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NOTATIONAL PRACTICE IN CONTEMPORARY MUSIC: A CRITIQUE OF THREE COMPOSITIONAL MODELS (LUCIANO BERIO, JOHN CAGE, AND BRIAN FERNEYHOUGH)

by

BENEDICT WEISSER

A dissertation submitted to the Graduate Faculty in Music in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1998

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Abstract

NOTATIONAL PRACTICE IN CONTEMPORARY MUSIC: A CRITIQUE OF THREE COMPOSITIONAL MODELS (LUCIANO BERIO, JOHN CAGE, AND BRIAN FERNEYHOUGH)

by

Benedict Weisser

Advisor: Professor Philip Lambert

The purpose of this dissertation is to to examine the integration of notation and content in contemporary music. In particular, it is to show that for the three composers I have chosen, Luciano Berio, John Cage, and Brian Ferneyhough, the notation of a work is not just a traditional "encoding" but is inextricably linked to its form and content. Their compositional agendas are in many respects *defined* by their notation.

Following an introductory chapter, in which the breadth of twentieth-century notational innovation and experimentation is presented, chapter two deals with the music of Luciano Berio. I compare the 1958 version of his *Sequenza I* with the 1992 version in metered notation. The title of chapter two, "notation-as-play within a predefined system," is the basis of what I see as the success of Berio's works both from a compositional as well as a performance standpoint.

In chapter three I study notational aspects of the late music of John Cage, the works known as the "time-bracket" or "number" pieces. In these late works, Cage uses notation to reconcile and accommodate himself to certain elements of musical expression, most notably harmony and the very notion of vertical relationships. Purely notational considerations

produce harmonic situations that Cage could accept, a flexible, "anarchic harmony" which is also highly determinate and "coherent."

In the case of Brian Ferneyhough, the subject of chapter four, notation is approached as a kind of "inventory of processes," where various pre-compositional generations of multi-metric structures and compositional transformations of material are presented in an ostensibly unfiltered manner. One now encounters a situation where the composer has no discernible interest in compromising his material to the predispositions of the performer. Instead, Ferneyhough is interested in using notation as a "behavior-altering agent," a new notion of "communication" radically different from both Berio and Cage.

Finally, in a concluding chapter I put Berio, Cage, and Ferneyhough in a deeper context, comparing them to each other and reflecting on their importance. I also venture my own opinions as to the future influence of the kind of notational thought they each embody.

Preface

Twentieth-century music can be characterized by, on the one hand, an expansion of possibilities involving all parameters of sound, and, on the other, an increasing ineffectiveness of previously accepted means of expressing them. This has given rise, especially in the second half of the century, to a proliferation of notational techniques designed to reflect new linear, vertical, and temporal considerations. Some of these trends have involved a modification and loosening of older notational systems, some a complete negation by means of pictorial and graphic elements, and some a heretofore unheard-of arrangement of informational layers that in its sheer density exceeds the limits of what the performer can physically negotiate and mentally process. All three of these approaches challenge the notion of what constitutes a score, and of what the result should be when interpreted by a performer.

In this dissertation I examine these notational trends, and the work of three composers who in particular represent them in their fullest flower: Luciano Berio, John Cage, and Brian Ferneyhough. I seek to establish these composers' criteria for communication, to understand their attitudes toward performance, to explain the choices that they make, and to generate critical judgments. First and foremost, I relate each composer's notation to his compositional identity.

In many ways notation is the composer's "dirty little secret." It is not often considered an issue of "content" but of "presentation," serving an external function after the truly important work of the composition has been done. Yet how composers decide best to communicate their ideas to the performer (and, consequently, the audience) -- this "public" aspect -- is precisely the issue that can be a strong determinant of a work's validity.

And where there is no *lingua franca* from which to draw, a composer's notational choices become yet another element of a work that warrants consideration.

My purpose, therefore, is to examine the integration of notation and content in contemporary music. I show that for the three composers I have chosen, the notation of a work is not just a traditional "encoding" but is inextricably linked to a work's form and content. I argue that the compositional agendas of these composers are in many respects *defined by* their notation.

I hope that this dissertation will be of potential use to the composer, the performer, and the analyst. It deals with many performance-practice issues involved in the composer-performer relationship, such as what and how composers wish to communicate and what effect they intend their notation to have on the performer. For the analyst, such a project could focus attention on the too-long-ignored issue of notation, and perhaps initiate a different form of analytical machinery that could augment present tools of inquiry.

Approach

My methodology resides at the intersection of theory/analysis (the *what* -- what the materials of the work are, what are the techniques used by the composer, what is the pre-compositional material, if any), performance practice (the *how* -- how the work is performed, how its notation is communicated to the performer, how the player may "enter into" the inner workings of the piece), and musical aesthetics/philosophy (the *why* -- why the composer notates the work the way he/she does). I believe this tripartite distinction of methodological components translates into an

analyst-performer-composer relationship that can be used as a structural model for this dissertation. I have therefore used performers as informal consultants for this essay, discussing with them the notation of the works I am analyzing in order to give my project a more solid grounding in performance practice.

In analyzing music with regard to its notation, I have sought answers to these kinds of questions:

1. What are the aims of the composer's general compositional program, and what role does notation play in it? Is it a byproduct of an inseparability of form and content, theory and practice, thought and expression? Is the notation built into the aspirations of the piece? Is it a pre-compositional matter? How important is it?
2. Does the notation act as a "filter," in which certain pre-compositional strategies and processes are compromised in order to facilitate a coherent, more easily performable whole, a "public version" of the work?
3. What questions does the composer ask with his/her notation? What assumptions does he/she make? What are the long-range possibilities, the ramifications of the composer's notational techniques?
4. What is the composer trying to communicate, if anything? *How does one define good notational communication*? Is the composer at all interested in communication? What terms is he/she interested in being accepted on?
5. Does the composer wish to alter the "performance behavior" of the player? What is the general effect of the notation on the

performer? How should he/she react to it? What is the relationship between the composer and the performer?

6. How do we define a successful notation? Is it communication-intensive (how well the composer communicates his/her ideas to the performer)? Do we *need* to define the impulses, aims, and aspirations of the work in order to determine if the notation is successful?
7. Could the piece have been notated any other way? Is it "over-complicated," what one could call "vanity notation"?
8. Can we make critical judgments regarding the notation (both in general and in particular) once we think we understand what it is trying to do?

Following an introductory chapter, in which the breadth of twentieth-century notational innovation and experimentation is presented, chapter two deals with the music of Luciano Berio. I compare the 1958 version of his *Sequenza I* with the 1992 version in metered notation. The title of chapter two, "notation-as-play within a predefined system," is the basis of what I see as the success of Berio's works both from a compositional as well as a performance standpoint.

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In the case of Brian Ferneyhough, the subject of chapter four, notation is approached as a kind of "inventory of processes," where various pre-compositional generations of multi-metric structures and compositional transformations of material are presented in an ostensibly unfiltered manner. One now encounters a situation where the composer has no discernible interest in compromising his material to the predispositions of the performer. Instead, Ferneyhough is interested in using notation as a "behavior-altering agent," a new notion of "communication" radically different from both Berio and Cage.

Finally, in a concluding chapter I place Berio, Cage, and Ferneyhough in a deeper context, comparing them to each other and reflecting on their importance. I also venture my own opinions as to the future influence of the kind of notational thought they each embody.

Acknowledgments

There are too many people to thank. I will begin by acknowledging my professors in the Ph.D. Program in Music at The Graduate School and University Center of The City University of New York. I owe special thanks to Philip Lambert, my advisor for this dissertation; to David Olan, my composition teacher; and to Joseph Straus. I greatly enjoyed all their teachings over the years and am deeply appreciative of the encouragement and support that they have always offered me.

My interest in notation is an outgrowth of my experiences as a composer. A great debt of gratitude is owed to my former composition teacher, and present colleague on the composition faculty at the Oberlin Conservatory of Music, Randolph Coleman. Randy was my major and most formative influence in igniting my interest in experimental music in general, and the music of John Cage in particular. By his example Randy demonstrated to me that an artist could aspire not merely to be something, but to *do* something. Such a sense of mission is indeed the greatest legacy a teacher can have.

My composition teacher in the Netherlands during the years 1989-90, the composer/conductor David Porcelijn, proved pivotal to my appreciation and understanding of the role that notation plays in a composer's work. He injected in me a precision and attention to detail that I have taken forward with me to this day. In his occupation as a conductor, he gave me my first serious exposure to the work of Brian Ferneyhough, as well as a thoroughgoing performance-practice analysis of many works by Berio. I am eminently grateful to him for his contributions to my development both artistic and scholarly.

I am extremely fortunate that I have been able to speak personally with two of the three composers featured in this dissertation: Luciano Berio, who graciously granted me an interview on the subject of his notation while in residence at Harvard University in April of 1997 (which can be found in Appendix B); and Brian Ferneyhough, whose generous participation in a festival of his music at the Oberlin Conservatory of Music in April of 1998 offered me many helpful insights on his work.

My research has been greatly enhanced by my interaction with many people who are experts on the three composers who were my major subjects. I am especially grateful to Laura Kuhn, Executive Director of The John Cage Trust in New York, for granting me access to do research there in the summer of 1995, as well has for her expertise on Cage's music, thought, and life which she shared with me through our many discussions. I value her friendship and thank her so much for her support.

On the subject of Cage, I am also indebted to Andrew Culver, for our very valuable meetings in January of 1997 in which he shared with me the computer programs he wrote for John Cage's number pieces: *Musicfor*, *ic*, and *TBrack*. I thank him as well for his personal reminiscences concerning the eight years he spent working with Cage. Many thanks as well to Joan Retallack of the University of Maryland, one of the eminent authorities on the subject of Cage's music, for reading my chapter on Cage and offering a wonderfully helpful critique; to Paul van Emmerik, one of the foremost Cage scholars in Europe; and to Don Gillespie, Cage's editor at C.F. Peters in New York. I also wish to thank Kathan Brown and Sasha Baguskas of Crown Point Press in Oakland, California, as well as Cage's gallerist Margerete Roeder in New York City, for supplying me with slides of his graphic works. Robert Kosovsky was very helpful as well in granting me permission to photocopy excerpts from

The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.

Being that this dissertation concerns itself with the subject of notation, it only makes sense that those who play a role in the process of score preparation would have deservedly elevated status. To that end, I wish to thank the following people: Paul Sadowski, for our numerous conversations in which he documented his experiences as John Cage's copyist from 1974-92; Nicholas Hopkins, for affording me a rare insider's view of Luciano Berio's working methods and notational practice which he gained from the years spent as one of Berio's assistants at Tempo Reale studio in Milan; and Eric Dries of the University of California at San Diego, for discussing the work he did as Brian Ferneyhough's copyist.

Many performers were of great help to me in my work on this dissertation. Deserving of particular mention are the oboist Jacqueline Le Clair, whose work in revising Berio's *Sequenza VII* was a source of many interesting discussions; the soprano Rebecca Cross, for her superb performance of *Sequenza III* in my notation seminar at Oberlin Conservatory last fall as well as for the several enlightening colloquies we had regarding the work; the members of the new music group *Sounding* (Anthony Burr, Lisa Cella, Stephen Gosling, and Deborah Moore), who gave me countless insights on learning and interpreting Brian Ferneyhough's music; and the cellist Alexander Waterman, who achieved the near-impossible in his performances of Ferneyhough's *Time and Motion Study II* at the Oberlin Conservatory of Music in April of 1998.

I wish to thank all my students at the Oberlin Conservatory of Music who were enrolled in my theory course on "The New Complexity" and my composition seminar on "Notational Practice in Contemporary Music" (both courses given in the fall semester of 1997). Their feedback and

creativity was of great benefit to me in preparing the latter stages of this dissertation.

I wish also to acknowledge the care, support, and inspiration provided me by my friends, with special mention given to Douglas Brooks and Renate Falkner. Thanks as well to my friends Curtis Bahn, Matthew Suttor, Gaelen Hanson, Lisa Portes, Mark Frieser, Mitchell Rasor, Landis Hudson, Jacob Molyneux, Diane Drews, and Victoria Rosner.

Finally, this dissertation is lovingly dedicated to my adored mother, Betty Weisser, who passed away during the very closing stages of its writing. This work, as well as anything I have or will ever accomplish, would simply have been inconceivable without her. My mother meant and continues to mean everything to me. Not only was she an absolutely devoted and doting parent, but she was also my best friend and most trusted advisor. I loved her more than life itself, and I miss her more than I can possibly express. It is my greatest heartbreak that I cannot share with her the completion of this dissertation as well as of my formal education. This work is for her, with all my gratitude, sadness, and love -- forever.

B.W.
August, 1998.

Table of Contents

Notational Practice in Contemporary Music: A Critique of Three Compositional Models (Luciano Berio, John Cage, and Brian Ferneyhough)

List of Examples

Chapter 1 - *An Introduction to Notational Practice since 1945*

Chapter 2 - Luciano Berio: Notation-as-play within a predefined system

Chapter 3 - John Cage: "...the whole paper would potentially be sound": Time-Brackets and the Number Pieces (1981-92)

Chapter 4 - Brian Ferneyhough and The New Complexity: Notation-as-Inventory

I. An Introduction to Notational Practice since 1945

The innovations in contemporary music notation that will be discussed in this introduction have customarily been associated with a period of roughly twenty-five years following the end of the Second World War. They are tied to the rise of two movements in particular: the American experimental school, centered at first in New York and dominated by John Cage and his students and associates; and the European avant-garde, a group which converged initially at the summer course at Darmstadt, West Germany and took as their departure-point the ramifications of the music of Anton Webern. The categorical distinctions that will be made here are not exclusively germane to the differences between these two movements, but are informed to some degree by them.

The revolution in notation on both sides of the Atlantic after 1945 was influenced by several factors, not least the advent of electronic music as a viable medium for which composers had some sort of ready access. The late 1940s and early 1950s saw the development of electronic studios both at American universities (most notably, of course, Columbia and Princeton) and at European radio stations (the most important of which were in Cologne, Paris, and Milan). Composers began to work with their materials in *real-time*, and were keen on absorbing the lessons they learned from tape into their thinking about acoustic music. In addition to the indisputable effect that electronic music had over all parameters, especially timbre, there were repercussions for notation as well. For example, there began the interest in equating a certain amount of space on a page with a certain amount of time, the beginnings of what went on to be called proportional or "spatial" notation.

As conventional methods of graphic expression (e.g., staves, pitches, rhythms, barlines, etc.) were proving inadequate in the representation of electronic sound, new pictographic and phenomologically descriptive means were being developed. For example, Karlheinz Stockhausen's *Elektronische Studie II* (1953) was issued with a graphic representation of the sounds on tape. This "score-picture" involves two sets of shapes divided by a time-line that measures the point of each new entry. The first and larger set consists of rectangular shapes; each rectangle symbolizes a complex of five sine waves. The vertical axis contains pitches in frequency numbers, and the horizontal axis shows durations in centimeters of tape for each section. The second set, consisting of triangular "envelopes" at the bottom that are clearly aligned with the frequency rectangles, represents dynamics. Such graphic thinking, in this case for purely practical purposes, would be brought to the notation of acoustic music.[1]

Another important influence for Europeans was that of Cage himself, who, after all, had spent the entire decade of the 1940s trying unsuccessfully to set up an electronic music studio somwhere in the United States. Making his first trip to Paris in 1949-50, Cage initially exerted a great deal of influence over Pierre Boulez, who played a minor role in creating some of the earliest *musique concrète* works by Pierre Schaefer and Pierre Henry in Paris in 1948. Cage then consolidated his influence with two trips to West Germany, to the Donaueschingen Festival in 1954, and, more importantly, to Darmstadt in 1958. With his introduction of indeterminacy and graphic notation, Cage forever radicalized the thinking of composers on the continent. This led to a profound cross-fertilization

[1] In America, there were also economic motives for publishing notated versions of electronic works. Until the late 1970s, composers were protected under U.S. copyright laws only if their works were represented graphically by a score.

between the experimental and avant-garde schools, and a blurring of distinctions that remains even until this day.

I parse post-1945 notation into six non-exclusive categories, to provide a starting point for addressing relevant topics. The first two are directly apropos to the notion of an American/European schism, and they may be reflective of certain attitudes about both control issues and tradition which we associate with the two mindsets. The other four categories, however, cannot be traced to such divisions as differences often penetrate within countries, and not always between them. There will also be a certain sense of "bleed-through," where a work presented as exemplary of a certain category may also be relevant to another one. May I stress as well that the examples illustrating each category are not intended to be exhaustive; it may appear that certain important composers and works are being left out. My aims here are designed to be tightly focused: to present important notational issues in summarized form, and to set the scene for the three composers studied in the body of this dissertation.

Categories of Post-1945 Notation

1. *The graphic score:*

   - as incentive to produce a musical situation where the outcome is unforeseen

   - the use of graphic elements within a conventional musical context in order to initiate variables within a globally determined set of parameters

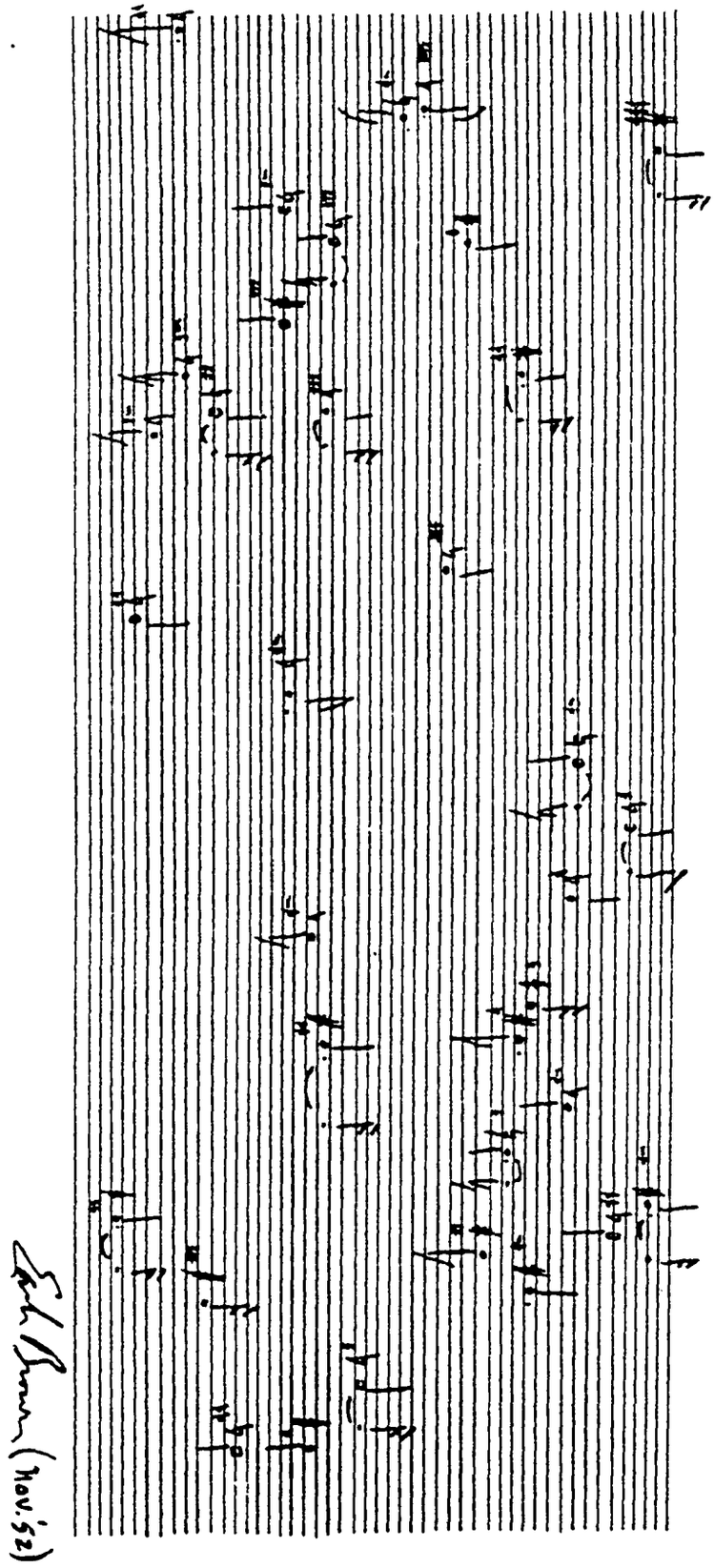
Category one concerns the use of graphic elements, introduced in the early 1950s by American experimental composers such as John Cage and Earle Brown. By "graphic elements," I refer to what one would consider a non-conventional or "non-musical" orientation more associated with

painting. Graphism in the American experimental mindset at that time was associated with the idea of indeterminacy -- namely, the production of a situation, environment, or field in which the outcome is unforeseen.

Example 1.1 presents a page from Brown's *Folio* (1952), a seminal collection of graphic pieces. In this example, his *November 1952*, Brown lays out a notational system that can be regarded as a "fifty-line staff." Within this field that preserves a vague trace or atmosphere of a staff while being impossible to approach practically as such, notes are given stems, durations (without a time signature, of course), dynamics, and accidentals. Disposition of clefs, tempo, articulation, and order are left to the performer's discretion. The outcome of *November 1952* is unforeseen because any attack can be performed with the chosen set of parameters enumerated above, independent from any of the others. In addition, the identity of the pitches themselves are dependent on where the clef is placed: this is especially true for notes which fall on all the lines between the top and bottom five. Brown's *December 1952*, also from the *Folio*, consists of lines of various lengths and thickness, arranged both vertically and horizontally at various locations on the page. The score can be performed forwards of backwards, or upside down. Here of course, there are no conventional notational traces, and there are an unlimited amount of ways to interpret the page. For example, pitches, durations, and dynamics can be ascribed to the various dimensions. Or one could even superimpose transparent staves over the page and perform the work that way. Like *November 1952*, any number of performers can play *December 1952*.

The reaction to graphism among numerous European avant-garde composers in the late 1950s and early 1960s was to introduce graphic elements within a conventional notational environment. By this I refer to the use of a five-line staff, clefs, retrievable pitch material, tempi, and

Example 1.1 - Brown. *November 1952*



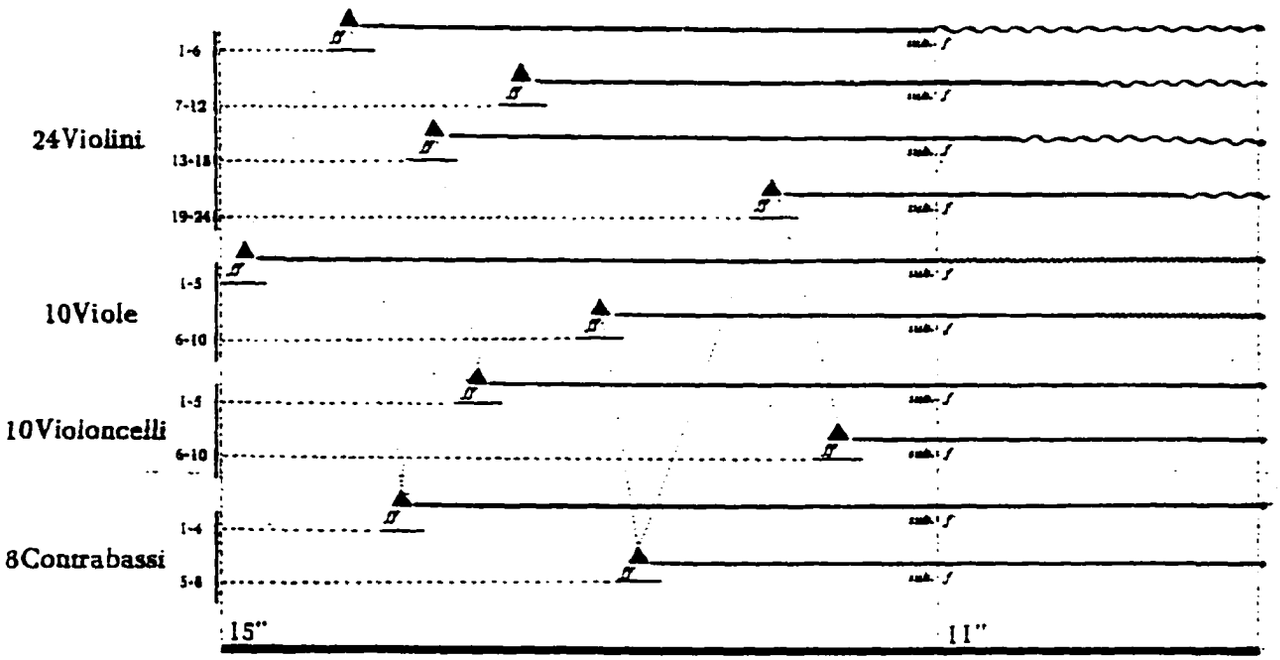
pitch presentation such as note-heads, stems, and beams. Examples 1.2a-b present two systems from perhaps the best-known example, *Threnody to the Victims of Hiroshima* (1959) for string orchestra, by Krzysztof Penderecki. In Example 1.2a, the first system of the score, Penderecki indicates with a blackened-in triangle that each player enter *ff* on the highest note of their instrument. Pitch itself is indefinite, left to the performer's discretion, and is held (the indication being a dark horizontal line following each triangle). Over the course of the next four sections in Example 1.2a, the steady state of each attack dissolves into *molto vibrato*, indicated by a change from straight to wavy lines. The degree, intensity, and speed of vibrato follows how closely the waves in each line follow each other. The thick black line below each string orchestra system refers to the amount of time for each section; the first one is fifteen seconds. The thin dotted lines from one triangle to the next clarify cues, exactly where each string section enters in relation to the one preceding.

Example 1.2b presents a detail from the system at rehearsal number 16 in the *Threnody*. Each part consists of two staves: one with thick black lines, and one with an ascending microtonal pitch collection. This means that the players can choose within the specified time-frame (again, given at the bottom of the system) from the pool of pitches indicated below to produce a held tone. The thick ascending and descending lines at the end of Example 1.2b, indicated by arrows, refer to the rising of the pitch on each line, accompanied by a change to glissando harmonics that are performed with a rapid though not rhythmic tremolo.

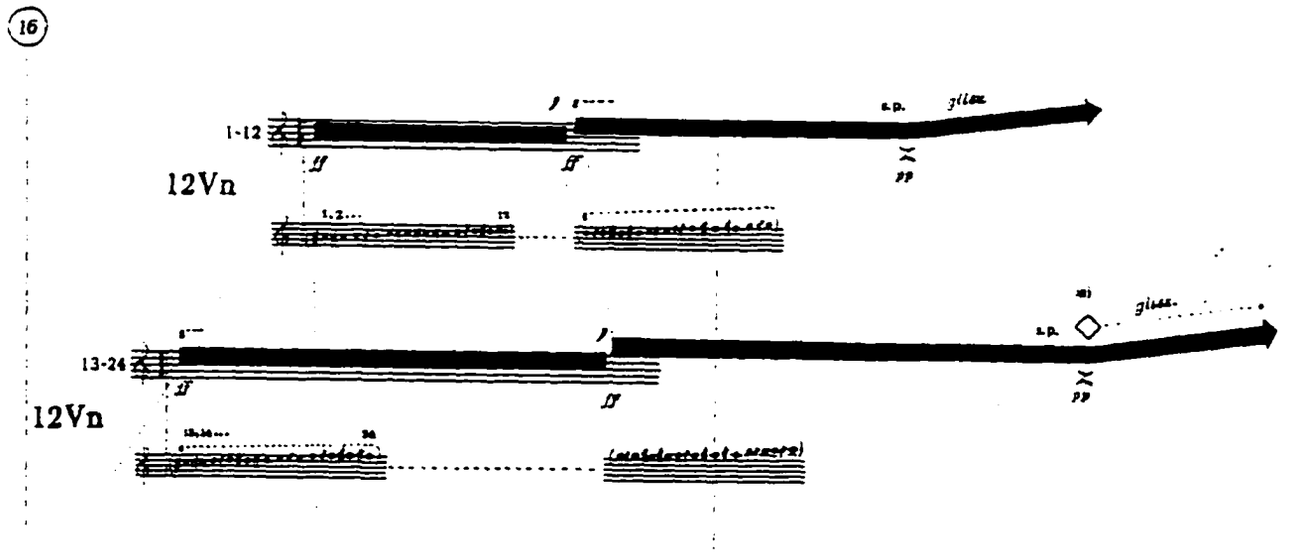
2. *Notation and form:*

- *notation in the "open form" work*
- *notation in the "open work" and the "moment form" work*

Example 1.2a - Penderecki, *Threnody to the Victims of Hiroshima*, first system.



Example 1.2b - Penderecki, *Threnody to the Victims of Hiroshima*, system at rehearsal number 16.



The second category concerns the issue of how notation relates to form, and once again offers clear lines of demarcation between the American and European mindset. The general orientation behind "open form" works can be encapsulated in this remark by Christian Wolff: "form in music could be taken as a length of program time."[2] From Earle Brown's early graphic works such as *Folio*, there grew his propensity for presenting material in a non-linear narrative context so that its identity was "mobile" and contingent on a sense of direct contact with the performer.[3] Brown was later able to integrate open form principles into a more precise (and *less indeterminate*) notational framework, such as in his *Available Forms* series.

Example 1.3 presents a page from Brown's *Available Forms 2* (1962) for "large orchestra, four hands." In other words, Brown divides the orchestra into two groups, each with its own conductor -- our example comes from the orchestra 2 part. Each conductor has a score that contains four or five events on each page, easily recognizable through the presence of extremely large numbers layered directly on top of each event. Either conductor may begin a performance of *Available Forms 2* with any event on any page; the numbers of the five possible events on each page are indicated to the performers with the appropriate fingers on the conductor's left hand. The conductors may proceed to any other page at any time; pages or events can be omitted or repeated as desired. The notation of pitch (in the form of note heads only) is relatively precise, but the

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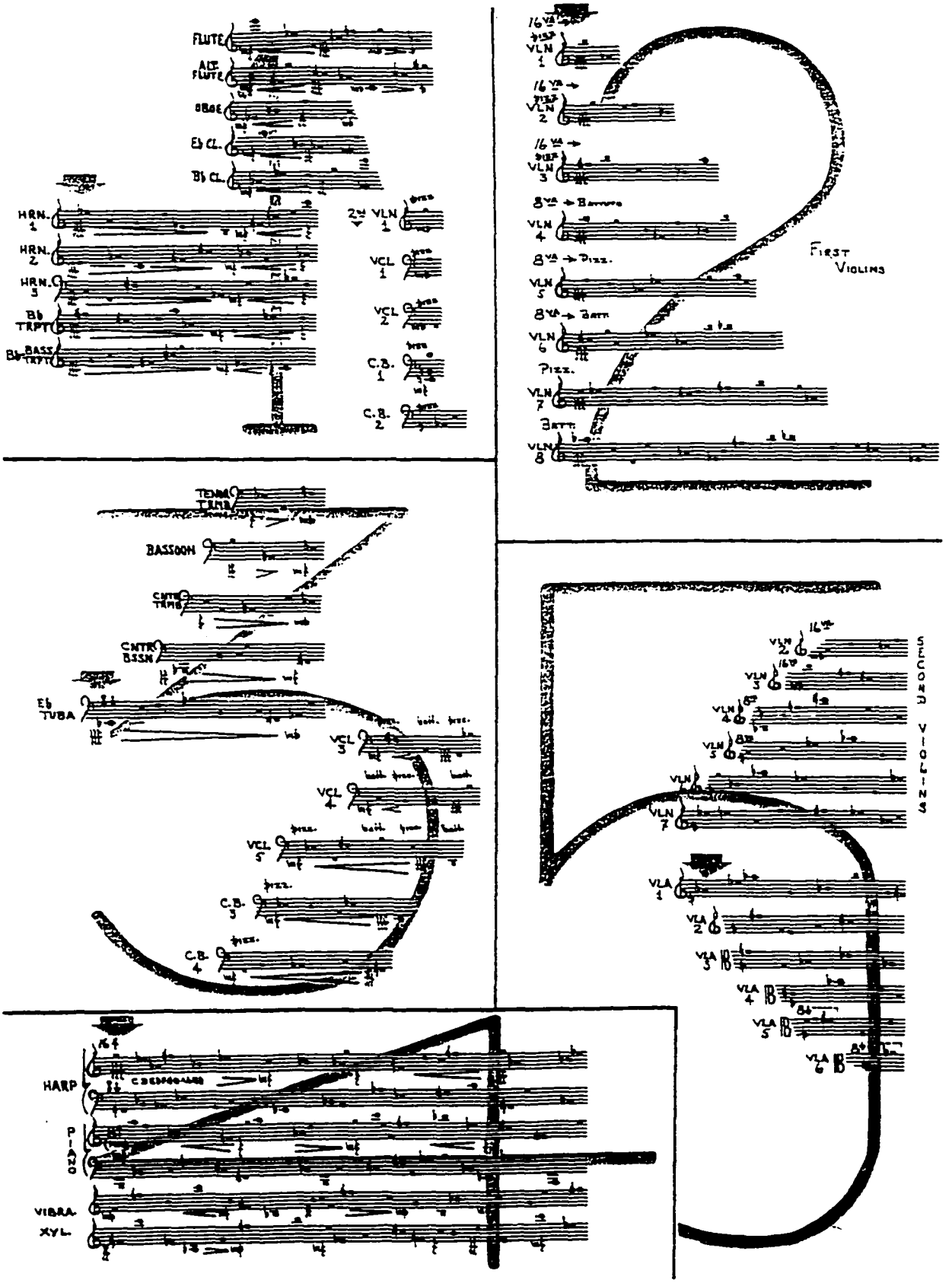
[2] Christian Wolff, "On Form," *Die Reihe* 7 (1965): 26-31. Reprinted in *Writings about John Cage*, ed. Richard Kostelanez (Ann Arbor: University of Michigan Press, 1993), 58-65.

[3] Brown cites Abstract Expressionist painters such as Jackson Pollock as being very influential on his thinking in this regard. In the introductory remarks to his orchestral work *Available Forms 2* (1962), Brown writes that "the performance conditions of this work are similar to a painter working spontaneously with a given palette."

Example 1.3 - Brown. *Available Forms* 2, orchestra 2 part. p. 4.



performer's time-sense is expected to be personal and spontaneous, based on one's changing perception of spatial relationships.

As a response to the New York School's innovations in open form, the European avant-garde countered with works that harnessed certain aspects of "openness" within much more controlled and goal-directed formal surroundings. The semiotician and author Umberto Eco coined the term *opera aperta* (open work) to describe the European answer to open form.[4] A full consideration of the structural and philosophical underpinnings of the open work can be found in chapter two of this dissertation.

Perhaps the most frequently cited open work, Stockhausen's *Klavierstück XI* (1956), appears in a poster-sized score (measuring 53 x 93 centimeters), in which nineteen traditionally -notated groups of material are distributed irregularly. The pianist is instructed to look at random at the large sheet and begin with whatever group her eye falls upon, choosing her own tempo, dynamics, and types of attack. At the end of each group there is a tempo indication, a dynamic level, and a mode of attack that determines the way the next group (once again determined by where one's eye falls) is to be played.

Boulez's forays into the open work are remarkable in that they are in effect "denunciations" not only of Cage's indeterminacy and Brown's extensions of those principles into open form, but of Stockhausen's adaptation of these trends. His *Eclat* (1965) for fifteen instruments is designed as a kind of "concerto for conductor," namely Boulez himself; a

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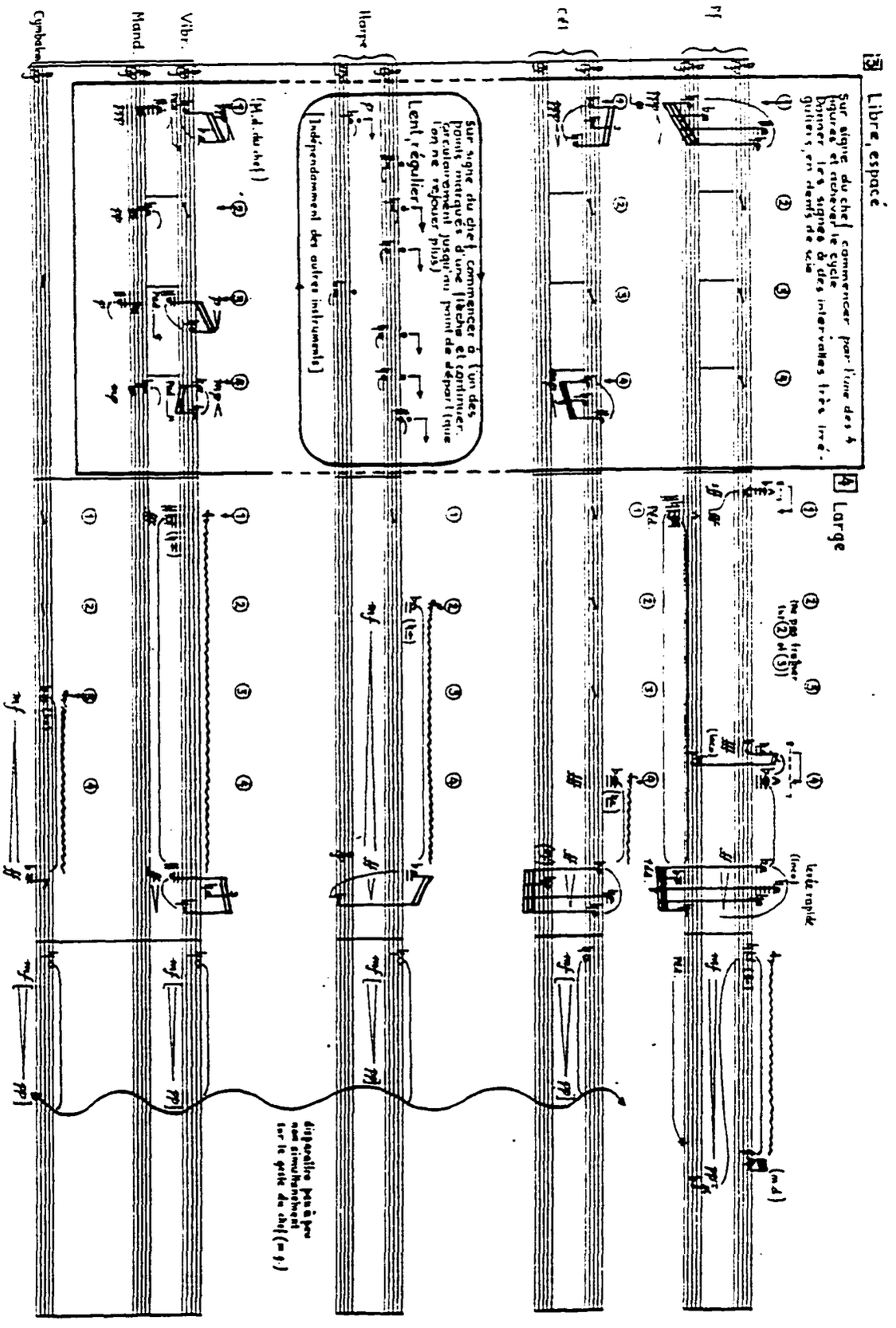
[4]Umberto Eco, "L'opera in movimento e la coscienza dell'epoca." *Icontri musicali* 3 (1959): 32-54. Reprinted in *Opera aperta - Forma e indeterminazione nelle poetiche contemporanee* (Milan: Bompiani, 1962). Translated by Bruce Merry as "The Poetics of the Open Work," *Twentieth-Century Studies* (1974): 6-26. Revised version of the translation in *The Role of the Reader: Explorations in the Semiotics of Texts* (Bloomington: Indiana University Press, 1979), 47-66. Translated by Anna Cancogni as *The Open Work* (Cambridge: Harvard University Press, 1989), 1-23.

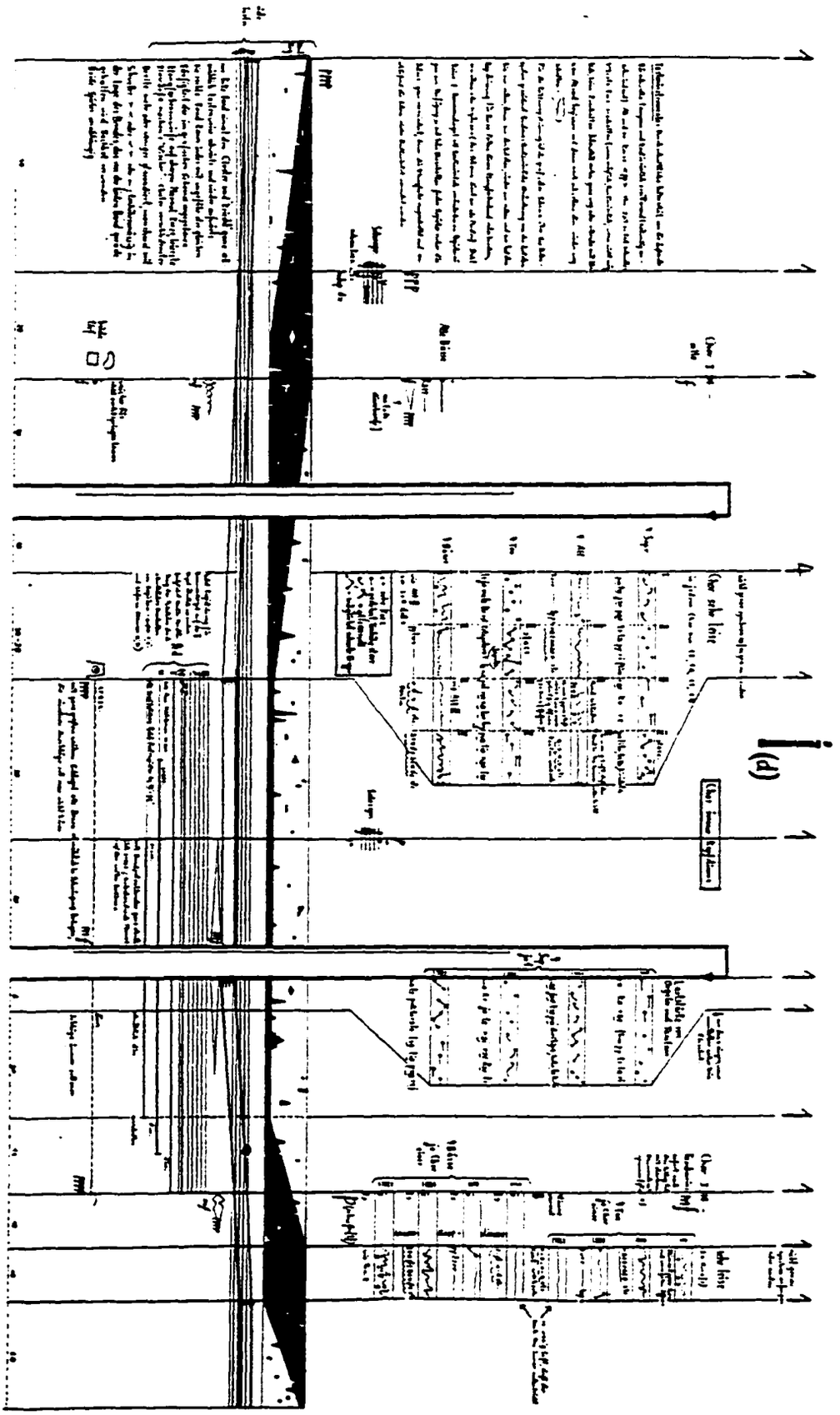
detail from the score is presented in Example 1.4. Performers are given small, shard-like gestures above which appear encircled numbers. These numbers reference finger cues given by the conductor, which determine the performers' entrances and material. The job of the ensemble is to react instantaneously to these finger cues, which can get very involved and complex. The conductor in *Eclat*, therefore, "composes" and "orchestrates" the work. He determines when *and if* each player enters, how long they play for, and what the instrumental combinations will be at any particular moment. The large-scale teleology of the work is predetermined, but the conductor exercises absolute control over all other aspects. For example, she may luxuriate as long as she wishes inside any given section.

Stockhausen's innovation of "moment form" composition appeared in the late 1950s as an offshoot of the open work. Moment form can be regarded as a series of separate "gestalts," where each moment is an independent thought in itself. Examples 1.5a-b present a section from Stockhausen's *Momente* (1962) for soprano, four choruses, and thirteen instruments; the score represents a mixture of graphic and proportional notation (for a description of the latter, please see chapter six). Example 1.5a consists of three discrete moments, each delineated by a thin, open vertical block. The numbers along the top of the score indicate the "meter" of each bar. The "beats" are not all of the same length, but are a general indication of a consistent set of visual proportions. The exact duration of each "measure" in seconds is notated along the bottom edge of the page. After each moment, an insertion is made from one of the three fragments pictured in Example 1.5b. The durations and dynamics of each fragment observe those of the moment in which they are inserted.

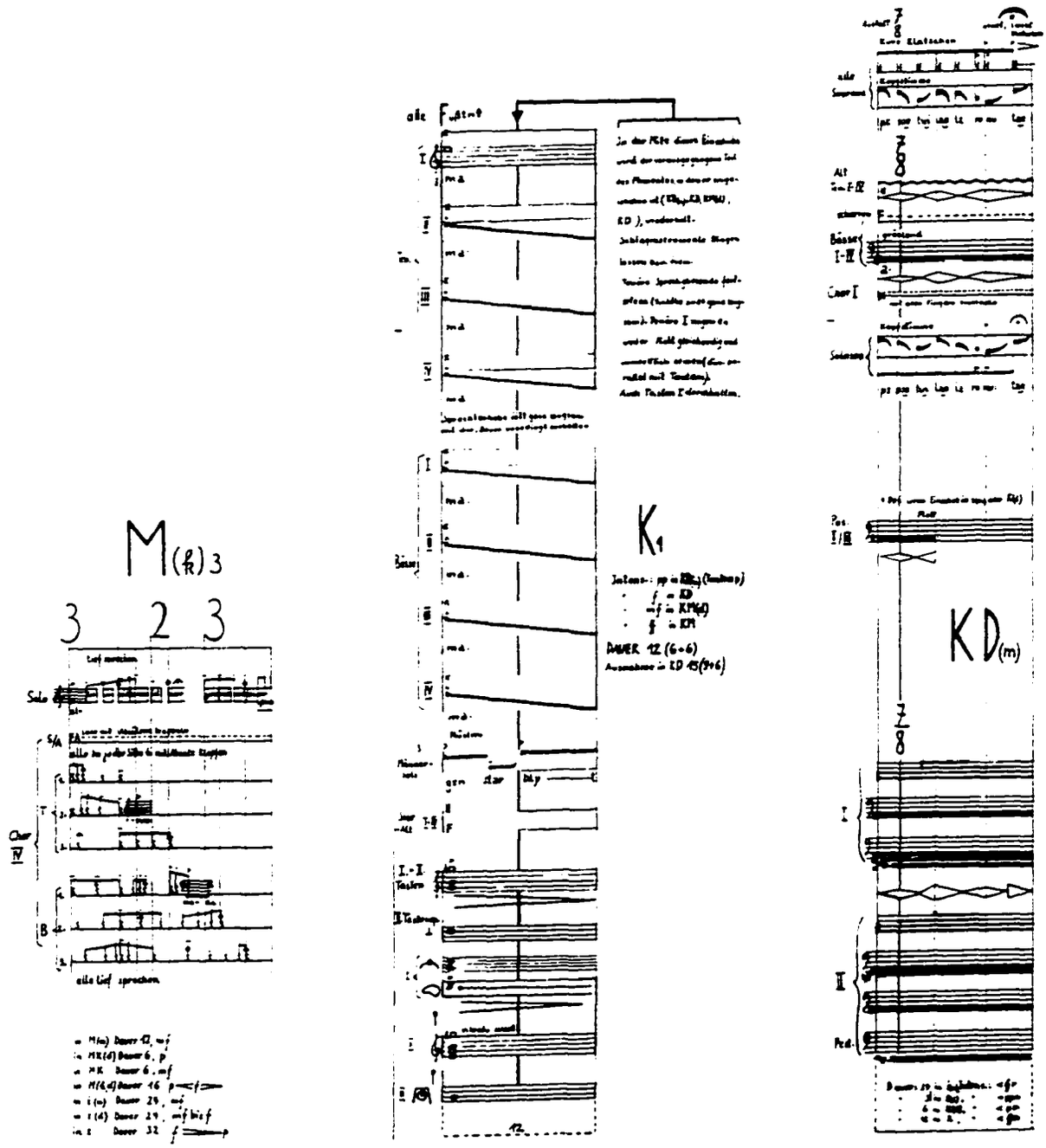
Example 1.4 - Boulez, *Eclat*, rehearsal number 3.



Example 1.5a - Stockhausen, *Momente*, p. 1.



Example 1.5b - Stockhausen, *Momente*, page of possible "insertions" into material on p. 1.



3. *Indeterminacy:*

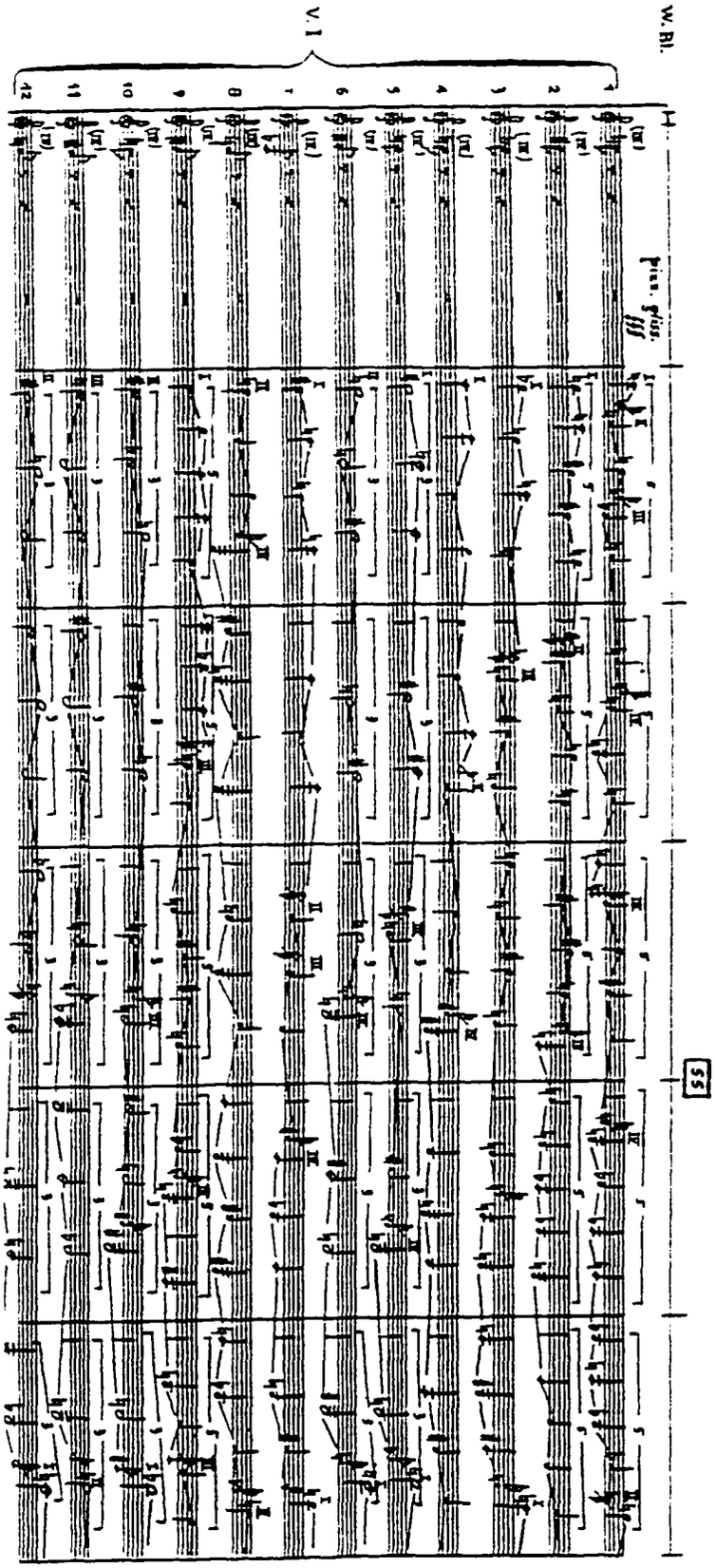
- notation which is a result of "composer indeterminacy"

- notation which produces a work indeterminate with respect to performance

Category three is the first that does not reflect any sort of American experimental/European avant-garde schism. It concerns notational differences that exist within a single compositional ideology, namely that of indeterminacy. These differences, unlike those in category one and two, are not in any ideological tension with one another but are merely two different ways of exploring and realizing a single impulse. Let us distinguish between "composer indeterminacy" and "performer indeterminacy." To say that a work is *indeterminate with respects to its composition* means that some sort of chance operations were employed in writing the work that are *not* reflected in its score, where the outcome is foreseen. The notational presentation of the work may be entirely straightforward, though the *means* of generating its constituent materials are indeterminate. The outcome of the composition itself was unforeseen, but once it reaches the performer it becomes stabilized; resultant performances of a "composer-indeterminate" work will most often not be very different from one another. To say that a work is *indeterminate with respects to its performance* means that its materials may or may not be arranged according to chance operations, but the outcome remains unforeseen from one performance to another.

Two generative systems regarded as examples of "composer indeterminacy" are chance operations (which includes the consultation of *I Ching*, the Chinese oracle otherwise known as the "Book of Changes"), and stochastic techniques. Example 1.6 presents a detail from the score of the orchestral work *Pithoprakta* (1956) by Iannis Xenakis. *Pithoprakta* is one

Example 1.6 - Xenakis, *Pithoprakta*, mm. 51-56.

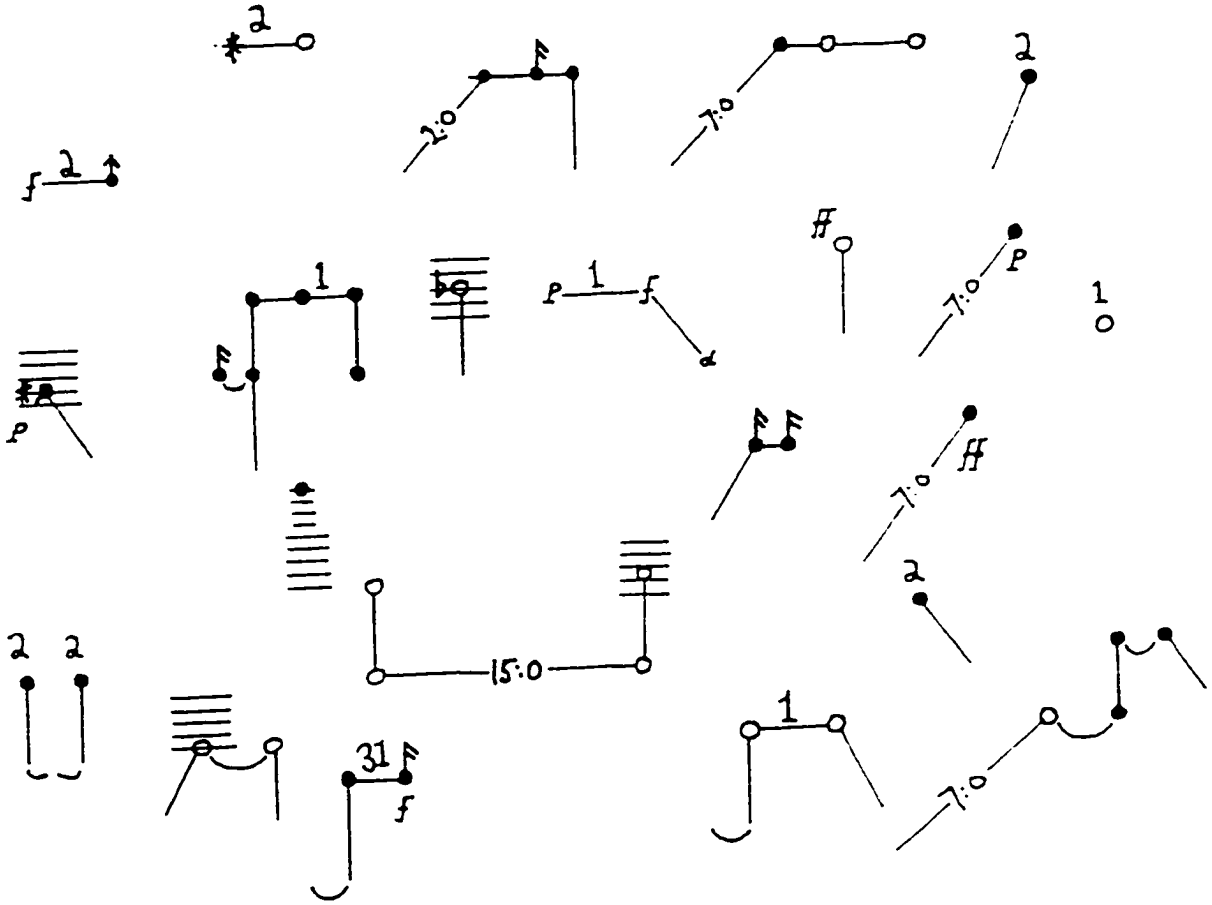


of Xenakis's earliest efforts in stochastic thinking, in which chaotic behavior stabilizes and resolves to a steady state via the application of probabilistic theory. Whereas in works such as *Music of Changes* (1951), Cage utilized chart techniques in which given source material was subject to random selection and manipulation via *I Ching*, Xenakis's indeterminacy is one of large-scale graphic, often architectural designs (often executed with the aid of computer programs performing algorithmic functions), whose activity is represented in analogous musical form. It is no surprise that Xenakis is known for his extensive use of *glissandi*, as that gesture constitutes a direct musical analogue to an occupation of space, of covering ground in a field. Therefore, though stochastic music reflects another form of "composer indeterminacy," by the time Xenakis's works such as *Pithoprakta* move from computer printouts to score stage, they are notated entirely conventionally. In fact, when Xenakis designs stochastic computer programs, he deliberately sets up routines within them to answer questions of how certain numbers will be represented in the form of discernible pitches, registers, and durations on a five-line staff.

As an illustration of a work that is "performer-indeterminate," a page from Christian Wolff's *For 1, 2, or 3 People* (1964) is presented in Example 1.7. The score is comprised of ten sheets which can be performed in any order; in addition, a performance may consist of one sheet repeated as often as desired up to ten times. The one-to-three performers may use any instruments, and play the symbols in any sequence desired. Wolff's performance notes explain in exhaustive detail what each graphic notation denotes. For example, the first symbol on the upper left consists of a line with the number two above it, connected to a point leading upwards to an arrow, the whole gesture marked *f*. This means that

Example 1.7 - Wolff. *For 1, 2, or 3 People*. p. 3.

III



the performer plays any loud sound, holds that sound, changes two aspects of it (dynamics, timbre, etc.), then moves to another higher sound.

The notation of *For 1, 2, or 3 People* contains an interminable amount of conditions and modifiers in each part, as well as a great variety of interactions between the three players. Wolff has exercised the instrument of notation to invent a possible language that can only be processed, negotiated, and completed by the players in the act of performance, both individually and as a collective. Therefore, the notation is essentially a framework for a process, whereby each thoughtfully rendered performance cannot help but be radically different by its very nature.

4. *Notation and Complexity:*

- *notation which presents an inventory of processes*
- *notation which filters processes into a compromised result but does not viscerally reflect them*

In many respects this category is concerned with how complexity is portrayed on the page. The oppositional structure here consists of unprocessed, raw data manifested in a great deal of surface performative difficulty, versus processed data that the composer has compromised notationally in order for the result to be easier performed and more likely heard.

