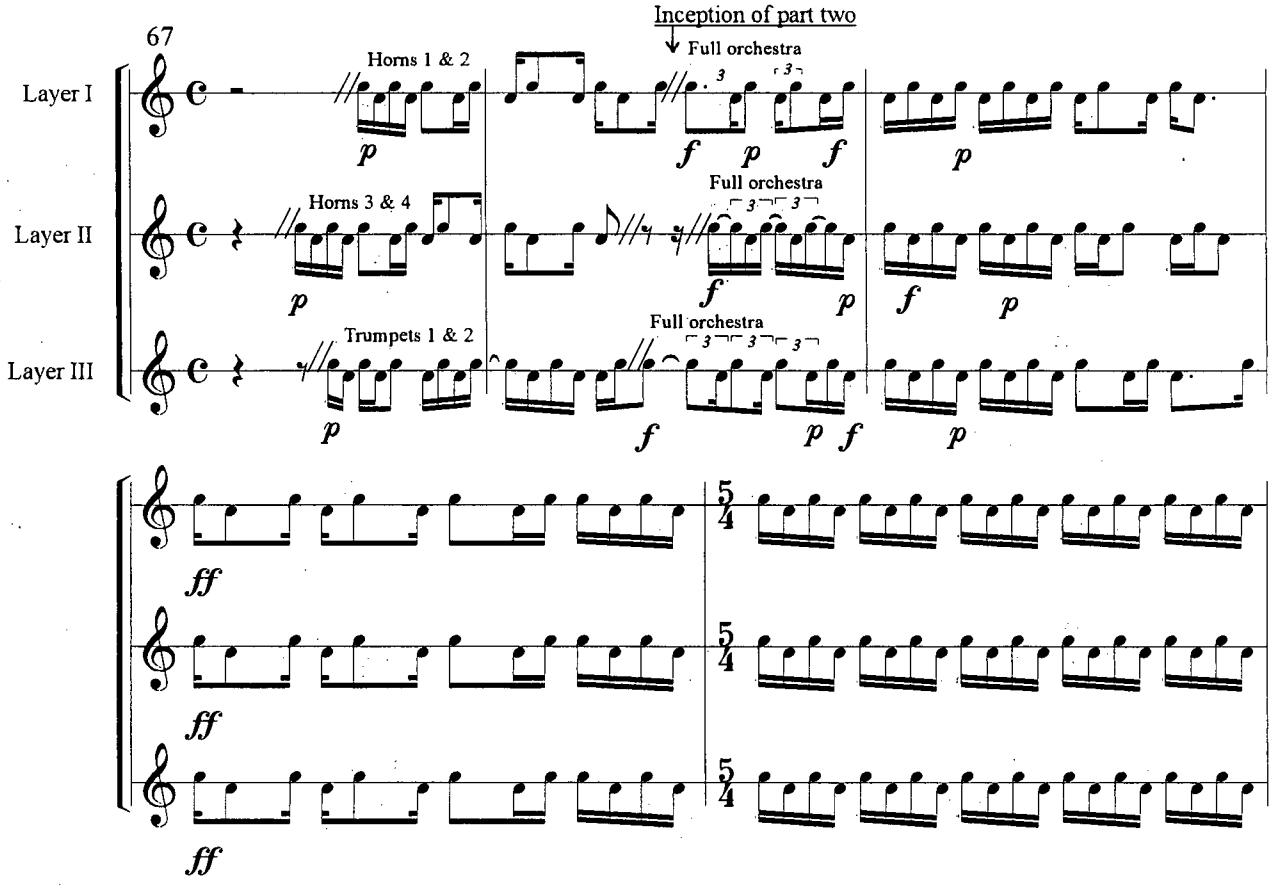
Figure 4.13 – Score of mm. 67/2–68/3, horns and trumpets



–Part two, mm. 68/3–71

Here the same three instrumental layers as are established in mm. 64–67/1 return. They restate the two pitches of Motive 2, E♭5 and D5, along with added pitches from harmonies 7 and 8, above and/or below. At first, in measure 68 (tie to beat 3) to measure 69, the three layers present their pitches in quasi-canonic fashion: layer I follows layer III two sixteenths later (on beat 3), and layer II follows layer I one sixteenth later (the triplet-sixteenths make this canon not exact). The initial dynamic marking of *forte* emphasises the beginning of each canonic entry. Finally, in the last two measures of this part (mm. 70–71), the quasi-canon ceases, and all three layers have exactly the same rhythm, stated here *fortissimo*. Figure 4.14 below shows a reduction of mm. 68/3–71, but only the rhythms are notated. The upper and lower noteheads indicate the two parts of a chord-shifting technique that will be explained below.

4.14 – Rhythms of mm. 67/2–71



The chord-shifting technique

The chord-shifting technique employed in this part creates oscillating-style chord-colours. Each layer employs a different vertical subset of the seven pitches of each respective harmony in top-to-bottom order, and each presents an alternation with the four-pitch subset that begins one pitch lower. Thus, labeling the seven pitches of a chord from 1 to 7 (1 indicating the top pitch, 7 the lowest, and 4 the central melodic pivot), the topmost layer (layer I) presents the four uppermost pitches for each harmony (numbers 1 to 4), alternating these with the next-to-uppermost four pitches (numbers 2 to 5). Layer II employs the next-to-uppermost pitches for each harmony (numbers 2 to 5), alternating with the next-lower subset of pitches (numbers 3 to 6); layer III presents pitches 3 to 6, alternating with pitches 4 to 7.

All seven pitches for each harmony are thus vertically stated in two large subsets, numbers 1 to 6 and numbers 2 to 7. Rapid oscillation between subsets produces registrally wide chords, which help create a highly dense orchestral texture. Since these harmonies are first stated canonically, then in unison, the intervallic and registral extremities are greatly enhanced. Moreover, throughout this part, Motive 2 is restated in trumpets and horns, along with its harmony pitches (i.e., those of harmonies 5 to 7). Figure 4.15 on the next page shows the chord-shifting technique with respect to harmony 7 (used in m. 68/3–4), and Figure 4.16 following supplies a reduction and chord analysis of part two, less the rhythms (cf. Fig. 4.14 above). Note that the brasses, throughout this part and the next, do not participate in the chord-shifting technique.

Figure 4.15 – Harmony 7 employing the chord-shifting technique

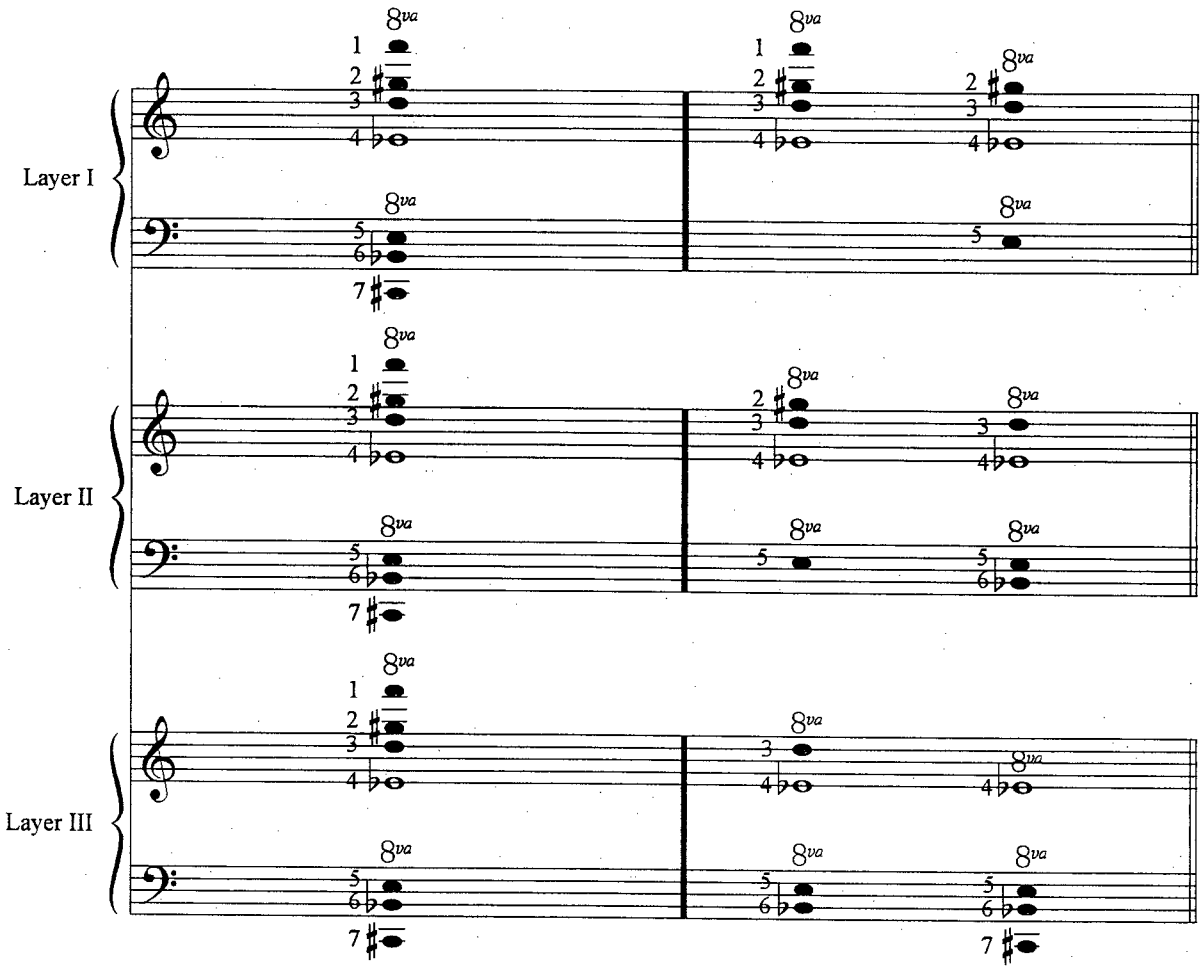
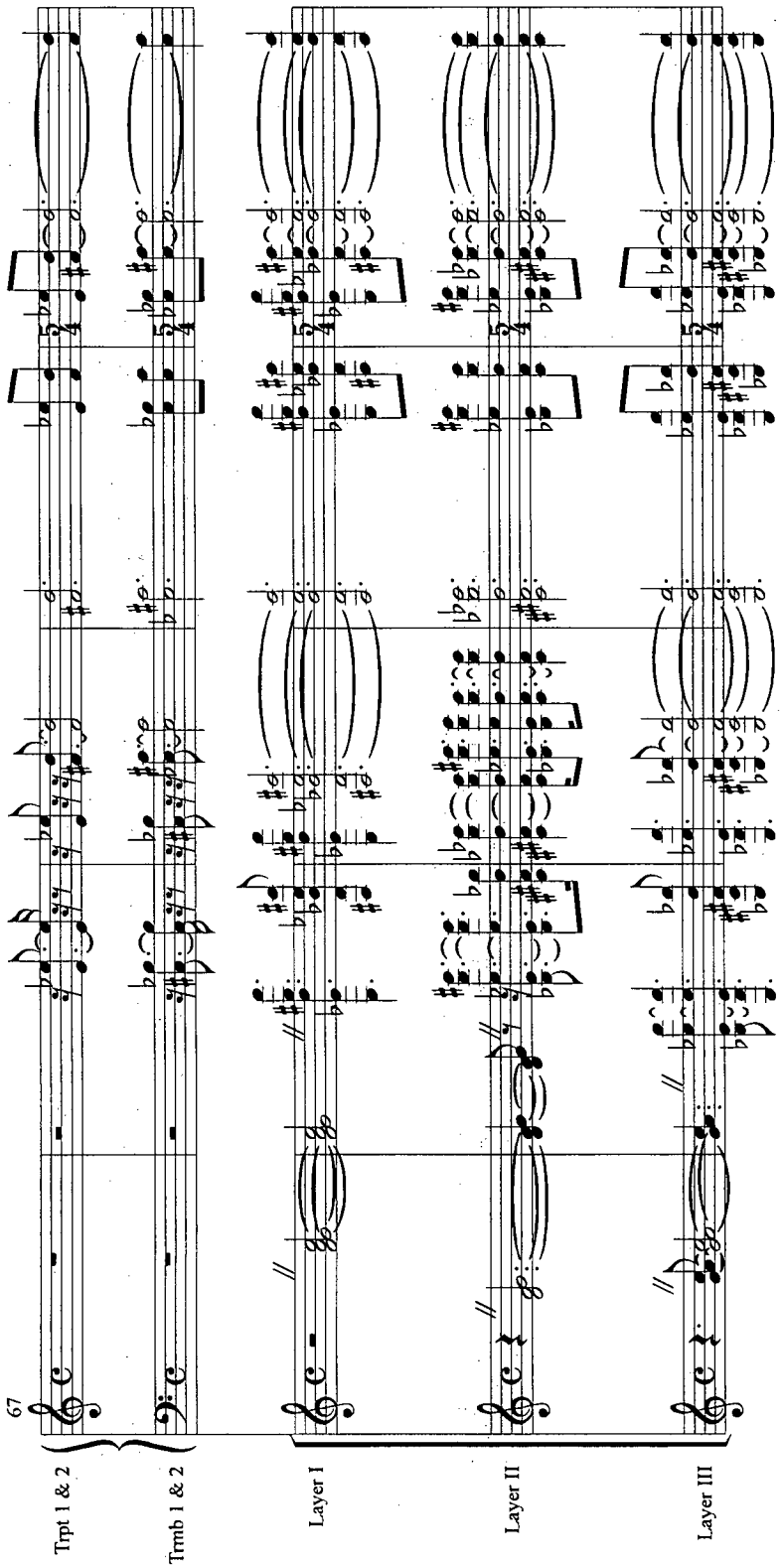


Figure 4.16 – Chords of mm. 67/2–71

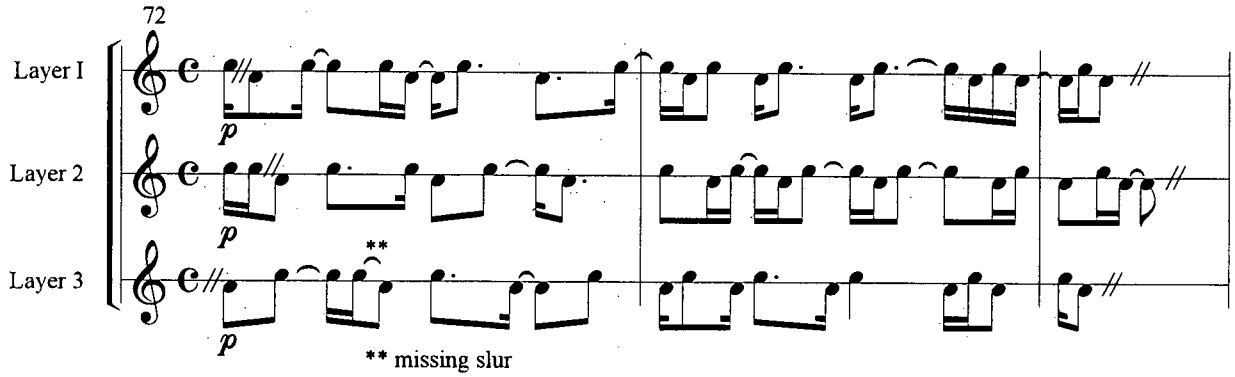


–Part three, mm. 72–79

In the third part, Motive 3 is plainly stated in the horns, coupled again with lower pitches of the motive's harmonies from the *jeu de timbres*. Specifically, the first four melodic pitches in mm. 72–75/2 (F♯4, A4, C5, B4), and their associated harmonies 9 to 12, employ only harmonic pitches 5 and 7 (no pitch 6).[17] However, when the horns state the motive's last two pitches in mm. 75/2–79 (C5 and E5) and its associated harmonies 12 and 13, they use all three lower harmonic pitches, 5 through 7 (see Fig. 4.19 below, p. 149).

The remaining instruments are organised into the same three layers as before, and execute a series of canons, exact and near-exact ones. Specifically, at the beginning of measure 72, a limited number of instruments of the three layers is used (layer I: first marimba and first violins; layer II: harp and second violins; layer III second marimbas and violas). These state only F♯4 and lower harmonic pitch D♯4, and all layers begin on the downbeat of measure 72. In mm. 72–73, the rhythms of each layer are nearly the same, and at a distance of one 16th-note: layer III begins, followed by layer I, then layer II.[18] Figure 4.17 below shows these measures, and the upper and lower noteheads indicate the two positions of the chord-shifting.

Figure 4.17 – Rhythms of mm. 72–74/2



[17] Actually harmonic pitch 6 (A♯3) is briefly present as a passing-note (in the third horn), occurring between harmonic pitch 5 of harmony 9 to harmonic pitch 5 of harmony 10 (i.e., B3 to G♯3).

[18] Coincidentally, in these measures, the first violins (starting at m. 72) have the same rhythms as in the first subdivision (starting at m. 64).

This brief canon ends on the first beat of measure 74, at which point all other instruments of the orchestra are added, with the instrumentation of each layer the same as in the previous subdivision. From measure 74 to the end of this subdivision (m. 79), two more three-part canons occur: one, (m. 74 to m. 78/1) featuring the same three layers ordered as before (layers III, I, II), now *two* 16th-notes apart, the beginnings of which are indicated by the *piano* dynamic;[19] and two, (m. 77/4 last three sixteenths to m. 79), same layers ordered as before, now *three* 16th-notes apart, the beginnings of which are shown by the *fortissimo* dynamic. Figures 4.18a and 4.18b on the next page show a reduction of this music. As in Figure 4.17 above, the rhythms are notated, and the upper and lower pitches indicate the two positions of the chord-shifting.

These canons help to create the same dense texture throughout the third part as at mm. 68–72, and their supporting harmonies employ the same technique of rapidly shifting harmonic pitches as before, this time with harmonies 9 to 13, that is, those associated with Motive 3. Again, the melodic pitches, here stated in the first horn, form focal pitches to an otherwise inscrutable and dense texture. Figure 4.19 below on p. 149 shows a reduction of mm. 72–79, but without the rhythms of the three layers as shown in Figure 4.17, 4.18a and 4.18b. Strikingly, the brasses' move to chord 11 in measure 74 coincides with the first entry of the second canon, and their final change to chord 13 in measure 78 coincides with the last entry of the third canon.

[19]Layer III lacks an initial sixteenth note which would otherwise make this canon rhythmically perfect.

Figure 4.18a and 4.18b – Rhythms of the other two canons

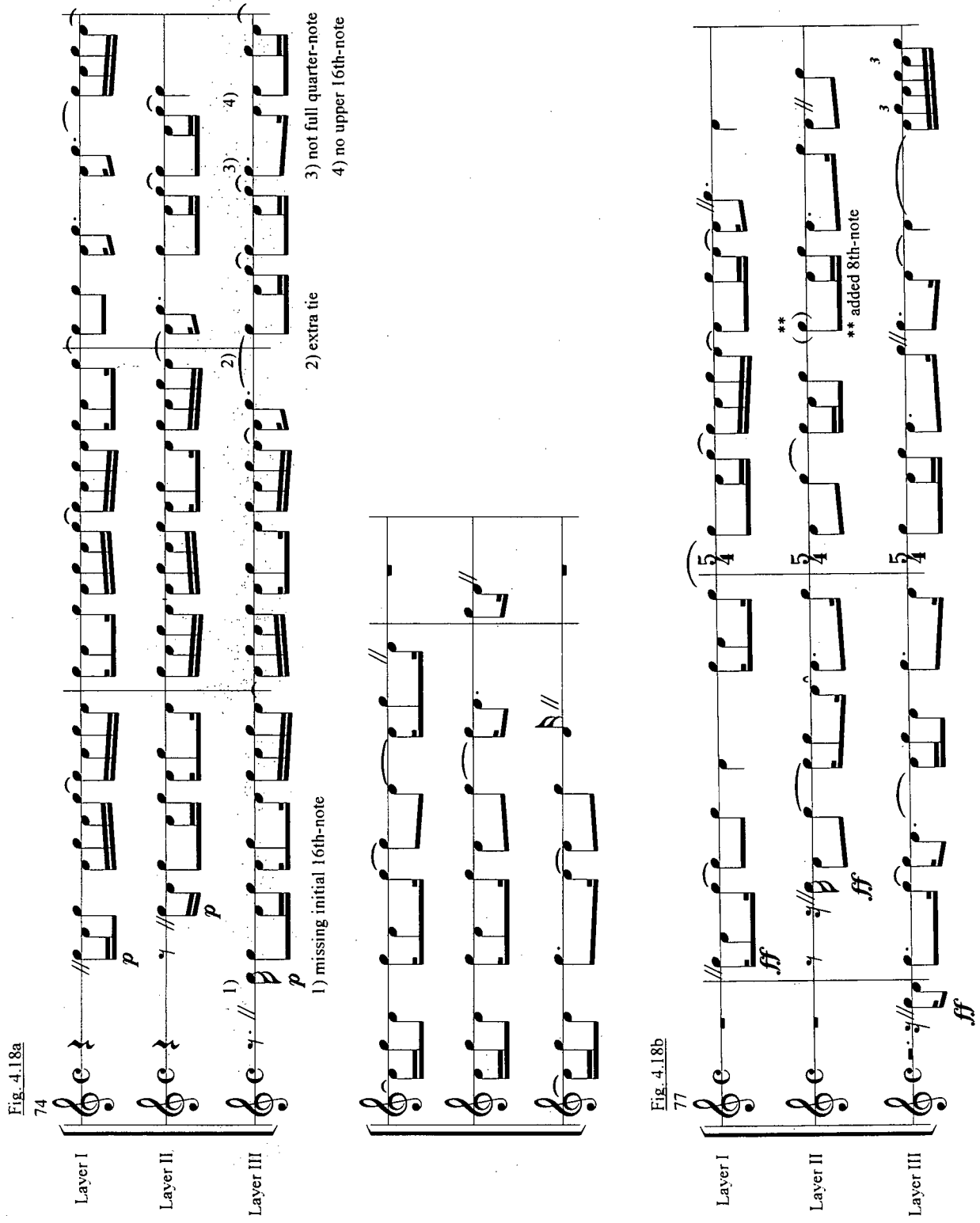
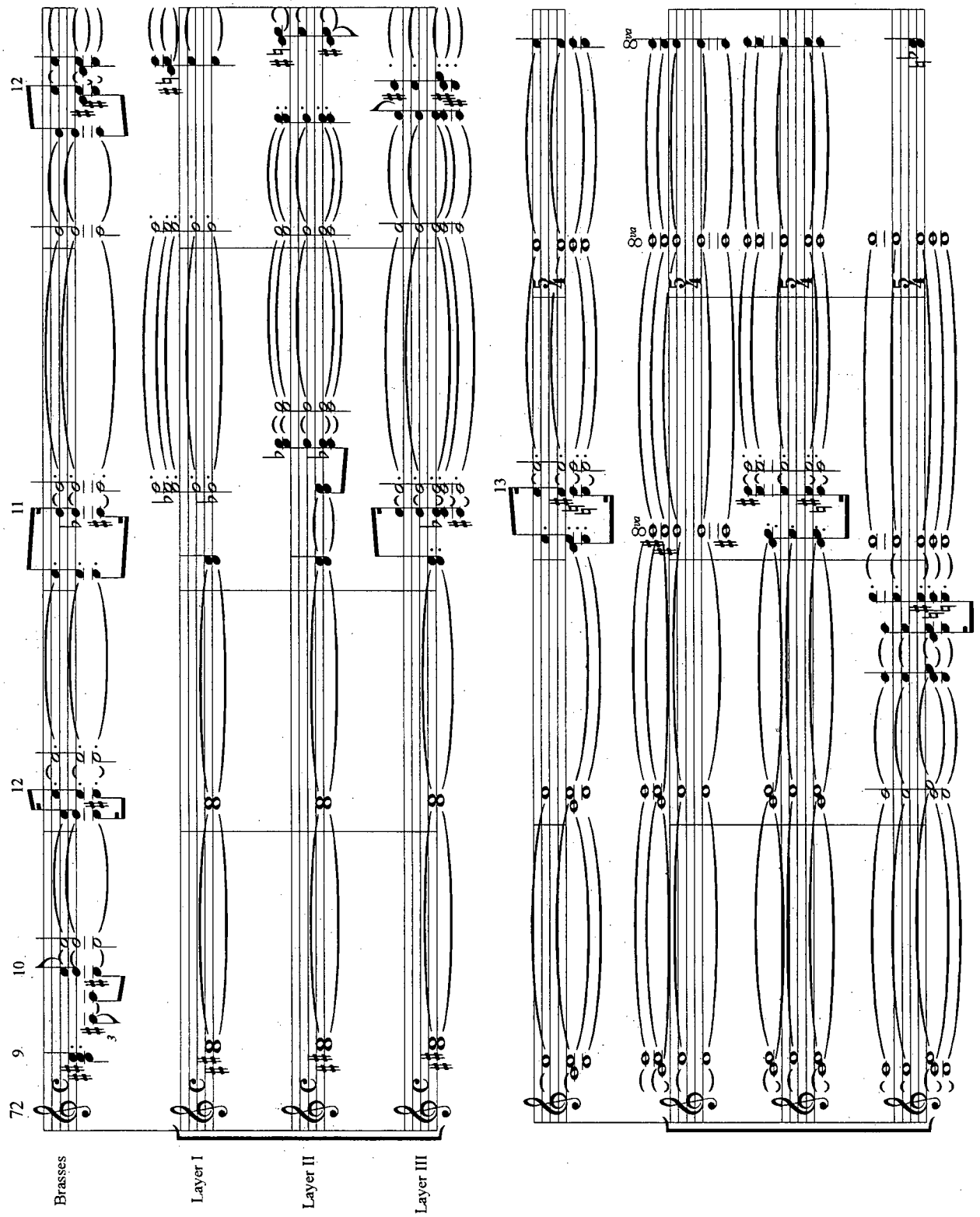


Figure 4.19 – Pitch reduction and chord analysis of part 3, mm. 72–79

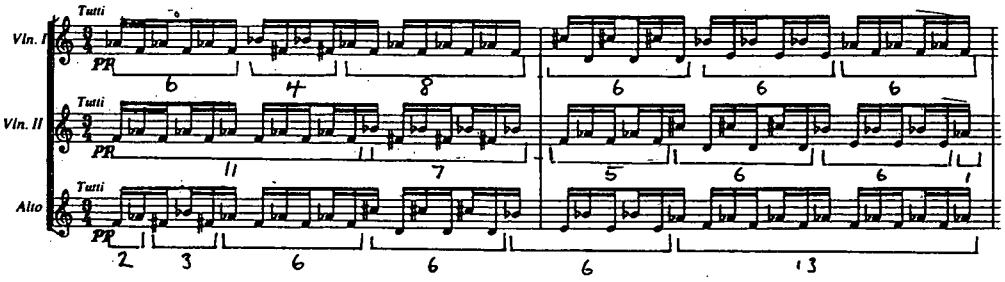


–Part four, mm. 80–86

As in part three, the instrumentation increases in three stages: the first and second violins and violas begin *piano* (mm. 80–81), along with their percussion counterparts (the two marimbas and harp). Then in mm. 82–83, wind counterparts are added (the flute, oboe and clarinet). Finally in mm. 84–86, the remaining instruments are added *fortissimo*.

The first four measures of this part, mm. 80–83, state the basic melodic pitches of Motive 4 (A♭4, B♭4, A♭4, D♭5, B♭4, A♭4) and the first lower harmonic pitch of their respective harmonies of the *jeu de timbres*, 14 to 19. These measures introduce a sudden shift of rhythms from sixteenths (4:1) to triplet-sixteenths (6:1), recalling the triplet figures that characterise Motive 4 (which Vivier's calls the "*petite valse*"). The rhythmic values of the three layers are indicated underneath the bracketed motives in Figure 4.20 below, measured in triplet sixteenth-note durations. Each layer is based on the six melodic pitches of Motive 4 (beginning with the "root" of harmony 14, A♭4, or its lower pitch, F4), but their durations are inconsistent from layer to layer. Figure 4.20 shows the first two measures of part four.

4.20 – Score of mm. 80–81



For the last three measures of this part (mm. 84–86), the three-part canon ceases, and the horns and trumpet state the melodic pitches of the second half of Motive 4, along with the three lower pitches of harmonies 20 to 22 (=15).[20] The rest of the orchestra uses the technique of rapidly alternating and shifting harmonic pitches as in the previous subdivisions, here with harmony numbers 20 to 22 (=15), still with the same layers and instrumental groups as before. These last three measures offer a surprise: an underlying A2 is added, stated *pianissimo* by double basses and tuba.[21]

4.3.3 – Subdivision 3 (A2), mm. 87–97/1, rehearsal 14 to 15

This subdivision consists of two parts: a short two-part canon based on the first three-note cell of Motive 1 (mm. 87–90); and a second statement of the new, Thai motive (mm. 91–97). More specifically, in the two-part canon the solo first and second violins repeatedly restate the pitches of the three-note cell from Motive 1 (i.e., <F4, G4, C♯5>) at a distance of three 16th-notes.[22] Throughout both parts of the canon, *pianissimo* artificial harmonic pitches break up the repetitive 16th-notes. Intriguingly, the numbers of *fortissimo* 16th-notes in successive figures in the first violin nearly match the durations of the motives and rest periods of the basic melody, that is, 5 + 6 + 8 + 13.[23] The Thai motive that follows is stated, but with the addition of a melodic pitches, for solo violin. The violin's four pitches (E6, D6, C♯6, B5), do not originate from the *jeu de timbres* and, judging from relevant

[20]Harmony 22 is identical to harmony 15.
[21]A2 is the inverted melodic pitch at T_7I for B♭4, the final pitch and goal-tone of the melody
[22]Curiously, both parts of the canon use additive rhythms, for each of the three pitches of the motivic cell, identical to those of the first two-part canon in section 2, mm. 11–14.
[23]The last value was originally sketched as 11, but Vivier corrected this to 13, possibly to create a total of 32 16th-notes for an even total of eight quarter-notes.

sketch material, appear to be a wholly new melodic idea, and yet match those of the four unpitched nipple gongs with respect to its general contour. Underneath the entire subdivision there is a persistent Lydian harmony at T_0 (F4, B ♭ 4, D5, E5), stated in cello harmonics *divisi*, which is to be played with uneven bowing. Once again, this subsection contrasts, in its comparatively sparser texture, with those that flank it.

4.3.4 – Subdivision 4 (C), mm. 97/2–105 , rehearsal 14 to 16 (*tempo molto piu ritenuto*)

In the fourth subdivision, which I regard as the second episode, Motives 1, 2 and 3 form the content of the upper winds, but their exact pitches are not stated in succession without repeats. Rather, the pitches of Motive 1 are freely repeated, and the music proceeds to the next motive, but freely adds one or two pitches of the previous motive, or even the subsequent one. This results in a rhapsodic combination of all three motives, the boundaries between which are not defined as in previous sections. The winds state this mixed motivic melody in form of a two-part *déphasage* with the piccolo, E ♭ clarinet, first flute, oboe and clarinet as the first group, and with the second flute, oboe, and clarinet as the second one. Both groups begin with the same rhythm for their first four pitches (measure 98), after which the second group restates the same four durations to create a near-exact canon with the first group, with occasional added 16th-notes. An unusual correlation exists between the 16th-note distance between both parts and the *approximate* quarter-note segments in which the canon unfolds: mm. 98–99 is seven beats in duration, and the canon is seven 16th-notes apart; mm. 100–101 is six beats in duration, now at six 16th-notes apart; and this reduction of durations and canonic distances continues to narrow until the A4 in measure 104, after which

the final three pitches are no longer rhythmically canonic. Figure 4.21 shows a reduction of mm. 97–105, in which the brackets above the upper two layers indicate the canonic entries. (Please note accidentals in Figure 4.21 are used normally rather than in conformity with Vivier's practice of labeling each individual pitch.)

The horns appear at first to be another canonic voice, because their part begins in the latter part of the previous measures (m. 97), with the same four rhythmic durations as the upper wind parts. However, they do not use the same motivic amalgam as the winds, and so do not form another canonic voice. Finally, the first and second violins state seven punctuating *forte* chords during this subsection. The time intervals between these chords diminish in quarter-note increments from seven to one.

The two-part canon in the winds uses the upper three pitches of the *jeu de timbres* harmonies for Motives 1 to 3, that is, harmonies 1 to 13. The overlapping nature of the canon forges these harmonic pitches into a more complex product. As well, the seven punctuating chords in the violins are based on the *jeu de timbres* harmonies, suitably numbers 1 to 13 to match those of Motives 1 to 3. First and second violins do not always state the same harmonies together, but rather reflect the two simultaneous harmonies arising in the two-part canon just described. Subsequent Table 4.2 (p. 155) shows how the harmonies of Figure 4.21 on the next page unfold.

Figure 4.21 – Reduction of mm. 97–105

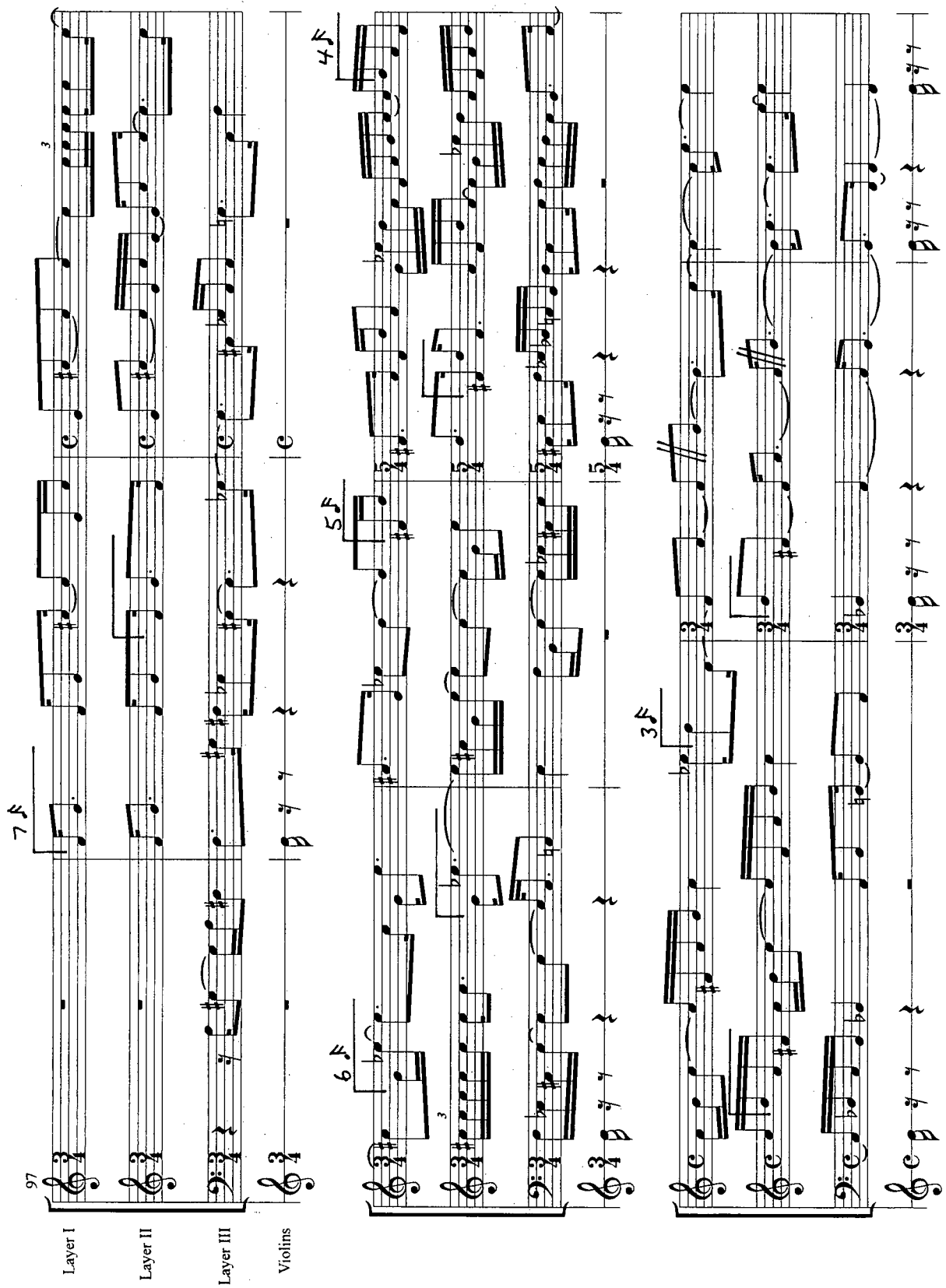


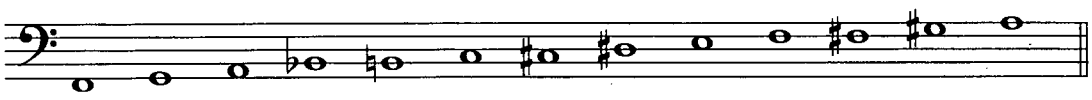
Table 4.2 – Chord choices in mm. 98–105

N.B. The upward arrows indicate the top three pitches of a *jeu de timbres* chord, the downward arrows indicate the lower three.

measure numbers	98	100	102	103	104	105
solo violin I *divisi.*	1 ↑	4 ↑	9 ↓	10 ↑	9 ↓	12 ↑, 13 ↑[24]
solo violin II *divisi.*	1 ↑	3 ↑	8 ↑	12 ↑	8	11 ↑, 13 ↑

The horns form another, unrelated layer, and state the lowest notes of this subsection, a series of tetrachords. Specifically, the lowest pitch of each chord is harmonised with three upper notes, each time resulting in a Lydian harmony, the all-important first one of the *jeu de timbres.* Throughout this subsection the horns state this harmony in parallel motion. The lowest pitches appear not to be based on the *jeu de timbres*, but rather form a 13-note scale as shown in Figure 4.22 below:

Figure 4.22 – 13-note scale of horns from mm. 97–105



This scale originates in Vivier's first sketch of the *jeu de timbres* (*cf.* sketch J1), which contains four rows of six chords each, along with four scales comprised of the notes derived from the chords of each row. In particular, this scale is the lowest of the four scales listed. It

[24]The upper C♯7 for first violin and upper C♯6 for second violin deviate from the *jeu de timbres*, harmony 13, which should have had an E♭ instead. Coincidentally, the exact spacing of harmony 13 for the first violin matches that of the suggested *jeu de timbres* listed under the *2e arrêt* in sketch J4.

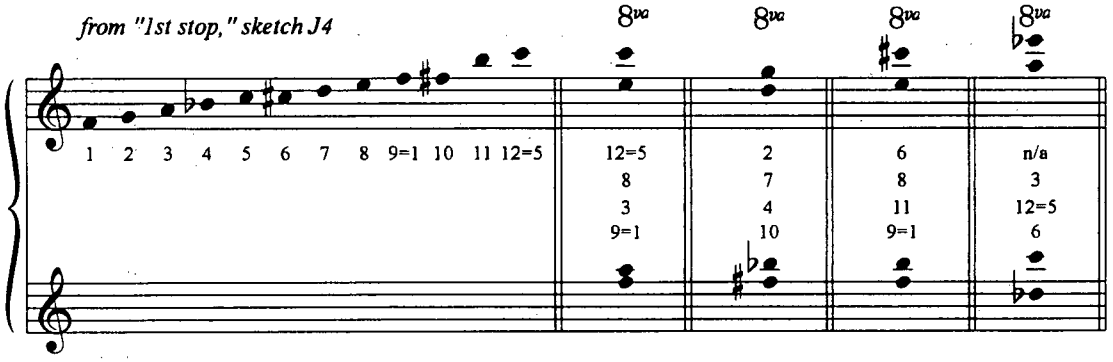
is duplicated in this subsection note-for-note beginning with the uppermost pitch in measure 97, the A3, and descending to the F2 by the end, measure 105.

4.3.5 – Subdivision 5 (A3), mm. 106–114, rehearsal 16 to 17

This final, third statement of the Thai motive forms the fifth and final subdivision of the "second development of the melody," which occurs after two introductory measures, spanning mm. 108–114. The two measures that act as a short introduction help establish the E♭2-B♭2 open fifth interval that forms the basis of the Thai motive, and continues into the next section, which Vivier terms the "meditation on the melody." At first, on the 16th-note prior to the downbeat of measure 106, a tetrachord (C♯2, B2, F3, B♭3) is stated, forming an inverted Lydian harmony. A quick glance at the bottom of Vivier's sketch J4 reveals the same chord under the *2e arrêt* (under which he writes "*jeux* [sic] *de timbres*"). This chord appears smoothly and resolves to the open fifth that follows, again beginning one 16th-note before the next measure, measure 107.

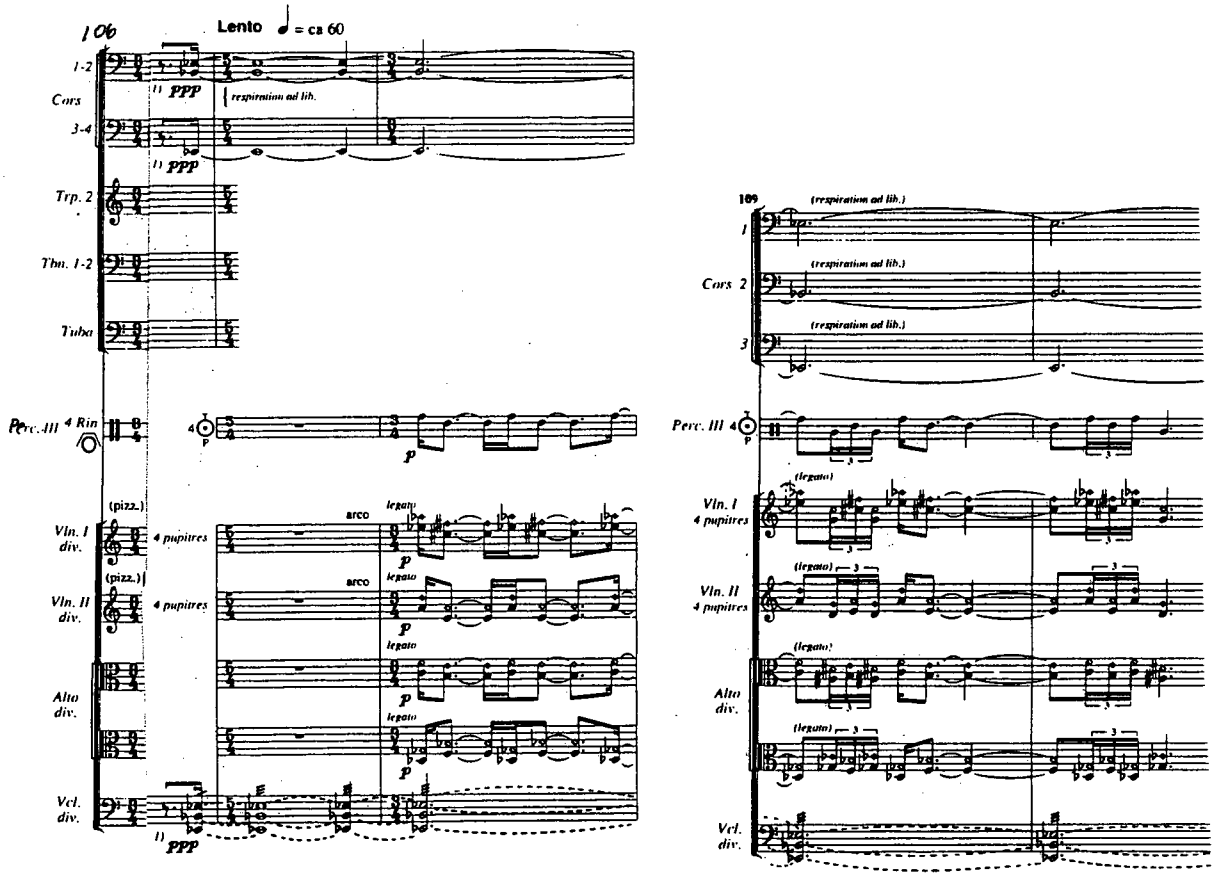
The four-note Thai motive is presented in a four-part harmonisation (mm. 108–114). The chords are not derived from the harmonies of the *jeu de timbres*; instead, their pitches are derived from the scale appearing in the *1e arrêt* of sketch J4 (marked: violin solo). Remarkably, the first chord matches the range of the scale, both extending a perfect 12th (the chord though, is one octave higher). All the pitches of the 12-note scale are used for the four Thai chords (four pitches each), which result in some doubled pitches. Only the highest pitch of all four chords, the E♭7, has no link to the invented scale. Figure 4.23 on the next page displays how these pitches form the four Thai harmonies.

Figure 4.23 – Four Thai harmonies



These harmonies use the highest pitches of any in *Orion*, ranging from D5 to E♭7. As well, the contours of the three upper string parts (mm. 108–114) closely match those of the Thai motive. In keeping with the mirror-inversion aspect of the *jeu de timbres*, the lowest part, the solo viola, presents a contour inversion of the upper lines. Figure 4.24 below shows a brief excerpt, the beginning of the harmonised Thai motive.

Figure 4.24 – Score of mm. 106/3–110



In summary, the "second development of the melody" reveals additional stages in Vivier's quest for chord-colours. The attention to upper string harmonics and to the unique spectra of percussion sounds is a crucial aspect of the Thai motive. In the episodes, as in the first development, Vivier combines two or more *jeu de timbres* harmonies by way of three-part canons, and sometimes by way of punctuating harmonies.

More specifically, in the first episode, Vivier designed an innovative way of shifting pitches within each harmony of the *jeu de timbres* creating a tremolo of chords over a wide-spaced interval. Later I discuss FM frequency modulation (see Chapter Six, pp. 207–208), and I believe Vivier may have been incorporating a simplified version: the upper and lower pitches around each melodic centre could be compared with the upper and lower sidebands of a modulating pitch. While having no modulating index to generate the sidebands, the resultant texture is roughly comparable to that of FM electronic technique, one that Vivier deftly captures with orchestral writing.

4.4 *"Meditation on the melody"*

According to a minor sketch outlining the form of the third section, the fourth was originally an extension of the third (and, incidentally, does not display either the *jeu de timbres* or three major-sounding tetrachords).[25] In the finished score, mm. 115–135 (rehearsal 17 to 21) form a separate fourth section. The first three motives of the principal melody appear in simplified form, stated in solo trombone, and the section ends with a two-note cell

[25]This sketch was not commented on in Chapter Three, as its only importance is that it shows that section four began as an addendum to the preceding section, the "second development of the melody."

from Motive 4 on the vocal utterance "*he-o*" (D♭4-B♭3). As well, the entire melody is stated over one of two pedals: 1) an E♭2 pedal, the lower pitch of the open fifth established in the last subsection of the previous section; 2) a D2 pedal, over which the upper B♭2 of the previous open fifth is maintained. The two intervals, the perfect fifth (E♭2-B♭2), and the minor sixth (D2-B♭2) form the basis of the principal cadential gesture for this piece, one that eventually closes the entire work on the goal-tone of B♭2. Figure 4.25 below shows how the melody unfolds over two pedal tones:

Figure 4.25 – The melody presented over two pedals

Pedal E♭2 (mm. 116–121):
Motive 1 (F3, G3, D♭4, G3), Motive 2 (E♭4)

Pedal D2 (mm. 122–127):
Motive 2 continues (D4), Motive 3 (F♯3)

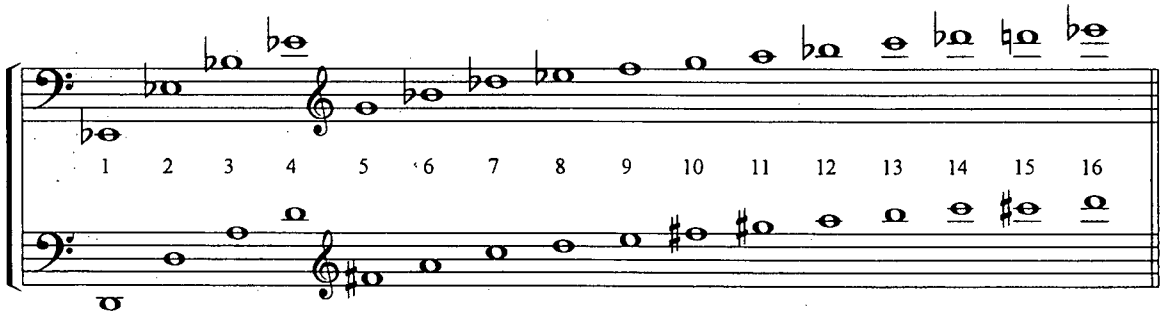
Pedal E♭3 (mm. 128–129):
Motive 3 continues (A3, B3, C4)

Pedal D (mm. 130–132):
Motive 3 ends (E4), Motive 4 "*hé-o*" (D♭4, Bb3)

Pedal Eb (mm. 133–135):
reprise of "*hé-o*" pitches (i.e., D♭4, B♭3) in double basses

Simultaneously, the double basses freely improvise with the overtones of the pedal tones E♭2 and D2 *ad libitum* throughout the first two pedals listed above. Interestingly, the pitches of the motives can be derived from the overtones of the two pedals as fundamentals. Figure 4.26 on the next page displays the overtones involved in the simplified motives used in this section.

Figure 4.26 – Overtone series of fundamentals of E♭ and D



Pedal E♭2: Motive 1: based on overtones 9, 10, 14
Motive 2: based on overtones 16, 15

Pedal D2: Motive 3: based on overtones 5, 6, 7, 8, 9
Motive 4: loosely based on overtones 11 and 15 (its perfect fourth range from A♭ to D♭ here as enharmonic equivalents, G♯ to C♯)

According to a relevant sketch, Vivier intended the ten notes of the first three motives to produce an aggregate of 10 durations, as ordered in the chart below.[26] From the initial F3 of measure 117 through to the C4 of measure 129, each of the ten integers from one to ten are represented in quarter-note durations. Table 4.3 below shows Vivier's original plan:

Table 4.3 – Durations of first three motives

F3	G3	D♭4	G3	E♭4	D4	F♯3	A3	B3	C4
3	10	5	4	6	9	7	2	1	8
N.B. total quarter-note duration is 55 (M.M. = 60)									

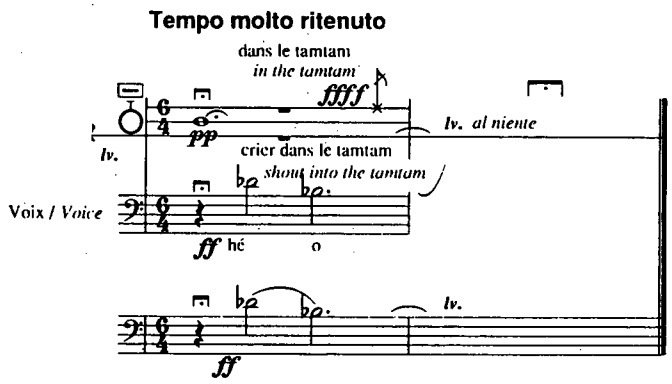
The lower left-hand part of the sketch shows the total value of these ten pitches as 55, listed in a column with three other integers. The first of these is the duration of the pedal E♭2-B♭2

[26]Each of the original durational values of the principal melody is here doubled, as indicated at the bottom of Vivier's *jeu de timbres* sketch J4, under the *3e arrêt*, right side.

that precedes the melody, in mm. 116–117, while the other two relate to the music following the restatement of the 10-note melody: the 15 reflects the total duration of the last E4, which is elided with the eight quarter-note "*hé-o*" figure; and the 17 reflects the remaining total duration of this section, during which the basses restate the "*hé-o*" figure. However, there are a few changes in the finished score: 1) a passage for two trumpets lasting 13 quarter notes is added following the D4 (mm. 124–126); and 2) the F♯3 (m. 127) is actually nine quarter-notes long, not seven.

Some of the means of sound production used in this section are quite striking. The solo trombone restates the simplified principal melody with a variety of avant-garde techniques, such as flutter-tonguing, vocal *glissandi*, open and closed mute (often on the same pitch, and executed with *accel.* or *rall.*). The two-trumpet passage at rehearsal 18 (mm. 124–126) uses open and closed mutes on D5 and B♭4, often alternating from 16th-note to 16th-note. Lastly, the final vocal "*hé-o*" (m. 132) is shouted into the tam-tam for a haunting effect. This is Vivier's way of adding a human touch to an otherwise exclusively orchestral work, an effect he also concludes the work with (see Fig. 4.27 below).

Figure 4.27 – Final measures of *Orion*



4.5 *"Memories of the melody"*

The last two sections of *Orion* are sketched on a plain 11 x 14 page, and reveal an intriguing key for analysis—the role of the *appel* (i.e., the two-pitched "*hé-o*"[27] first heard at the end of section four). The word *appel* appears five times: once at the top of the page, then three times after each of the four motives of the principal melody (for section five), and finally once after the final sixth section (sketched as a *mélodie intervallisée*), inside a box marked as *dernier appel*. The durations for these motives and sections are fully described in the following analysis. A second sketch (also on a plain 11 x 14 page), this time for section five only, indicates no durations. Only the associated pitches of the *appel* are shown, as *ré ♭* and *si ♭* (i.e., the D♭ and B♭). The two-pitched statement is restated four more times, situated between the motivic statements, as in the first sketch.[28] The word *accord* appears on the first instance of the pitched *appel*, suggesting a chord should accompany it (and, by implication, the other statements of *appel*). The suggested chord is placed at the bottom of the page (an eight-note chord written in solfège), and is based on two of the major-sounding tetrachords described in the previous chapter.[29]

Figure 4.28 below presents the sketched eight-note chord and compares it with the first of the two used in the score. I refer to each upper and lower tetrachords with their respective OICs, and their root note I interpret as the upper pitch of the lowest perfect fourth interval. The lower four-note portion of the sketched chord has an OIC of <5 4 2 > (a Lydian

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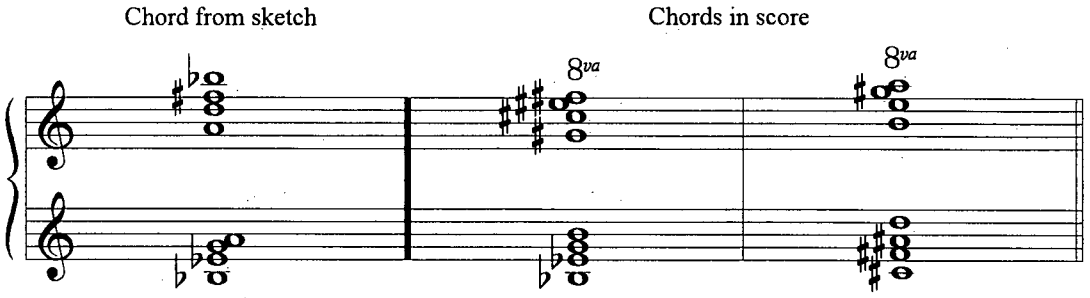
[27]The French word "*hé-o*"is a common everyday greeting, a jovial used call to get someone's attention.
[28]As well, selected instruments for the various passages of these two sections are chosen. The most important is the solo trumpet used for the first three motives of section five.
[29]The exact construction of the three major-sounding tetrachords, derived from Japanese temple bells, was discussed on p. 101.

harmony), and is replaced in the score with another one of the three major-sounding tetrachords (see Fig. 3.15 above, p. 101), with OIC <5 4 4> (i.e., the A4 over the root E♭4 is replaced with B4). The upper portion of the sketched chord, an OIC of <5 4 4>, is altered to an OIC of <5 4 1>, and then is transposed down a semitone. Interestingly, the eight-note harmony in the score does not use a Lydian harmony (i.e., OIC <5 4 2>), but rather combines the other two major-sounding tetrachords.

Figure 4.28 – Eight-note sonority as sketched and used in the score



The form of the fifth section is again rondo-like, the "*hé-o*" chords alternating with each of the first three motives of the principal melody. Table 4.4 on the next page outlines the durations of each section in quarter-notes, duplicated from the sketch mentioned above. Of note is the changing tempo from M.M.= 72 for the "*hé-o*" portions, to M.M. = 60 for the three motives (indicated as 'M'). Also, the dynamics for the "*hé-o*" portion start *forte*, but get softer each time until, the fourth time, they sound *pianissimo*. In contrast, the motives are always stated *piano*. Notably, the original durations of each note of the first three motives of the principal melody are here doubled. As well, the + 15 for Motive 3 refers to its last 32nd-note motivic cell, which is repeated by two solo trumpets to form a quasi-canon.

Table 4.4 – Durations of the "*hé-o*" *appel* and various motives

hé-o	M1	*hé-o*	M2	*hé-o*	M3	*hé-o*	M4
136–40	141–42	143–46	147–48	149–51	152–59	160	162–65
21	12	15	10	10	17 + 15	5	8

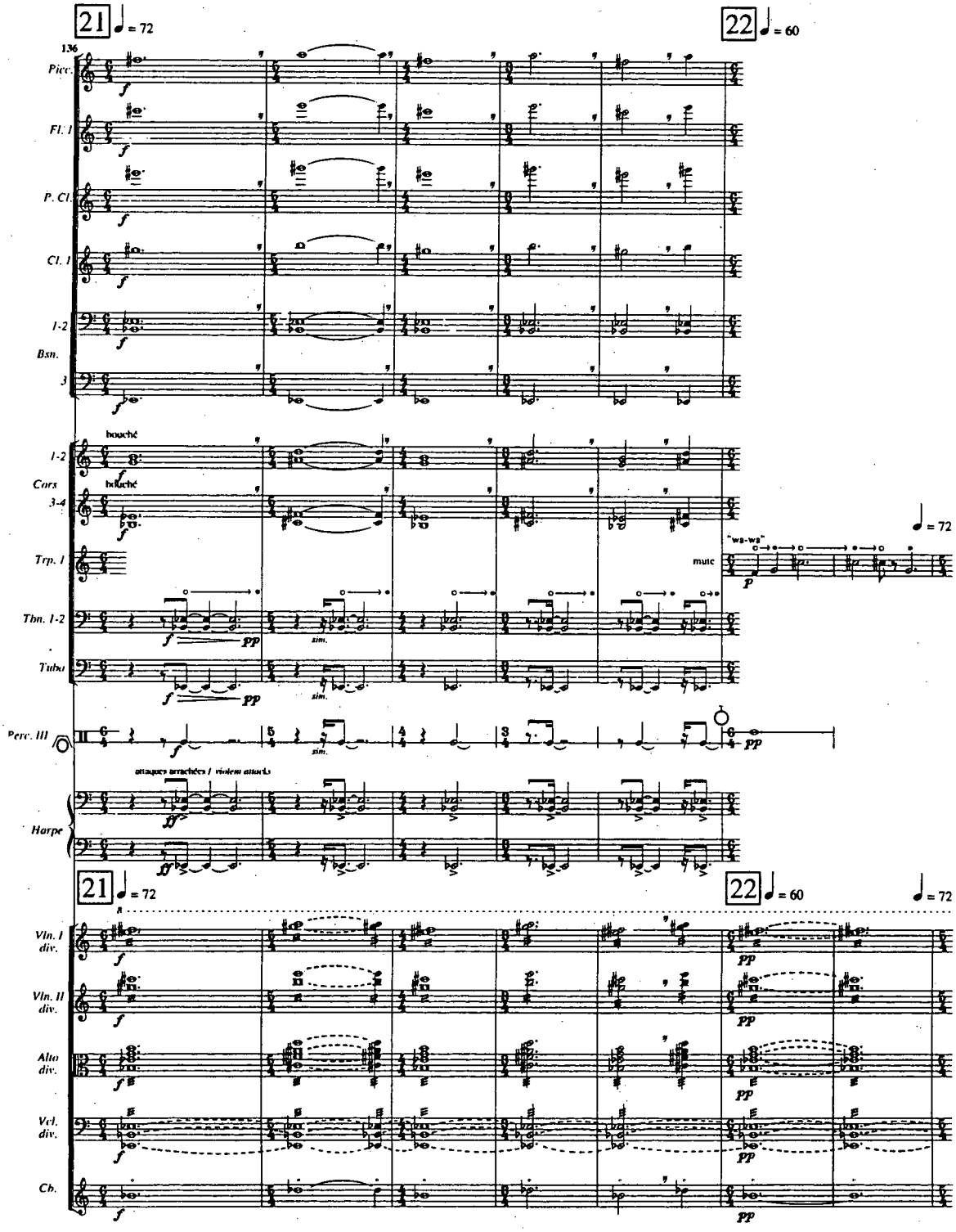
Throughout the entire section, regardless of whether the "*hé-o*" chords or the motives of the principal melody are sounding, there is a constant E♭2-B♭2-E♭3 open fifth/octave, the same one as is played through much of the previous section. This only changes after Motive 4 is stated occur in the last two measures of this section (mm. 167–168) where, not surprisingly, it moves to D2-B♭2-D3, the minor sixth resolution of Vivier's favoured cadence.

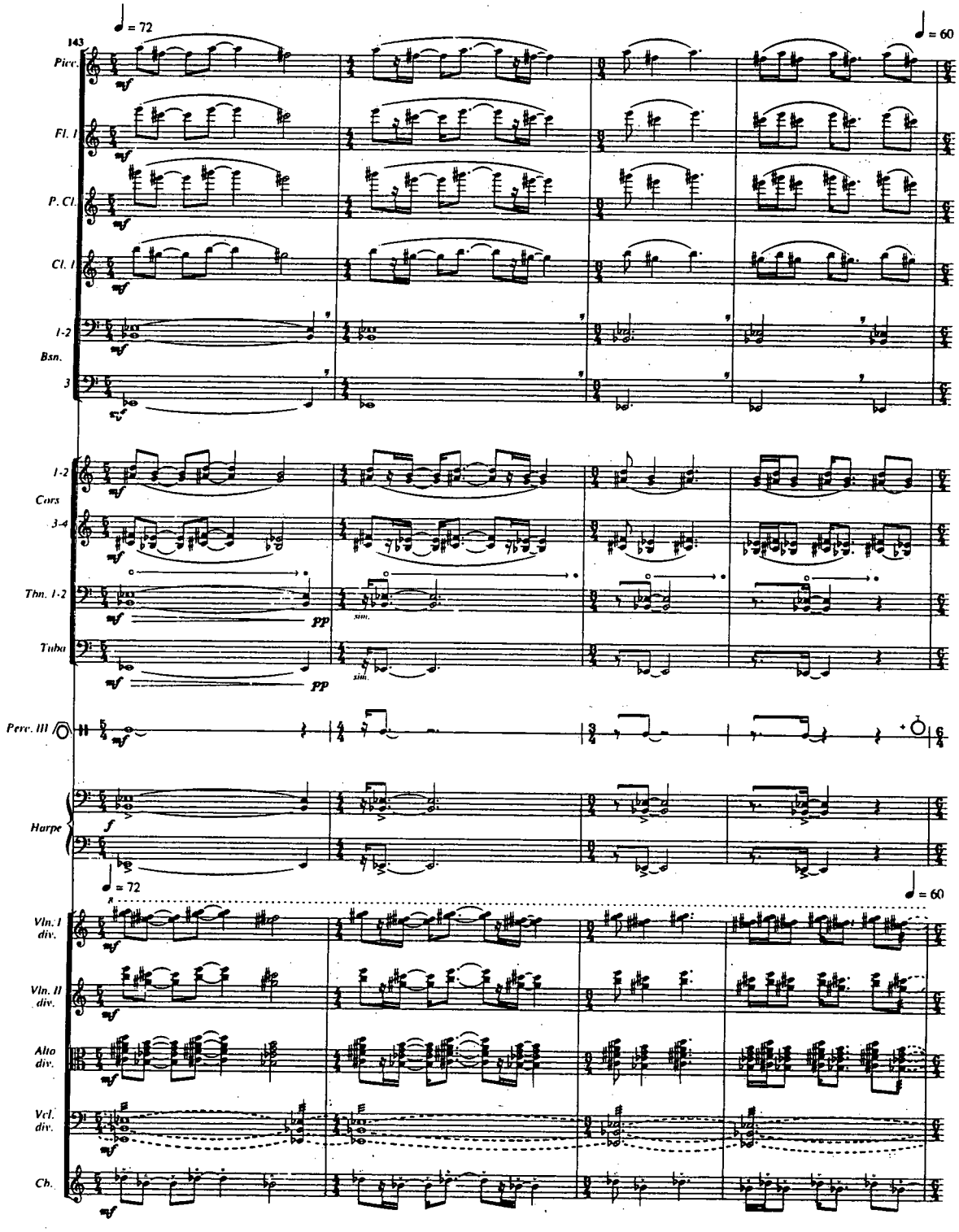
The proportional rhythm of this section as implemented in the "*hé-o*" segments is quite striking. For example, in mm. 136–140, the alternating "*hé-o*" chords display respective durations of 6:5:4:3:2:1. After Motive 1 is restated, the subsequent "*hé-o*" section has more rhythmic activity, with less clear the proportional rhythms. Nevertheless, at measure 143, there is a 1:2:3:4 proportional rhythm, in eighth-note increments; at measure 145, a 1:2:3, also in eighth-note increments. The open fifth/octave chords of the bassoons of these five measures (mm. 143–147), shows a clear overriding 5:4:3:2:1 proportional rhythm in quarter-note increments. Hence, Vivier appears to truncate the proportional pattern of the first "*hé-o*" segment by one member in the next portion. And, in fact, the next "*hé-o*" section is 4:3:2:1 (mm. 149–151), although the durational values are here reversed. In the last segment (m. 160) though, he eliminates the two outer values, leaving a simple two-fold statement of 2:3.

The fifth/octaves also engage with the same proportional rhythms through each "*hé-o*"

segment, but in a slightly more unusual manner. For instance, in the first "*hé-o*," mm. 136–140, the fifth/octaves do not occur on the downbeats like the eight-note chords. Rather, the first one occurs on the fourth eighth-note of measure 136, and in each successive measure occurs one sixteenth-note sooner. In this manner, they occur much closer to the eight-note chords by the end of the 6:5:4:3:2:1 proportional rhythm, in measure 140. In contrast, when the fifth/octaves return in the next "*hé-o*" portion, they first occur on the downbeat (m. 143), then appear successively one sixteenth-note later, which thus creates the opposite effect. The same successive sixteenth-note delays are again employed in the third "*hé-o*" portion (mm. 149–151). The fifth/octave appears as a single sixteenth-note at the very end of the one-bar "*hé-o*" statement in measure 160, and is sustained as the sole harmony throughout measure 161. Figure 4.29 presents the score of mm. 136–146 over the next two pages.

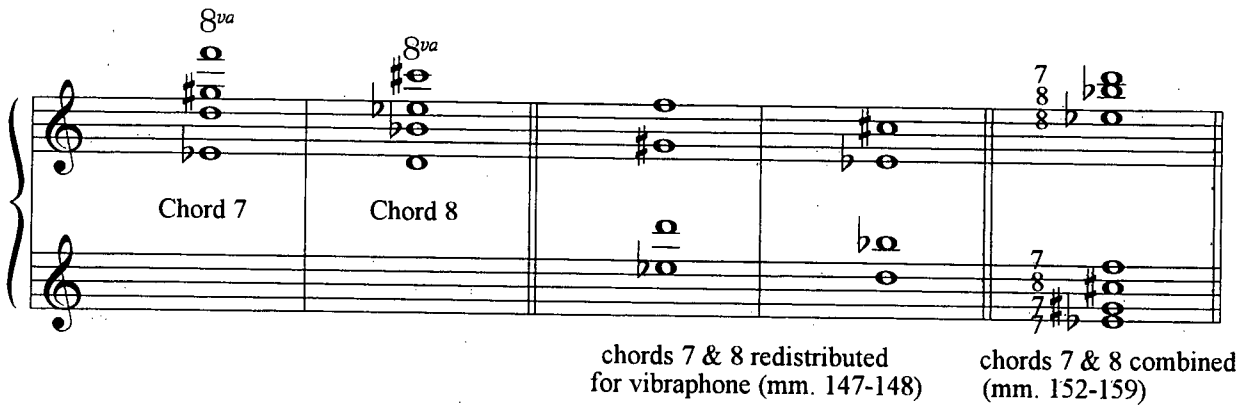
Figure 4.29 – Score of mm. 136–146




143
♩ = 72
♩ = 60
Picc.
Fl. I
P. Cl.
Cl. I
1-2
Bsn.
3
1-2
Cors
3-4
Thn. 1-2
Tuba
Perc. III
Harpe
♩ = 72
♩ = 60
Vln. I div.
Vln. II div.
Alto div.
Vcl. div.
Cb.

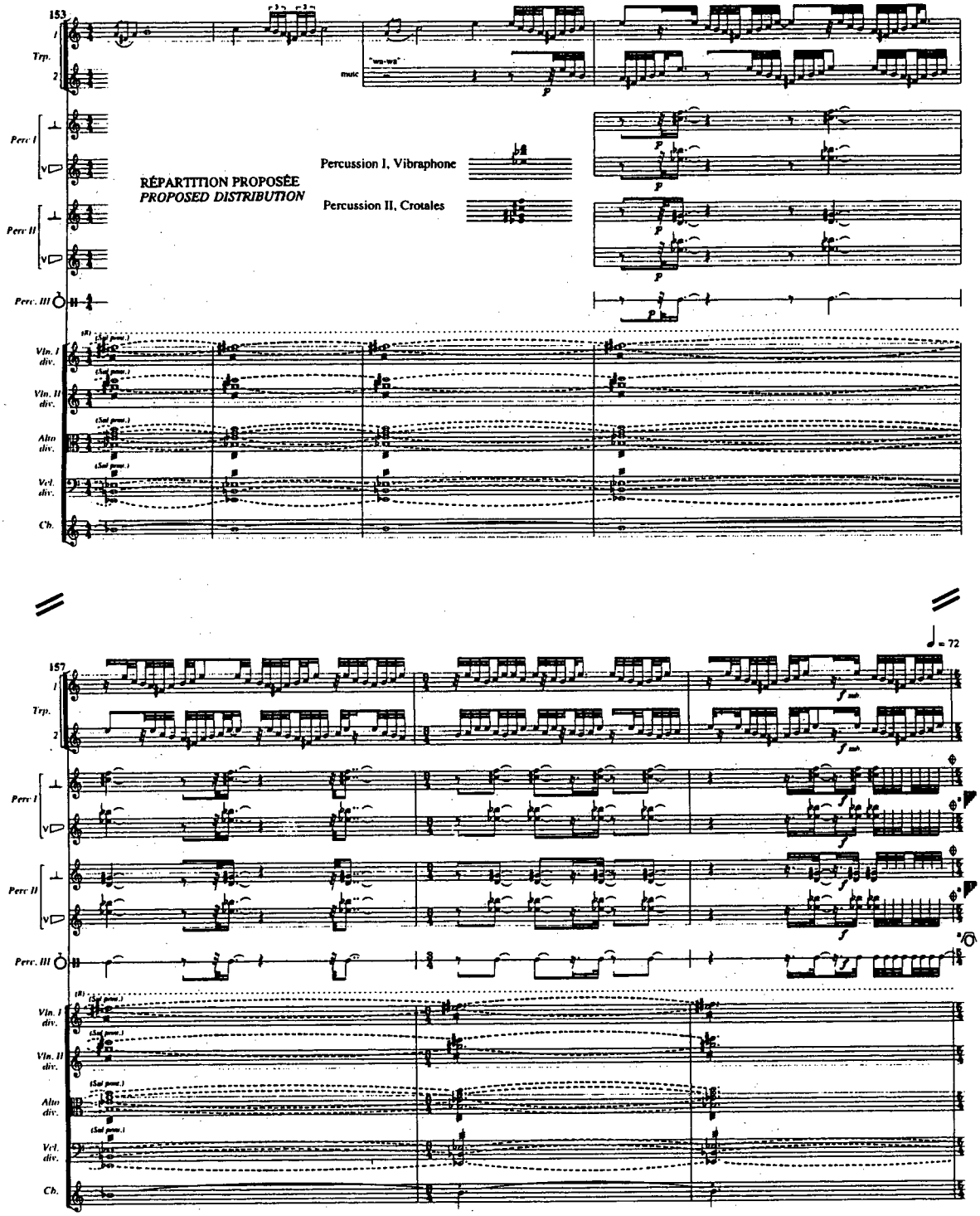
The *jeu de timbres* harmonies are used only twice in the fifth section. The first brief occurrence is in the percussion accompaniment to the statement of Motive 2, in mm. 147–148, where the three upper harmonic pitches of harmonies 7 and 8 are combined, along with their corresponding central melodic pitches. The original registral placement is altered as well to better suit the range of the vibraphone. These harmonies occur for the second time in mm. 152–159, which feature Motive 3 restated for two solo trumpets in a canon. There the harmonic components are combined to create a composite seven-note harmony. Again, their original registral placements are altered to better suit the ranges of the vibraphone and antique cymbals, indicated in the score as a so-called "proposed redistribution." Figure 4.30 below shows both arrangements of chords 7 and 8 below.

Figure 4.30 – Chords 7 and 8, both in normal and "redistributed" order



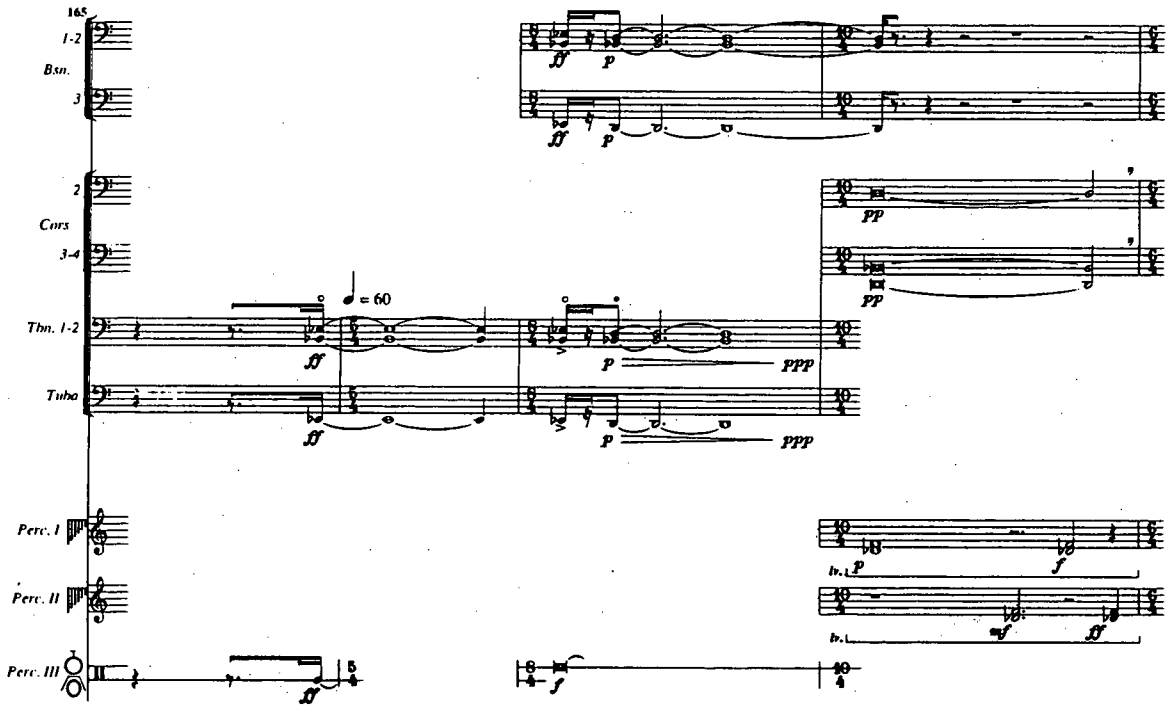
In mm. 152–159, the seven-note composite chord occurs roughly every 1½ beats, coinciding with the upper pitch (the sustained E5) of the second trumpet. Strikingly, the chord occurs more quickly from the last beat of measure 157 through measure 158, particularly as the motive shortens. Roughly at the end of measure 159, the percussion chord matches every one of the last nine trumpet pitches, which signals an end. Figure 4.31 on the next page presents the score of mm. 153–159.

Figure 4.31 – Score of mm. 153–159



After the last "*hé-o*"in measure 160, the music continues at M.M. = 72 for Motive 4, stated in mm. 162–165. As mentioned, the two eight-note chords cease, which results in a greatly reduced orchestration. While Motives 1 to 3, in the solo trumpet, are given in doubly augmented values,[30] here, at mm. 162–165, Motive 4 is stated in its original time values, scored for second violins and violas. At measure 166, the tempo returns to M.M. = 60 and the fifth/octave is stated *fortissimo* to form a cadence with the following *piano* minor sixth interval (m. 167). The final measure of this section, scored for solo tubular bells, implements a final proportional rhythm of 4:3:2:1, along with successively louder dynamics. Its presence helps to usher in the final section without a break, particularly as the pitches of the bells, D♭-F, match those of the first major third interval of the sixth section. Figure 4.32 presents the score of mm. 165–168 below.

Figure 4.32 – Score of mm. 165–168

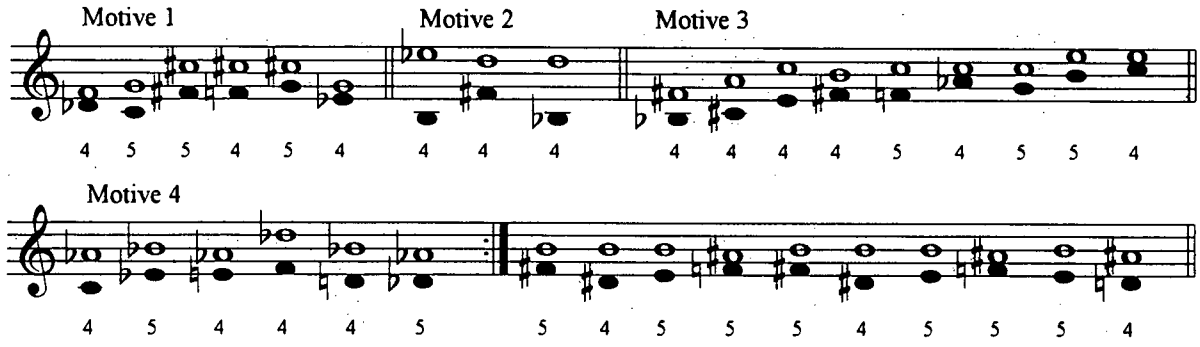


[30]Motive 1, mm. 141–142, Motive 2, mm. 147–148, Motive 3, 152–159.