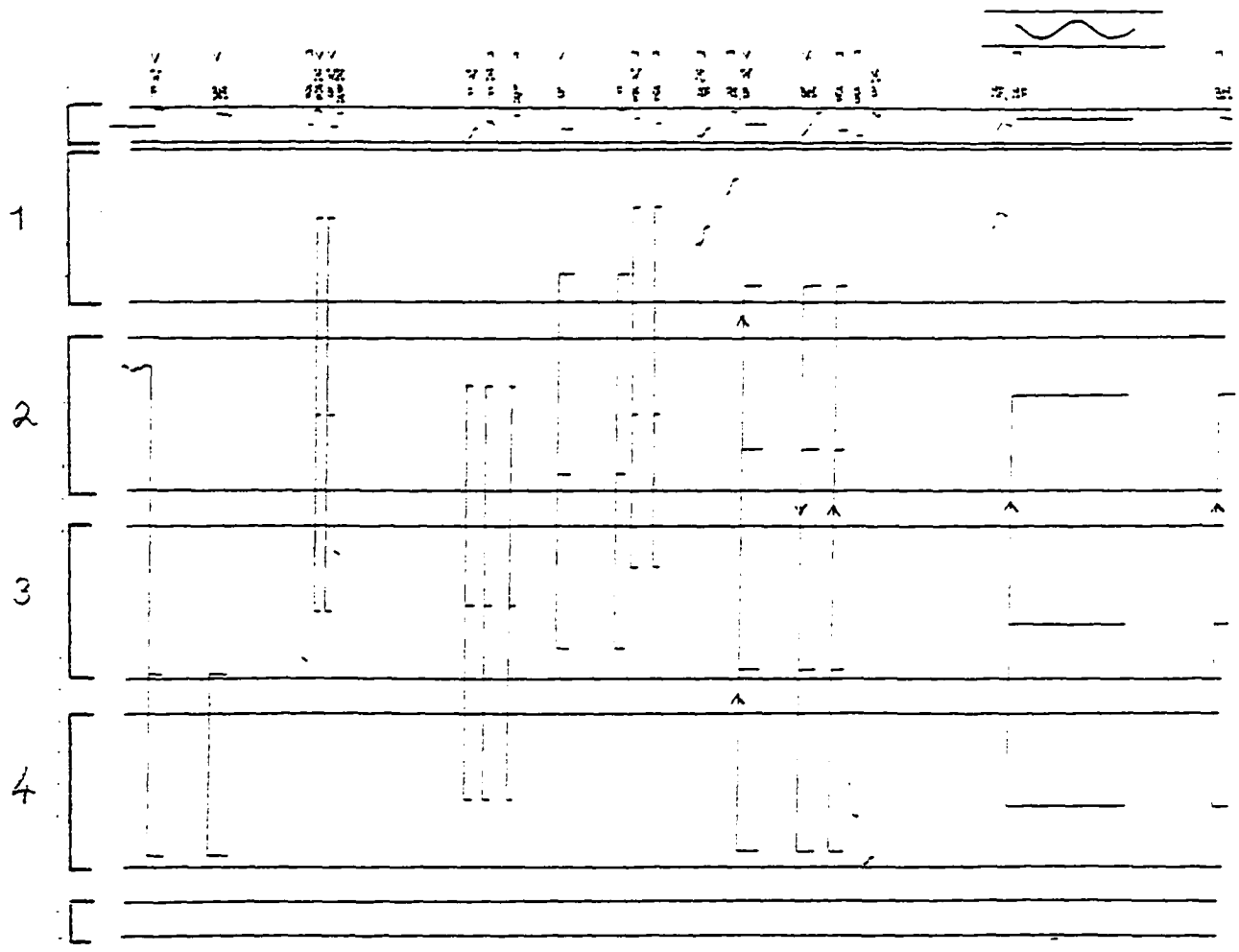
Once again this is a category that defies any simple ideological divisions. The earliest examples of the presentation of multi-level, unprocessed information come from the schools of total serialism and indeterminacy of the 1950s. An early instance of "inventory" notation can be seen in Cage's works from his "Ten Thousand Things" series, for which a page from one of them, *26'1.1499" for a String Player* (1955), is

shown in Example 1.8. Cage chooses to make the instrument itself the basis for the notational system; there are four bands, marked 1-4, which represent the four strings being played from high to low. This allows the work to be performed on any four-stringed bowed instrument. The smaller band above the top string indicates bowing pressure/amplitude, the top of the band being least pressure (softest) and the bottom the most pressure (loudest). The bottom band below the lowest string represents noises of any type, with vertical placement indicating the relative pitch of each noise.

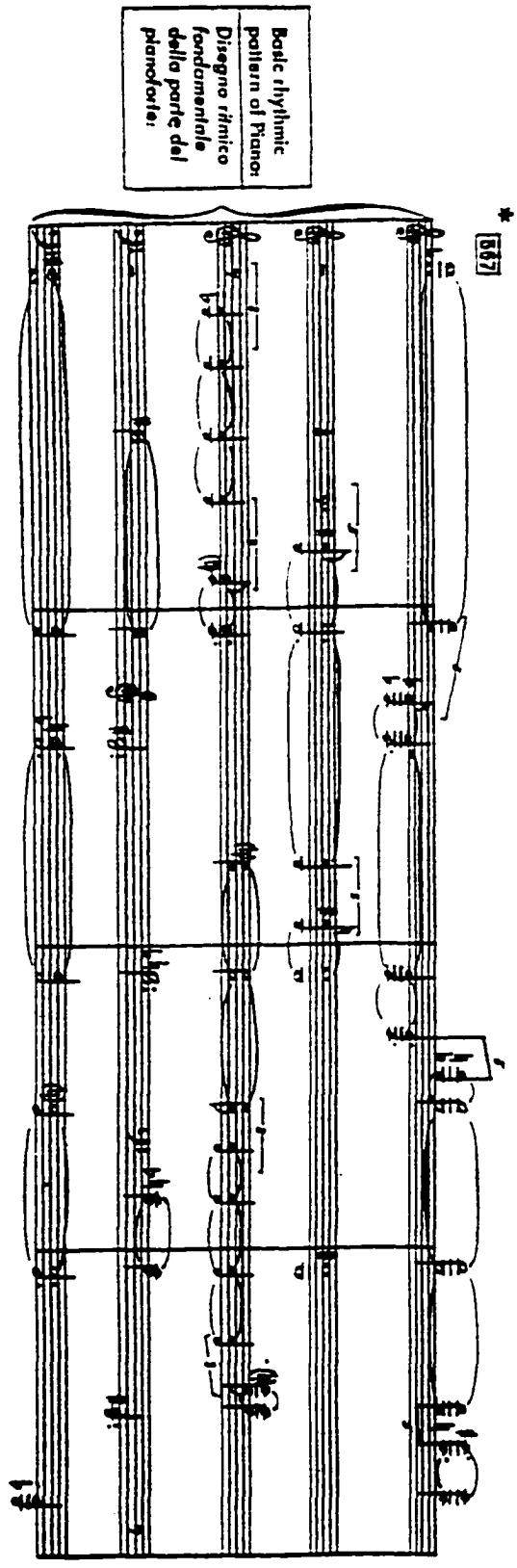
The seeming disconnection between all of the bands lends the notational system of *26'1.1499" for a String Player* the character of a recipe or an inventory/list, demanding from the player a multiplicity of attentions and behaviors. There is so much discrete visual information to process on so many levels that a string player will often be juggling one band or parameter against another, constantly shifting one's focus of attention. The contemporary adherents to this idea of notational inventory are the group of composers associated with the "New Complexity" school, most notably Brian Ferneyhough. For an extensive treatment of Ferneyhough and the "New Complexity," I refer the reader to chapter four of this dissertation.

Xenakis's *Pithoprakta*, noted as an example of "composer indeterminacy" in category three, can also be considered representative of the school of thought where processes are presented in compromised form. Such a sense of notational "filtering" occurs to an even greater extent in the music of Elliott Carter; Example 1.9 comes from one of the best-known moments in his *Double Concerto for Harpsichord and Piano with Two Chamber Orchestras* (1959-61), the second cadenza for piano. Measures 567-70 constitute a climactic amalgamation of five patterns that

Example 1.8 - Cage, *26'1.1499" for a String Player*, p. 7.



Example 1.9 - Carter. *Double Concerto for Harpsichord and Piano with Two Chamber Orchestras*. breakdown of rhythmic pattern in piano cadenza. mm. 567-70.



correspond to five discrete dyads, tempi and rhythmic ratios that come together for the first time in this cadenza. In the score, the five patterns appear in conventional, undifferentiated fashion, but at the bottom of the page, as shown in the example, Carter outlines them on five separate staves. Put another way, Cage's score is Carter's marginalia.

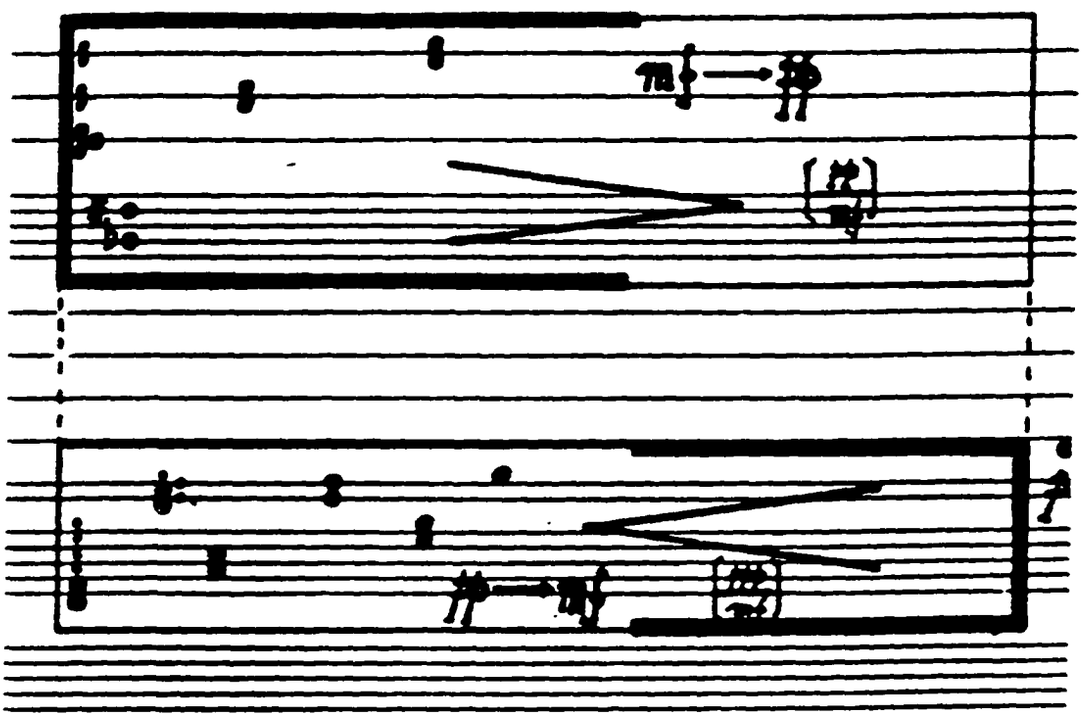
5. *Improvisation:*

> *- "frame notation" that allows for limited improvisation and possibilities of choice within fixed limits*
>
> *- notation which presents a general strategy for improvisation*

This category concerns the different ways in which composers address the issue of improvisation when devising a notational system. "Frame notation," or what has come to be known as the "box," is a technique favored by many European avant-gardists, including Luciano Berio. Frame notation refers to a situation where a composer isolates a certain amount of material inside a box, and gives instructions to the player as to how it is to be approached. The box may consist of sounds that can be played in different orders, or at varying speeds and dynamics. For a composer interested in preserving some measure of control over her material when placed in the hands of a performer, frame notation holds a number of advantages. It enables the composer to set up a very defined, enclosed situation where fixed limits are placed on the choice a player can exercise in interpreting and completing the "unfinished" material. Numerous performances of a work utilizing frame notation may have subtle differences, but the larger profile will not change.

Example 1.10 presents a notable example of frame notation, a detail from Berio's *Circles* (1960). The varying thickness of each frame (and

Example 1.10 - detail from Berio, *Circles*, p. 17.



within frames themselves) refers to the degree of intensity of the specified action; thicker lines denote greater intensity than do thinner ones. For example, two frames being played simultaneously by the first percussionist (in the top system) are moving in opposite directions of intensity.

Other composers less interested in exercising control over specific pitch material and more preoccupied with presenting broad improvisational strategies have pursued radically different notational means. Example 1.11 presents the score to *in memoriam...Esteban Gomez* (1967) by Robert Ashley. The work is for a quartet of any combination of instruments. The circular score is graphic and consists of sixty-four dots divided into four quadrants delineated by larger dots. The performers read the graph circularly; each dot represents a constant unit of time that each player determines privately and independently. The individual player assigns to each quadrant one of the following: pitch, intensity, timbre, and density. These elements may be assigned in any pattern, but that pattern must remain consistent.

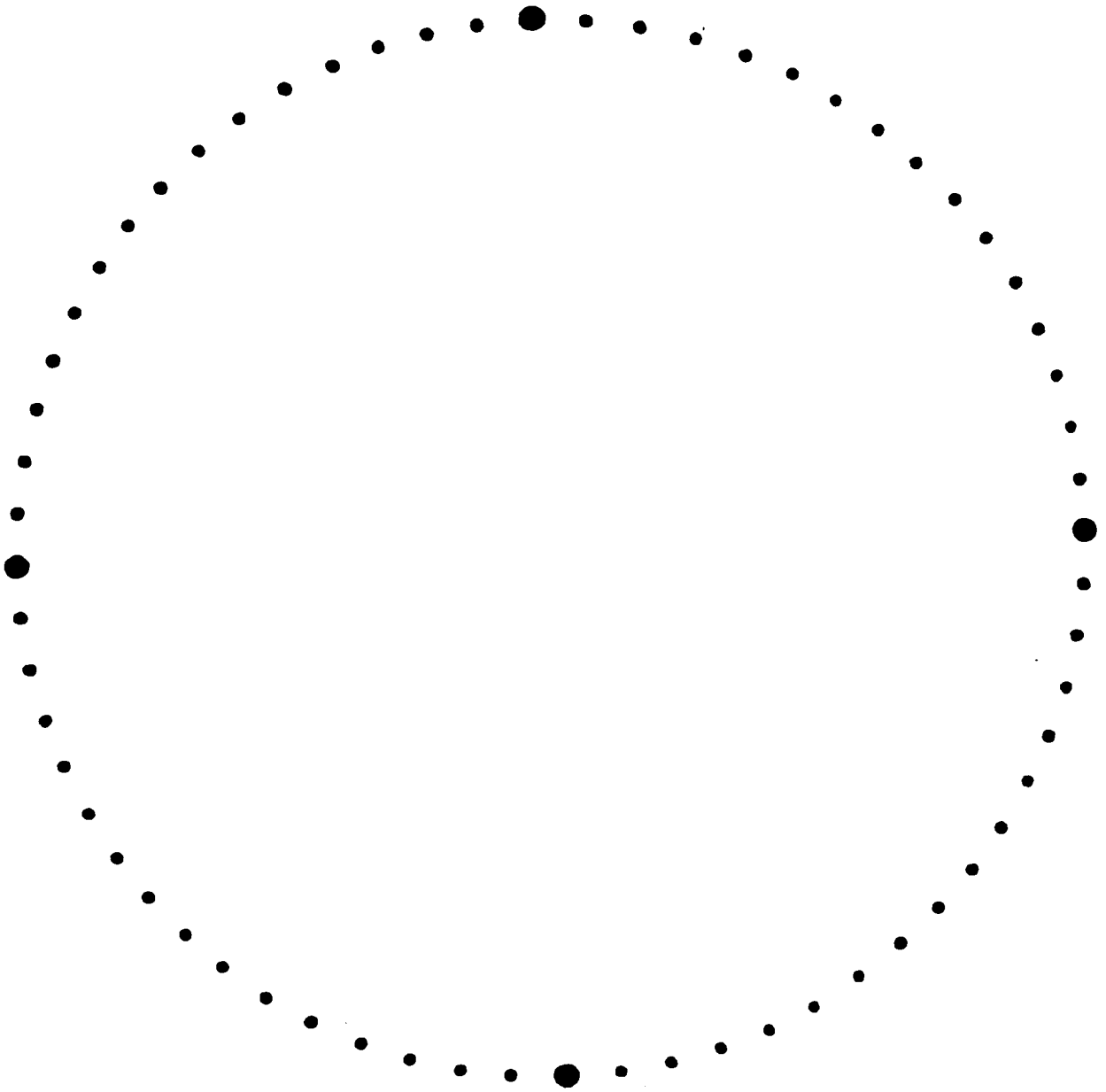
An even more radical approach is taken by Stockhausen in his *Aus den sieben tagen* (1968), a set of group improvisations in which all instructions are entirely verbal, such as for the piece "Intensität" (Intensity):

> play single sounds
> with such dedication
> until you feel the warmth
> that radiates from you
>
> play on and sustain it
> as long as you can

or this example, "Treffpunkt" (Meeting Point):

> everyone plays the same tone
>
> lead the tone wherever your thoughts
> lead you
> do not leave it, stay with it

Example 1.11 - Ashley, *in memoriam...Esteban Gomez.*



always return
to the same place

The British composer Cornelius Cardew adopts a more philosophical approach to improvisation in his *Treatise* (1963-67): at 193 pages it is the longest and most extensive graphic composition ever attempted. Modeled after Ludwig Wittgenstein's *Tractatus Logico-Philosophicus*, Cardew's book of graphic designs is intended as a philosophical treatise with its own logical narrative development.

Practically every page of the score contains two fixed elements: a pair of staves at the bottom of each page, and what Cardew called a "lifeline" or central horizontal line that divides the page into two halves. The two staves are intended as a convenience for the potential interpreter, for writing down one's realization of the page at hand. Cardew's intent was for *Treatise* to be used for improvisation and realization, using as many or as few pages as necessary, and with no fixed rules of interpretation. However, the work can also exist both as graphic art and as a critique of musical rhetoric. Brian Dennis observes in his 1991 *Tempo* article on *Treatise* that "the piece can be regarded as a graphic construction inspired by music -- and with "music," in the broadest sense, as its subject matter."[5] There are several vestiges of traditional notation, as shown in Examples 1.12a-b: noteheads, clefs, accidentals, and dynamics. However, they are heavily subsumed and treated as one more part of the entire graphic process; turned around, upside down, distorted, and blown up to the point of abstraction.[6]

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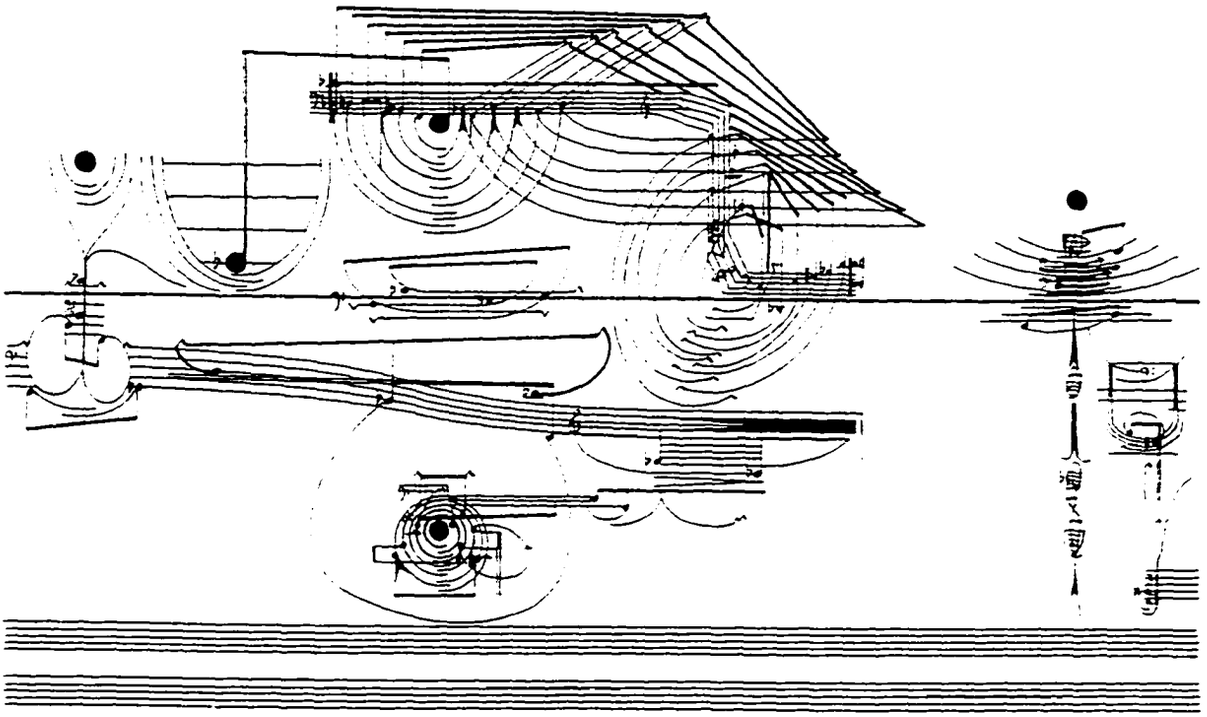
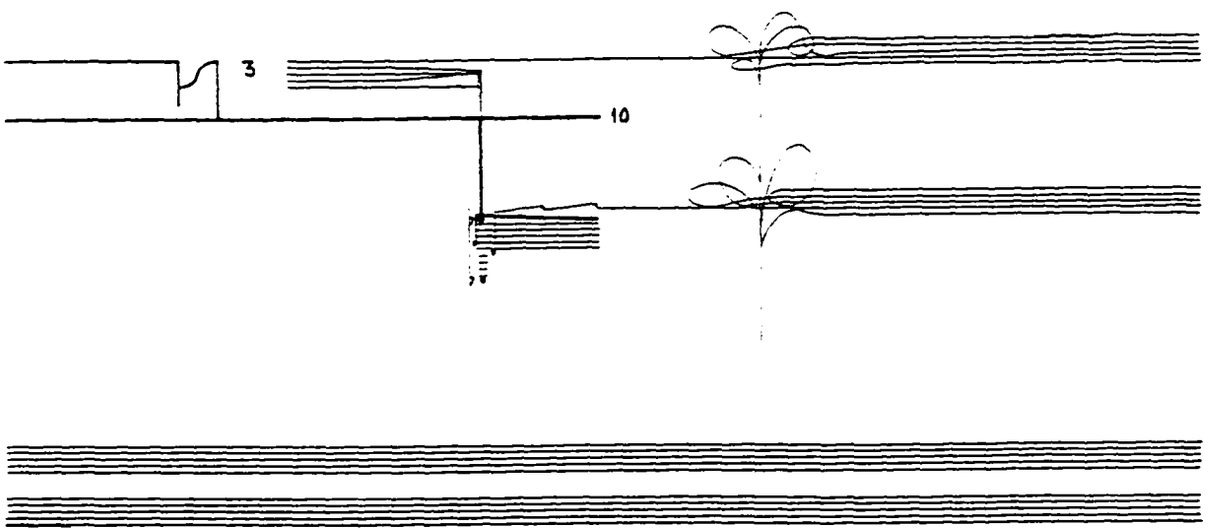
[5] Brian Dennis, "Cardew's *Treatise* (Mainly the Visual Aspects)," Tempo 177 (1991): 10-16.

[6] Cardew also made a highly provocative and polemical contribution to the "International Symposium on the Problematic of Today's Musical Notation," which was held in Rome in 1972. He published his lecture and panel discussion responses from the symposium in his classic musico-leftist collection *Stockhausen Serves Imperialism*. Cornelius Cardew, "Talk for Rome Symposium on Problems of Notation" and "Additional Material Presented in the Course of Discussion," chap. 4 in *Stockhausen Serves Imperialism* (London: Latimer New Dimensions Limited, 1974), 79-91.

Example 1.12a - Cardew, *Treatise*, p. 183.



Example 1.12b - Cardew, *Treatise*, p. 191.



6. *Proportional notation:*

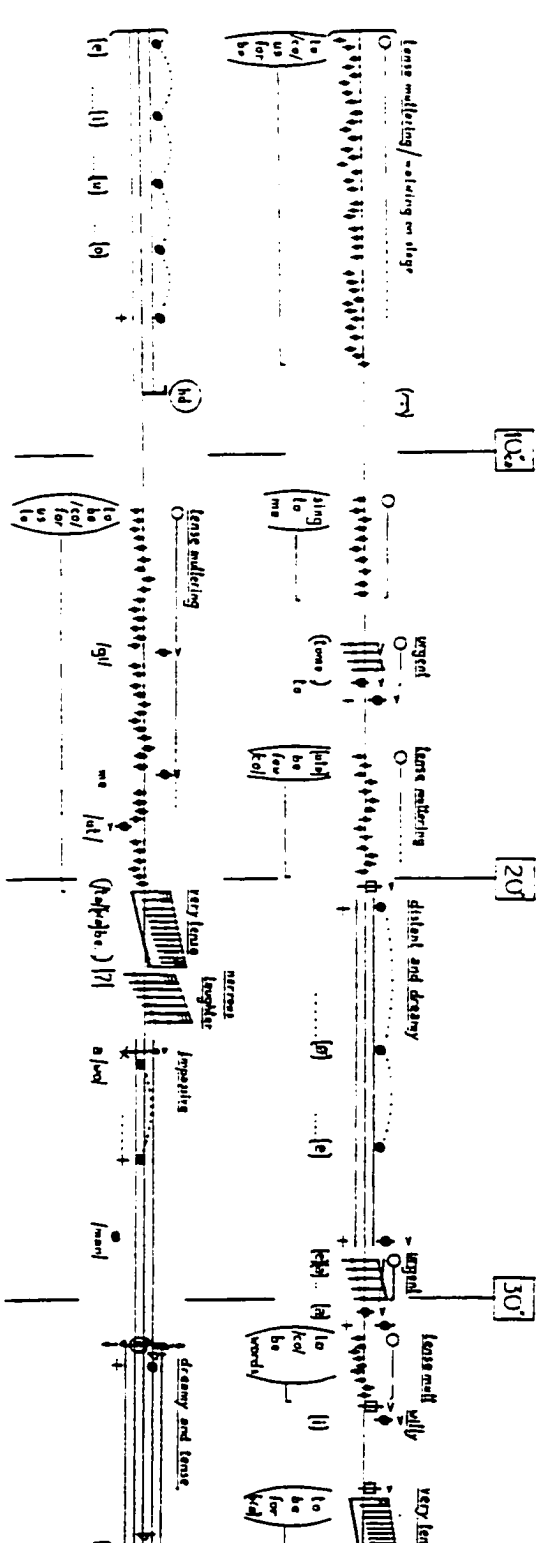
- *used to convey a sense of gesture or quasi-dramatic narrative*
- *used to bring about a sense of rhythmic/temporal freedom*

The last category deals with proportional, or "spatial" notation, a system in which durations are translated into horizontal distances instead of traditional duration symbols. Therefore, if the duration of a quarter note is equal to one inch of horizontal space, a half note will equal two inches, etc. In other words, all durations are notated in spatial relationship to each other; note-heads indicate pitch only. Durations of sustained sounds are indicated by horizontal lines -- either a single beam or an extension line at the level of the note-head.

As mentioned previously, proportional notation originated from work with tape, where a certain amount of space equaled a certain amount of time. Its advantages are that the number of possible durations is unlimited and not restricted to durations symbols within time-signatures. Proportional notation is especially useful to portray *accelerandi* and *ritardandi*, as well as aperiodic rhythmic passages that are difficult to represent in traditional notation. It is a hallmark of post-1945 notational practice on both sides of the Atlantic.

Several composers have seized on the dramatic possibilities inherent in proportional notation -- how added rhythmic freedom can be used to convey a sense of heightened tension and theatricality. No composer has exploited these possibilities more effectively than Luciano Berio; Example 1.13 presents a detail from the first page of his *Sequenza III* (1966) for female voice. Perhaps the most unique notational innovation in *Sequenza III* concerns staff-lines. Berio moves absolutely seamlessly between one-

Example 1.13 - Berio. *Sequenza III*. detail from p. 1.



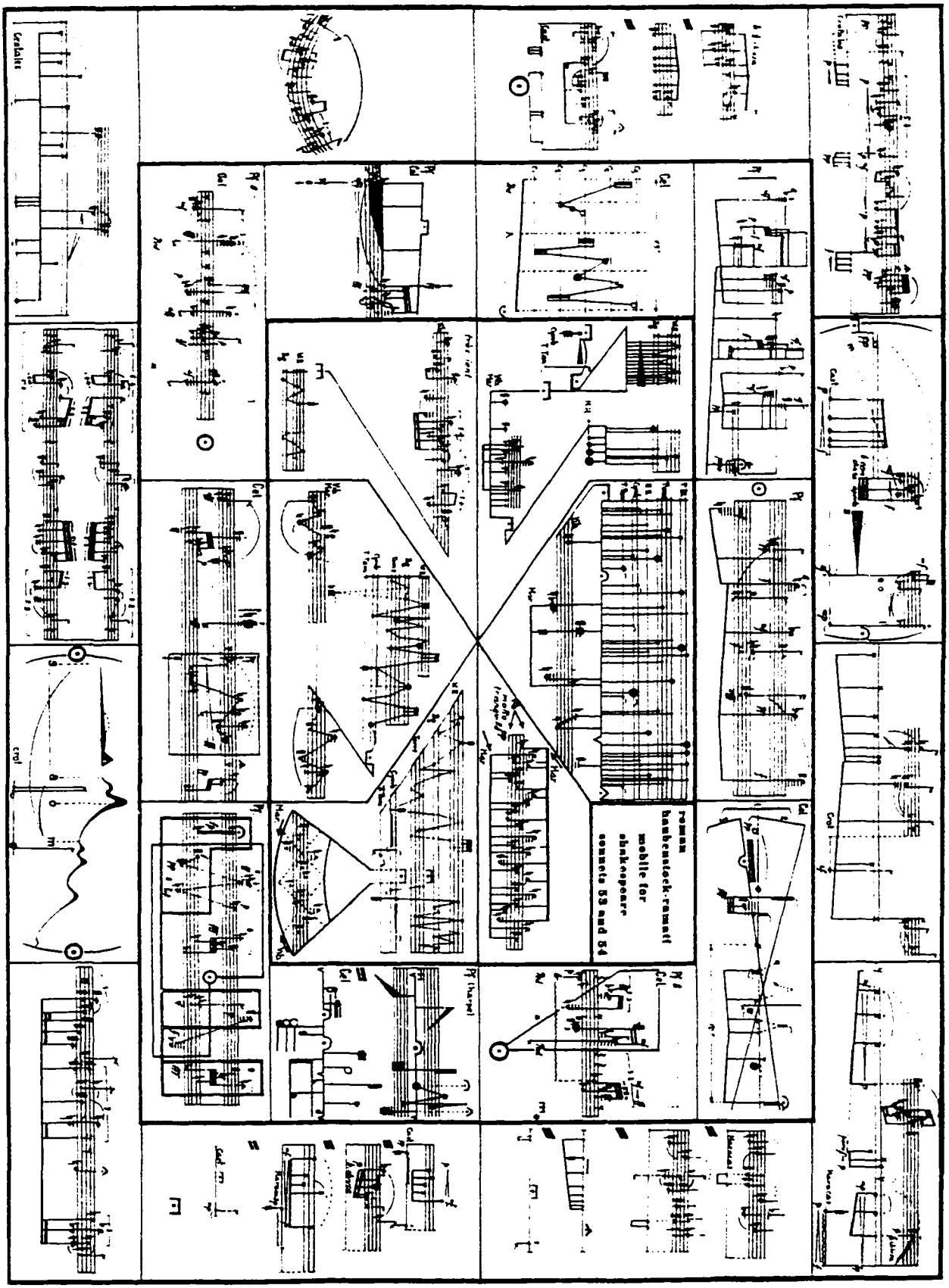
line notation (indeterminate pitch), to three lines (relative pitch), to five (precise intervals though pitch need not be absolute).

The works of the Austrian composer Roman Haubenstock-Ramati are remarkable for their novel approach towards proportional notation. Haubenstock-Ramati is known for his "mobiles," poster-like scores of a structural flexibility appropriate to Alexander Calder's sculptures of the same name. The constituent elements of Haubenstock-Ramati's mobiles are brief fragments in proportional notation which are capable of being combined with one another in myriad ways to forge novel, larger-scale narratives. Example 1.14a presents Haubenstock-Ramati's *Mobile for Shakespeare* (1960), for voice and six players.

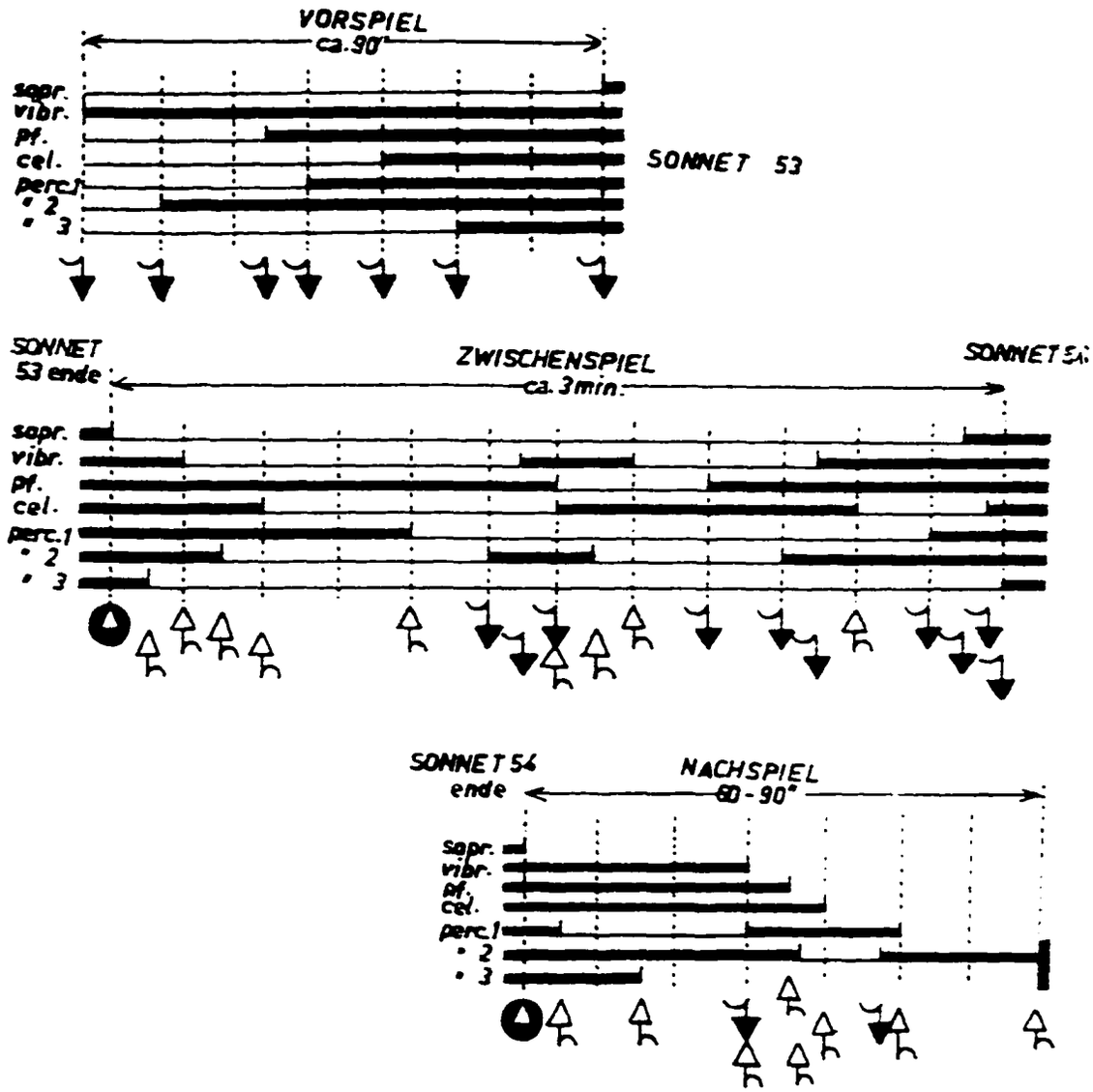
In this setting of Shakespeare's 53rd and 54th sonnets, a closer examination of the score reveals Haubenstock-Ramati wiring a great deal of control into his notation (once again, apropos for a European composer whatever the vintage). Let us look at how the mobile is structured. First, the outer frames are the part for the singer and the third percussionist; the two fields in brackets (at the top and bottom of the mobile) apply only when the preceding square or "field" coincides with the end of a movement (more on the work's form shortly). The singer devotes one syllable to each tone or group of tones under a *legato* slur. The next level of frames, moving inside, are the parts for celesta and piano, followed by the innermost frames which are reserved for percussionists one and two.

Second, *Mobile for Shakespeare* has a sharply formal profile that is articulated with the assistance of a conductor: Prelude/Sonnet 53/Interlude/Sonnet 54/Postlude. Example 1.14b presents the diagram that is essentially what the conductor sees; each section delineated by the dotted lines in the prelude lasts 12-13 seconds, in the interlude 15 seconds, and in the postlude between 9 and 13 seconds (the conductor is tacet during the

Example 1.14a - Haubenstock-Ramati, *Mobile for Shakespeare*.



Example 1.14b - Haubenstock-Ramati, *Mobile for Shakespeare*, conductor's part/diagram of form.



sonnets). Within these diagrams the conductor has very set points dictating when performers enter and when they exit.

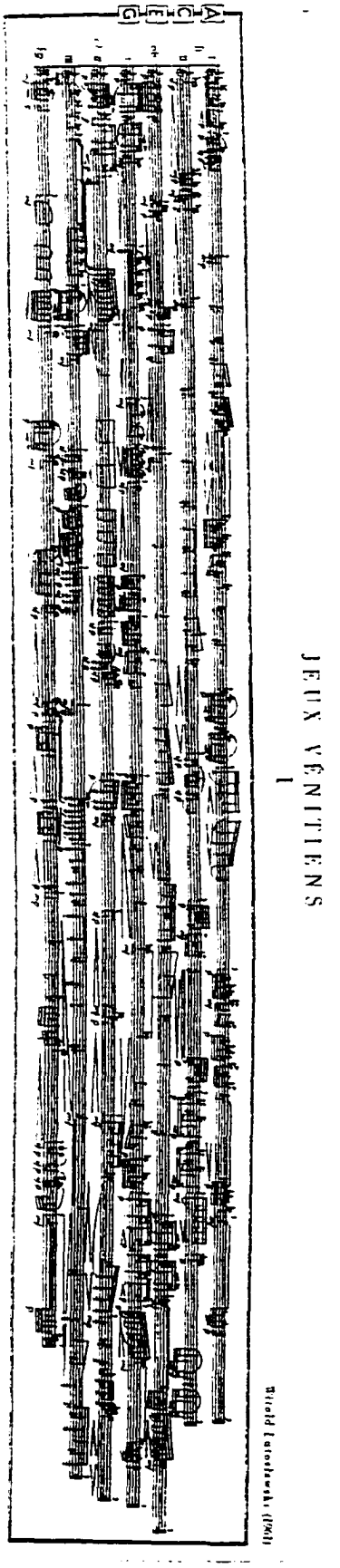
Other composers are interested in using proportional notation in more abstracted ways, in merely investigating the sense of rhythmic and temporal freedom. A composer who explores the verities of proportional notation for its own sake is Witold Lutoslawski; Example 1.15 presents an excerpt from the first movement of his orchestral work *Jeux vénitiens* (1961). Instead of a full orchestral score, in this movement Lutoslawski ties notation to orchestration and form. Sections are lettered *A-H* and performed in that order. Each section's constituent material is isolated within boxes (Lutoslawski's use of the box should not be confused with Berio's frame notation in works such as *Circles*), and each box is devoted to a different and discrete traditional instrumental choir.

There are also a variety of time-senses in this movement. Sections *A*, *C*, *E*, and *G* are given defined durations, while the material within them is performed in the manner of a horse-race. Players begin together and end when they are done -- all other verticalities are gratuitous. In sections *B*, *D*, *F*, and *H*, divisions of "bars" by seconds contain material which Lutoslawski directs to be played "with the greatest possible freedom."[7] In addition, Lutoslawski insists that these bar-divisions, such as the ones of three seconds in section *B*, are highly relative; attacks within these sections are proportional and free. Therefore, within the structure of the first movement of *Jeux vénitiens*, Lutoslawski has managed to inject a great deal of formal interest and recursiveness inside a highly variegated chronometric morphology.

The following chapter, dealing with aspects of the notation of Luciano Berio, will involve itself heavily in this domain of proportional

[7] Witold Lutoslawski, performance notes for *Jeux vénitiens*, first movement. Celle: Moeck Verlag, 1962.

Example 1.15 - Lutoslawski, *Jeux vénitiens*, first movement, p. 1.



notation-as-abstracted play. When combined with his structural preoccupation with sign-systems and his aforementioned sense of theatricality, we shall see Berio fashioning from his notational systems a rich gestural and semantic catalogue that forms a vital element of his highly distinctive compositional profile.

II. *Luciano Berio: Notation-as-play within a predefined system*

Luciano Berio's *Sequenza I per flauto solo* (1958) has long been regarded as a paradigm of the "opera aperta," or "open work." Composed for the late flutist Severino Gazzelloni, *Sequenza I* is one of the first pieces Berio wrote using proportional notation, a system in which durations are "translated" into horizontal distances instead of duration symbols (e.g. the duration of a half-note is made equal to one inch of horizontal space, a quarter-note equal to a half-inch, etc.). In Berio's performance notes to the 1958 Edizioni Suvini Zerboni score, he specifies that

> The tempo of execution and the relations of durations are suggested by:
> - the reference to a constant quantity of space that corresponds to a constant metronomic pulsation;
> - the distribution of the notes in relation to that constant quantity of space:
> | 70 MM= | and thus equal to about 0,80.[1]

The complete score of *Sequenza I* is presented in Appendix B. Pitches are plotted in these relatively arbitrary yet consistent durations on a kind of "temporal grid" in which each boundary delineated by a vertical line over the top two staff lines refers to one unit equaling MM 70. Pitches notated in what look like unbeamed eighth-notes are to be performed *sciolte*, or separated, without slurs or phrase connections. Their actual duration is determined by the manner of attack. Units of beamed notes are played *legato*. The durations of these notes last until the succeeding attacks or silences, in proportion to the length of the crossbar. The virtue of such a notational system is that Berio is able to achieve a rhythmically complex result with a great deal of ease and flexibility without tying the performer down. However, Berio's former musical assistant Nicholas Hopkins told me that this notation did not represent Berio's original design for the piece.

---

[1] Luciano Berio, performance notes to *Sequenza per flauto solo*. Milano: Edizioni Suvini Zerboni, 1958. English translation by Carolina Carry.

It was instead a compromised version of an earlier attempt in metered notation that was extremely difficult to play:

> He originally wrote it in exceptionally fine detail (almost like Ferneyhough in the original form), but Gazzelloni could not handle it, so Berio decided to use proportional notation.[2]

Whatever Berio's original intent, *Sequenza I* became a rallying-point for advocates of the open work. It is important to place this moment in a context where it can be properly appraised, as it reflected a certain cross-pollination of poetics in the 1950s and 60s which saw a great deal of correspondences between the European musical avant-garde and certain trends in literary theory. In his seminal 1959 essay "The Poetics of the Open Work," the semiotician and author Umberto Eco described *Sequenza I* as a work in which

> the composer presents the performer a text which predetermines the sequence and intensity of the sounds to be played. But the performer is free to choose how long to hold a note inside the fixed framework imposed on him, which in turn is established by the fixed pattern of the metronome's beat.[3]

Eco classifies the *Sequenza* with a number of pieces, among them Karlheinz Stockhausen's *Klavierstück XI* (1956), Pierre Boulez's *Third Sonata for Piano* (1957), and Henri Pousseur's *Scambi* (1957), all of which by their notation leave the performer a quantifiably considerable but qualitatively delimited autonomy. To Eco, the radical difference between these *opere in movimento* and works from the canon lies in the aspect of communication. Traditional works (which he considers to be everything from a Bach fugue to *Aïda* to *Le sacre du printemps*) live in a kind of "closed" space in the sense that they represent a well-defined and arranged "assemblage of sound units."[4] These units are converted into conventional

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[2] Letter to the author, March 27, 1997. Berio told me that there is no complete "first version" of *Sequenza I*, only sketches which now reside in the Paul Sacher Stiftung in Basel.

[3] Umberto Eco, "L'opera in movimento e la coscienza dell'epoca." *Icontri musicali* 3 (1959). Translated by Anna Cancogni as *The Open Work* (Cambridge: Harvard University Press, 1989), 1.

[4] Umberto Eco, *The Open Work*, trans. Anna Cancogni (Cambridge: Harvard University Press, 1989), 2.

symbols which oblige the performer to observe a format predicated on reproduction of the composer's intent. On the other hand, an "open work" such as the *Sequenza* rejects such a definitive, conclusive message, opting instead to "multiply the formal possibilities of the distribution of their elements."[5] The role of the composer is now to hand a performer the components of a construction kit, giving the performer space to conclude the work "at the same time as he experiences (it) on an aesthetic plane."[6]

The autonomy with which the performer is endowed in the "open work" needs to be located and defined. Eco draws some important boundaries around the "open-ness" of a work. Borrowing a term from physics, he suggests the notion of a "field" acting as a model for the state of communicative play in the work, a "complexity interplay of motive forces...a configuration of possible events, a complete dynamism of structure."[7] Yet this field is not limitless; an open work operates within a given field of relations that is built into a basic communicative context, or "code." The *Sequenza*, as well as the works by Stockhausen, Boulez, and Pousseur,

> will never be quite the same on different occasions. Yet they will never be gratuitously different. They are to be seen as the actualization of a series of consequences whose premises are firmly rooted in the original data provided by the author.[8]

Eco views the composer of a "work in movement" as inviting the performer to make an "oriented insertion" into something that never departs from the contextual world intended by the author, or to borrow a term of the critic Walter Benjamin, the "aura." As opposed to an indeterminate situation, the outcome in an open work is foreseen. The image I provided before of a construction kit is apt because the composer is

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[5] Ibid., 3.
[6] Ibid., 4.
[7] Ibid., 14.

offering the interpreter a work to be completed. The composer does not know *exactly* how the work will be completed, but he knows it will be recognizably his own. The idea is that the composer must discard a syllogistic attitude towards the issue of control in favor of proposing a set of "possibilities" to the performer, though these possibilities in themselves have already been considered and factored into the work's structure.

As for Berio's own views towards the open work and its notational manifestations, they have changed considerably over the years. Participating in a panel on form at the 1960 International Conference of Composers, Berio echoed the poetics of the *opera aperta*:

> We cannot consider today's music a language, a closed system, precise and comfortable, where everything happens according to prevision, but rather a branch-system of sounds and actions definable and significant only in their actuality and in the relationships which they imply at the moment.[9]

Though offering his affirmation, Berio, like Eco, takes great pains to stress the control which the composer must exercise over the entire enterprise. What Berio was after in the late 1950s and early 60s was a situation in which the composer furnishes the player with a set of starting-points, lines of pursuit which one could react to "in a constantly renewed way."[10] Yet in order to achieve that sense of eternal spontaneity, according to Berio, the work needs to be planned carefully, preserving the integrity of relationships that is necessary to maintain coherence. Berio perceives a dialectical relationship where the more freedom one gives the performer (and, consequently, the audience), the more complex the resultant structure. Therefore, in order to prevent the work from degenerating into

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[8] Ibid., 19.

[9] *The Modern Composer and His World: A Report from the International Conference of Composers, Held at the Stratford Festival, Stratford, Ontario, Canada, August 1960*, ed. John Beckwith and Udo Kasemets (Toronto: University of Toronto Press, 1961): 141.

[10] Ibid., 144-45.

what he sees as chaos that destroys possible relationships, the composer should

> give a certain degree of redundancy to the texture that constitutes a kind of buffer state between chaos and the fields of possible meanings... But when the buffer state is not established, when the tendency to give freedom to the interpreter is pushed to its limit, the composer is evidently condemned to renounce ever making free decisions--to no longer giving any signs for any interpretation whatsoever.[11]

The latter is, of course, how Berio would define an indeterminate situation. In the face of such incoherence, structuralist thinking argues for the reference and adherence to preestablished codes in the interpretation of a "message." In the case of composition, Berio's response is to establish his own notational code. All communication is thus valid to the extent that its method is decodable by reference back to the code. The "certain degree of redundancy" is the layer provided by the notational code adopted specific to each work; in the case of *Sequenza I* it is the notational grid and pitch/durational sigla I mentioned before. Berio sets up a communicative context and is then able to proceed with rhetorical behavior that constitutes a kind of "play." This "play" is often of a gestural cast, and, like the hallmarks of the *opera aperta* as defined by Eco, once the context is set down, it does not deviate from the "aura" but rather reinforces it. This element in Berio of "notation-as-play" is something that I believe contributes to his uniqueness among those composers who, like himself, emerged after World War II interested in pursuing a more comprehensive serialism. His music is conventionally regarded as far more "lyrical," "musical," and gestural than that of his contemporaries. I think Berio's establishment and adherence to notational codes, and this element of "notation-as-play" within a predefined system are important contributing factors to the success of works such as *Sequenza I* both from a

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[11] Ibid., 145.

compositional as well as a performance standpoint. Part of this "musicality" is a byproduct of the establishment, via these notational codes, of a contextual and referential space for the interpreter and audience, a kind of zone that is compatible with the modification of traditional rhetoric -- rhythmic, temporal, and gestural constructs. The result is extremely accessible to performers on the terms and assumptions that they are used to and comfortable with.

Later in Berio's career, this tendency towards narrativizing performance-based issues would be manifested in a growing conservatism (both compositionally and epistemologically), and a turning-away from the ramifications of the *opera aperta*. Today he is of the view that the concept of the open work is anachronistic: "the notion of the open work is very dubious now."[12] The only situation he would support nowadays that in any way resembles an open work is a dramatic/narrative scenario where the audience could choose between endings, be they happy, tragic, etc. -- rather a cartoonish and unimaginative caricature of the form, I must say. Second, Berio now believes that the open work was always a theory of reading from the beginning, not of writing, and it was never intended to be a compositional technique: "the fact is the open work is not involved with the performer, but the listener."[13] Not only is this again the conventional view, but it directly contradicts his talk of a "buffer state," which precisely represented a building of openness into the morphology of a work and making that property a primary compositional issue. Part of the whole play in works such as *Sequenza I*, of the narrative which plays itself out over the course of the work, is the tension between the redundancy Berio

[12] Interview with the author, April 24, 1997. The full text of my interview with Berio is presented in Appendix A, where this remark can be found on lines 139-40. In addition, Berio believes that Eco effectively put the issue to rest with the publication of *The Open Work*.

[13] Ibid., lines 132-33. In my interview with him, Berio goes on to cite some of the well-worn examples of open works, such as Joyce's *Ulysses* and *Finnegans Wake*.

has sought to build into the code and the eternal "renewal" that offers the performer a certain measure of freedom.

In addressing exactly what he now objects to about the open work, Berio singles out Boulez's *Third Piano Sonata*, with its direction to the player to redistribute the order of constituent sections:

> LB: ...(it) is beautiful piano music, huh? But who cares? It's not relevant; it's not *saying anything*, this possibility of modifying the order of the pieces. Not even for the interpreter, not to speak of the listener, he couldn't care less if the *Trope*, or whatever, *Formant* comes before or after...That means simply there is a "spatial form," if you want--the form is suspended. You can float around, but already it's the music that doesn't need a perspective, a million perspectives.
>
> BW: ...there is a certain kind of sameness to the possible realizations. So the process is active only up to a certain point, then it just stops and becomes an object.
>
> LB: That is because there is a suspension of a very important parameter, which is the syntactical parameter. There's no syntax; there's a grammar in that music.[14]

By "a suspension of...the syntactical parameter," I believe Berio is making the point that Boulez's *Sonata* has no "content," no kind of "harmonious arrangement of parts and elements" (the very definition of syntax), because it is so obsessed with first principles and rules -- all structure and no meaning, all map and no territory. The music speaks no language because it is bogged down in a structural quagmire that dictates too much of the content and overly reduces the composer's prerogatives, forcing him to resort to an non-integrated, artificial "post-compositional" device -- a gimmick. Content is merely the fallout of the row manipulations, and the "shufflings" only cover up the fact. Even when, at the beginning of his career, Berio was engaged in serial procedures, preserving his options over the course of a work was a matter of great importance to him.

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[14] Ibid., lines 145-63.

Of course, once notation becomes a matter worthy of its own exploration, such a grammatical/syntactical duality is transcended. Berio plays down this question of notational codes serving any kind of autonomous function in his music, adopting instead a highly utilitarian stance. All notational considerations, as he sees it, are secondary; he is only concerned with notation when "there's a problem...a dilemma...that pushes me to find solutions."[15] As an example Berio cites his landmark work *Circles* (1960) for female voice, harp, and two percussionists, where the solution, much as in *Sequenza I*, is "behavioral." By this, I mean that the composer is endeavoring to "program" the player to process and transmit a large amount of information in an authoritative, dramatic manner. "Gesture" becomes a manifestation of a notational compromise with density and complexity. The result of the performer's being persuaded into a stylized negotiation becomes iconic.

> In a score like *Circles*, I need the maximum density of events, so this can be obtained only if the performer is not...tied, but he has to perform a gesture with a certain amount of, I wouldn't call it freedom, but a certain amount of indeterminacy that is not specified only as an aspect. He has to play it fast, as fast as possible, on all instruments in a circular way, you see. So the notation had to express this, to give this possibility to the performer. But the notational problem is always a secondary problem.[16]

In Berio's mind the notation of a work is, in other words, a presentational layer superimposed over the material (reflecting the processes of generating both content and narrative), and is not truly integrated though it should ideally reflect a certain conceptual symmetry or homogeneity. Local solutions in his notational systems are thus often justified by what he calls "the technical and expressive reason of the work"

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[15] Ibid., lines 12-15.
[16] Ibid., lines 18-26.

-- in this case, the notion of "circularity." Example 2.1 presents an instance of this characteristic in the percussion notation of *Circles*.[17] In this system, the circularity is twofold: presentation on the page matches performance-practice considerations. The instruments, from the foot-pedal bass drum to the bongo drums, are situated circularly. Likewise, the gesture in this example proceeds visually from its starting-point in a circular motion, and returns at its completion.

Any resorting to a code is for Berio a matter of necessity by nature. Since "there are no implicit codes" as there were in the time of Mozart, "now we have to express, to notate everything."[18] He believes that there was a certain moment in the canon (and it is important to keep in mind that Berio believes very deeply in the notion of a canon as well as his role in it) when "the notation broke down...where there was an excess of information...and the notation is among the cracks that cannot carry all this information." Berio credits Stravinsky as being among the first to turn to explicit directions and suggestions regarding all aspects of performance -- dynamics, phrasing, speed, fingering, etc.

Even Berio's employment of proportional notation is not now considered by the composer to be inseparable from his compositional identity, or part of an agenda advocating a new time-sense. It is one out of many choices at his disposal, a matter of practicality which is most attractive when trying to render a complex passage easier to play.

> It depends (what) is required...there is something very basic sometimes with very difficult articulations, and proportional notation makes things definitely easier.

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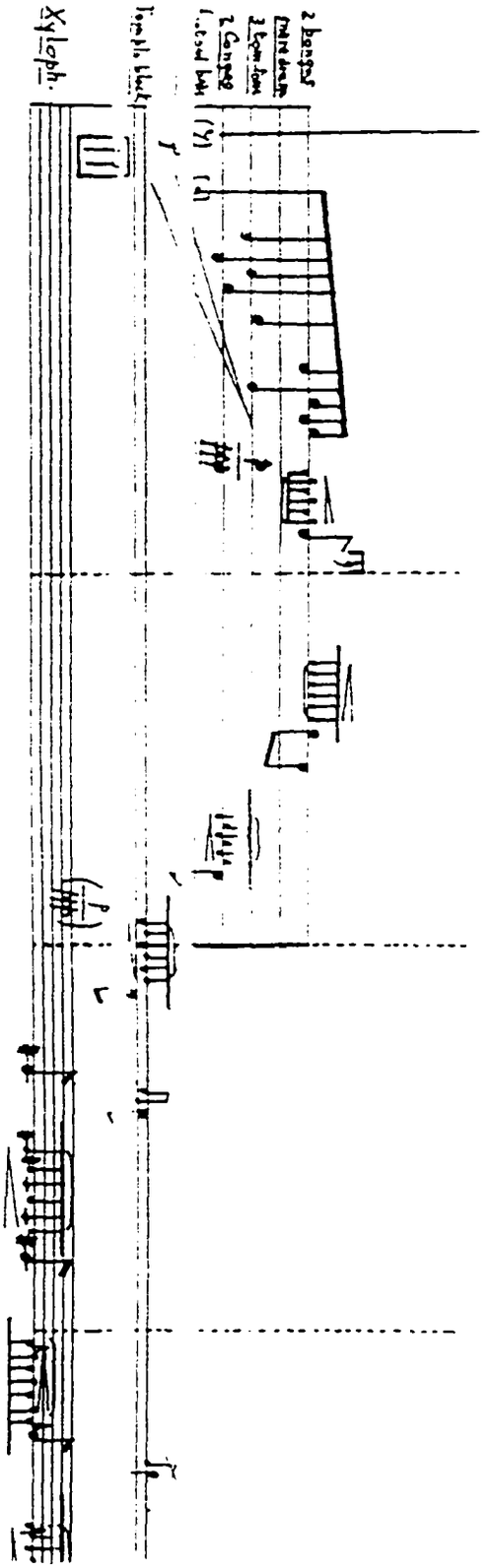
[17] Berio's interest in the notion of circularity is reminiscent of two movements from George Crumb's *Makrokosmos, vol.1 (Twelve Fantasy-Pieces after the Zodiac for Amplified Piano)* (1972). Movements number eight (*The Magic Circle of Infinity (Moto perpetuo)*) and number twelve (*Spiral Galaxy*) in *Makrokosmos* use circular notation. Crumb also employs a similar device at the beginning of his *Star-Child* for soprano, antiphonal children's voices, male speaking choir, bell ringers, and large orchestra (1977). It also brings to mind the 14th-century perpetual canon *Tout par compas suy composé* by Baude Cordier (Chantilly Codex), which is written on circular staffs.

[18] Appendix A, lines 57-58.

Example 2.1 - Berio, *Circles*, detail of percussion II part, p.9, beginning of second section, "riverly is a flower."



> And the performer plays better. You know, if you have experiences with singers, or a chorus, and there are difficult passages, then the vocal output is changed. They don't produce the voice so freely, if you want to say, so "nicely" as when they are free.[19]

In other words, Berio is now interested in proportional notation almost exclusively to avoid a situation in which a player will look at a difficult passage written in metered notation and immediately recoil, thus bringing about a certain stiffness of performance. This to me represents another acceptance of conventional wisdom similar to Berio's *volte-face* regarding the open work. Nicholas Hopkins agrees that

> proportional notation has served little use for him in recent years.... I think it is because he has had too many bad experiences with performers butchering the results.[20]

The use of a temporal grid, however, is a matter which still greatly interests Berio. A grid on which a composer may plot points, attacks, and fluid rhythms is a thread running through his work from *Sequenza I* to such recent works as *Kol-Od (Chemins VI)*, *Recit (Chemins VII)*, the *Sequenzas XII* and *XIII* for bassoon and accordion respectively, and his opera for La Scala, *Outis*.[21] Berio often composes today by drawing bar-lines on every measure of the page, such that each beat within a measure is equivalent in size. He will take a ruler, measure the length of a staff on the paper, divide it in such a way as to produce a number of beats equidistant in size, and then fill in the music. Rhythmic material is defined as to how it fits into the grid Berio lays out on each sheet of paper. By doing this, he can jump from page to page, system to system, and fill in the content as he wishes.[22]

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[19] Ibid., lines 212-21.

[20] Letter to the author, April 7, 1997.

[21] The bassoon *Sequenza* is one of the few recent works by Berio to use proportional notation, though to a limited extent.

[22] I thank Berio's former musical assistant Nicholas Hopkins for this information about Berio's current working methods (letter to the author, March 27, 1997).

For all of Berio's protestations of indifference, I feel that the logical outcome of this method is that the notational system, the code, attains dominance over both "syntax" ("ways") and "grammar" ("means"), actually functioning in both roles simultaneously. Material may be presented in any manner of disoriented, reversible narrative. The artifice of a "durational-grid architecture" in the notation infiltrates and imposes itself on all other parameters on all other levels of surface. Berio accounts for this by thinking of a work as containing many different temporal "organizations" simultaneously. He says he simply cannot conceive of time in a "univocal" way:

> So very often what happens, there is a temporal grid, maybe static, but the other ones are moving in a constantly mobile way. Sometimes the temporal grid is completely abstract, indifferent, like...a "meter" that is indifferent to the rhythm.[23]

In the case of *Sequenza I* or *Tempi concertati* (1958-59) for solo flute and spatially distributed orchestra, a work I will touch on later, this property of temporal multivalence is expressed as a kind of "phantom" metrical grid that is structurally omnipresent if audibly inoperative.