4.6 *"The melody based on two intervals"*

The sixth and final section comprises the last two pages of score (mm. 169–182). Here the entire orchestra states the principal melody, marked *forte*. Each of the basic 42 melodic notes[31] is twice as long as its counterpart in the opening melody (2:1), but with no intervening rests between each motive, and without grace-notes for Motives 2 and 3. Furthermore, each pitch is "intervallised," to use Vivier's terminology, with interval-class 4 or interval-class 5. In other words, each melodic pitch is harmonised with one of the following four intervals: major third or minor sixth, representing ic 4; and perfect fourth or perfect fifth, representing ic 5. In the completed score, these intervals may occur either above or below the principal melody. Figure 4.33 below presents the principal melody and its resultant lower intervals, transcribed from an 11 x 17 inch, 16-staved sketch. (N.B. Nowhere is there any indication when the intervals should be realised above for the final score.) The ics indicated underneath are my addition, and are not present on Vivier's original sketch.

Figure 4.33 – Sketch of *Orion* melody harmonised with ic 4 and ic 5



[31]Actually, only 40 of the 42 original melodic pitches are restated, as two relatively minor notes in Motives 3 and 4 are dropped. This allows for a two-note coda on the word "*hé-o*," which brings the total back to 42.

I have attempted, without much success, to ascertain whether the added pitches are created from the *jeu de timbres*, or in some other systematic way. Certainly these added pitches do not create the same kind of 12-tone aggregate as the original melody. They may stem from the 13-note scale Vivier used in the "second development of the melody," where the horns restate parallel Lydian harmonies, with each lowest note stemming from this scale (mm. 97–105). But the scale does not contain a D♮, which is prominently displayed in the last interval above. Nor does it account for the intervallised upper B4 and C5 pitches of Motive 3, since the 13-note scale stops at the uppermost pitch of A3. I conclude that Vivier worked purely out of musical instinct to create this "intervallised melody."

Why the selection of ics 4 and 5 for "intervallisation" of the principal melody? The answer may lie in the fact that about 40% of the entire score uses the E♭2-B♭2 pedal or its D2-B♭2 counterpart (mm. 31–56, mm. 107–135, mm. 143–168). These intervals, respectively ic 5 and ic 4, form *Orion*'s main cadential gesture. Also, the three major-sounding tetrachords (those that stem from Vivier's restructuring of the Japanese bells) are employed in approximately 25% of the whole piece. The first two interval-classes for these harmonies are 5 and 4 which, again, may partly explain Vivier's selection of these two intervals for the final section.[32] I believe both elements, the pervasive pedals and the major-sounding harmonies, suggested Vivier's choice of ic 5 and ic 4 for the final section.

In the sixth section considered on its own, some intervallic patterns are noteworthy. For example, each motive begins and ends on ic 4 as a third or sixth, as Table 4.5 indicates.

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[32]Interestingly, no other chords can be formed that have OICs beginning with <5, 4, . . >, according to my formation rule of OICs based on Vivier's own sketch material. See Chapter Three, section 3.4.

Table 4.5 – Initial and final intervals of each motive

	Initial	Final
Motive 1	D♭4–F4	E♭4–G4
Motive 2	B3–E♭5	B♭3–D5
Motive 3	B♭3–F♯4	C5–E5
Motive 4	C4–A♭4	D4–B♭4

Furthermore, there are 23 occurrences of ic 4, eight of which are realised as major thirds, and 15 as inverted minor sixths. The total number of ic 4s is close to that of ic 5s, namely 18. Of these ic 5s, ten are realised as perfect fifths, and eight as perfect fourths. In summary, Vivier appears to have intuitively constructed a well-balanced continuity in respect to intervallic choices.

The melodic intervals and contours of the four original motives sometimes bear a striking resemblance to the parts added below (see Table 4.6 on the next page). For example, the first three-note cell of motive 1, the F4, G4, C♯5, is intervallically similar to the lower notes D♭4, C4, F♯4. As well, the descending ic 6 of the last two pitches of Motive 1, the C♯5 to G4, is similar to the descending ic 5 of the lower notes, G♯4 to E♭4. The semitone descent in Motive 2, the Eb5 to D5, is reflected in the descending ic 1 of the lower part, B3 to Bb3 (overlooking the F♯4). In Motive 3, the ascending three-note pattern, F♯4, A4, C5, is reflected in the lower pitches, B♭3, C♯4, E4, with ic 3s for both parts. As well, the last two pitches of Motive 3 form a rising major third, C5 to E5, which is reflected in the lower part's G4 to B4 (then C5). For Motive 4, the span of the original motive is an ic 5, from A♭4 to D♭5, which closely matches the span of the added lower part, C4 to F♯4. Additionally,

the thrice-repeated pitches of each phrase (Motives 1 and 2 combined for phrase 1) have an intervallically similar lower part as shown below.

Table 4.6 – Lower pitches and resultant intervals below each phrase's repeated pitches

Phrase 1	3 x C♯5	F♯4, F4, G♯4	ic 1, ic 3
Phrase 2	3 x C5	F♯4, F4, A♭4	ic1, ic 3
Phrase 3	3 x C♭5	F♯4, D♯4, E4	ic 3, ic 1

The final measure of the work, measure 182, forms a short two-note coda, with the sudden tempo marking *tempo molto ritenuto* (see Fig. 4.27 above, p. 161). Here, the "*hé-o*" motive returns, with the original direction to sing into the tam-tam (*fortissimo*), along with the same two pitches as before (D♭4, B♭3). Also, the two accompanying eight-note chords used in the previous section are here restated by the first and second violins (*pianissimo*). At the end of measure 182, a final wood-block is struck *ffff*, ending the entire work abruptly.[33]

Further enhancing each motive in the last section, large tam-tams are struck at the beginning of each restatement: measure 169 for Motive 1, measure 171 for Motive 2, and measure 173 for Motive 3. However at certain points in Motive 4 (second half of m. 179, last eighth-note of m. 180, and all of m. 181), the tam-tam is instructed to play with "irregular and menacing sounds with a triangle beater on the surface." The final "*hé-o*" in the last measure, sung into the tam-tam, which presumably is still resonating, gives the voice a strongly distorted tone. The vocal element gives a haunting final touch to this work as it fades into

[33]The wood-block *cessura* may be Vivier's interpretation of a Japanese tradition, one that cleanly demarcates the end of a dramatic work.

nothingness, but the fade-out is jarred by the sudden wood-block *cessura*. The last measure forms perhaps the most poignant chord-colour of the entire piece, one of a particularly lasting, yet disruptive quality (see Fig. 4.27 above, p. 161).

4.7 *Summary*

Various chord-colours dominate each section of *Orion*, ranging from simple ones of a single harmony (section one) to relatively more complex ones involving several layers of music (section two), canons (sections two and three), chord-shifting technique (section three), overtone series (section four), complex eight-note sonorities (section five), and simple intervals harmonising the principal melody (section six). Orchestrational details enhance the colours, for example: the *Rin* in section 1, the layers of instruments chosen for sections two and three, the interpolation of an added Thai melody in section three, the human element of the voiced "*hé-o*" of section four, the strings' irregular tremolos in sections one and four, and the "lion's snare" in section six. Most importantly, the role and deployment of the *jeu de timbres* remains central to each section and its resultant, imaginative *couleurs*.

Chapter 5: The chord-colours in the other instrumental works of 1979–80

Overview

Vivier restricted *Zipangu* and *Cinq chansons* to a single family of instruments each—respectively, strings and percussion—to explore various possibilities of producing *couleurs* in a limited context. They differ strongly in timbral terms from *Orion*'s large orchestral palette. Following the model of Classical chamber music, each of a small number of players has one part (13 in *Zipangu* and five in *Cinq chansons*). This enables Vivier to concentrate on more intricate aspects of musical production not normally possible in orchestral music, especially individual dynamics and *kotekan* textures.

Zipangu does not use superimposed realisations of the *jeu de timbres* to create *couleurs*. Generally, *Zipangu* uses avant-garde string techniques, many quasi-aleatoric, to produce its unique and dense *couleurs*. Among these are exaggerated bow pressure (producing what Vivier called "granular" sound); *tremolos* that are either irregular, or instructed to accelerate or decelerate. Bartókian *pizzicato*; and artificial harmonics, both "normal" (with second finger touching a node a perfect fourth above the note played) and "unspecified." As Vivier explained in his program notes:

> I explore different aspects of "colour" in this piece. I have tried to veil my harmonic structures [read: *jeu de timbres*] by using different bow techniques. A colourful sound is obtained by applying exaggerated bow pressure on the strings as opposed to pure harmonics when returning to normal technique. In this way melody becomes "colour" (chords), grows lighter and slowly returns as though purified and solitary.

In *Zipangu*, the *jeu de timbres* forms the basic level of the written score;[1] the new string techniques produce unspecified, exaggerated spectral overtones. The manner in which these techniques are executed significantly contributes to the realisation of the *couleurs*; a suitable outcome is a function of how carefully the string parts are performed. Both players and conductor must strive for what they imagine to be Vivier's desired sound in order to execute a satisfactory performance.

The exact sonic result of the various percussion instruments in *Cinq chansons* is even more difficult to predict or indicate. The specified instruments, mostly Balinese gong racks, may be substituted for by similar metalophones of approximately the same pitches, depending on availability. Nowhere in the sketches or program notes does Vivier use the terms *jeu de timbres* or *couleurs*, although he does use two *jeux de timbres*: the first, featuring 15 two-voiced melodic components, is the basis of the third "song," and the second, consisting of ten four-note harmonies, is the basis of the fourth "song." Because the first two "songs" are essentially monophonic in texture (i.e., no accompanying harmonies), and the last one uses various dyads (loosely derived from an unrelated scale), only the middle two "songs" will be considered in my analysis.

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[1]The word *jeu* (not its plural, *jeux*) is frequently used in a preliminary sketch to *Zipangu* on the lower left side. Refer to sketch Z1 in Appendix 3, p. 248.

5.1 *Jeux de timbres* in *Zipangu*

The 15 chords which make up the *jeu de timbres* of *Zipangu* (see sketch Z3, Chapter One) appear in two variations, presented with unusual string techniques and dynamics. Further variations apply new sets of harmonies to the basic melody (i.e., new *jeux*). *Zipangu*'s explorations of new timbral-harmonic designs go beyond the theoretical framework of *Orion*, which is relatively systematic. Here, in addition to the use of the chords of the *jeu* in complex and layered textures, a less structured manner of producing *couleurs* appears—one based on intuitive choices that conform neither to the *jeu de timbres*, nor to additive synthesis.

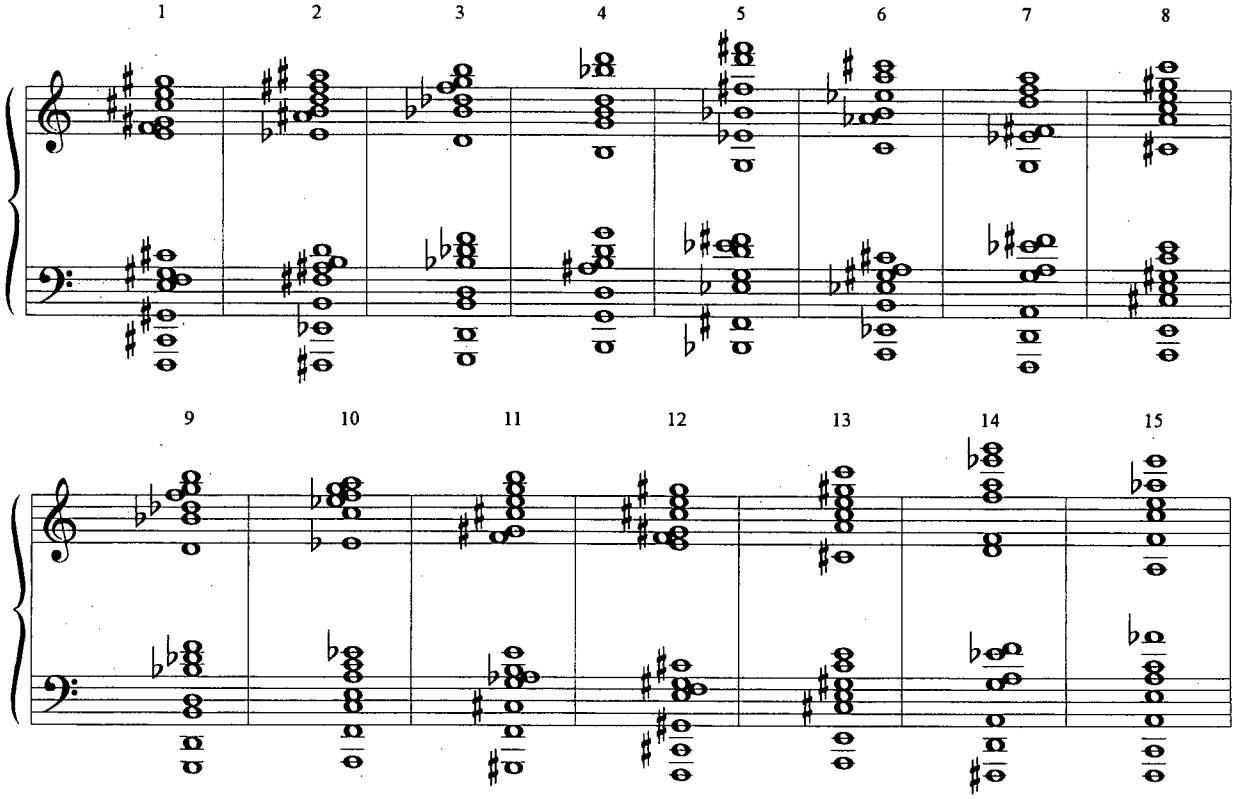
5.1.1 – Variation One (mm. 40–68)

Variation One follows the basic melody immediately (mm. 1–39), restating the 15 basic pitches of the melody with a form of the *jeu de timbres*. The original harmonies of sketch Z3 (the result of various interplays of intervals and inversions discussed in Chapter One) are arranged for the 13 string instruments. This arrangement is given in sketch Z4,[2] entitled "*accords tutti*," duplicated below (see Fig. 5.1). Specifically, the top staff of each system of sketch Z4 (treble clef) largely duplicates the original 15 harmonies of sketch Z3 with a few minor alterations: chord 6 is rearranged slightly with the original pitches C5 and A♭5 dropped one octave, chord ll does not have its representative melodic pitch F5 at the top, this being placed an octave lower as well, and the associated uppermost melodic pitch of chord 7, the G5, is placed two octaves lower.

[2]The relevant sketches for this discussion are duplicated from the archives at the Université de Montréal, file #68. See n. 2, chap. 3.

This top portion of the "*accords tutti*" is scored for roughly half the strings, violins 1 to 6. The original 15 harmonies of sketch Z3 are duplicated in the lower seven parts (on the bottom staff of each system), but the registral arrangement of pitch-classes is different. I see no clear correlation between the arrangement of pitches of the original 15 harmonies on the upper staff with those on the lower one: the melodic pitches are not placed in the uppermost instrument of the lower group (i.e. violin 7), nor are the lowest pitch-classes the same on both staves; the span of the basic melody (a major ninth) is not matched by either of the outer parts in the lower group (i.e., violin 7 and double bass), both of which have a comparatively narrow range: violin 7, C♯4 to A♭4 and double bass, F2 to B2. See Figure 5.1 below.

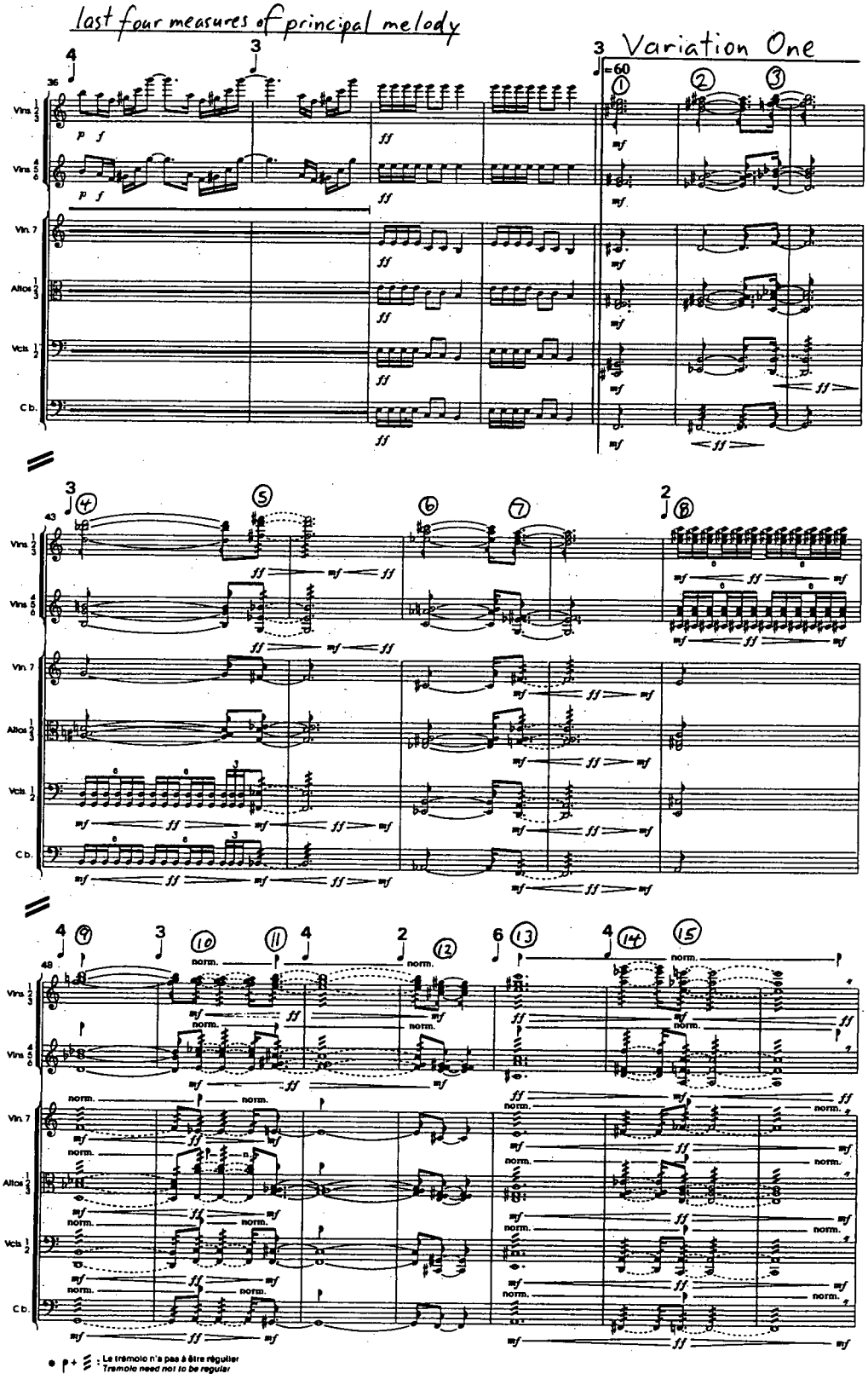
Figure 5.1 – "*Accords tutti*"



These "*accords tutti*" form the basis of the first variation, in which each harmony is presented once, using a variety of string techniques to produce a dense texture. One technique—extreme bow pressure on the string, resulting in so-called "granular" sound—is indicated by small half-circular black appendages to each note-stem. This generates indeterminate frequencies additional to those actually fingered. Both high and low groups use this effect throughout the variation, usually at an even *mf* dynamic. Variation One also introduces a large number of tremolos with varying dynamics, typically with a quick *cresc.* to *ff*, followed by a return to *mf*. Less often used are triplet sixteenth-note figures lasting for two quarter-note beats (m. 43 and m. 47), which have the same dynamic fluctuations as the tremolos.

The manner in which these effects are introduced or combined creates the texture, which becomes increasingly dense as the variation proceeds. See Figure 5.2 below, where I duplicate the score, including signs that indicate tremolos, sixteenth-note figures, and tremolos combined with "granular" sounds in the latter portion (mm. 48–54). The special string techniques are mostly introduced by the lower group up to measure 47, in increasing number of voices. In the last measures (mm. 48–54), dynamically unstable tremolos with "granular" sound alternate between both groups. The densest texture thus occurs in the final harmonies of the variation.

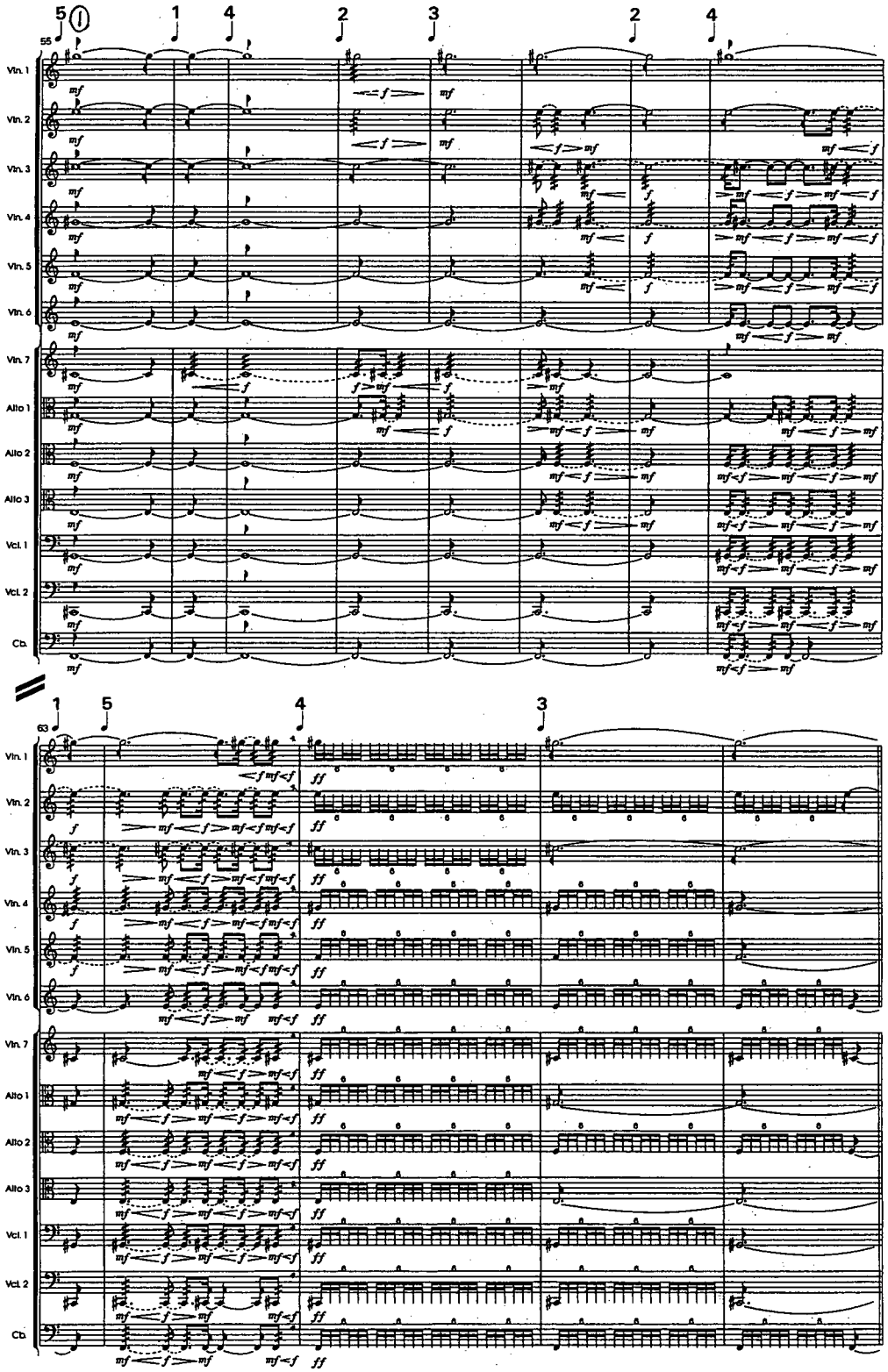
Figure 5.2 – *Zipangu*, mm. 40–54



The first harmony is restated in the following measures, mm. 55–68, with the characteristic string techniques of Variation One. These measures constitute a final segment to this variation, particularly as another change of texture occurs at measure 69, where the *jeu de timbres* is restated in a different timbral guise. In this concluding segment, Vivier uses two sets of progressive durations. Measure 55 begins with five quarter-note beats, and every second measure thereafter gets shorter by a quarter-note until measure 63, which is one quarter-note long. On the other hand, measure 54 is one quarter-note long, and every second measure thereafter increases by quarter-note durations, to five by measure 64.[3] Throughout mm. 55–64 granular effects are extensively used, but the effects of tremolo/dynamic enter in increasing numbers. Figure 5.3 below (mm. 55–67) shows how both groups steadily add more tremolos, until all instruments use this effect in the latter portion of measure 64. Measures 65–67 reintroduce the triplet sixteenth-note figures at its loudest dynamic of *ff*, non-granularly at first, and reinstating the granular effect by degrees until, at measure 68 (not shown in Fig. 5.3) all instruments are using the granular effect on an extended fermata.

[3]Typical of Vivier's style, the alternating proportional scheme of two groups of durations here in *Zipangu* recall that of section five of *Orion* ("the memories of the melody").

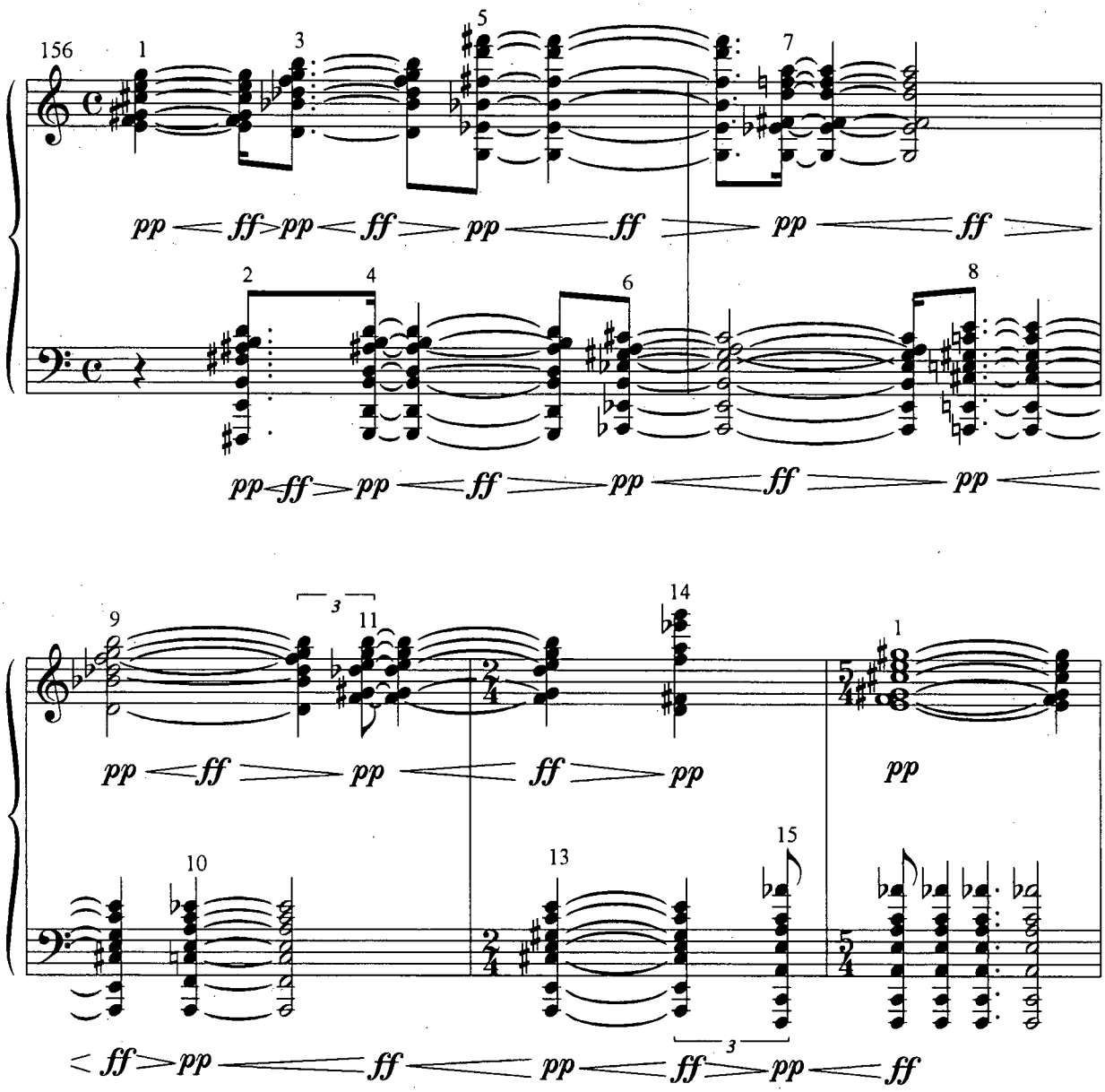
Figure 5.3 – *Zipangu*, mm. 55–67



5.1.2 – Variation Five (mm. 156–178)

Variation Five also uses the 13-note "*accords tutti*," preceding the final statement of the basic melody. The two instrumental groups (that is, violins 1–6, and the remaining lower strings) alternate harmonies in hocket fashion, beginning with the upper group. The arrangements of the chords presented by each group are those played in Variation One. I have simplified the score in Figure 5.4 on the next page, and eliminated the repeated sixteenth-note and occasional triplet-note rhythms. The dynamics and the *crescendi* and *decrescendi* are indicated to show how they alternate in each group, with the groups complementing each other.

Figure 5.4 – Beginning of Variation Five, mm. 156–160

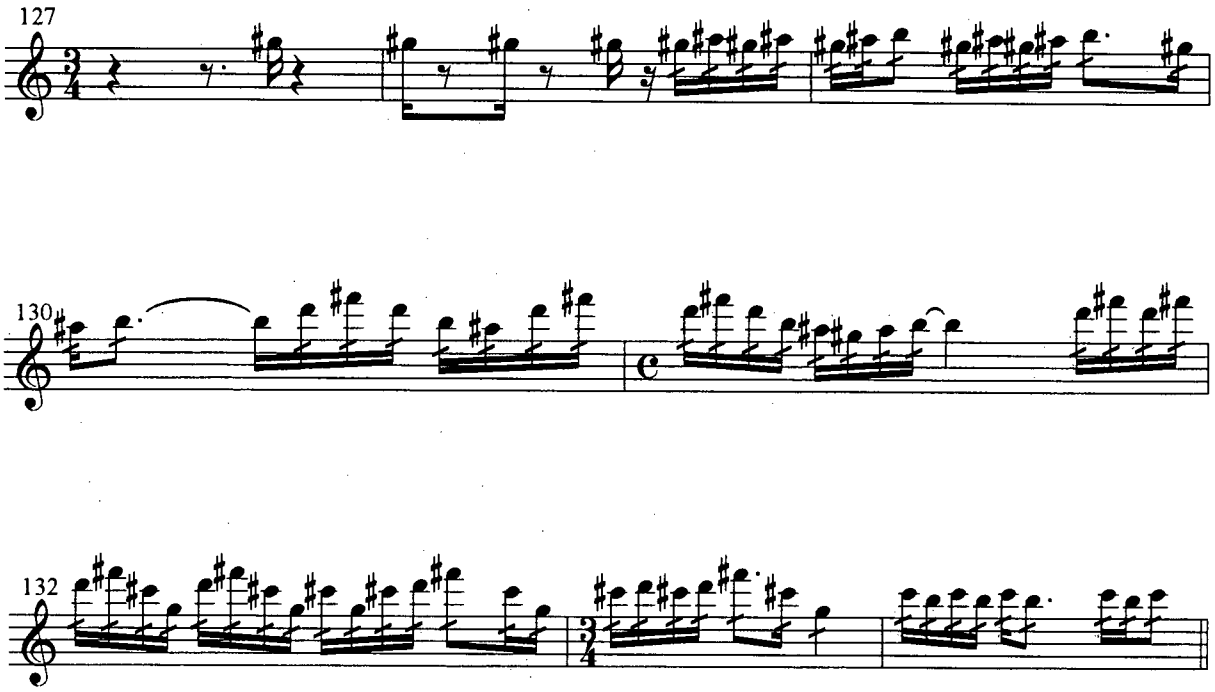


Exhaustive analysis of all the variations of *Zipangu* is beyond the scope of this study, but Variation Four is worth commenting on in some detail. It incorporates two other series of four-note sonorities in a manner recalling the polyphonic passages in *Orion* (see chapter four, discussion of "the first development of the melody"). The first of these series has some relation to the *jeu* in *Orion*, making use of all-interval-class aggregates and symmetrical OICs in the vertical dimension. The second series has no obvious theoretical basis. Nonetheless, the overriding purpose of these additional harmonies is to achieve *couleurs* without resorting to additive synthesis. Hence, these passages in Variation Four may be seen as an intermediary stage between the *jeu de timbres* as executed in *Orion*, and the additive synthesis of *Lonely Child*.

5.1.3a – Variation Four (mm. 127–156/1)

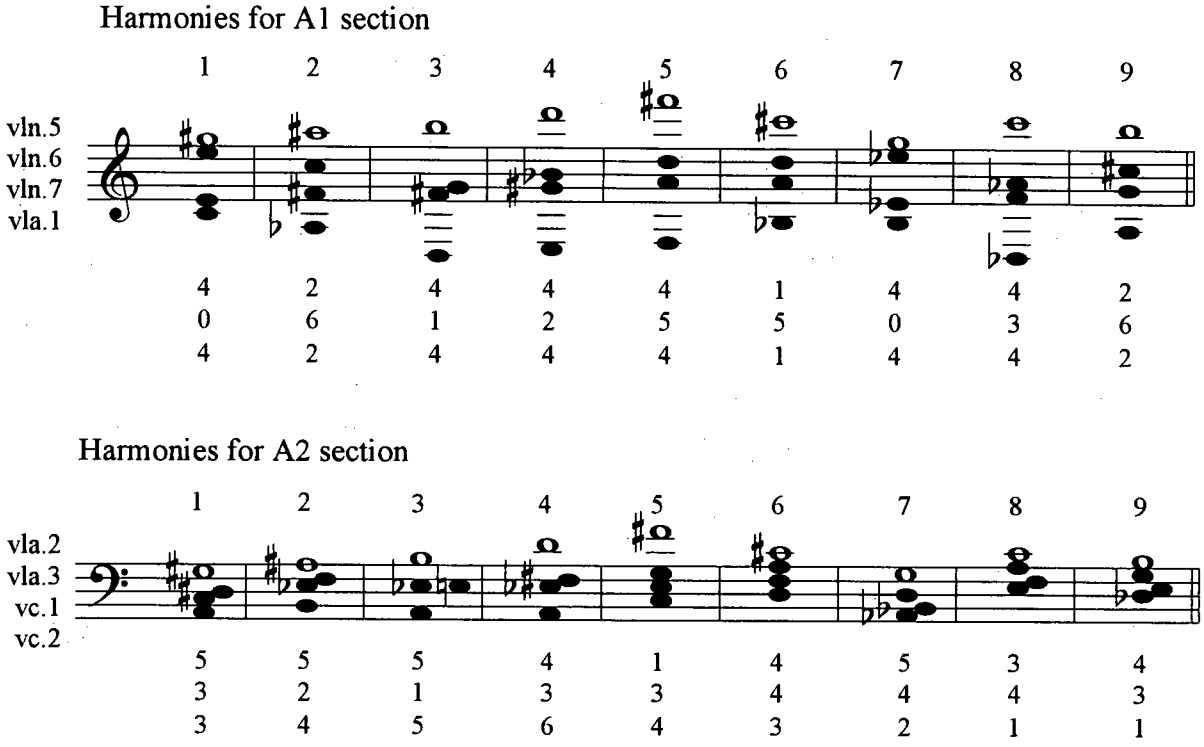
The overall form of Variation Four is ternary (ABA), with the first nine notes of the basic melody restated from mm. 127–134 (A1 section) and from mm. 150–156/1 (A2 section). The middle section (B section, mm. 135–149) presents the melody in inverted form, and in numerous small thematic cells. The ABA form of Variation Four displays Vivier's predilection for varying textures even at this lower formal level. The first A section (A1) presents the melody in violin 5, harmonised with a new series of four-note harmonies, in which violins 6 and 7 and viola 1 produce the lower harmony pitches. While just the first nine pitches of the melody are used, the many repetitions of various melodic cells create a rhapsodic variation. (See the melody reduction in Figure 5.5 below.)

Figure 5.5 – Simplified form of A1 melody



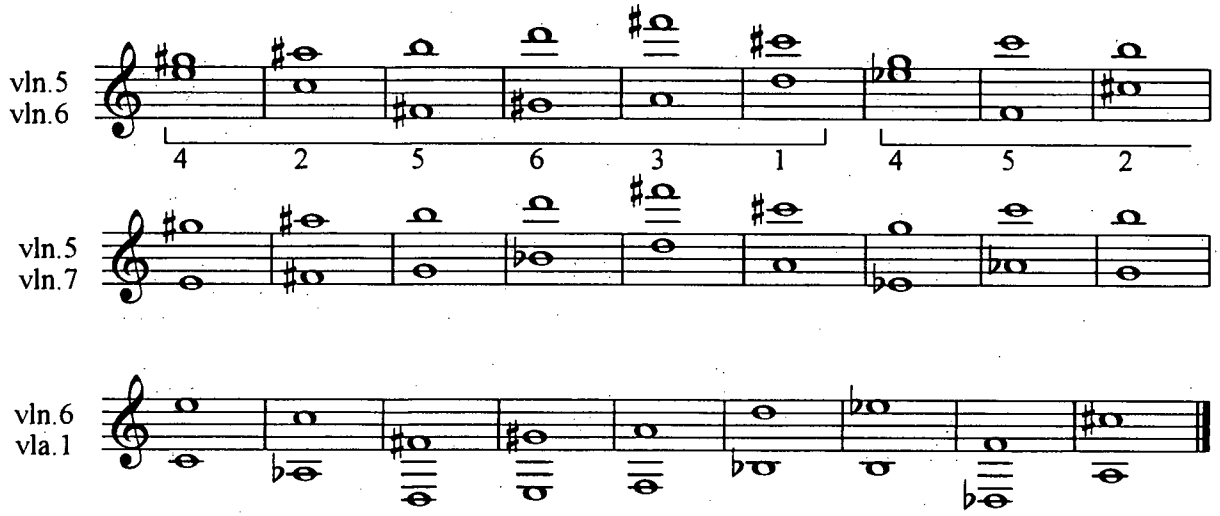
The second A section (A2) restates the same melody, now a solo for violin 1. The lower four instruments (violins 2–5) form a new series of four-note accompanying harmonies which unfold in relatively slower time-values, independent of the melody. The accompanying harmonies do not match those of section A1, nor does either set of harmonies in this variation relate to the *jeu de timbres* of sketch Z3. Frustratingly, no sketches extant indicate these new series of harmonies. While the chords of the first set (A1 section) display obvious symmetry in their intervallic ordering, those of the second set (A2 section) show no obvious principle of construction. See these two sets of harmonies in Figure 5.6 on the next page.

Figure 5.6 – Supporting harmonies of A1 and A2
Please note the value of zero indicates two pitches which belong to the same pitch-class



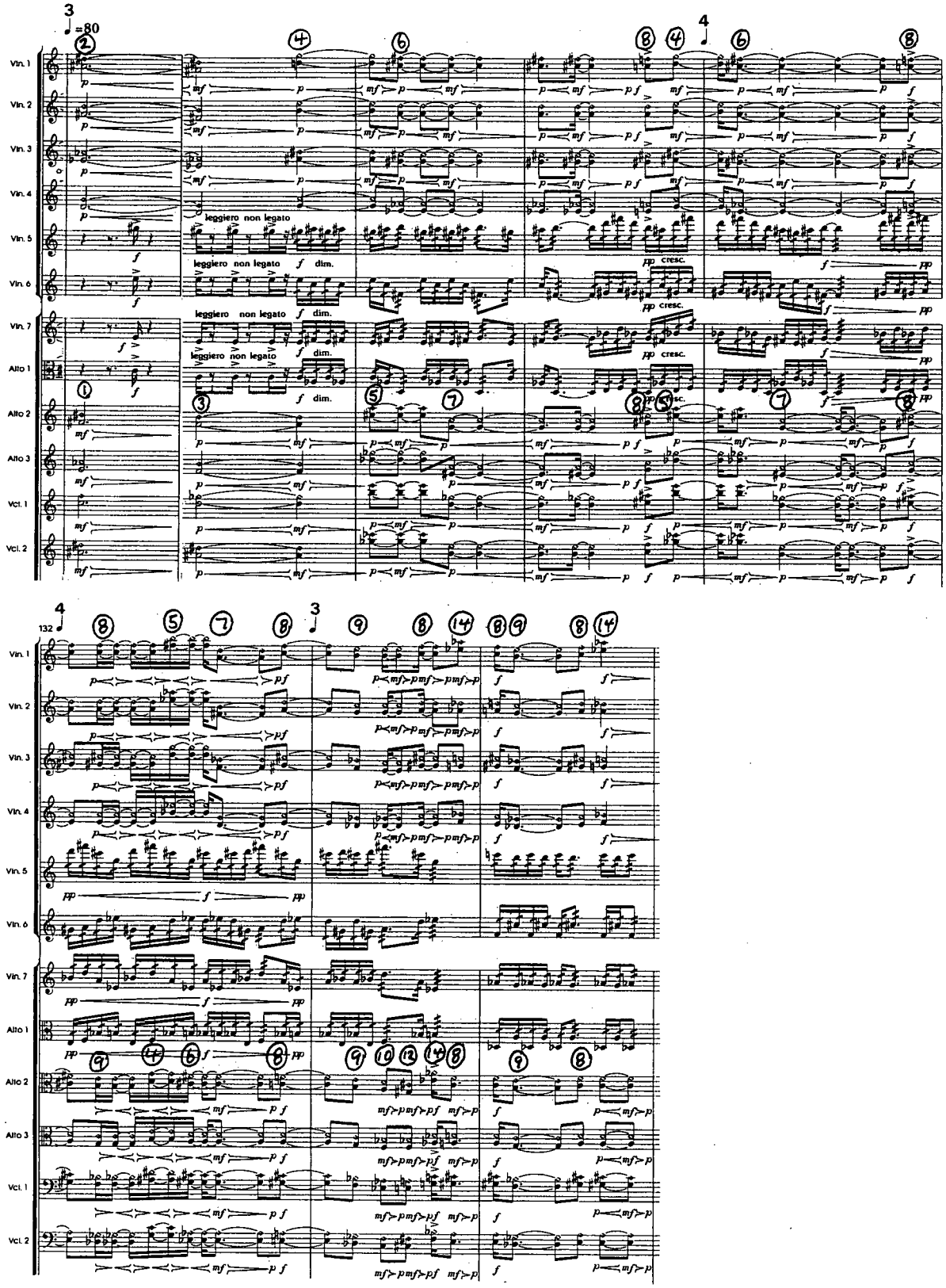
Closer examination of the harmonies of section A1 in Figure 5.7 below reveals an interesting "play" on intervals. Each of the first six melodic pitches (violin 5) is assigned a unique interval-class below (violin 6), and both parts are harmonised by a series of parallel major tenth intervals, respectively by violin 7 (counterpart to the melody) and viola 1 (counterpart to the invented lower part). Vivier calls the process of counterpointing two voices to form an all-interval aggregate "intervalisation," intimated under item four of his preliminary sketch to *Zipangu* (sketch Z1, see Appendix 3, p. 248), where he writes, *la mélodie s'intervallise sur tous les intervals.* Interestingly, the first six melodic pitches employ one instance each of all interval-classes, but the invented lower part doesn't quite conform in this respect (it lacks a 3, and has two 1's).

Figure 5.7 – Analysis of A1 harmonies into ics



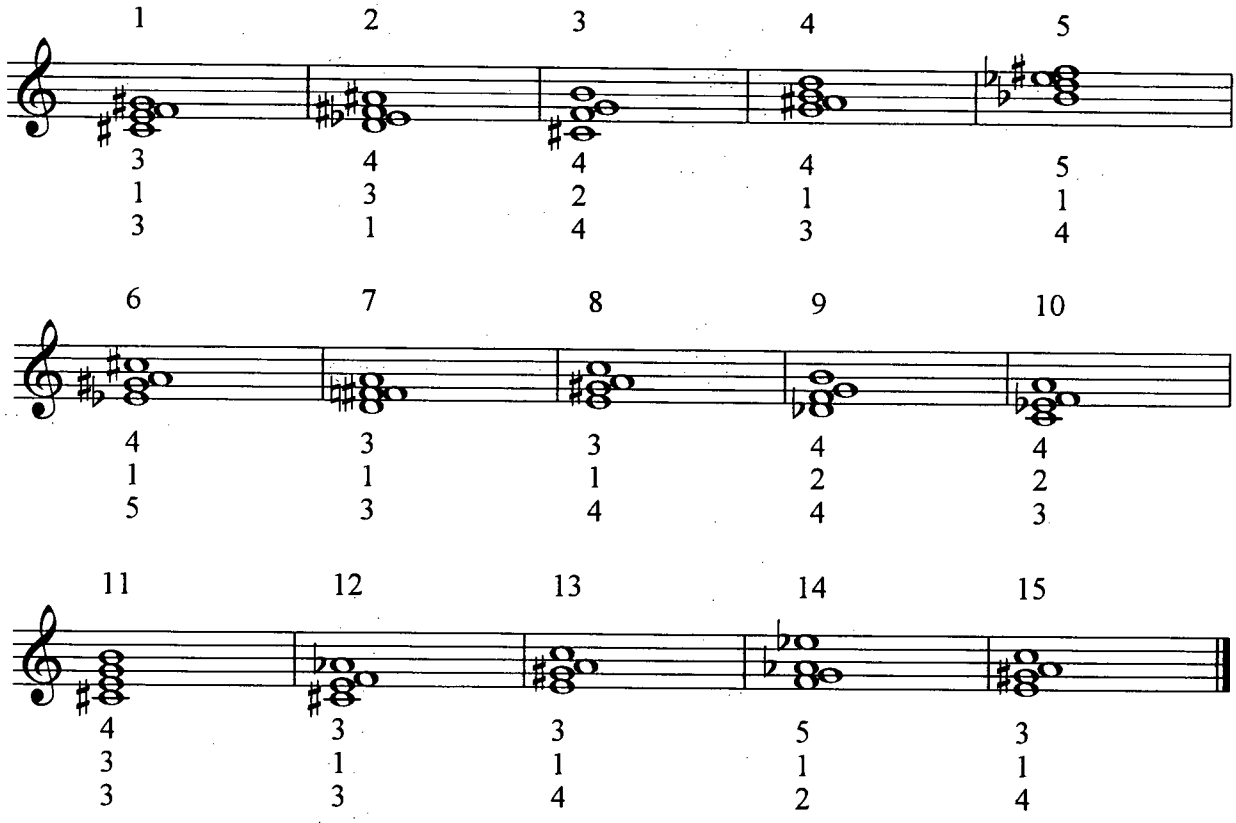
In section A1, the instruments outside the melodic group are divided in two, and restate a new arrangement of the original *jeu de timbres* of sketch Z3 (described below). These latter harmonies form a counterpoint to those of the melodic group; they are stated one at a time with longer time-values than those of the melodic group, and are also stated more quietly, as artificial harmonics. In this section, the upper accompanying group is formed by violins 1–4, and the lower by most of the remaining instruments (violas 2 and 3, celli 2 and 3). The double-bass does not engage with either group, but maintains a steady G♯2 pedal-point (and is not included in the annotated Fig. 5.8 below to save space). The two supporting groups restate four-note versions of the original 15 chords in alternation, except at the beginning of this variation (m. 127) where they state harmonies 1 and 2 simultaneously. These harmonies use artificial harmonics at the fourth, which result in pitches two octaves higher than indicated in the score. The upper group states its harmonies *crescendo*ing from *p* to *mf* while the lower group states them *diminuendo*ing from *mf* to *p*. Each harmony begins, in each part, exactly at the softest dynamic point (i.e., *piano*) in the other part. The speed at which these chords are stated gradually increases throughout the variation as well. See Figure 5.8 on the next page.

Figure 5.8 – Variation Four, A1 in score, mm. 127–134 (annotated)



The accompanying chords in A1 are first indicated in sketch Z4, below the "*accords tutti*," used in Variation One and Five. They employ a far narrower range than indicated in the sketch (see Fig. 5.9 below). While most retain the pitches of the basic melody as their highest pitches, harmony 11 (like its corresponding harmony in the "*accords tutti*") has a B as the uppermost pitch (not the expected F).[4] Harmony 14 also lacks the uppermost G of the original melody, and has an E♭ instead (although the pitch G is contained within).[5]

Figure 5.9 – "Harmonic" chords from sketch Z4



[4]Interestingly, this harmony is not used in A1 of Variation Four.

[5]Another anomaly in the accompanying chords of A1 is at chord 8, which is presented simultaneously between both groups instead of conforming to the prevailing alternation between groups. This harmony almost largely identical in both groups, but the uppermost pitch is different. In the upper group, C-natural is stated corresponding to harmony 8 of the original 15, and in the lower group, C♯ is stated. I'm unsure if this is deliberate on Vivier's part or an error on part of the Doberman-Yppan publisher (which, according to Mme Desjardins, is quite likely).

5.1.3b – Sketch Z2: the B section of Variation Four

The harmonies for the basis of the middle section of Variation Four stem from another sketch for *Zipangu*, rendered diplomatically in Figure 5.10 on the next page.[6] The relevant portion consists of two systems of chords in the lower half of the page, each with its own two staves, both in treble clef. The chords of the bottom system are identical to those of the top system, but are transposed up a major third (T_4), and the 15 basic pitches of the principal melody form the lowest pitches of each harmony. Square brackets in the upper system and rounded phrase marks in the lower suggest segmentations, but are not identically placed from system to system.

In both systems, each tetrachord is divided into two dyads, one per staff. Over the top staff are five square brackets, which segment the 15 chords into groups of 3, 4, 2, 5, and 1 chord, respectively. This segmentation reproduces the lengths of the five motivic segments of *Zipangu*'s basic 15-note melody. The formation of these harmonies reveals no systematic approach such as seen in *Orion*. See the harmonies of the lower system in Figure 5.11 below (which follows Fig. 5.10) and includes the OICs and set-classes of all 15 harmonies. (N.B. My OICs appear inverted, reflecting the first two in Vivier's sketch, which display the ics in bottom-to-top order). At the top of Figure 5.10 are the basic pitches to the principal melody of *Zipangu*, along with its inversion, appearing in the same system on the lower staff.

[6]The top portion of this sketch suggests preliminary information regarding the formation of the harmonies below. There is not enough information to convincingly evaluate the connection between this portion and the larger portion contained below.

Figure 5.10 – Sketch Z2 for *Zipangu*

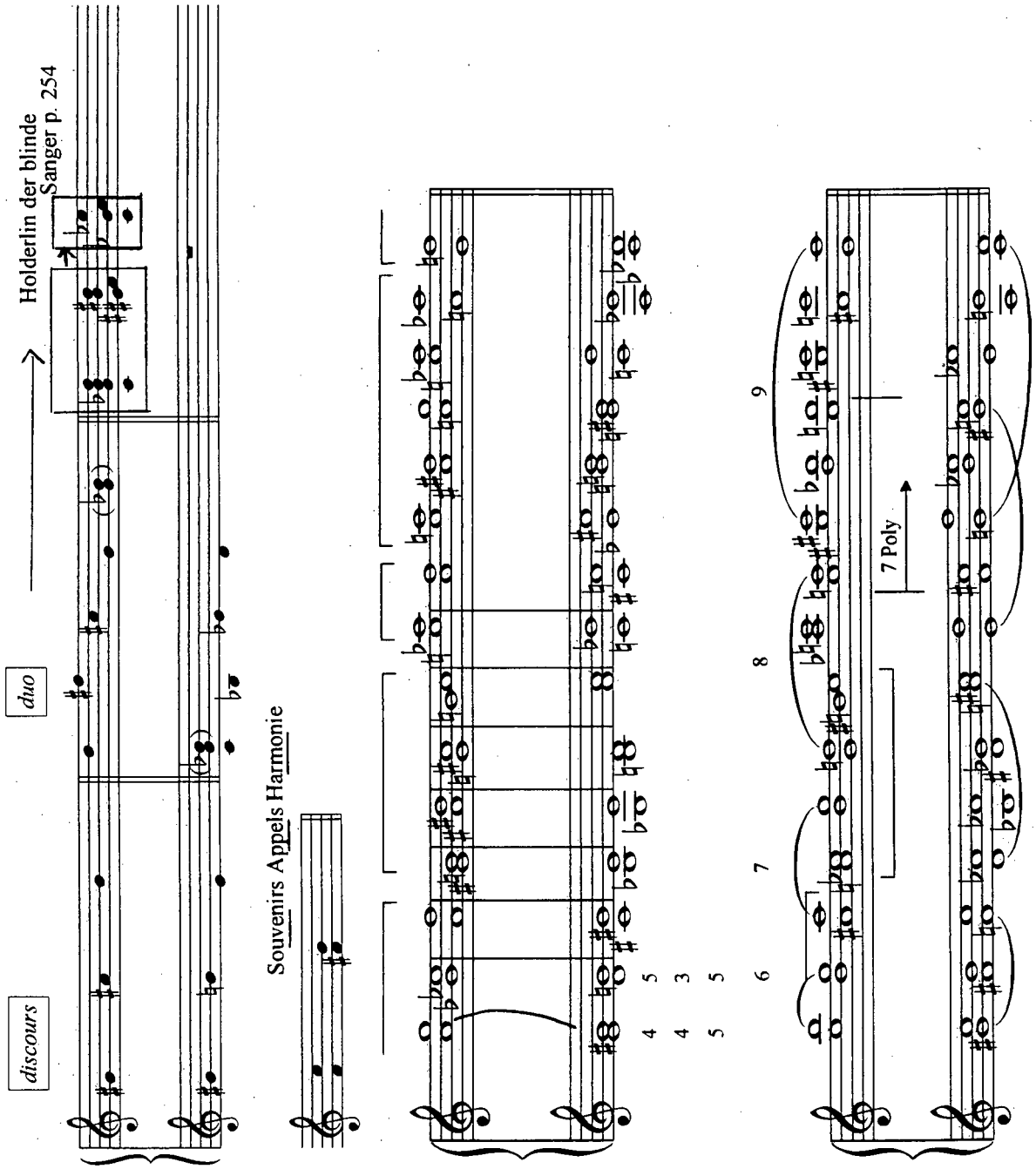
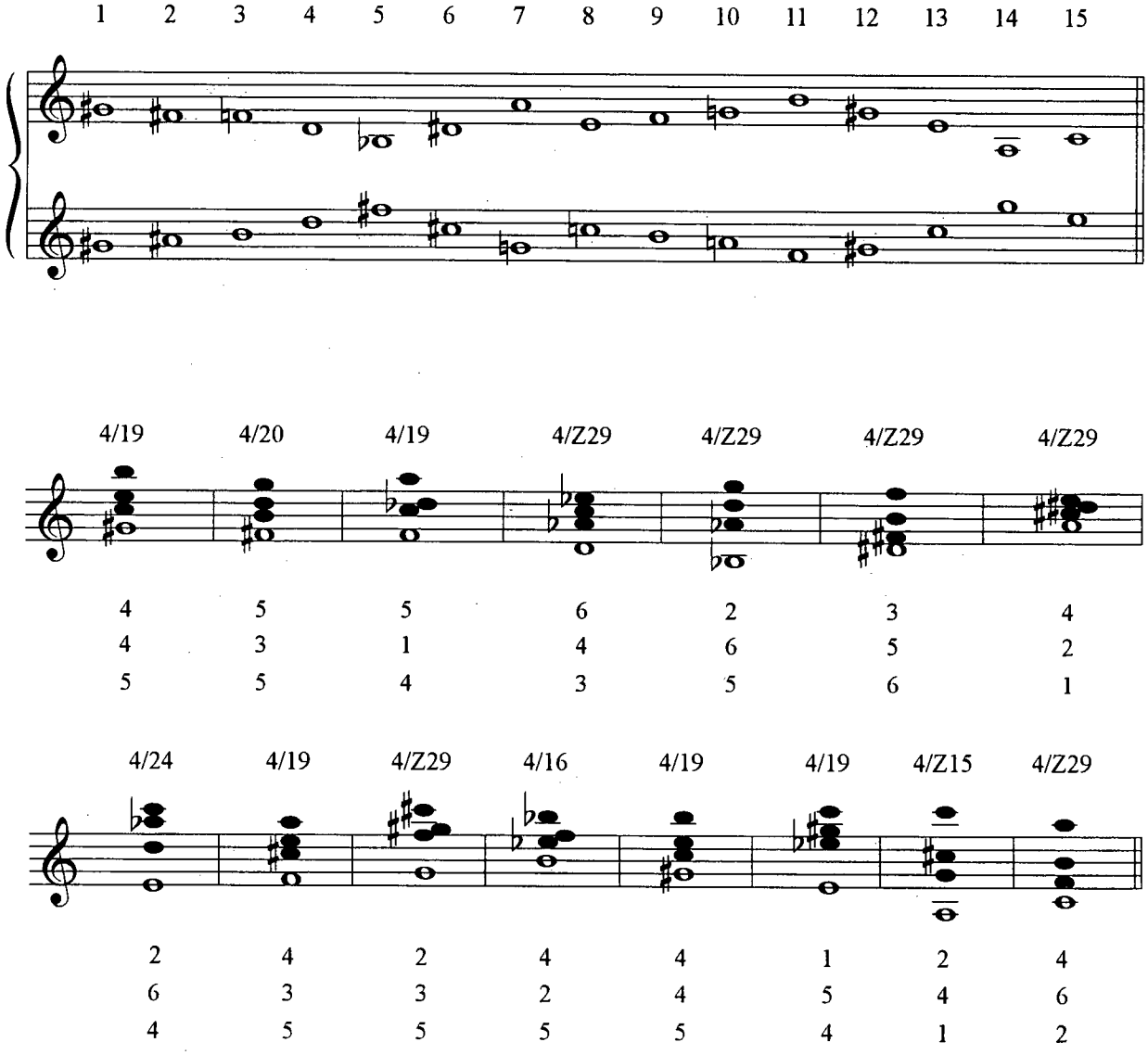


Figure 5.11 – Inverted melody and harmonies for B section of Variation Four



There are six different set-classes represented in the 15 harmonies in Figure 5.10, with six instances of 4-Z29 and five instances of 4-19. Two set-classes (4-Z29 and 4-Z15) have the same all-interval-class vector of [111111], while the interval-class vector of the other set-classes emphasises ic 4 and ic 5: 4-16 [110121]; 4-19 [101310]; 4-20 [101220]; 4-24 [020301]. The OIC sets of all harmonies show a concentration of ic 4 and

ic 5, which occur 23 times (respectively, 11 and 12), nearly exactly half of all possible intervals (45 total). These two interval-classes are the same two first indicated under item three in a preliminary sketch to *Zipangu* (sketch Z1, see Appendix 3, p. 248).[7] As well, some hint of all-interval aggregates is present in the first seven harmonies: the middle intervals of chords 2 to 7 have all six (ics 3, 1, 4, 6, 5 and 2), while the top ones of chords 3 to 7 have five (ics 4, 3, 5, 6 and 1) and the bottom ones of the same chords also have five (ics 5, 6, 2, 3 and 4). Otherwise there are no other apparent aggregates formed in this series of harmonies, and certainly nothing as thorough as in *Orion*.

Another significant factor about these chords is their quasi-tonal direction towards A. Chords 1 and 12 are identical, and form approximate dominants, the first as an opening gesture, the second as a half-cadential gesture approaching the end. Chord 7 appears as a cadential tonic, and closes the first two groupings, while chords 14 and 15 collectively represent a tonic function, the latter one as a ♭VI transposition (T_8) of chord 7. As well, the descending contours of the topmost pitches indicate a quasi-tonal progression. The first seven chords (1 to 7) have three descending contours which ultimately rest on the E5, the "dominant" of the quasi-tonic chord 7.[8] The last eight chords (8 to 14) evince three descending contours, with a slight prolongation of the uppermost pitch of the final one before its descent to the quasi-tonic, A5.[9]

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[7]Strikingly, these two intervals are the very same two used to intervalise the principal melody of *Orion* in its last section.

[8]Chords 1 and 2: B5-G5; chords 3 and 4: A5-E♭5; chords 5, 6 and 7: G5-F5-E5.

[9]Chords 8 and 9: C6-A5; chords 10 and 11: C♯6-B♭5; chords 12, 13, 14 and 15: B5-C6-C6-A5.

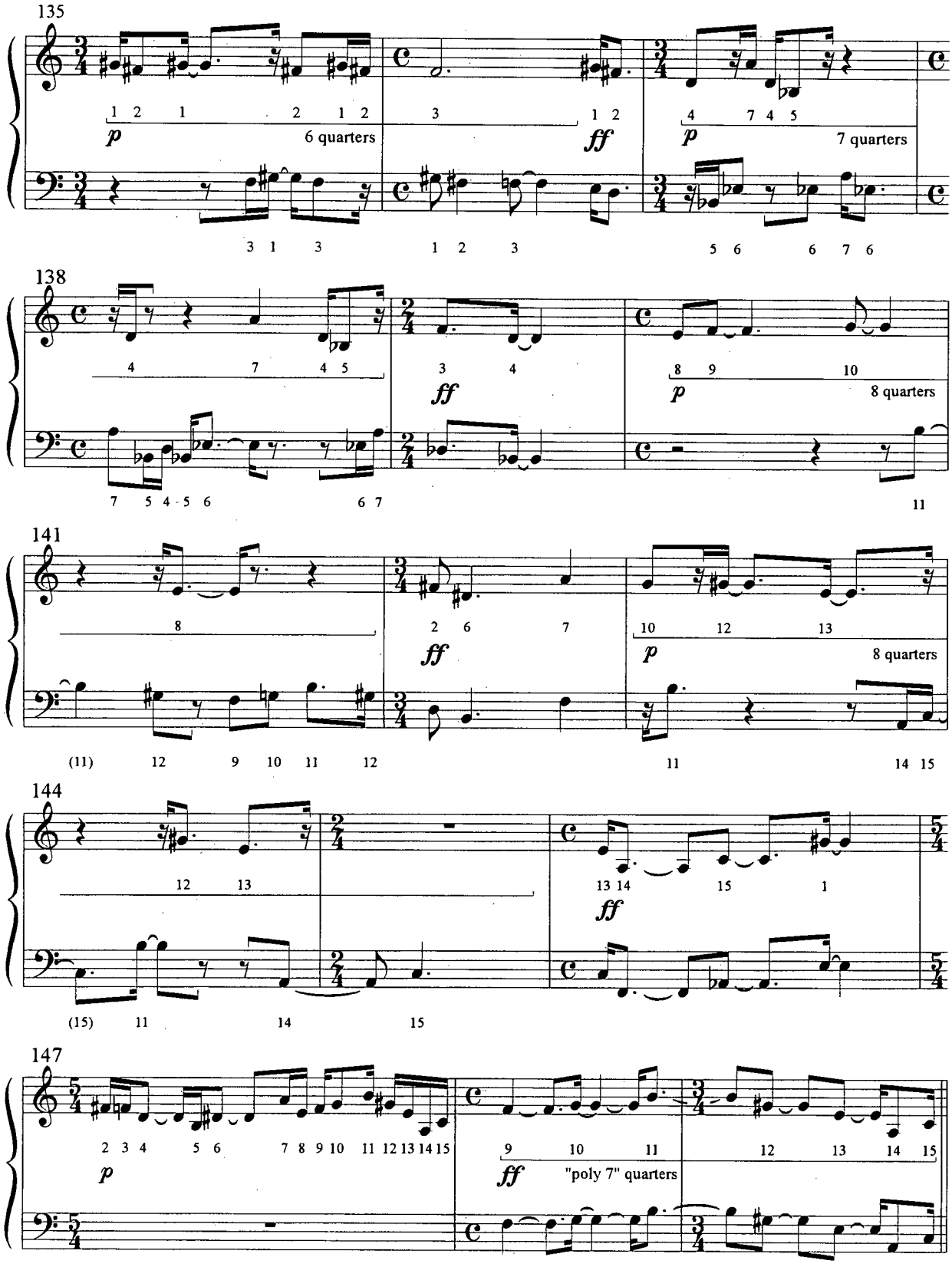
Returning to the lower system of sketch Z2, there are various phrase marks in both staves, and they do not group the harmonies according to the melody's constituent motives, as do the brackets in the top system described above. Integers are only placed above the slurs of the top staff (6, 7, 8 and 9), and, respectively imply groups of 2, 3, 4 and 6 chords. Vivier appears dissatisfied with these groupings, and extends the first of two harmonies to include a third (marked by a right-closed square bracket). The next grouping of four harmonies is adjusted by the addition of a lower square bracket under the top staff notes to encompass harmonies 4 to 7. The other two groupings remain the same, despite an overlap of harmonies 6 and 7 between the second and third grouping. The integers 6, 7, 8 and 9 refer to the quarter-note durations of the segments in which these harmonies are applied in the B section of Variation Four. They are exchanged between two instrumental groups, as shown in Figure 5.12 below (note the dynamic level of these passages remain consistently *piano*). For simplicity, only the bottom pitch of each harmony is duplicated, along with its respective ordinal integer.

Upon closer examination, the harmonies contained in the groupings of the top staff do not completely coincide with those used in the five *piano* passages (see n. 9). However, the phrase markings of the lower staff group the harmonies more accurately with chords 1–3 in the first passage, of six quarters duration; chords 4–7 in the second, of seven quarters, chords 8–12 in the third passage, of seven quarters, chords 10–15 in the fourth passage, of eight quarters, and chords 2–15 in the fifth and last passage, of five quarters. (the last three of phrase 5 overlap with the first three of phrase 6).[10] The "poly 7" in the middle of both staves indicates a repeat of chords 9–15, likely for mm. 148–149.

---

[10]Note the durations of the *piano* passages do not perfectly correspond with sketch Z2: mm. 135–136/3 is six quarter-notes long, mm. 137–138 is seven quarters, mm. 140–141 is eight quarters, and mm. 143–145 is eight quarters (not nine as expected). Measures 147 presents harmonies 2 to 15 over five quarters, the duration of which is not indicated in sketch Z2.

Figure 5.12 – Entire B section, mm. 135–149 (simplified)



At the periodic *ff* passages in the B section, both streams of T_4-related chords from the sketch are stated, one in each instrumental group. This creates eight-note harmonies by duplicating each tetrachord a major third lower. While the five *ff* passages introduce the 15 chords in sequential order, some irregularities emerge as Table One illustrates below. The durations are measured in total quarter-notes.

Table 5.1 – Five *ff* passages in B section of Variation Four

Measures	**Chords**	**Duration**
136/4	1, 2	1
139	3, 4	2
142	2, 6, 7 (no 5)	3
146	13, 14, 15, 1	4
149–50	9 to 15 inclusive	7

Curiously, chords 5 and 8 are absent. Perhaps the melodic contour of the third passage (m. 142) is improved by replacing expected chord 5 with chord 2 to produce F♯4-D♯4-A4 rather than expected B♭3-D♯4-A4. Chord 8 may have been eliminated to produce the last seven harmonies (chords 9 to 15) for the final passage. Overall, these five *ff* passages present the inverted melody in highly veiled manner, along with increasing quarter-note durations from passage to passage. Rhythmically idiosyncratic as well, the last statement presents each of the final seven harmonies in decreasing durations of sixteenth-note increments from seven to one.

5.2 *Jeux de timbres* in *Cinq chansons pour percussion*

Two *jeux de timbres* are used, as described in Chapter One. The first one is created through the following process:

1) Find approximate pitches for Balinese *pelog* and *slendro* scales (as realised on *trompong* and *bonang gamelan* bell racks).

2) Create a composite scale of these pitches, in this case with a range of just over two octaves, from A3 to C♯6 (see sketch CC1, Fig. 1.5 on p. 26).

3) With these pitches, create three series, one each of dyads, trichords and tetrachords, namely the components of the *jeu* (see sketch CC2, Fig. 1.6 on p. 29).

4) With two coloured pencils (red and blue) circle and label two sets of 15 of these components, and pair them, a red component with a blue, so as to fill out 15 "measures," shown on two-stave systems (see sketch CC3, Fig. 1.7 on p. 31).

This *jeu de timbres* is the only one used melodically in the three instrumental pieces—that is, it does not involve chords. It is used in the third "song," which Vivier calls the *chanson au soleil*, from mm. 94–130. The beginning of this "song" is demarcated by a double-*chang*[11] *ff* ring in measure 93, the third time it is used in this score. As well, the key signature changes to accommodate the composite scale,[12] and more importantly, the texture changes as the two instruments of this "song" (the *trompong* and *bonang*) engage in *kotekan*, a close rhythmic interlocking of two melodies typical of Balinese music. The *jeu de timbres* are generally employed with the top portion of each independent component (the *bleu* series) relegated to the *trompong*, and the bottom portion (the *rouge* series) stated in the *bonang*. I duplicate the first 10 measures of this "song" as Figure 5.13 below. The integers above each measure correspond to the *jeu de timbres* of sketch CC3.

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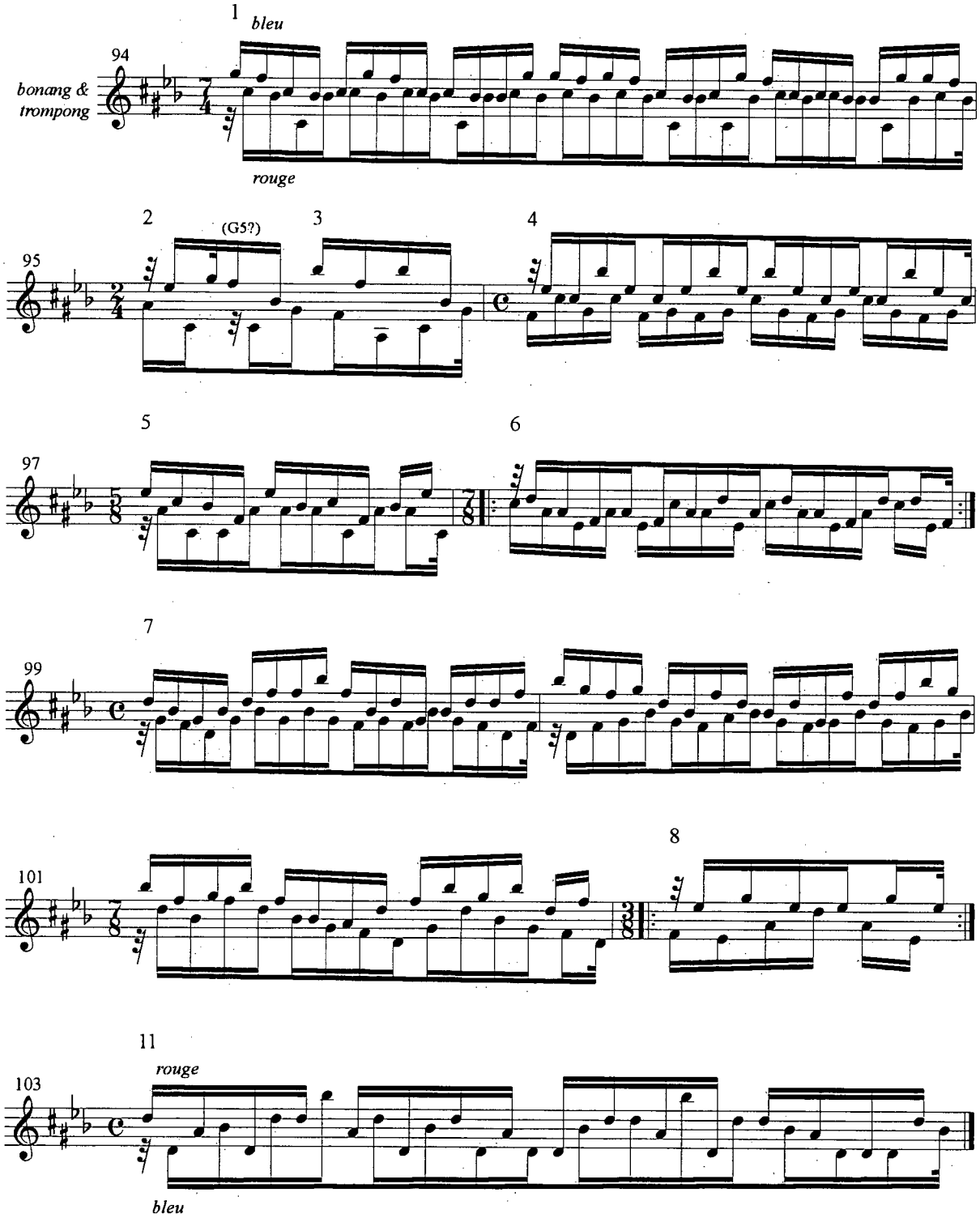
[11]A "chang" is actually a *ceng ceng*. See ft. 5, Chapter One. Vivier uses a pair of them six times, designed to demarcate the beginning of each "song," and to conclude the fifth "song."

[12]The associated key signature for the composite scale includes the following accidentals: G♯, C♯, E♭ and B♭.

Figure 5.13 – Score of the third "song," mm. 94–103



The order of components appears sequential through to number 8. At measure 10, components 9 and 10 are skipped over, and the music moves directly to component 11. Further analysis of the remaining music shows other sequential patterns, but no overall logical patterning to the selection or durations of these components of the *jeu de timbres*. There are also minor liberties taken the final score with the register of some pitches indicated in sketch CC3. Specifically, in the last measure of Figure 5.13 the pitches of *jeu de timbres* 11 are duplicated in other registers: *bleu* D5 and B♭4 of sketch CC3 also has D4 and B♭5 in the score;[13] *rouge* D5 and A4 of sketch CC3 also has D4 in the score. Minor enharmonic changes of sketch CC3 were necessary to comply with the newly invented key signature. For example, A♭ in the sketch is realised as G♯ in the score. Other than these small alterations, the entire series of the first *jeu de timbres* is fully utilised throughout the third "song," and nowhere else in *Cinq chansons*.

Unfortunately, the first *jeu* does not exhibit any systematic theoretical basis. When the melodic components are considered vertically (see Fig. 5.14 on the next page) the resultant "chords" do not reflect any consistent element. The total number of notes for each "chord" varies (indicated by the left digit between the staves); the discrete number of pitches, regardless of octave equivalents, also varies (indicated by the right digit); the range of lowest to highest pitches widely varies (indicated on the top); and because the pitches of the percussion do not correspond to a Western well-tempered system, their respective OICs or pitch-class sets are not fully determined. Hence, this *jeu* appears to merely organise the composite scale into various intrinsic components, solely for the purpose of melodically creating cells for this third "song."

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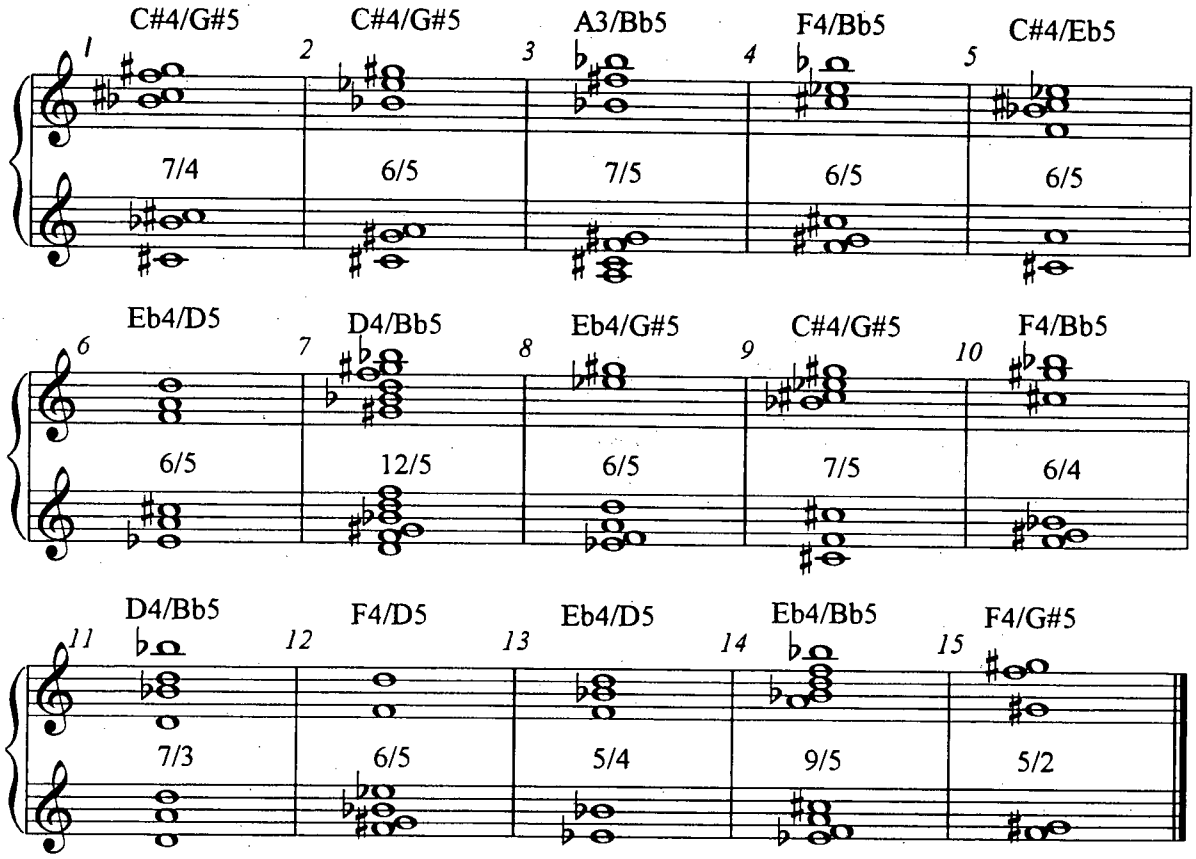
[13] Special note: the reversal of instruments for *bleu* and *rouge* in this single measure is unusual.

Figure 5.14 – "Chords" of the third "song"



The second *jeu de timbres*, employs a far simpler "game." It is used as the basis of the next "song," which Vivier calls the *chanson à la mort*. This extends from mm. 152–177 (and like the other "songs," follows the double-*chang ff* ring, m. 151). I summarise its derivation in three stages as described below:

1) Beginning with A3, the lowest note of the composite scale indicated in sketch CC2, a tetrachord is produced by moving upwards through the scale, skipping over alternate pitches.

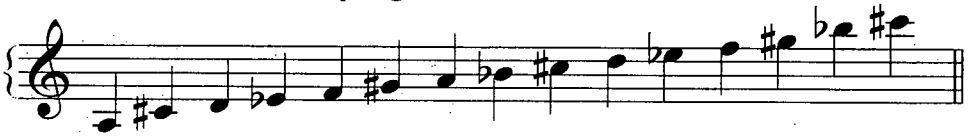
2) The "root" of the next harmony begins with the second scale pitch, the C♯4, and the same process repeats for selecting the other three members of its chord.