Since Gazzelloni's 1958 premiere, *Sequenza I* has gone on to become a true repertory staple, attaining the status of a signature contemporary work for solo flute as well as being one of the most cited and taught examples of proportional notation. Indeed, it is one of the works that led to a pedagogy of new music. Yet for all its ubiquity, Berio was becoming increasingly upset with the liberties flutists were taking with the notation. Specifically, some players took the notation as an invitation to quasi-improvisatory *rubato*, totally disregarding the rigor of the durational grid. In a 1981 interview with Rossana Dalmonte, Berio's level of concern with

[23]Appendix A, lines 199-203.

this state of affairs is such that he is publicly entertaining a rather dramatic solution:

> The piece is very difficult, and I therefore adopted a notation that was very precise, but allowed a margin of flexibility in order that the player might have the freedom -- psychological rather than musical -- to adapt the piece here and there to his technical stature. But instead, this notation has allowed many players -- none of them by any means shining examples of professional integrity -- to perpetrate adaptations that were little short of piratical. In fact, I hope to rewrite *Sequenza I* in [more conventional] rhythmic notation: maybe it will be less "open" and more authoritarian, but at least it will be reliable.[24]

As a response to what he viewed as performers taking advantage of the slightly relaxed sense of control, in 1992 Berio rewrote the *Sequenza* in conventional metered notation, and it was published by Universal Edition the following year. In a recent interview with the Dutch composer Theo Muller, Berio further outlined the rationale and motivations behind the renotation:

> At the time I wrote *Sequenza I*, in 1958, I considered the piece to be so difficult for the instrument that I didn't want to impose on the player specific rhythmical patterns. I wanted the player to wear the music as a dress, not as a straitjacket. But as a result, even good performers were taking liberties that didn't make any sense, taking the spatial notation almost as a pretext for improvisation. Certainly some sort of flexibility is part of the conception of the work. But the overall speed, the high amount of register shifts, the fact that all parameters are constantly under pressure, will automatically bring a feeling of instability, an openness which is part of the expressive quality of the work--a kind of "work-in-progress" character if you want.[25]

In preparing the revised version, Berio made use of the original, "pre-proportional" sketches from 1958, the ones I mentioned at the outset. He copied the old version in pencil, then modified all the rhythms in order to simplify them. This process consisted of regularizing or "rounding off" rhythms so they would fit into rational meter. Berio describes it in a wonderfully understated, pithy manner: "I eliminated some excess of

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[24] Luciano Berio, *Two Interviews*. Interviews with Rossana Dalmonte and Bálint András Varga (New York: Marion Boyars, 1985): 99.

[25] Theo Muller, "'Music is not a solitary act': conversation with Luciano Berio." *Tempo* 199 (1997): 19.

complexity."[26] After approximately two to three months, Berio was satisfied that it had been "simplified" enough. The only difference between both 1958 versions and the revision lies in the area of rhythmic notation; pitches, dynamics, and articulations are kept intact.[27]

Berio now professes to be quite happy with the result. Many flutists who have played the revised version report to him that they continue to perform from the Suvini Zerboni edition (if they do not commit the work to memory), and use the new metered version as a reference. In a sense, one can say that the player now produces an intertextuality, a "composite version" of the *Sequenza* from this practice. Curiously, one flutist who memorized the original version and performed it several times told me that he re-learned the work from the 1992 version and now regards it as the exclusive source. This flutist, Michele Marasco, told me that he believes nothing was lost in the re-notation.[28]

To Berio, the metered version of *Sequenza I* only makes apparent the obvious -- everything was notated in the old version, but "the visualization of this sometimes is not simple. Sometimes it invites enormous flexibility, an excess of flexibility."[29] Berio feels he has sacrificed nothing, paid no price for his renotation.[30] This new version of *Sequenza I* has proved controversial, however. Even Berio's biographer, the British musicologist David Osmond-Smith, has had some very pointed criticisms to offer. Most notably, Osmond-Smith questions whether the work emerged from its renotation as the same work at all. In essence, he feels there is a new relationship between, composer, performer, and score:

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[26] Appendix A, line 95.
[27] My thanks to Nicholas Hopkins for this information (letter to the author, April 7, 1997).
[28] Conversation with the author, June 19, 1997, Cincinnati, Ohio. Marasco, who works frequently with Berio, is a member of the orchestra of La Scala and first flutist in the Orchestra della Toscana.
[29] Appendix A, lines 126-28.
[30] Speaking of renotations, the oboist Jacqueline Le Clair has realized a metered version of *Sequenza VII* for oboe and sound source (1969).

> The music leaps off the page in a way that the less conventional Suvini Zerboni score does not suggest. Yet there is a price to be paid. The fluid spring of the original resolves into simpler relationships, often suggesting an underlying quaver or crotchet pulse for a few seconds. The conventional use of beams to join smaller rhythmic units into quaver and crotchet groups encourages a very different view of structural priorities within the phrase. It would be interesting to hear performances from the notations side by side: I think one could tell them apart.[31]

Although I understand Berio's motivation for the renotation, Osmond-Smith's criticism is by no means unfounded. Berio may have finally achieved the original precision he sought from the very beginning, but I believe certain things were "lost in translation." The process of interaction between the composer's creation of an "open text" and the performer's interpretation of it has simply metamorphosed into what Berio himself terms a "'work-in-progress' character." A *character* is a distillation, the imitation and objectification of a process. For all the control, precision, and intent Berio sacrificed in the 1958 version, I am persuaded that he got back something far more interesting. The subtext of the 1992 revision is that Berio feels it is now more important to have a "proper result" than to have the *possibility* of a richer amount and variety of relationships.

A Notational Analysis of the Revised Version of *Sequenza I*

At this point I will attempt a "notational analysis" of the 1992 version (hereafter 1992), along the way comparing it to the 1958 version (from here on known as hereafter 1958). By the term "notational analysis," I mean an examination of *Sequenza I* with regard to Berio's decisions about notation, then a relating of those decisions to other issues

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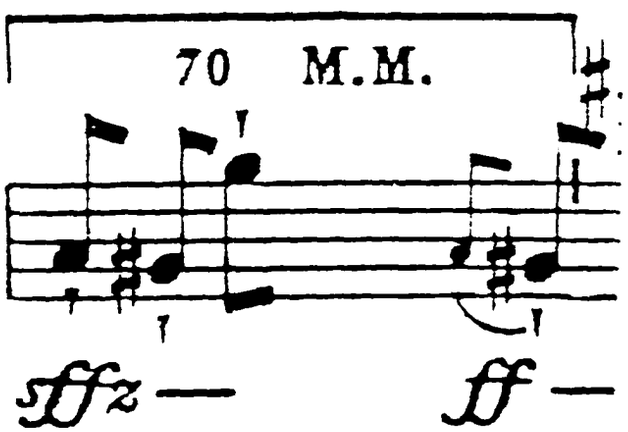
[31] David Osmond-Smith, "Only Connect..." *The Musical Times* 134/1800 (1993): 80. Paul Nauert (University of California, Santa Cruz) deals with some of the structural issues Osmond-Smith hints at in "Berio's Re-Notation of *Sequenza I*: Representations of Surface and Structure in Nonmetric Music," paper presented at the Annual Meeting of the Music Theory Society of New York State, State University of New York - Stony Brook, 1996. Nauert discusses the notational strategies of the two versions in the context of a theory of perceived temporal structure in nonmetric music.

relevant to the work as a whole. My analytical intention here is to use notation as the means to "open the door" of the work.

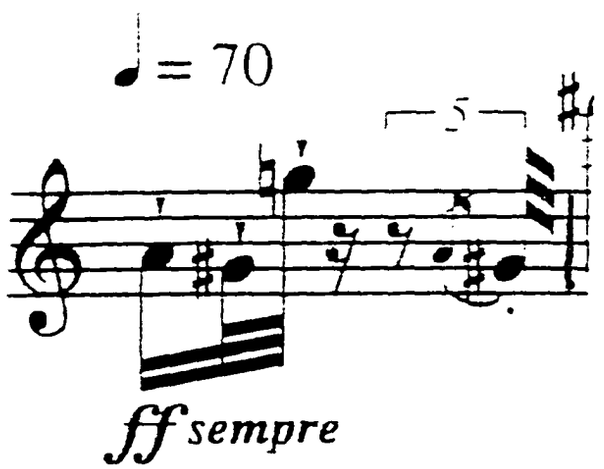
The revised version, as mentioned previously, is written in conventional note values but is unmetered. By not providing barlines, presumably Berio was interested in preserving the discursive, "open" quality of the original version while introducing an element of exactitude. In other words, he wanted to keep the veneer of "openness" while in essence closing up the options available to the performer. However, as I will show in the following pages, such a strategy must be considered somewhat disingenuous. This is because it stops one step short of its logical conclusion, which I have realized in Appendix C, my markup of the revised version. The analytical/interpretive stance I am adopting is based on the premise that 1992 can easily be barred in very rational and basic metrical configurations, most notably in 2/8 meter with deviations that never stray too far. My final result in Appendix C exhibits such a simplification and "closing" of the openness of 1958 that one may wonder whether, underneath the spatial surface, this music essentially "cried out to be metered" from the very beginning. By adding barlines, one can plainly see the nature of the alterations that Berio made, and how the new rhythmic units are constituted.

At the beginning of 1958, Berio specifies that each unit is equal roughly to MM=70. This can be seen at the beginning of the piece in Appendix B, where the first unit of MM=70 is delineated by a bracket. In 1992 Berio begins with a very straightforward metronomic marking of quarter note =70. One naturally must assume at this point that what was a unit of proportional time-length is now a unit of a quarter note. Examples 2.2a-b line up portions of the two versions to show how Berio took that initial bracketed proportional unit and gave it a determined durational

Example 2.2a - Berio, *Sequenza I*, 1958, p. 1/line 1.



Example 2.2b - Berio, *Sequenza I*, 1992, m. 1.



value: an eighth-note unit of a sixteenth and two thirty-seconds; a sixteenth rest; and another eighth-note unit consisting of quintuplet thirty-seconds.

Even at the outset of such a proposition, questions can be raised. One would assume that since the first proportional unit in 1958 is equal to MM 70, which then becomes a quarter note in 1992, the new initial grouping would be in essence a 2/8 bar. However, if one keeps the integrity of the initial grouping, that new opening measure adds up to a 5/16 bar! This is due to the fact that Berio adds a sixteenth rest after the third pitch of the aforementioned opening grouping. I assume this is because Berio wanted to create more durational space as an analogue to 1958. However, as with his alteration of the original three-note grouping, the very least one can say about 1992 is that in the very first bar one encounters a marked change from 1958.

In Appendix C, I have gone through 1992 and added barlines and meters based on strict interpretation of the MM=70 proportional units in 1958. In doing this, as I mentioned before, one merely makes obvious the inevitable ramifications of Berio's change in mindset. By making the units visibly smaller, one may also see Berio's "moves" with greater ease. By getting 1992 down to a manageable level, and then comparing it to 1958, one can see what was changed, what was added, what was even sometimes deleted from the original.

There are 283 measures in my adaptation of 1992. The held tones with fermatas in 1958, given fixed real-time lengths in 1992, become measures in "zero meter" in my treatment (such as mm. 16, 53, 56, and 60). I made decisions of where to include barlines by thinking of 1992 in a context of a consistent metrical framework of 2/8 observing Berio's MM=70 unit, which is after all the linchpin of his 1992 "code", subject to a fair amount of deviation. Such deviation assumes the form of meters

related to 2/8: those in an *additive* relationship to 2/8 (such as the 5/16 in m. 28 or the 3/8 in m. 30); or those in a *subtractive* relationship (such as the 2/16 in m. 16 or the 3/16 in m. 210). Most of the metrical structure in Appendix C exists in these kinds of relationships to the basic 2/8. This aspect of the re-notation can be related back to one of Berio's comments from my interview with him: it is one of the latest manifestations of his interest in having a work encoded with a great deal of temporal multivalence, of not being "univocal."[32]

Comparing 1958 and my treatment of 1992, we find that the "2/8 with deviation" code holds steady, without modification of the original version, for the first twenty-seven measures (this corresponds roughly to the first four systems of 1958). Then we encounter a sequence of some rather subtle and interesting "moves" on Berio's part. He adds another sixteenth to m. 28 (corresponding to the end of the fourth system of 1958), turning what would have been simply another 2/8 measure into one in 5/16. Then in m. 29 he seems to be adding durational space where there is none in 1958 (an alteration-type which can also be observed in the 2/16 bar in m. 40). The original unit is isolated and presented in the second unit of Example 2.3a; I do not believe that at first glance this could be viewed as a potential triplet. Two possible renotations of this unit, as a subdivision of four thirty-seconds or a sixteenth-note triplet followed by an eighth-rest, are shown in Examples 2.3b and 2.3c respectively. These kinds of renotations might have been more logical when thinking how to transfer this unit from proportional to metered notation, in order to preserve the same amount and type of space. Yet what Berio does, isolated and shown in Example 2.3d, is to add a rest of one-third of a sixteenth-note triplet, turning the figuration into one of *two* sixteenth-note triplets.

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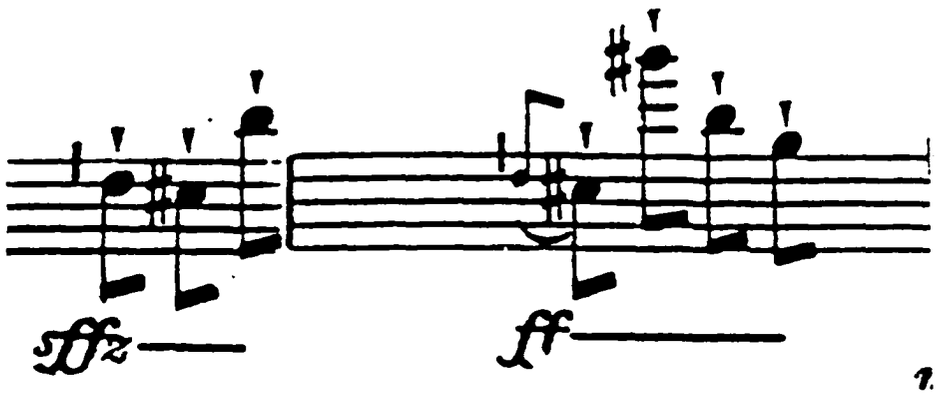
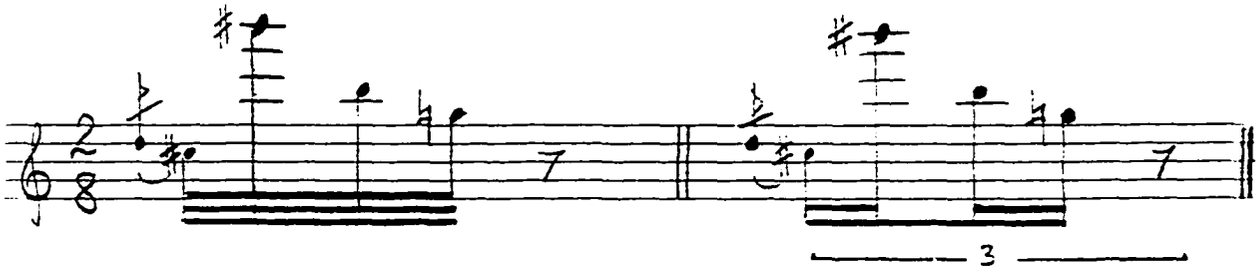
[32] Appendix A, lines 208-09.

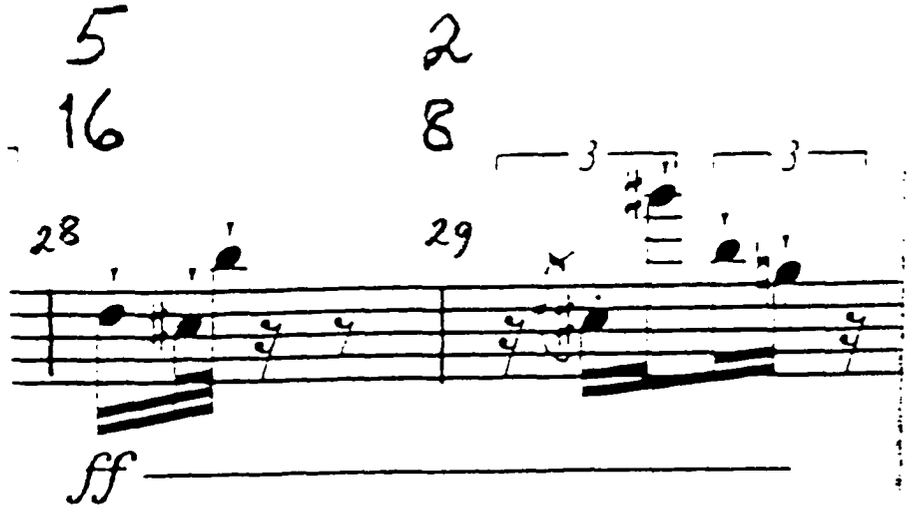
Example 2.3a - *Sequenza I.* 1958, p. 1/lines 4-5.



Example 2.3b-c - Two possible renotations of Example 2.3a.



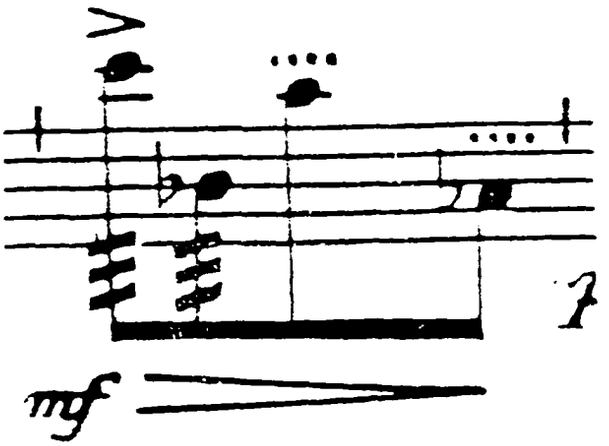
Example 2.3d - *Sequenza I.* 1992, mm. 28-29.



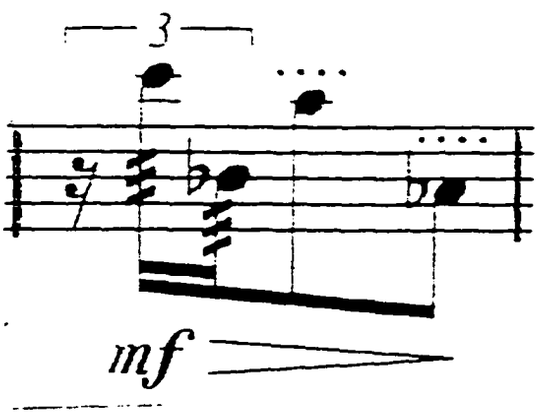
Berio does something similar in m. 30; this time, he converts a 2/8 unit into 3/8 by adding one-third of a sixteenth-note triplet as he did in the previous measure, then elongating the last note's duration to twice what it appears to be in 1958. Examples 2.4a-b present the two versions. In m. 31, the last of the system, Berio again adds a rest where clearly one does not exist notationally in 1958, to create a situation where silence is added (or, better, made more visually apparent) to two-thirds of a renotated unit. The last note of the sixteenth-note quintuplet, D, is tied over to the beginning of m. 32; in Examples 2.5a-b I compare the figures in mm. 31-32 in 1992 and their 1958 companion.

This passage also raises a graphic issue worth discussion, of how closely attacks fall near hashmarks in 1958, and whether these attacks turn into tied-over notes in 1992. Berio provides no clear answer to this issue in his 1992 treatment; compare, if you will, Examples 2.2, 2.3, and 2.5 for evidence of that. In Example 2.2 and the first unit of Example 2.3, attacks close to hashmarks are notated on the beat; in the second unit of Examples 2.3 and 2.5 they are either tied over or staggered. Let us say this, then: it would be reasonable to contend that, since in 1958 attacks never begin *directly* underneath the hashmarks that mark off units, that gives Berio the license to tie them over a metered bar in 1992. However, it would also be reasonable to contend that Berio's goal in 1992 is to notate what he had in mind in 1958, even if that might deviate from a literal renotation or trivialize the integrity of the code. Compare the first four systems in 1958 and 1992. The space between the hashmark and the first attack in the unit in 1958 is almost never transferred to include a rest in 1992. These kinds of graphic considerations bring us back to the issue of the notational code, and the question of whether it needs to retain the same degree of redundancy as it did before in order to preserve its

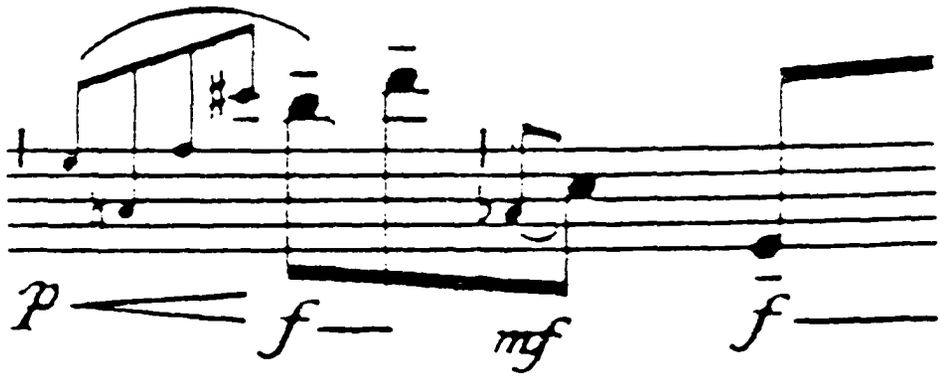
Example 2.4a - *Sequenza I*, 1958, p. 1/line 5.



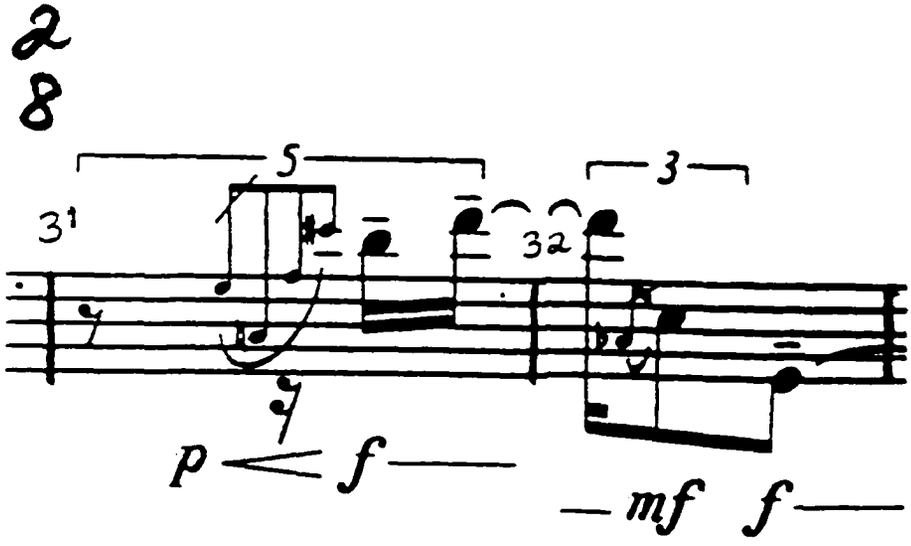
Example 2.4b - *Sequenza I*, 1992, m. 30.



Example 2.5a - *Sequenza I*, 1958, p. 1/line 5.



Example 2.5b - *Sequenza I*, 1992, mm. 31-32.

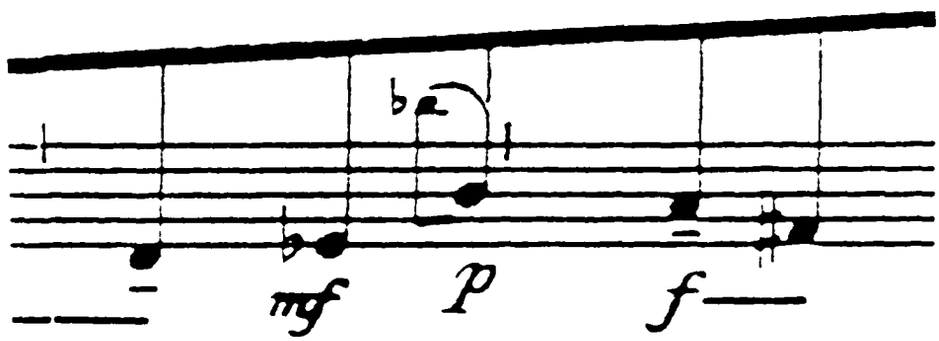


communicative validity.

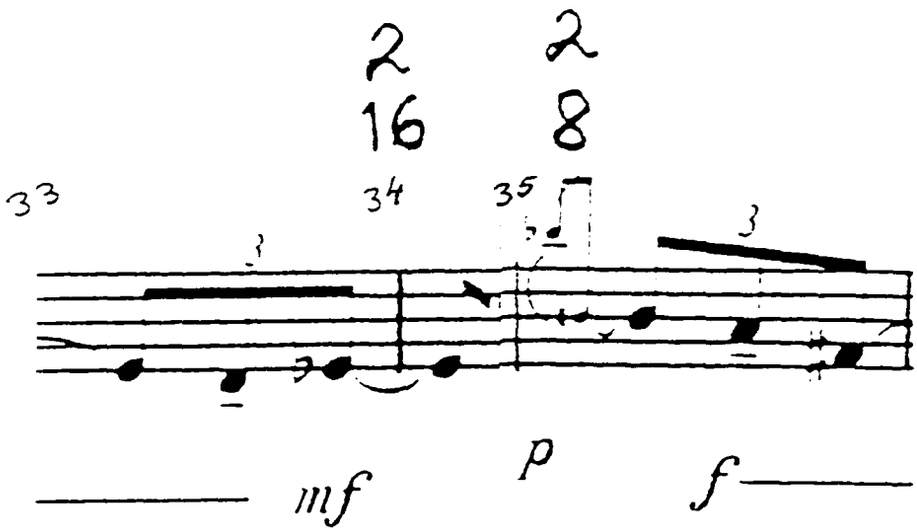
One of the things I find curious about what Berio does from mm. 28-31 is that this sequence does not represent a "normalizing" of 1958. Rather, Berio is reconfiguring the passage, playing within the limits of the new code he has set up to counteract the old one, setting up certain expected patterns (for example, the basic 2/8 unit) and then deviating from them in various precise gradations. Measure 35 contains the first instance in 1992 where attacks are placed in a different rhythmic grouping than they are in 1958. In Examples 2.6a-b I compare the two versions. In 1958 the B-flat grace note is followed by a B-natural that is tied over to the next unit. These two attacks come at the end of a unit that begins with the D and E-flat. In 1992, however, the E-flat is tied over to a subtractive unit (the 2/16 measure), and the B-flat and B-natural *both* appear as grace notes! Of course, the grace-note status of the B-natural is disputable, as it is tied over to the first third of the triplet. This enables Berio to maintain much of the integrity of the original continuity, but because of the 2/16 measure holding over the E-flat, the beat placement and emphasis is significantly adjusted. Why could Berio not, for example, have placed the B-flat grace/B-natural at the end of the same measure as the E/D/E-flat triplet? As in 1992, they could have both been employed as grace notes, an option I present in Example 2.7a. Or Berio could have shortened the duration of the last third of the triplet and written them as two sixty-fourths following a dotted sixteenth, as shown in Example 2.7b.

Although m. 35 *does* constitute a "rounding-off" or simplification of 1958, it is one achieved via a "syncopation" of the previous version in which meter is used to "stagger" a pre-established unit of durational measurement. A similar sensibility of rearrangement that is both simplified and more contextually layered occurs in mm. 46-47. Examples

Example 2.6a - *Sequenza I*, 1958, p. 1/line 5.

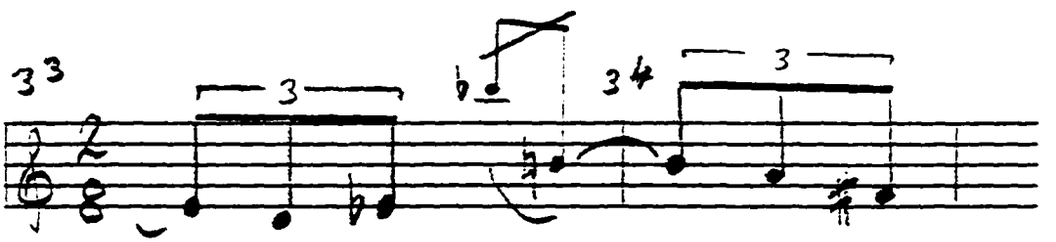


Example 2.6b - *Sequenza I*, 1992, mm. 33-35.

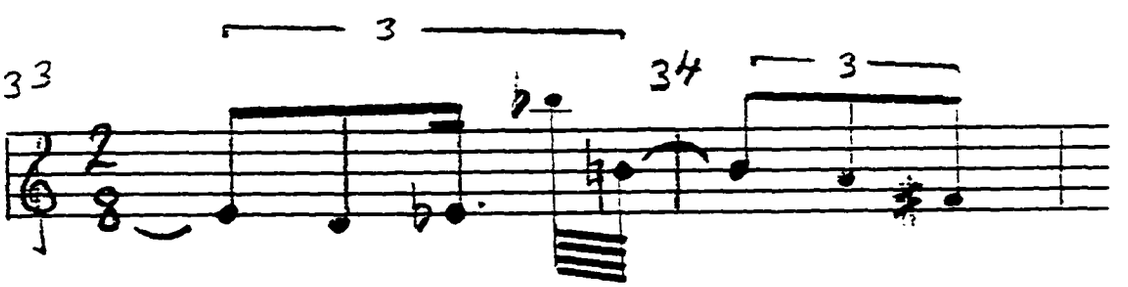


Examples 2.7a-b - Two possible renotations of Example 2.6a.

Example 2.7a



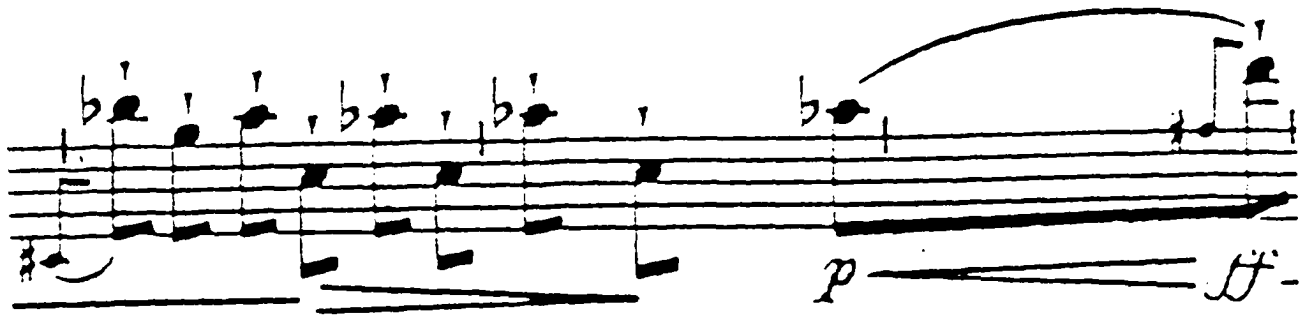
Example 2.7b



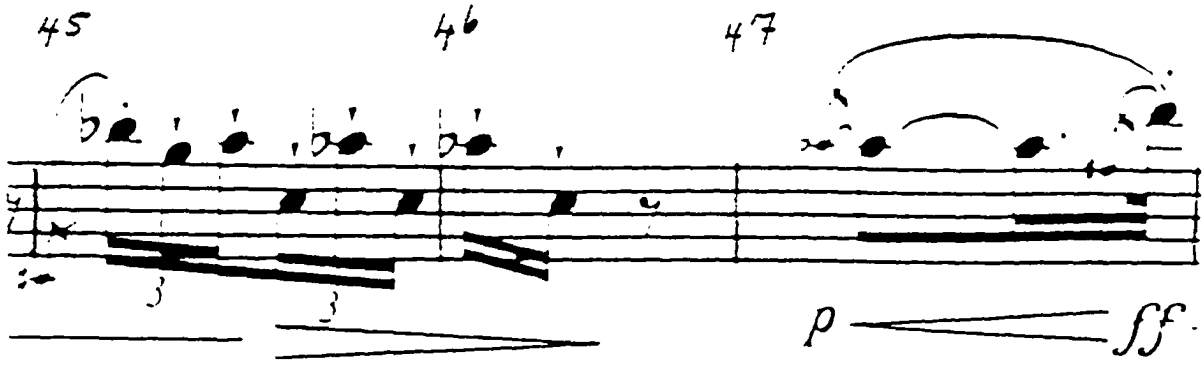
2.8a-b present a comparison of the two versions. Berio takes the A-flat, the last of a *sciolto* oscillation between A-flat and C-natural, and moves it from the end of one unit over to the beginning of the next -- clearly a "normalizing" move. Yet for each one of these moves, he constantly replenishes the supply of fresh ingredients which serve to overlay a different and more conventional kind of complexity. The A-flat appears on the downbeat of m. 47 as a grace note that is tied over and held until the last thirty-second of the bar.

The sequence from mm. 64-69, shown in Examples 2.9a-b, is illustrative as well. As in m. 47, Berio takes an attack that falls at the end of one unit in 1958 and nudges it over to the downbeat of a bar in 1992 -- namely, the sixteenth note G. The *sciolto* C-sharp of 1958, though, becomes a sustained dotted eighth that completes the 2/8 and pushes that wonderful seven-note flourish over to m. 65. Yet where there is no break in space whatsoever between the *sciolto* C-sharp and the beginning of the seven-note figuration in 1958, Berio adds an eighth-rest at the downbeat of 65. The passage falls back into line with the quintuplet in m. 66 but staggers once again in m. 67, where the C-sharp is moved from the middle of the unit to the downbeat. Berio uses a 2/16 bar in m. 69 to realign to 1958, then returns to the normative 2/8 in m. 70. The fact that Berio turns something that had been "grace notes in effect" into actual grace notes in 1992 is yet another example where something which was contextually ambiguous and free within a certain narrow band is now fixed in time and static. What distinguishes this seven-note grace from the other examples is that here is an instance where the *identity* of the gesture changes, both substantially and rhetorically. It is striking to see how a unique and multivalent code is broken down by a gesture being made *more* conventional.

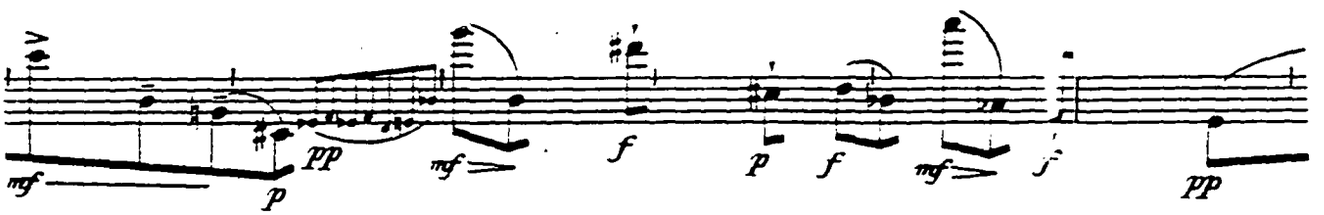
Example 2.8a - *Sequenza I*. 1958, p. 1/line 7.



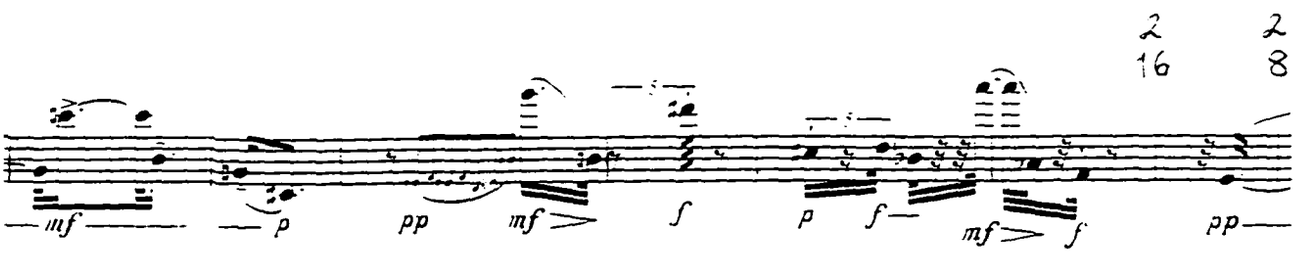
Example 2.8b - *Sequenza I*. 1992, mm. 45-47.



Example 2.9a - *Sequenza I.* 1958, p. 2/line 3.



Example 2.9b - *Sequenza I.* 1992, mm. 63-69.



While in 1958 this passage is characterized by an obscuring of focus as a byproduct of the tension between where attacks are plotted and where units are marked off, in 1992 this *sense* of obscuring becomes just that, a manufactured effect. It is as if Berio is producing one realization of 1958 and then fitting it to observe certain aspects of conventional discourse. Indeed, the *opera aperta* has become, as Berio put it, a theory of listening -- the composer has become an auditor to his own work. Is 1992, then, merely a "listening to" 1958, or perhaps a commentary on it?

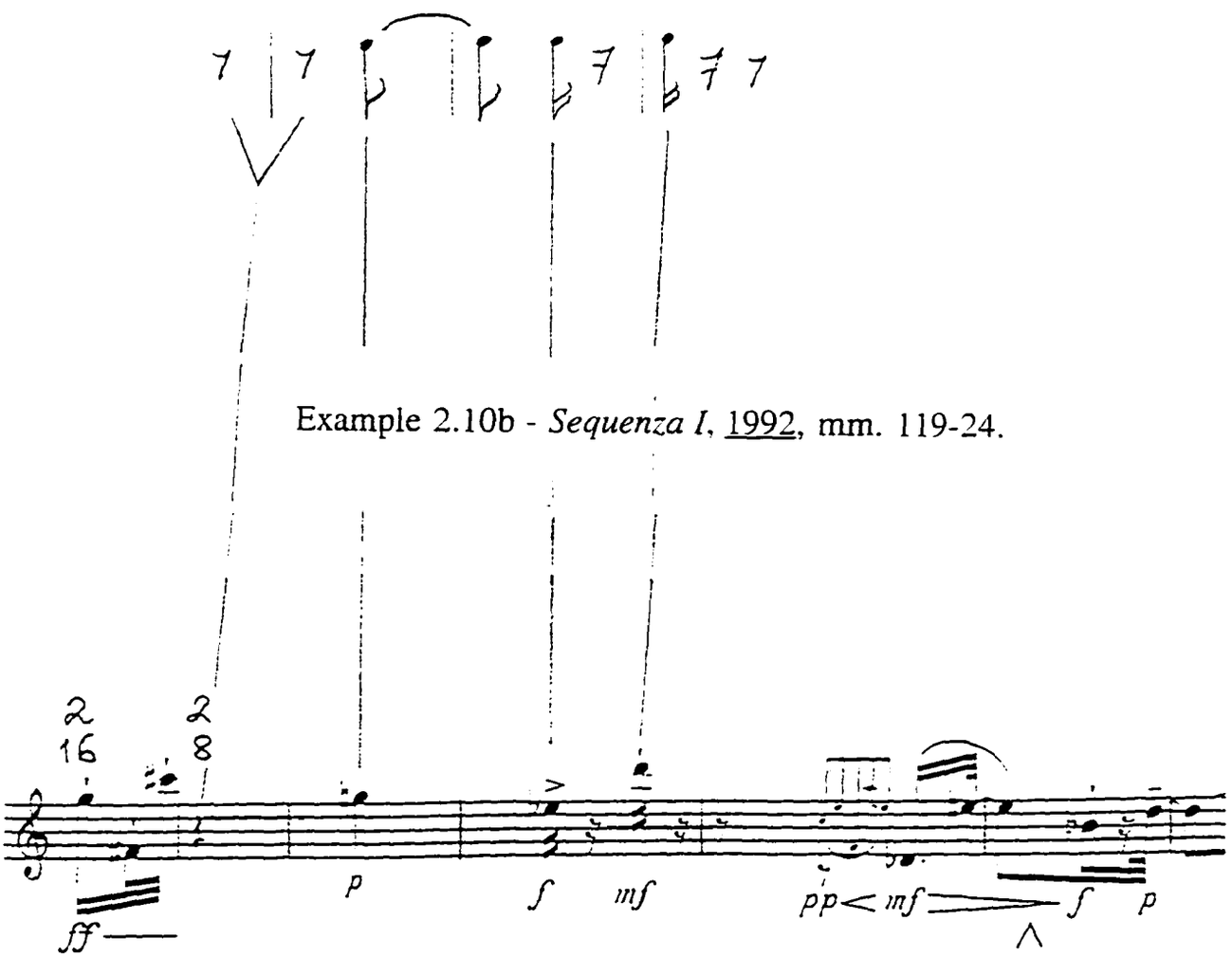
Such a sense of contrived syncopation is at work in Examples 2.10a-b, which show mm. 120-24. Here the staggering is quite clear: Berio takes an entire MM=70 unit and halves it into one of 2/16. Moving back to 2/8 in m. 120 produces a bar's quarter rest. So while the context of the units has not changed, here the play is with the unit markers themselves. Content is not staggered, but the container in which it comes is.[33] The connecting lines I have drawn between Examples 2.10a and 2.10b show, for example, that the quarter-rest in m. 120 adds up roughly to the same amount of proportional space as in 1958. The G that falls in the middle of the 1958 unit instead falls on the downbeat of m. 121. Not only does the concept of play within a predefined system apply to what is proportionally notated versus what is metrically notated but it also pertains to the durational skeleton itself. Though the passage moves back into line in m. 124, it engages in a micro-desertion again in m. 126 where the two grace notes in 1958 become two thirty-seconds on the downbeat of a 2/16 bar which moves to 3/16, in essence adding a sixteenth to the original unit.

These techniques, of both normalizing and staggering, and of adhering to a basic temporal grid that is subject to deviation, are continued

[33] A similar device is also used in mm. 143-45. Although the 2/16 bar of rest staggers the metrical framework, the content as well as its placement in the durational narrative is unchanged, at least to the point of verisimilitude.

Example 2.10a - *Sequenza I*, 1958, p. 3/line 2.

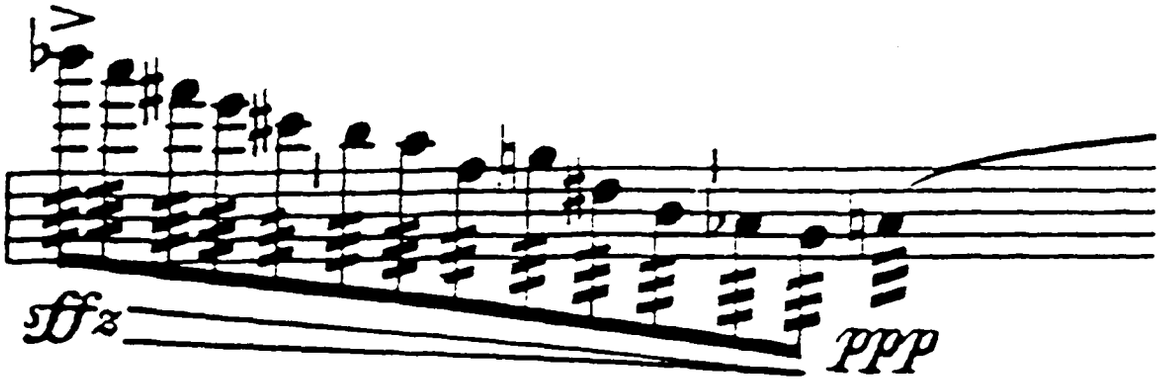
Example 2.10b - *Sequenza I*, 1992, mm. 119-24.



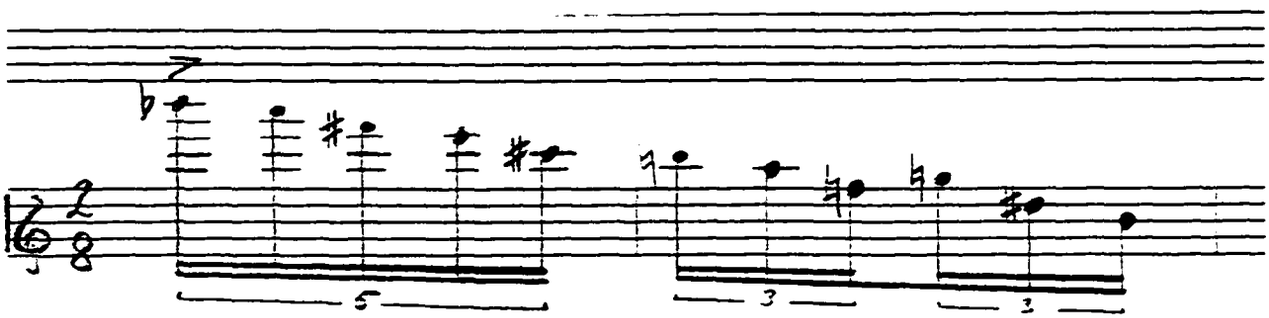
throughout the remainder of 1992. Berio adds a wrinkle to the device of regularization in mm. 152-53. Example 2.11a shows the same material in 1958. A descending flutter-tongued figure of thirteen attack-points is beamed as one large grouping over the span of three MM=70 units (or two units plus space left over). It is divided into units of five, six and two attacks respectively. One might have expected Berio to renotate this run in a manner such as is represented in Example 2.11b, as a quintuplet followed by two sixteenth-note triplets. However, that is not what Berio does. Two things immediately grab one's attention about the way this passage is "transposed to meter" in 1992: a) how much faster the new version starts than in the original, and b) how it suddenly slows down. As shown in Example 2.11c, m. 152 is faster than expected. It consists of eight attacks (two groups of four thirty-seconds), which means that three of them (B/A/F) are being pushed back in the time-continuum, over the bar. Measure 153 takes the last five attacks, adds the arrival point (A) to the grouping, and arranges them as two groups of triplet sixteenths. This is particularly interesting as the second unit of 1958 also has six attacks in it (although a partially different collection of six: notes 6-11 rather than 9-13 plus the arrival point). The middle six notes of 1958, however, are actually faster than the first five, whereas in 1992 the unit of six is slower than the first eight. As a result of the sped-up first measure of the run, a grouping that had previously taken three units' space is fit into two.

A similar example of manipulation in order to effect metrical normalization occurs in mm. 207-16. Example 2.12a shows the organization of the passage in 1958: four groups of evenly spaced and beamed units, a separation brought about by two *sciolto* attacks, and a unit much longer than the first yet similarly spaced and beamed. Example 2.12b shows the rearrangement of the same passage in 1992, starting on the

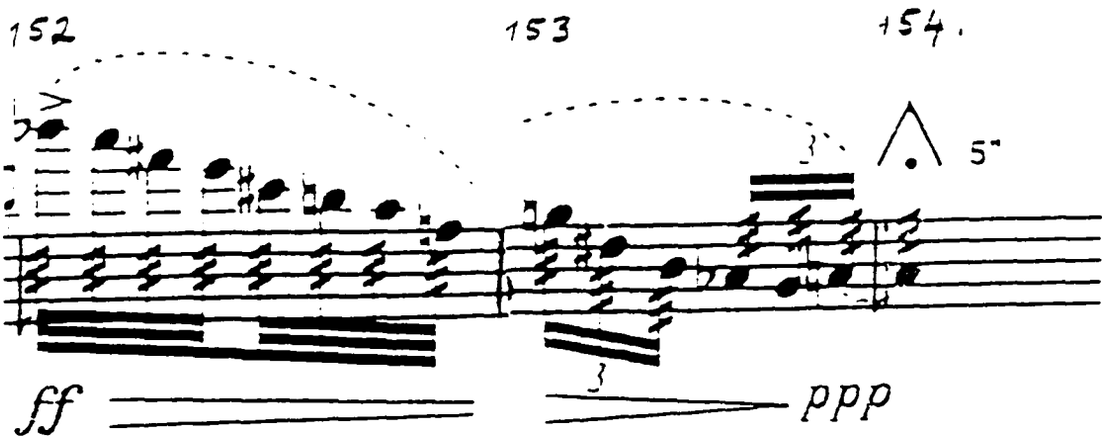
Example 2.11a - *Sequenza I*. 1958, p. 3/line 7.



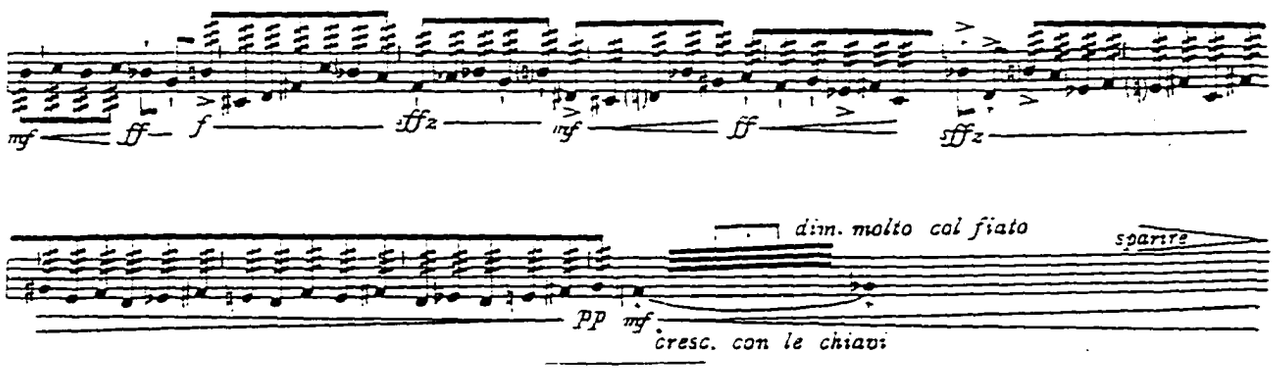
Example 2.11b - Possible renotation of Example 2.11a.



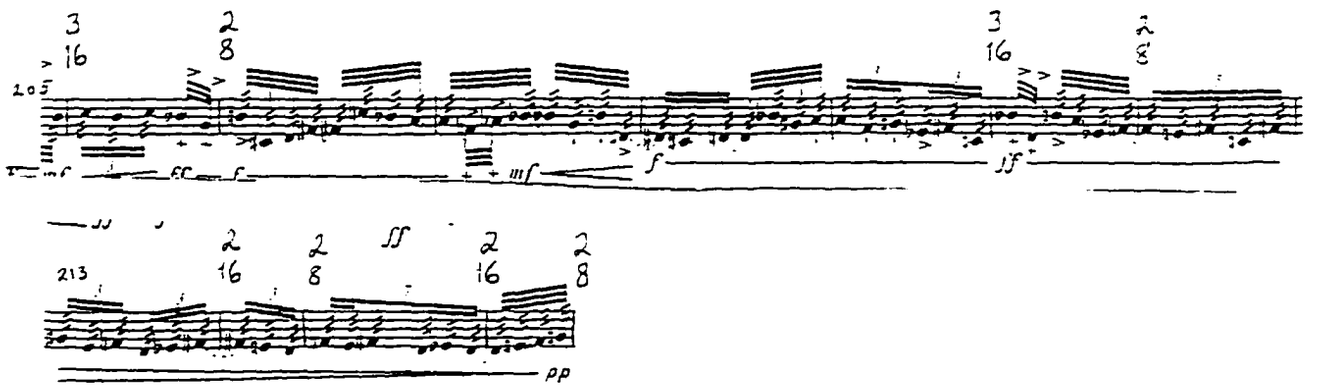
Example 2.11c - *Sequenza I*, 1992, mm. 152-54.



Example 2.12a - *Sequenza I*. 1958, p. 4/lines 6-7.



Example 2.12b - *Sequenza I*. 1992, mm. 205-16.



3/16 bar the measure before. An obvious issue that arises when turning a passage written in proportional notation into one in meter is the question of preserving the integrity of a rhythmic unit though it may create a new and sometimes undesirable level of complexity. Berio takes an obvious route, solving the problem by cutting off a prospective 2/8 bar and pushing the B-natural that starts the first flutter-tongued unit over to the beginning of the next measure, thereby creating a 3/16 bar. That B-natural is at the end of the unit in 1958; in proportional notation such complexity communicates a certain dynamic to a player which is more of an "incentive" to engender polyrhythmic relationships than something strict which needs to be written down and rendered exactly. When attempting to notate the same passage in meter, however, one runs into severe challenges which, even when worked out rationally, inevitably lead to the "straitjacket" Berio sought to eschew.

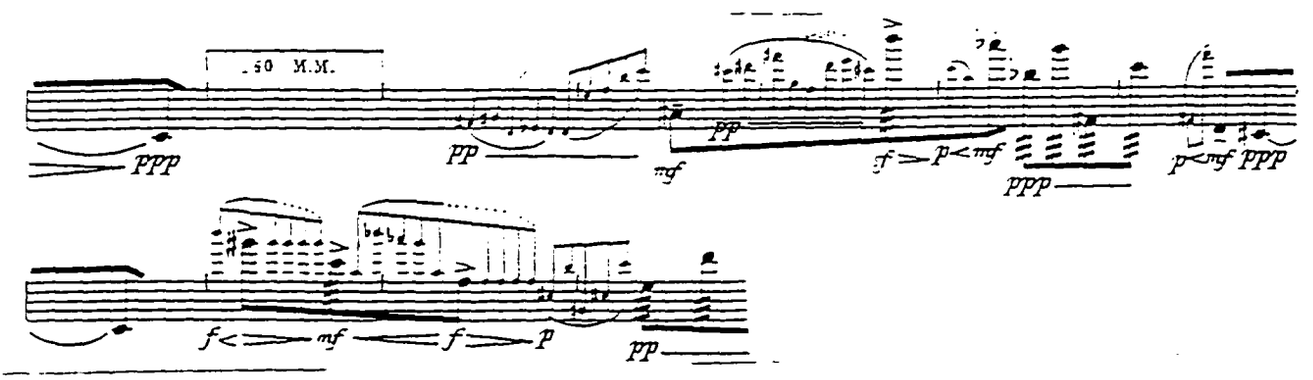
In mm. 207-16 Berio again seeks to regularize a passage that gives the *impression* of evenness in 1958 though a closer look reveals a non-uniform number of attacks per unit: six (plus the first note at the end of the previous unit), six, five, five, four, four, six, five, and five respectively. Not only is he trying to situate them within an overall 2/8 metrical context, but he needs as well to adjust what Nauert calls the "beat hierarchy," so that the transfer of this music to a conventional strong/weak continuum is also operating properly. To achieve this, Berio constantly ties notes over the bar to an extent that is new in the re-notation; in fact, it very much works within the spirit of the original version. In one of the rare cases, it may even work better in 1992. At certain points Berio feels the need to slightly distort certain figures from 1958. At the end of m. 210, for example, there is no space between the flutter-tongued C-natural and the *sciolto* B-flat although there is rather a large amount in 1958 (over 1/4 in. compared with the average of 1/8 in. between beamed attacks). One

wonders why Berio needed to re-notate the passage this way, because it necessitates a disruption of the original flow. He could just as well preserved the 2/8 chain and added a sixteenth-triplet rest at the beginning of m. 211. Doing this would have communicated a sense of space, separation and difference between flutter-tongued and *sciolto* groupings, and it also would have raised the stakes of the device of tying items over that Berio had made such a characteristic of this passage's re-notation. In this instance, what would be tied over is silence.

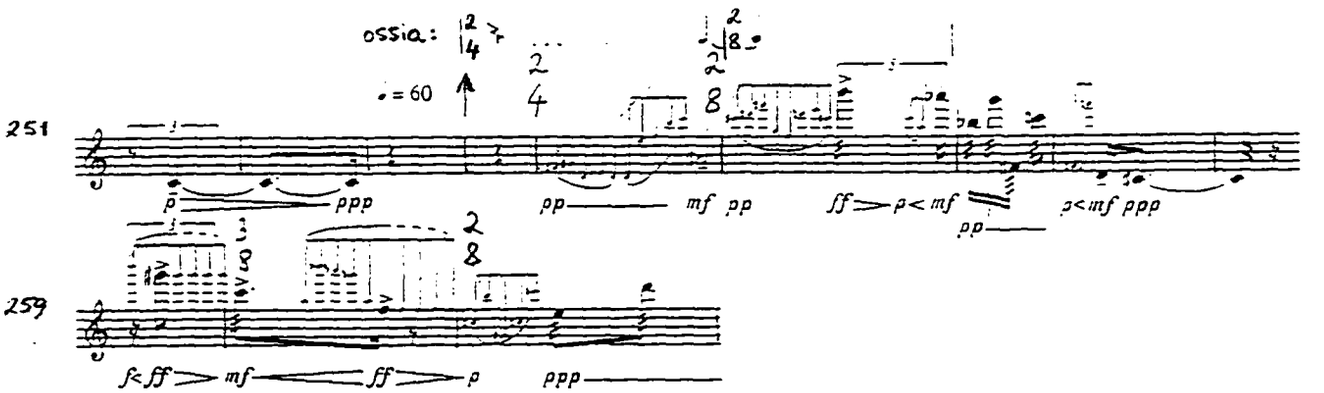
Measures 214-16 can be regarded as an approach (a kind of metrical cadential preparation) to the arrival on F-natural in m. 217, and once again Berio strays out of line. In 1958 the final flutter-tongued attack, G-natural, lags over to the start of another unit, something that would obviously not communicate a hierarchical beat structure with much clarity. What Berio does is to re-arrange mm. 214-16 so that they essentially work out to two measures of 2/8, the first of which is cut in half and presented at the outer ends: 2/16, 2/8, 2/16. The middle measure becomes a septuplet: instead of being tied over the bar, as one would predict given Berio's notational behavior in this local context, the F-natural tie is *simulated.* Instead, it is elongated and subsumed *within* the septuplet. Berio is thus able to enhance a low-level sense of rhythmic coherence, by keeping up for one more unit a pattern of triplet sixteenths that was begun in the previous measure.

At the close of 1992, we find Berio proceeding with more and more "normalizations," realigning a number of passages that are staggered and rhythmically ambiguous in 1958. These normalizations become progressively monolithic in their service of having accented attacks fall on downbeats. I cite specifically mm. 233-34, 243-47, and 255-61. Measures 255-61 are shown in Examples 2.13a-b. This passage is particularly

Example 2.13a - *Sequenza I*, 1958, p. 5/lines 6-7.



Example 2.13b - *Sequenza I*, 1992, mm. 251-61.



informative because it constitutes a re-contextualization of 1958; for the first time in *Sequenza I* the metronomic marking unit changes, from MM=70 to 60. Berio tacks on a measure of quarter-rest (in m. 254), and notates the A-sharp as a half-note downbeat (which it was not before) preceded by a breathtaking deca-attack grace flourish. The *ossia* part in Example 2.13b offers another means of understanding mm. 255-56, this time notated as two measures of 2/4. In the *ossia* the A-sharp actually appears on the weak beat, the way it seemed to look given the busy grace-note figuration. In this way, too, the tacked-on measure of rest does not *feel* like an extra measure compared to 1958. As with mm. 120-24, the content has not changed, but it is now presented in a radically different "dress" (to borrow Berio's term). The multi-grace figurations which extend over unit boundaries in 1958 are placed either on downbeats or, in the case of mm. 259-60, on rational attack-points such as the fourth sixteenth-beat in m. 260. Berio also adds durational space near the very end of 1992: the 2/8 bar of silence at m. 267 does not exist in 1958. Theoretically there could have been a rest in the original, but Berio uses very similar spacing on the page in both 1958 and 1992. This leads one to suspect that the added space for the rest is truly new.

Conclusion

Earlier I raised the question of whether 1992 represented Berio's "listening to" 1958, or if it could be viewed as a commentary on it. Both these enterprises are by their very nature "reactionary," of course. By now, it should not be a surprise to anyone if I make known my preference of the earlier version of *Sequenza I*. Such a judgment is not based on the conceit that a performance of 1992 will be utterly and radically different from one of the original. Having heard both versions several times, based

on sheer aural/visceral reaction I find them both highly beautiful and exciting. My concerns with 1992 are grounded in other values, and those have to do with what I see as the connection between Berio's notational decision-making process and his compositional identity. The nature of his recent notational project can be characterized as fundamentally derivative, one of distillation, manufactured effect, conventional sigla, and a growing need for control which manifests itself in a standard, accepted relationship between the composer and the performer. These developments in his notation mirror the changes his music and thought has undergone since the late 1960s.