3) This process repeats for the first nine chords of this series, with "roots" ranging from A3 to C♯5. However, the last four-note harmony is created simply by using the last four pitches of the composite scale, from F5 to C♯6.[14]

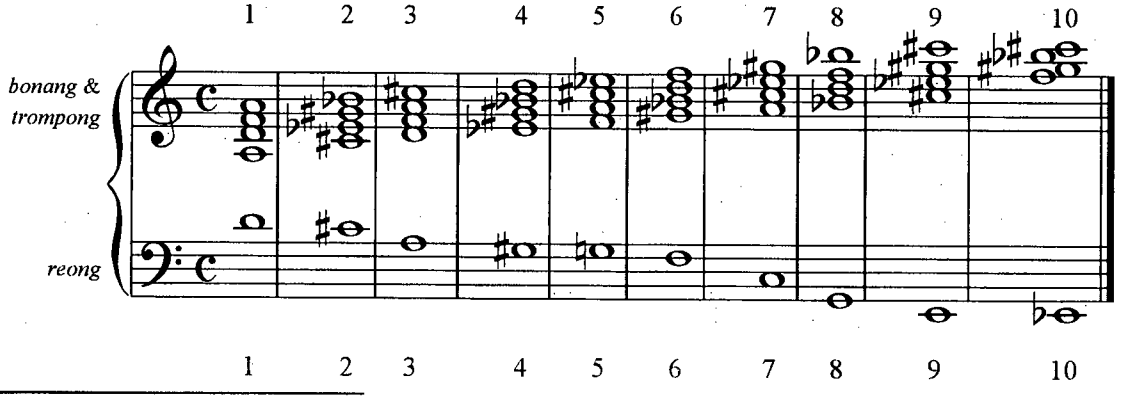
In addition to the ten chords of this second *jeu de timbres*, an independent scale is created for the *reong* gong rack, pitched much lower than the other two. The lower scale does not appear to correspond with the pitches of the upper instruments in any way. As well, both the upper composite scale (for the *bonang* and *trompong*) and the lower scale (for the *reong*) are duplicated on the cover page. Anomalies include: B♭3 and A5 appear "missing" in the composite scale, both here and on the cover; and G2 of the *reong* scale is here, but not on the cover page. Figure 5.15 shows the synthetic scale underlying the *jeu* of "song" four and its derived chords (cf. Fig. 1.8, p. 32). Figure 5.16 below shows the score of the fourth "song," in which the appearance of the elements in the two layers, *jeu* and scale, is evident.

Figure 5.15 – Composite scale and *jeu de timbres*

Composite *slendro* & *pelog* scale



Jeu de timbres and *reong* scale from sketch CC4

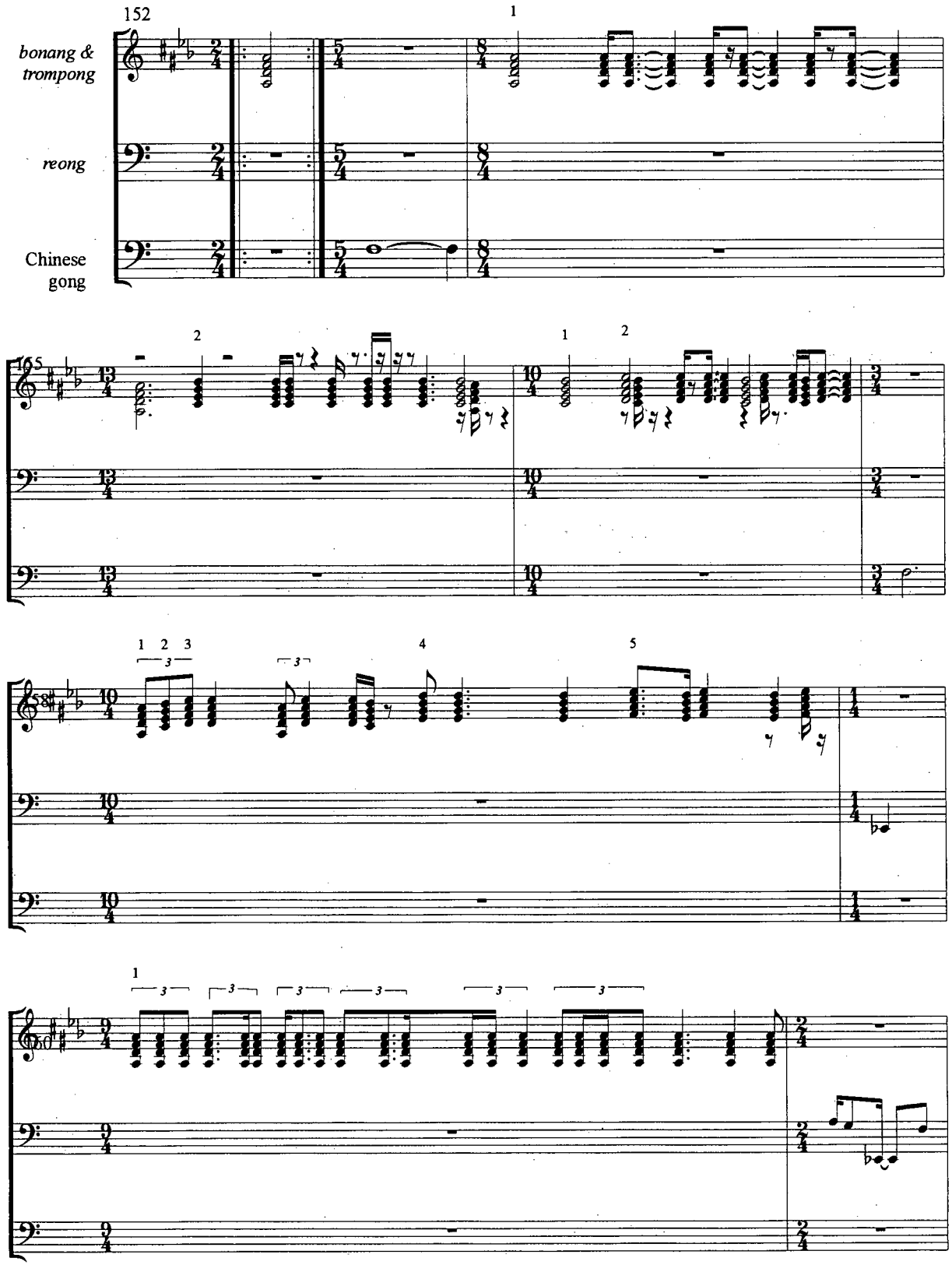


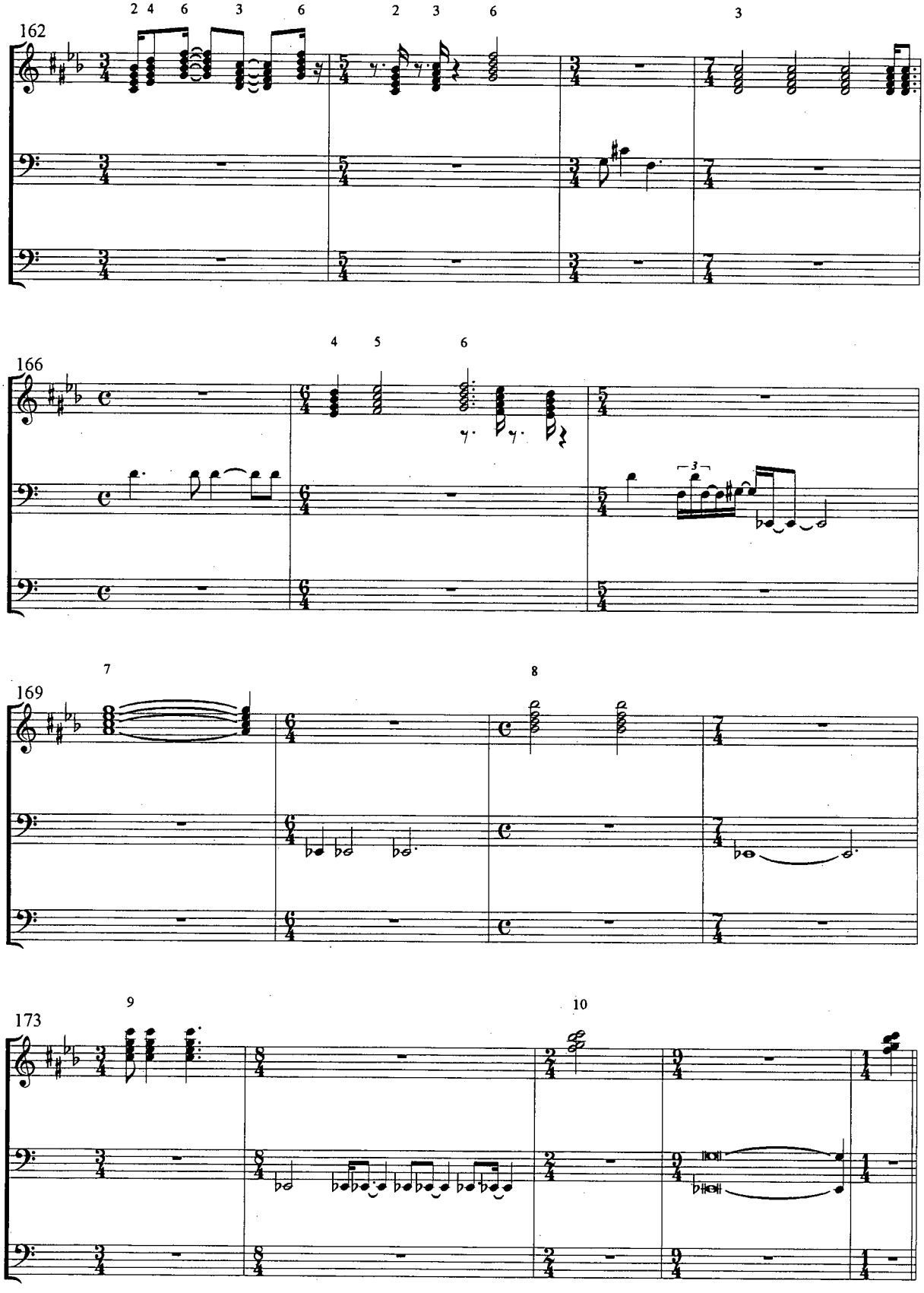
[14]The creation of both *jeux* for *Cinq chansons pour percussion* differs from the other works described in one unique respect: the added pitches are derived from the same basic scale pitches on which the *jeux* are constructed. Nonetheless, a systematic arrangement of these added pitches is still present, whether that system appears arbitrary (as with the first *jeu*) or simplistic (as with the second *jeu*). See definition, chap. 1, p. 14.

While the majority of music for the fourth "song" employs the *jeu de timbres* for the *trompong* and *bonang*, the *reong* has intermittent one-bar statements throughout, freely using most, but not all, pitches of its respective scale. I have duplicated this entire "song" (see Fig. 5.16 over the next two pages), where the integers above the uppermost staff corresponds to the chords of the *jeu de timbres*. At times, again, Vivier uses the harmonies in sequential order, and at times more erratically (see m. 162). Furthermore, no correlation appears between the order of the pitches of the *reong* scale and the *jeu de timbres* for the upper instruments. The durations of both groups of instruments are also striking: the *reong* passages gradually increase over the entire "song" in quarter-note increments from one quarter (m. 159) to nine (m. 176), while in alternate measures the durations of the upper instruments decrease in quarter-note increments from nine quarters (m. 160) to one quarter (m. 177), the last measure of this "song."

While the second *jeu* is very loosely related to tonal harmony, with chords and chord transpositions based on fifths and thirds, the upper partials generated by the instruments playing the written pitches are highly erratic and unpredictable. The "harmonics" they produce contribute to its chord-colours, and cannot be completely predetermined. Thus, the chord-colours necessarily change from performance to performance depending on the exact qualities of the instruments, and the exact manner in which they are played.

Figure 5.16 – Score of the fourth "song," mm. 152–177




162
2 4 6 3 6
2 3 6
3
166
4 5 6
3
169
7
8
173
9
10

Chapter 6: Additive synthesis and its impact on Vivier's post-1980 music

6.1 *Additive synthesis in Vivier's vocal works*

6.1.1 – "Additive synthesis" technique

Jaco Mijnheer explains that Vivier's chord-colours are produced as the result of addition of frequencies—hence my term additive synthesis.[1] *Lonely Child* is the only composition of the 1979–80 period to use this technique, and as in his other late works there are always two fundamental lines: the principal melody and an added bass line.[2] The frequencies of simultaneous pitches (read: intervals) in these two homorhythmic lines are added together using various simple algorithms to produce specific upper overtones (played by other instruments) resulting in a unique spectra of harmonics. Mijnheer describes this technique as part of Vivier's way of producing artificial overtone spectra, and believes this is what produces chord-colours. When the exact frequency calculated by an algorithm is not present in our well-tempered system, Vivier indicates an approximation of the desired pitch with small arrows (descending or ascending) that roughly designate quarter-tones.

Additive synthesis has been related (in the literature) to frequency modulation, but frequency modulation normally involves both the addition and difference of a carrier pitch (the main tone), and a secondary lower pitch (the modulatory tone).[3] These two frequencies are

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[1]Jaco Mijnheer, "Het akkoord voorbij," *Maandblad voor Muziek* (January 1998): 10–15.
[2]The intervals created between these two parts often consist of a near-complete all-interval series. See discussion below of Tannenbaum's analysis of *Lonely Child*, 210–211.
[3]Peter Tannenbaum (see Introduction, n. 24), 19.

then applied against a modulating index whereby various overtones are produced. Vivier employs no modulating index, nor any difference tones between the carrier and modulatory pitches (i.e., no lower pitches). Instead, he selects only sum tones (i.e., higher pitches), the result of combining two parts (i.e., the upper one which forms the principal melody and the lower one which forms a bass line) always by addition, never by difference. Thus any comparison with FM technique seems too vague to be useful.[4]

In summary, *Lonely Child* and post-1980 vocal works use *couleurs* based on additive synthesis technique, created in the following two stages:

> 1) A bass-line is invented for the principal melody (i.e., there is no "harmonised" melody like the *jeu de timbres*).
>
> 2) Based on the frequencies of the melodic and bass pitches, "harmonic" overtones are calculated with various algorithms. The exact *couleur* depends partly on the interval used between the melody and bass-line, partly on the number of "harmonics" used and their relative strengths.

Citing one chord-colour from *Bouchara* (Mijnheer's example is reproduced here as Fig. 6.1 on the next page, but a couple of his original algorithms have been corrected), he carefully shows how Vivier selects its harmonic spectra with regards to the frequencies of the first melodic pitch (E ♭ 3) and bass note (C2), respectively as 154Hz and 65Hz.[5] For the below figure, each of the ten pitches is designated with an upper-case letter, A through J, from the lowest to the highest pitches. To produce the next higher frequency (designated as C), Vivier doubles the frequency of the lowest pitch (2A = 130Hz), and then adds it to the upper pitch (B = 154), which roughly produces the pitch, D4 (284Hz). Vivier then generates seven more upper frequencies by means of a simple addition-style algorithms.

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[4]For further information, refer to Dr John Chowning and David Bristow, *FM Theory & Applications: by Musicians for Musicians*, Yamaha Music Foundation, 1986.

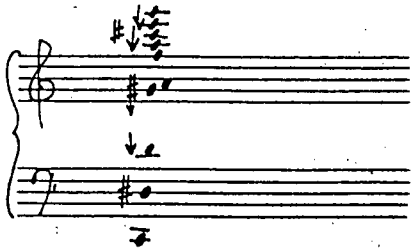
[5]Mijnheer, 13–14. I have supplied Hz calculations, not present in Mijnheer's example, for all "harmonics."

Figure 6.1 – Harmonics of one chord-colour in *Bouchara*

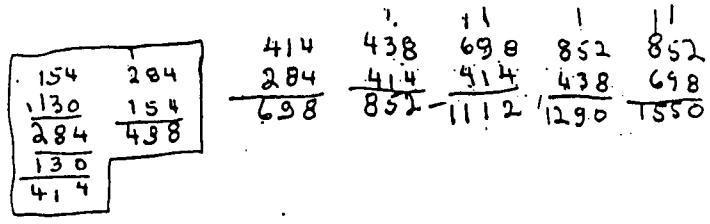
A = **C2** (65Hz): the first bass pitch, (the lowest pitch of the *couleur*)
B = **E♭3** (154Hz): the first melodic pitch (the *second* lowest pitch of the *couleur*)
C = 2A + B = **D4** (284Hz): sum of doubled 65Hz (C2) + 154Hz (E♭3)
D = 2A + C = **G♯4** (414Hz): sum of doubled 65Hz (C2) + 284Hz (D4)
E = B + C = **A4** (438Hz): sum of 154Hz (E♭3) + 414Hz (G♯4)
F = C + D = **F5** (698Hz): sum of 284Hz (D4) + 414Hz (G♯4)
G = D + E = **A5** (852Hz): sum of 414Hz (G♯4) + 438Hz (A4)
H = D + F = **C♯6** (1,112Hz): sum of 414Hz (G♯4) + 698Hz (F5)
I = E + G = **E6** (1,290Hz): sum of 438Hz (A4) + 852Hz (A5)
J = F + G = **G6** (1,550Hz): sum of 698Hz (F5) + 852Hz (A5)

In this manner, eight harmonics (designated as C through J) are selected and combined with the first melodic and bass pitches to fully create its first *couleur*. Vivier's sketch materials for *Bouchara* and *Lonely Child* are filled with similar calculations.[6] Figure 6.2 below is a duplication of Vivier's sketch, and demonstrates how the above calculations are reflected in this completed chord-colour.

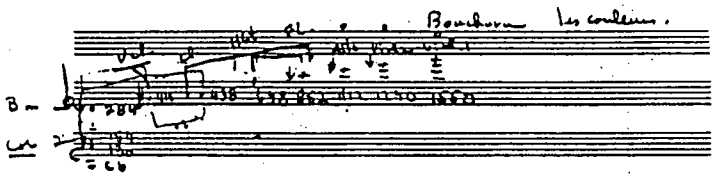
Figure 6.2 – Corresponding chord-colour and calculations



Voorbeeld 1b: Claude Vivier, *Bouchara*, m. 24



Voorbeeld 4a: Claude Vivier, *Bouchara*, schets



Voorbeeld 4b: Claude Vivier, *Bouchara*, schets

[6]In the former work, the term "*couleurs*" is marked directly on the score, while the latter's cover page is marked "*couleurs*."

Mijnheer points out that Vivier always writes the melody along with the accompanying bass line first, prior to any calculation of the chord-colours. The sum tones resulting from the two parts create different chord-colour spectra. Mijnheer observes other variables in the production of these colours: the number of pitches they contain (*Bouchara* always has ten, but *Lonely Child* has seven as displayed in Fig. 6.3 below), the way the pitches are distributed in the orchestration (generally in the upper winds and violins), and the specific algorithms employed.[7] Interestingly, because the chord-colours move in parallel motion with the melody, the resultant texture is predominately homophonic. The melody is put in relief, so to speak (akin to relief in sculpture), as a recognisable feature for these dense chord-colours. Consequently, since the melodic pitches are always second lowest, the melody is consistently thickly embedded.

Further examples of chord-colours created with additive synthesis from *Lonely Child* are found in Tannenbaum's analysis (see Fig. 6.3 below).[8] These occur only when the vocal part is engaged; the purely instrumental passages do not employ *couleurs*. The passage cited below (mm. 24–32) is the opening vocal melody, and follows the instrumental introduction. The melodic pitches are sung by the soprano (duplicated in first clarinet, first horn, and sixth violin), and added lower bass notes are stated in the second horn, cello and double-bass.[9] Note that the resultant five intervals of these two parts consist of a near-complete all-interval series, respectively, ic2, ic3, ic4, ic6, and ic5 (refer to the lower staff of Tannenbaum's Fig. 2b).

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[7]More often than not, the various algorithms selected will remain the same from one chord-colour to the next within the same work. Mijnheer, 13–14.

[8]"Modernism vs. Post-modernism in the music of Claude Vivier," presented at McGill University, ca. 1992.

[9]While Tannenbaum's Figure 2b show the algorithms and the resultant upper frequencies in the score (his Figure 2a), there is one small mistake. The algorithm for the uppermost pitch of the first chord (Chord A) should read 3X (not 2X) + 3Y = 1908.

Figure 6.3 – Examples of chord-colours in *Lonely Child*

Figure 2a: mm. 24-32

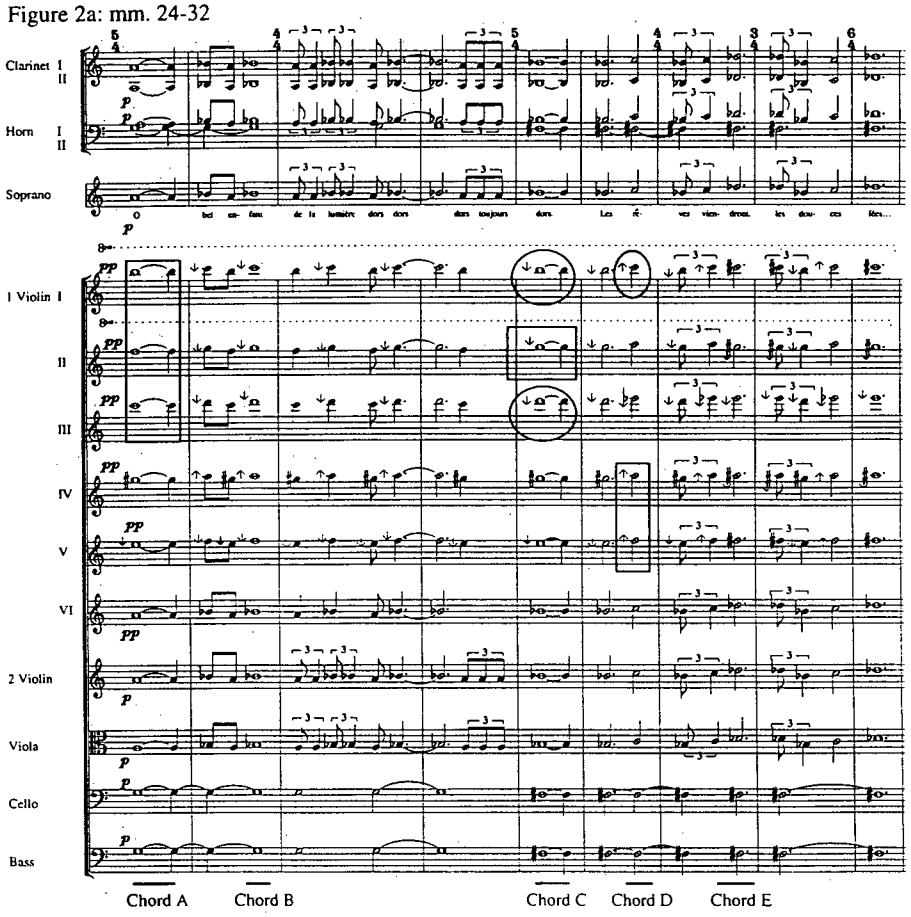
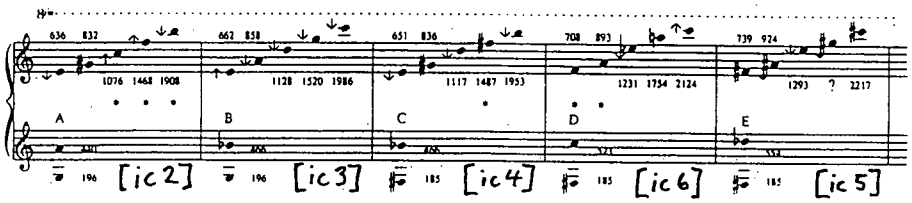


Figure 2b: Reproduction of Vivier's sketches for the harmonies in this passage:

N.B.: The asterisks below and the dark squares in Figure 2a mark differences between the sketches and the score. The 1/4-tone below G# in Chord E does not correspond to any note in that range that can be derived mathematically through the frequency modulation technique.



Chord A:	Chord B:	Chord C:	Chord D:	Chord E:
X = 196	X = 196	X = 185	X = 185*	X = 185
Y = 440	Y = 466	Y = 466	Y = 523*	Y = 554
X + Y = 636	X + Y = 662	X + Y = 651	X + Y = 708	X + Y = 739
2X + Y = 832	2X + Y = 858	2X + Y = 836	2X + Y = 893	2X + Y = 924
X + 2Y = 1076*	X + 2Y = 1128	X + 2Y = 1117	X + 2Y = 1231	X + 2Y = 1293
3X + 2Y = 1468*	3X + 2Y = 1520	3X + 2Y = 1487*	X + 3Y = 1754	?
2X + 3Y = 1908*	3X + 3Y = 1986	3X + 3Y = 1953	3X + 3Y = 2124	3X + 3Y = 2217

6.1.2 – Origins of Vivier's additive synthesis technique

Mijnheer posits intriguing conjectures about the origins of the approach to chord-colours first evident in *Lonely Child*.[10] Vivier explored a variety of electronic equipment and procedures during 1971–72 while studying with Gottfried Koenig in Utrecht. The ring modulator especially appealed to him: when Vivier studied with Stockhausen a year later in Cologne, he spent considerable time studying his teacher's *Mantra* for two pianos and oscillators. Vivier learned the concepts of ring modulation and frequency modulation with its carrier and modulating frequencies, and its resultant upper and lower sidebands. Electronic techniques and music did not inspire Vivier directly—he wrote just three electronic works during this time in Europe, which utilised none of his teachers' techniques. But aspects of his lessons would later emerge in the development of the new chord-colour scheme, particularly the idea of higher frequencies produced by addition.

Mijnheer suggests Vivier became seriously interested in harmonic spectra only after attending a lecture by Tristan Murail at one of the numerous Ferienkurse in Darmstadt in the late 1970s. This is quite possible, but my analyses show Vivier was already attempting various methods of producing chord-colours other than additive frequency algorithms, and he did not fully implement the kind of artificial harmonic spectra described above as a textural element until after his trip to Europe in late 1980. Vivier certainly absorbed some ideas from Murail's relatively new technique of French spectral music before 1981, since he used them in *Lonely Child*. However, only after his return to Montréal in early 1981, starting with his

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[10]See n. 1, *supra*.

compositions *Bouchara* and *Marco Polo*, did the new chord-colour techniques become a definitive element of his style.

Mijnheer emphasises that Vivier's attention to sound and to acoustic properties was not confined to the music of his last years. Vivier always took a strong interest in unusual sounds of all types. For example, his earliest pieces composed at the Conservatoire in Montréal use the Ondes Martenot, and include a tape work which incorporates a variety of sounds, ranging from the coarsest noises to the most ethereal near-whistling tones. During those early years in Montréal Vivier wrote a sizeable thesis on Edgar Varèse's orchestral work, *Arcana*, minutely analysing various motives and sound complexes.[11] Mijnheer sums up the aesthetic impact of Vivier's *couleurs*:

> Thus Vivier's colours fit on the one hand his desire to make connections clear, and on the other hand arise from his love of complex sound. In that sense they are a typical product of the last decades, in which composers have searched for a new simplicity, and in which the public. . . has become much more used to previously unheard sound (*my translation*).[12]

6.2 *Vivier's post-1980 views on his musical language*

Timbre is the key to Vivier's unique language based on *couleurs*. Many writers have commented on this elusive aspect of music, which Vivier interprets in a predictably personal way. The *Harvard Dictionary of Music* discusses timbre under the heading "tone color," defining it as "the quality ('color') of a tone as produced on a specific instrument, as distinct

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[11]*Arcana*, graduating thesis for *Conservatoire de la musique*, Montréal 1969.
[12]Mijnheer, 15.

from the different quality of the same tone if played on some other instrument." Following the line of Hermann Helmholtz's seminal opus *On the Sensations of Tone as a Physiological Basis for the Theory of Music*,[13] Willi Apel asserts that "tone color is determined by the harmonics, or, more precisely, the greater of lesser prominence of one or another harmonic."[14]

Many twentieth-century writers have attempted to define timbre. Like the dictionary cited above, Alexander Wood refers to the difference in sound between two instruments playing the same pitch as one of characteristic "quality."[15] Siegmund Levarie expands this definition to show that the timbre of an instrument is not fixed: "Any change of pressure or position necessarily brings about a fresh overtone constellation."[16] Other authors find the identification of timbre with fixed, or comparatively invariant, attributes of instruments too constraining. Thus, for Robert Erickson, the term "tone quality" is inadequate.[17] Wayne Slawson considers timbre to be the "color" of sound in general, although he admits there "is no agreement . . . about what constitutes an element of sound color."[18] Reiner Plomp cites additional attributes:

> Timbre depends upon several parameters of the sound including the spectral envelope and its change in time, periodic fluctuations of the amplitude of the fundamental frequency, and whether the sound is a tone or noise.[19]

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[13]Hermann Helmholtz, translated by Alexander Ellis (1885), *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (2d ed. conforming to 4th ed. of German original, reprinted New York: Dover, 1962).

[14]Willi Apel, author and editor, *The Harvard Dictionary of Music* (Cambridge, MA: Harvard University Press, revised and enlarged, 2d ed., 1972), 852.

[15]Alexander Wood, *The Physics of Music* (New York: Dover, 1944), 61.

[16]Siegmund Levarie and Ernst Levy, *Tone: A Study in Musical Acoustics* (Kent: Kent University State Press, 1968), 137.

[17]Robert Erickson, *Sound Structure in Music*, (Berkeley: University of California Press, 1975), 6–7.

[18]Wayne Slawson, *Sound Color* (Berkeley: University of California Press, 1986), 15.

[19]Reiner A. Plomp, *Aspects of Tone Sensation: A Psychophysical study* (New York: Academic Press, 1976), 85.

Others consider the multifarious complexity of timbre in terms of musical perception. Rudolf A. Rasch argues that "sounds cannot be ordered on a single scale with respect to timbre. Timbre is a *multidimensional attribute* of the perception of sounds."[20] Carol Krumhansl lucidly describes three levels of timbre in her 1989 article, "Why is Timbre so hard to define?" Specifically, she offers a broad distinction between

> percussion instruments, whose behaviour is determined completely at the instant when they are set into motion, and instruments, such as blown and bowed instruments, whose behaviour is controlled continuously.[21]

Vivier's views on timbre were characteristically complex. He elaborated the importance of vertical structures in his music in an interview with Susan Frykberg in 1981,[22] a year after completing the last of the four pieces of 1979–80. Vivier's explanation of his unique musical language surfaces in conflicting statements during his interview. For example, he explains that *Kopernikus* contains only harmonies (i.e., no chord-colours), but that *Orion* has mirror chords to create *couleurs*, while *Lonely Child* and *Bouchara* have only chord-colours (but no chords). These rather perplexing distinctions can be understood only with reference to specific compositional techniques employed in these works.

As he explained to Frykberg, the basis for Vivier's "chord-colour" concepts lies in his dissatisfaction with the sound of serialism. He thought it difficult, if not impossible, to serialise harmony; serialist composers therefore fashioned interrelationships among pitches in a crudely arbitrary manner, and the resultant harmonies were at best haphazard. Vivier believed

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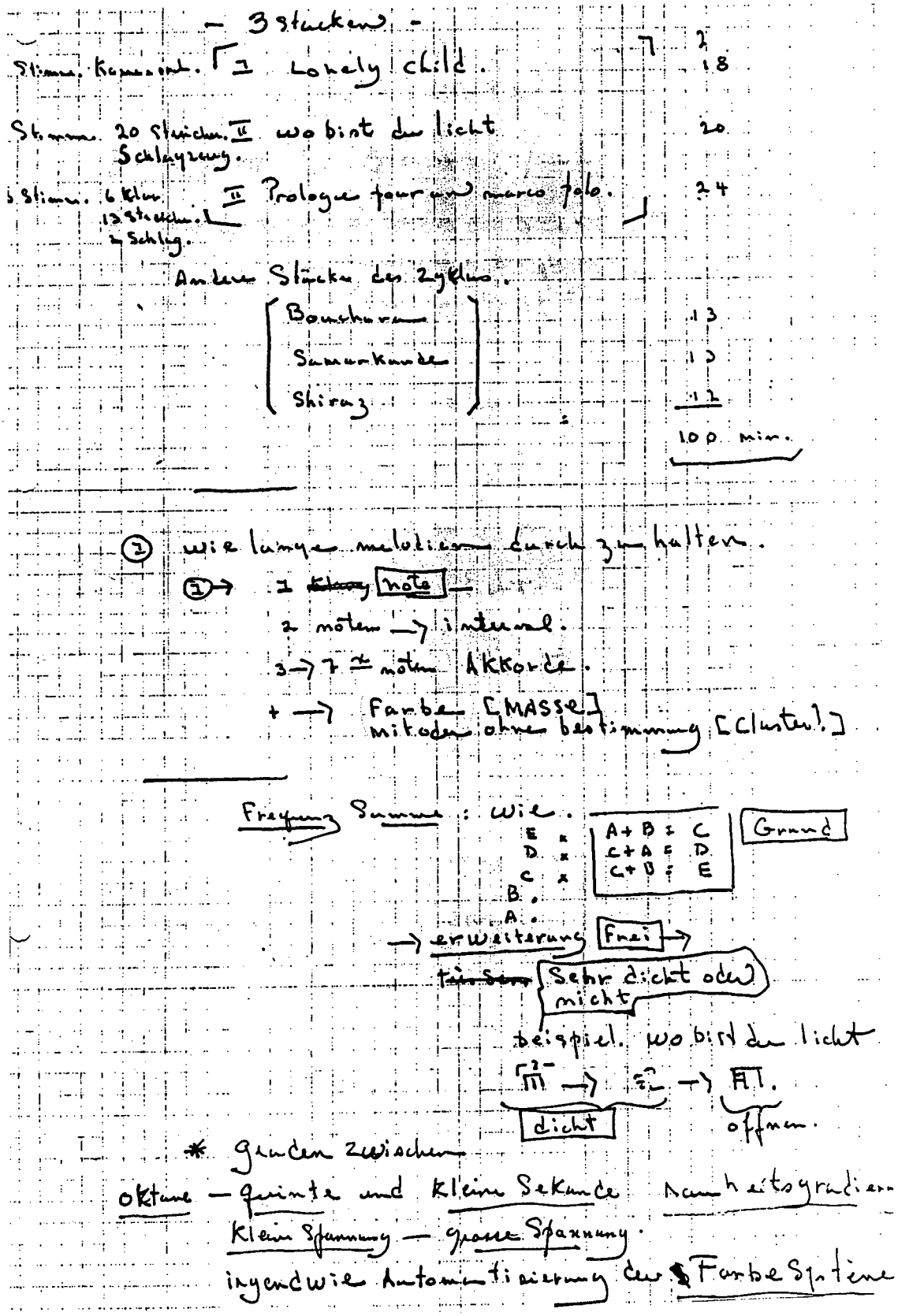
[20]Rudolf A. Rasch and Reiner A. Plomp "The Perception of musical tones," *The Psychology of Music* (New York: Academic Press, 1986), 14.
[21]Carol Krumhansl, *Structure and perception of Electroacoustic Sound and Music* (Amsterdam: Excerpta Medica, 1989), 43–53.
[22]Susan Frykberg (see Introduction, n. 34), 9.

harmonies should instead be organic resultants, growing naturally from the principal melody. Some of his comments were reproduced on the cover page to his incomplete *Opera fleuve* (1982), duplicated as Figure 6.4 on the next page. Here he attempts to clarify his system of *couleurs*, or chord-colours.

Vivier divides his vertical world into elements of increasing size: a single *note*, then an *interval* (two notes), a *chord* (3 to 7 notes), and finally a *mass* (more than 7). In the middle portion of the cover page to *Opera fleuve*, Vivier uses "mass" and "colour" (= *couleur* = *Farbe*) interchangeably (see Fig. 6.4 on the next page). He explains that a *mass* blurs the tensions inherent in *chords* (i.e., the *jeu de timbres*), resulting in an ineffable musical collection that lacks voice-leading directionality. More specifically, masses can be perceived as *couleurs* (i.e., chord-colours), providing they are derived from a "basic acoustical relationship with a single sound, *an interval* or *a chord*"(italics, mine).[23] In this respect, mass as chord-colour can stand both for the interval-based properties of additive synthesis found in *Lonely Child* and post-1980 works, and for the chord-based entities found in *Orion*, *Zipangu*, and *Cinq chansons pour percussion*.

[23]Mijnheer, 9.

Figure 6.4 – Cover page from *Opera fleuve*



On the bottom portion of Figure 6.4, Vivier lists three components of his chord-colours, or as indicated at the bottom of the page, his *Farbesysteme* (literally, colour system). 1) Additive synthesis technique is indicated under the header "*Frequenz Summe*." While no actual pitches are notated, the sums contained within the box under the header (e.g., A + B = C, etc.) suggests algorithms to produce additional frequencies. 2) Underneath the box of algorithms Vivier describes a favourite textural technique: using a very thick texture leading to a more open one (see boxed comment, *sehr dicht oder nicht* [very thick or not]). The musical example he mentions, *Wo bist du Licht?*, is his 1981 work for soprano, strings and percussion. 3) Below the texture component, the comments after the asterisk outline the role of intervals in Vivier's *Farbesysteme*, translated as follows:

> * to be established between
>
> octave–fifth and minor-second [unclear word, unable to translate]
>
> small tension — large tension
>
> somehow (or other) automation of the colour system

These comments suggest various tensions inherent in intervals, hence a possible reason for employing an all-interval aggregate (or nearly so) between the two parts (i.e., the melody and the invented bass) of the additive synthesis technique. These three components—algorithms, thick-open texture, interval choice—form the basis of Vivier's later chord-colour technique. Significantly, the cover page to *Opera fleuve* does not mention or describe the *jeu de timbres* he employed earlier in his instrumental compositions, or its role in producing chord-colours.

Conclusion

Vivier's three instrumental works of 1979–80 employ a variety of *jeux* as the first stage of their respective harmonic-timbral complexes (i.e., chord-colours, Vivier's *couleurs*). While I have consistently defined *jeu de timbres* as a series of harmonies (see p. 8) the literal translation "game of timbres" reflects a sense of play, or more accurately, a process of interplay. Vivier's plural form suggests that *jeux de timbres* comprises several interplayings, which progressively rely less and less on theoretical concepts of all-interval-class aggregates, mirror-inversions, and the like. The *jeux* can be viewed as different "games" of varying complexity, whether realised for orchestra, string or percussion ensemble.

The "games" in *Orion* are primarily based on all-interval-class aggregates and mirror-inversions. As realised for orchestra and three percussion groups, these generate a range of chord-colours through arrangements in two-voiced and three-voiced canons, and deployment in layers of simultaneous harmonies. The "games" in *Zipangu* do not use all-interval-class aggregates, but at times employ mirror-inversion as a formative element. The intricate string writing and avant-garde techniques in this work contribute to its unique chord-colours. The "games" in *Cinq chansons pour percussion* are the least theoretically based. The large composite *pelog-slendro* scale used in this piece forms the basis of its "games:" one *jeu* consists of three series of two- three- and four-note components; and a second *jeu* consists of 15 tetrachords. Since most of its "songs" are monophonic in the pitch dimension (only the fourth "song" employs simultaneous pitch collections, i.e. "chords") its chord-colours are

often generated by textural processes taken from Balinese music, such as the *kotekan* texture of the third "song."