It is quite telling that Berio did not revert to the complexity of the pre-1958 version in its entirety when he sat down to undertake the renotation. After all, contemporary music performance practice has grown dramatically since 1958, in no small part because of works such as the original *Sequenza I.* Presumably, many of the things Severino Gazzelloni could not handle then are now considered *de rigeur.* The fact that today Berio's instinct is to simplify as much as possible represents to me a sort of "surrender" to both the prejudices of the performer and to the safety of accepted discourse. I choose to employ the rather incendiary term "surrender" because I imagine the rationale for the kind of notational behavior Berio is exhibiting. One may well argue that, even if the composer notates something proportionally, performers will makes these changes anyway. I believe that this mindset fails to factor in a dynamic of tension and negotiation that comes from a performer dealing with the challenge offered by the composer. As we shall see with the music of Brian Ferneyhough, a composer may choose to notate a piece in a more complex and less conventional manner even if he/she knows that the level of precision in the performer's realization will not be the same. One is

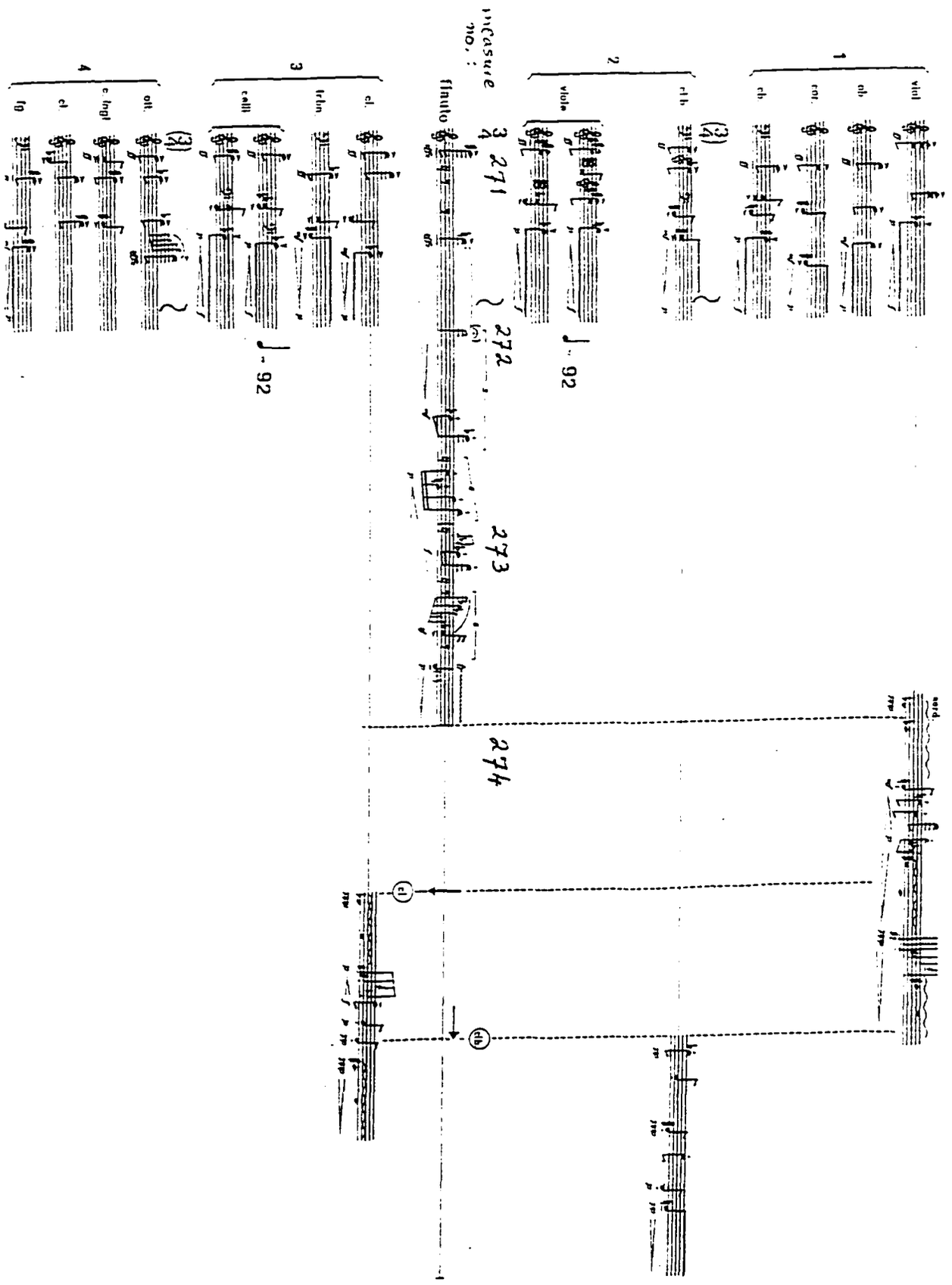
willing to sacrifice some precision in exchange for a richness of meanings and multiplicity of surface. This dynamic, found in notations such as 1958, becomes another, tacit level of the musical surface and simply will not occur when one uses conventional notation.

What drives Berio's change, instead, is the desire for a controlled and fixed result. Even the language he uses (not always the most dependable harbinger of a composer's intentions) has changed drastically and illustrates his motives. Compare his wish for reliability, "less open and more authoritative" expressed to Rosanna Dalmonte in the early 1980s with this remark I quoted before, from the era of *opera aperta* in 1960: "we cannot consider today's music...a closed system, precise and comfortable."[34] The very terminology Berio throws around has shifted from the language of multiplicity to that of control.

It is not by coincidence that one of Berio's great enthusiasms since *Sinfonia* (1968) has been the work which employs pre-existent material -- the "quote piece." This tendency is epitomized in one of the most successful of his recent pieces, the orchestral work *Rendering* (1988-89), a fresco-style "filling-in" of Schubert's *Unfinished Symphony*. This "anti-progressiveness" is diametrically opposed to Berio's music of the late 50s and early 60s, around the period of *Sequenza I*. Works such as the aforementioned *Circles* and *Tempi concertati* were of a progressive nature which invariantly found its way into notational considerations. In the case of *Tempi concertati*, I speak of a mixture of metered and non-metered time in the same temporal continuum, as shown in Example 2.14 where the solo flute part (in metered notation) is set in relief against the rest of the

[34] That Berio was unhappy with what performers were doing with the original version suggests that even he may not have fully understood the ramifications of his "compromise" that gave rise to proportional notation, but his remarks from 1960 plainly show this is (or was previously) not the case.

Example 2.14 - Berio, *Tempi concertati*, mm. 271-74.



ensemble (in proportional notation). Berio told me that the notational problem that needed to be solved in *Tempi concertati* was

> ...to overcome any feeling of a rhythmical situation, to "go over rhythm" in a kind of freer situation, a more flexible, more...fluid situation, so that it cannot be brought down to any formal regularity of meter, and so on. The regularity may be in the larger phrases, but inside, you overcome the feeling and the notion of rhythm.[35]

Not only were Berio's works from this period progressive by nature (speaking in terms of their language and aesthetic outlook), but they also represented a progression in the sense that each work invented a system to solve a new and different sort of notational problem or addressed a certain issue. By contrast, his music today seems to drift towards the same elements of rhetoric and artifice that in 1958 were things to be "overcome," to be "gone over" and "made freer." This stasis and lack of logical progression or sense of discovery and play in Berio's recent notational techniques is matched by a lack of progression in his music as a whole. If, as Berio told me, "there are no implicit codes," then he certainly is not taking it upon himself to invent them any more.

[35]Appendix A, lines 285-93.

III. John Cage: "...the whole paper would potentially be sound": Time-Brackets and the Number Pieces (1981-92)

> You see, I don't hear music when I write it. I write in order to hear something I haven't yet heard. My writing is almost characterized by having something unusual in the notation. The notation is about something that is not familiar. (John Cage, 1983)[1]

> I began doing graphic notations, and these graphic notations led other people to invite me to make graphic works apart from music. And those led me in turn to make musical scores that were even more graphic. (John Cage, 1984)[2]

Introduction

Among twentieth-century composers, few have spent more time thinking and writing about notation than John Cage. Besides organizing the volume *Notations*, a collection of manuscripts by two hundred and sixty-nine composers interspersed with their thoughts about notation, Cage also contributed an introduction to a catalog for the exhibition *Sound on Paper: Music Notation in Japan.*[3] On this occasion Cage defined notation as a process by which the composer sends a "letter" to the musician, each letter describing the production of the sounds to be created and their sequence. To Cage, this process is characterized by an latent inadequacy and lack of clarity in communication; the score/letter "stands between" the performer and the music to be performed.[4] This source of this disability, which the noted French Cage scholar Daniel Charles has referred to a "screen," is traced by Cage to an essential difference between the nature of paper and that of sound.[5]

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[1] John Cage, interview with Joel Eric Suben (1983), in *Conversing With Cage*, ed. Richard Kostelanez (New York: Limelight Editions, 1987), 63.

[2] John Cage, interview with Ev Grimes (1984), in *Conversing With Cage*, ed. Richard Kostelanez (New York: Limelight Editions, 1987), 184.

[3] John Cage and Alison Knowles, *Notations* (New York: Something Else Press, 1969); John Cage, *Sound on Paper: Musical Notation in Japan* (New York: Japan House Gallery, 1981), introduction to the catalog of the exhibition, 6-8.

[4] Cage, *Sound on Paper*, 6.

[5] Daniel Charles, "Figuration and Prefiguration: Notes on Some New Graphic Notions," Catalogue of the *Video Independents* Exhibition (Geneva: Swiss Independent Video, 1991). Reprinted in *Writings about John Cage*, ed. Richard Kostelanez (Ann Arbor: University of Michigan Press, 1993), 248-63.

Paper has only two dimensions while sound has many. In his *Sound on Paper* essay, Cage lists at least six dimensions embodied in a sound and its conventionally recognized notational response: *pitch/frequency* (notated in relation to verticality), *duration* (notated in regard to horizontality), *loudness/amplitude* (notated with special signs near the affected pitches), *timbre/overtone structure* (also with special signs or words), *position in space of sound-source* (leading "letters" to be frequently prefaced by maps determining the place from where a player produces sound), and *morphology/changes in course of the nature of a sound* (again, necessitating special signs or words). Cage envisions technology creating new dimensions of sound that a prospective notation would have to take into account. Given the complexity of sound production and the clear inadequacy of the conventional notational media to communicate it effectively to an executor, "the composer's letter writing nowadays therefore gets off to a bad start."[6] Cage does not propose new solutions in his *Sound on Paper* essay; he merely describes (in an uncharacteristically neutral way) approaches taken by contemporary Japanese composers. However, this essay coincides roughly with a change in Cage's work, one in which he was addressing these very concerns anew and forging a kind of "reconstruction" of clarity with respects to notational communication between the composer and the performer.[7] By the time Cage delivered the

[6] Cage, *Sound on Paper*, 6.

[7] I borrow the term "reconstruction" from Suzi Gablik's *The Reenchantment of Art* (London and New York: Thames and Hudson, 1991). Gablik, an artist, critic, and theoretician, coined the term "reconstructive postmodernism" as the polar opposite to what she views as the currently dominant "deconstructive postmodernism." To Gablik, reconstructive postmodern practice makes "the transition from Eurocentric, patriarchal thinking and the "dominator" model of culture toward an aesthetics of interconnectedness, social responsibility and ecological attunement" (*The Reenchantment of Art*, 22). I cite Gablik by way of Laura D. Kuhn's excellent Ph.D. dissertation, "John Cage's *Europeras 1 & 2*: The Musical Means of Revolution" (University of California at Los Angeles, 1992). Kuhn relates Cage's work to Gablik's "reconstructive" model.

Norton Lectures in Music at Harvard University in 1988, notation was one of fifteen core compositional issues:

> Turning the paper into a space of time, imperfections in the paper upon which the music is written. The music is there before it is written. Composition is only making it clear that that is the case. Finding out a simple relation between paper and music, how to read it independently of one's thoughts.[8]

In this chapter I shall discuss Cage's notational thinking in the works of his final period (1981-92). Specifically, I will trace the development of Cage's "time-bracket" technique from *Thirty Pieces for Five Orchestras* (1981), through the *Music for...* series (1984-87), to what have come to be known as the "number pieces" (1987-92). I shall endeavor to show that for Cage, this late period was characterized by a sense of reconciliation with certain afore-scorned elements of musical expression, most notably harmony and the very notion of vertical relationships. Purely notational considerations produced harmonic situations that Cage could accept, a flexible, "anarchic harmony" that is also highly determinate and "coherent."

Cage's notational mindset

In Chapter 1 attention was devoted to Cage's notational innovations of the 1950s and 60s, and in this chapter I will focus on works from his last creative phase (1981-92). To understand Cage's mindset, however, it is also important to recognize ideas that Cage appropriated from non-musical sources. Studying Cage's work in other disciplines, such as his artwork (especially in his printmaking) and his poetry, is revealing because he was such a great believer in extending ideas and practices from one discipline into another.

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[8] John Cage, *I - VI* (Cambridge and London: Harvard University Press, 1990), 429.

For Cage, openly appropriating the work of those who influenced him was a way of defining himself as an artist. Whether it was the work of other composers such as Erik Satie, painters such as Marcel Duchamp, Jasper Johns, and Robert Rauschenberg, engineer/theorists such as Buckminster Fuller, or men of letters such as Henry David Thoreau, James Joyce, and Marshall McLuhan, Cage did not try to hide his influences or hesitate to borrow from them. In fact, many times his borrowing was conscious to the point of advertisement; he would often "write through" another author's work via use of his mesostics (texts structured along a string of capital letters running down their middle), or would subject another composer's completed work or general techniques to chance operations.[9] Cage's ideas about time were very much influenced by decades of musical experience, by his study of Zen Buddhism, and also by his relationship with the work of his friend, the Canadian media and technology critic Marshall McLuhan (1911-1980). These ideas are reflected in Cage's attitude towards notation, especially in the "number pieces" from his final period.

One of McLuhan's central works, *Understanding Media*, contains a chapter titled "Clocks - The Scent of Time," a critique of the way the West views time.[10] In this critique lies the core of Cage's notational rationale. McLuhan believes that great cultural changes were able to occur in the West in medieval times when a way was found to fix time as something that happened between two points, rather than measuring it by previous unique and culturally decentralized methods such as gradations of incense and

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[9] Jann Pasler discusses Cage's artistic relationships with those who influenced him in "Inventing a Tradition: Cage's *Composition in Retrospect*," in *John Cage: Composed in America*, ed. Marjorie Perloff and Charles Junkerman (Chicago and London: University of Chicago Press, 1994), 125-43.

[10] Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: New American Library, 1964), 145-56.

seasonal rhythms.[11] Therefore, he sees our Western feeling for time as duration originating from this division into visualizable, abstract, and uniform units, as does our impatience when we cannot endure the delay between events. To McLuhan, this particular sense of impatience, or of time as duration, would be unthinkable among non-literate cultures. Just as the fundamental concept of work arises out of the division of labor, the fundamental concept of duration arises out of the division of time, and especially those subdivisions by which the mechanical clock imposes a uniform succession on the time-sense.

According to McLuhan, time measured not by the uniqueness of private experience but by abstract uniform units gradually pervades all sense-life, much as does the technology of writing and printing (the subject of another of his best-known works, *The Gutenberg Galaxy*). The mechanical clock is another instrument that creates the image of a numerically quantified and mechanically powered universe. McLuhan contrasts this view of ours with that of the Hopi Indians, quoting Edward T. Hall's *The Silent Language*:[12]

> Time for them is not a uniform succession or duration, but a pluralism of many kinds of things co-existing. "It is what happens when the corn matures or a sheep grows up...it is the natural process that takes place while living substance acts out its life drama." Therefore, as many kinds of time exist for them as there are kinds of life. This, also, is the kind of time-sense held by the modern physicist and scientist. They no longer try to contain events in time, but think of each thing as making its own time and its own space. Moreover, now that we live electrically in an instantaneous world, space and time interpenetrate each other totally in a space-time world.[13]

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[11] McLuhan likens this development to the revolution that he believes happened in mathematics when positional, tandem numbers were discovered, e.g. 302 instead of 32, etc.

[12] Edward T. Hall, *The Silent Language* (Garden City, New York: Doubleday, 1959).

[13] McLuhan, *Understanding Media*, 147-48.

We know that this passage was important to Cage, because he quoted it in his lecture/performance *Time (Three Autokus)* (1988).[14] I do not mean to assert here that McLuhan alone is the sole influence on Cage's time-sense, and on the way it manifests itself in his notational thinking. Far from it--in the same lecture, Cage also refers to the obvious influence that Zen Buddhism had on his view of time:

> Neither space nor time is substantially anything, but everything else in the world needs both of them. You could say space and time are the no things in between the things that are three-dimensional things...or you could say there is no time exterior to any one of us. Each of us has his own time.[15]

However, McLuhan's critique is useful and resonant because it goes straight to the heart of Cage's mindset, furnishing an immediate sense of coherence. Cage's notation is part of his compositional identity, more so than perhaps any other composer. There is no difference in Cage's music between a compositional device and the way it is expressed in a notational system. They are not exclusive; they are one and the same construct. Cage does not attempt to represent an outcome whose transmission the notation facilitates; instead he presents the materials for a *potential* situation, one where certain events may or may not occur and the overall outcome is unforeseen. He wishes to engender a "pluralism of many kinds of things co-existing," where "as many kinds of time exist for them as there are kinds of life." Therefore, the notation, as Cage points out, has to be "about something that is not familiar," something where the concept of uniform succession or duration is inoperable. He felt the need to invent notational systems which *in themselves* made no attempt to "try to contain events in time," but which let each thing make "its own time and its own space." The notational system, a vital composition in itself, sets the parameters.

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[14] John Cage, *Time (Three Autokus)*, in *Musik-Konzepte Sonderband John Cage II*, ed. Heinz-Klaus Metzger and Rainer Riehn (Munich: Edition Text und Kritik, 1990), 264-304. Reprinted in *John Cage: Writer*, ed. Richard Kostelanez (New York: Limelight Editions, 1993), 219-225.

This idea was virtually a constant in Cage's notation from the 1950s onward. What made his works of the 1980s and early '90s such a departure was that, ironically, to complete his revolt from musical time, Cage made use of the main instrument of temporal subjugation--McLuhan's villain, the clock.

Not only Cage's favorite notational device over the last decade of his work and life, but also his compositional/theoretical tool of choice--and the principal focus of this chapter--was what he called the "time-bracket." In a "time-bracket" work a piece, a group of pitches, or (most characteristic of the very last works) a single sound is contained inside a period of time, known as a time-bracket and represented by two sets of two real-time durations, each separated by a two-way horizontal arrow. Example 3.1 presents a generic time-bracket, from Cage's *Five* (1988). A time-bracket has the visual layout of a mini-system, containing a fragment of a staff on which pitches are notated as whole notes, though they do not bear such durational implications. The dark, two-way arrows are on the left and right-hand sides above the staff, in this case above a G#. The two sets of durations are 0'00" / 0'45" (on the left), and 0'30"/ 1'15" (on the right), meaning that the music can begin anywhere from zero to forty-five seconds after the starting point, and must end at any time after thirty to seventy-five seconds have elapsed. The exact placement and duration of the music is free within these limitations. Consequently there is a period in which both of the previously mentioned time-spans overlap (and in which, therefore, a system can begin or end). And there is also a period in which the end of a system and the start of the next overlap.

There is no "score" per se in a time-bracket work, no overarching vertical lineup. There are no intentional, hidden "coherences" that reveal

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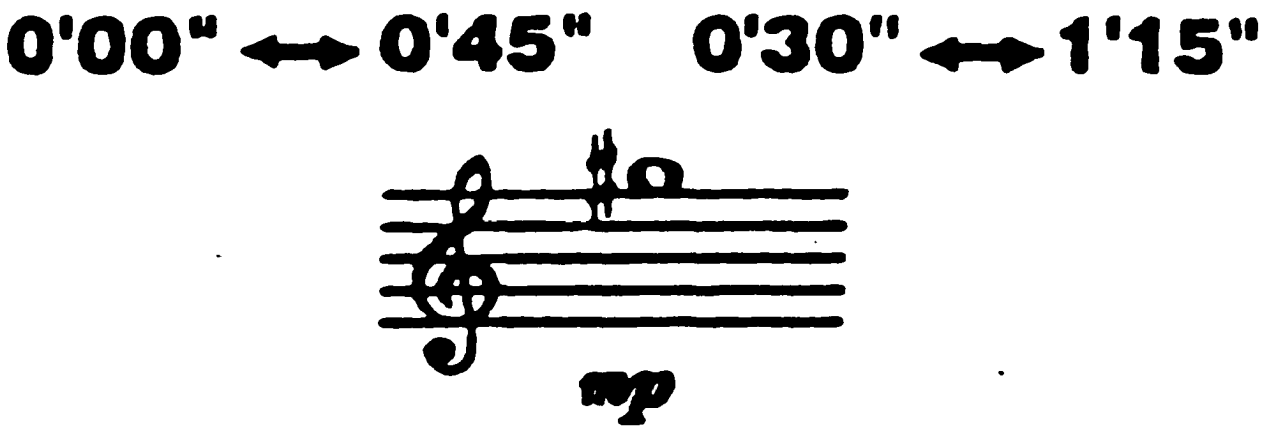
[15] Ibid., 265.

Example 3.1 - *Five*, player 1 part, first time-bracket, p. 1.



themselves in score-like importance once the work is realized. There are only individual parts, even in the case of the largest orchestral works composed in this technique such as *108* (1991). Some time-bracket works do not have uniform brackets distributed for all the players. In the case of a work for several performers, large digital displays for their reference may be employed onstage.

Cage's early time-bracket works: from Thirty Pieces for Five Orchestras (1981) to Thirty Pieces for String Quartet (1983)

The first of the time-bracket series is *Thirty Pieces for Five Orchestras* (1981).[16] This piece and its notation has its origins in Cage's work in the visual arts. Cage began a career in printmaking (etchings and monotypes) in 1978, working at Crown Point Press in Oakland, California. There he executed a series of thirty-six etchings, *On the Surface* (1980-82), bearing a direct relation to *Thirty Pieces for Five Orchestras*. In *On the Surface* Cage uses sixty-four plates of scrap copper (refuse plates just lying around the printmaking studio) which are cut according to chance operations; for each of the thirty-six etchings he used the *I Ching* to determine how many and which of the sixty-four plates would be used, and where and at what angle they would be placed. There is an imaginary horizon line in each print; it lies at the top of the page in the first etching, and moves down gradually to the golden mean point by the last. No plates were allowed to extend above this horizon. If, by its random placement, a plate would extend above the horizon, that plate was

[16] Cage's first-ever use of structures resembling time-brackets was in the now-lost score to the famed 1952 Happening at Black Mountain College in North Carolina. Cage coordinated activities by himself (lecturing), Merce Cunningham (moving with other dancers through and around the audience), David Tudor (playing piano), Robert Rauschenberg (playing a phonograph), and the poets M.C. Richards and Charles Olson (reading) by the use of these proto-time-brackets. All could not perform their activities when they wished, but had a particular span of time within which they could do so. Cage's *45' For A Speaker* (1954) also makes use of time-spans within which certain amounts of text must be spoken.

cut at the point, thus creating more and smaller plates. No images were engraved on the plates at all, but any random scratches that happened to occur during the printmaking process were accepted. As is apparent from Example 3.2, an etching from *On the Surface*, what results from this process is a kind of invisible tracing that almost realizes what Freud mused over in his speculative essay "A Note upon the Mystic Writing-Pad."[17] Only the pale outlines of the plates show up in the prints, layered one on top of the other, along with the tiny scratches and imperfections.

As Cage points out in the second of the introductory quotes for this chapter, the method of making artworks is then transferred to invent a new compositional process in the case of *Thirty Pieces for Five Orchestras*. A piece of cardboard the size of one score page was cut up at random, producing a large number of unique templates, much like the copper plates of *On the Surface*. Holes were then punched at chance-determined locations in these templates. A different set of templates was made for each of the five independent orchestral groups; in other words, Cage used five different and separate score-sized pieces of cardboard. For each of the thirty pieces, the *I Ching* was used, as it was in the etchings, to determine which of these templates would be used and in what positions. The notes of the piece were then inscribed through the holes of the templates. Cage does not use a "horizon" line as in *On the Surface*, but produces a similar effect by distinguishing between those templates that lay wholly within the space

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[17] I am referring here to Sigmund Freud, "Notiz über den 'Wunderblock,'" *Internationale Zeitschrift für Psychoanalyse* 11/1 (1925): 1-5; translated by James Strachey as "A Note upon the Mystic Writing Pad," *International Journal for Psychoananlysis* 21/4 (1940): 469-74. The "mystic writing-pad" was actually a product in Freud's time. It consisted of a slab of dark brown resin or wax over which was laid a thin transparent sheet, itself consisting of two layers which could be detached from one another. The upper of these layers was a transparent piece of celluloid on which the writing was done, and the lower was made of thin translucent waxed paper. When the covering-sheet was detached from the wax slab, all writing was destroyed but the grooves were visible as dark writing on the otherwise smooth whitish-gray surface of the celluloid. Freud uses this device as a metaphor to engage in a discussion of how the human memory works.

Example 3.2 - *On the Surface #3*, 1980-82. One of 36 related etchings with accidental marks printed in color from shaped plates on Farnsworth handmade paper. 18" x 24". Courtesy Crown Point Press, Oakland.

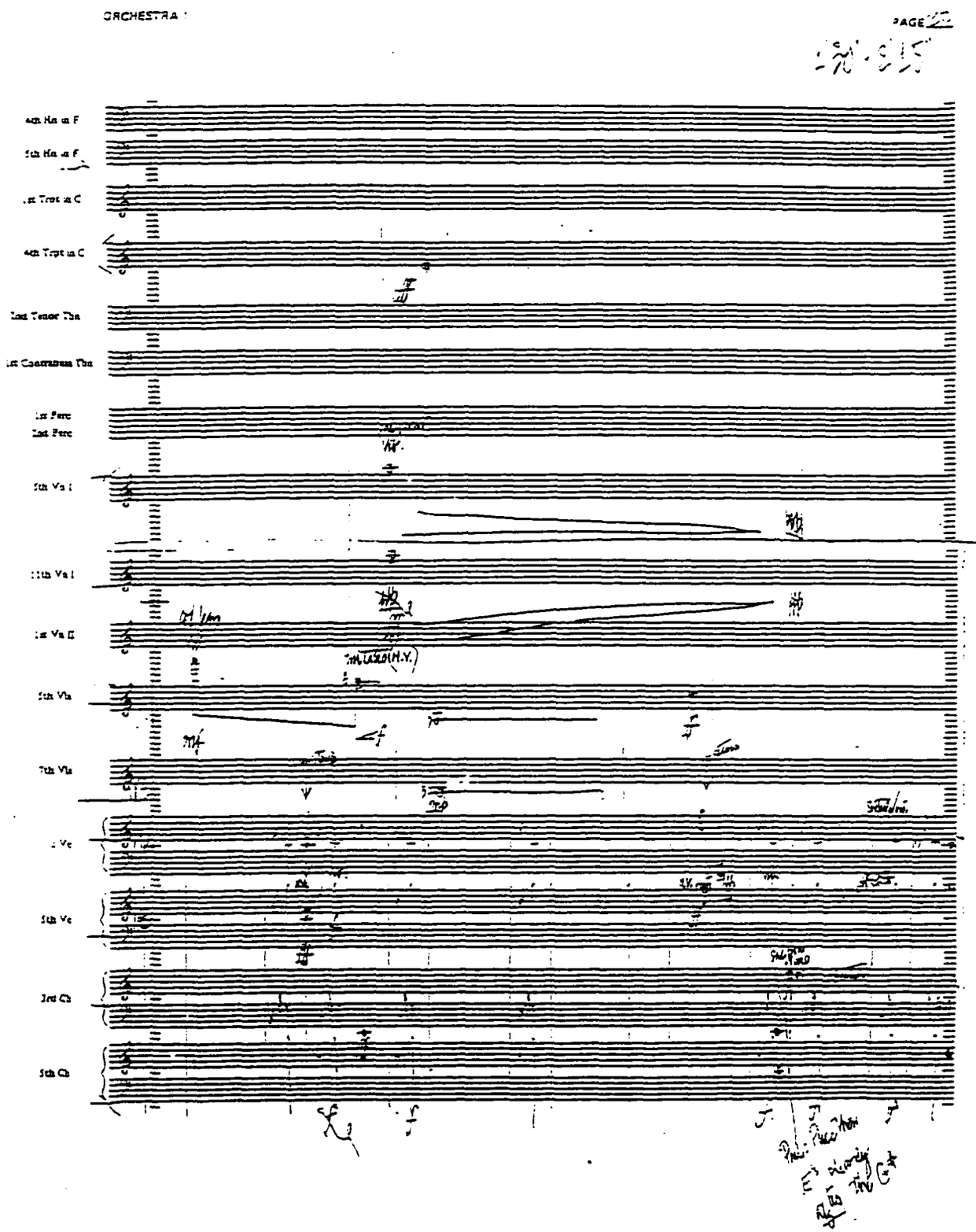
of the page and those that extended outside it. All of the paper was potentially sound; the space between the staves would represent the leger lines of one instrument or another (this is indicated in the score by the presence of hash marks), assuring that there is no conceptual separation between staves and that every chance determination specifies a sound.[18] As stated in his mini-manifesto on notation cited earlier (from the 1988 Norton Lectures), Cage was "turning the paper into a space of time." Example 3.3 shows a system from *Thirty Pieces for Five Orchestras*. Time-brackets are placed at the beginning and end of each piece. The "five orchestras" is in actuality one orchestra parsed into five groups; the hash marks between the parts signify leger lines for the upper or lower instrument.

The notes of the templates that extended outside the page-space were added together to form a single chord, and this chord was then repeated in a randomly derived ostinato pattern. The notes produced by the other templates were given randomly chosen durations, pitch inflections, dynamics, vibrato, etc. The surface of *Thirty Pieces for Five Orchestras*, therefore, is one where things that change--unique single lines--are set against the grid of the irregularly repeated ostinato chords.

Each of the five orchestras has thirty pieces to play. Each of the thirty pieces is placed within a "flexible" time-bracket. For each piece, an earliest and latest time is given for its beginning and end. For example, the first piece can begin anywhere from zero to forty-five seconds elapsed time, and must end any time between thirty and seventy-five seconds. The unused portion of the time-bracket is left silent. The pieces, therefore, have no fixed location in the time-continuum, and can "float" in the

[18] In the sketches of *Thirty Pieces for Five Orchestras*, Cage had his copyist, Paul Sadowski, superimpose a grid over the score-pages with hash marks above and below each stave. This lack of separation also, by the way, led to a preponderance of extreme registral occurrences.

Example 3.3 - *Thirty Pieces for Five Orchestras*. orchestra 1 part. p. 2B. Composer's manuscript. courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts. Research Division.



brackets "allotted" them. The overall effect is of the five spatially separated orchestral groups playing both repeated patterns and spontaneous outbursts of sound, all overlapping and drifting freely in time. This sonic effect of the flexible time-brackets is analogous to the visual effect of the freely-moving engraving plates. Cage discovered, however, that in applying graphic techniques from printmaking certain things needed to be somewhat modified. In making etchings, he noticed, the top of the paper was important and downward motion was interesting. But the same processes applied to music made the horizontal more interesting than the vertical, because the former corresponded to time.[19] "I discovered that a horizontal line which determined graphic changes, to correspond, had to become a vertical line in the notation of the music," he said in one of his 1988 Norton lectures.[20] The direction of the chance operations and what they referred to needed to be altered accordingly.

Thirty Pieces for Five Orchestras is a prime example illustrating my general point that Cage's notational techniques, especially in his later music, are often compositional ones as well. His means of pitch generation in this work are *in themselves about writing*--there is an element of play at work here, a truly experimental sensibility which associates graphic considerations with what we are used to considering as "substance," not as mutually exclusive entities. Put simply, Cage's experimental mindset involves finding ways to make marks on paper that are removed from one's value judgments, and then saying: "what would *this* sound like as a piece of music?"[21] In many ways *Thirty Pieces for Five Orchestras* is overloaded with substance, but that is a byproduct of the work's transitional nature. Cage is moving from a "maximalist," pitch-centric

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[19] I imagine this is due to the nature of the printing press and the fact that the mechanism works vertically.
[20] John Cage, *I - VI* (Cambridge and London: Harvard University Press, 1990), 71.
[21] These marks may or may not be considered "musical," and the paper may or may not contain staves.

sound world to a (more) "minimalist," time-centered world. Is the basis of the work the time-structure or the pitch material? It seems that the latter is being force-fed into the former. This is a paradigm-shifting work in Cage's career, as I believe it sees him off on his "final road," to a point where time-structure becomes the actual point of departure for the compositional process as well as the element most elucidated by the notation.

A feature of *Thirty Pieces for Five Orchestras*, which becomes a predilection of Cage's throughout many of his time-bracket works, is the use of a time-structure of balanced proportions. Three factors comprise this symmetry:

1. *The time spans governing the beginning and end of a system are always the same.* Forty-five seconds are available for the start of the system, and forty-five seconds are also available for the ending of the same system.
2. *The overlap time between the beginning and end of one system and between the end of one system and the beginning of the next is always the same.* Where the time spans for the start and end of the same system overlap by fifteen seconds, the time spans for the end of this system and the start of the next overlap by fifteen seconds.
3. *The time spans governing the beginning and end of a system always stand in the same ratio to the overlap times belonging to them, that is, 3:1.* If the time spans governing the start and end of a system are forty-five seconds, the overlap times are fifteen seconds long.

Here is the time-structure for the entire work. Each line is understood as a single piece:

45"	15"	45"
0'00" - 0'45"	"	0'30" - 1'15"
1'00" - 1'45"		1'30" - 2'15"
2'00" - 2'45"		2'30" - 3'15"
3'00" - 3'45"		3'30" - 4'15"
4'00" - 4'45"		4'30" - 5'15"
5'00" - 5'45"		5'30" - 6'15"
6'00" - 6'45"		6'30" - 7'15"
7'00"- 7'45"		7'30" - 8'15"
8'00" - 8'45"		8'30" - 9'15"
9'00" - 9'45"		9'30" - 10'15"
10'00"-10'45"		10'30"-11'15"
11'00"-11'45"		11'30"-12'15"
12'00"-12'45"		12'30"-13'15"
13'00"-13'45"		13'30"-14'15"
14'00"-14'45"		14'30"-15'15"
	etc. until	
29'00"-29'45"		29'30"-30'15"

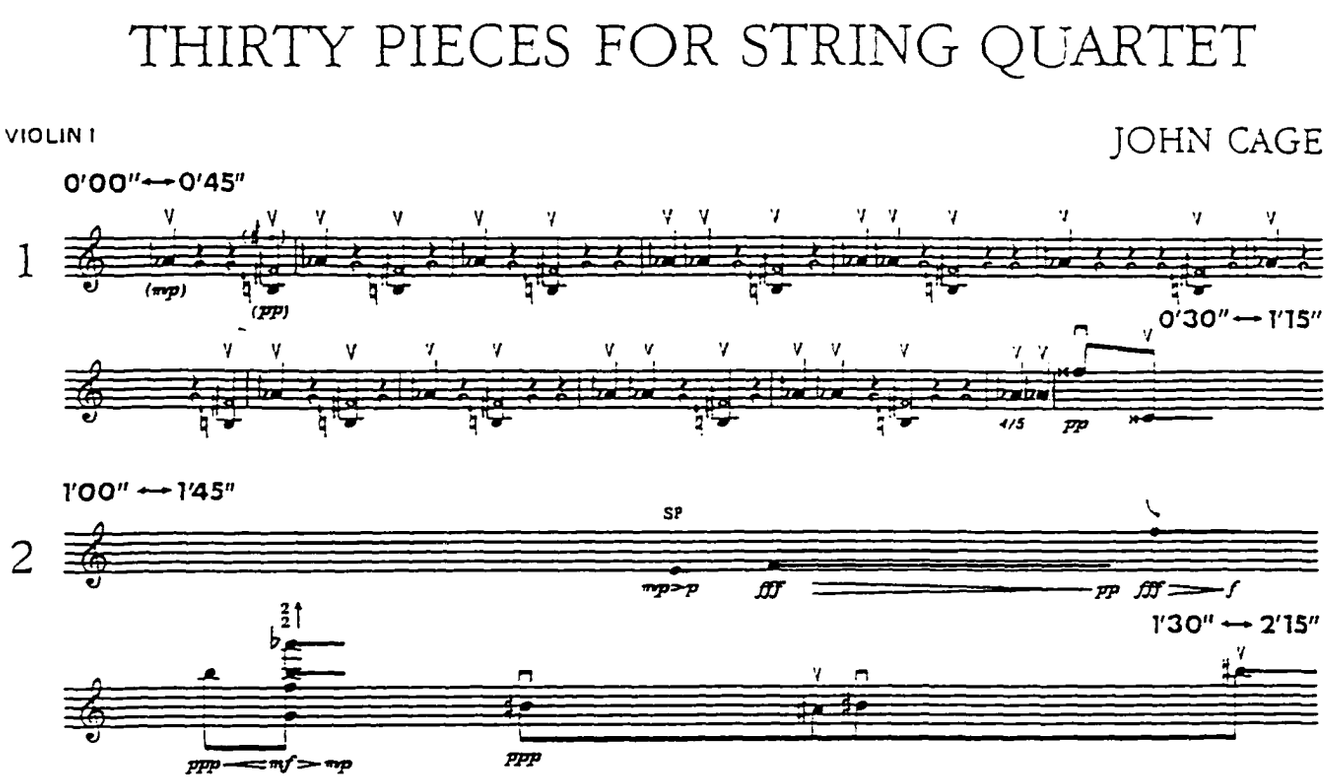
Cage would change his methods of working within these parameters as his usage became more sophisticated in subsequent pieces. But *Thirty Pieces for Five Orchestras* sets down much of the basic vocabulary of this form. In the next stages, the *Music for...* series (1984-87) and the number pieces (1987-92), the real changes took place in "content," in how Cage chose to fill the stratified boxes of empty time. In this development I also detect a kind of creeping McLuhanism. For as time passed, Cage was filling the boxes with progressively less and less. This only magnified the importance of the system itself, the time-structure. And Cage was of the belief, again showing McLuhan's influence, that it was often irrelevant what "content" (namely, the sounds) passed through the system. By designing a notational system, Cage was also creating a compositional process, and any interaction with the system would be conditioned by the system and the process itself. Indeed, "the medium is the message."

The influence of *Thirty Pieces for Five Orchestras* is particularly fresh in works composed in its aftermath, such as *Dance/4 Orchestras* (1982) and *Thirty Pieces for String Quartet* (1983). Both of these works

observe the exact same time-structure as in *Thirty Pieces for Five Orchestras*; what Cage is really interested in experimenting with here is the content of the time-brackets, what he would like to "fill them with." In *Thirty Pieces for String Quartet*, composed for the Kronos Quartet, Cage writes in three kinds of "styles," or types: tonal, chromatic, and microtonal. Within the time-brackets he uses two notational styles: metered (without time-signature) and proportional, as evidenced by the first two pieces in the Violin I part. As shown in Example 3.4, the first piece employs a quarter-note pulse stream while eschewing any time-signature. One might call this a discursive "essence of meter" somewhat reminiscent of Ives's *Concord Sonata*, though that work is not stratified by any kind of real-time, "chronocentric" constrictions. The first piece is begun anytime during the first forty-five seconds and finished anytime from 30" to 1'15". The second piece is proportional with regard to notation; it can be initiated anywhere from 1'30" to 2'15." Note that the durations are exactly the same as in the first piece, with the only difference being that everything is occurring a minute later. As with *Thirty Pieces for Five Orchestras*, time-brackets are posted at the beginning and end of each piece.

Cage's use of metered notation without time signature within open time-brackets is particularly odd and unsatisfying, and I find it regrettable that this was not the last time Cage worked this way. The same unfortunate practice occurs in the *Europeras* a few years later. What is Cage trying to accomplish here? Obviously he wanted to achieve a measured, rhythmic effect. But for someone as ingenious yet precise in his solutions as was Cage, to seek to retro-fit old sigla which carry so much referential baggage into a new time-structure seems rather weak. It should also be said that even proportional notation, as is the case with Berio's *Sequenza I*, invites

Example 3.4 - *Thirty Pieces for String Quartet*, Violin I part, detail from p. 1.



phrasing and pattern-creation that often does not fit Cage's desire for relations between sounds to be unique and "environmental" in their unpredictability. Perhaps this is one of the reasons he moved in later years to single sounds set off in fixed blocks of time--gestures that transcend musical grammar and meaning.

Ryoanji (1983-85)

A notable detour from the pieces involving time-brackets in the 1980s is the series of works known as *Ryoanji: Solos for Oboe, Flute, Contrabass, Voice, Trombone with Percussion or Orchestral Obbligato* (1983-85). The notational system devised by Cage for *Ryoanji*, as well as the series itself, is one of his most exquisite. Ryoanji is the famous stone garden attached to a Zen Buddhist temple in Japan, consisting of fifteen irregularly-shaped stones placed in a rectangular bed of raked sand. *Ryoanji* represents in one sense Cage's return, albeit a brief one, to graphism. It shares a common foundation with the time-bracket pieces, in that it has a visual-arts complement in Cage's stone drawings and etchings of the same title. Where it differs, besides the fact that it has no time-brackets, is that it is a straightforward analogy to a visual phenomenon, almost to the point of programmaticism.[22]

The *Ryoanji* drawings/etchings began in early 1983; Cage worked on this series until his death. Essentially they consist of drawings around

[22] James Pritchett discusses Cage's modified kind of program music in *The Music of John Cage* (Cambridge, Mass.: Cambridge University Press, 1993). For Pritchett, *Ryoanji* is prototypical of a work where Cage begins with an image in his mind, and then makes a piece which neither communicates nor expresses the image, but which *is* the image. *Ryoanji* is a work that acts in the way its image, the rock garden, acts. Pritchett sees this as an extension of the influence on Cage of the Indian aesthetician Ananda Coomaraswamy, who wrote of "imitating Nature in her manner of operation." I would agree and add that works like *Ryoanji* represent a kind of marriage of Western programmaticism and Eastern aesthetics.

fifteen (or multiples of fifteen) stones.[23] Example 3.5 presents one of the drawings, *Where R=Ryoanji R/6 - 12/90* (1990). It is made up of several tracings of stones of different sizes, superimposed over each other and drawn with pencils of different strengths, thicknesses, and lead sizes. The placement of the stones on the paper upon which they were drawn is determined by chance operations.

In the parts for oboe, flute, contrabass, voice, and trombone, the method of drawing around stones was transferred almost exactly to create pitch curves. These curves are generated by drawing around *parts* of the perimeters of the stones. In *Musicage*, a series of conversations Cage held from 1990-92 with the poet and essayist Joan Retallack, Cage discusses why he only draws around parts of the stones in a way that makes one aware of the nuances of "transposing" a retinal technique to an aural/temporal one:

> Joan Retallack: So there are more rules for the use of the stones in the music than in the drawings. In the graphic pieces you also place the stones by chance operations-
> John Cage: It's quite different. There I'm not dealing with time, so I can draw around the whole stone. Music is characterized by detail and by having to do things that work in time.[24]

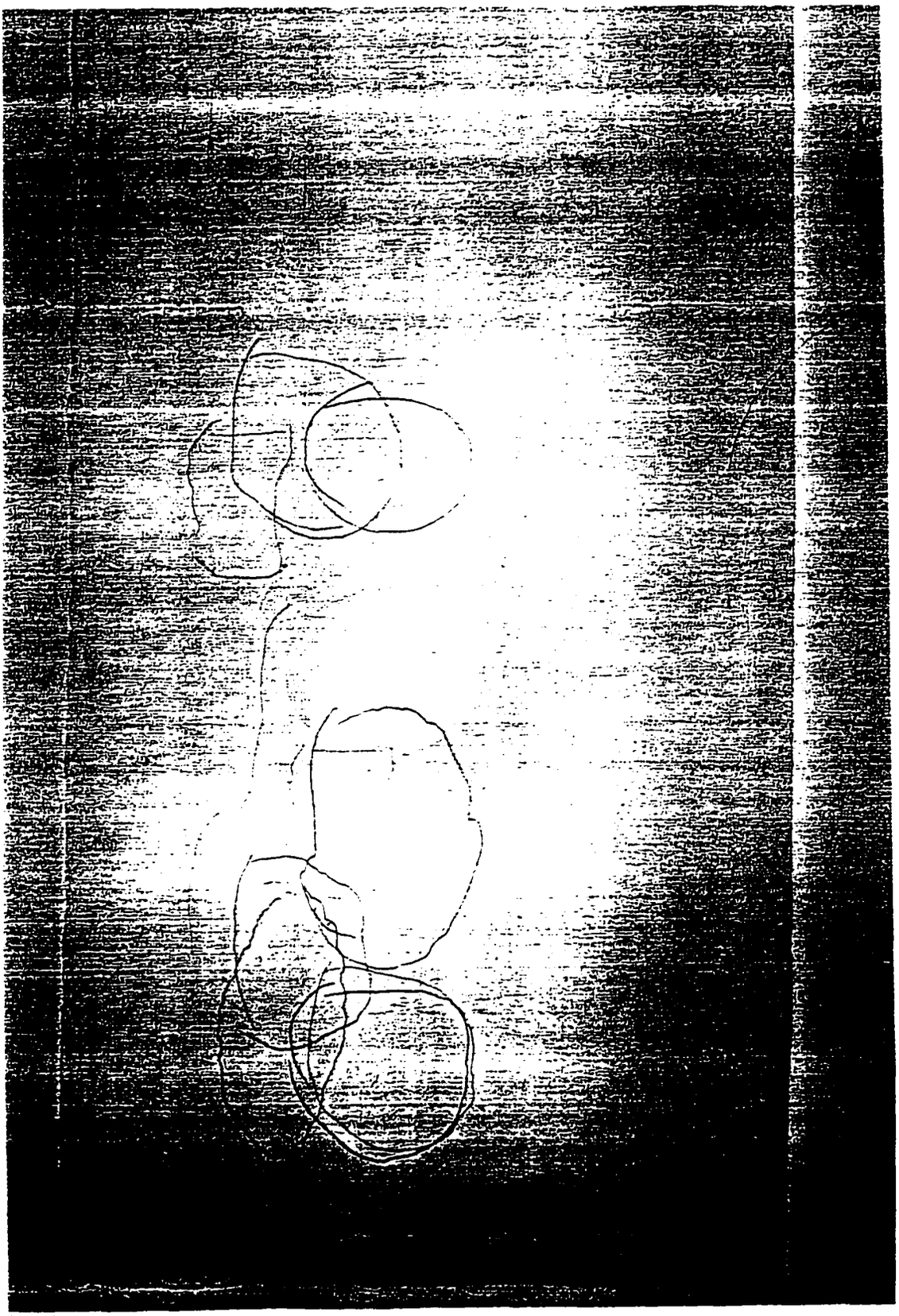
The pitch curves connect chance-determined points in the space-time, points analogous to where stones might be situated in a rock garden, for instance. In devising his notational system, Cage prepared score pages that had two rectangular systems. Each two pages (four systems) make up a "garden" of sounds:

> JR: You've talked about creating space-time on the musical page. How does this work in *Ryoanji*?
> JC: I think of *Ryoanji* as being fifteen stones, hmm? and I think of the garden or the space for the fifteen stones as being four staves, or two pages - each page having two staves. And the staves are actually the area of the garden. Knowing

[23] The works in this series have titles such as *R/12* or *3R/5*. An explanation of the code: R is Ryoanji or 15, thus "3R" stands for 3 times 15 stones are being used. The other number is the number of different pencils used to make the drawing.

[24] John Cage and Joan Retallack, *Musicage: Cage Muses on Words, Art, Music* (Hanover and London: University Press of New England/Wesleyan University Press, 1996), 243.

Example 3.5 - *Where R=Ryoanji R/6 - 12/90*. 1990. Graphite on paper. 10" x 19". Courtesy Margarete Roeder Gallery. New York.



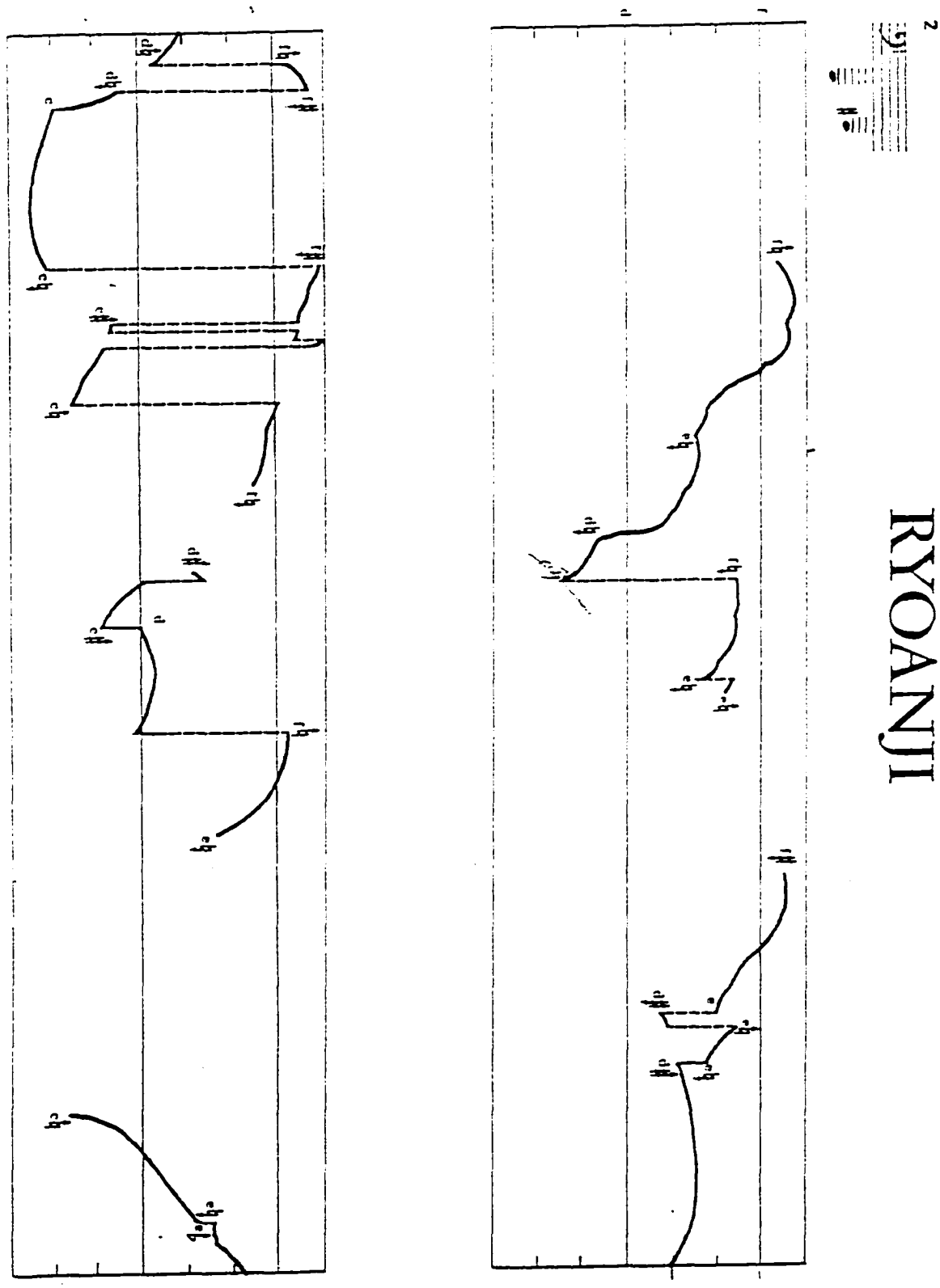
> the whole of it. I can find by chance operations where to put which stone. And knowing that it has to go from left to right, I know, once I put it there, where to draw. Then if two lines go over one another, I know that to distinguish them I must draw one one way and the other another, so that they don't ask that the same things be done at the same time You don't involve doing something impossible.[25]

Cage was interested in pursuing microtonality in these works, and he employed pitch ranges that vary from wide to narrow, and that encourage subtle gradations of pitch. Each hash mark inside of one of the systems represents a half-step. When one combines these pitch curves with the limited pitch range, the result is a music of glissandi. Examples 3.6a-c present sample pages from the trombone part of *Ryoanji*, each page consisting of two linear rectangular systems and pitch curves with note names printed in lower-case letters. Time is "personal" and relative, calling for an arbitrary yet consistent time-sense. The pitch curves have initiating and concluding tones (in the first complete curve in Example 3.6a, the sharpened F-natural and the sharpened C-natural, respectively), and sometimes "floor" and "ceiling" tones (the flattened C-natural in the lower system of Example 3.6a being what I would consider a "floor" tone). The distance between the hash marks on the left and right sides of each system allow a generous amount of performative/mental space for microtonal gradations, a way Cage can call for microtones and achieve them without over-burdening the player with a blizzard of specifics.

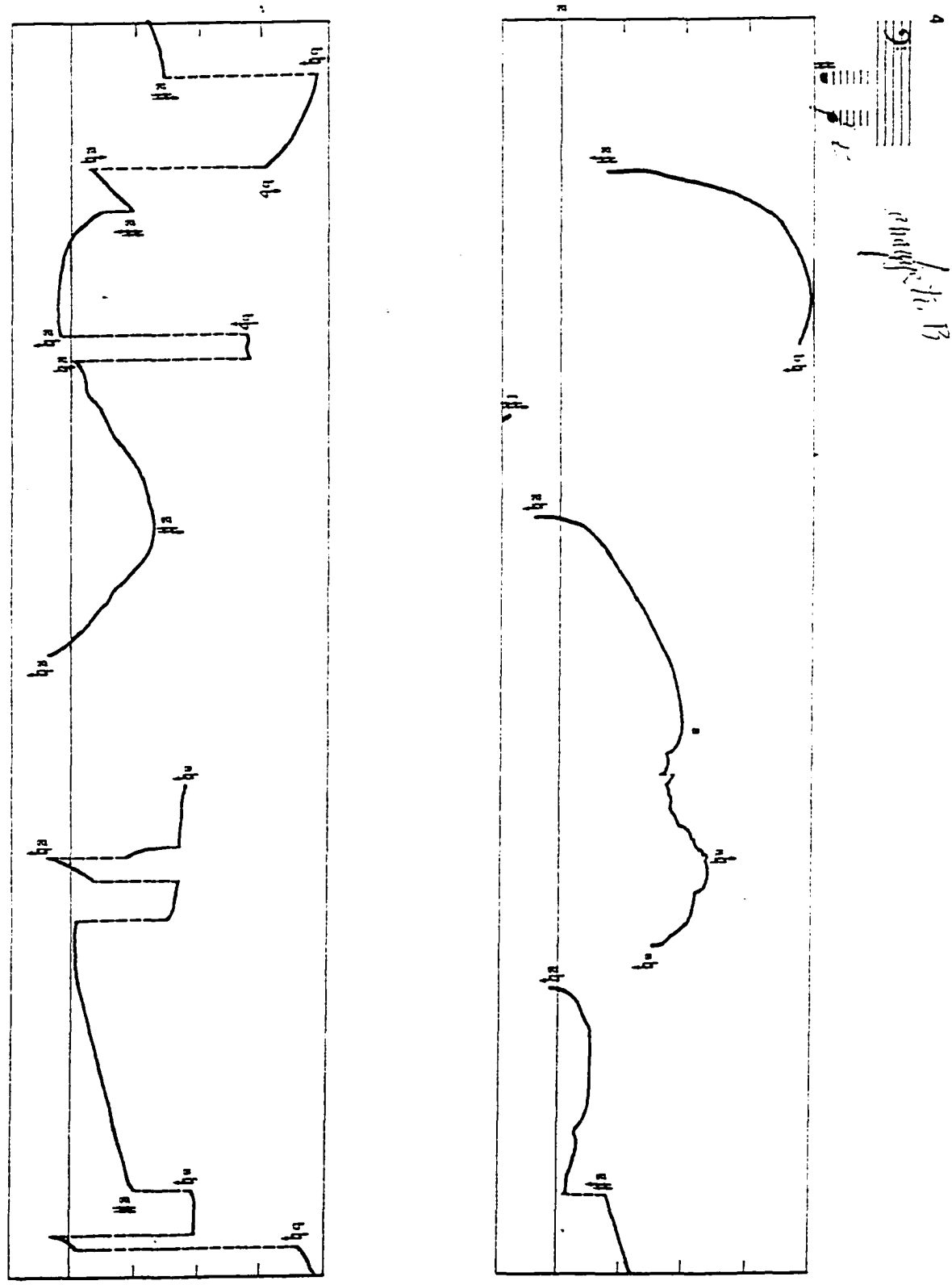
The staff fragment in the upper-left hand corner of Example 3.6a indicates that the range of the trombone *glissandi* is a perfect fifth, operating between the pedal tones B-natural and F-sharp. This is the case for the first four systems of the trombone part, a situation resembling the practice in choral parts. At the beginning of the fifth system, however (Example 3.6b), there is a dual pitch descent and range compression. The range shortens from P5 to P4, between the pedal tones F-sharp and B-

[25] Ibid., 242.

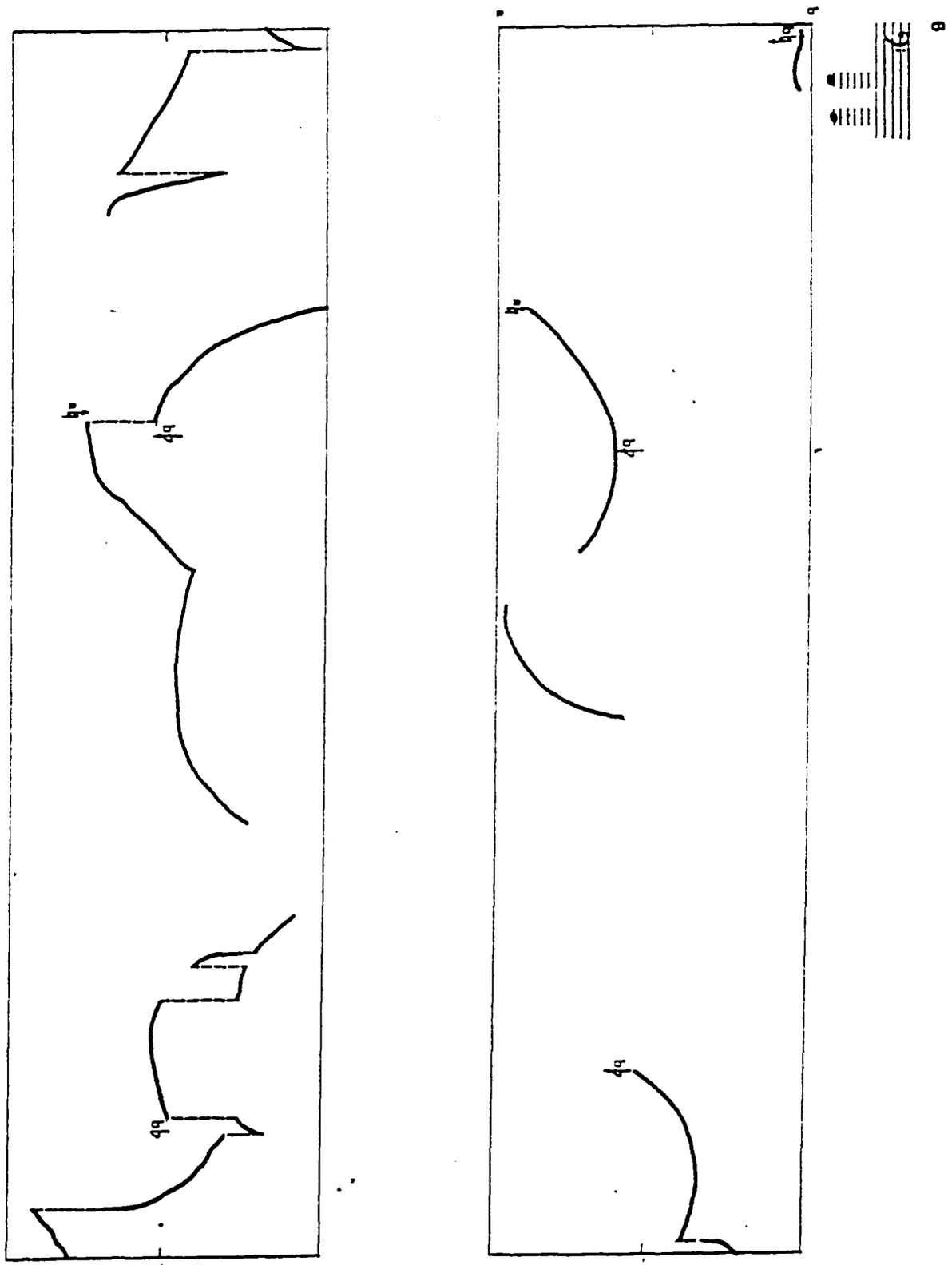
Example 3.6a - *Ryoanji*, trombone part, p. 2. Composer's corrected score, courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



Example 3.6b - *Ryoanji*, trombone part, p. 4. Composer's corrected score, courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



Example 3.6c - *Ryoanji*, trombone part. p. 6. Composer's corrected score. courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts. Research Division.

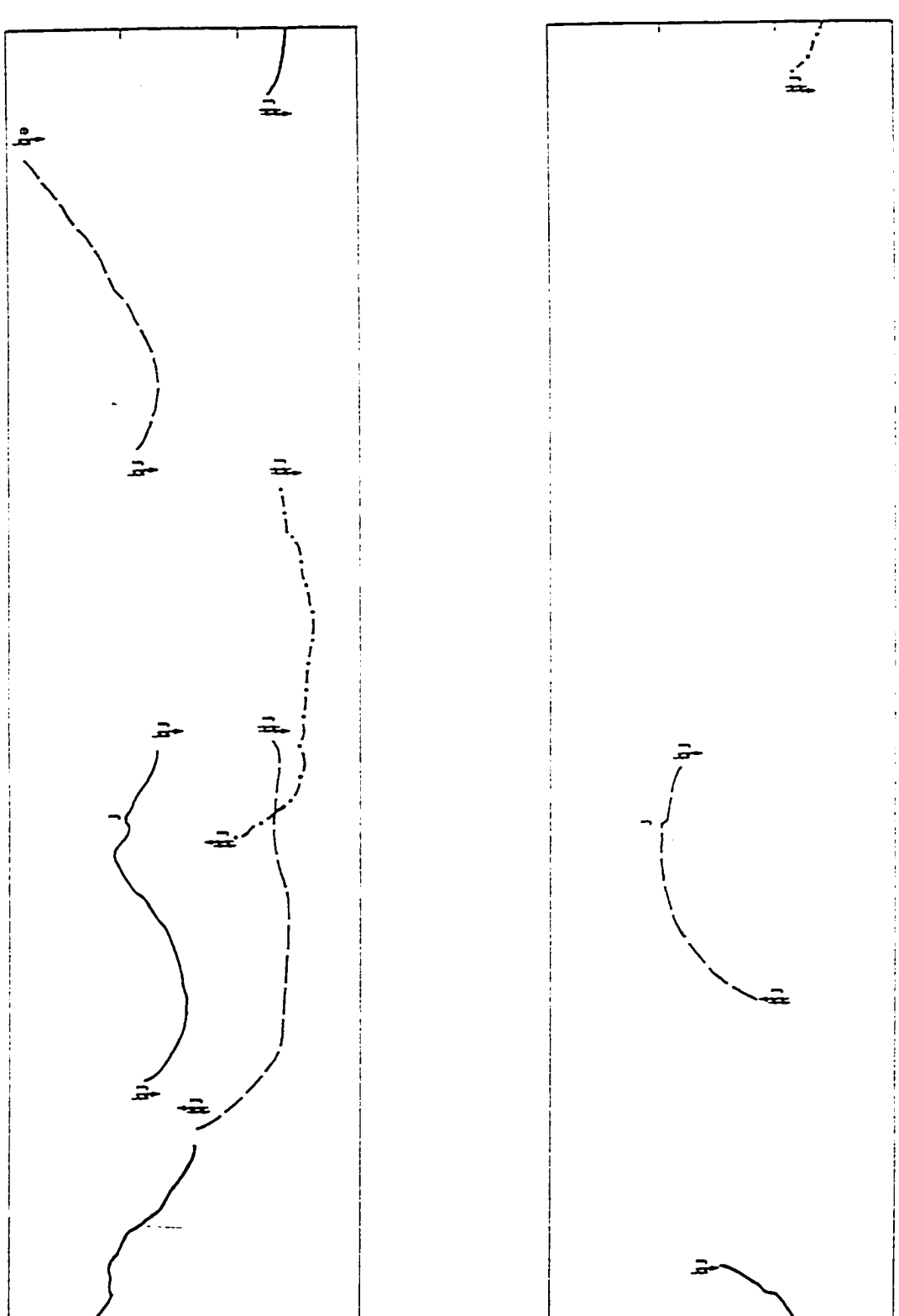


natural. Note that this occurs while the size of the overall system remains constant, and while each hash mark still represents a half-step. In Example 3.6c, at the beginning of the ninth system, the range compresses again, to the M2 between pedal tones A and B.

Besides this being an ingenious and economical way for Cage to write a very pitch-specific "letter" while keeping to his analogous graphic system, this range compression carries other ramifications as well. If two notational systems are the same size, measured off in equal half-step divisions, and they differ only in the size of the pitch range within each whole, it follows that in one system the space a half-step represents will be greatly different than in the other. These differences, obviously, generate different responses on the part of a player. The system in Example 3.6c allows one far more room for expansive and subtle microtonal inflection than in Example 3.6b or even 3.6a. Taking this to the next stage, Cage could generate a rich myriad of complex inflection-types with a small, clean adjustment *outside* the notational system, not one from within which would have necessitated elaborate changes in pitch designation. Merely by expanding and compressing pitch ranges and notifying the player of these changes in the left-hand corner of a system, with all else being equal, Cage could induce not microtonality *per se*, but "microtonalities." To me this represents the quintessence of "psychological notation," where a composer employs a subtle and rather subliminal communicative device to engender an instinctive behavioral respomse on the part of the performer. Cage's example is a model of craft achieving the marriage of experiment and intent.

In the bottom system of Example 3.7, the oboe part of *Ryoanji*, three lines occur simultaneously. Cage addresses the issue of contour overlap by, as noted before, drawing the lines in four different ways: straight and

Example 3.7 - *Ryoanji*, oboe part, p. 13.



unbroken, dash, dotted line, and dash/dot. [26] To fully realize this solution in a performative context, the performer records the other parts on tape, in effect playing duets or trios with him/herself. In this manner the performer needs to go through the part, identifying and tracing individual lines. Sounds are to be "brushed" in and out of existence by the performer,[27] a manner of production with logocentric implications. The performer is "writing the sound" rather than generating it, in a manner that calls to mind calligraphy--even the art of performance, not just "content," is becoming melded with notation. With respect to time, all Cage asks is that each part have the same overall length of time and follow the general outlines of proportional notation. One need not be overly slavish in replicating any vertical alignment of parts. In Cage's performance notes for *Ryoanji*, he introduces an image of no small resonance:

> The score is a "still" photograph of mobile circumstances. That is, where there are two or more parts active at the same time their relationship in time need not be exactly the one delineated.[28]

The notational layout for *Ryoanji* is reminiscent of a still photograph in another very important respect, a panoramic portrait of a garden whose "overall-ness" the player is "rendering." There is in the layout a sense of empty space and spaciousness that reflects and matches the composer's intent to analogize the image of a garden. Cage tells Joan Retallack that, in effect, the "garden" notation enables a sonic transference:

> JR: When *Ryoanji* is performed, does the sound for you relate directly to the garden - creating a similar experience of space-time - and to the marks on the page? Is there more of a formal continuity than in other pieces where the way the score looks really doesn't function in the same imagistic way as a visual analog to the sounds that you will hear, or vice versa, a sonic analog to what you see?

---

[26] Cage further emphasizes the importance of moving from left to right: "music doesn't go in a circle....You make the piece by placing the stones at chance-determined points [pitches] in the total garden, and draw from left to right" (*Musicage*, 242-243).

[27] John Cage, *Ryoanji* (New York: C.F. Peters, 1983), performance notes.

[28] Cage, *Ryoanji*, performance notes.

> JC: I think they do relate to one another. I think that with proportional notation, you automatically produce a picture of what you hear. Perhaps more so in *Ryoanji*.[29]

Each of the solo parts (alone or in any combination) is accompanied by an obbligato part for percussion or a twenty-piece chamber orchestra. Whereas the solo glissandi represent the stones in the garden, the obbligato part stands for the raked sand. This part is metrically notated, and is dry in texture. When performed in the original percussion part (the first page of which is presented in Example 3.8), the player independently chooses a single complex of unspecified sounds which is then played in one unison attack. When realized by an orchestra, the twenty players each independently choose a single sound or aggregate of sounds which they use for the entire course of rehearsals and performance. The part consists of five chance-distributed *icti* in meters of twelve, thirteen, fourteen or fifteen. Cage wanted the patterns of beats and rests to be totally irregular:

> I didn't want the mind to be able to analyze rhythmic patterns.[30]
>
> What I wanted to do was to find a way not to know what the beat was, even though what I'd written would be measured. Make the measure long (twelve to fifteen beats), only five of which were to be heard. Slow the tempo down to sixty. You can't, in metrical terms...understand what you're hearing any more than you can when you listen to ambient sound.[31]

In the orchestral version, Cage tries to achieve a kind of "Korean unison," where, in the style of traditional Korean music, unison attacks are close but not exactly together. As shown in Example 3.9a, the first page of orchestral part A, the sequence and disposition of meters, attacks and rests is identical both to the percussion part and in the twenty instrumental parts themselves.[32] The differences lie in how the attacks are played. Cage provides arrow-like notations (distributed uniquely in each part) to play

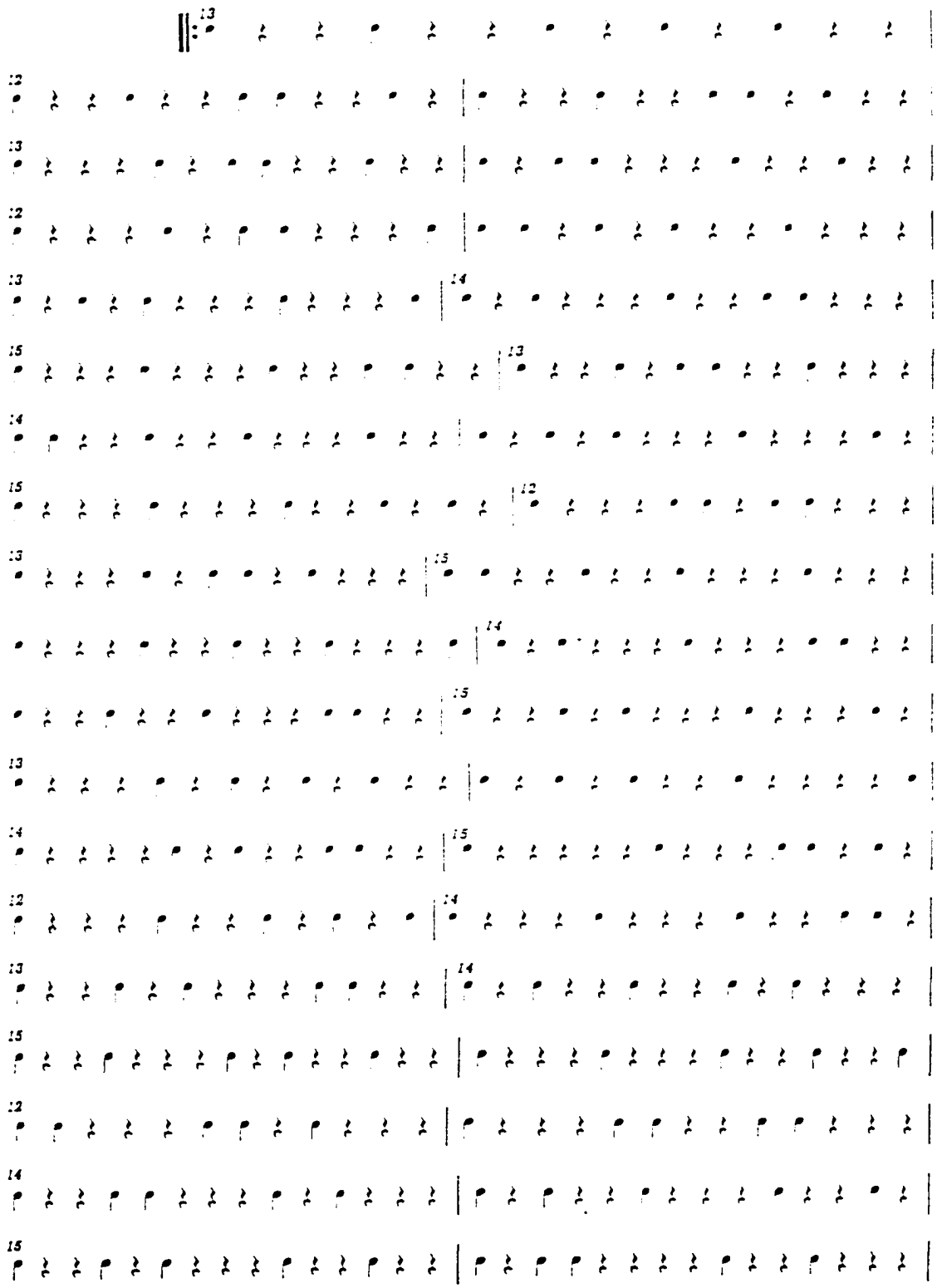
---

[29] Cage and Retallack, *Musicage*, 243.
[30] Cage, *Ryoanji*, performance notes.
[31] John Cage, *I - VI* (Cambridge and London: Harvard University Press, 1990), 444.
[32] There are twenty instrumental parts for the orchestral version of *Ryoanji*, lettered A-T.

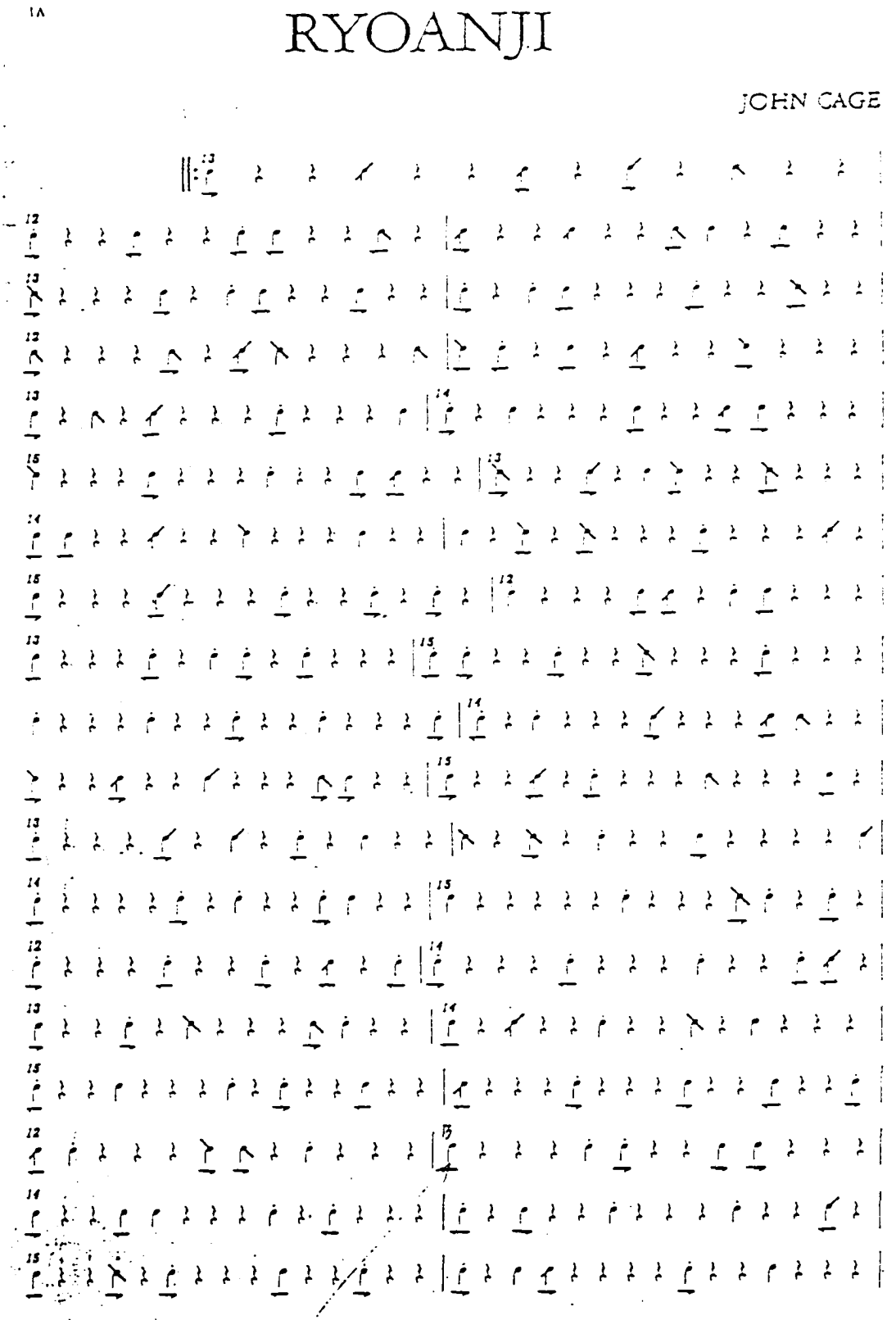
Example 3.8 - *Ryoanji*, percussion part, p. 1.

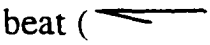
RYOANJI

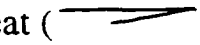
JOHN CAGE



Example 3.9a - *Ryoanji*, orchestra part A, p. 1. Composer's corrected score, courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.

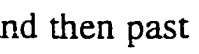


very slightly *before* the beat ();

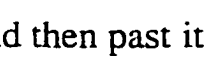
very slightly *after* the beat (); or where there is no arrow, "more on the beat than not."

There are also staccato markings (attacks are automatically performed tenuto in their absence) and notations for microtonal slides within a small range around one's chosen pitch, e.g.:

descending to the tone ();

descending to the tone, and then past it ();

ascending from the tone (); and

ascending to the tone, and then past it ().

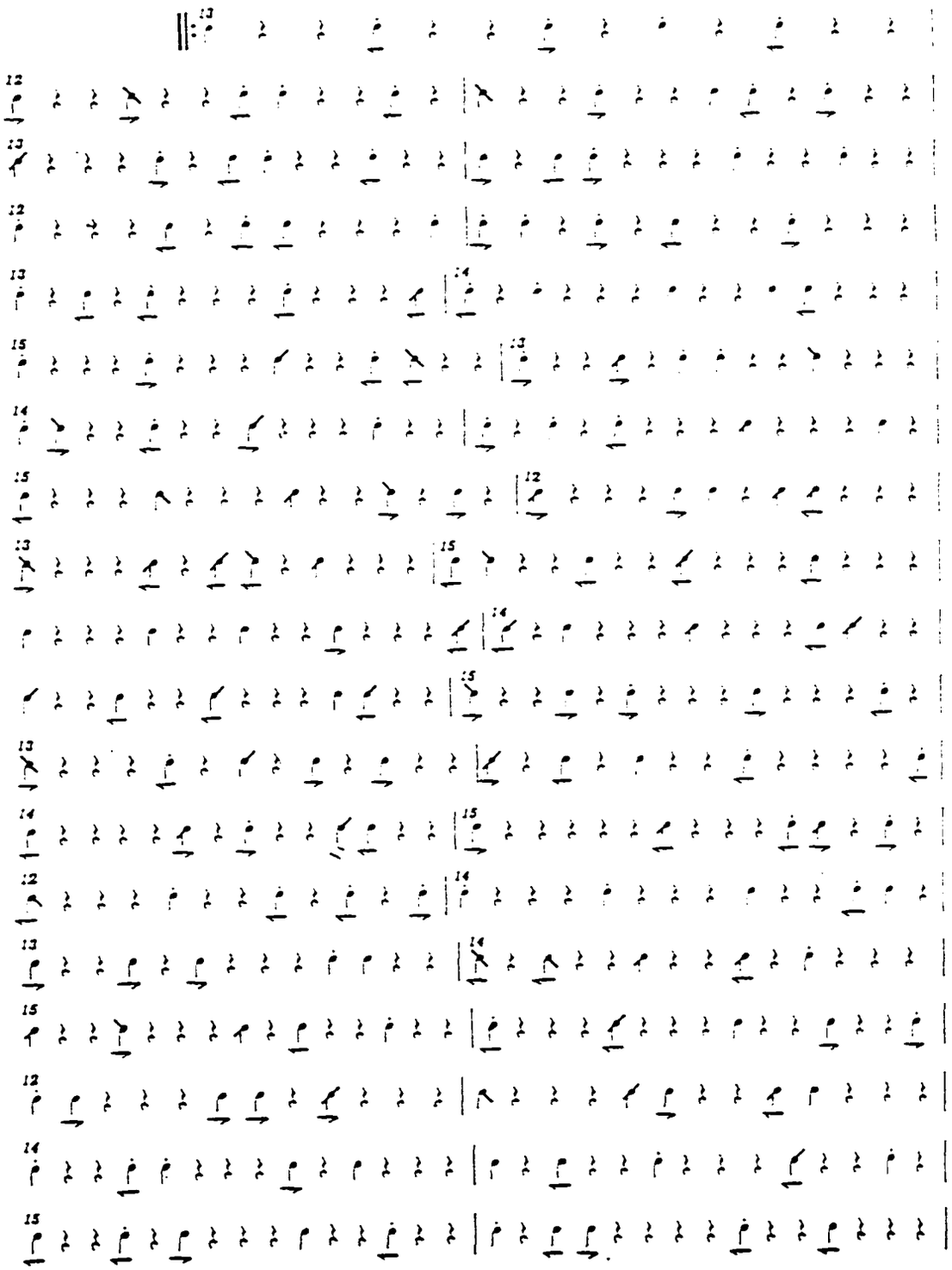
In Example 3.9a, then, the first attack (within a measure of thirteen beats) is played staccato very slightly after the first beat. Following two beats' rest, there is a microtonal pitch glissando ascending from the tone, played tenuto, another two beats' rest, and then a microtonal glissando ascending *to* the tone, played very slightly before the beat. Compare the distribution of "attack-types" in part A with that in part B, shown in Example 3.9b.

While the use of metered notation within a real-time structure can be severely problematic in *Thirty Pieces for Five Orchestras* and the *Europeras*, here the wielding of the potent instrument of meter succeeds mightily precisely for the same reasons it failed in those works. On a psychological level there is total character contrast between "wet"/space-y and "dry"/metrical sounds, so the use of two notational systems only drives home that content contrast. Meter here is more a "manner" (to use a Stravinskyesque term, bringing to mind another composer who gloried in issuing stylistic and technique-specific reminders of genres past), more a behavioral inducement than it is any kind of musical imperative. The

Example 3.9b - *Ryoanji*, orchestra part B, p. 1.

RYOANJI

JOHN CAGE



performer's interpretation of and reaction to meter does not take place inside any kind of time "box" as it does within the brackets of *Thirty Pieces for String Quartet*. The obbligato part in *Ryoanji* manages at once to observe one kind of time and, helped by its setting in relief against another radically different system, to create its own. This is not unrelated to Cage's notion of a "music of contingency." This idea arose out of Cage's critique of conventional improvisation as too reliant on a player's tastes and habits. Cage wrote pieces which either use plant materials (such as cacti or conch shells filled with water) where the resultant sound is too unreliable to consummate a relationship of cause and effect, or which prescribe so many rules for an improvisational situation that one cannot fall back on one's old habits of memory and taste, where there is literally "nothing in the fingers."[33] The obbligato notation in *Ryoanji* manages to drain the causality out of strict meter and turn it into very much a "contingent situation."

One more word regarding *Ryoanji*. This series augurs another change that occurred in Cage's later music, especially in the number pieces of 1987-92. The notation in these works allowed Cage to reconcile and accommodate himself to certain elements of musical expression that he had previously treated with scorn, most notably harmony (as we shall find out in *Four* for string quartet), and the very notion of discrete vertical relationships. The conventionally metered quarter notes and quarter-note rests in the obbligato were Cage's first use of pulse and meter since *Concerto for Prepared Piano and Chamber Orchestra* in 1951, right before

[33] *Child of Tree (Improvisation I)* (1975) and *Branches* (1976), both for amplified plant materials; *Inlets (Improvisation II)* (1977) for three players of water-filled conch shells and 1 conch player using circular breathing and the sound of fire; *c¢omposed Improvisation for Steinberger Bass Guitar* (1987), *c¢omposed Improvisation for Snare Drum Alone* (1987), and *c¢omposed Improvisation for One-Sided Drums* (1987).

the seismic shift represented by *Music of Changes*.[34] In addition to being a material-generating activity (an "ends," or a means to a different sort of "ends") in itself, notation for Cage became something closer to a "means" --a process by which to send a more adequate brand of "letter" to the performer. It became a vessel which was open, flexible, yet focused *enough* that Cage could introduce traditional referents and accept some measure of personal taste, determinism, and "coherence."[35] The *Ryoanji* series marked another turning point both in how Cage generated his compositional material and how he devised techniques and notational systems to represent them.

What we see in *Ryoanji*, viewed over the longer term, is another stage in a process of gradual transformation in Cage's music which had begun with *Thirty Pieces for Five Orchestras* and would continue into the *Music for...* series (1984-87) before reaching its culmination in the number pieces (1987-92). The notion of "content" providing material for Cage's treatment-by-chance operations, especially in the form of pre-existent works by other composers, had greatly informed his music from the late 1960s through the end of the 1970s. As he came to abandon the notion of and need for "content," his music became more and more "about writing" -- about the notation itself. When this process reached its final stage in the number pieces, the music became simply about time. I see *Ryoanji* functioning as a transitional work in this timeline, representing "writing as a bridge to time." In the *Music for...* series, notation became increasingly both process *and* content, with pure time-structure giving such tactile primacy as to be almost in the foreground of the work aurally.

---

[34] I am not counting works such as *Cheap Imitation* (1969), *Apartment House 1776* (1976), *Quartets I-VIII* (1976), and *Hymns and Variations* (1979), all of which appropriate and alter pre-existent musical material.
[35] More appropriately to *Ryoanji*, an empty space, or an empty garden instead of a "vessel."

Music for... (1984-87)

In the winter of 1983-84 Cage, with the help of his assistant, the composer Andrew Culver, began using the computer as a compositional aid. Cage was not interested in writing music for the computer or in using it to generate sound, but rather in speeding up and facilitating the compositional process. The methods of composition in a given work were codified into generic paradigms and written as computer programs in the C language. The first such program was *ic*, which automates the throwing of coins (as a random number generator) for the *I Ching*. Another program, *tic*, is a time values-specific version of *ic* that was used to generate the specific timings of the time-brackets. Both *ic* and *tic* were used from 1984 until 1991. In the winter of 1988 Culver wrote the program *musicfor*, which was intended to be used to generate time-brackets, pitches, and dynamics in the *Music for...* works. It was also used to account for certain exigencies, known as "specials." I should note at this point that the *musicfor* program was produced after Cage had composed all seventeen pieces in the *Music for...* series. Those pieces were written using *ic* and *tic*. However, Culver told me that

> The process in the program was the same as the process had been before the program. There was talk of building an orchestra piece of *Music for...* parts (which is the reason I saw fit to automate the process) but two things led away from that. First, John heard a performance of *Music for...* with many, if not all, of the seventeen parts and thought it was busy. Second, he was leading into (the simpler) numbered pieces methodology, and finding the results very beautiful.[36]

This use of the computer enabled Cage to become extremely prolific; in a 1992 article in *Musicworks*, Culver wrote: "what we accomplish with a computer could readily be accomplished without one in a dozen or so pairs of lifetimes."[37]

---

[36] Andrew Culver, letter to the author, December 22, 1996.

[37] Andrew Culver, "A Note and a Table in the 10th Year," *Musicworks* 52 (1992): 24-26.

The following is a description of *musicfor* and how it works: (Example 3.10)

Document: MUSICFOR
ver. 1.0
1 feb 88
by
andrew culver

This document describes John Cage's compositional process for the series of combinable solos called "Music For n" (n being the number of performers in a given performance) as understood and implemented by this programmer. Computer simulation of the *I Ching* coin-tossing oracle is the mechanism referred to whenever the verbs "assign," "determine," or "generate" are used herein.

TIME BRACKETS

musicfor first generates a sequence of time brackets from the eight possible type/lengths, assigning to each a type of piece or interlude...

Beginning again with the first time bracket, musicfor then generates piece or interlude events for each bracket.

PIECES

Pieces are of type A, B, AB, or BA. The simple ones begin at the minimum bar position and end at the maximum position. A middle (dividing) bar position must be generated for the combination types. From then on, A and B types can be treated separately within their barlines.

Pieces of A type have as a maximum number of events a fraction of the defined MAXEVENTS which is given by the ratio of the A piece's size to the size of the whole piece. A value between 1 and this calculated maximum is determined as the piece's number of events. If for example the A piece is exactly half of the whole piece (i.e. A and B parts are equal), then half of MAXEVENTS will be the top of the range from which the number of events is determined. Each of these events is assigned a pitch from within a subrange determined uniquely for that piece. Each event is determined to be *legato* or *detaché*, the *detachés* having as durations some assigned value bringing them no closer than 2 positions away from the next event. Each may or may not be determined to be a special event (marked * (star)). Each is assigned its own dynamic, and *detaché* events with durations of 3 or more are assigned a second (ending) dynamic.

B pieces have only one pitch positioned 1/3rd of the way between beginning and ending bars.

INTERLUDES

Pitches for the interludes must be generated before stepping through the time brackets because they are drawn from pools that are usually in effect for more than one interlude. First it is determined whether there are to be 1, 2, or 3 pools of five pitches each, generated from the same number of pre-determined subranges. If repetitions occur they are given unique after-the-decimal-point values (e.g. 22.0, 22.1, 22.2). Changes

from one pool to the next are generated as needed according to the total number of interludes.

Within each interlude, a type (A, AB or ABC) is determined. A sequence for the three pitches within each part is also determined. This produces a string of 3, 6, 9 or 12 pitches (12 is possible in the situation described above under "arguments"). Pitch repetitions may again occur; it is determined whether these are kept or eliminated - if kept, the first occurrence is marked as a phrase ending. Then the string of pitches is processed to determine if any more pitches are to be phrase endings. Finally, a phrasing of *tenuto* or *staccato* is generated for each pitch so marked.

So, for example (N.B: my words):

46	224	7	*legato*	mf*
47	227	7	*legato*	fff
48	239	11	*legato*	fff
49	241	3	*legato*	p
50	248	4	*legato*	mp

[00:45 - 00:50]

Event	Pitch	Phrasing
1	5.0	
2	4.0	-
3	6.0	-
4	5.0	.
5	7.0	-

[04:50 - 06:05]

A, between barlines at 000 and 313
14 events, ranging from 06 to 06

Event	Position	Pitch	Legato/Duration	Dynamic	Special
1	11	6	4	mf mf	
2	18	6	5	f mp	
3	37	6	0	pp	
4	38	6	legato	pp	
5	124	6	52	fff mf	
6	223	6	1	fff	*

(etc., etc.....)

Within each interlude, a type (A, AB, or ABC) is determined. A sequence for the three pitches within each part is also determined. This produces a string of 3, 6, 9 or 12 pitches...Pitch repetitions may again occur; it is determined whether these are kept or eliminated - if kept, the first occurrence is marked as a phrase ending. Then the string of pitches is processed to determine if any more pitches are to be phrase endings. Finally, a phrasing of *tenuto* or *staccato* is generated for each pitch so marked.

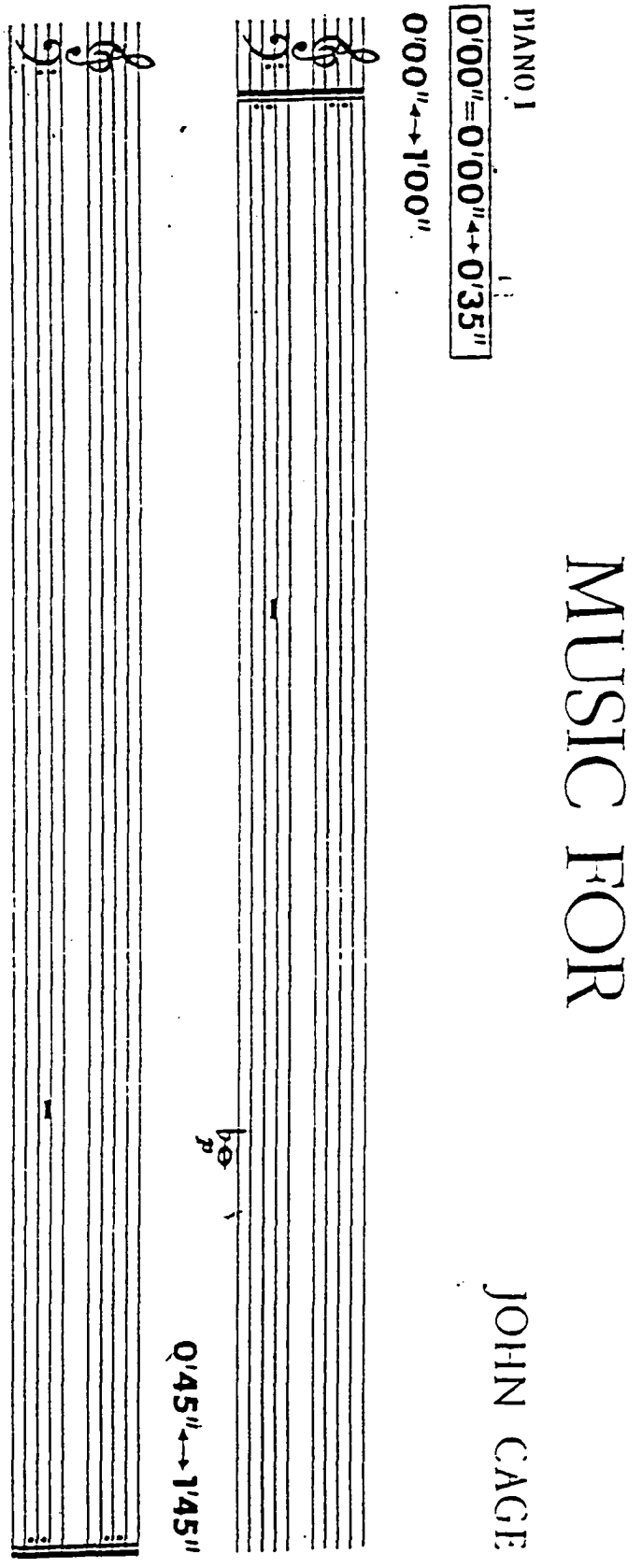
Cage describes the *Music for...* series as "parts for voice and instruments without score (no fixed relation), title to be completed by adding to Music for _____, the number of players performing." This means that a performance with five players would be called *Music for Five*, etc. Cage conceived *Music for...* as a continual work-in-progress, never to be finished. Cage composed one solo part at a time and completed seventeen of them from 1984-87. Any number of these parts may be performed simultaneously. A solo part is a sequence of what Cage calls "pieces" and "interludes." Each piece is written on two systems, and begins and ends at any time within the flexible time-brackets given. *Pieces* are made up of one or the other or both of two types of music:

1. a single sustained tone played *p* (in Example 3.11, the left-hand E-flat in the first bracket of the Piano I part) , preceded and followed by silence.[38] Pieces with single tones also carry repeat signs to indicate that the tone may be repeated any number of times. The box above the bracket signifies that this part begins (has its own 0'00") at any time within that box, creating a staggered effect with both the other parts and with respect to consideration of time-structure.
2. a number of tones in proportional notation (in Example 3.12, the first such instance in the Piano I part), not to be repeated, containing a variety of pitches, dynamics, timbres, and durations within a limited range.

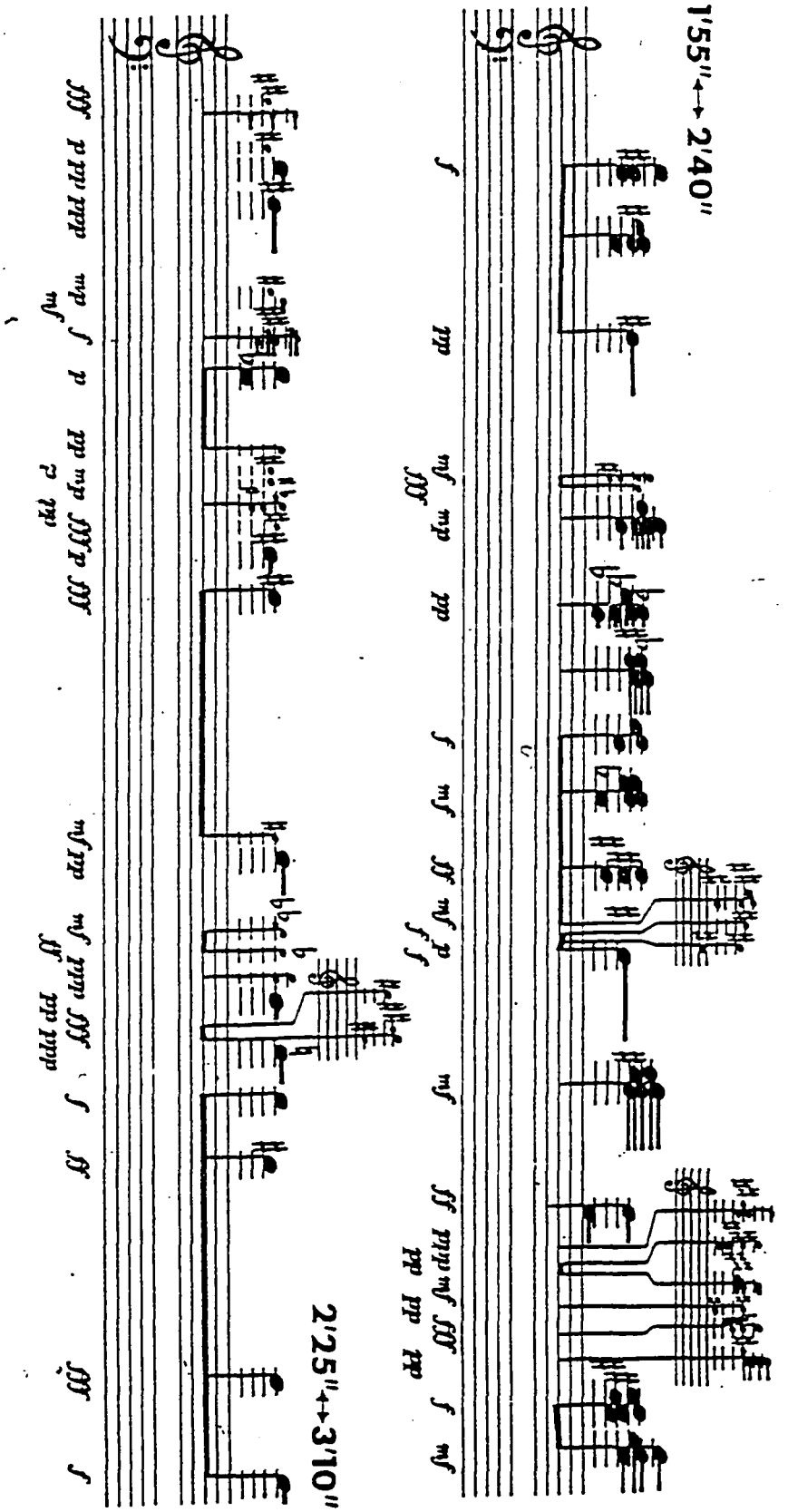
To repeat, both types may exist in succession in a "piece." *Interludes*, unlike pieces, are placed within *fixed* time-brackets--not

[38] Andrew Culver credits Cage's copyist Paul Sadowski with being very influential on the graphic consideration of where the pitch would fall in a bracket (in conversation with the author, January 10, 1997). Evidently Cage had worked out a system of chance operations to determine pitch placement on paper, but I have not been able to unearth it.

Example 3.11 - *Music for...*, Piano I part, first time-bracket, detail from p. 1.



Example 3.12 - *Music for...*, Piano I part, third time-bracket, detail from p. 1.



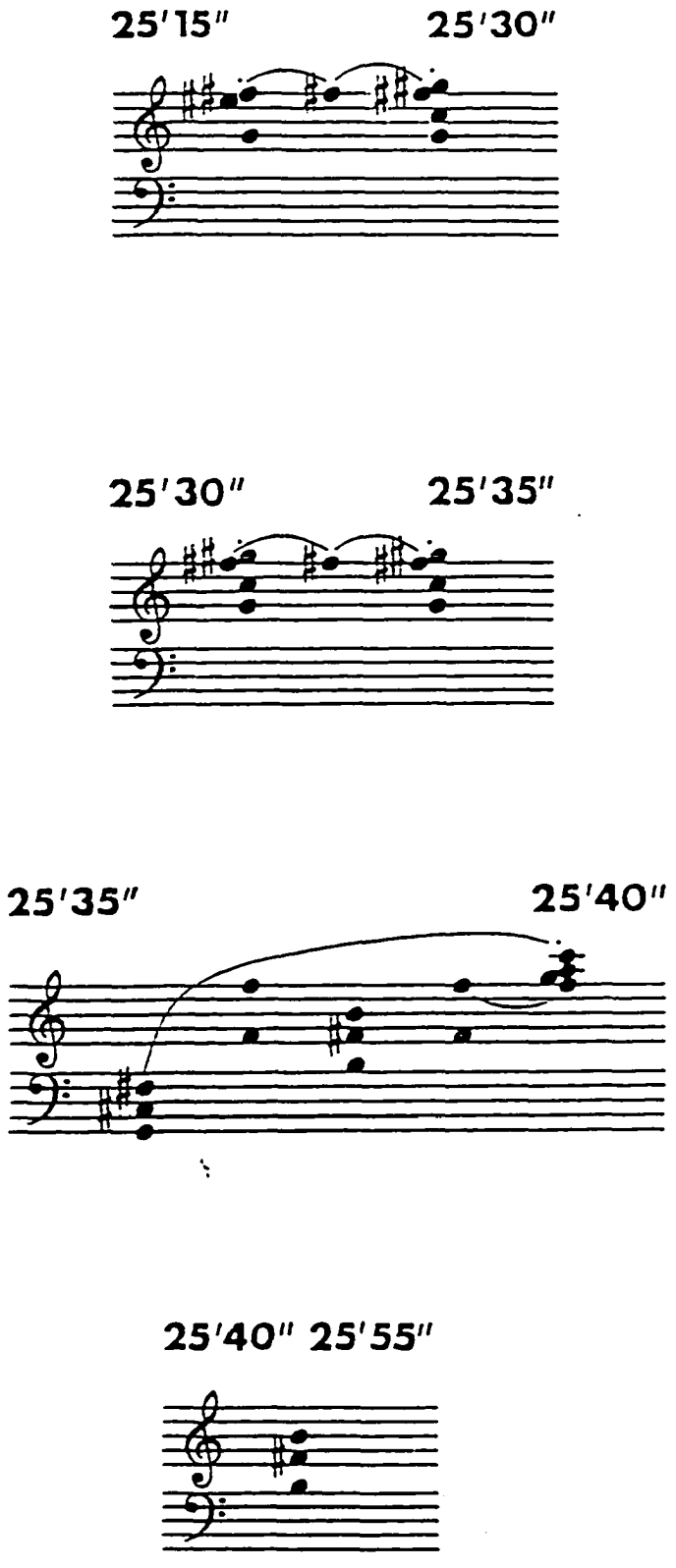
flexible ones. That means there are no two-way arrows, and the player begins and ends at a specific time-point. An interlude in *Music for...* is five, ten, or fifteen seconds in total duration. Interludes consist of phrases which are made up of a small number of notes or sonorities in varying patterns. They are to be played freely with respect to dynamics and the durations of single notes, normally with respect to timbre. In Example 3.13 four consecutive interludes from the Piano I part are shown, with durations of fifteen, five, five, and fifteen seconds respectively. In Cage's parts for other instruments, he comes up with different notational solutions. In the voice part, shown in Example 3.14, pieces are notated in entirely different tablature than are interludes. Specific pitches are left to the choice of the performer in both cases. However, Cage employs a two-line, percussion-like system in the interludes, whereas both sorts of pieces resemble those in Examples 3.11 and 3.12, different from those brackets only in that they are indeterminate with respect to pitch.

Cage specifies that players prepare their parts by themselves, not coming together to rehearse jointly until they have learned how to play with their own chronometers (in other words, when they can play fully independently from one another). Players may sit anywhere within the performance space with respect to the audience and to each other. In this manner Cage hopes for the parts "to be played as though from different points in time."[39] The work is thirty minutes long, although a performance of shorter length can be given if a time-length is agreed upon and each player independently chooses a sequence of pieces and interludes that lasts approximately that length.

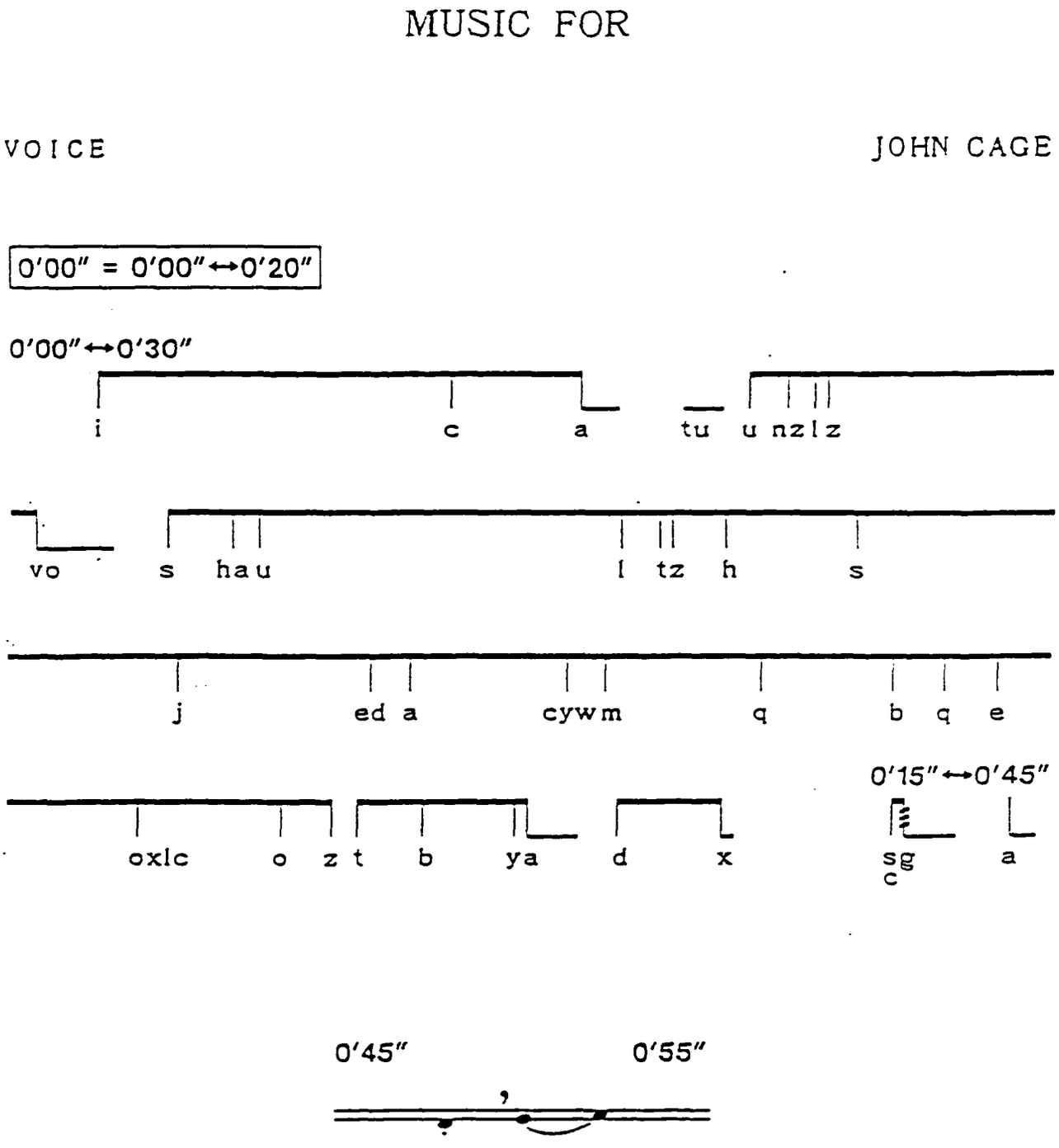
The time-structures in *Music for...* mark the first change in that element since *Thirty Pieces for Five Orchestras*, another sign that this

[39] John Cage, performance notes for *Music for...*, in *John Cage: Writer*, 138.

Example 3.13 - *Music for...*, four consecutive interludes in Piano I part, detail from p. 7.



Example 3.14 - *Music for....* mixture of pieces and interludes in voice part. first two time-brackets. p. 1.



series represents a development in Cage's thinking. Bracket structure is treated with far greater sophistication than in *Thirty Pieces for String Quartet*: it becomes a matter exposed to the element of play, considered worthy of exploration in its own right.

Where Cage used time-structures of balanced proportions in the 1981-83 works, in *Music for...* these structures are asymmetrical. I refer back to the three factors comprising symmetry that I outlined earlier:

1. *The time spans governing the start and end of a system are usually the same, but there are exceptions.* One such exception occurs in the fourth bracket of the voice part, where twenty-five seconds are available for the start of the system and forty-five seconds are available for the ending of the same system.
2. *In the pieces, the overlap time between the start and end of one system is always the same. In the interludes, there is no overlap because there is only one time span.* When, in a piece, there is any overlap at all between the end of one system and the start of the next, the overlap is fifteen seconds. An example of this occurs in the piano I part between the last timing of the third bracket (3'10") and the first timing of the fourth bracket (2'55").
3. *The time spans governing the start and end of a system stand in a variety of ratios to the overlap times belonging to them.* Though the overlap times are always fifteen seconds, the time spans vary from twenty-five to, more often, thirty (2:1 ratio), forty-five (3:1), sixty (4:1), and seventy-five (5:1) seconds.

All seventeen parts in *Music for...* are generated individually with no intended relationships, and this anarchic principle extends as well to the dimension of time-structure. Each part has a different amount of time-brackets, which in turn have varying bracket-lengths. In addition, each of

the seventeen parts contain a unique sequence and distribution of pieces and interludes. The time-structure for the Piano I part is given below. The first time-bracket is an example of a piece, as it contains two time spans, while the second, with only one span, is that of an interlude. The number directly above each span denotes that span's overall length in seconds.

Music for... (Piano I)

	60"		60"
1.	0'00"- 1"00"		0'45" - 1'45"
		10"	
2.		1'45"- 1'55"	
	45"		45"
3.	1'55"- 2'40"		2'25" - 3'10"
	75"		75"
4.	2'55"- 4'10"		3'55" - 5'10"
		15"	
5.		5'10"- 5'25"	
	30"		30"
6.	5'25" - 5'55"		5'40" - 6'10"
		15"	
7.		6'10" - 6'25"	
		10"	
8.		6'25" - 6'35"	
	45"		45"
9.	6'35" - 7'20"		7'05" - 7'50"
	75"		75"
10.	7'35" - 8'50"		8'35" - 9'50"
		10"	
11.		9'50" - 10'00"	
		5"	
12.		10'00" - 10'05"	
		5"	
13.		10'05" - 10'10"	
	60"		60"
14.	10'10" - 11'10"		10'55" - 11'55"
		10"	
15.		11'55" - 12'05"	
	60"		60"
16.	12'05" - 13'05"		12'50" - 13'50"
		15"	
17.		13'50" - 14'05"	
	75"		75"
18.	14'05" - 15'20"		15'05" - 16'20"
	45"		45"
19.	16'05" - 16'50"		16'35" - 17'20"
	30"		30"
20.	17'05" - 17'35"		17'20" - 17'50"
		15"	

21.		17'50" - 18'05"	
		10"	
22.		18'05" - 18'15"	
	60"		60"
23.	18'15" - 19'15"		19'00" - 20'00"
	30"		30"
24.	19'45" - 20'15"		20'00" - 20'30"
		10"	
25.		20'30" - 20'40"	
		15"	
26.		20'40" - 20'55"	
		5"	
27.		20'55" - 21'00"	
	75"		75"
28.	21'00" - 22'15"		22'00" - 23'15"
	75"		75"
29.	23'00" - 24'15"		24'00" - 25'15"
		15"	
30.		25'15" - 25'30"	
		5"	
31.		25'30" - 25'35"	
		5"	
32.		25'35" - 25'40"	
		15"	
33.		25'40" - 25'55"	
	75"		75"
34.	25'55" - 27'10"		26'55" - 28'10"
	30"		30"
35.	27'55" - 28'25"		28'10" - 28'40"
	45"		45"
36.	28'25" - 29'10"		28'40" - 29'25"

There are thirty-six time-brackets in this piano I part, evenly distributed between pieces and interludes. While there is a fifteen-second overlap between the end of one system and the start of the next in eight instances (between time-brackets 3/4, 9/10, 18/19, 19/20, 23/24, 28/29, 34/35, and 35/36), there is no overlap in twenty-eight of them. Incidentally, the fact that the overlap time between the start and end of the system in the final bracket is not fifteen but thirty seconds is not something I would truly consider exceptional. Rather, I consider it a "completion," a filling-out of the time-structure.

Below is the time-structure for the voice part. In addition to all the variance of bracket lengths, time span ratios, and sequence/distribution

between this and the piano I part, note that in the fourth bracket the time span for the start of the system is twenty-five seconds, while that for the end is forty-five.

Music for... (Voice)

	30"		30"
1.	0'00" - 0'30"		0'15" - 0'45"
		10"	
2.		0'45" - 0'55"	
	30"		30"
3.	0'55" - 1'25"		1'10" - 1'40"
	25"		45"
4.	1'45" - 2'10"		1'55" - 2'40"
	60"		60"
5.	2'25" - 3'25"		3'10" - 4'10"
	75"		75"
6.	4'10" - 5'25"		5'10" - 6'25"
	45"		45"
7.	6'10" - 6'55"		6'40" - 7'25"
	60"		60"
8.	7'10" - 8'10"		7'55" - 8'55"
	75"		75"
9.	8'40" - 9'55"		9'40" - 10'55"
		10"	
10.		10'55" - 11'05"	
		5"	
11.		11'05" - 11'10"	
		5"	
12.		11'10" - 11'15"	
	60"		60"
13.	11'15" - 12'15"		12'00" - 13'00"
		10"	
14.		13'00" - 13'10"	
	60"		60"
15.	13'10" - 14'10"		13'55" - 14'55"
	30"		30"
16.	14'40" - 15'10"		14'55" - 15'25"
	75"		75"
17.	15'10" - 16'25"		16'10" - 17'25"
	30"		30"
18.	17'10" - 17'40"		17'25" - 17'55"
		5"	
19.		17'55" - 18'00"	
	30"		30"
20.	18'00" - 18'30"		18'15" - 18'45"
		5"	
21.		18'45" - 18'50"	
	45"		45"

22.	18'50" - 19'35"		19'20" - 20'05"
		10"	
23.		20'05" - 20'15"	
	30"		30"
24.	20'15" - 20'45"		20'30" - 21'00"
		15"	
25.		21'00" - 21'15"	
		15"	
26.		21'15" - 21'30"	
	60"		60"
27.	21'30" - 22'30"		22'15" - 23'15"
		15"	
28.		23'15" - 23'30"	
		10"	
29.		23'30" - 23'40"	
		15"	
30.		23'40" - 23'55"	
	45"		45"
31.	23'55" - 24'40"		24'25" - 25'10"
		5"	
32.		25'10" - 25'15"	
		15"	
33.		25'15" - 25'30"	
		5"	
34.		25'30" - 25'35"	
		5"	
35.		25'35" - 25'40"	
	60"		60"
36.	25'40" - 26'40"		26'25" - 27'25"
	60"		60"
37.	27'10" - 28'10"		27'55" - 28'55"
	30"		30"
38.	28'55" - 29'25"		29'10" - 29'40"

There are thirty-eight time-brackets in this part, divided into twenty-one pieces and seventeen interludes. Not only is there no overlap between the end of the third bracket and the start of the aforementioned fourth, but there is a five-second *gap*. There is, as in the piano I part, a fifteen-second overlap between the end of one system and the start of the next in eight instances (between time-brackets 4/5, 6/7, 7/8, 8/9, 15/16, 16/17, 17/18, and 36/37), but there is no overlap in thirty of them.

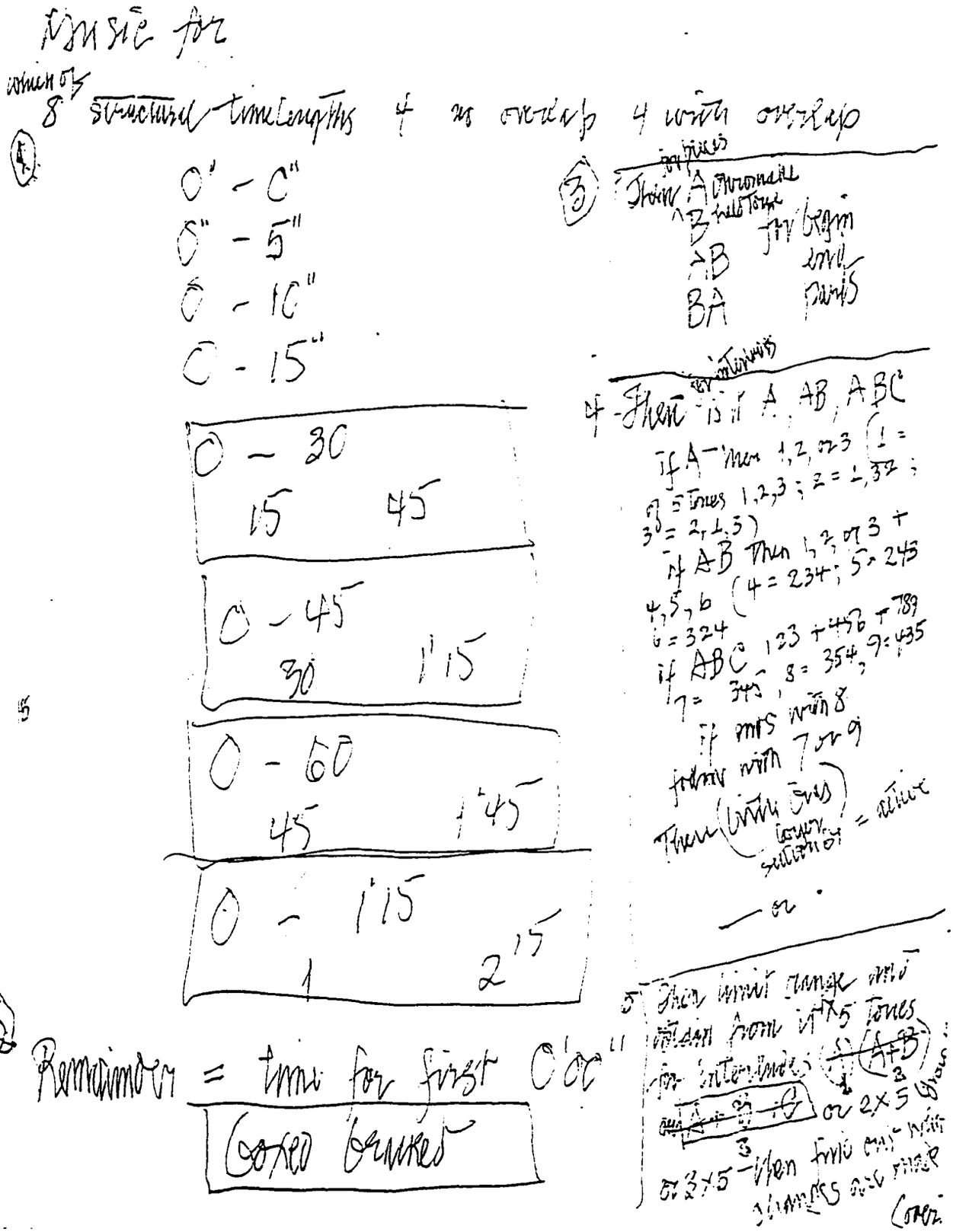
Studying his sketches for *Music for...*, one sees precisely how Cage was dealing with the potential complexity latent in these very issues. They are illuminating because Cage's generative processes often centered on the

questions he would ask. Asking questions took the place of what he called a "value judgment"; chance operations could be used to fill in detail.[40] Example 3.15 is an early sketch which shows how Cage was toying with different bracket lengths, experimenting with a pool of eight possible timelengths, four with overlap, four without. This idea, of course, would manifest itself as the structural division into pieces and interludes. Initially Cage thought of two distinct material-types, "chromatic" and "held tone." The term "chromatic" was most likely a lingering trace from *Thirty Pieces for String Quartet*, composed the preceding year. Cage also sketched out different time-bracket scenarios, as in Example 3.16, where progressively longer time lengths overlap each other, but where the overlap is always the same, fifteen seconds. This idea is clearly present in the final version, where the overlap time between the beginning and end of one system and between the end of one system and the start of the next is always fifteen seconds, no matter whether the internal time lengths are twenty-five, thirty, forty-five, sixty, or seventy-five seconds.