Alternatively, Vivier's *jeux de timbres* may reflect a plural sense of my definition of *jeu de timbres*. In the Introduction I posited a working definition (see p. 14), suggesting that the *jeu* refers to a series of proto-timbral chords whereby any systematic arrangement of added pitches can be applied to the basic melodic or scale pitches. As my study has demonstrated, series of harmonies other than those of the *jeu* occur in *Orion* and *Zipangu*. Specifically, *Orion* has two additional series of chords beyond its basic one of 21 harmonies: the four tetrachords that complement the Thai melody, and the three major-sounding tetrachords that are based on Japanese bells. *Zipangu* has two additional series of tetrachords in Variation Four, neither of which stems from the original 15-note melody. In short, Vivier's *jeux de timbres* might be better defined more broadly as containing more than a single series of harmonies, which may or may not stem from the basic melodic pitches. In all cases, as I have demonstrated, the resultant chords are applied in a variety of instrumental contexts and complex quasi-timbral effects, producing full-fledged chord-colours.

The *couleurs* of the instrumental works differ strongly from those that introduce voice. With no *jeux* and no chords *per se*, the new sonorities of *Lonely Child* are based on selecting upper partials through various algorithms that combine the frequencies of the melody and bass. This method of producing *couleurs* represents a radical departure from the quasi-traditional methods that start with *jeux de timbres*. The chord-colours of the instrumental works are the result of the way underlying chords are deployed in the score. They constitute a foreground meant to be received more as timbral expression than as

harmony. Additive synthesis, because quasi-harmonic, dispenses with the more traditional stage of the *jeux de timbres.* Sonorities are no longer derived from a scale (as in *Cinq chansons*) nor from intervallic aspects of the principal melody (as in *Zipangu* and *Orion*). Instead additive synthesis produces new harmonic-timbral entities (i.e., chord-colours) with greater directness and, in a sense, clarity.

Additive synthesis becomes the formative feature of chord-colours in Vivier's post-1980 music, which, with two exceptions, features voice.[24] His study with spectral composers Grisey and Murail in Paris, during his brief visit in late 1980, affirmed the new direction of composition first attempted in *Lonely Child.* The three instrumental works considered here display a parallel attempt at a new musical language based on *jeux de timbres*, in which Vivier could freely invent new rules for each "game" in question. *Orion* is the most accomplished of the three works, with its attention to all-interval-class aggregates based on fairly solid theoretical principles. The *jeux* in *Zipangu*—the main *jeu* of the 15 basic harmonies and the others used in variation four—display a less rigorous theoretical approach. Vivier was more interested in the textural and timbral possibilities than the actual pitches composed, hence the incorporated avant-garde string techniques (*sul ponticello* effects, "granular" sound, etc.). This is pushed further in *Cinq chansons*, where the written pitches do not exactly correlate with the aural pitches due to the inherently unstable timbral properties of the percussion instruments.

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[24]*Samarkand* (September 1981) features wind quintet and piano. A cursory examination of the score suggests additive synthesis technique with the horn and bassoon parts producing the basic melodic and harmonic pitches, and the upper winds producing its "harmonics." *Et je reverrai cette ville étrange* (October 1981) was commissioned for *Arraymusic* of Toronto. Scored for chamber ensemble and percussion, its five modal melodies unfold with no harmony or chord-colours, and employs unison writing throughout.

In Vivier's penultimate compositional stage of 1979–80, he achieves *couleurs* by moving away from quasi-traditional proto-timbral constructions (*jeux de timbres*) to vertical timbral sonorities based on frequency partials (additive synthesis). The addition of the human voice in nearly all his post-1980 works marks a definitive stage (regrettably, the final one) in his quest for a new musical language. *Lonely Child* is the most significant work of the 18-month turning point, in terms of looking to the future. *Orion* represents the most eloquent instrumental work because of its profound links to the past.

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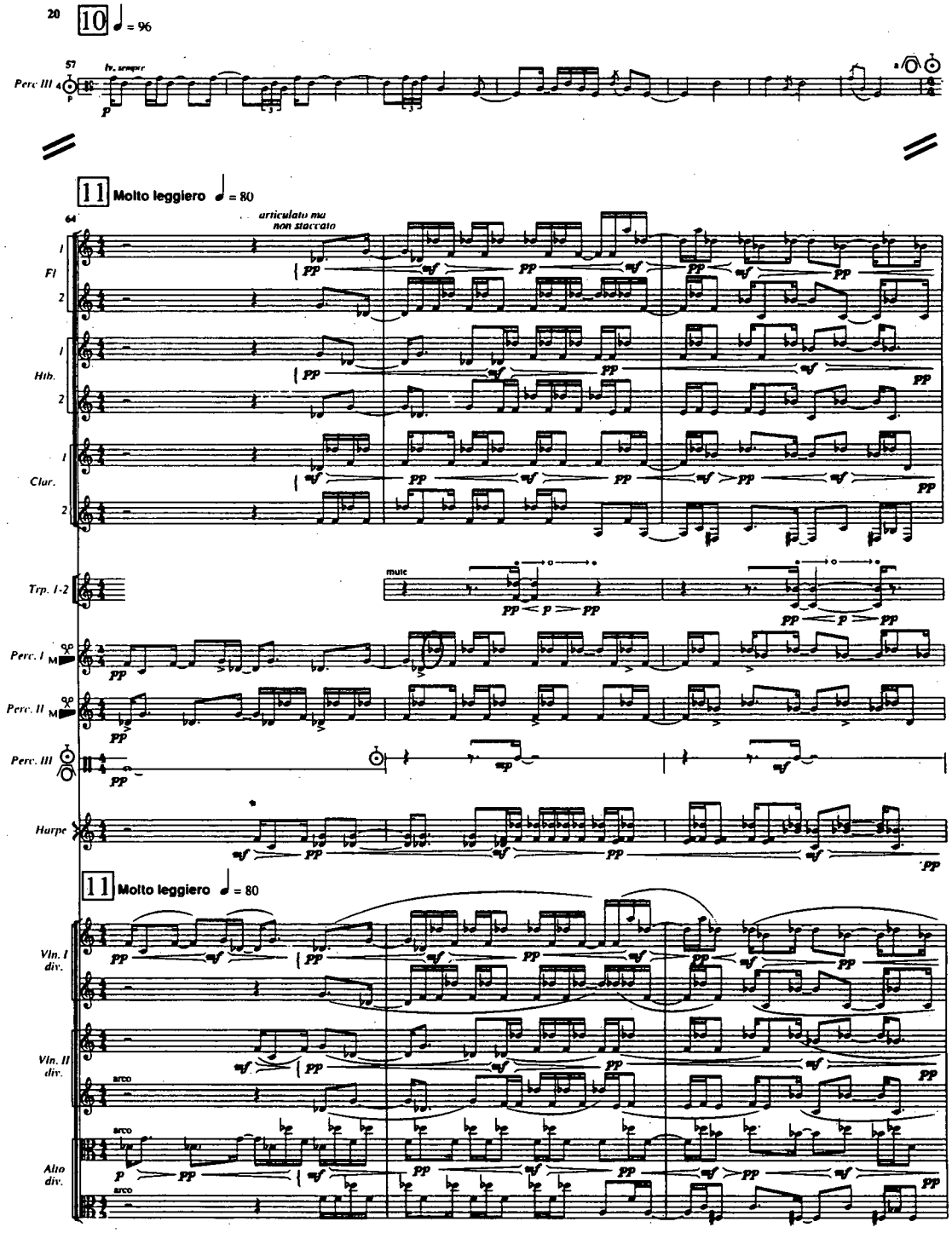
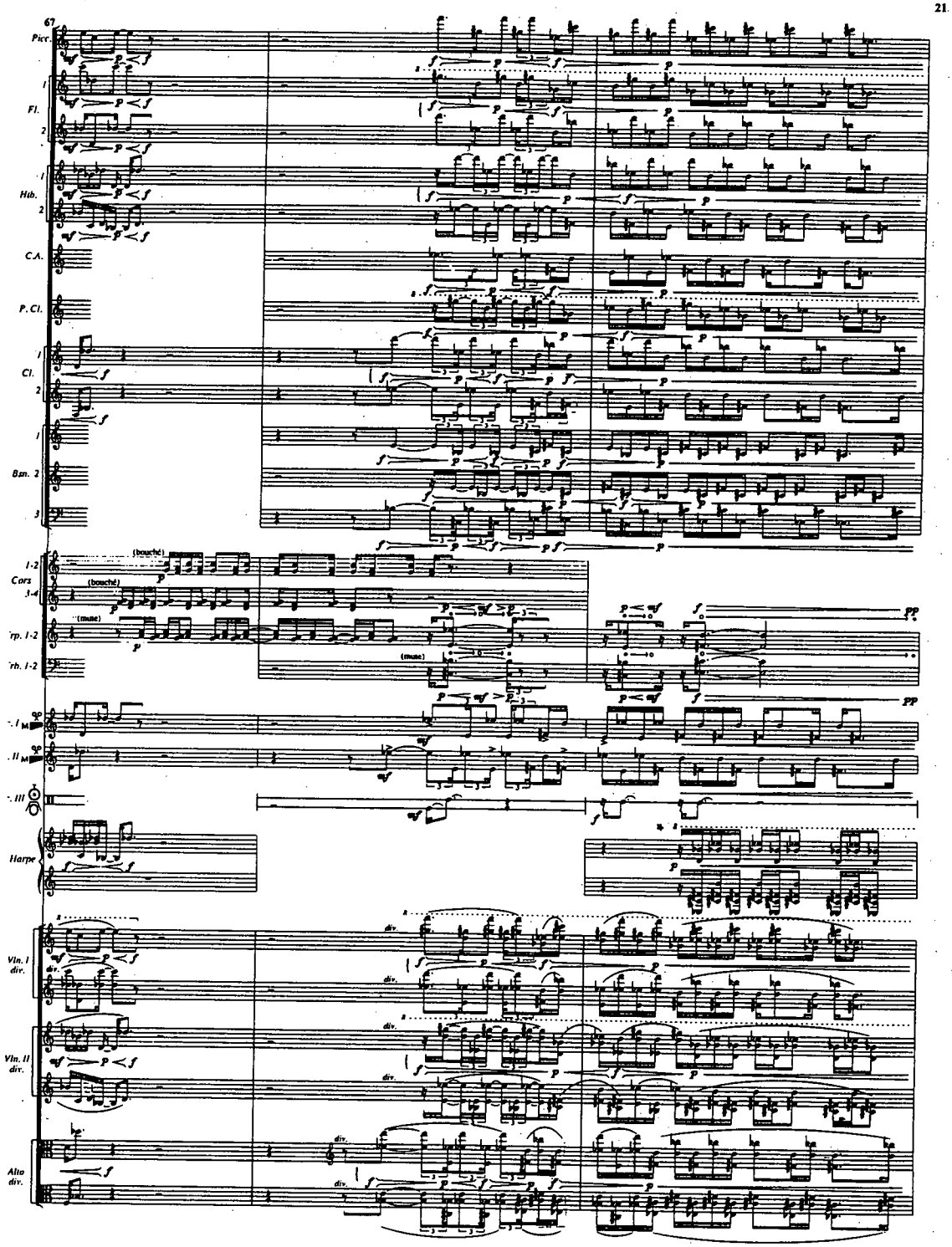
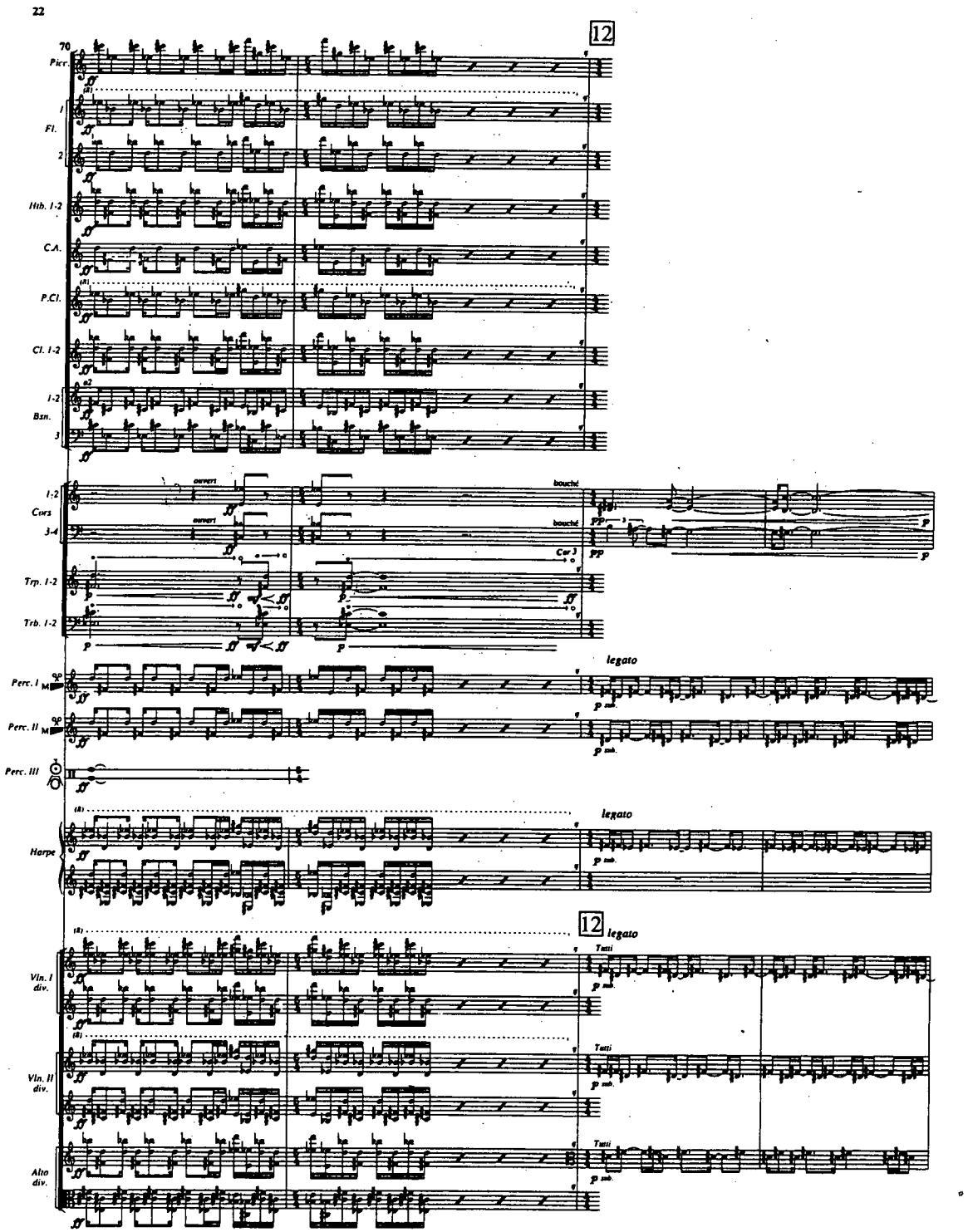
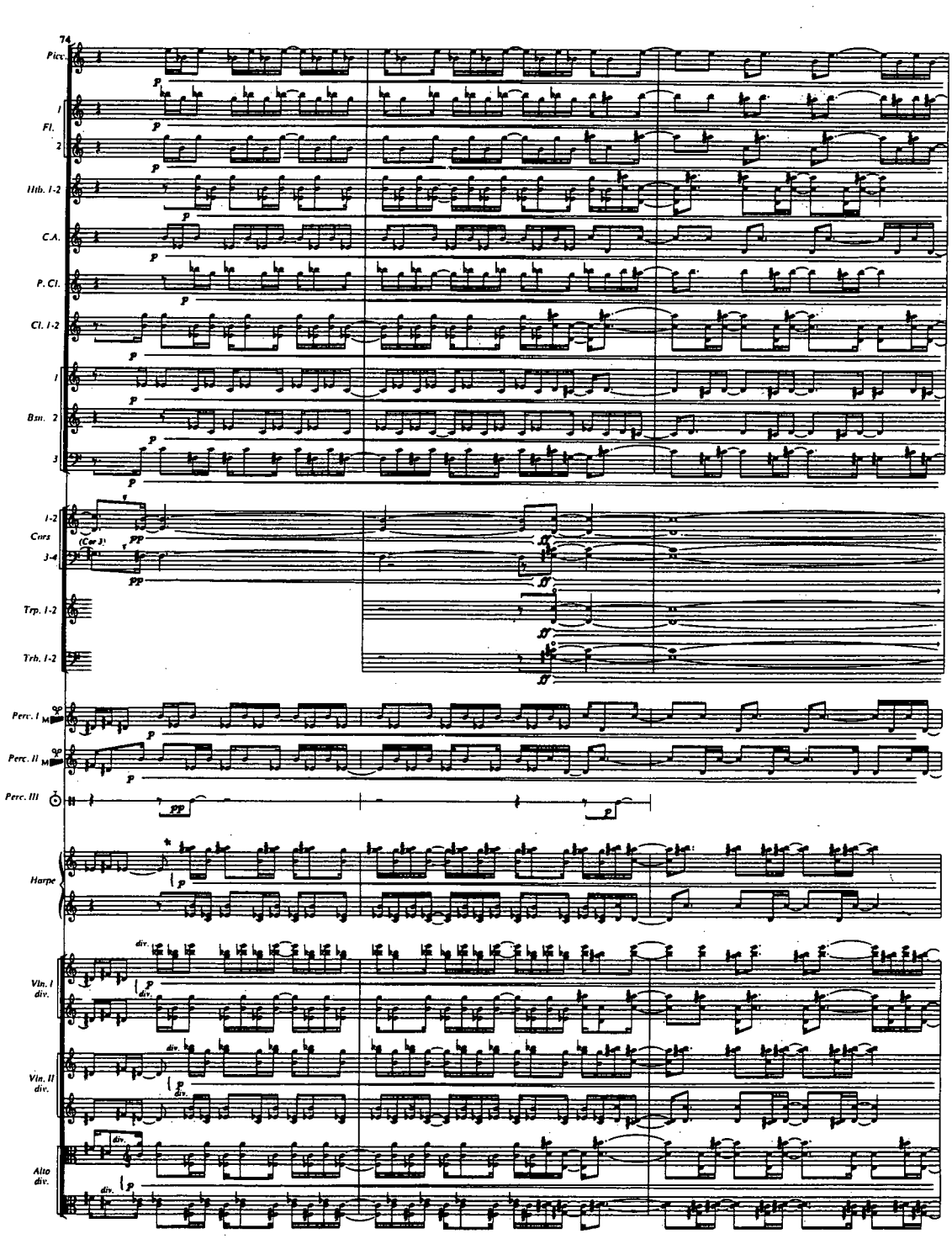
Appendix 1: "second development of the melody"

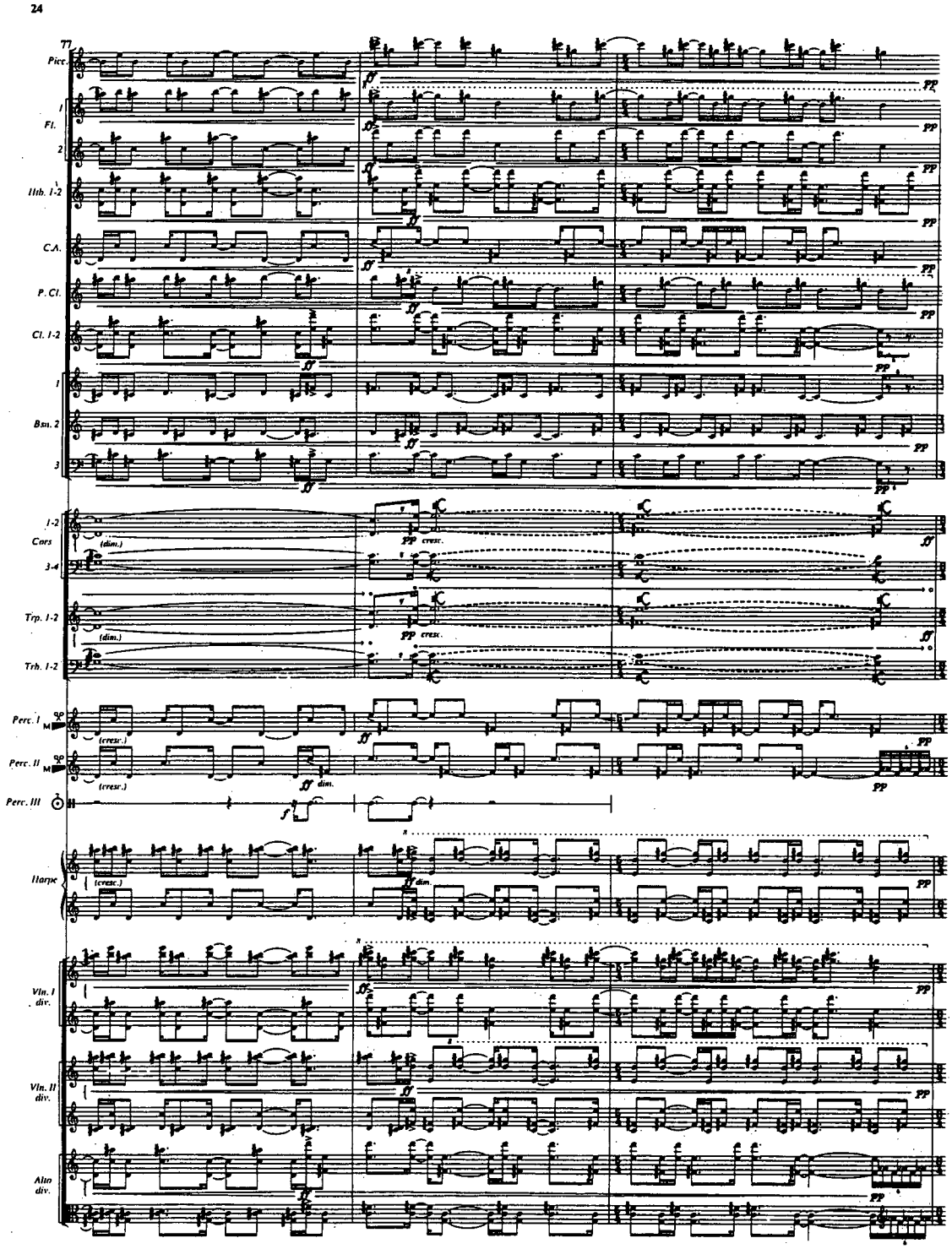
- score of mm. 57–114

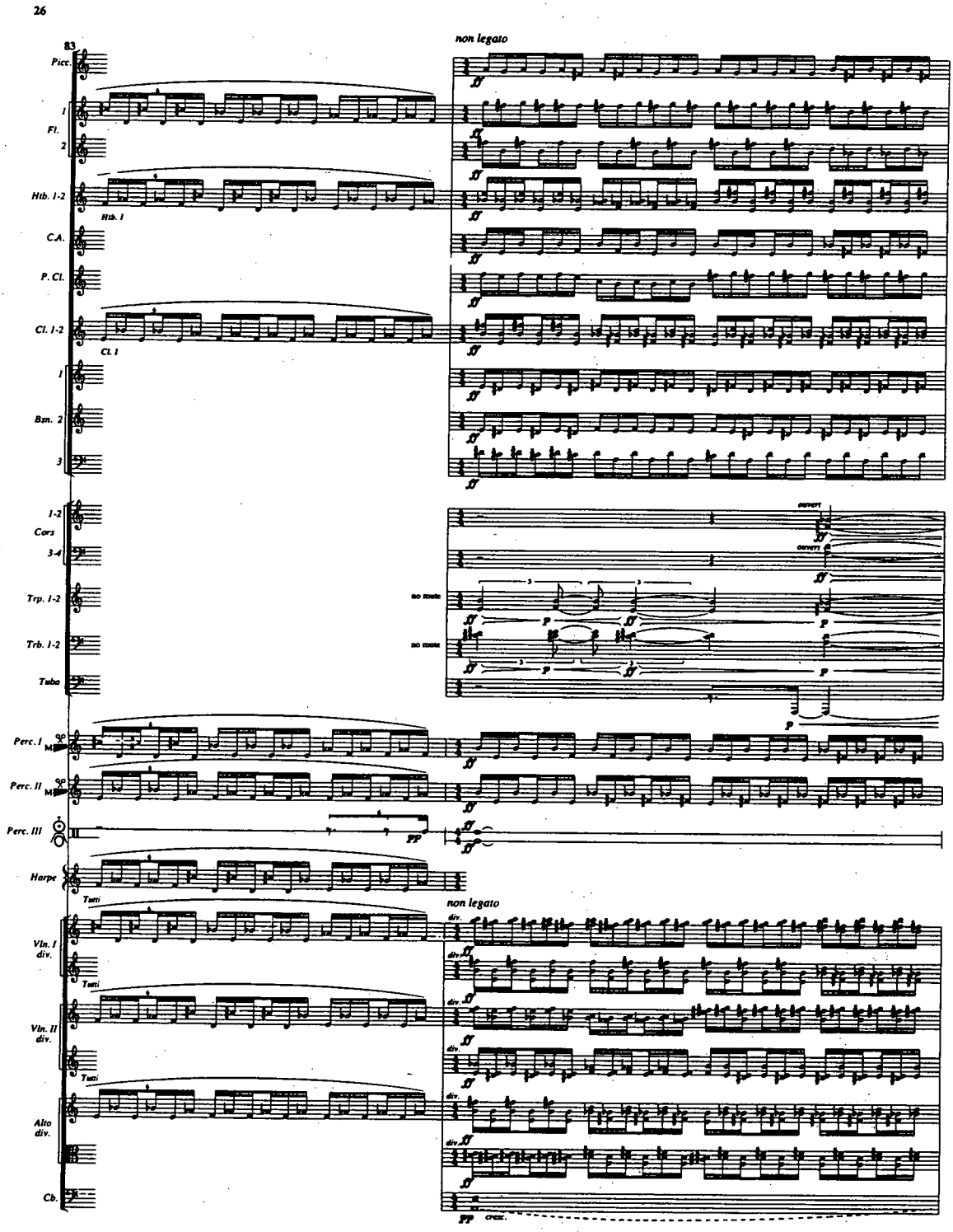


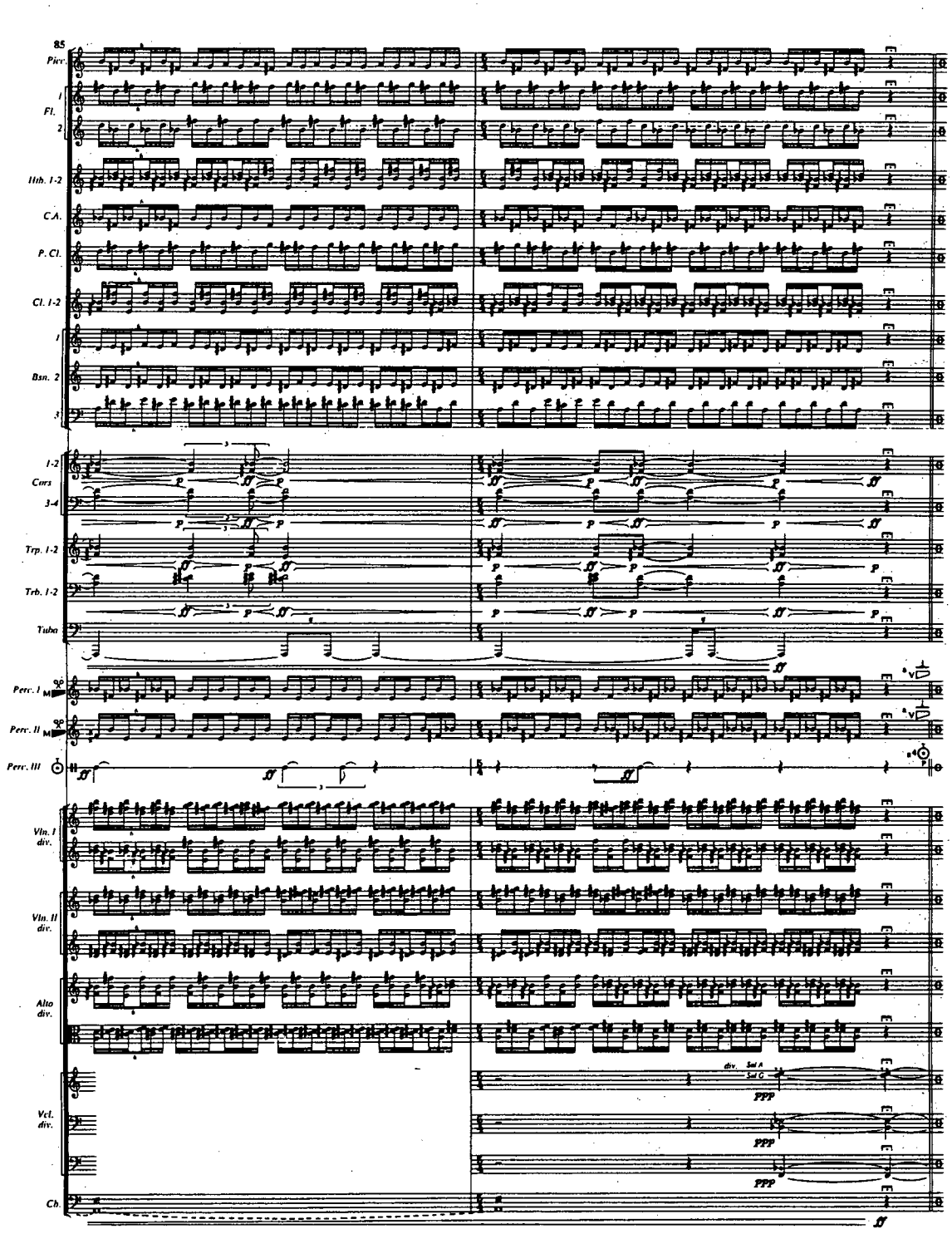

67
21
Picc.
Fl. 1
Fl. 2
Hb. 1
Hb. 2
C.A.
P. Cl.
Cl. 1
Cl. 2
Bsn. 1
Bsn. 2
Bsn. 3
Cors 1-2
Cors 3-4
(bouché)
(mute)
Trp. 1-2
Trb. 1-2
Timp. I
Timp. II
Timp. III
Harpe
Vln. I div.
Vln. II div.
Alto div.
pp

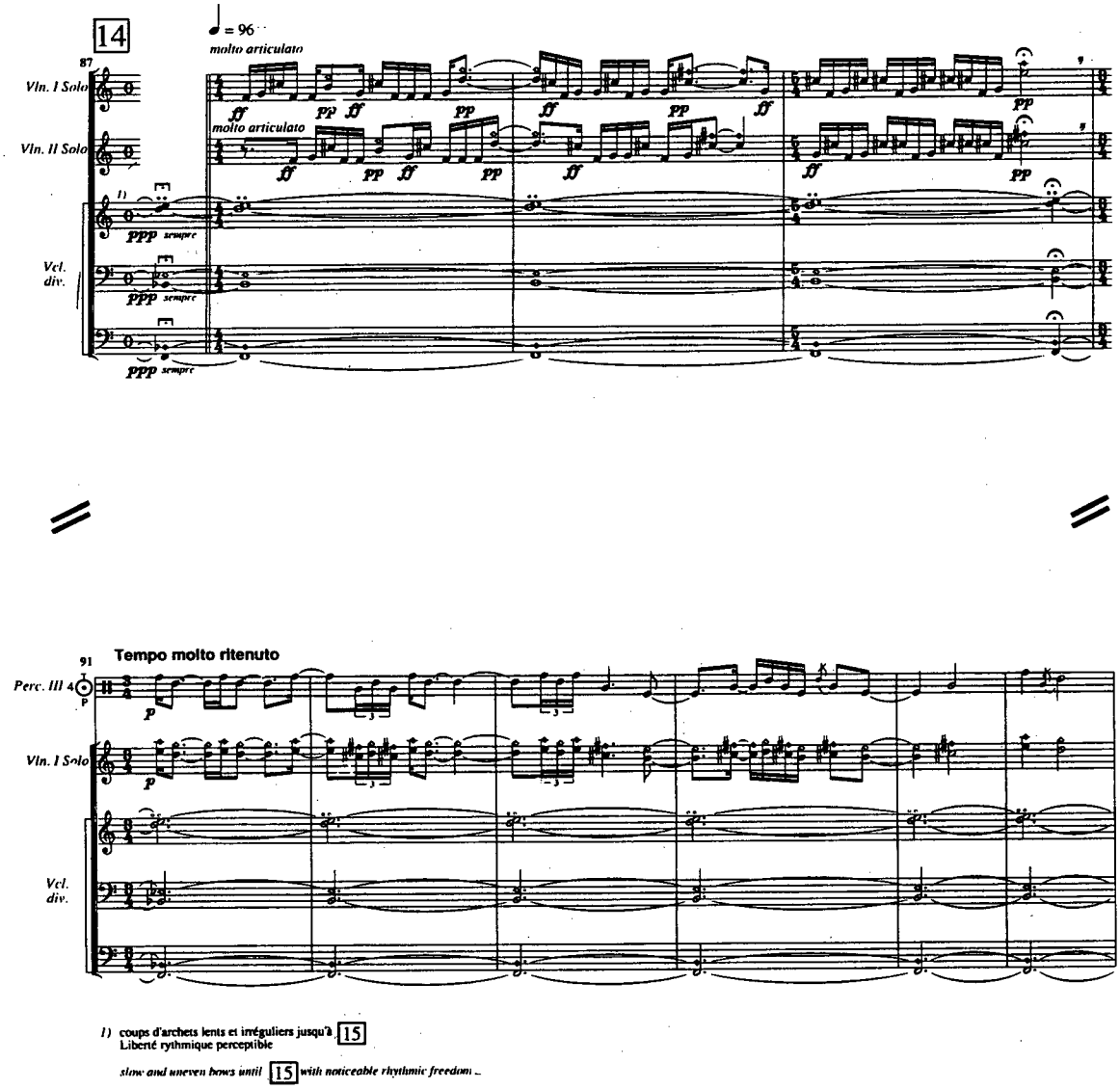

22
70
12
Picc.
Fl.
Hb. 1-2
C.A.
P.Cl.
Cl. 1-2
Bsn.
Cors
Trp. 1-2
Trb. 1-2
Perc. I
Perc. II
Perc. III
Harpe
Vln. I div.
Vln. II div.
Alto div.
ouvert
bouché
legato
Tutti


23
74
Picc.
Fl. 1
Fl. 2
Hth. 1-2
C.A.
P. Cl.
Cl. 1-2
Bsn. 1
Bsn. 2
Bsn. 3
Hrns 1-2
Hrns 3-4
Trp. 1-2
Trb. 1-2
Perc. I
Perc. II
Perc. III
Harpe
Vln. I div.
Vln. II div.
Alto div.


24
Picc.
Fl. 1
Fl. 2
Hth. 1-2
C.A.
P. Cl.
Cl. 1-2
Bsn. 1
Bsn. 2
Bsn. 3
Cors 1-2
Cors 3-4
Trp. 1-2
Trb. 1-2
Perc. I
Perc. II
Perc. III
Harpe
Vln. I div.
Vln. II div.
Alto div.


26
83
non legato
Picc.
1
Fl.
2
Htb. 1-2
Htb. 1
C.A.
P. Cl.
Cl. 1-2
Cl. 1
1
Bsn. 2
3
1-2
Cors
3-4
Trp. 1-2
Trb. 1-2
Tuba
Perc. I
Perc. II
Perc. III
Harpe
Tutti
non legato
Vln. I
div.
Tutti
Vln. II
div.
Tutti
Alto
div.
Cb.