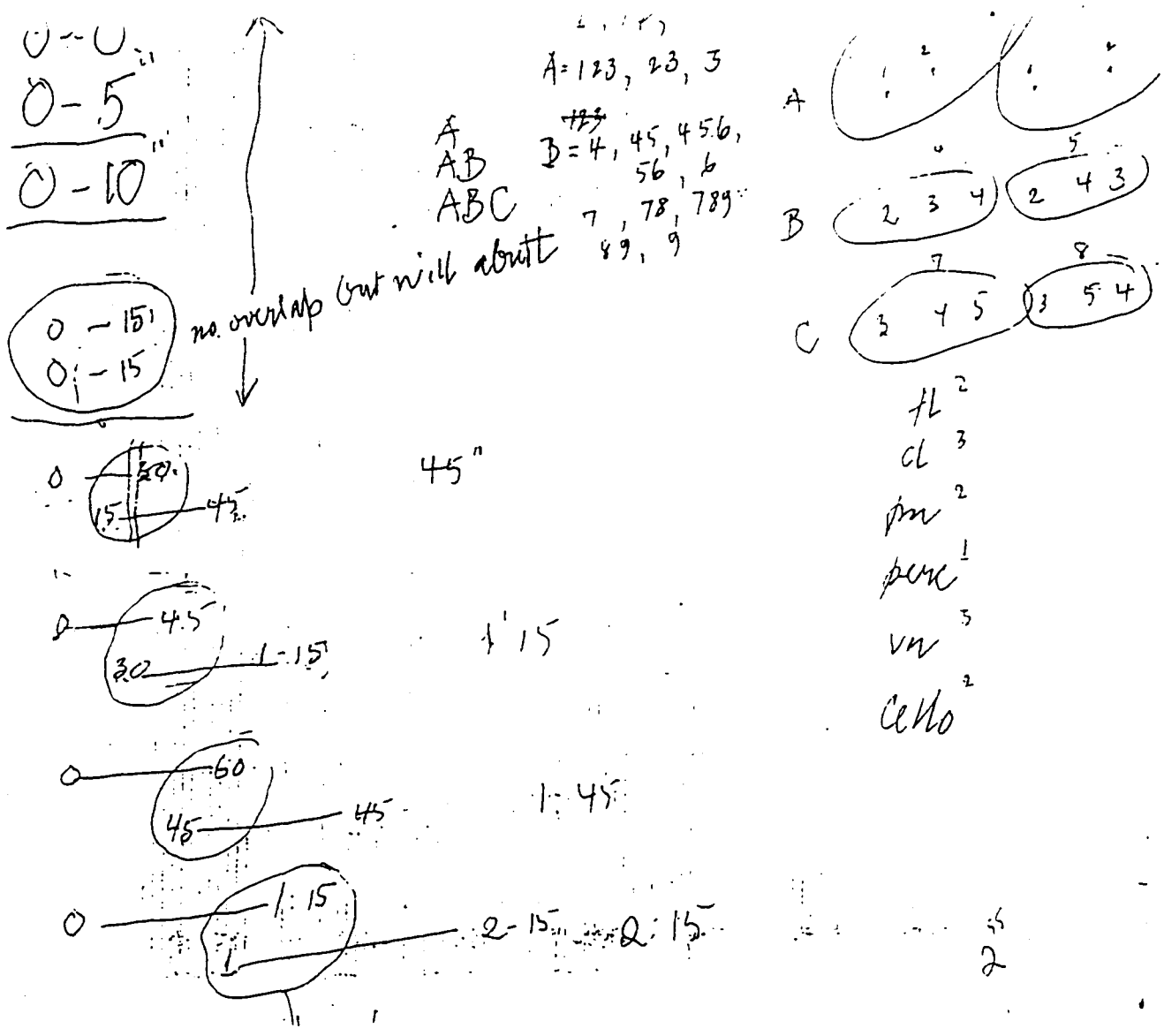
Once he had run this information through *ic* and *tic*, Cage was interested in seeing what the result looked like in terms of the structure, symmetry, and flow of the time-brackets themselves. I am certain these sketches do not in any way refer to pre-compositional choices. A number of them show how Cage charted out the movement and overlap of material within the time-brackets. Example 3.17 is a kind of charting out of points and numbers in space. Given the presence of another sketch on the following page which assigns numbers to instruments, 1 denotes the percussion part, 2 the piano, and 3 the clarinet. Because in his performance notes to *Music for...* Cage specifies that players may sit

[40] For Cage, making a "value judgment," meaning to view one object as better or worse than another, was an absolute waste of time. Cage wished to replace the value judgment with the observation, which he felt was more conducive to the proper business of art and life, namely curiosity and awareness.

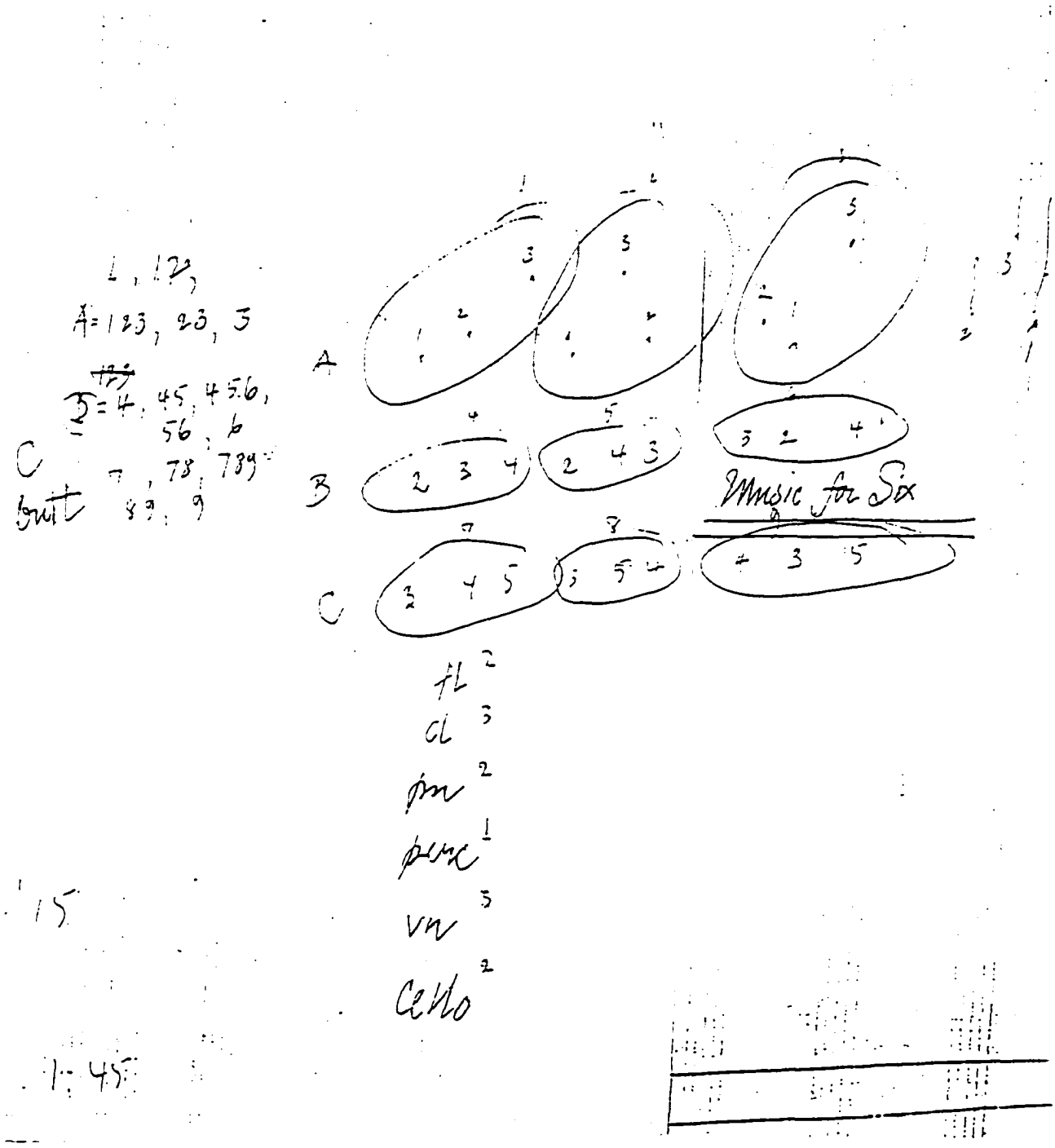
Example 3.15 - Sketch for *Music for...* Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



Example 3.16 - Sketch for *Music for...* Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



Example 3.17 - Sketch for *Music for...* Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts. Research Division.



wherever they wish in the hall or space, he probably is not interested in positions of sound-sources. What this might be is a speculative sketch regarding the verticalization in spatial terms of the time-bracket flow of these three parts.

In Example 3.18 Cage sketches out a thirty-minute timeline for the first six parts he realized, graphing time lengths for the top three (flute, clarinet, and percussion). The numbers in boxes above the indication of flute and clarinet on the left refer to the number of pitches to which Cage was limiting himself on those respective instruments. Circled on the right are the times remaining from each of the three parts. For example, the 1'20" remaining in the flute part means that Cage generated 28'40" worth of time-brackets. This meant, of course, that the 1'20" would be included in the beginning of the part as the available "stagger" time. Example 3.19 is similar, a timeline using blackened-in lines denoting different time lengths. I believe this timeline was made congruent to Example 3.16, where Cage was experimenting with asymmetrical and progressively longer lengths. The two examples appear on the same sketch-page.

Being present at the creation of *Music for...*, Andrew Culver believes that Cage's governing impulse was at first an interest in mixing different ways of writing and playing inside one piece.[41] This was realized by making it a series of many small pieces composed in two or three different ways. Once that had been achieved, the logical next step was a complete independence of parts, each player centered on a unique sequence of pieces, "the presence or lack of others irrelevant."[42] For Cage, such an arrangement served objectives both practical and philosophically fanciful.

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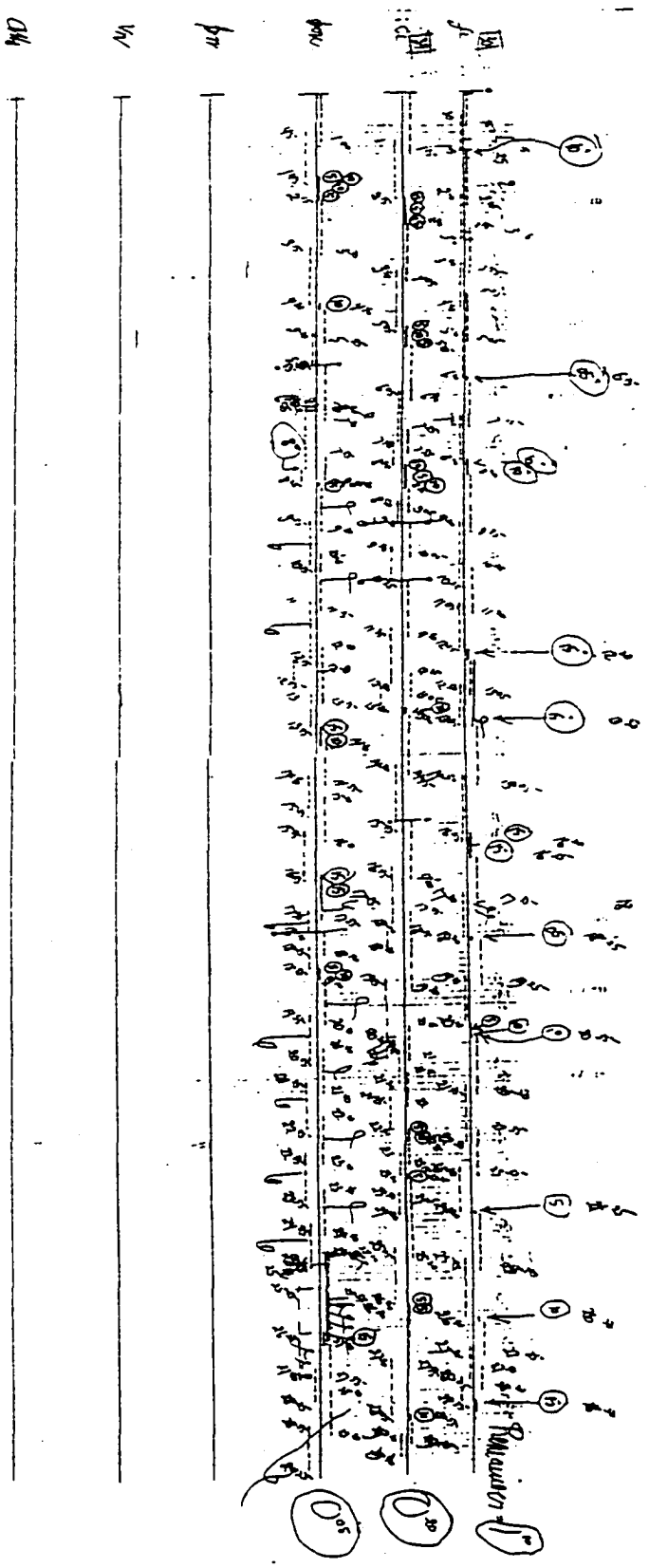
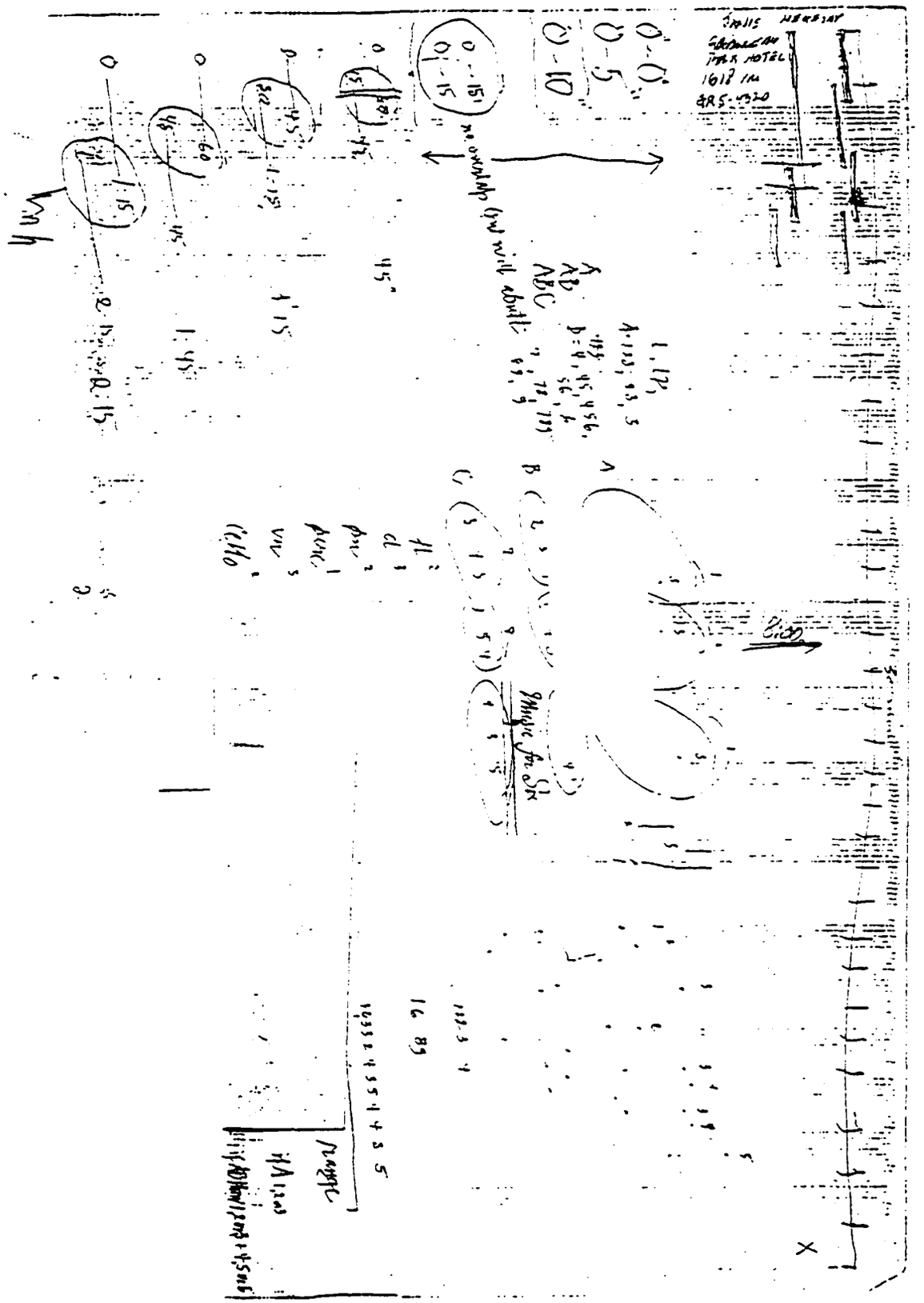
[41] This contention is backed up by a note in one of Cage's sketches for *Music for...*, isolated within a plan for limiting instrumental ranges: "diff. ways of playing same instr. or pitch, etc." (Courtesy of The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division, Folder 795).

[42] Culver, "A Note and a Table in the 10th Year," 24.

Example 3.18 - Sketch for *Music for...* Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



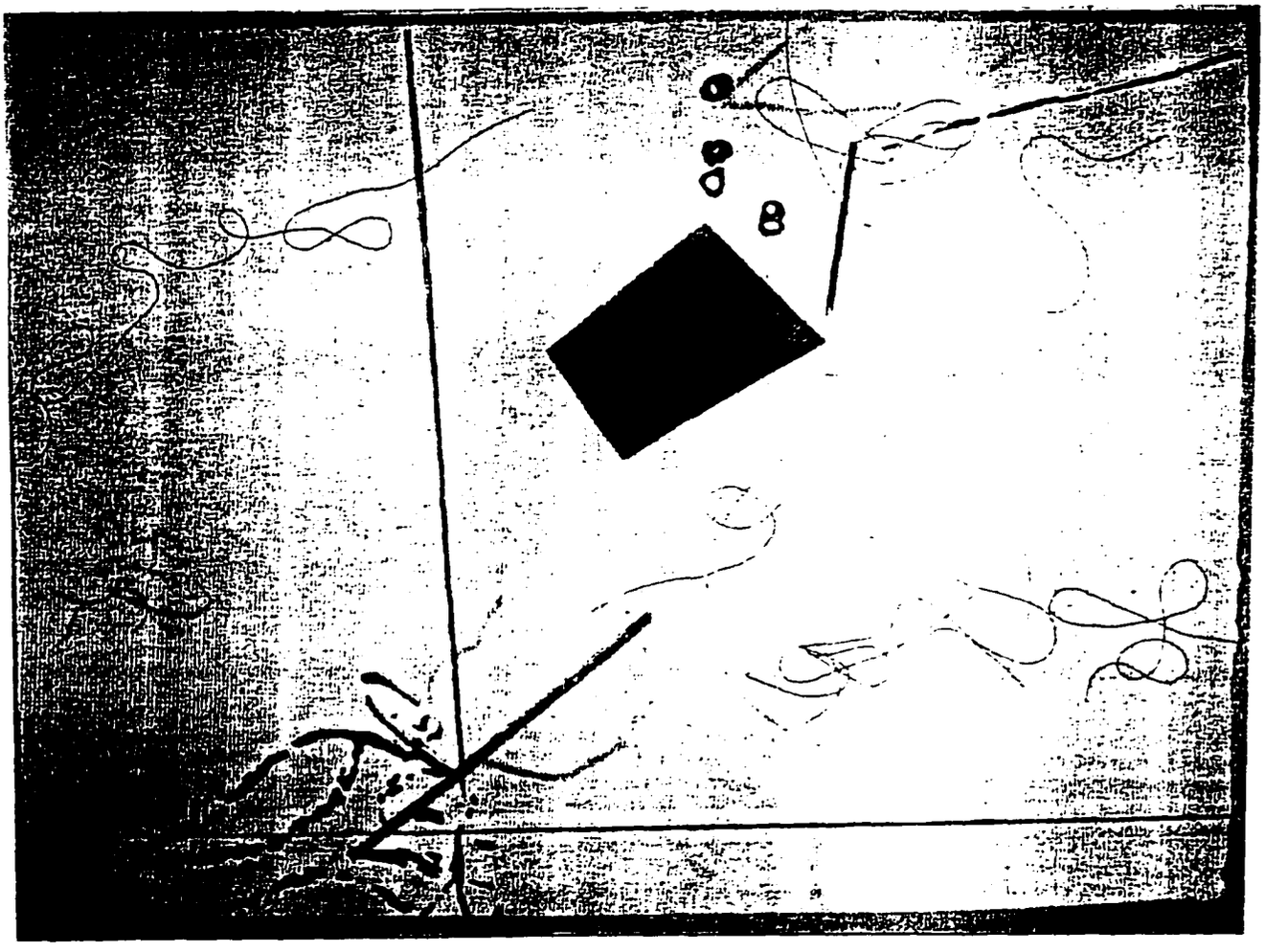
Example 3.19 - Sketch for *Music for...* Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



Practical, because a method was evolving where Cage's needs for complexity and multiplicity could be satisfied in a remarkably simple and economical fashion. Cage was merely multiplying simple means to achieve a complex situation where it was exceedingly difficult to sense in listening any trace of method, artifice, or planned connection. I say "philosophically fanciful" because Cage was moving ever closer to that McLuhanesque ideal of each thing making its own time and space, that "pluralism of many kinds of things co-existing." As mentioned earlier, the desire to "uncontain" matter from time occurs in an environment in which a composer makes more and more conciliations to artifice.

As I showed with *Thirty Pieces for Five Orchestras* and *On the Surface*, a good way to enter Cage's notational mindset for *Music for...* is to see if there exists any sort of companion graphic work. It may be useful to study Cage's series of prints entitled *Dèreau* (1982), executed a few years before *Music for...* and possibly informative as to its methods. *Dèreau* employs five types of images: a circle, a horizon line, blocks of parallel lines, patches of aquatint, and random curves. From print to print these image-types move freely against a backdrop of environmental drawings from Thoreau's *Diaries*. All five are present in Example 3.20, which is the tenth print from the series (Thoreau's drawings can be found in the bottom-left corner). Just as the same well-defined and distinctive images overlap and interact with each other, there is a similar quality in *Music for...* of "monolithic" material-types set in constant recombination. Compare the five image-types in *Dèreau* to the repeated, sustained single tones, the recurring patterns of the interludes, and the freer, proportionally notated pieces endowed with the property of variety with regards to pitch, dynamics, and expression that clearly delineate them from the other two. As James Pritchett puts it, "one can almost *see* these elements as they drift

Example 3.20 - *Dèreau #10*, 1982. One of 38 related color etchings with aquatint, engraving, photoetching, and drypoint. 18.5" x 24.5". Courtesy Crown Point Press, Oakland.



across the space."[43] This sense of a free-floating presentation of recurring, monolithic material was an element which, while not new for Cage, had never been explored by him in this organized a fashion. It was a feature he would further explore in his *Europeras* (with the entire eighteenth- and nineteenth-century operatic canon as homogeneous source material for manipulation), as well as in works such as *Four* (1989) for string quartet, where Cage chooses pitch material that, when presented in this free-floating manner, carries heavily triadic implications. Later in this chapter I will evaluate *Four* in the larger context of the number pieces.

Andrew Culver has spoken of a two-dimensionality inherent in the premise of the time-brackets, a combination of the material and the time-sense that substantially alters one's performative response to it.[44] From a purely phenomenological standpoint, Cage's asking the question of where to situate each sustained tone on the page in the "pieces" helps contribute a sense of field. According to Paul Sadowski, what Cage was trying to avoid was a situation in which the performer would see a bracket, a pitch, and begin performing that pitch right at the beginning.[45] So as to elude a symbol/response casuality, Cage established a grid on which he could keep graphic position in a state of play familiar though in flux just enough constantly to reorient the performer's mindset. Compare the placement of sustained tones in selected pieces from the piano I and voice parts of *Music for...*, as lined up vertically in Examples 3.21a-b.

The cumulative effect is of a kind of check on the performer's behavior that, when merged with a sparseness of information to process (especially in the case of the pieces in *Music for...*), helps generate a remarkable gestural purity. Again, it must be noted that this was not a new

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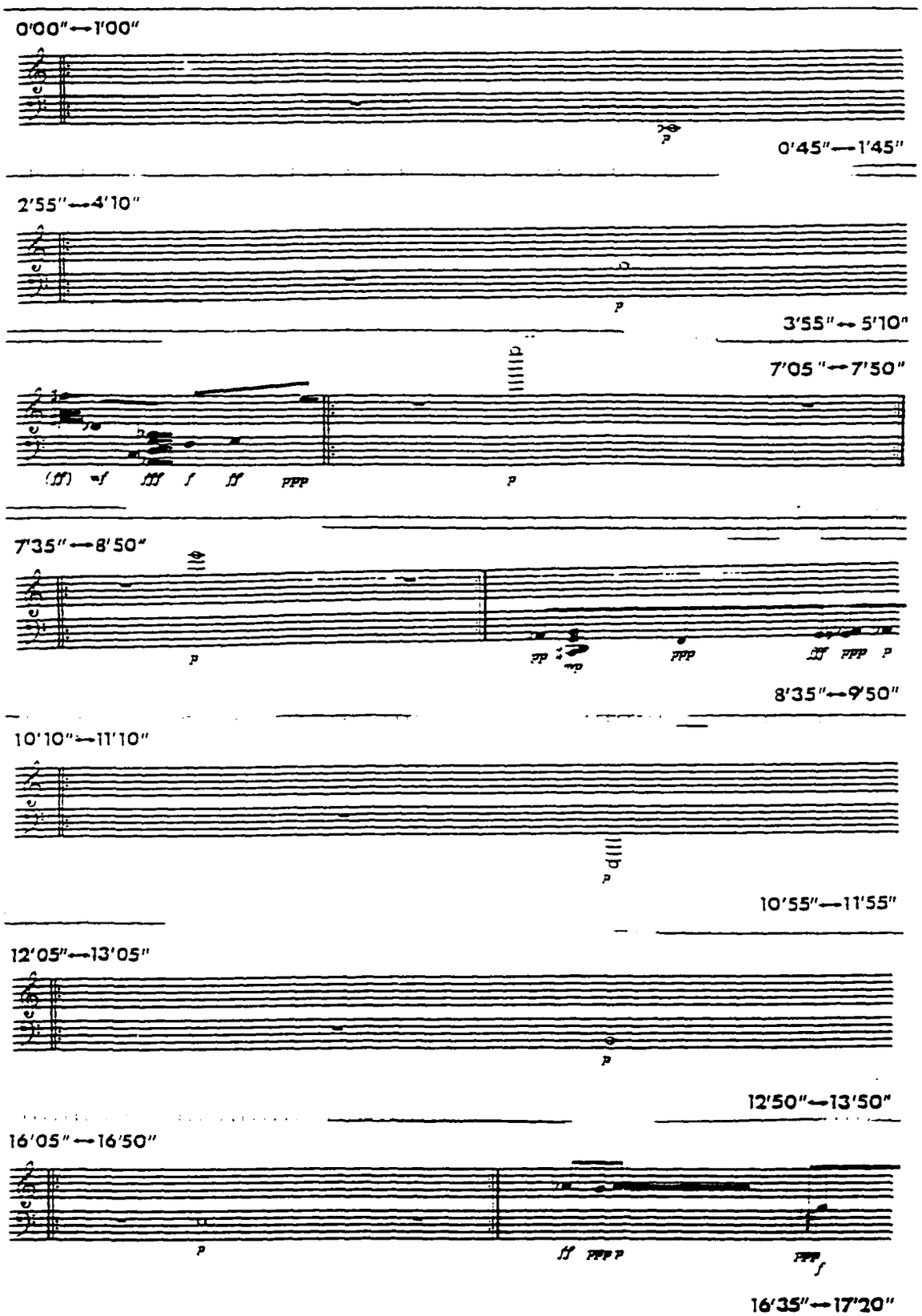
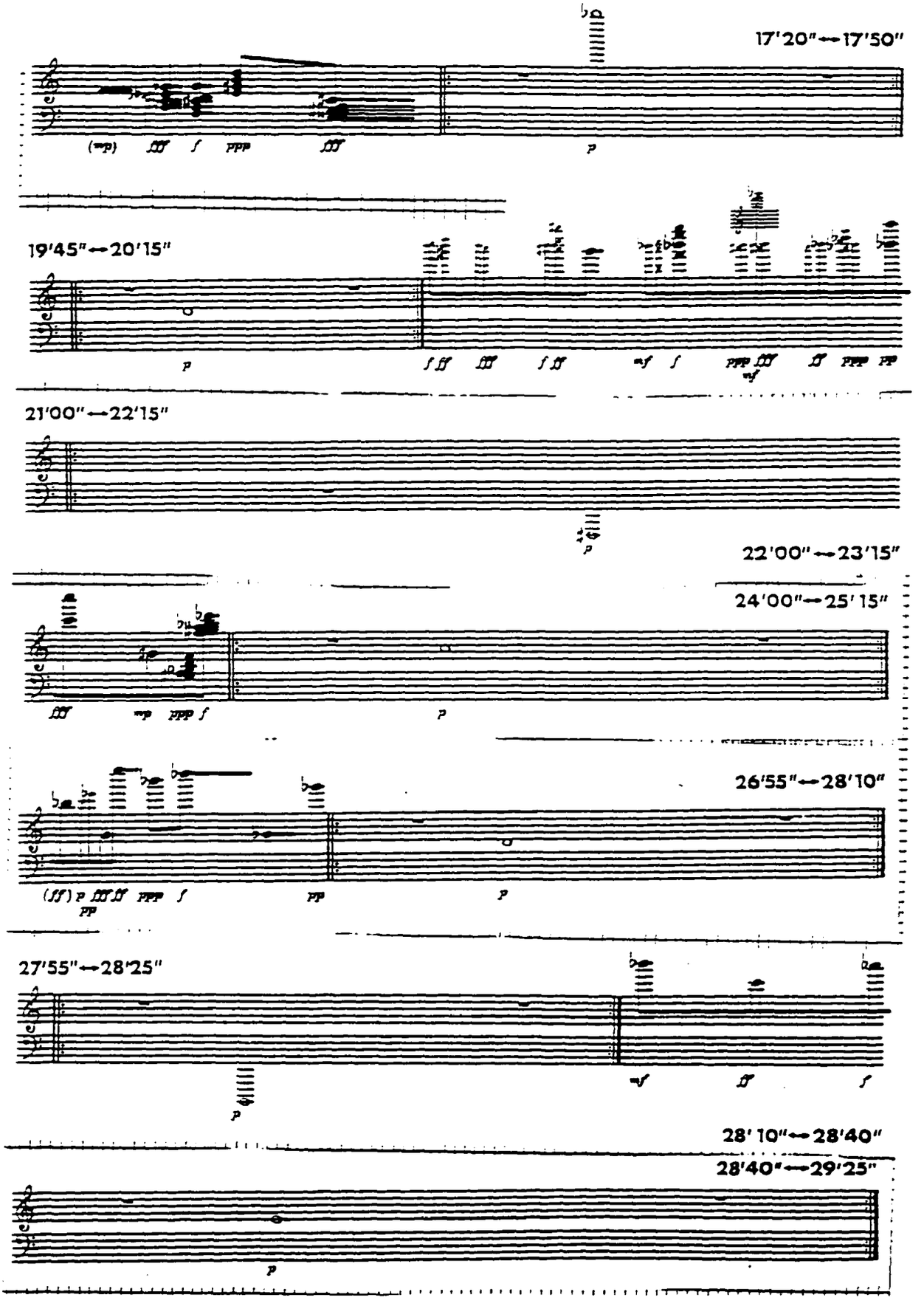
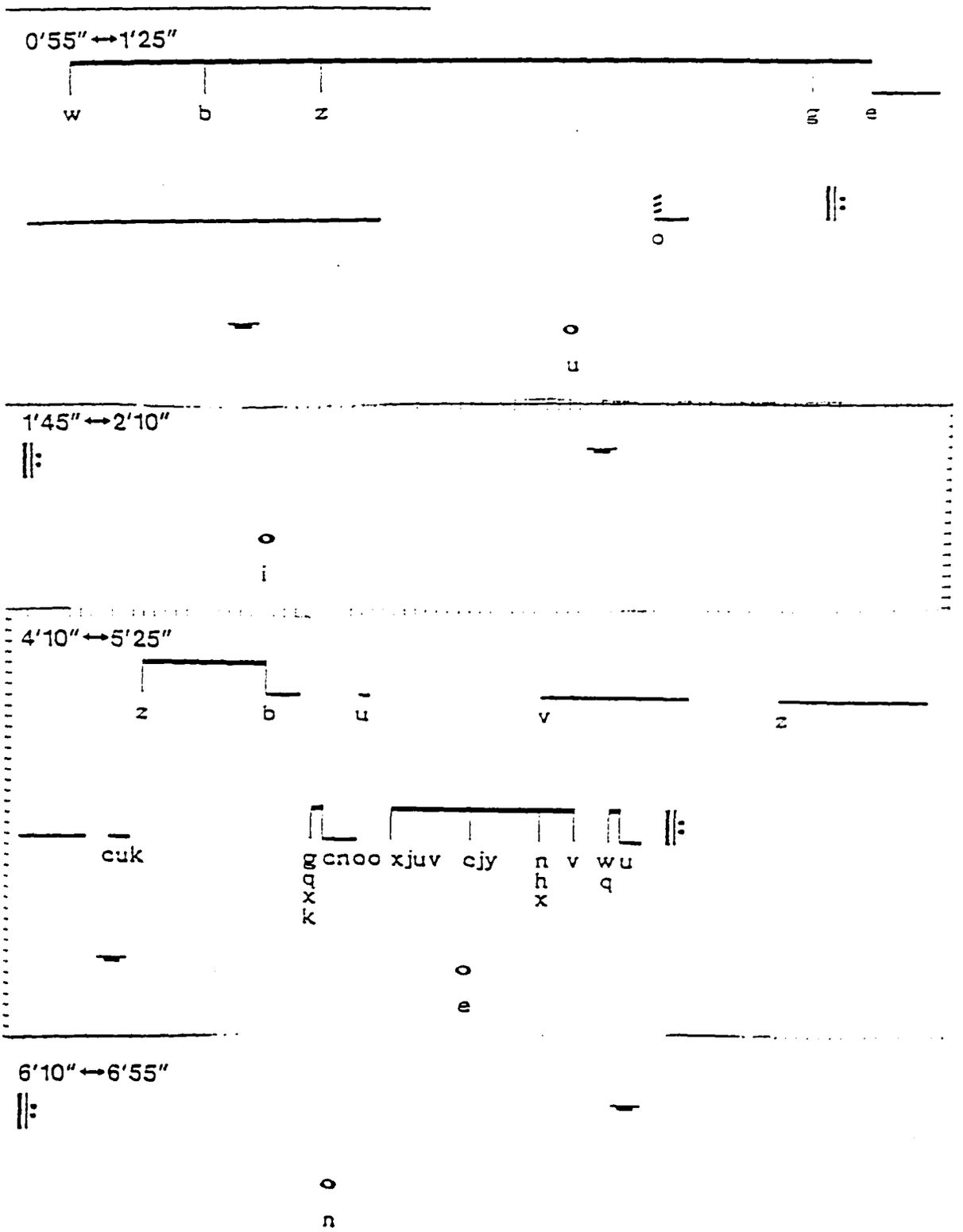
[43]James Pritchett, *The Music of John Cage*, 189.
[44]Andrew Culver, in conversation with the author, January 10, 1997.
[45]Paul Sadowski, in conversation with the author, December 27, 1996.

Example 3.21a - Vertical alignment of selected pieces in Piano I part of *Music for...*





Example 3.21b - Vertical alignment of selected pieces in Voice part of *Music for...*

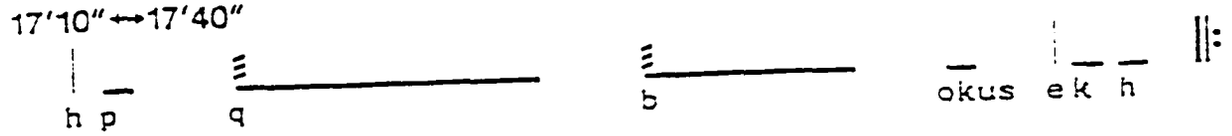


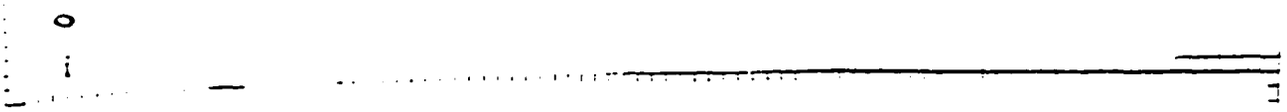
8'40" ↔ 9'55"

11'15" ↔ 12'15

14'40" ↔ 15'10

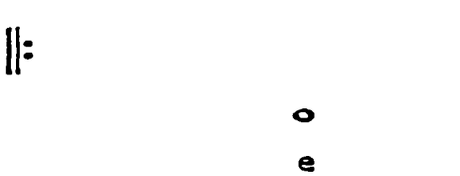
17'10" ↔ 17'40"

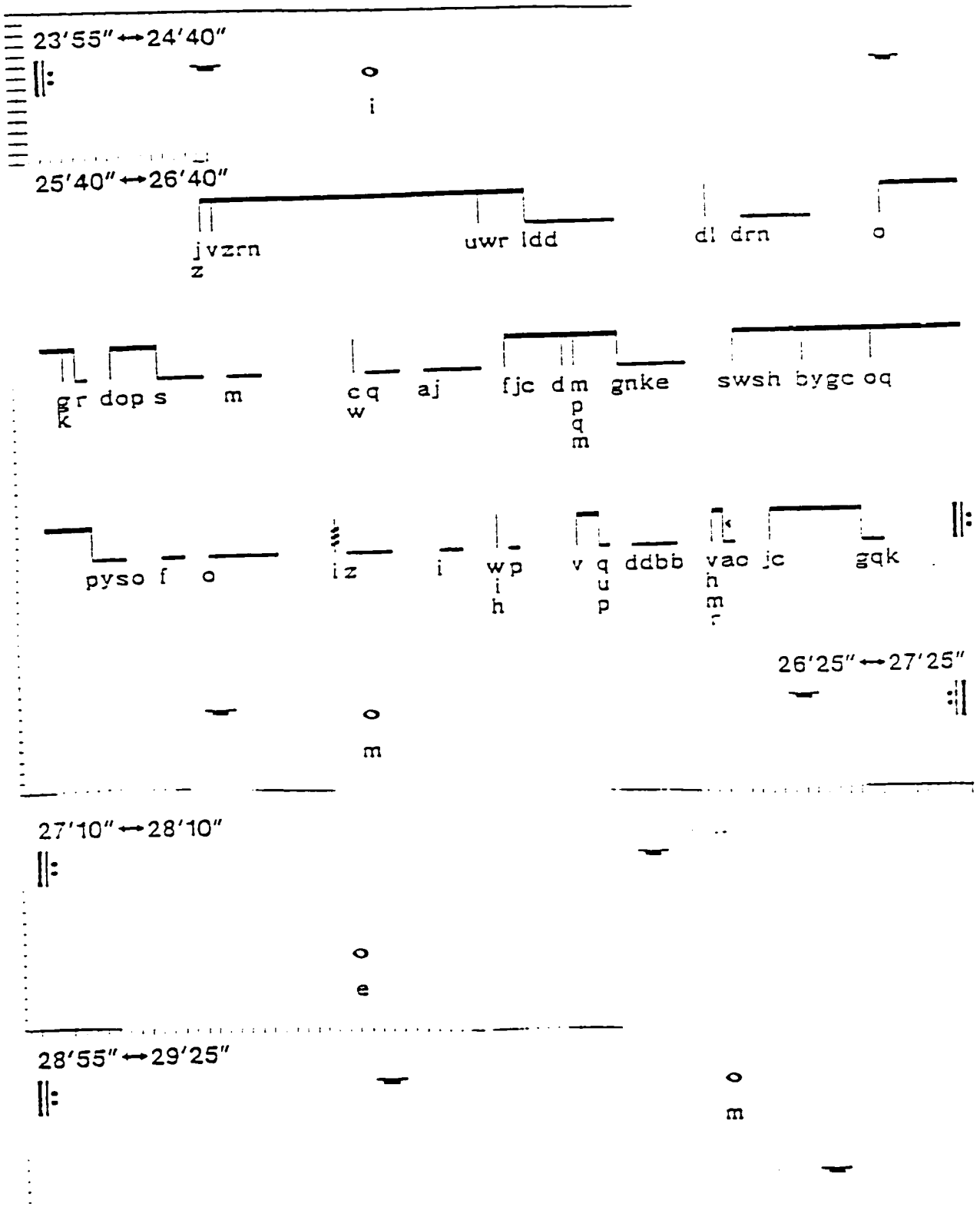




18'00" ↔ 18'30"

21'30" ↔ 22'30"





concern of Cage's; works such as *0'00"* (1962) also reflected an interest in purity of gesture. But Cage's practice of merging content-based and presentational considerations to coax and induce a thoughtful "centering" of each individual tone was a fresh development in his works of the 1980s. This development began in *Ryoanji* and would be perfected in the number pieces, the apotheosis of Cage's graphic influence. *Music for...* is significant because Cage has gradually arrived at a type of material to match his notation, and a means of communicating it that is concentrated yet flexible. Indeed, it calls to mind what the Mexican poet/critic Octavio Paz wrote in relation to Duchamp's *Large Glass*: "purity requires that the gesture should be realized in such a way that it seems as little like a *choice* as possible."[46]

What could be viewed as a new, accommodationist stance on Cage's part, a fresh simplicity occasioned by a rediscovery of elements of common-practice musical rhteoric, can also be seen as a redefinition of how we think about control and structural issues. We are now faced with a modified and relativized environment, one where context and localized, shifting foci become informative to the notion and assignment of "limits." This is not so unrelated to the "Korean unison" in the orchestral version of *Ryoanji*, merely the same concept applied to different parameters. The sustained tones fall randomly within limited and well-defined notational gamuts; the pieces and interludes are given a strong sense of context and "meaning," then collide and interact in constant yet not aurally unlimited recombination. These sort of vertical relationships are in line with a certain definition of chaos as not altogether that "chaotic," but a series of randomly generated "moves" within a localized field. Cage used the term

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[46] Octavio Paz, *Marcel Duchamp: Appearance Stripped Bare*, trans. Rachel Phillips and Donald Gardner (New York: Seaver Books, 1978), 28.

"earthquake-proof" to describe the kind of vertical relationships produced where "variable structure" is determining the large-scale, durational (read "horizontal") morphology:

> It was part, I thought, of a movement in composition away from structure into process. Away from an object having parts, into what you might call weather. Now I see that the time-brackets took us back from weather (which had been reached) to object. They made an earthquake-proof music, so to speak, music the parts of which can move with respect to each other. It is not entirely structural, but it is at the same time not entirely free of parts.[47]

By "weather" Cage is implying a structurally undifferentiated experience. With a delightful reference to the New Testament, he called this "the peace which passes understanding," or, on another occasion, "a music that can't be taught."[48] Cage rediscovers and returns to the object by means of time-brackets, which impose a new dimensional layer, alter performance behavior, and create a new sense of musical space. However, as I have maintained in my discussion of *Ryoanji*, Cage also rediscovered and returned to the object by means of the notational system unique to that work. And once Cage arrived at the number pieces, as we shall soon see, he would often ask a work to answer a single question or devote it to a single narrative idea, such as the transfer of a melody from one low-registered instrument to another in *Seven*^{2} (1990). What is invariant in all three evolutionary stages I just mentioned, however, is that notational considerations provide Cage with the possibility of an "object" that meets with his satisfaction.

In what is still the only published biography of Cage, the British composer/critic David Revill likens this "earthquake-proof" structural thinking to that of "an Oriental house made with sliding doors and panels,"

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[47]Cage, *I - VI*, 442.

[48]John Cage, "King of the Avant-Garde," interview by Michael John White, *Sunday Observer*, September 26, 1982. Reprinted in *Conversing With Cage*, 284.

where "the different instrumental parts do not coincide in any fixed way."[49] Compared to the "Ten Thousand Things" series of the 1950s (such as *26'1.1499" for a String Player*, 1955), and the series of *Variations* from the 1960s, *Music for...* is Cage's most structured music since the pre-1951 rhythmic structure works (not counting pieces employing quoted or referential material, which often adds a deceptive patina of coherence). As Cage notes in a Harvard lecture, *Music for...* is not entirely structural because there is not even a clear beginning; even 0'00" is staggered and subject to simultaneous overlapping. What time-brackets are capable of in this regard is in ensuring predictiveness on a very remote and distant scale global in its proportions. We can safely foresee a large-scale pitch outcome in this music, in which certain vertical combinations could conceivably occur. But then to take the next step and specify such combinations is often gratuitous even if, as in *Four*, diatonic referents are latent. The structure and division into parts carries with it such flexibility that one realizes after a while that what is really being parsed here is a disciplined disorientation, a planned absence of place that is hardwired to survive any manner of architectonic disruption. The two-way arrow of the time-bracket signifies not only a lack of forward, "horizontal" motion but a view of motion that both defies and transcends any sense of past, present, or future. Rather, as both Cage's Zen Buddhist orientation and his McLuhan-inspired revolt against the depersonalization of time would manifest themselves, there is only a "permanent present." Time brackets *repersonalize* time by subverting its very mechanism of delivery, by turning it into a duality. The brackets read themselves both backwards and forwards, encoding themselves with an almost literary sense of narrativity, as if one can turn back twenty pages to check from where one has come at

[49] David Revill, *The Roaring Silence: John Cage: A Life* (New York: Arcade Publishing, 1992), 278.

the same time one is reading twenty pages forward. Or, like the Torah, time unscrolls itself in the brackets, from the middle outward. The question of motion in any direction becomes the wrong question to ask.

The number pieces (1987-92)

The final section of this chapter deals with the apotheosis of Cage's time-bracket technique, the "number pieces" series. These exquisitely wrought works are of a radical simplicity, an indication of Cage's growing sophistication and comfort with his use of time-brackets. There is a curious parallel development going on in these works; while the structure of the brackets themselves becomes more playful and complex, the content within them is progressively more pared down and "empty." In addition, the reconciliation with more traditional elements of musical discourse that had been stirring in *Ryoanji* and *Music for...* reaches a point of maturation in the number pieces. This characteristic lends these works a new air of relative conservatism that manages to coexist comfortably with Cage's long-held practices of indeterminacy and non-intention. In this section I will show how Cage employed computer-generated templates to aid in his composition of the number pieces, and how different works in the series explore different possibilities inherent in the time-bracket method.

Cage's progress from the *Music for...* series to the number pieces was not disjunct or by design. Rather, it reflected a process of working through a complex of issues having to do with practical as well as compositional considerations, and, as evidenced by Andrew Culver's recollections cited earlier, through Cage's response to performances of his music. By the end of this seamless, almost unconscious overlap of a transition, Cage emerged with a new, systematized elementary principle.

The year 1987 marked Cage's seventy-fifth birthday, an occasion commemorated by numerous performers and ensembles around the world with commissions for new works. As Cage endeavored to fulfill them all, he was in need of a way both to compose rapidly and to come up with titles for the works he completed. From a purely practical standpoint, the number pieces solved both problems beautifully. These works have come to be known as the "number pieces" because Cage uniformly gave them titles indicative of the number of performers required in each particular ensemble.[50] There are pieces ranging in size from *One* to *108*; in fact, there are twelve solo pieces. Each of them contains a superscript that refers to its rank in the chronological order of compositions sharing the same title and distinguishing it from all the others. So, for example, the second solo work is titled *One*^{2} (for piano, 1990), the fourth *One*^{4} (for solo drummer, 1990), the ninth *One*^{9} (for solo sho, 1991), and so on. Daniel Charles finds a telling kinship between Cage's method of numerological superscription and the postal divisions of the city of Tokyo, which are based on districts and blocks rather than streets and numbers.[51] Tokyo's plan drew the attention of the French literary critic Roland Barthes (1915-80), who characterized it as a "domiciliary obliteration," betraying a essential irrationality strongly associated with the Japanese sensibility and contrasted with the West's "urban toponymy." For Barthes, "Tokyo tells us again that the rational is only one system among others."[52]

Bringing this back to Cage, one can observe a Wittgenstein-esque "family likeness" in works having the same number but different

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[50] James Pritchett began the practice of calling these works "number pieces."

[51] Daniel Charles, "The Unison of Differences: Notes on *Four*^{3}, *One*^{5}, and *Two*^{6} by John Cage," sleeve-note for John Cage, *Vol. 12: The Number Pieces 1 - One*^{5}; *Two*^{6}; *Four*^{3}. Joste, Flammer, Alchourroun, Michaut. Mode 44.

[52] Roland Barthes, *L'Empire des Signes* (Genève: Editions d'Art Albert Skira S.A., 1970). Translated by Richard Howard as *Empire of Signs* (New York: Hill and Wang, 1982), 33.

superscripts. However, Barthes's "domiciliary obliteration" is also relevant to Cage's content as well as to what Charles terms the "irregular chronology" of the titling system. The phrase, after all, sounds very familiar to us after a discussion of "absence of place" in *Music for...*, a property whose scale would only be magnified in the number pieces. Here Cage addresses this very idea of musical "homelessness":

> I think the whole harmonic structure of Western music is based on having a home...wandering away from it and then coming back to it. A key, a mode, or a kind of repetitive music as we experience now, gives a sense of place. I think that's gone and what we're dealing with is an absence of that...a feeling of not knowing where you are in sound, but rather floating; of there being no terra firma. I found an absence, not knowing where one is in the sound. I think [the music]'s preparing us to be...homeless eventually.[53]

Seen in this light, the number/superscript is *a propos* of such a deterioration of structural moorings and general order. Even in works such as *103* (for orchestra, 1991) and *108*, the title transmits the impression that one-hundred-three or one-hundred-eight individual people are involved, not an orchestra. Even when Cage was composing for traditionally constituted forces, he sought to avoid any possibility of hierarchy, opting instead for a workable anarchy.

In all, Cage was able to produce forty-seven number pieces in the last five years of his life, twenty-three in his last year and seven just in October 1991 alone. This kind of output is extraordinarily prolific for a composer of any age, let alone one approaching his eightieth birthday. Indeed, a big part of that final explosion in 1991-92 consisted of works written in response to commissions honoring his birthday. Unquestionably one of the reasons Cage was working exclusively with number pieces by 1991 was the astonishing speed the method afforded him. The orchestra work *Seventy-four* (1992) illustrates this point. The American Composers

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[53] David Revill, *The Roaring Silence*, 278-79.

Orchestra faxed Cage a contract commissioning him for a work, which he received late in the morning of March 17, 1992. Working with Andrew Culver, he composed *Seventy-four* in a couple of hours, and the work was in Paul Sadowski's hands later that very afternoon. The rest of the day was spent laughing mischievously about the entire experience. As Mark Swed, the music critic of *The Wall Street Journal* puts it, Cage was

> almost like a latter-day Vivaldi producing formulaic concerti grossi on demand. Cage's New York loft turned into something of a number-piece factory.[54]

As with *Music for...*, the number pieces had their own special computer program written for Cage by Andrew Culver. *TBrack* (or *tb*) was written in 1990-91 to facilitate the generation of time-brackets for the number pieces.[55] Unlike *musicfor*, *TBrack* was not geared towards "content" decisions such as designating sequences of pieces and interludes. Those sorts of delineations disappear in the number pieces; anything we can discuss in the context of retrievable structure is derived from the time-brackets themselves. The fact that *TBrack* was intended strictly as a time-specific generating program should provide a clue as to the direction in which Cage was taking his method. It signals a growing preoccupation with pure time-structure, even at the expense of "content."

The way Cage used *TBrack*--the kinds of questions he was asking of it, the things he wanted it to do for him--in itself reflects an advance in sophistication and confidence from the *Music for...* series. To demonstrate how *TBrack* was utilized, let us follow the actual process he used to compose one of his number pieces. The process begins with Cage receiving a commission from "ensemble X" to write an instrumental work.

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[54] Mark Swed, "Cage and Counting: the Number Pieces," in *Rolyholyover A Circus*, ed. John Cage (Los Angeles: The Museum of Contemporary Art and New York: Rizzoli, 1993), 5.

[55] The relationship between *TBrack* and the number pieces composed before 1990 is similar to that between *musicfor* and all of the *Music for...* works. *TBrack* represented a codification of methods that were used for number pieces composed before that point.

He would then sit down at the computer with Andrew Culver, before a screen that showed the following setting: (Example 3.22)

Example 3.22 - Prepared setting for *TBrack* program

TBrack TBrack TBrack TBrack TBrack

Title _____ Bracket Types

Beginning End

Overlap

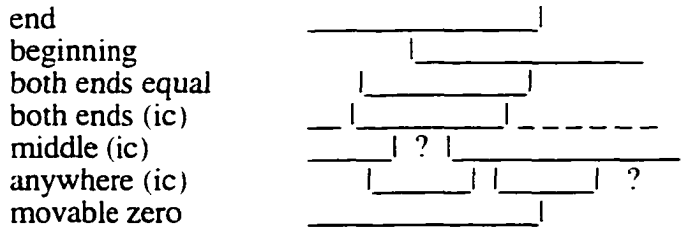
		Begin	End	Begin	End	---
Number of instruments	_____					
Begin time	_____	0	0	0	0	0
End time	_____	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
End by Time or Bracket _____		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
If end by brackets,		0	0	0	0	0
brackets range align to	_____	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0

Alignment silences _____

This setting represents the time-bracket template in its "tabula rasa" form. As noted before, the number of instruments in the ensemble Cage was writing for would determine the title of the piece; let us say that "Ensemble X" had thirteen players (see "Title" and "Number of instruments" on the left-hand side of Example 3.22). Cage would next tell Culver the intended length of the piece; let us say it was thirty minutes. To begin to convert this to bracket form, Culver would type 0'00" after "Begin time," and 30'00" after "End time." A decision was then made as to whether the piece would "end by time or bracket." This meant that either the brackets would cover the entire thirty minutes or there would be a certain amount of time left "empty" (for example, ending the brackets at 29'30"). Most often Cage chose to end the piece "by time," covering all the durational space allotted. If Cage did choose to end the piece "by

brackets," they would be aligned to a certain range. In this arrangement the brackets might begin thirty seconds into the piece and end thirty seconds before the end. That leads to the last parameter on the left side of Example 3.22, the "alignment silences." Example 3.23 presents Culver's "graphical representation of alignment silences," the menu of choices Cage had to choose from:

Example 3.23 - Graphical representation of alignment silences



Alignment silences are places in a piece where there are no brackets, where silence has been "inserted." Example 3.23 shows that Cage was working with a set of seven possibilities. The silences might be placed just at the end or the beginning of a piece, or they could be divided equally at both outer extremities (this would be similar to an alignment of bracket range). The alignment silences could be placed at both ends, but their exact placement might be asymmetrical, determined by *I Ching*, which accounts for the notation "(ic)." They could also lie in some gray, indeterminate area in the middle (also determined by *I Ching*), or as Cage was wont to do, they could begin anywhere in each individual part. This was often Cage's predilection in an ensemble piece, and understandably so. Such a hard-wired "staggering" of parts matched his aesthetic, political, and philosophical impulses for independent and anarchical relations between entities. Cage could also decide to employ something he and Culver called a "movable zero," where any individual part could begin at any place in the time-continuum and consider that point as 0'00."

Cage's next decisions pertained to the shape the brackets would take - their type, length, degree of overlap, and symmetry. These properties fall under the heading of "bracket types," shown on the right-hand side of Example 3.22. Culver presented Cage with the option of using time-brackets of multifarious lengths, but often he used only a few. Other works, as will be shown, exhibit a great diversity of bracket-lengths and types.

Having made these decisions, Andrew Culver was given a "recipe" for making a number piece, in this case the work *Thirteen* (1992). Example 3.24a shows what *TBrack* looked like at this stage, followed by a configuration that Culver devised to begin generating parts.

Example 3.24a - Next stage of *TBrack*

TBrack TBrack TBrack TBrack TBrack

Title Thirteen Bracket Types

Beginning End

Overlap

		Begin	End	Begin	End	
Number of instruments	13	0	15	10	25	5
Begin time	0'00"	0	30	20	50	10
End time	0'30"	0	45	30	115	15
		0	0	0	0	0
End by Time or Bracket	time	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
If end by brackets,		0	0	0	0	0
brackets range align to	_____	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0

Alignment silences anywhere (ic)

Thirteen (May 14 1992) 12:42 and 29 sec.

composed for Manfred Reinert and the Ensemble 13
fl/ob
Cl. in B-flat/Bn
Tpt/Tbn

Tuba
2 Perc
2 Vn
Vla
Cello

Configuration

```
#thirteen
$NUM_INSTRS              013
$BEGIN_TIME              000000
$END_TIME                003000
#                        hhmmss
$END_BY                  time
$END_BRACKET_BOT         000
$END_BRACKET_TOP         000
$ALIGN_TO                end_time
$ALIGNMENT_SILENCES      anywhere_(ic)

#Table of Bracket Types
  #Beginning                          End
#Begin        End          Begin        End          Overlap
#m m s s      m m s s      m m s s      m m s s      m m s s
 0 0 0 0      0 0 1 5      0 0 1 0      0 0 2 5      0 0 0 5
 0 0 0 0      0 0 3 0      0 0 2 0      0 0 5 0      0 0 1 0
 0 0 0 0      0 0 4 5      0 0 3 0      0 1 1 5      0 0 1 5
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
 0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0      0 0 0 0
```

In Example 3.24b each part in the ensemble is then distributed its own number of brackets, as well as a unique amount of alignment silence inserted in different places. Pitch ranges are established for a set number of brackets in a sequence.

Example 3.24b - Distribution of time-brackets and alignment silences

Oboe	Instrument 2 has 46 brackets	(00:15 inserted after bracket 9)
B-flat Cl.	Instrument 3 has 39 brackets	(00:35 inserted after bracket 37)
Bn	Instrument 4 has 41 brackets	(00:55 inserted after bracket 18)
Tpt in C	Instrument 5 has 44 brackets	(00:10 inserted after bracket 44)
Tenor Tbn	Instrument 6 has 42 brackets	(00:25 inserted after bracket 36)
TBA??	Instrument 7 has 44 brackets	(00:50 inserted after bracket 21)

1 Perc in unison with 2 Perc	Instrument 8 has 41 brackets	(00:45 inserted after bracket 5)
2 Perc	Instrument 9 has 47 brackets	(00:15 inserted after bracket 46)
I Vn	Instrument 10 has 44 brackets	(00:10 inserted after bracket 23)
2nd Vn	Instrument 11 has 49 brackets	(00:15 inserted after bracket 22)
Viola	Instrument 12 has 50 brackets	(00:05 inserted after bracket 49)
Cello	Instrument 13 has 47 brackets	(00:15 inserted after bracket 35)

Instrument 1 (Flute)

1	c^1 - f^1	8	c^1 - a^1	17	$c\#^1$	24	d^1 - e-flat^1	32	d^1- g^1
2		9		18		25		33	
3		10		19		26		34	
4		11		20		27		35	
5		12		21		28		36	
6		13		22		29		37	
7		14		23		30		38	
		15				31			
		16							

39	e^1 - a^1
40	
41	
42	
43	
44	

Instrument 2 (Oboe)

1	e^1 - g^1	10	c^1 - a-flat^1	17	d^1 - f^1	25	c^1	33	e^1 - a^1
2		11		18		26		34	
3		12		19		27		35	
4		13		20		28		36	
5		14		21		29		37	
6		15		22		30		38	
7		16		23		31			
8				24		32			
9									

39	e^1 - a^1
40	
41	
42	
43	
44	
45	
46	

Example 3.24c shows a sample of the first individual part, the one for flute. Note that its alignment silence falls ten seconds after the thirty-third bracket, an example of "anywhere (ic)."