27
85
Picc.
1
Fl.
2
Hth. 1-2
C.A.
P. Cl.
Cl. 1-2
1
Bsn. 2
3
1-2
Corn
3-4
Trp. 1-2
Trb. 1-2
Tuba
Perc. I
Perc. II
Perc. III
Vln. I div.
Vln. II div.
Alto div.
Vcl. div.
Cb.
ppp
ppp
ppp



28

14

♩ = 96

molto articulato

87

Vln. I Solo

Vln. II Solo

molto articulato

ff *pp* *ff* *pp* *ff* *pp* *ff* *pp*

ff *pp* *ff* *pp* *ff* *ff* *pp*

1)

ppp sempre

Vcl. div.

ppp sempre

ppp sempre

91

Tempo molto ritenuto

Perc. III 4

p

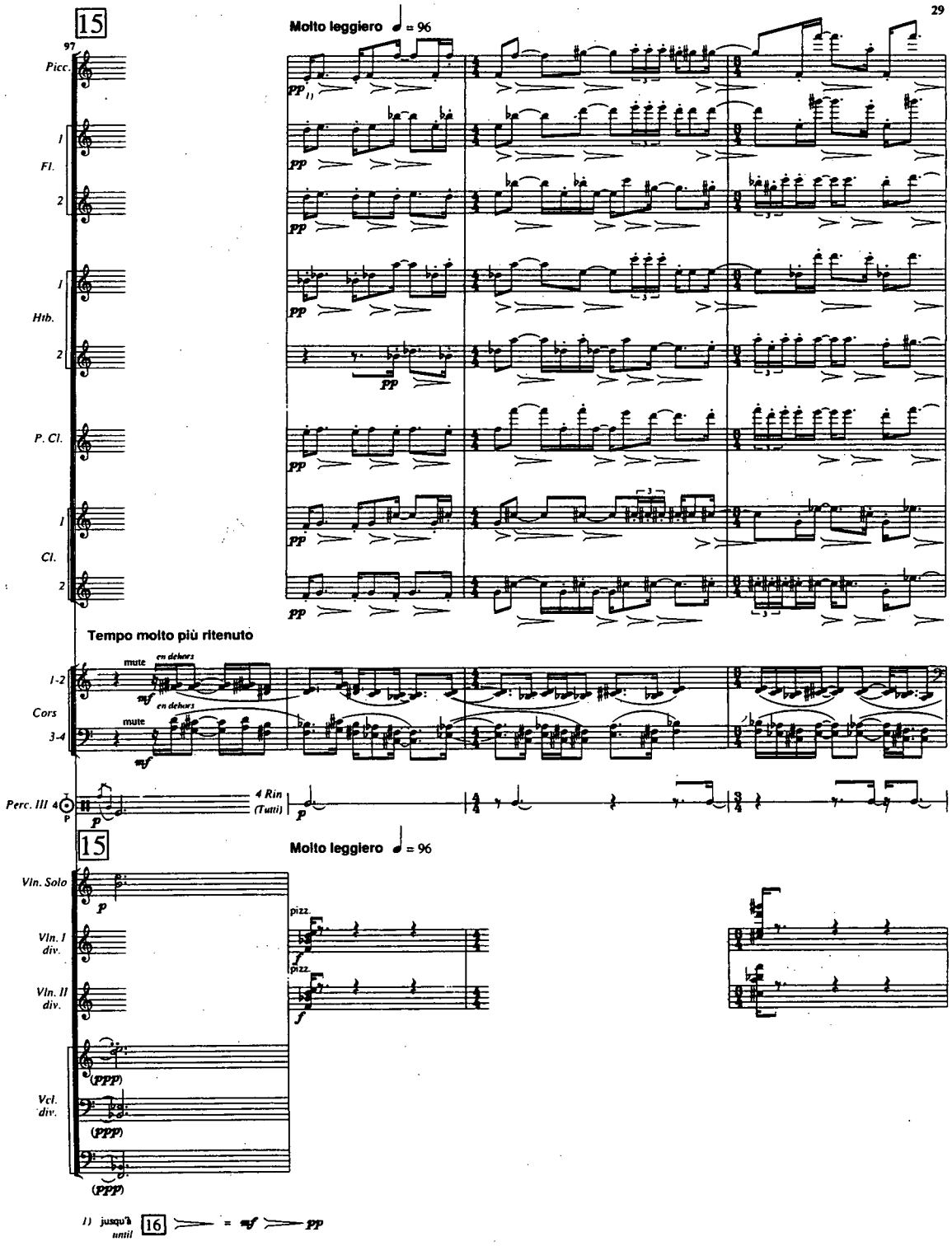
Vln. I Solo

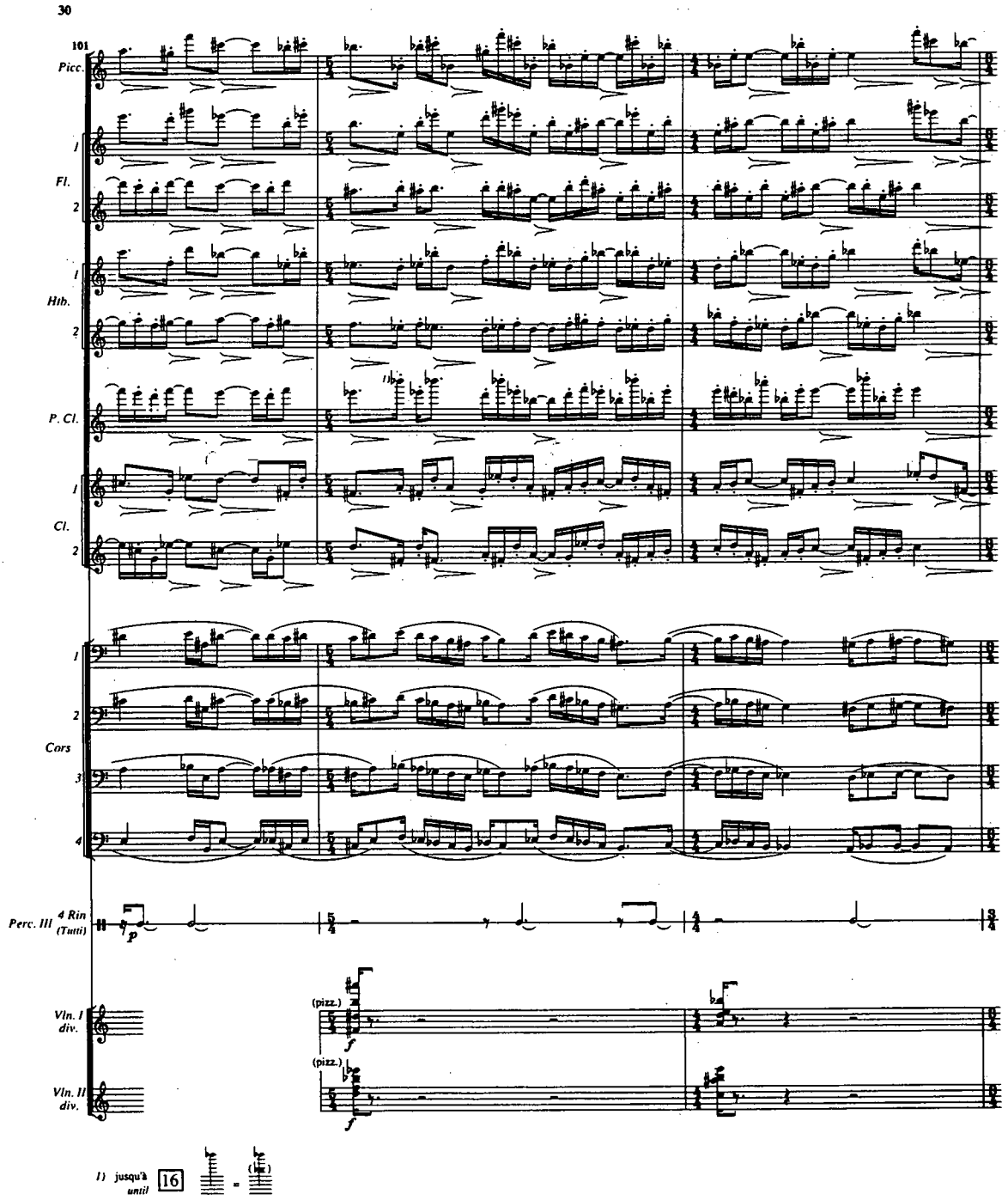
p

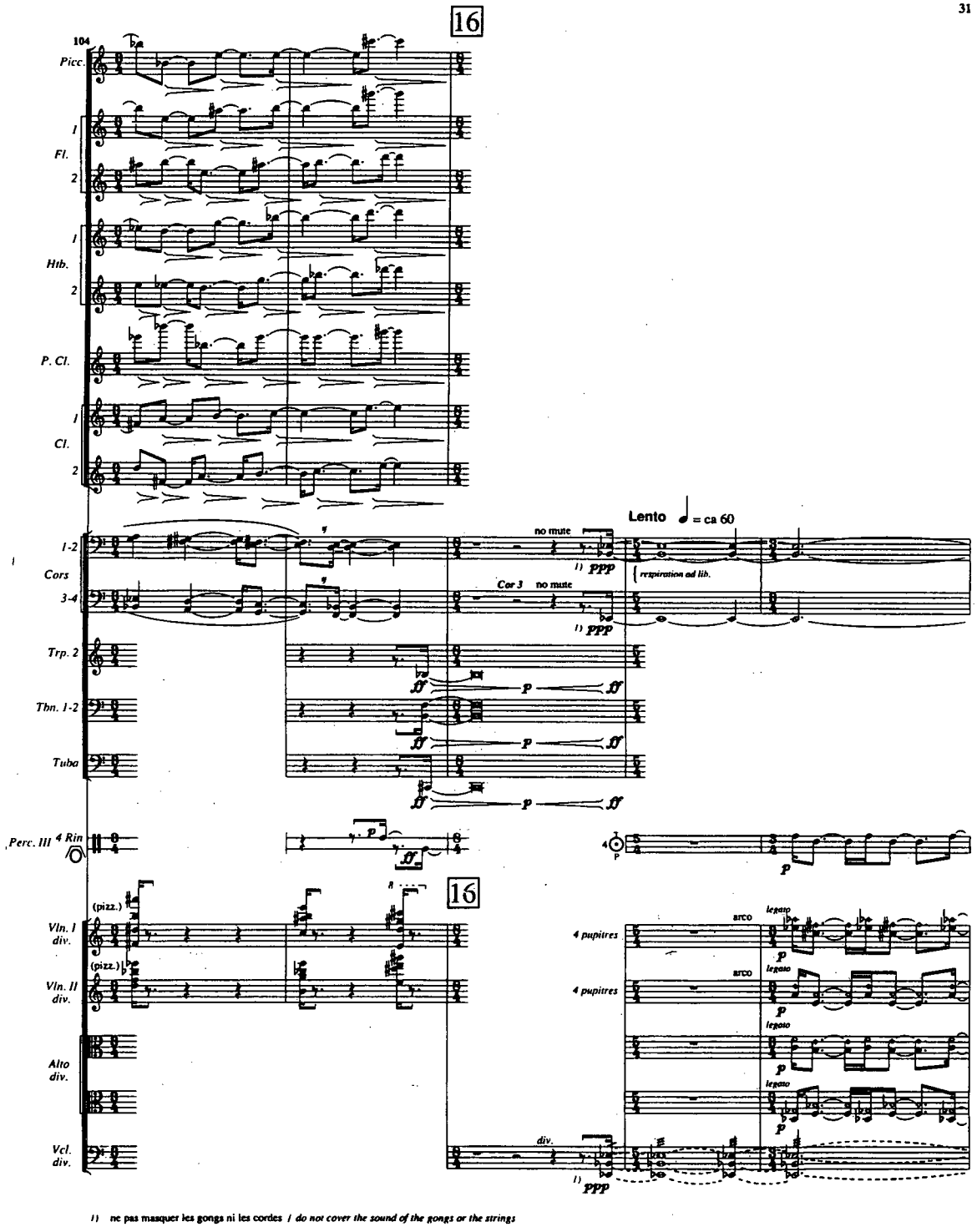
Vcl. div.

1) coups d'archets lents et irréguliers jusqu'à 15
Liberté rythmique perceptible

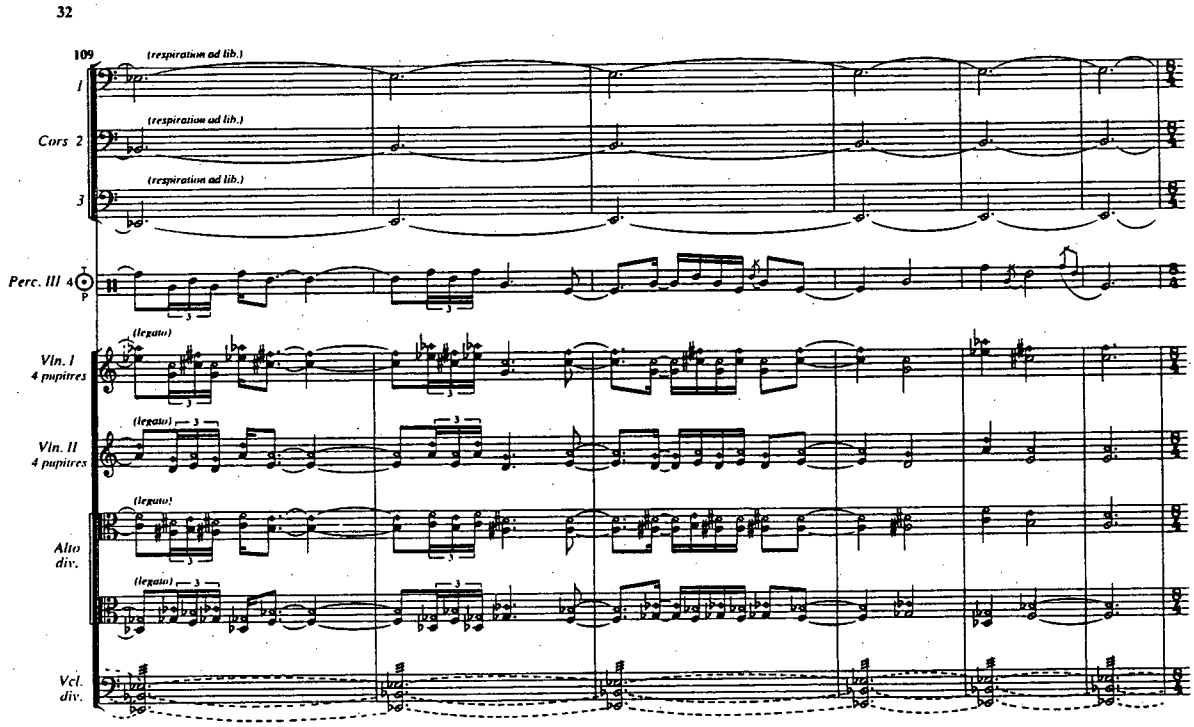
slow and uneven bows until 15 *with noticeable rhythmic freedom*


15
97
Molto leggiero ♩ = 96
29
Picc.
Fl.
Htb.
P. Cl.
Cl.
Tempo molto più ritenuto
mute
en dehors
Cors
Perc. III
4 Rin
(Tutti)
15
Molto leggiero ♩ = 96
Vln. Solo
Vln. I div.
Vln. II div.
Vcl. div.
pizz.
(PPP)
jusqu'à until
16


30
101
Picc.
1
Fl.
2
1
Hb.
2
P. Cl.
1
Cl.
2
1
2
Cors
3
4
Perc. III
4 Rin
(Tutti)
p
Vln. I
div.
Vln. II
div.
(pizz.)
f
(pizz.)
f
1) jusqu'à
until
16

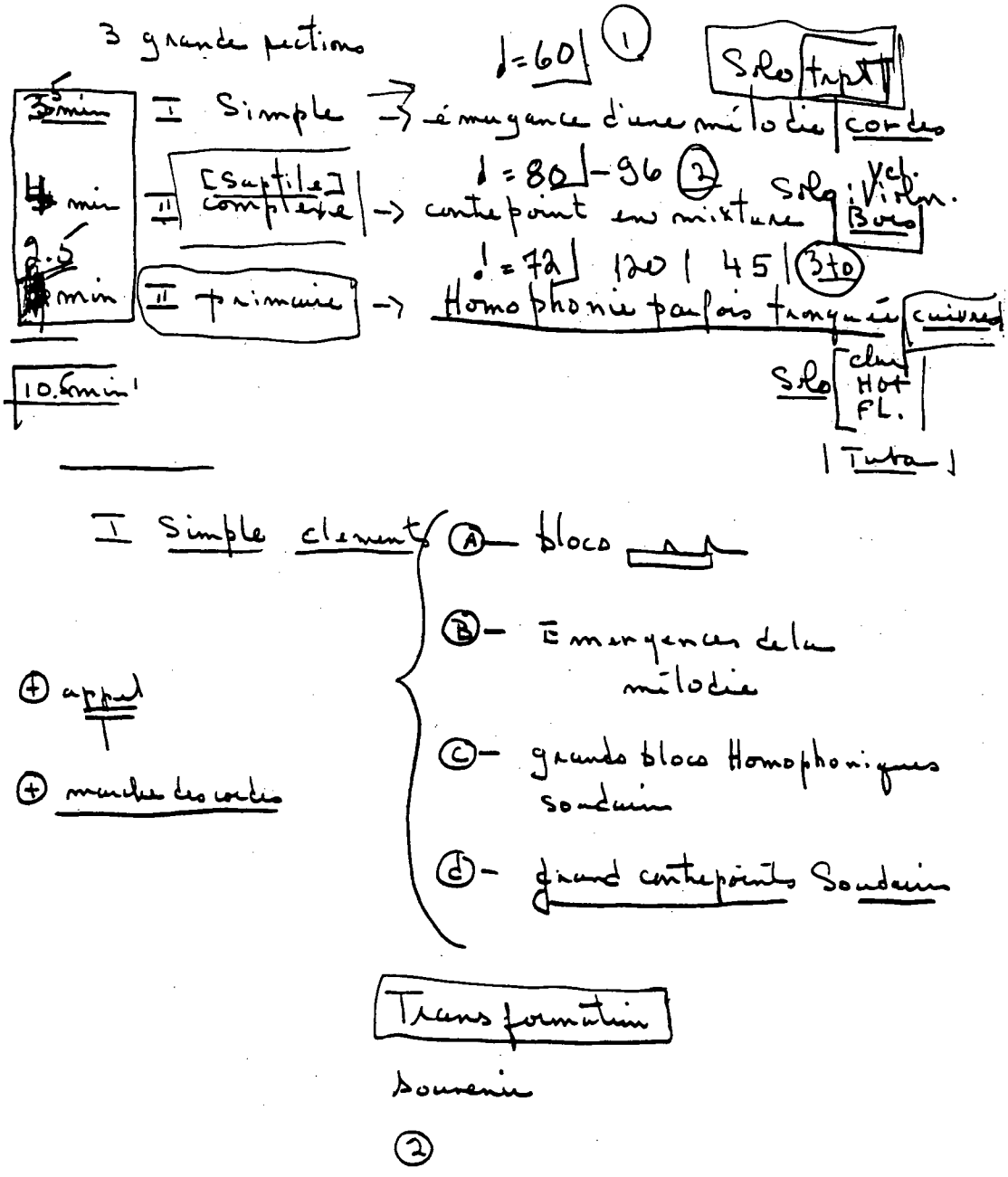


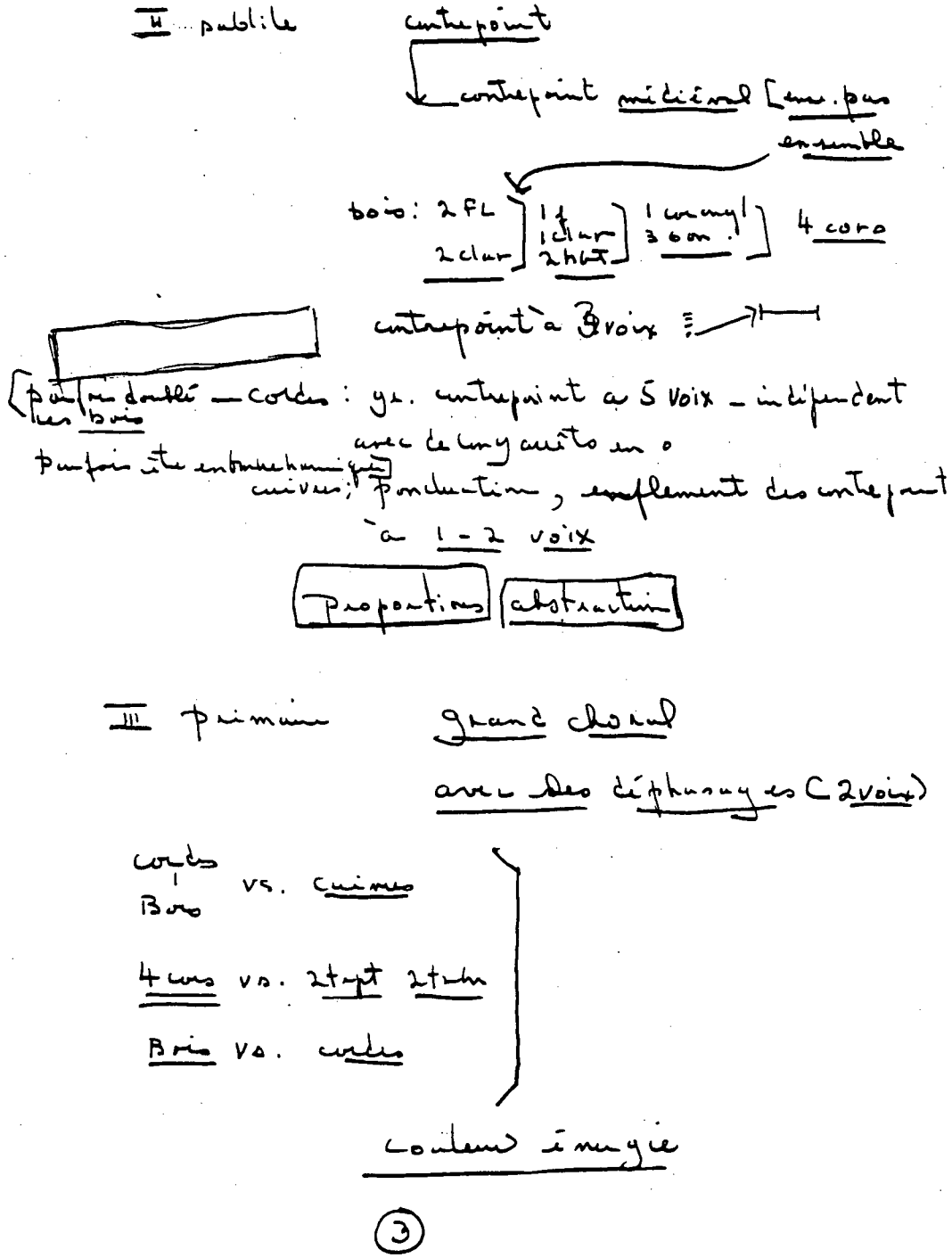
1) ne pas masquer les gongs ni les cordes / *do not cover the sound of the gongs or the strings*


32
109
(respiration ad lib.)
I
(respiration ad lib.)
Cors 2
(respiration ad lib.)
3
Perc. III 4
p
(legato)
Vln. I
4 pupitres
(legato)
Vln. II
4 pupitres
(legato)
Alto
div.
(legato)
Vcl.
div.

Appendix 2: Sketches for *Orion*

- Sketch S1





II ... publile — contrepoint

contrepoint médiéval [ens. pas ensemble

bois: 2 FL, 2 clar — 1 f, 1 clar, 2 hbt — 1 cor ang, 3 bon. — 4 cors

contrepoint à 3 voix

[parfois doublé les bois — cordes : gr. contrepoint à 5 voix – indépendent avec de long arrêts en o

parfois être entouré harmonique]

cuivres; ponctuation, enflement des contrepoint à 1 - 2 voix

Proportions | abstraction

III primaire — grand choral

avec des déphasages (2 voix)

cordes / Bois vs. cuivres

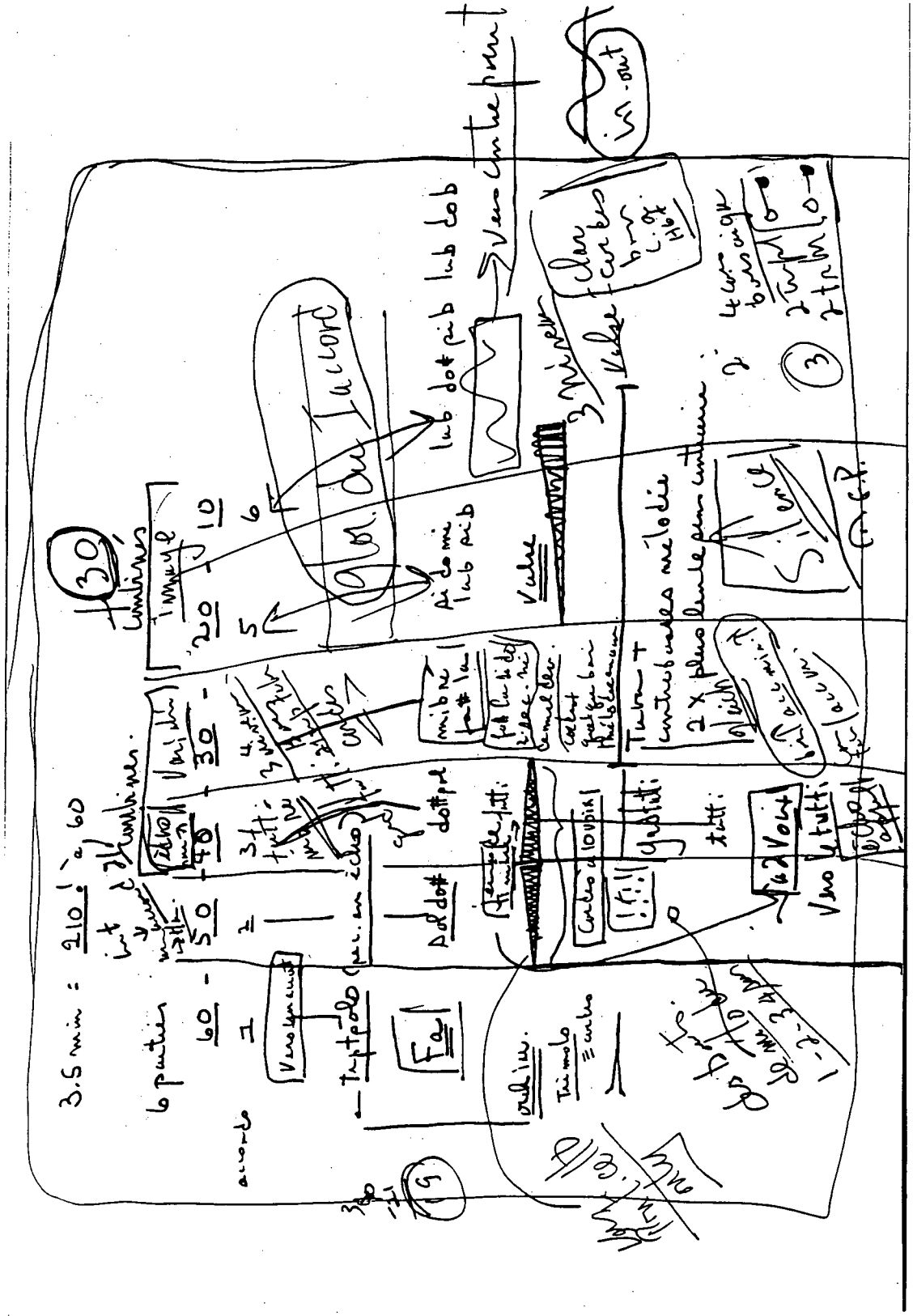
4 cors vs. 2 trpt 2 trbn

Bois vs. cordes

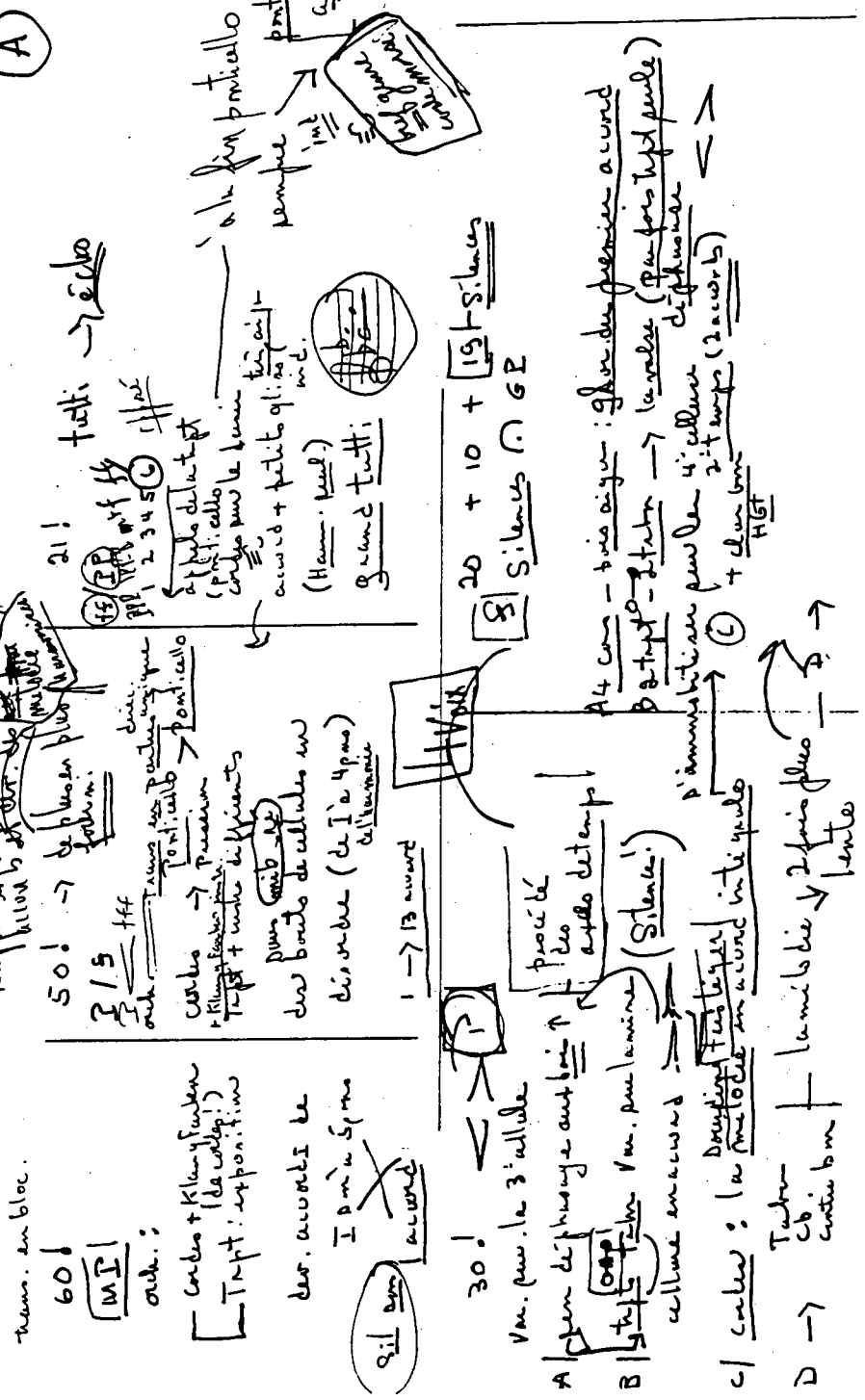
couleur énergie

(3)

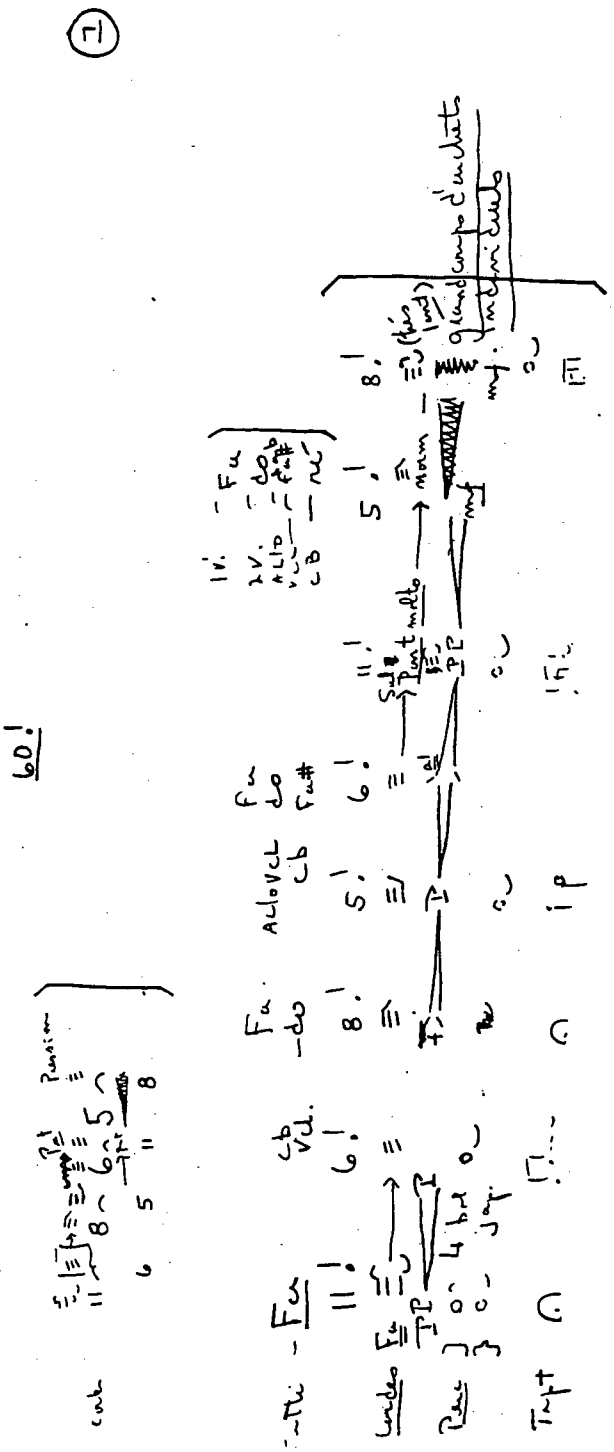
• Sketch S2



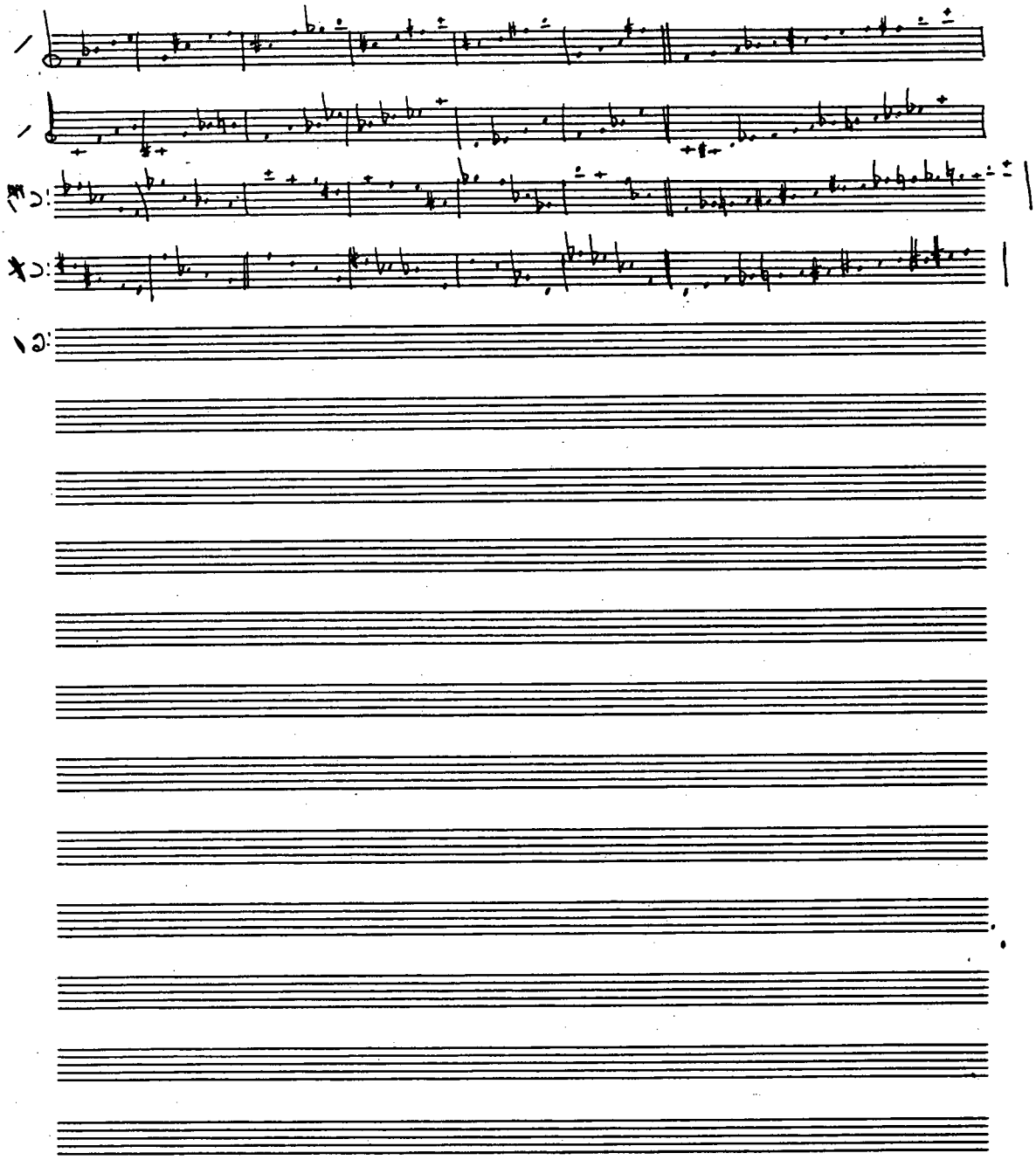
• Sketch S3



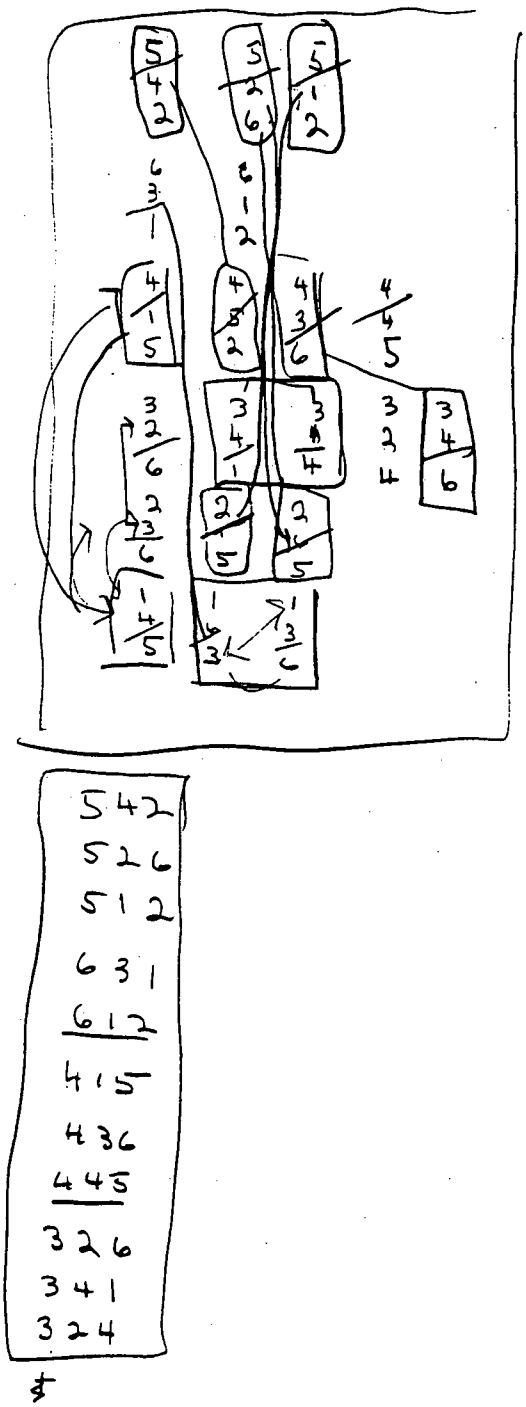
• Sketch M3



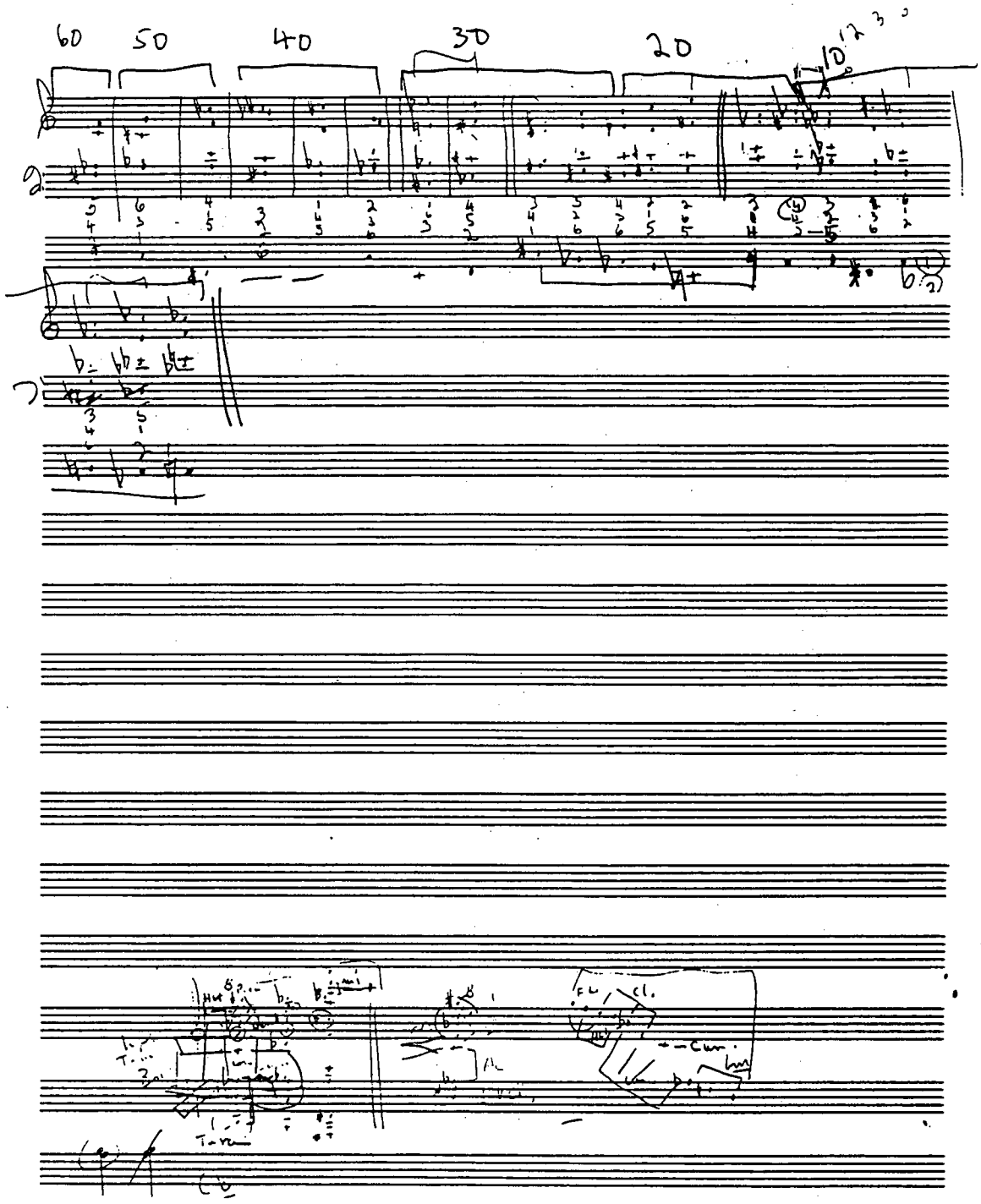
• Sketch J1



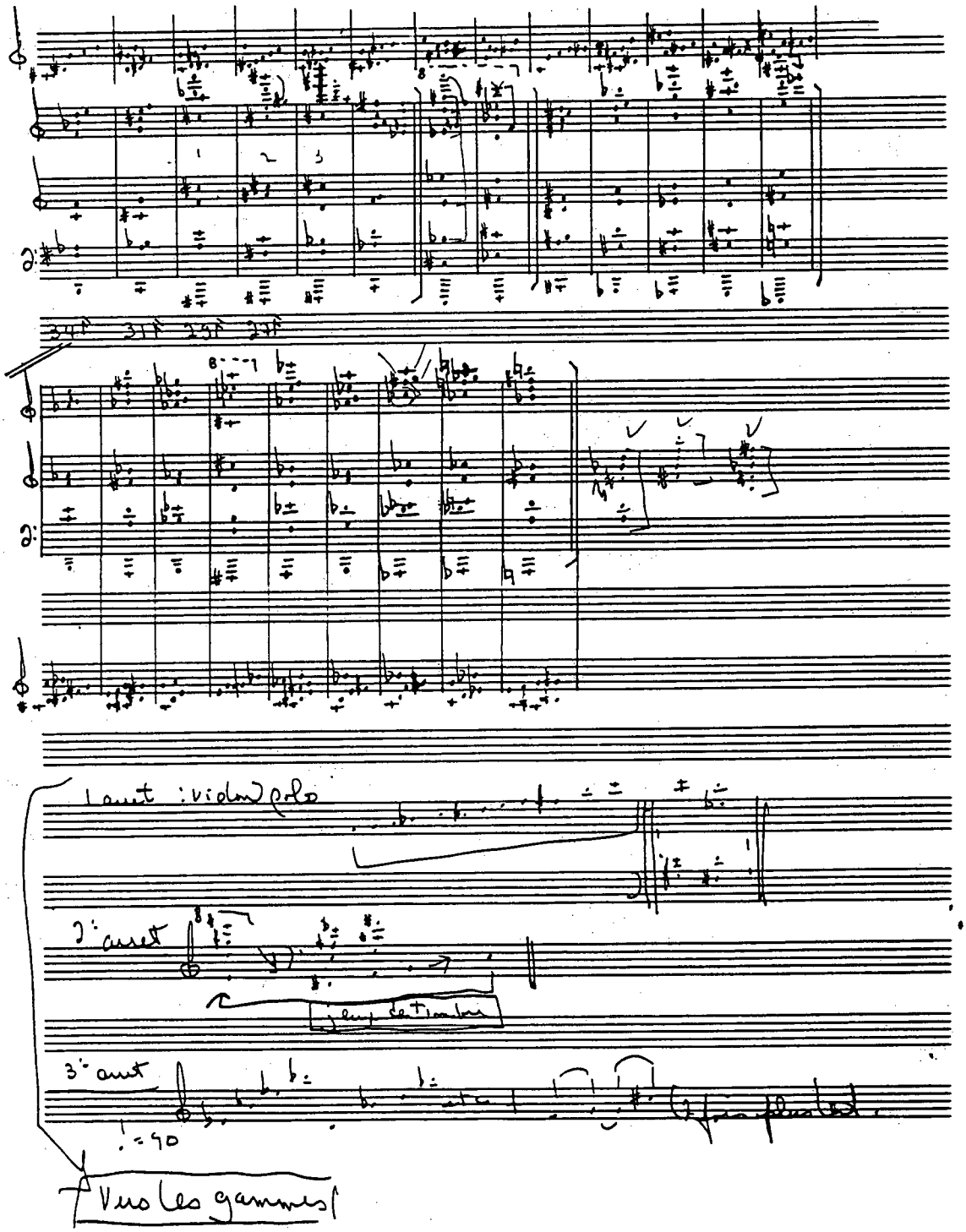
- Sketch J2



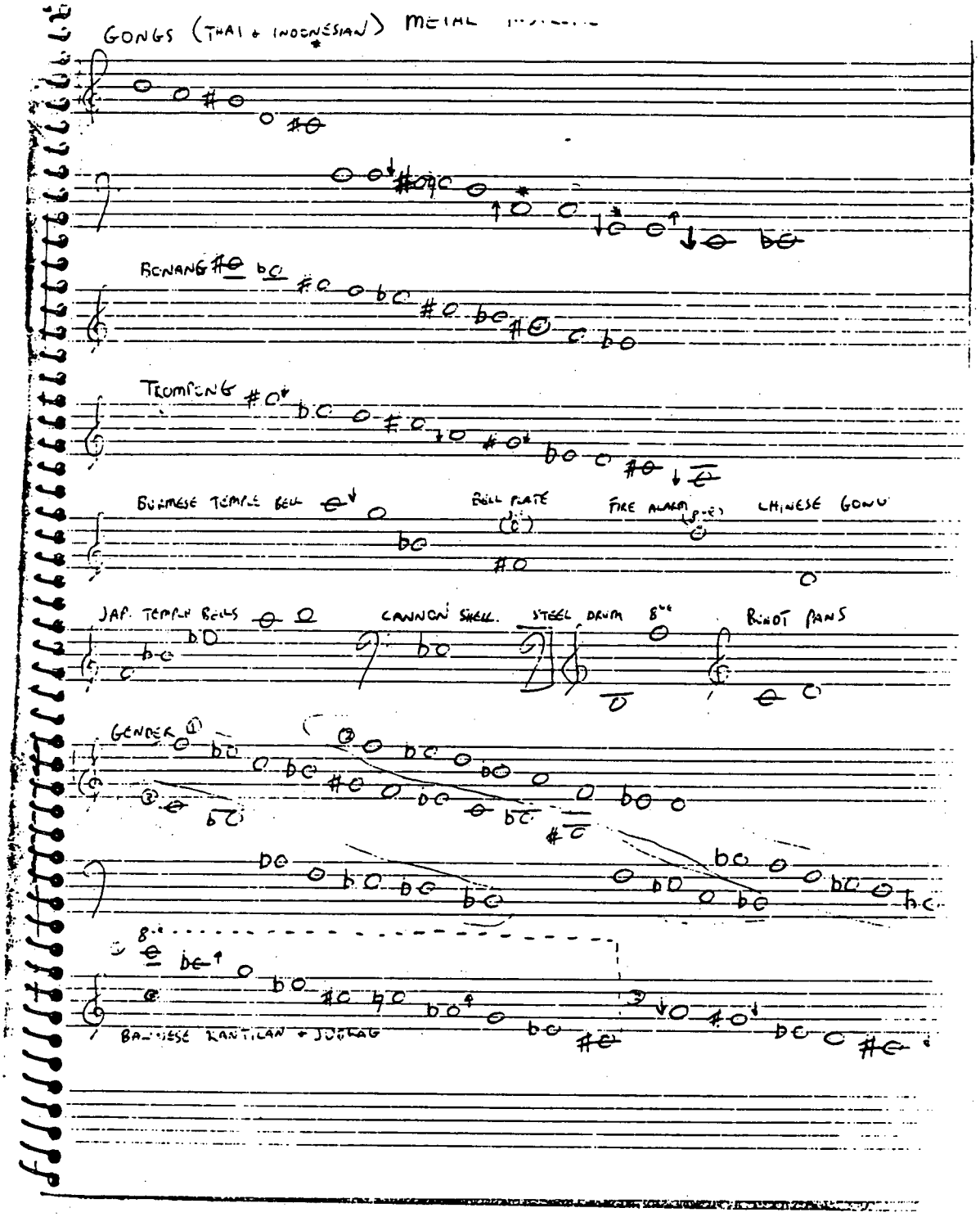
• Sketch J3



• Sketch J4

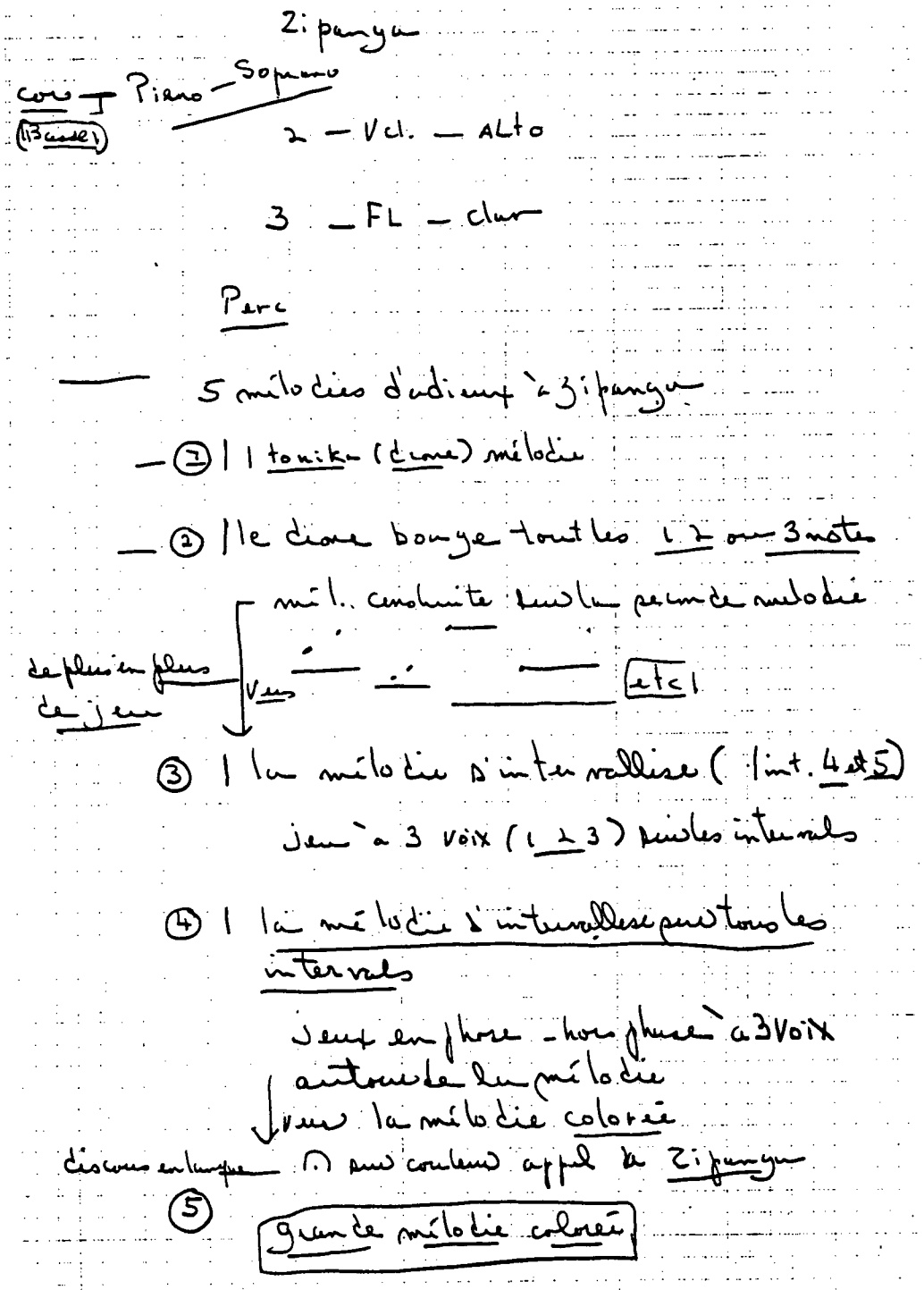


• Sketch AM1

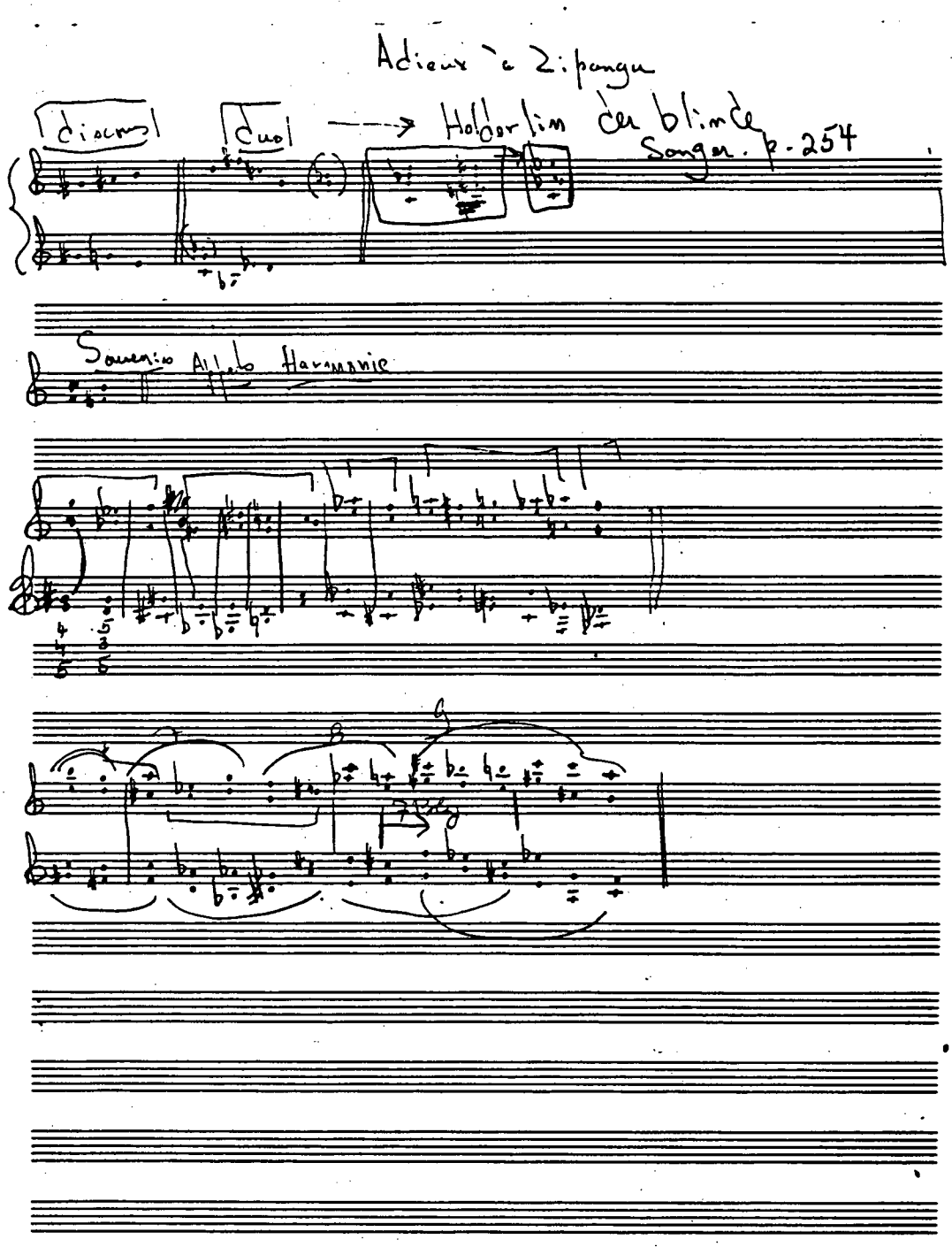

GONGS (THAI + INDONESIAN) METAL
BONANG
TROMPONG
BURMESE TEMPLE BELL
BELL PLATE
FIRE ALARM
CHINESE GONG
JAP. TEMPLE BELLS
CANNON SHELL
STEEL DRUM
BIDOT PANS
GENDER

Appendix 3: Sketches for *Zipangu*

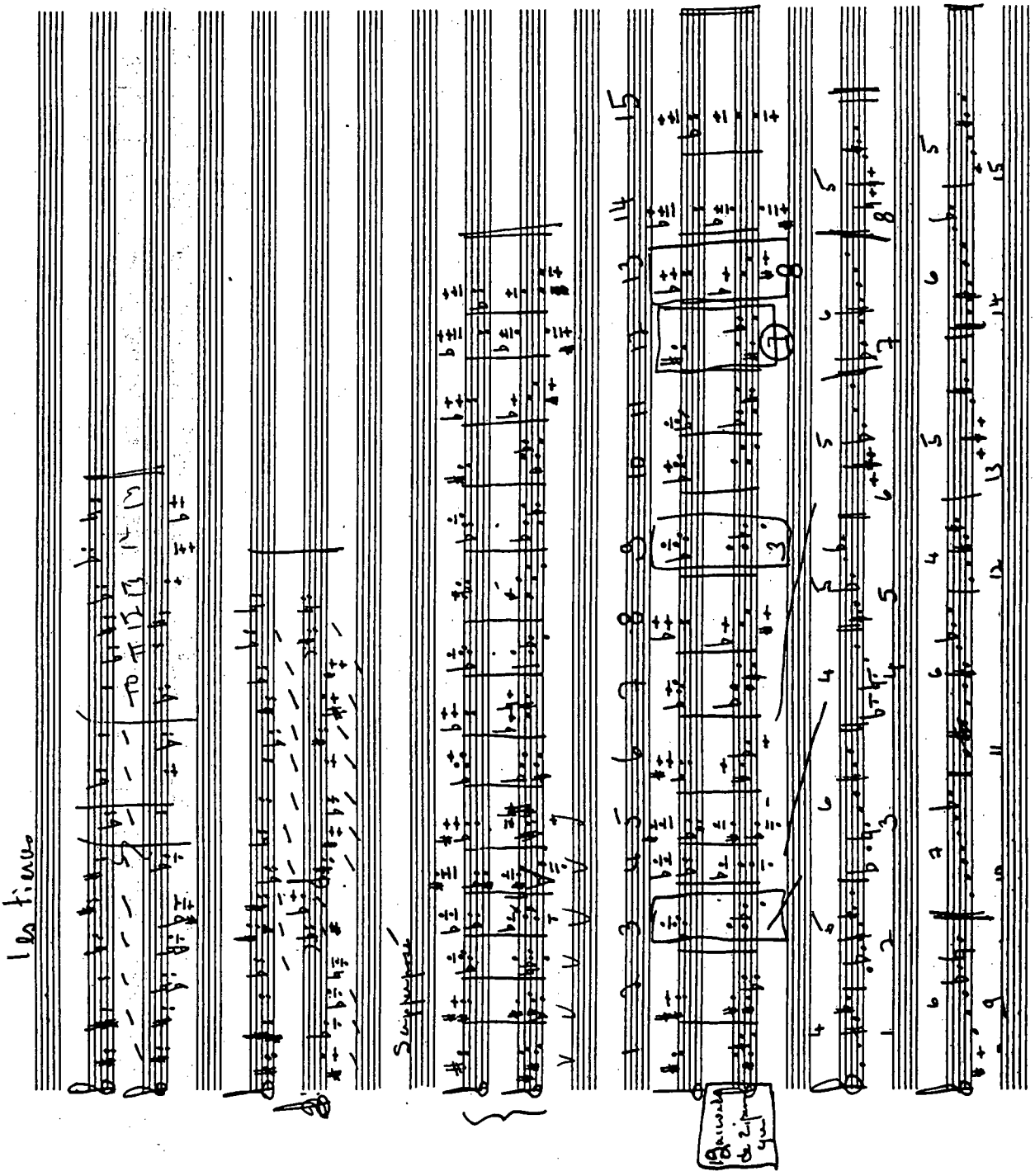
- Sketch Z1



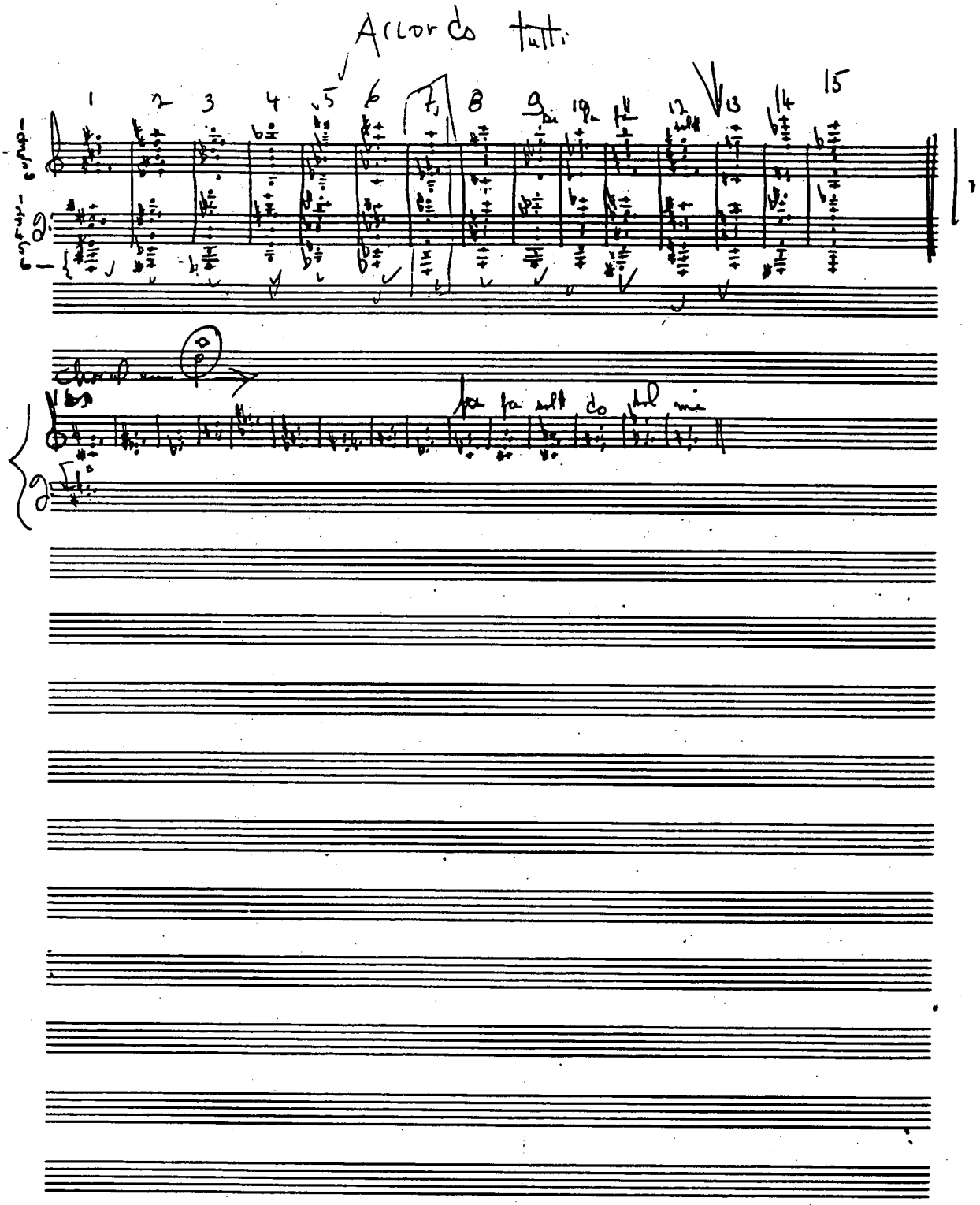
• Sketch Z2


Adieux à Zipangu
discours
duo
Holderlin der blinde
Sanger. p. 254
Souvenir Appels Harmonie

• Sketch Z3

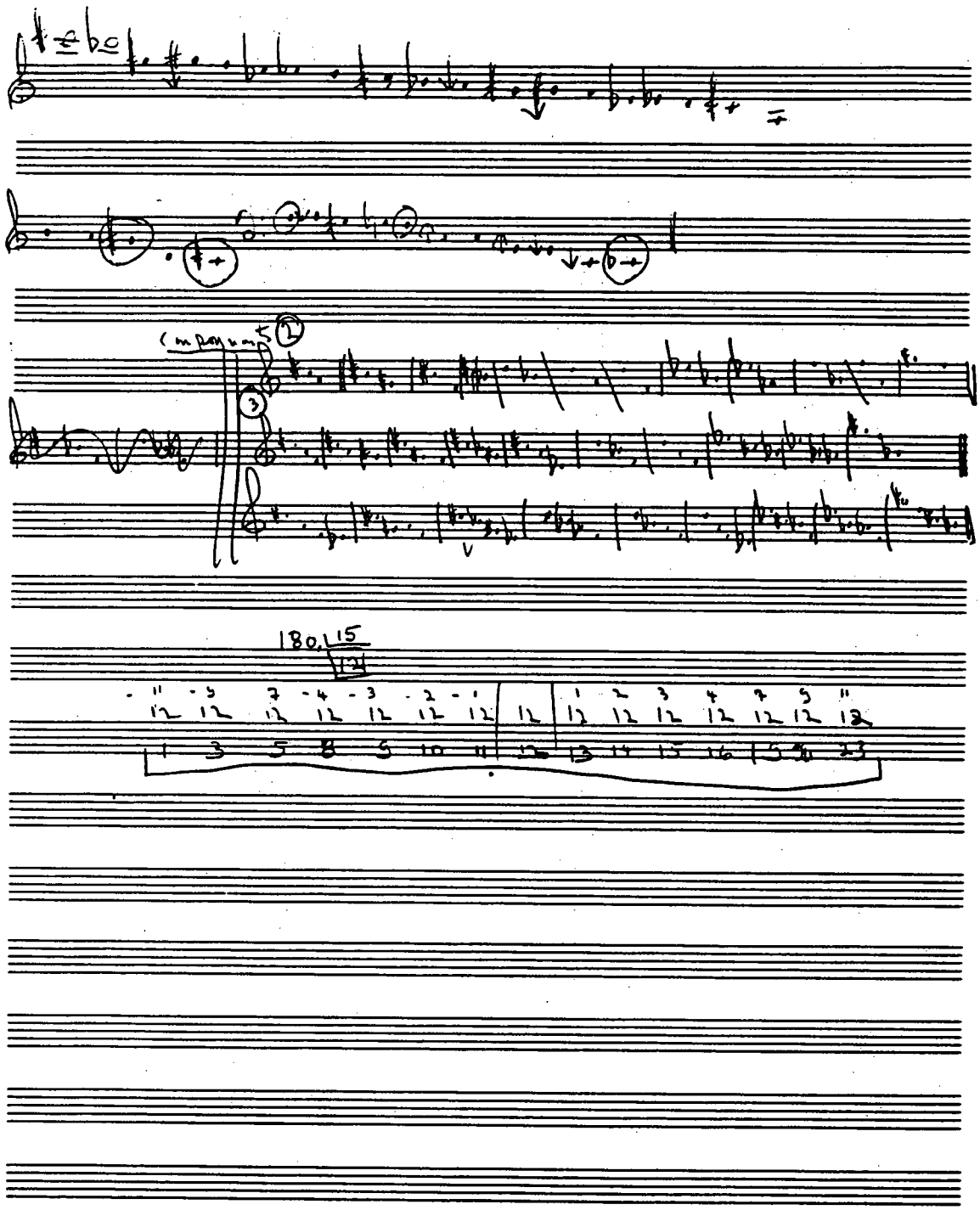


• Sketch Z4

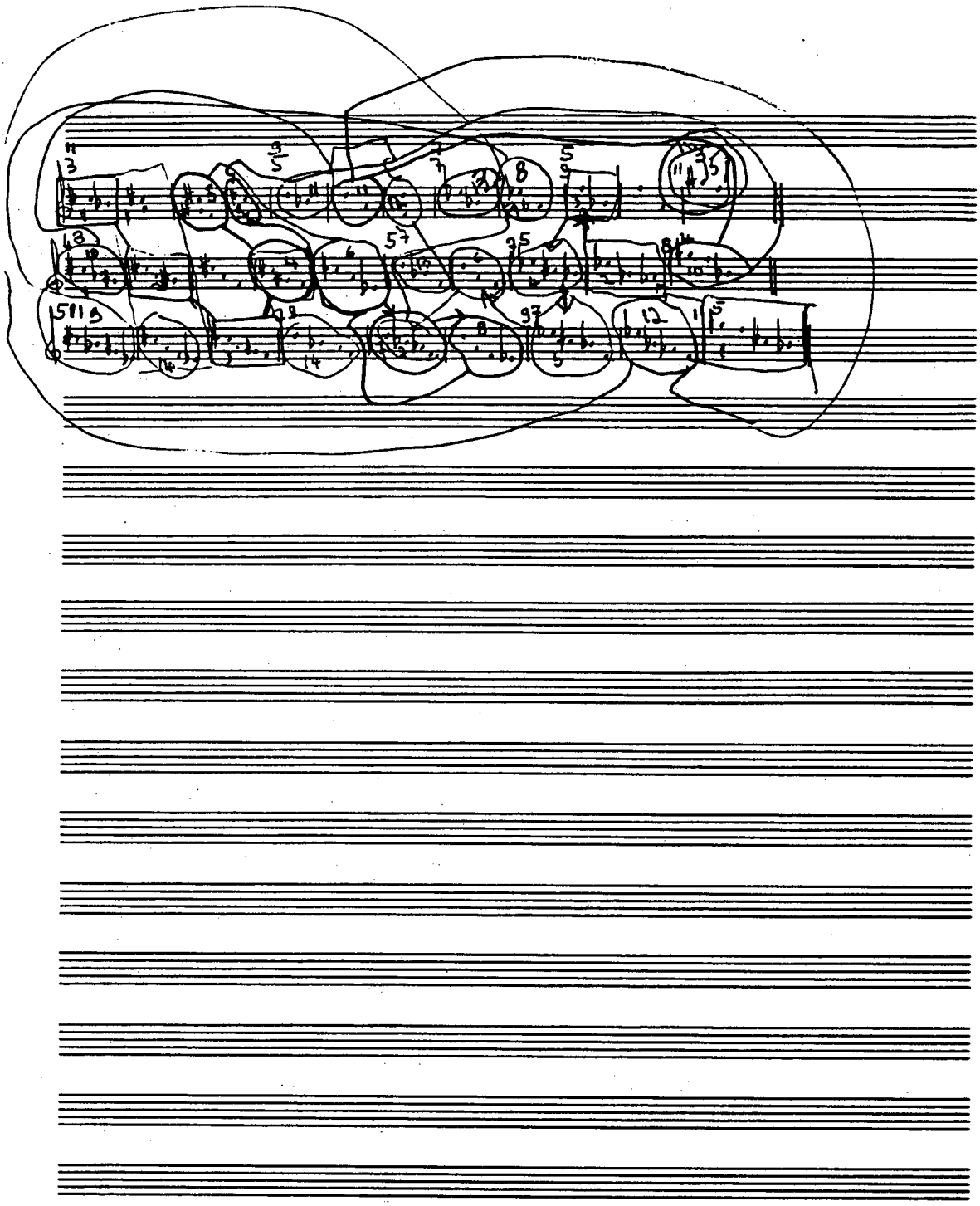


Appendix 4: Sketches for *Cinq chansons pour percussion*

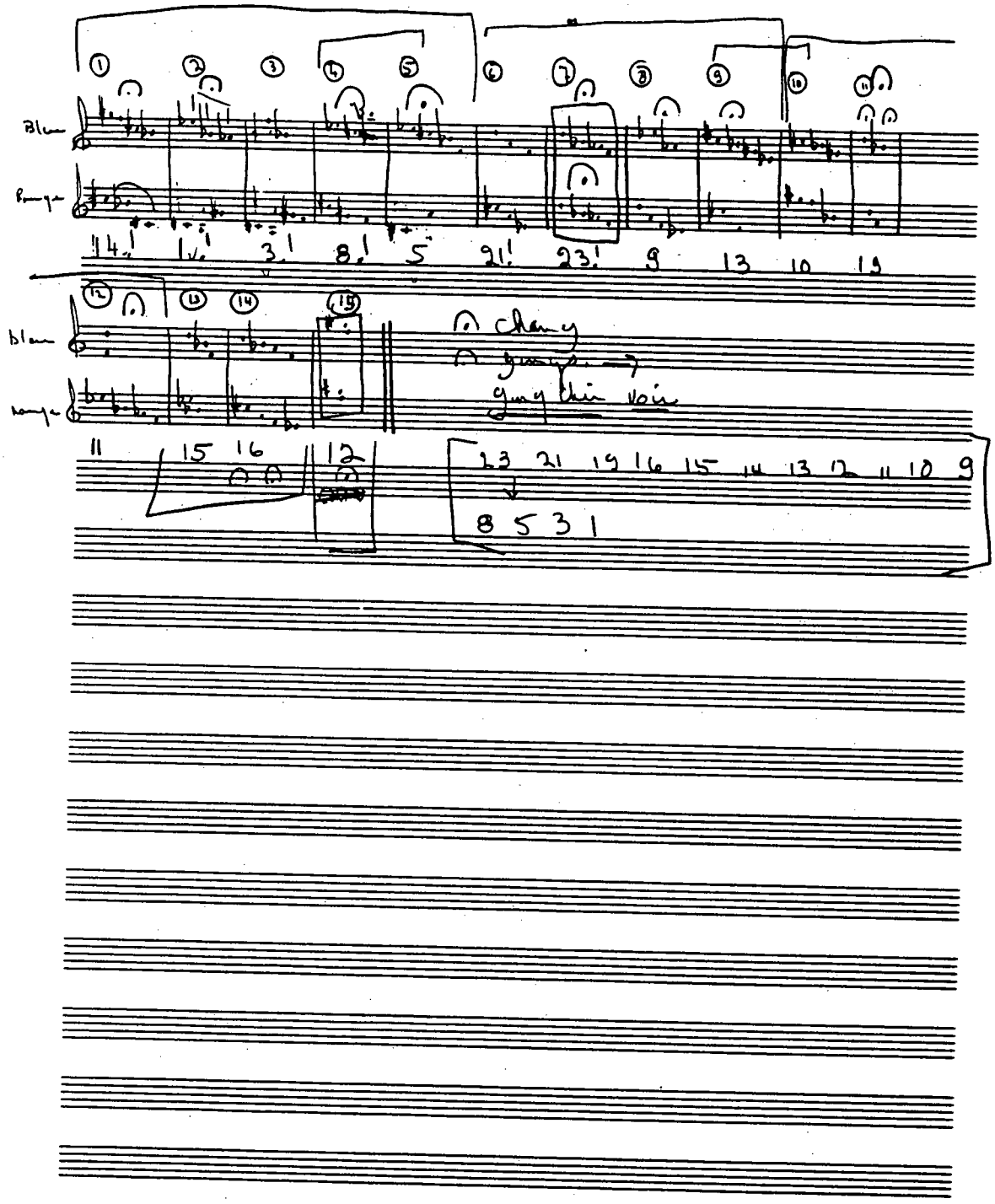
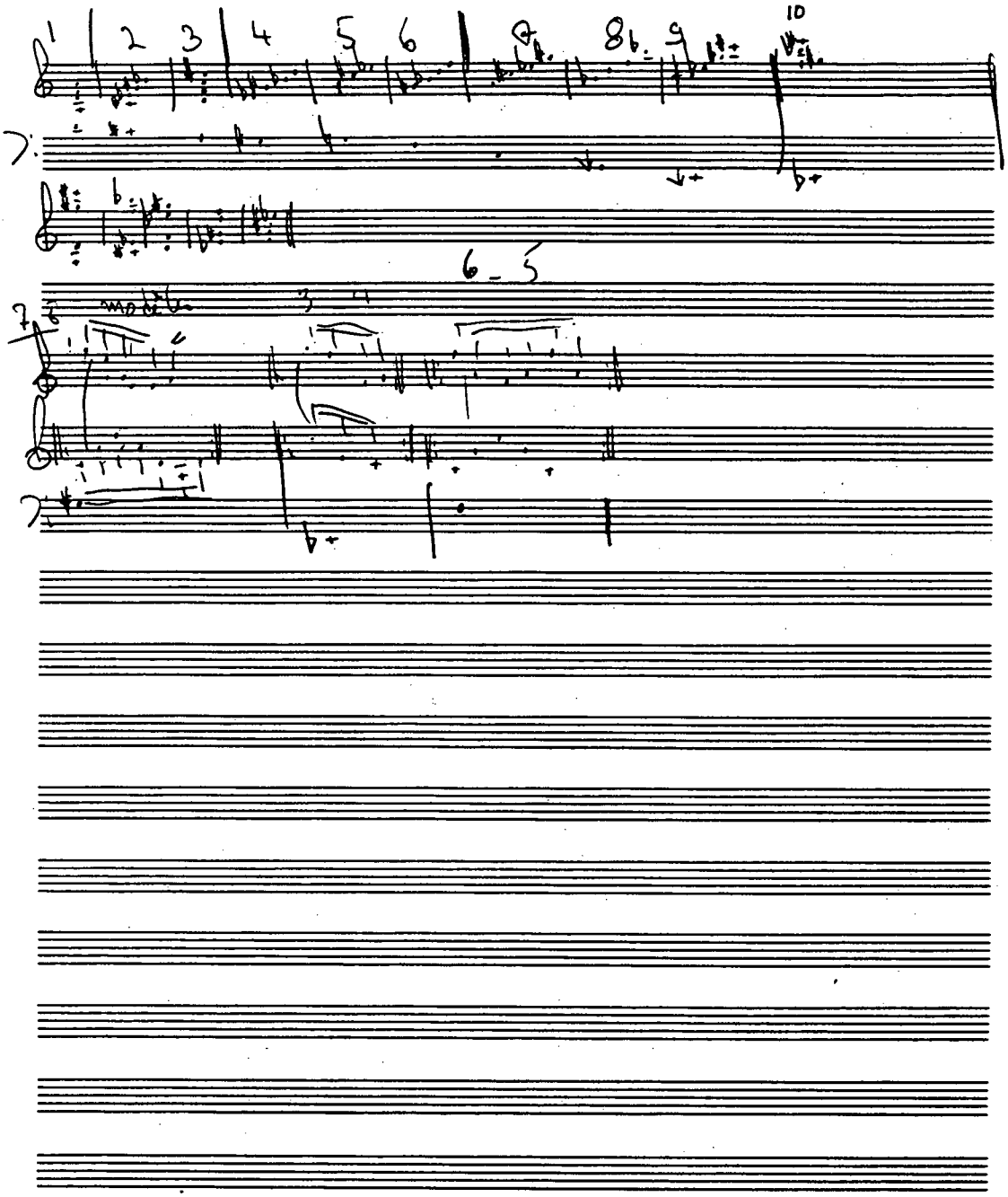
- Sketch CC1



• Sketch CC2



• Sketch CC3


Blanc
Rouge
14 1 3 8 5 21 23 9 13 10 19
11 15 16 12
23 21 19 16 15 14 13 12 11 10 9
8 5 3 1

• Sketch CC4