Example 3.24c - Sample of Instrument 1 part (flute)

	Instrument 1 (44 brackets)[56]		flute		
		[00:10 inserted after bracket 33]			
1-6	1	c^1 - f^1	[00:00 - 00:30]	e^1 $c\#^1$ f^1	[00:20 - 00:50]
	2		[00:45 - 01:00]	$c\#^1$ d^1 $e\text{-flat}^1$ c^1 e^1 $e\text{-flat}^1$	[00:55 - 01:10]
	3		[00:55 - 01:40]	e^1 c^1 $e\text{-flat}^1$ f^1	[01:25 - 02:10]
	4		[02:05 - 02:20]	$e\text{-flat}^1$	[02:15 - 02:30]
	5		[02:20 - 02:50]	d^1 $d\#^1$ e^1 $c\#^1$	[02:40 - 03:10]
	6		[03:00 - 03:30]	$c\#^1$ e^1 $d\#^1$ e^1	[03:20 - 03:50]
	7		[03:40 - 04:10]	f^1	[04:00 - 04:30]
1-10	8	c^1 - a^1	[04:20 - 04:50]	$f\#^1$ c^1 e^1 f^1 a^1 e^1	[04:40 - 05:10]
	9		[04:55 - 05:40]	a^1 g^1 e^1 d^1 g^1 $c\#^1$ e^1	[05:25 - 06:10]
	10		[05:55 - 06:40]	a^1 $a\text{-flat}^1$ $f\#^9$ $e\text{-flat}^1$	[06:25 - 07:10]
	11		[07:05 - 07:20]	c^1 $g\#^1$ a^1 f^1 e^1 $e\text{-flat}^1$	[07:15 - 07:30]
	12		[07:25 - 07:40]	$f\#^1$ e^1 c^1 $e\text{-flat}^1$ e^1	[07:35 - 07:50]
	13		[07:45 - 08:00]	g^1 d^1 $e\text{-flat}^1$ $c\#^1$ f^1 a^1	[07:55 - 08:10]
	14		[07:55 - 08:40]	$f\#^1$ a^1 g^1 $f\#^1$	[08:25 - 09:10]
	15		[09:05 - 09:20]	$a\text{-flat}^1$ c^1 $c\#^1$ g^1 $f\#^1$	[09:15 - 09:30]
	16		[09:25 - 09:40]	f^1	[09:35 - 09:50]
2	17	$c\#^1$	[09:40 - 10:10]	$c\#^1$	[10:00 - 10:30]
	18		[10:25 - 10:40]	$c\#^1$	[10:35 - 10:50]
	19		[10:45 - 11:00]	$c\#^1$	[10:55 - 11:10]
	20		[11:00 - 11:30]	$c\#^1$	[11:20 - 11:50]
	21		[11:45 - 12:00]	$c\#^1$	[11:55 - 12:10]
	22		[11:55 - 12:40]	$c\#^1$	[12:25 - 13:10]
	23		[12:55 - 13:40]	$c\#^1$	[13:25 - 14:10]
3-4	24	d^1 - $e\text{-flat}^1$	[13:55 - 14:40]	$e\text{-flat}^1$	[14:25 - 15:10]

The pitch names in the third column denote the range of the part in that section, not so dissimilar in that regard from the changing ranges in *Ryoanji*. In his poem *Mesosticha* (1990), Cage uses the term "pitch bracket" in describing this practice.[57] He also uses it in reference to Morton Feldman's *Intersections* series (1953), in which boxes within a grid achieve a stratification of pitch range into high, middle, and low registers.

The pitch names printed inside the periods of each bracket in Example 3.24c (e.g. e^1 / $c\#^1$ / f^1 in bracket 1 of the flute part) signify the actual pitches to be played. Cage wrote them in by hand directly on the printout after receiving it from Culver, using a separate *ic* program to generate all pitch material. It was in this state that all parts for the number

[56] The first twenty-four brackets are presented here.

pieces were given over to Cage's copyist Paul Sadowski. Cage had no retinal/graphic connection during the period of composition to the two-way arrows and mini-staves characteristic of the time-bracket series. In fact, Paul Sadowski was often entrusted with a fair deal of autonomy in deciding where exactly to place the pitches on the staff, as well as on issues concerning the appearance of the brackets themselves--how dark, what font to use, how far apart in the left and right-hand corners of the page they needed to be, and so forth. Example 3.25 presents the first three pages of the final version of the flute part from Cage's *Thirteen*.

It is instructive to compare general characteristics of the number pieces with those of *Music for...* and other works from 1981-87. The one important element all these works have in common is that the basic graphic look of the score--two time-periods separated by two-way arrows in the left- and right-hand corners--remains basically the same. That said, the number pieces are significantly different in many ways. Unlike works in the *Music for...*series, there are no pieces or interludes. The number pieces are structurally undifferentiated outside of whatever gratuitous divisions are engendered by the brackets. They are pure-time abstractions, empty slates (á la Freud's mystic-writing pad) on which any sequence of events is in principle compositionally but not performatively admissible. By essentially abandoning structure, Cage turned what was a hermetically closed system in *Music for...* into an open one that could accommodate everything. This enabled him to engage in a number of "reconciliations," one of them with harmony and the very possibility of some measure of retrievable vertical relationships.

Cage could not have admitted any and all kinds of harmony in the 1981-87 works such as *Music for...* and *Ryoanji*. The structures are not

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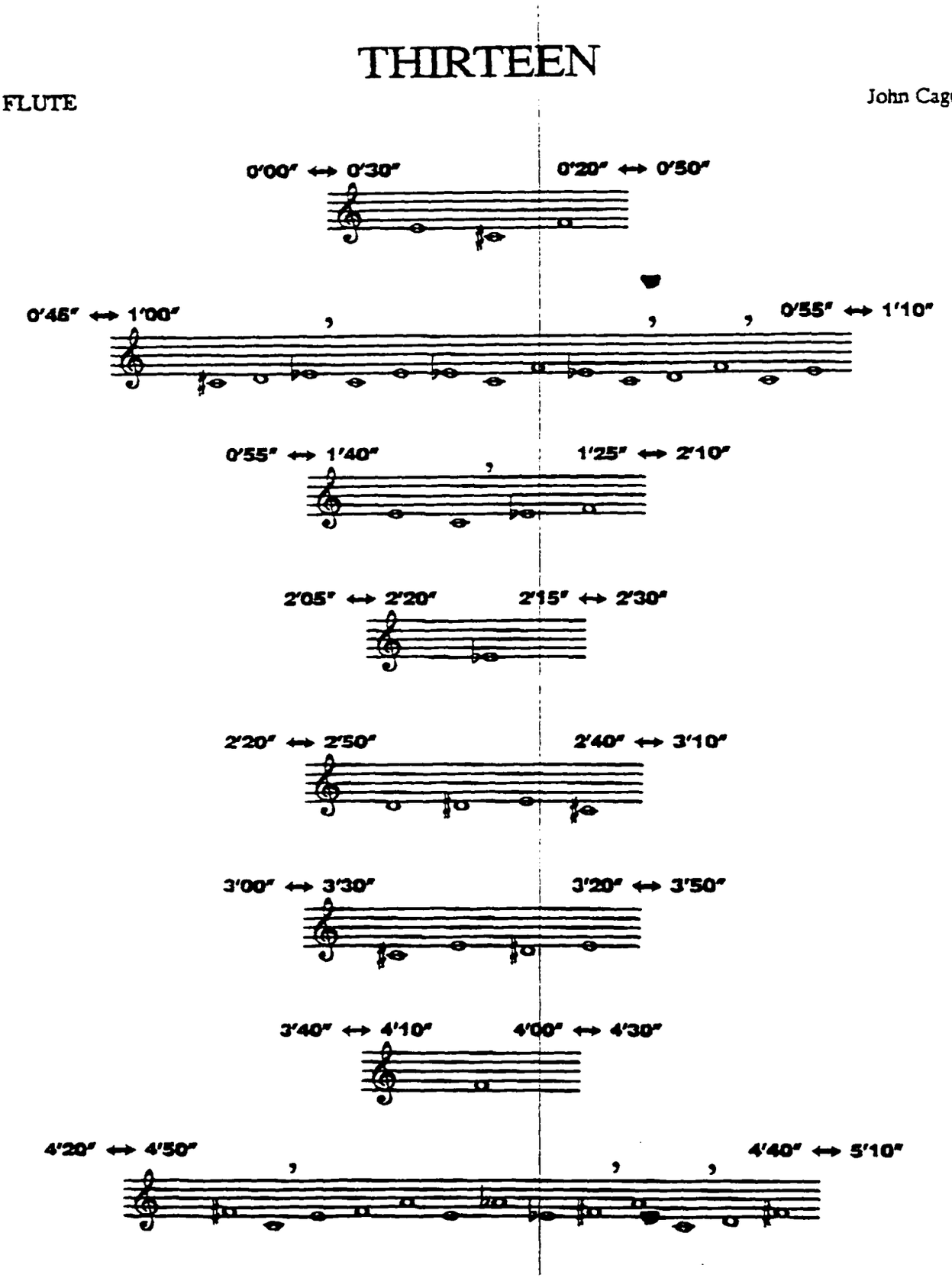
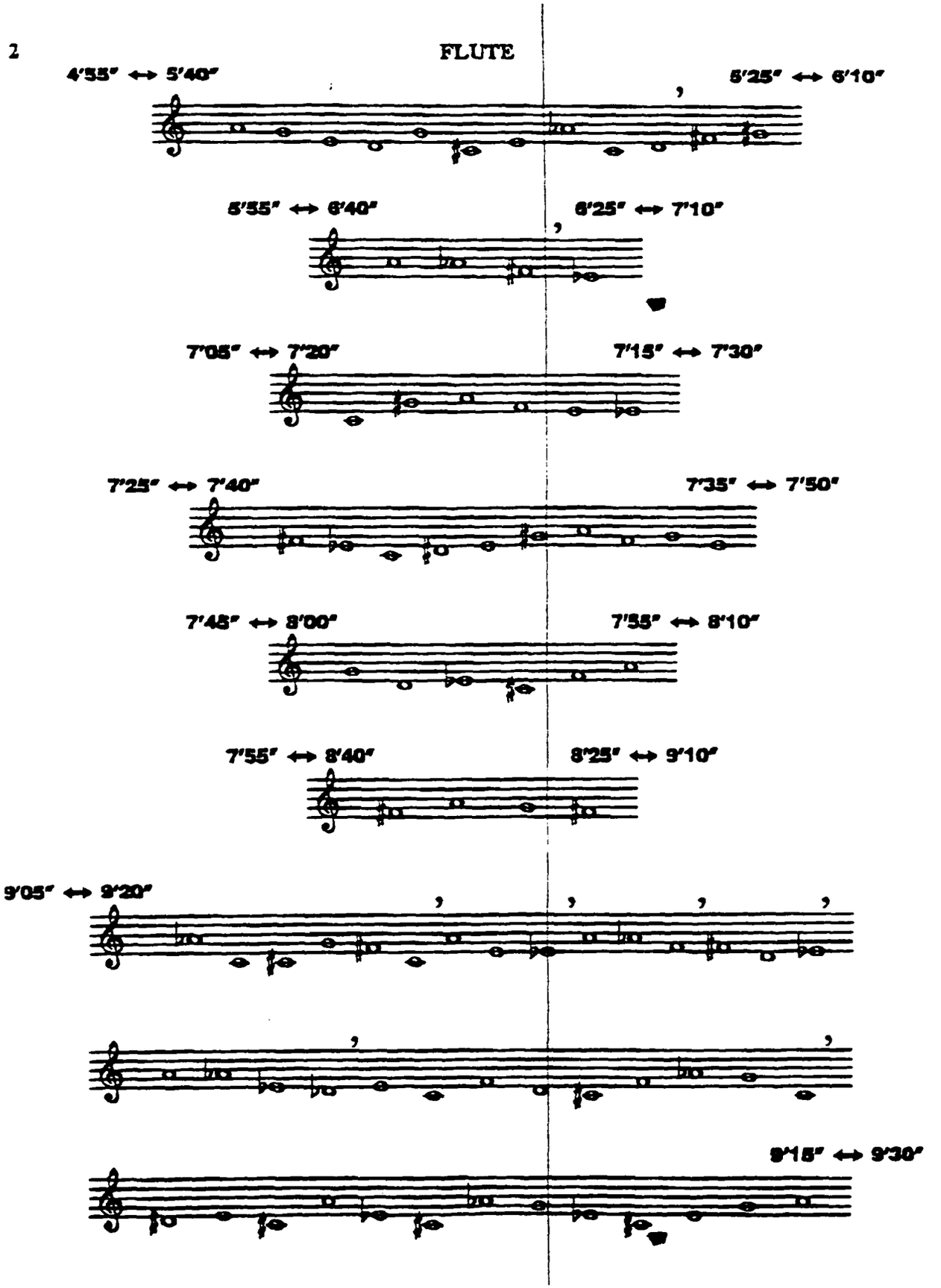
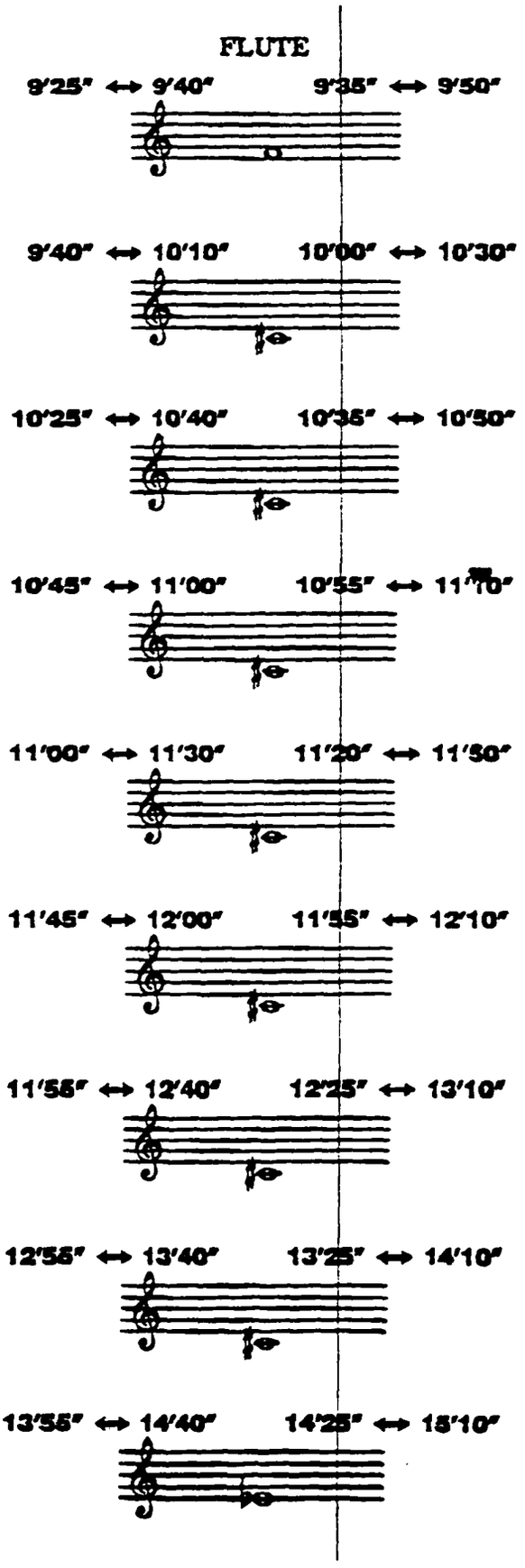
[57] John Cage, *Mesosticha*. *MusikTexte* 40/41 (1991): 27.

Example 3.25 - *Thirteen*. flute part. pp. 1-3. Courtesy The John Cage Trust.







empty enough; in *Ryoanji* pitch is conceived strictly as an analogy to a pictorial image, that of the stones. Perhaps one would have to search as far back as *Variations I-IV* (1958-63), Cage's apotheosis of graphism, to find a moment so wrought with harmonic "availability." The *Variations* are practically problematic, though, because their notation and directions steer the performer towards inventing a delimited sound-world from scratch. By the late 1980s, however, Cage was willing to accept and admit any traditional element as long as it fell inside the blank slate of pure time. Whereas earlier Cage was still devoted to deriving his pitch content from *ic*, and presenting it in varying degrees of density with some kind of resultant gestural fallout, in the number pieces the content is so diminished it transcends the notions of derivation and gesture. In his chamber theater piece *Europera 5* (1991), he goes so far as to allow the singers and solo pianist to insert complete common-practice arias of their choice (the pianist makes a transcription in this event), coordinated with specified timings. Notational considerations allowed Cage to come to terms with the very element he had spent his entire career fighting.

Cage documents in *Mesosticha* some of the events that led to his new-found acceptance of vertical relations. He gives special credit to the American experimental composers James Tenney (1934-) and Pauline Oliveros (1932-) for helping him change his mind: "now haRmony / has changEd / its nAture it comes back to you it has no laws / there is no alternative to it."[58]

In 1983 Tenney wrote an article entitled "John Cage and the Theory of Harmony."[59] In it he sought to make the case that Cage's ideas about the

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[58] John Cage, *Mesosticha*, 24. I quote these lines from the poem out of their mesostic alignment, but preserving the capital letters from the mesostic string.

[59] James Tenney, "John Cage and the Theory of Harmony," *Soundings* 13 (1984). Reprinted in *Writings about John Cage*, ed. Richard Kostelanez (Ann Arbor: University of Michigan Press, 1993), 136-61.

priority given to each sound are not incompatible with a potential theory of harmony. Such a theory takes into account "the total sound-space of musical perception" (including the admission of microtonal relations, clusters, and noises) within a multi-dimensional space.[60] Unlike other harmonic theories, Tenney's is descriptive, grounded in psychoacoustics, aesthetically neutral, and applicable to all kinds of music. It does not attempt to prescribe a set of conventions; it only attempts to demonstrate that "nothing is necessary, and everything is possible."[61] Harmonic relations between "relatively stable and salient pitches" can occur, but merely as one aspect within a larger sound-space of complex musical phenomena. This article made an impression on Cage, as did Tenney's work for seven instruments *Critical Band* (1988), an application of his theory. In *Critical Band*, a solo accordion starts off playing one note and six other instruments join in staggered entrances on the same pitch, gradually and microtonally widening the interval in both directions. Upon hearing *Critical Band* in 1988, Cage had the sensation that

> ...sound was stretching itself.... It was the first piece which gave me the experience of a harmony which I could understand, or experience and love.... Harmony is just sounds coming together at the same time.[62]

Around the same time Cage heard a performance of *Deep Listening*, a structured improvisation by Pauline Oliveros in collaboration with the trombonist Stuart Dempster. Oliveros (who is also an accordionist) and Dempster adapted improvisational strategies to the acoustics of unique spaces, particularly those with long resonance times such as large halls or caves. In such a site-specific situation, a sense of "harmony" arises from a complex and uncontrollable relationship between a location and a performer who is "listening deeply." Noises, of course, are not foreign to

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[60] James Tenney, "John Cage and the Theory of Harmony," 144.
[61] Ibid., 141.
[62] John Cage, interview with Max Nyttelr (1990), Swiss National Radio.

this continuum but are thoroughly integrated as they contribute to the resonance which influences the sounds the performers make. In Tenney and Oliveros, Cage found models of "anarcHic harmony / harmony that doEs not exclude noise / no ideAs / noThing to say no feelings no taste / no vaRiations / no rEpetitions."[63]

Cage's reaction to this epiphany was to say that "if this is harmony, I take back everything I've said--I'm all for it."[64] The ramifications of this were profound; by coming to terms with harmony, he was able to work within a fluid definition of intention. This, in turn, opened up a new dimension of choice hitherto unknown in Cage's music since 1951, leading to nothing less than an astonishing rediscovery and recasting of the idea of the work-as-object.

Nowhere was this change more apparent than in the work Cage composed in 1989 for the Arditti Quartet, *Four*. The four parts are intended to be interchangeable, all written in the narrow two-octave range common to violin, viola, and cello: G3 to G5. The parts are not labeled by instrument, but merely numbered 1-4; the members of the quartet determine beforehand which of the four parts each will play. *Four* has three sections (A-C) of five minutes' duration each; each section consists of ten brackets, nine flexible (two periods) and one fixed. Bracket structure is straightforward, although Cage provides a wrinkle by employing divisions of seconds. The flexible brackets are all 37.5 seconds long, the fixed brackets fifteen seconds. There is an overlap ratio of 3:1 between periods within brackets as well as between one flexible bracket and the next. A reason for the rigid bracket structure may be that "content" is

[63] John Cage, *Mesosticha*, 26.
[64] David Revill, *The Roaring Silence*, 280.

of more significance in this work, relegating time-structure to the status of "means" rather than "ends" as it becomes in later number pieces.

Cage gives the quartet a choice between three possible performances of *Four*: BB (ten minutes long), ACAC (twenty minutes), or a complete ABCABC (half an hour). No matter which option they choose, at the midpoint of each performance the players must exchange parts, for instance violin 1 with cello / violin 2 with viola. After resetting their chronometers, the players proceed with the second half of the piece.

Listening to a performance of *Four*, one cannot help but feel that the work is characterized on its surface by a great deal of consonance. As per derivation, Cage used *ic* to generate pitch material and there is no evidence of him hard-wiring any special formula into the program in order to produce a bias towards familiar vertical relationships. One could also credit this sonic imprint to total dynamic and timbral homogeneity; the work is never louder than *p*, and it consists exclusively of long tones played *non-vibrato*. However, there comes a point where such explanations prove inadequate in accounting for the presence of what sounds like triadic harmony. It is so striking, in fact, that a listener knowledgeable of Cage's music feels the need to negate it, to view it as a surrealist illusion. Perhaps, to adapt the title of Renè Magritte's celebrated 1926 painting, one could offer the disclaimer "ceci n'est pas une triad."

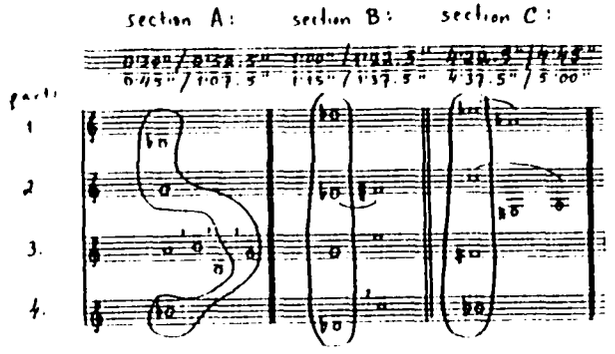
A complete version of *Four* entails the performance of sixty, or two times thirty, time-brackets. Of the thirty notated brackets, twenty-five of them contain functional tonal/harmonic referents, in the form of some kind of triad or seventh-chord. These chords, of course, must always be understood here as divorced from any functional role. Having aligned the brackets and taken an inventory, I have divided the twenty-five into four categories, two of which may show up in the same bracket. The first

category, shown in Example 3.26a, consists of what I call *certain triads/seventh chords*. By "certain" I mean that on three occasions in *Four*, one is virtually guaranteed of hearing such a chord during the time-bracket within which it appears. In both instances the chord in question is missing one of its constituent elements, but also contains mitigating circumstances. For instance, the first chord in Example 3.26a (the second bracket in section A) could be either a G minor triad missing a fifth or an E-flat major triad without a root. Yet the A in the third part can be viewed as pushing the chord in the direction of the former, acting as a second scale degree of G minor.

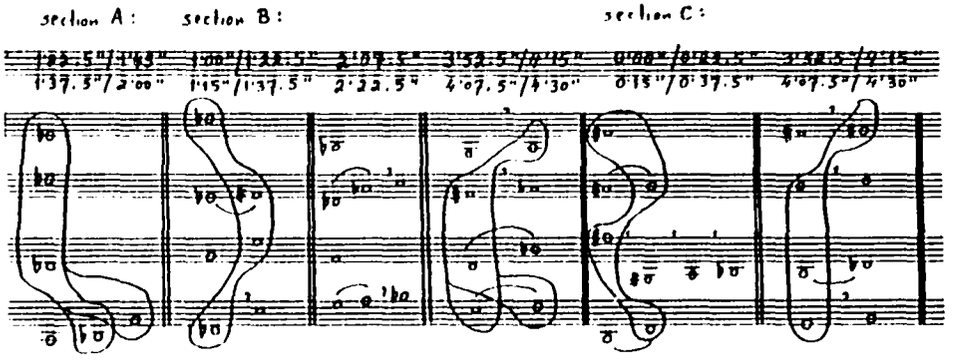
The second category, shown in Example 3.26b, consists of *possible triads/seventh chords*. By "possible" I mean that there is both a statistical and practical possibility that these chords (which may also be missing constituent elements) will be heard during the time-bracket within which they appear. There are six "possible" traditional chords in *Four*: the penultimate bracket in section C (the last one in Example 3.26b), for example, yields a possible E-major chord.

The third category, shown in Example 3.26c, is the largest. It consists of what I call *"thwarted" triads/seventh chords*. A "thwarted" chord is one where one voice out of the four prevents it from being an unambiguous triad or seventh-chord. Most often that voice is some kind of second, sixth, or seventh in the case of a triad. There are fifteen such chords; in a way they stand as subsets of the first two categories because some are "certain" and some "possible." To some this may be reminiscent of Stravinsky's neo-classical practice, where generative tetrachordal segments are formed by "verticalizing" dissonances inside functional harmonic units, thus creating a kind of dualistic "stasis" that drains the chords of their teleological "existentials."

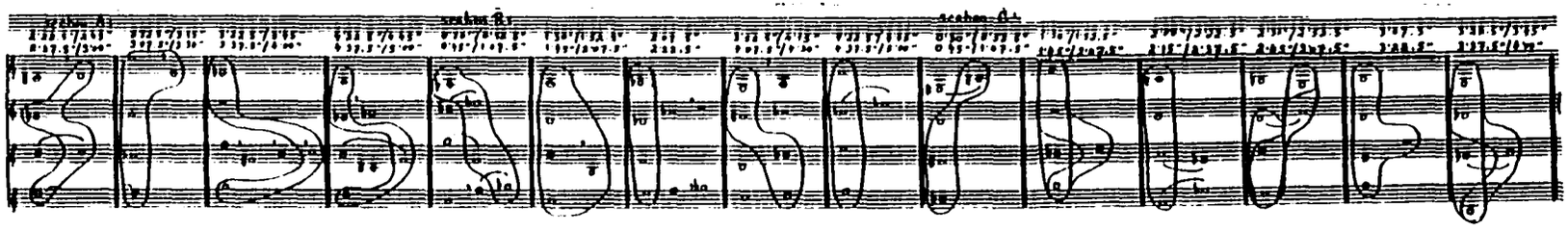
Example 3.26a - certain triads/seventh chords in *Four*



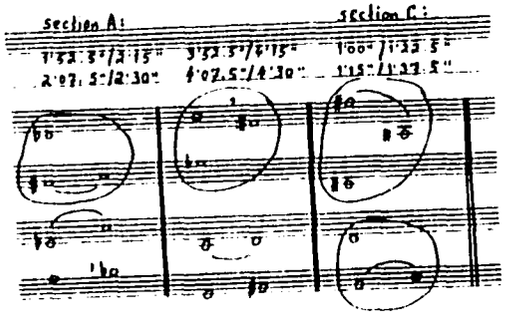
Example 3.26b - possible triads/seventh chords



Example 3.26c - "thwarted" triads/seventh chords



Example 3.26d - triadic segments



The fourth category, shown in Example 3.26d, consists of what I call *triadic segments*. They are formed by two adjacent voices outlining a triad; presence of two of the three constituent members within a given bracket is assured. The first of three triadic segments occurs within the fifth bracket of section A; parts 1 and 2 combine to form what could be an F# minor triad. Two segments can be found in the same bracket, as they are in the third from section C, which results in an F# major/G major bitonality.

Though it is possible that one may hear all of this traditional harmonic material, it is entirely possible one may hear virtually none of it. In an outstanding article on harmony in Cage's late music, the Belgian composer/theorist Eric de Visscher writes that *Four* is all about the idea that

> traditional harmony is then not excluded from Cage's concept of harmony, but is only one part of it, or a possibility, and not a rule.[65]

Four can thus be viewed as a fulfillment of Tenney's notion of relations between "relatively stable and salient pitches" as one possibility within a larger notationally driven matrix offering an infinity of realizations. In a remarkable historical sequence, Tenney's critique of Cage's harmony became a speculative algorithm for a possible harmony, which in turn was reflected back onto itself by Cage, becoming prophecy.

Works such as *Four* are at the same time among Cage's most conservative and his most radical. The conservatism of *Four* is readily apparent--the potential for traditional harmonic relationships, even the causality between notational signal and performative response. However, I do not believe that Cage is pursuing a compositional agenda that is fundamentally different from the one he followed during the 1950s and

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[65] Eric de Visscher, "John Cage and the Idea of Harmony," *Musicworks* 52 (1992): 54.

60s--an agenda based on nonintention, indeterminacy, and interpenetration. The difference in the late music is in the growing sense of reconciliation, notational compromise, and focus. Cage ultimately presents what he liked to call "whispered truths" in the form of "instances," which, like a microscope's isolation function, focus attention on certain issues. Though philosophically impure, such compromise imparts the Cagean project in an environment of what Daniel Charles terms "radical simplicity," perhaps more effectively than ever before.[66] On another occasion Cage likened a musical score to a camera that never wears out, and I believe the metaphor is apt in the case of *Four*.[67] Here pictures are constantly being taken and appraised of different combinations of the same phenomena, from ever-changing angles.

One may be tempted to inquire at this point why it made such a difference for Cage to use time-brackets in works such as *Four*. Surely, a reasonable observer might conclude, Cage could have achieved a similar result with proportional or "zero-time" notation. There are a number of reasons why Cage continually employed the notational device of the time-brackets, and they all center on the notion of *intent*.

To begin with, Cage is not interested in achieving any one "result." The number pieces enable him to set up ground rules where one outcome among many is capable of taking place, but not via his direct intent. To notate a piece such as *Four* in proportional notation would necessitate some fashion of vertical part-alignment, a dose of structural determinism that Cage's instincts always told him to eschew. The cardinality of time-structure would naturally recede and each set of harmonic "possibilities" would fold up into a single "certainty." Proportional notation allows for

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[66] Daniel Charles, "The Unison of Differences" 4.
[67] Ibid.

only a relatively small number of "moves" inside a delimited field. Its flexibility, unlike that of the time-brackets, is not exponential but relative. It is not a notation that can become truly integral to a compositional strategy because inherent in it are all the abstractions and dualisms regarding time.[68] It is a means of presentation that provides a "less fixed" version of a thing (such as meter), when for one reason or another a composer does not want to write in that manner but still wishes to have discrete harmonic or rhythmic relationships. On the other hand, to notate such a work in "zero time" (as in *0'00"*) would be to succumb to what Charles calls the "myth of temporality...the utopia of a disoriented, perfectly reversible time."[69]

The time-bracket is a compositional/notational system that produces a temporal object neither passive/finite or hyperactive/infinite. Instead, it produces a very slippery object comparable to weather. In such complex systems found in nature, the global is determined but the details are context-specific. Cage sets the limits of his "object" in his book of conversations with Joan Retallack:

> ...then, we can foresee the nature of what will happen in the performance, but we can't have the details of the experience until we do have it.[70]

Unlike the *Music For...* series, each number piece aspires to be different. Besides experimenting with bracket length and type, Cage was constantly reinventing what went inside. He was so encouraged by each premiere that he felt free to go back and invent a fresh number piece in

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[68] Charles regards Cage's invention of the time-bracket as arising from his desire to free the interpreter from all "presuppositions concerning the "*a priori* nature of time" (Ibid., 3).

[69] Ibid., 3.

[70] Cage and Retallack, *Musicage*, 182. Retallack herself compares this notion to weather, "whose broad patterns we can more or less predict, but not the fine local details. This is characteristic of all complex turbulent systems in chaos theory." In the same vein she compares it to Joyce's *Finnegans Wake* (Cage and Retallack, *Musicage*, 144).

which a new, playful concept could be admissible inside a method that was proving so accommodating. An example of this is *Seven*^{2} (1990).

Commissioned by the "Festival des Hörens" in the German city of Erlangen, *Seven*^{2} is written for a *basso* septet: bass flute, bass clarinet, bass trombone, two percussion (Japanese temple gong, tam tam, thundersheet, bass marimba, Chinese and Turkish cymbal, all bowed or played *tremolo*), cello, and double bass. In his performance notes, Cage offers the ensemble a manner of interpretation, a way to "enter" the work:

> Let the piece become a "melody" which moves from Percussion 2 to Bass Clarinet to Bass Flute to Contrabass to Violoncello to Percussion 1 to Bass Trombone. (a melody) which is heard in an anarchic society of sounds.[71]

What does Cage mean by a "melody"? There is nothing in the parts that could be construed as melodic lines capable of being passed from one instrument to another. There are two reasons for this. First, the first instrument playing the "melody" is a percussion instrument that has no specified pitch! It merely has a number signifying the amount of notes that can be played within the bracket. Second, Cage deletes some of the brackets in each part, changing the texture, composition, and number of instruments "in play" from one moment to the other. As a result of this, the bass flute, third in the melodic chain, has all its brackets deleted until 4'30" into the piece. At what point does Cage want the melody to be passed? What happens to the melody after it moves to the bass trombone? Is it then cyclic, repeating the same process? Swed believes that by "melody," what Cage is really talking about is a subsuming of melody into harmony:

> ..."melody" implies some sort of distinct, discernible shape...more likely sensed than heard. What holds the piece together...is the sonority. Sounds are linked by their commonality, a commonality that produces a sense of harmony.[72]

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[71] John Cage, *Seven*^{2} (New York: C.F. Peters, 1990), performance notes.

[72] Mark Swed, "Cage and Counting: the Number Pieces," in *Rolywholyover A Circus*, ed. John Cage (Los Angeles: The Museum of Contemporary Art and New York: Rizzoli, 1993), 18.

There is nothing objectionable about Swed's judgment. After all, is not the fact that the term is in quotes a tip-off to the close reader that the "melody" is not really a melody but something else with the potential for linear progression and frequency differential? However, I have a feeling Cage may be doing something else in addition. Cage, I believe, is turning an object (melody) into a process ("melody") via the "isolation function" of the time-bracket notation that was discussed in regards to *Four*. It is yet another flexible way to "encourage" intent rather than to prescribe or fix it. Performing without a conductor, the ensemble has a strategy to work together, listen to each other, and generally establish a mode of communication. The "melody" is really the activity itself, its own globally determined linear yet locally unpredictable narrative.

Bracket structure in *Seven*^{2} is typical of that in the number pieces as a whole.[73] Not only is there a wider variety of bracket-types in any given work (*Seven*^{2} uses the five shortest types, from 15" in fifteen-second increments up to 1'15"), but their use becomes more sophisticated and integrated within some larger "intention."[74] In one sense these works represent a step backwards from the *Music for...* series: the overlap ratio of 3:1 within bracket-periods and between the end of one bracket and the beginning of the next is maintained with greater consistency. However, as in *Music for...* there are moments of asymmetry; Examples 3.27a-c

[73] In his 1996 Ph.D. dissertation "Themes and Variations: Systematic Tendencies in the Compositional Techniques of John Cage," the Dutch musicologist Paul van Emmerik (University of Amsterdam) distinguishes between various bracket-types by adopting the term "virtual duration." He defines it as the sum of the durations of beginning and ending periods, minus the durations of the internal and external overlappings. van Emmerik classifies bracket structures as *additive* when the "virtual duration" of the bracket-types determined the actual duration of a number piece, and *divisive* when the piece as a whole was divided into a series of brackets one of which was changed or substituted in order to accommodate the series to a predetermined duration. Applying van Emmerik's definition, *Seven*^{2} is an example of a work whose bracket structure is divisive.

present three instances in *Seven*[2] where such disruptions in symmetry may be found. For example, Example 3.27a shows the twenty-first time-bracket of the bass trombone part, where the span of the first period is twenty seconds, and that of the second is fifteen. In addition, the overlap span is ten seconds, rendering this bracket incoherent according to Cage's practice.

Example 3.27a - *Seven*[2] / Bass Trombone / Bracket 21

20"	10"	15"
40'15" / 40'35"		40'25" / 40'40"

Examples 3.27b and c are from the first and eighth brackets of the percussion 2 part.

Example 3.27b - *Seven*[2] / Percussion 2 / Bracket 1

15"	35"	75"
0'00" / 0'15"		0'50" / 2'15"

Example 3.27c - *Seven*[2] / Percussion 2 / Bracket 8

55"	25"	75"
7'20" / 8'15"		7'50" / 9'05"

One result of Cage's development of the time-bracket method was that the idea of the work had less to do with content and more to do with notation and bracket structure. Late works such as *108* and *Four*[4] for four percussionists (both 1991) use all twelve possible time-brackets, but assign only one sound per bracket.[75] Example 3.28 is a chart showing the twelve possible brackets, in a 3:1 ratio with the overlap time between periods.

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[74] Six of the seven parts in *Seven*[2] have a discrete amount of brackets. The bass flute and cello have twenty-eight brackets, the bass clarinet twenty-nine, the bass trombone twenty-six, the two percussionists twenty-four and thirty-six respectively, and the double bass twenty-seven.

[75] A reason *108* and *Four*[4] are the only works that use all twelve brackets may have something to do with their lengths. *108* lasts forty-five minutes, and *Four*[4] is seventy-two minutes' duration, timed to fit on a compact disc. *Four*[4] is also remarkable because, for all the painstaking elaborateness of bracket structure, it consists mostly of silence.

Example 3.28 - The twelve possible time-brackets

duration of each bracket period	*overlap time (3:1 ratio)*
15"	5"
30"	10"
45"	15"
1'00"	20"
1'15"	25"
1'30"	30"
1'45"	35"
2'00"	40"
2'15"	45"
2'30"	50"
2'45"	55"
3'00"	1'00"

Example 3.29 presents the first page of the percussion 4 part from *Four*[4]. Cage uses five of the twelve possibilities on the first page alone. The number inside the staff indicates the number of notes that can be played within the bracket. As an aside, it is tempting to view this "all-combinatoriality" of twelve possible time-brackets as Cage's relationship with his teacher Schönberg come full circle. After all, Cage's initial forays in the area of rhythmic structure (the three *Constructions* for percussion ensemble and the early works for prepared piano) were partially motivated by a desire to apply serialism to the realm of duration. In fact, we learn from a eulogy by Mark Swed in *The Musical Quarterly* that, at the time of his death, Cage's reading of choice was Schönberg's *Harmonielehre*.[76]

Much like *Seven*[2], several other number pieces for even larger ensembles employ the technique of bracket omission. Two large-scale aims are thereby achieved: the "hard-wiring" of orchestrational considerations inside the notational system (effecting an ever-changing textural surface), and the satisfying of a globalized "intention" for a certain sound-picture without resorting to structural, localized determinism. Example 3.30

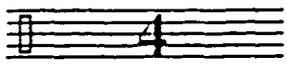
[76] Mark Swed, "John Cage: September 5, 1912-August 12, 1992," *The Musical Quarterly* 77/1 (1993): 140.

Example 3.29 - *Four*[4], percussion 4 part. p. 1.

FOUR[4]

PERCUSSION 4 John Cage

0'00" ↔ 0'15" 0'10" ↔ 0'25"

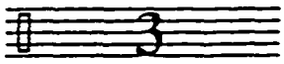


8'40" ↔ 11'10" 10'20" ↔ 12'50"

14'10" ↔ 16'10" 15'30" ↔ 17'30"

18'35" ↔ 20'20" 19'45" ↔ 21'30"

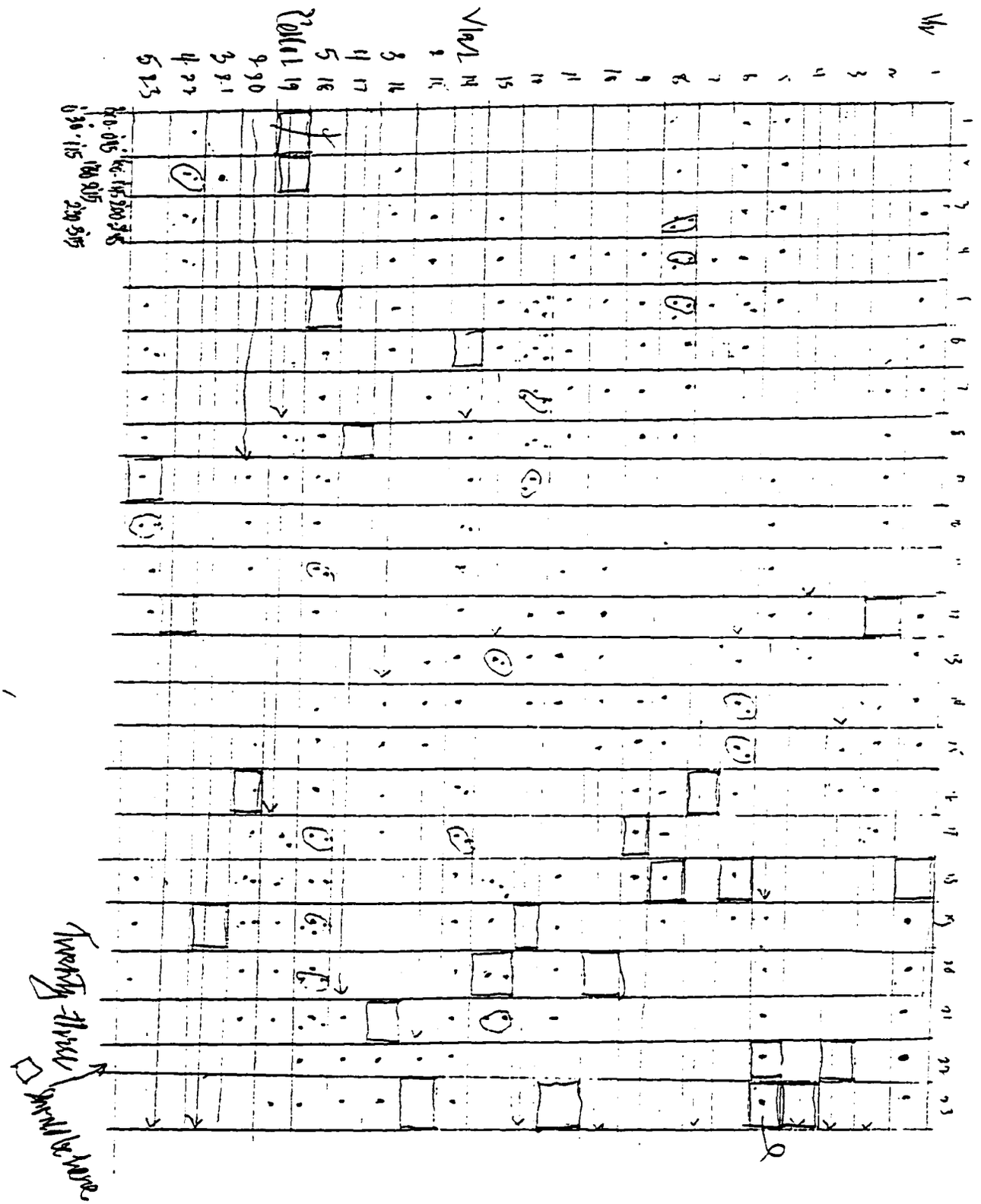
20'45" ↔ 23'00" 22'15" ↔ 24'30"



25'40" ↔ 28'10" 27'20" ↔ 29'50"

31'00" ↔ 33'00" 32'20" ↔ 34'20"

Example 3.30 - Sketch for *Twenty-three*. Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts. Research Division.



presents Cage's sketch of the bracket structure in his work for string orchestra, *Twenty-three* (1988).[77] As with the *Music for...* sketch material, this does not represent an *a priori* plan for the work. Rather, it is very likely a graph made by Cage after the twenty-three minute work had been realized on the computer, giving him an enlarged-scale picture of the changing combinations formed by the flow of the brackets. The sketch is a "23 x 23 matrix": numbers 1-23 going across the page represent the boxed brackets (the first bracket, for example, is 0'00 / 0'45", 0'30 / 1'15") and numbers 1-23 going down the page on the left-hand side represent the instruments of the string orchestra. When the extremities of a bracket's box are highlighted, the bracket in question is staggered forward by forty-five seconds (one period). Dots inside the boxes signify the number of pitches played inside the bracket, and circled dots represent chords. Arrows denote the extension of a bracket. Brackets that are blank are left silent. Compare the formal turbulence of the sketch-picture with the endless variety and asymmetry of their corresponding brackets, a cross-section of which is shown in Example 3.31:

Example 3.31 - Bracket-structure of selected parts in *Twenty-three* (1988)

Violin 3

14'45"	*45"*
0'00" / 14'45"	14'30" / 15'15"
45"	7'30"
15'00" / 15'45"	15'30" / 23'00"

Violin 7

45"	45"
3'00" / 3'45"	3'30" / 4'15"
45"	18'30"
4'00" / 4'45"	4'30" / 23'00"

Violin 6

45"	45"
0'00" / 0'45"	0'30" / 1'15"
45"	45"
1'00" / 1'45"	1'30" / 2'15"
45"	45"
2'00" / 2'45"	2'30" / 3'15"

Viola 4

20'45"	45"
0'00"/20'45"	20'15" /21'00"
45"	45"
20'45"/21'30"	21'15"/22'00"
45"	45"
21'45"/22'30"	22'15"/23'00"

[77] Courtesy of The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division, Folder 930.

45"
3'00" / 3'45"
45"
4'00" / 4'45"
45"
5'00" / 5'45"
45"
12'00" / 12'45"
45"
13'00" / 13'45"
45"
14'00" / 14'45"
45"
15'00" / 15'45"
30"
17'15
45"
17'45" / 18'30"

45"
3'30" / 4'15"
45"
4'30" / 5'15"
6"45"
5'30" / 12'15"
45"
12'30" /13'15"
45"
13'30" /14'15"
45"
14'30" /15'15"
45"
15'30" /16'15"

17'45"
45"
18'15" /19'00"

Cello 2

8'45"
0'00" / 8'45"
45"
9'00" / 9'45"
45"
10'00"/10'45"
45"
14'00"/14'45"
30"
15'15"
45"
15'45"/16'30"
45"
16'45"/17'30"
45"
17'45"/18'30"
45"
18'45"/19'30"
45"
19'45"/20'30"

45"
8'30" / 9'15"
45"
9'30"/10'15"
45"
10'30" /11'15"
45"
14'30" /15'15"

15'45"
45"
16'15" /17'00"
45"
17'15" /18'00"
45"
18'15" /19'00"
45"
19'15" /20'00"
45"
20'15" /21'00"

Cello 3

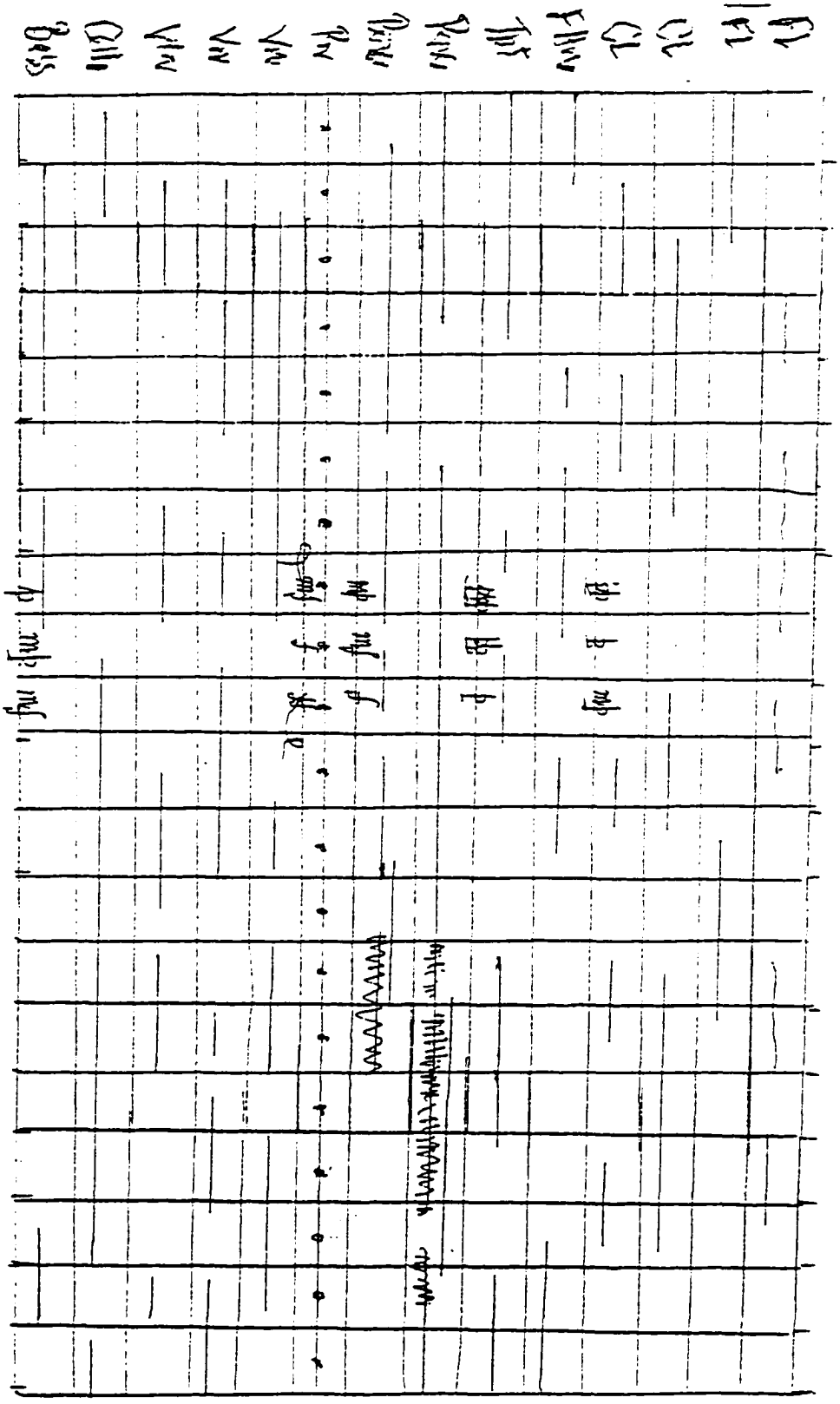
45"
1'00" / 1'45"

21'30"
1'30" / 23'00"

Example 3.32 shows a similar manner of graphic representation in a sketch made by Cage following the realization of *Fourteen* (1990), for piano solo and chamber ensemble.[78] The line represented by the solo piano is the sixth from the bottom in this sketch; note how it has dots (indicating single pitches) over lines in each bracket while the other thirteen lines fade in and out. That is precisely the "intention" of *Fourteen*: it is a "concerto" featuring the piano throughout, while the other instruments enter and exit at intervals of various durations. I submit the example of *Fourteen*, along with *Seven*[2] and *Twenty-three*, in order to illustrate how Cage manipulated the time-bracket device to achieve different things in different pieces. Such a sense of variety and difference, a characteristic of the number pieces as a whole, is a direct result of Cage's control over the

[78] Courtesy of The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division, Folder 977.

Example 3.32 - Sketch for *Fourteen*. Courtesy The John Cage Music Manuscript Collection at The Lincoln Center Library for the Performing Arts, Research Division.



bracket method as well as of his growing interest in hearing a "result" within certain boundaries.

Along with the hard-wiring of "intention" into notation and time-structure, number pieces around the time of *Seven*[2] begin to be characterized by progressively more minimal, restricted, and uniform material. One can trace a gradual reduction of content from *Thirty Pieces for Five Orchestras* to *Music for...* to number pieces such as *Seven*[2] where there is just one sound per bracket. As I observed before, this can be credited to the parallel evolution of the time-structures, of their progressive diversity of treatment. Example 3.33 presents the first page from the bass flute part in *Seven*[2]. Bracket-times appear in lightface when they overlap adjacent brackets, in which case the performer is asked to devise his/her own solution.

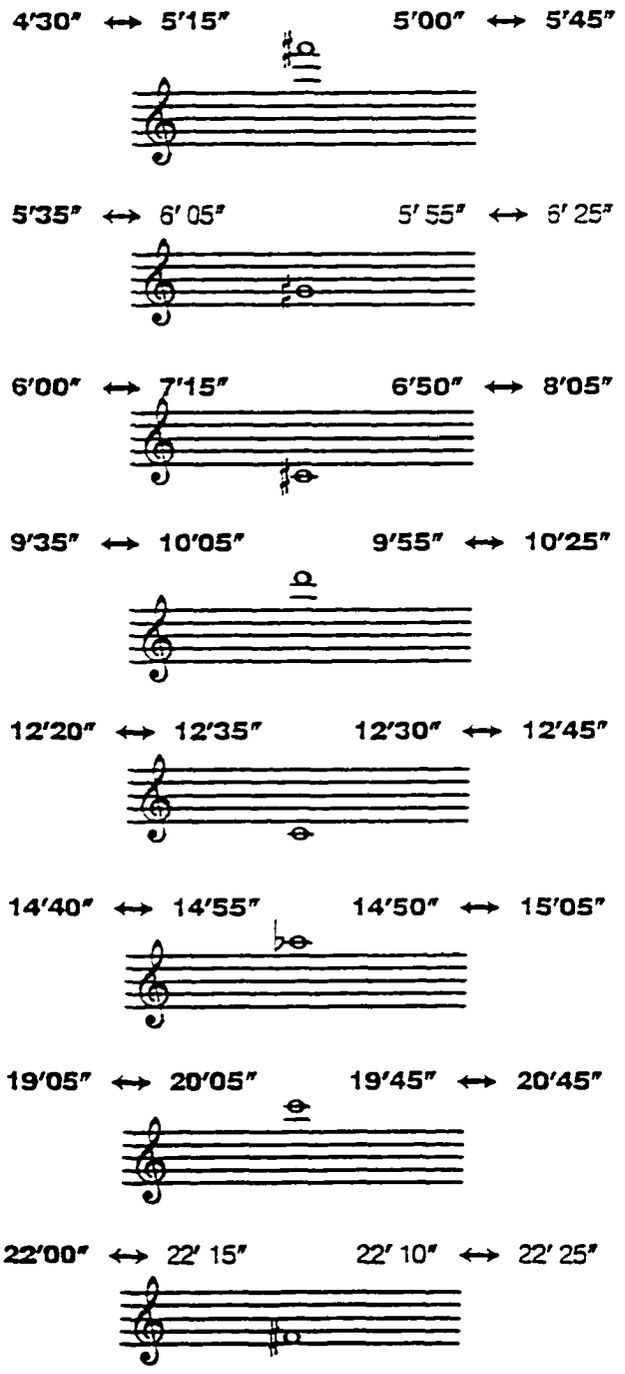
If Cage had long ago abandoned structure (with the time-brackets personifying yet another expression of that impulse), works such as *Seven*[2] and *Four*[4] allowed him to come precipitously close to abandoning "content." Paradoxically, this renunciation (as well as the accompanying minimization) allowed Cage to rediscover "content." Having found a practical way to separate material from its structural "containers," Cage was able to reintroduce the terms of traditional musical rhetoric (both elemental, in works such as *Four* and *Seven*[2] , and stylistic, as in the *Europeras*) in a fresh environment. Now that sound had been liberated from meaning by the time-bracket, new meanings and relationships were possible. This is almost equivalent to the purging and immolation of one's ego, self, and thoughts that is a goal of Zen meditation. Such destruction serves a cleansing function in Zen. The German musicologist and pianist Martin Erdmann observes such a duality between renunciation of control and its subsequent, newly-configured reacquisition:

Example 3.33 - *Seven*[2], bass flute part, p.1.

SEVEN [2]

BASS FLUTE

John Cage



> he formulated in his last years such a perfectly balanced and counter-balanced system of compositional structures...that he gained control to a much higher degree than previously over the nature of his music. We are dealing with a self-governing, autonomous music which creates its own space and which needs a protective wall around it.[79]

The growing uniformity of progressively minimal content culminates in three final orchestral works: *Eighty*, *Sixty-eight*, and the aforementioned *Seventy-four* (all 1992). In the first two, the parts are exactly the same for all instruments of the orchestra--the same amount of brackets (fifteen), the same bracket-timings, the same amount of pitches overall (fifteen, one in each bracket), and the pitches themselves. In *Seventy-four* Cage divided the orchestra into two sections, "high" (treble clef) and "low" (bass clef), providing a fourteen-note row to be intoned by each. As in *Eighty* and *Sixty-eight*, each part has an identical set of fourteen brackets with one pitch from the row in each.[80]

In these radically simple works, the time-bracket method is practically didactic in its expositive clarity. The notational system is engendering what Cage called a "unison of differences," a situation where each orchestra member is playing the same melody with a slightly different rhythm due to the flexibility of the brackets.[81] There can be no doubt that this was Cage's "intent," and it is an occasion where to some extent we can project what the final result will sound like, though inevitably one is surprised by the unpredictability of these works. Pritchett rightly characterizes this music as one of "minute variations," in which a mass of small timbral, durational, and intonational differences assemble and form

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[79] Martin Erdmann, "Concerning Some Aesthetic Changes in Cage's Last Works," *Musicworks* 61 (1995): 58.

[80] The division of the orchestra does not manifest itself in dual bracket structures.

[81] John Cage, *Seventy-four* (New York: C.F. Peters, 1992), performance notes.

an asynchronously heterophonic "harmony."[82] These are works with an extraordinarily tight focus, as the pitch unison creates a companion "vertical unison." Such a focus on each individual unison, to paraphrase Erdmann, "creates its own space," its own verticalized "pole" of local context that resembles Cage's mesostic strings. The minute variations of pitch, no matter how far apart the individual voices are, gravitate by irresistible force back to each unison *tactus* just as each vertical semantic referent in the mesostics exerts pull on the horizontal, often non-syntactic material on both sides. It is as if Cage's music had undergone a transformational process of closing in on itself, first temporally in the form of time-brackets, then harmonically through a progressive minimalization of pitch number and a lessening of pitch information. The final resting-point in the process is the unison.

It should not surprise us by now that Cage would be moving in a similar direction in his visual art. Example 3.34 shows one of the monoprints from the late series *Without Horizon* (1992). Whereas in the *Ryoanji* drawings Cage favored additive or multiplicative strategies to introduce complexity, in this print there are only two discernible images: a single line reminiscent of the vocal line in *Aria* (1958), and a patch resulting from the process of smoking the paper. The entire *Without Horizon* series undergoes a reductive process; Cage gradually reduced the number of marks he intended to make on the plates from eleven to five.[83]

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[82] James Pritchett, *The Music of John Cage*, 203. Swed likens this harmony/counterpoint duality (as well as the one of harmony/melody in *Seven*^{2}) to the phenomenon of the wave/particle duality in physics. Just as an electron acts like a wave in some circumstances and a particle in others but in actuality is neither, sound for Cage is something cannot be envisioned or described; "it is a way of being with various manifestations" (Swed, "Cage and Counting: the Number Pieces," 19).

[83] Anne d'Harnoncourt's article "Paying Attention" from the *Rolywholyover* box of materials, is illuminating in its coverage of issues relevant to both Cage's notation and his visual works.

Example 3.34 - *Without Horizon #28*. 1992. From a series of 57 unique prints on smoked handmade paper. 7.5" x 8.5". Courtesy Crown Point Press, Oakland.

Many observers have commented on the transparency and purity of these late works. In a conversation with Joan Retallack less than a month before he died, Cage himself described the way he viewed the creative act or, more specifically, the act of *writing*. To Cage, it was central to his sense of engagement:

> ...the proper action, or the way of acting in this situation of vast multiplicity, is to act without leaving traces, and the instance is given of writing on water--where your marks would not remain.[84]

The term "writing on water" is a reference to a Tibetan Buddhist image for authentic, or proper action. Yet it also carries considerable resonance with regards to the fluidity of the time-bracket method and the "slipperiness" of the sense of object, the feeling that the number pieces seem to often "about something," an idea or a surface texture that we intuit but cannot quite hold in our hands. To Cage's way of thinking, why would we need to?

> So that if no traces are left, that is to say, as though it were written on water...but it is of course written on paper, hmm?...and the traces are very clear, then what are they? There is no difference between no traces left, and what traces *are* left...writing on water has become writing on paper.[85]

[84] Cage and Retallack, *Musicage*, 189.
[85] Ibid., 190-91.

IV. Brian Ferneyhough and The New Complexity: Notation-as-Inventory

> Complexity is not a problem: it's a solution.
> Richard Barrett, 1990[1]

> A consequence of the increased emphasis on the unstable interface: performer/notation...is the constant stressing of the "fictionality" of the work ("work") as a graspable, invariant entity, as something that can be *directly transmitted*. That this is no longer the case has been recognized ever since indeterminacy assumed the mantle of progress; here, however...the notation (...depth of perspective) must incorporate, via the mediation of the performer (his personal "approach"), the destruction (secondary encoding) which it seems to be the task of most music to brush impatiently aside. The object of music thus becomes its conditions of realization, as these are made manifest in and through the encapsulated real-time structuration of composition/rehearsal/listening. There is simply one illusion less to contend with.
> Brian Ferneyhough, 1978[2]

The British composer Brian Ferneyhough (b.1943) is regarded as the leader of the New Complexity school, one of the most controversial and radical compositional movements of the past generation.[3] Four other composers stand out as especially prominent under the general rubric of New Complexity, all Britons as well: Richard Barrett, Chris Dench, James Dillon, and Michael Finnissy. With the exception of Finnissy, all are expatriates who have gained far more of a foothold on the continent than in their native country; Ferneyhough is often in residence at festivals and schools all over Europe, and has been on the composition faculty of the University of California at San Diego since 1987. In its pursuit of the expressive potential of ambiguous and volatile states, the New Complexity represents one of the last bastions of the Late High Modernist project most

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[1] Joël Bons, comp. and ed., *Complexity?* [questionnaire responses written by thirty-six composers, performers, and musicologists] (Amsterdam: JoB Press, 1990), 3.

[2] Brian Ferneyhough, "Aspects of Notational and Compositional Practice," in *Brian Ferneyhough: Collected Writings*, eds. James Boros and Richard Toop (Amsterdam: Harwood Academic Publishers, 1996), 5.

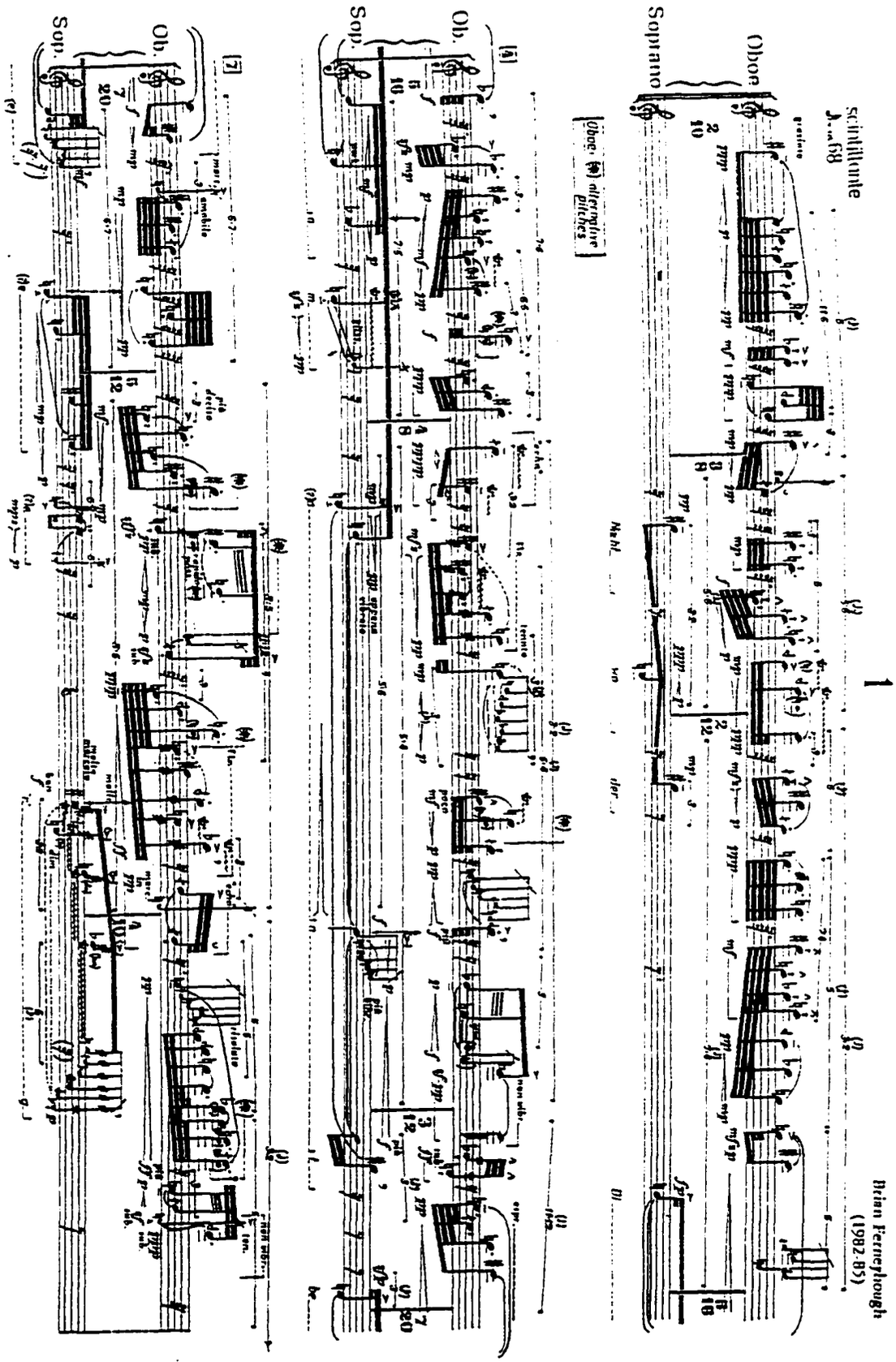
[3] The term "new complexity" was coined in the late 1970s by the Belgian musicologist Harry Halbreich, in part as a reaction to a number of willfully revanchist movements gaining prominence at the time both here and in Europe, such as the "Neue Einfachkeit" (New Easiness) of such composers as Rihm, Müller-Siemens, von Bose, and von Schweinitz.

associated with the two dominant forces in contemporary music in the 1950s and 60s: the post-1945 European avant-garde (e.g. Stockhausen, Boulez, Berio, Xenakis) and the "New York School" (e.g. Cage, Feldman, Brown, Wolff). Indeed, as composition course director at Darmstadt from 1984-92 (and lecturer at its *Fereinkurse für Neue Musik* since 1976), Ferneyhough inherited his initial base of power from the post-Webern serialists.

Over the course of this chapter, I shall define the term "New Complexity," determining what makes it both "new" and also different from the "old complexity." I will ascertain Ferneyhough's compositional agenda and notational posture, after which I will focus attention on relevant works and notational devices embodied therein (such as the use of irrational meters, polyrhythms, multiple staff-systems, and parametric layering techniques). I will then present a survey of the literature on the debate that has raged, mostly in continental Europe, regarding the notation and general "unplayability" of Ferneyhough's music.

The main objection to the New Complexity has to do with the utterly mind-numbing inaccessibility of its external format; Example 4.1 presents a sample of a Ferneyhough score-page, from the opening of his *Etudes Transcendantales* (1982-85). Ferneyhough's critics suggest that for all his hyper-complexity bluster and post-structuralist term-dropping (as evidenced by the dense and frequently arcane style of his numerous essays, lectures, and program notes), he is content to leave his interpreters adrift on the seas of approximation. According to this view, performances of Ferneyhough's music end up sounding nothing like what he allegedly intends. This raises the issues of whether the realization of the score is of secondary importance to the fetishization and graphic fact of the score itself (and whether there is even anything wrong with this attitude),

Example 4.1 - *Etudes Transcendantales*, p. 1.



whether these works could have been notated in a simpler way, and whether the whole enterprise is one colossal vanity display and waste of time.

The New Complexity

As to what defines the New Complexity, and what makes it a departure from "old complexity," I would attribute the difference as being one of *quality* of information rather than *quantity*. One can also observe a certain property of "hyper-ness," a sense of every single gesture being a loaded, intensified composite of several opposing levels, vectors, energies, and formal motivations; Ferneyhough has called this "parametric thinking." Whereas in the music of the post-1945 serialists and the New York School complexity was defined by informational overload and a mass of densities and possible relationships, the Australian theorist Richard Toop (the predominant critical exponent of the New Complexity and co-editor, along with James Boros, of Ferneyhough's collected writings) views this new development as

> essentially a subjective, perceptual phenomenon -- not an objective, material-based one. For me, the word "complexity" evokes a situation in which there are not necessarily "many things" (there could be many, but there might only be a few), yet in which I sense many levels of relationships between the few or many things. Whatever the definable cause of these relationships (organic, mechanistic, or even fortuitous), their outcome is something I unreflectingly sense...as "richness." This richness is by no means the same thing as systematic consistency.[4]

This lack of systematic consistency is a crucial difference between the New Complexity and the post-war total serialism of Stockhausen and Boulez. The notion of "system" is also nowhere as important in this music as it is

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[4] Richard Toop, "On Complexity," *Perspectives of New Music* 31/1 (1993): 48.

in the transcendental formalism (to borrow one of Leonard Meyer's terms) of both Cage's indeterminacy and Xenakis's stochastic processes. All these elements are set in a much more dialectical, inconsistent context than they were in the "old complexity."

Compatible with Toop's definition of the New Complexity, the German composer Claus-Steffen Mahnkopf has devised a theory of what he calls "complexism." Claiming this to be a new step in musical evolution. Mahnkopf has formulated three main attributes to complexism. These attributes also serve to differentiate the New Complexity from the old:

1. *Information mass*: (quantitative: the *amount* of information; a mass of real, "empirical" sound-events with a high degree of speed and density; qualitative: the *kind* of information; a mass of "subcutaneous" relationships in different semantic directions);
2. *Polyvalence of the "layer of sense"* (e.g., ambiguity, ambivalence, or a kind of "mitigated" arbitrariness): a bias towards multiple meanings and "manners of meaning," capable of occurring simultaneously or in very rapid succession, and carrying with it all intracompositional, stylistic, and historical implications; and
3. *"Bonding energies" between single events in music*: (stringency, conciseness, and authenticity of integral relationships, be they particularized or supercontextualized).[5]

By Mahnkopf's reasoning, various "old complexity" figures may fulfill one or two of these categories, but not all of them. In Webern's music, for instance, *qualitative* information mass is low while "bonding

[5] Claus-Steffen Mahnkopf, "Complexism as a New Step in Musical Evolution," in *Complexity?*, 28.

energies" are extremely high, while in music of Xenakis such energies are low due to the unsuitability of the statistical/stochastic techniques being employed (though, of course, the informational mass is exceptionally high). However, not only does Ferneyhough's music meet all available criteria, but it necessitates the formulation of a fourth category which Mahnkopf applies especially to this "radically polyphonized and hyper-differentiated music," what he terms "apperceptive surplus":

> This surplus is a kind of informational hypercomplexity and is to be understood as a meaningful impermeability of the musical surface and at the same time as a structural enhancement within the concrete content... The surplus has to be materialized in terms of an overflowing richness of musical events, but without changing into entropy (as a mere mass of elements) or into heterophony. This "controlled," overtaxing surplus should be perceived as the unperceivability of the discursiveness.[6]

The "black score" and Ferneyhough's notational mindset

Ferneyhough has written and spoken widely about his notation: it is an issue that never strays far from the very core of his creative enterprise. In fact, it is *the* main issue of contention in the furious debate that is his reception-history. Ferneyhough's works and those of his fellow "complexists" are often judged more by how they look in the score than how they sound; the term "black scores" has come into usage in reaction to their notorious and astonishing difficulty. In a 1990 interview with the American composer and theorist James Boros, Ferneyhough states that his method of notation

> attempts, at best, to suggest to the player relevant methods and priorities wherewith the material can be usefully approached -- the establishment of hierarchies; at worst, I imagine that he will be constantly reminded that new works often do not permit much to be taken for granted. Suggesting contexts of this sort via notation allows the player a different but no less important "free space" within which to move.... Scores are more than just tablatures for specific actions or else

[6] Ibid., 28.

> some sort of picture of the required sound: they are also artifacts with powerful auras of their own, as the history of notational innovation clearly shows us.[7]

Though he is in the main committed to most of the trappings of conventional notation (staves, clefs, measures, meter, rhythm, graphic alignment, tempo markings, etc.), Ferneyhough views the score as a kind of "map" that contains "material" (which implies a certain raw pre-compositional state, almost as graphic sense-data) presented with a multiplicity of possible performative routes and layers. By suggesting "relevant methods and priorities wherewith the material can be usefully approached -- the establishment of hierarchies," part of the performer's task is thus to employ this map to navigate one's way around the territory. The notation is so densely laden with information that one cannot then speak of a fixed sense of compositional intent that the notation is communicating, where a defined notational signal will engender a hopefully accurate response on the part of the performer. Instead, multiple performances of a Ferneyhough work will often yield tangibly different results. Because there is so much information to process, all of which cannot be realized in its entirety, different performers will simply be making different choices; they will be "navigating" their ways differently through the map.

A good example of this occurs in Ferneyhough's work for bass flute and tape, *Mnemosyne* (1986); I present the second page from the score in Example 4.2. Each system is comprised of three staves, all observing the same tempo marking and time-signature. Besides that, the three staves have almost nothing else in common. As the composer puts it, "each stave employed represents the results of an independent rhythmic process."[8] As

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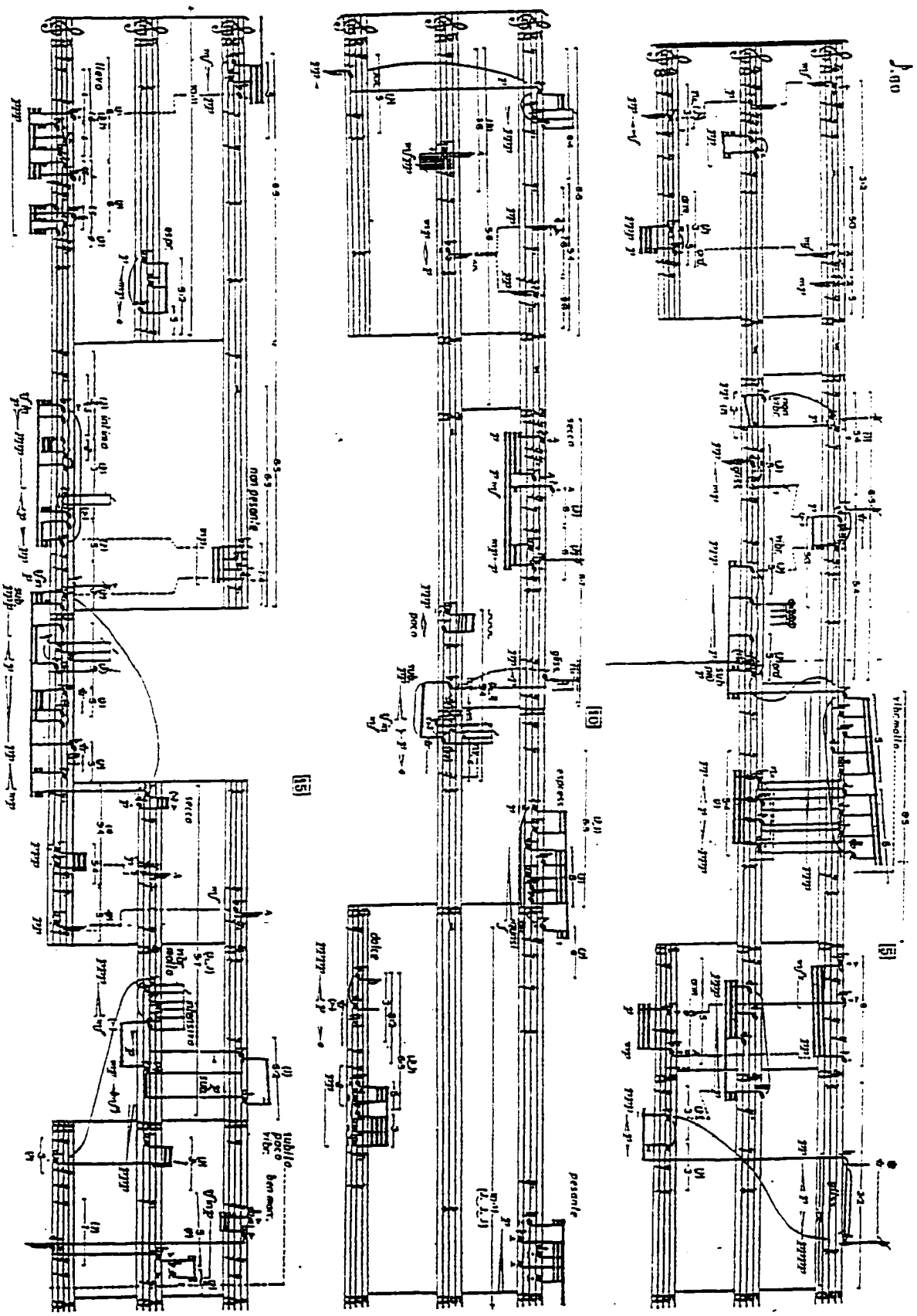
[7] "Shattering the Vessels of Received Wisdom: Brian Ferneyhough in Conversation with James Boros," *Perspectives of New Music* 28/2 (1990): 11. Reprinted in *Brian Ferneyhough: Collected Writings*, eds. James Boros and Richard Toop (Amsterdam: Harwood Academic Publishers, 1996), 373.

[8] Brian Ferneyhough, "The Tactility of Time," in *Brian Ferneyhough: Collected Writings*, 47.

Example 4.2 - *Mnemosyne*, p. 2.



a consequence, each individual line has its own discrete set of complex polyrhythms, which, as in system 1/line 1/measure 1, often contains "nestled polyrhythms" (meaning that the 5:3 figuration occurs inside the one of 3:2; a far more bewildering example of this occurs in system 2/line 1/measure 1, where there is a "quadruple nestling" going on). It is impossible to render the content and rhythmic integrity of each line in its entirety, as they are constantly being interrupted by the necessity of the performer to move from one system-line to another; to this Ferneyhough applies the term "interruptive polyphony."[9] It is as if the flautist is performing three different pieces at once, with three unique and complex rhythmic/pitch/dynamic structures.

As notated, *Mnemosyne* obviously cannot be realized live in its entirety. Not only that, but certain parts of the score may never be heard, no matter how many times the work is performed.[10] Instead, the flautist is placed in a "behavioral" role rather than the traditional "replicative" one. One must "react" to the score, dancing from one staff to the next and juggling three distinct and complex time-senses in one's head at the same time. As with his afore-cited comment about a score being about the business of suggesting hierarchies, Ferneyhough himself also points out some "relevant methods and priorities" when endeavoring to make head or tail out of *Mnemosyne* :

> It is clear that no monophonic instrument is going to be able to perform all materials on three lines.... What happens is that each of the three lines has its own typical materials in any given section; hence, there is always a particular priority pattern characteristic of the lines among themselves -- one is always dominant, the others accompanimental, interjectional or otherwise subordinate. Similarly,

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[9] Ibid.

[10] Ferneyhough speculates elsewhere on a notational system which deliberately sets out to offer "a *practical surfeit of information*" [emphasis original]. To him this represents a radicalization of the links between hierarchically grounded selection procedures and the final sonic result. As he puts it: "omitting information (whether voluntarily or involuntarily): is this not the ultimate recognition of *priorities*?" See Ferneyhough, "Aspects of Notational and Compositional Practice," in *Brian Ferneyhough: Collected Writings*, 5.

> particular tone colors, registral distributions or degree of relative density contribute to the sense of separation of essences between simultaneous layers of linear unfolding.[11]

Ferneyhough is of the belief that whatever the performer ends up making of a work such as *Mnemosyne* would not have come about if he had notated the piece according to a conventional, compromised communicational model. The result comes out of the performer's confrontation with the score; the work is wrought with a certain indeterminacy of intent, its location lying somewhere in the gray, murky area between the score and what one hears.[12] This calls to mind Ferneyhough's response to Richard Toop's question of what constitutes the criteria for a good performance of his music: "the establishment of audible criteria of meaningful inexactitude."[13] Ferneyhough prefers a situation in which the performer produces a fraction of the subcutaneous notated matter to one where a one-dimensional surface is precisely replicated, or, as he puts it himself:

> Composers who tend to restrict their notational specifications to a bare minimum end up getting one-dimensional representations of a possible sound-world rather than entering that world's inner workings.[14]

As suggested above, Ferneyhough's attitude towards the performer, and how this attitude manifests itself in his notation, contains a component far less blithe than that of merely suggesting "relevant methods and priorities." His mindset also involves using notation as a "behavior-altering

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[11] Brian Ferneyhough, "The Tactility of Time," 47-48.

[12] This idea is reminiscent not only of composers such as Cage but one of Cage's main influences, Marcel Duchamp. In his essay "The Creative Act," Duchamp posits the notion that the artwork is something out of the control of all involved in the art experience. It is not what the artist intends it to be, nor is it what the audience sees or hears. Rather, it lies somewhere in the middle, undefined and forever abstracted. Marcel Duchamp, "The Creative Act," *ART-news* 56/4 (1957): 28-29. Reprinted in *Salt Seller: The Writings of Marcel Duchamp (Marchand du Sel)*, eds. Michel Sanouillet and Elmer Peterson (New York: Oxford University Press, 1973), 138-41.

[13] Richard Toop, "Brian Ferneyhough in Interview." *Contact* 29 (1985): 12. Reprinted in *Brian Ferneyhough: Collected Writings*, 268.

[14] Brian Ferneyhough in Conversation with James Boros," 14.

agent," in which the performer is confronted with an idea of gesture as an utterly dense and physicalized chaos-composite that reveals many isolated smaller coherences within. By dealing with the notation, the player is able to "transform the score into a personal exercitium, a ritual practice of living reconstitution."[15] Part of the *drama* of the work itself, therefore, lies in this confrontation between player and score, where performative response will engender a transformation of content. Among the ramifications of this sense of committed confrontation is a peculiar quality of "hyper-gesture" that I do not believe would be possible in a traditional notational environment.

As a composer whose work embraces ideas from disciplines other than his own (much like Cage), one can detect traces of Ferneyhough's notational stance in what he has acknowledged as his intellectual heritage and operative frame of reference: post-structuralism, post-Marxism, and modernity. First, Ferneyhough has long expressed an interest in the thought of Theodor W. Adorno (1903-69), that apostle of "negative dialectics" and a leading critical advocate for avant-garde music. In general, he is naturally sympathetic to Adorno's critique of the work of art in alienated, late-capitalist society. In sum, Adorno believes that the sanctity of subjectivity embodied in the art object is under onslaught by market forces, where value is equated with price. He is motivated by a desire to see avant-garde works defy these homogenizing and debilitating effects caused by commercialization (what he calls *reification*), to be the point of resistance to such reappropriation. Adorno lauds difficult art and philosophy because only through a struggle to understand can there be a renewal of value. He also railed against Stravinsky's neo-classic works, as

[15] Ferneyhough, "Aspects of Notational and Compositional Practice," 7.

well as any music that evaded the "duty of difficulty" (Adorno hated popular music, and *especially* despised jazz).

That said, what Ferneyhough gets from Adorno *in particular* has to do with the notion of a "notational dialectic"; this reflects the influence of Adorno's manner of critical thinking itself. In their look, their sheer "impossibility," Ferneyhough's scores offer a kind of "notation-as-critique." Such a critique functions on two planes; the first is one of accepted norms of graphic presentation, of demonstrating that "new works often do not permit much to be taken for granted." The second form of critique is one on the part of the performer, involving one thinking critically (read *dialectically*, argumentatively) about one's relationship to the score. This is what Ferneyhough calls the "different but no less important "free space" within which to move." As Ferneyhough's scores refuse any clear, affirmative transmission of a notational signal (creating a negative situation which further justifies an Adorno comparison), one may call this state of affairs "dialectical," requiring a different, more engaged response on the part of the performer. In an essay of Ferneyhough's that I will be discussing shortly in greater detail, "Aspects of Notational and Compositional Practice" (1978), he writes that under the most favorable conditions the best a specific notation can hope to achieve is

> a *dialogue* with the composition of which it is a token such that the realm of non-equivalence separating the two (where, perhaps the "work" might be said to be ultimately located?) be sounded out, articulating the inchoate, outlining the way from the conceptual to the experiential and back.[16]

[16] Ferneyhough, "Aspects of Notational and Compositional Practice," 13. In the same essay (4) Ferneyhough further raises the specter of Adorno by stating that notation is "an explicit ideological vehicle (whether intended as such or not from the point of view of the composer)," and that an adequate notation must incorporate an "*implied ideology of its own process of creation* " (emphasis original). Ferneyhough addresses his engagement with Adorno's thought in greatest detail in his 1993 lecture "Parallel Universes" (*Brian Ferneyhough: Collected Writings*, 77-83), where he also discloses how Deleuze and Guattari's concept of the "schizophrenic fragmentation of experience" has been influential on his compositional project in general. Mahnkopf also broadly relates the New Complexity to Jean-Francois Lyotard's notion of "the ever-increasing complexity in society today which is 'suffering' from a polycontextual, non-centric,

Second, and somewhat related, Ferneyhough's notion of scores being "artifacts with powerful auras of their own" obviously brings to mind the use of the term "aura" associated with the German cultural philosopher Walter Benjamin (1892-1940). In his essay "The Work of Art in the Age of Mechanical Reproduction" (1932), Benjamin argues that every work of art has an "aura."[17] This aura ascribes to the work a certain property of authenticity to the work that Benjamin believes is being withered away by technology and mass access to new media providing for its reproducibility. Since, in the case of Ferneyhough's scores, all talk of performative reproduction or veritable multiplication of an "original source" is rather an iffy proposition, one could speculate on his notational enterprise as an attempted restoration of the work's "aura of authenticity."[18]

Lastly, what for lack of a better term I would call Ferneyhough's "in your face" attitude with regards to transforming the performer's chemical makeup and nervous system has parallels in the work of the French playwright and director Antonin Artaud (1896-1948). Best known for his revolutionary essay "The Theatre and its Double" (1931-36), Artaud is the progenitor of the "Theatre of Cruelty," advocating a theatre of total sensory immersion grounded in a poetics of intensity and violence.[19] One could say that Ferneyhough acquired his Artaud obsession second-hand via Boulez, whose works of the late 1940s (such as the Second Piano Sonata

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and polymorphic 'dissemination.'" Claus-Steffen Mahnkopf, "Complexism as a New Step in Musical Evolution," 29.

[17] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, ed. Hannah Arendt (New York: Harcourt, Brace, and World, 1968), 219-53.

[18] Further evidence of Ferneyhough's debt to Benjamin can be seen in the title of his work for solo guitar *Kurze Schatten II* (1989), which is taken from the Benjamin essay of the same name. Walter Benjamin, "Kurze Schatten II," in *Gesammelte Schriften*, vol.4, bk.1, ed. Tillman Rexroth (Frankfurt-am-Main: Suhrkamp Verlag, 1972), 425-28.

[19] Antonin Artaud, "The Theatre and its Double," excerpted in *Antonin Artaud: Selected Writings* (New York: Farrar, Straus & Giroux, 1976), 213-76. In the section entitled "An End to Masterpieces," Artaud writes: "I propose a theater in which violent physical images pound and hypnotize the sensibility of the spectator, who is caught in the theater as if in a whirlwind of higher forces" (259).

and *Le Visage Nuptial*) are thought to be representative of his "Artaud period." In notes on his *Time and Motion Study I* (1977) for solo bass clarinet, Ferneyhough writes that

> The...course of this nine-minute work is made up of the violent filtering of the energies thus liberated through the dexterity and bodily flexibility of the performer. As in Antonin Artaud's "Theater of Cruelty," each area of the work calls forth resonances from different parts of the total organism performer/instrument/context. This, for me, is "drama in music."[20]

The apotheosis of this line of inquiry, of using notation as an instrument of physicalized, extra-graphic transcendence, occurs in Ferneyhough's *Time and Motion Study II* (1973-76) for vocalizing cellist and live electronics, where the soloist has to react instantaneously to signals directed at him/her from various loudspeakers, and his/her vocal actions are picked up and amplified by a contact microphone attached to his/her throat (these vocal actions are subsequently transformed and distorted via ring modulation).

Contrast this general orientation with the conventional notational model, one to which I apply the term "notation-as compromise." According to this most common of paradigms, the notation acts as an intermediary, or "filter." Certain pre-compositional strategies and processes are filtered through (or "compromised," or "rounded off") various encodings and rational assumptions (often carrying with them performative imperatives as well) in order to facilitate a coherent, more easily performable whole, a "public version" of the work. The role of the notation is purely presentational; its success is defined by how "clearly" the composer transmits his/her ideas to the performer.

I would advance the notion that Ferneyhough's notation presents a different paradigm, as well as an important challenge to the accepted

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[20] Brian Ferneyhough, "The *Time and Motion Study* Cycle," in *Brian Ferneyhough: Collected Writings*, 113.

notational argument. According to this paradigm, notation can exist as a kind of "inventory of processes." Various pre-compositional generations of multi-metric structures and compositional transformations of material (indeed, Ferneyhough describes a certain sense of narrativity in his music occasioned by his changing views towards treatment of the "material") are presented in an ostensibly unfiltered manner. One now encounters a posture where the composer entertains no discernible interest in compromising his/her material to the predispositions and prejudices of the performer. Quite the opposite state of affairs is possible, actually, where a process of self-selection is at work:

> Obviously, in the sheer technical difficulty of the pieces there is a certain in-built defense mechanism against uncommitted performers. Is even the notation itself, and its *mis-en-page*, a sort of "protective commentary" (in Debussy's sense) against the dilettantish approach?[21]

The aforementioned "Aspects of Notational and Compositional Practice" is truly one of the most remarkable manifestos on the subject of notation ever issued by a composer. With it Ferneyhough established notation as his compositional "turf," and ensured it would be a prime topic in any discussion involving his music -- perhaps more than even he might have wanted. In this essay Ferneyhough contends that notation, no matter how historically traceable and analyzable,

> is nevertheless hardly to be separated, even in principle, from the actual goals which a particular artist has set himself. It is far from accidental that so many works of the last three decades are perhaps more immediately categorizable in terms of their visual than their aural characteristics.[22]

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[21] Richard Toop, "Brian Ferneyhough in Interview," *Contact* 29 (1985): 10; reprinted in *Brian Ferneyhough: Collected Writings*, 269. The statement is Toop's, an assertion Ferneyhough readily agreed with.

[22] Ferneyhough, "Aspects of Notational and Compositional Practice," 2.

The idea that notation is inseparable from content, of course, is an idea also important to Cage and Berio (at least in the latter's works of the 1950s and 60s). Ferneyhough observes that notation occupies a curious and somewhat strange ontological position: a sign-constellation that refers directly to a further such constellation of an entirely different perceptual order. In addition, the attractions and frequent self-indulgences involved in notation come with certain hazards. Specifically, while the adequacy of a notational system will always be judged by how well it signifies *sounds*, at the same time its premises must also reflect a concern for sound *after its production*:

> The sound...cannot, via the force of its reaching out towards emancipation, be permitted to expand into a vacuum, but must be curved back inside the space which the original organizational characteristics of the score (as reflection of the final stage of the *act* of composition, its *record*) should have assumed the task of defining. Both --score and sound-- are sign systems whose primary fields of signification must always remain their respective opposites.[23]

Though Ferneyhough acknowledges that no notational system can encompass all aspects of the sonic phenomena it purports to convey, he sees no reason why the composer should not investigate as near an approach as possible to such an unreachable ideal. He believes that the closer one comes to such a point, there will likely emerge a play of incompatabilities among the "various modes of existence" in a work. These modes are then free to exist as essential components, their "otherness" not disguised as is usually the case in compromised notational circumstances. The next passage from "Aspects" deserves very close attention, as it could not be more indicative of Ferneyhough's notational mindset:

> Perhaps the single most important task facing the composer in his confrontation with the various aspects of his *own* activity is the postulation of a universe within which these extremes be enabled to *speak* to one another and, in so doing, point out a path towards overcoming the endless proliferation of barriers compartmentalizing the realm of the senses. One point of departure for an

[23] Ibid., 3.

> iconology of compositional activity: the representation of the act of composition as a *polyphonic membrane*.[24]

Ferneyhough, therefore, views notation as an iconic vehicle with which to reformulate the essential nature of the work (meaning its assumptions, preconditions, situational validity), and "in so doing, allow the very concept of closed form in present-day compositional practice to acquire a renewed esthetic foundation."[25]

In order for a notational system to be able to achieve such a capability, Ferneyhough outlines three essential presuppositions:

1. it must demonstrate its ability to offer a *sound-picture* of the events for which it stands;
2. it must be in a position to offer all essential instructions for a *valid reproduction* of those sounds/actions defined as constituting the "text" of the work; and as I mentioned before in footnote 15,
3. through the "conflation and mutual resonance" of (1) and (2), it should incorporate an "*implied ideology of its own process of creation.*"[26]

Ferneyhough then proceeds to parse his work (up until 1978) into different categories of notational preoccupation. The first is that of "notation as intermediary, connecting border areas of representation."[27] As an example, he cites an early work of his, *Cassandra's Dream Song* (1970) for solo flute. The score of *Cassandra* consists of two pages, presented

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[24] Ibid.
[25] Ibid., 4.
[26] It should be noted, of course, that really all notational/performance-practice conventions come with a heavy ideological dose. What Ferneyhough is after in this case is the acknowledgment of such as well as the incorporation of ideology into the visual mode of a work, remarking: "perhaps it is considered indecent?" Ibid.
[27] Ibid., 5.

here in Examples 4.3a-b. Sheet 1 has six systems, labeled 1-6; sheet two has five, labeled A-E.

Cassandra can be thought of as Ferneyhough's very inventive response to the question of the "open work" that was discussed at some length in chapter two. Each of the six systems on sheet 1 is alternated with the five on sheet 2; however, the order of A-E is left to the performer's discretion while 1-6 are performed in sequence. One possible rendition would be as follows: 1 C 2 A 3 E 4 D 5 B 6. As in Berio's *Sequenza I* (1958; rev. 1992), formal "openness" is defined within a very delimited and quantified context. In other respects, though, the notational profile of this early Ferneyhough work already constitutes a departure from the practices of the European avant-garde establishment. In his performance notes Ferneyhough writes:

> The choice of notation...was principally dictated by a desire to define the quality of the final sound by relating it consciously to the degree of complexity present in the score. The piece as it stands is, therefore, not intended to be the plan of an "ideal" performance. The notation does not represent the result required: it is the attempt to realize the written specifications in practice which is designed to produce the desired (but unnotatable) sound quality.
>
> A "beautiful," cultivated performance is not to be aimed at...the audible (and visual) degree of difficulty is to be drawn, as an integral structural element, into the fabric of the composition itself.[28]

In other words, notational complexity is wired into *Cassandra's* work-structure, creating a situation where, as in the passage of Ferneyhough's I quoted at the very beginning of this chapter, "the object of music becomes its conditions of realization." Notational issues infiltrate formal conditions in *Cassandra* as much as they serve to define them. Ferneyhough intentionally "extremitizes" his material so as to project an

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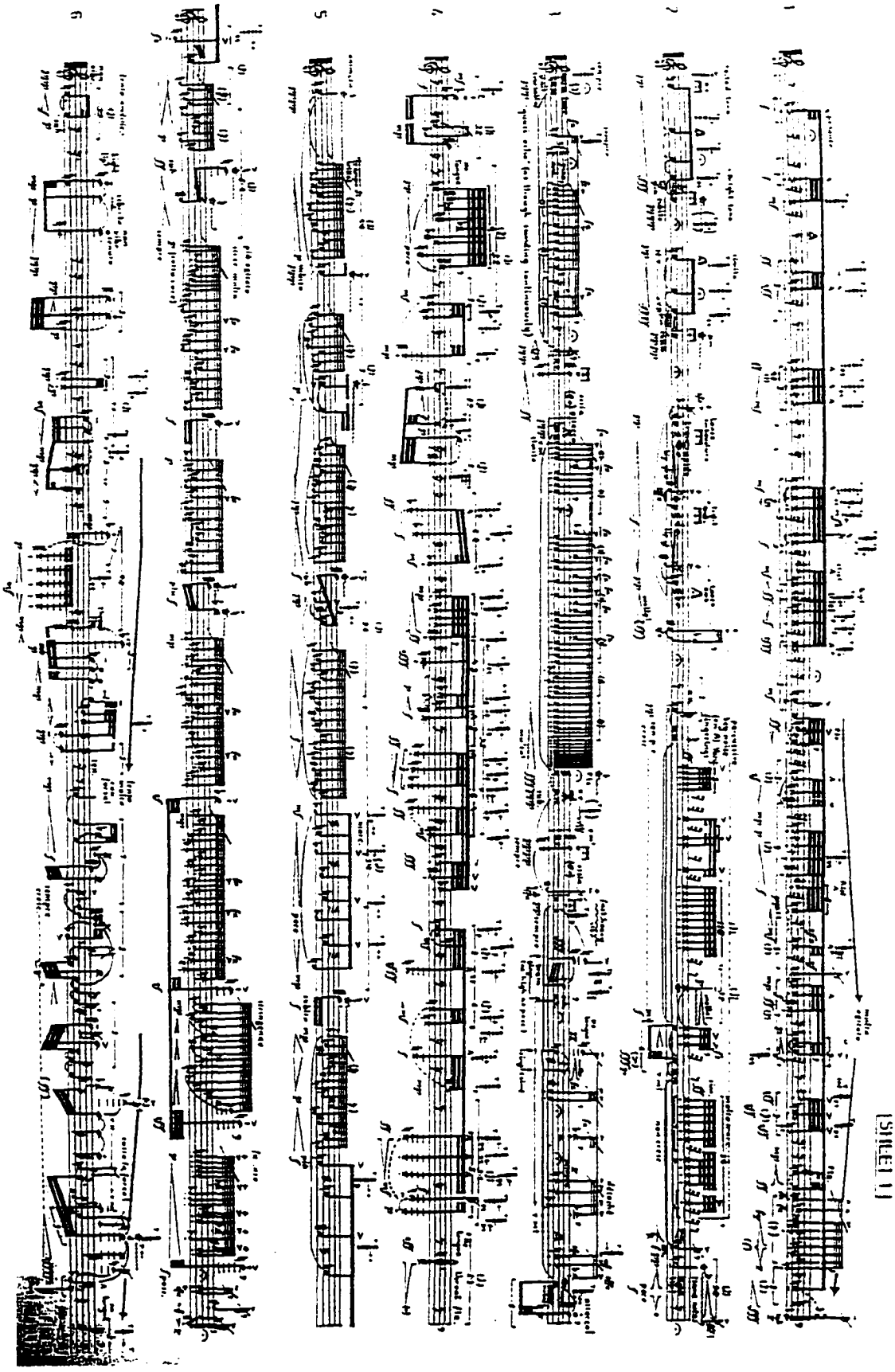
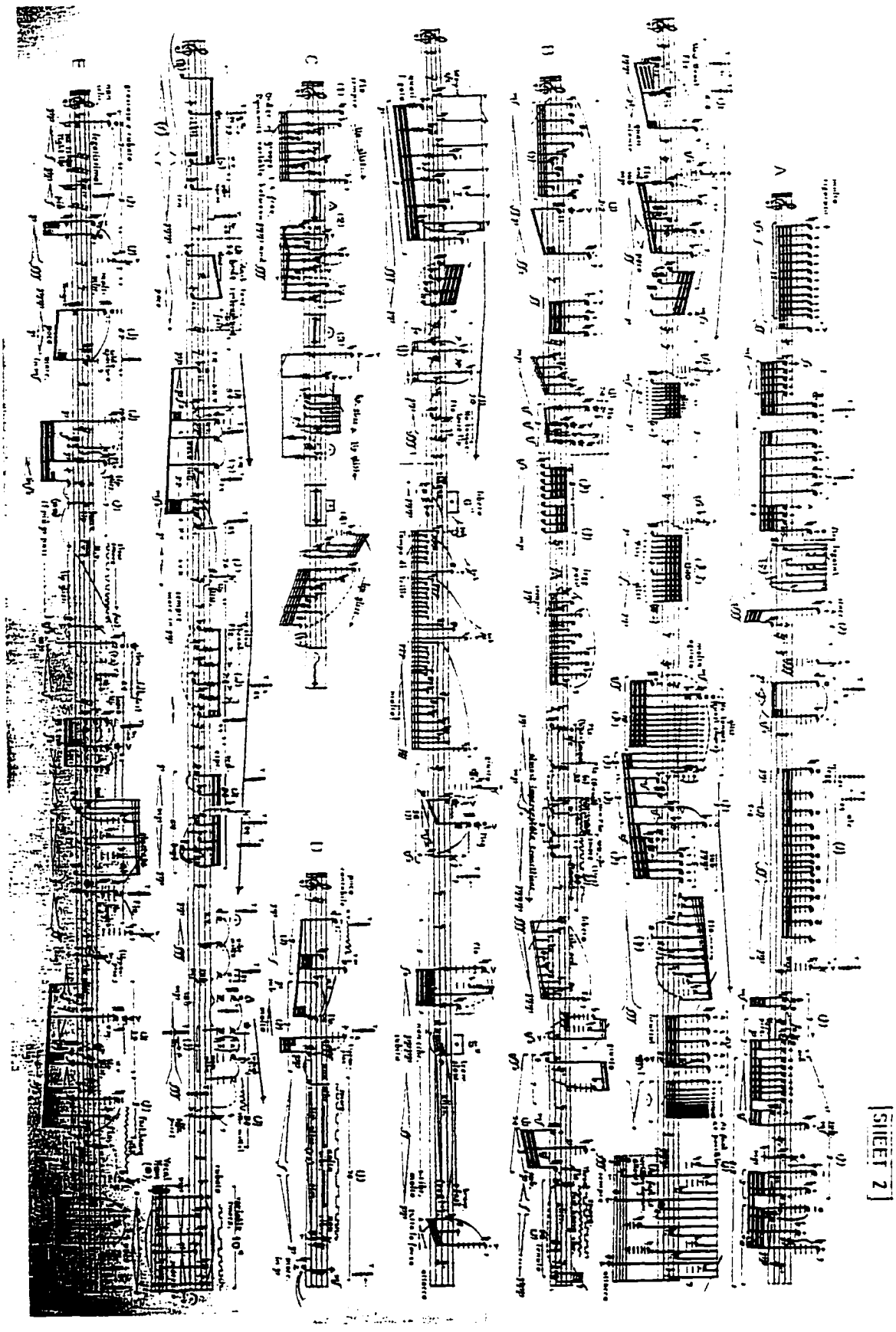
[28] Brian Ferneyhough, *Cassandra's Dream Song* (London: Edition Peters, 1975). Excerpts from performance notes in "Aspects of Notational and Compositional Practice," 5.

Example 4.3a - *Cassandra's Dream Song*, sheet 1 (1-6).



Example 4.3b - *Cassandra's Dream Song*, sheet 2 (A-E).



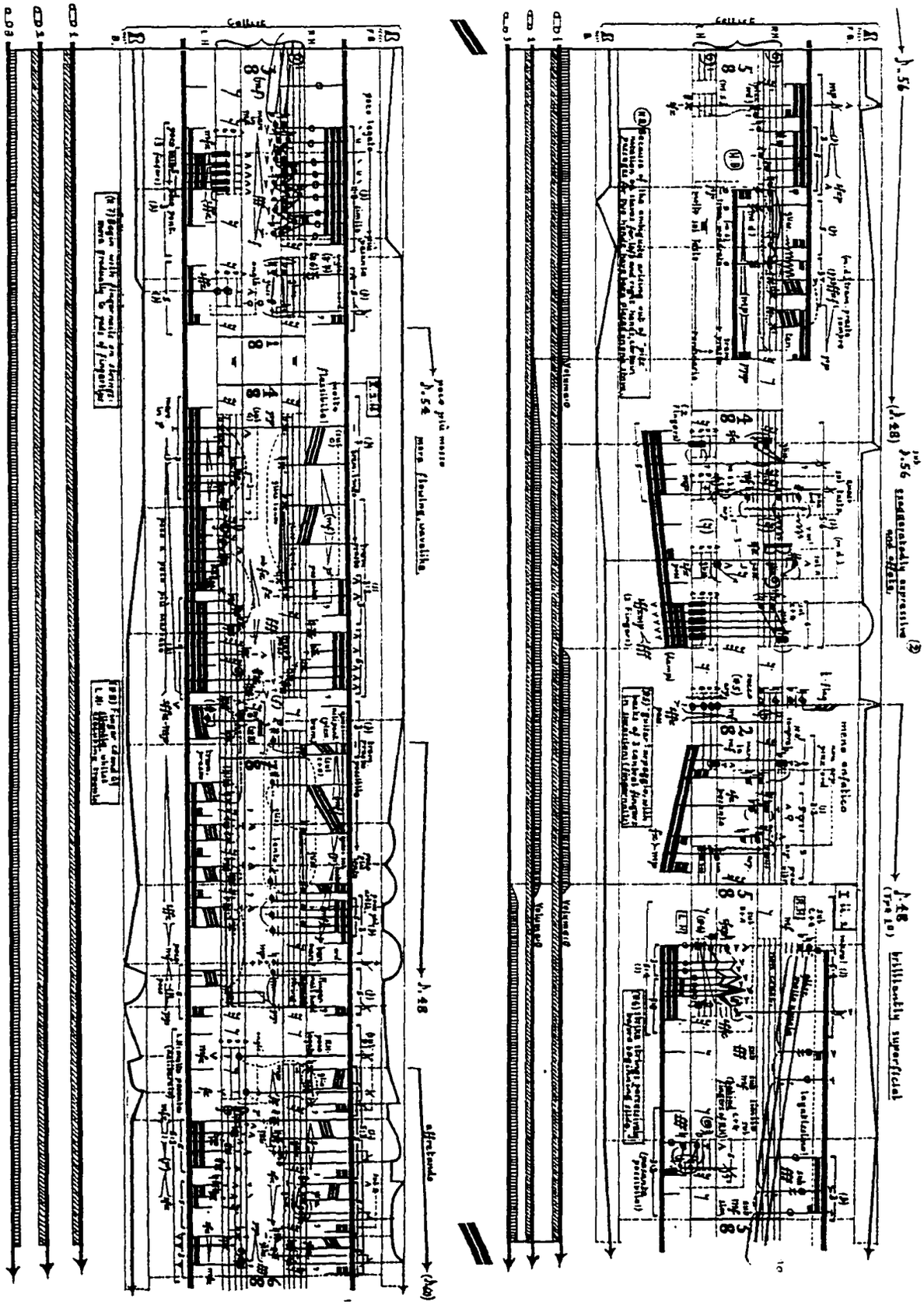
often literally "unplayable" image. The boundary between what is playable and unplayable is left up to the capabilities of the given flautist. "whose interpretational endowment forms a relativizing 'filter.'"[29] *Cassandra*'s "unplayability" is minimized by the lack of time-signatures and bar-lines, which exponentially reduces performative complications as well as keeping a sense of rhythmic tension out of the work that Ferneyhough would be keen on restoring in his later music.

The second category of Ferneyhough's pre-1978 notation is "the psychologizing of virtuosity (its effective transcendence) as medium of communication." This was a great preoccupation of his in the mid-1970s and relates to my idea expressed earlier of notation as a "behavior-altering agent." The works in this period include the three *Time and Motion Studies* and *Unity Capsule* (1975) for solo flute; in many respects they represent a progression from the notational milieu of *Cassandra's Dream Song*. Ferneyhough now is using time-signatures and bar-lines, which cause each gesture to be far more tightly wound. In this period he begins his characteristic and controversial practice of employing very slow metronomic markings combined with extremely short rhythmic values.[30] This is shown in Example 4.4, a page from *Time and Motion Study II* (1976-77), where the metronome markings move from eighth note=56 to eighth note=48, and rhythmic figures subdivide into units as busy as sixty-fourth note nonetuplets. I call this practice "controversial" because, of course, Ferneyhough easily could use faster tempi and longer note values to get an ostensibly similar result. This is obviously an example of "psychological notation," where the composer's intent is to create a sense of discomfort and physiological hyper-awareness on the part of the

[29] Brian Ferneyhough, "Aspects of Notational and Compositional Practice," 5.

[30] Apropos to Adorno, one should also note the dialectical properties inherent when an appearance of speed is negated by a slow tempo indication.

Example 4.4 - *Time and Motion Study II*, p. 2.



performer. It is a practice Ferneyhough continues to this day, and it is the element perhaps most important to the graphic look of the "black score."

Several of Ferneyhough's notational hallmarks are still missing at this point, including irrational meters and the most complex polyrhythms. By the term "irrational meters," I refer to a technique involving beats of irrational lengths in relation to the basic tempo of the piece. These lengths are expressed in time-signatures such as 1/10, 3/20, 1/12, etc. Irrational lengths are based on triplet or quintuplet subdivisions of the normal beat, so what looks like an eighth note in a 1/10 bar has four-fifths of its normal value in 1/8. Example 4.5a presents the first page from Ferneyhough's work *Superscriptio* (1981) for solo piccolo, which features a great many irrational meters in relation to a base tempo of eighth note=ca. 56. The basic units of the metrical layout of the first page are presented in Example 4.5b.

Ferneyhough employs irrational meters as "clicks" or "triggers" at the beginning of each bar. The performer is continuously jerked from one measure to the next into a "perceptibly different rapidity."[31] Ferneyhough views this "rapidity" as not involving a change of tempo, but as one of metric value:

> Most performers until recently have rewritten these relationships as changes of base *tempo*...that approach runs counter to my own intuitive "feel" for what tempo changes, as opposed to meter changes, actually imply.[32]

As with other of Ferneyhough's innovations and practices, such as the multiple staff-systems in *Mnemosyne*, the use of irrational meters is part of a larger "behavioral" agenda involving an emphasis on the performer's

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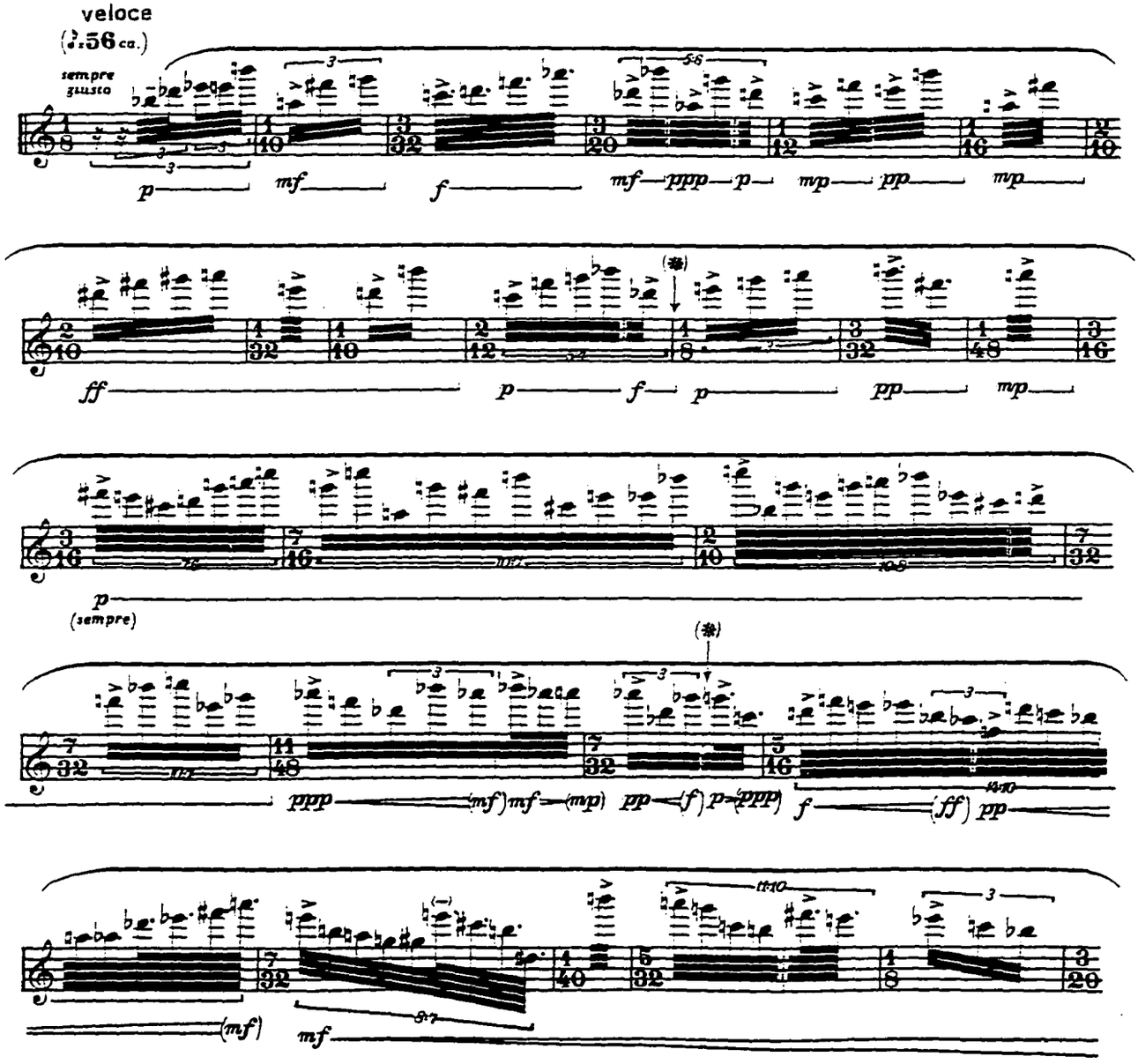
[31] Richard Toop, "Brian Ferneyhough in Interview," 14. Reprinted in *Brian Ferneyhough: Collected Writings*, 278.

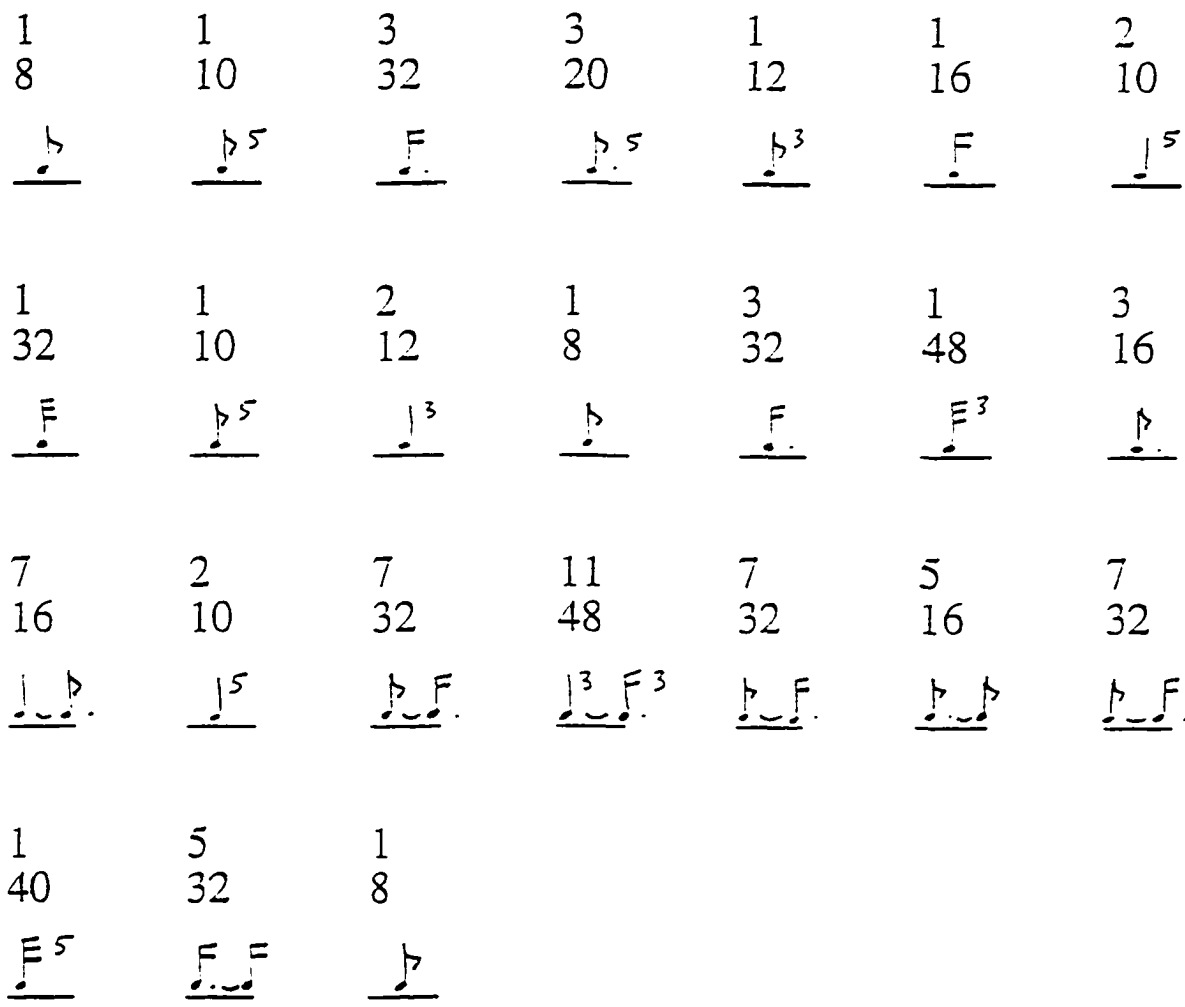
[32] "A Verbal Crane Dance: Brian Ferneyhough Interviewed by Ross Feller," in *Brian Ferneyhough: Collected Writings*, 447.

Example 4.5a - *Superscriptio*, p. 1.

Superscriptio



Example 4.5b - Basic units of the metrical layout for *Superscriptio*, p. 1. The irrational lengths are based on triplet or quintuplet subdivisions of the normal beat, so that what looks like an eighth note in a 1/10 bar has four-fifths of its normal value in 1/8.

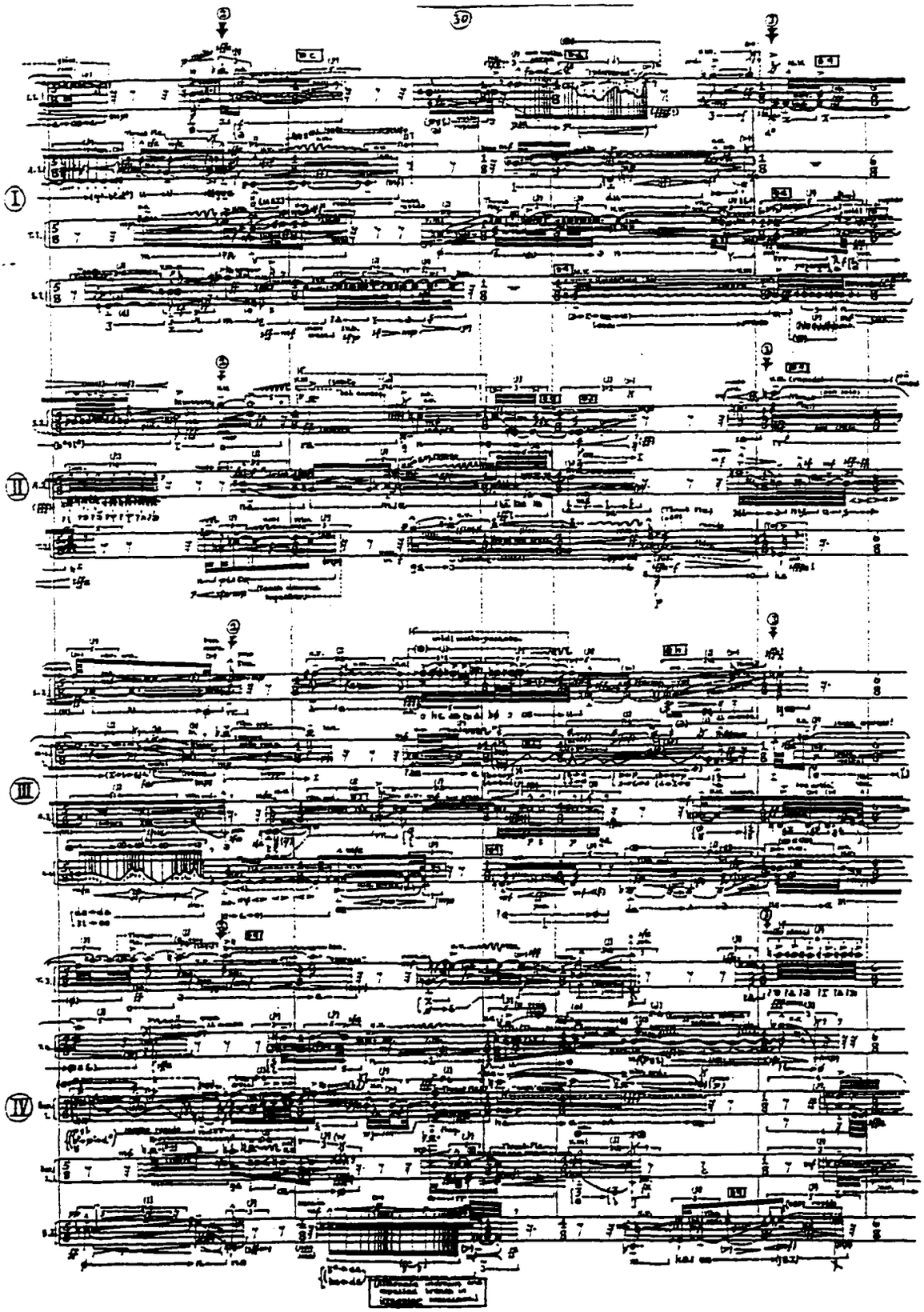


confrontation with and reaction to an overstretched perceptive signal. Ferneyhough is not so much interested in the performer's negotiating and solving a passage in irrational meter as he is in their establishment of a new context and idiom.

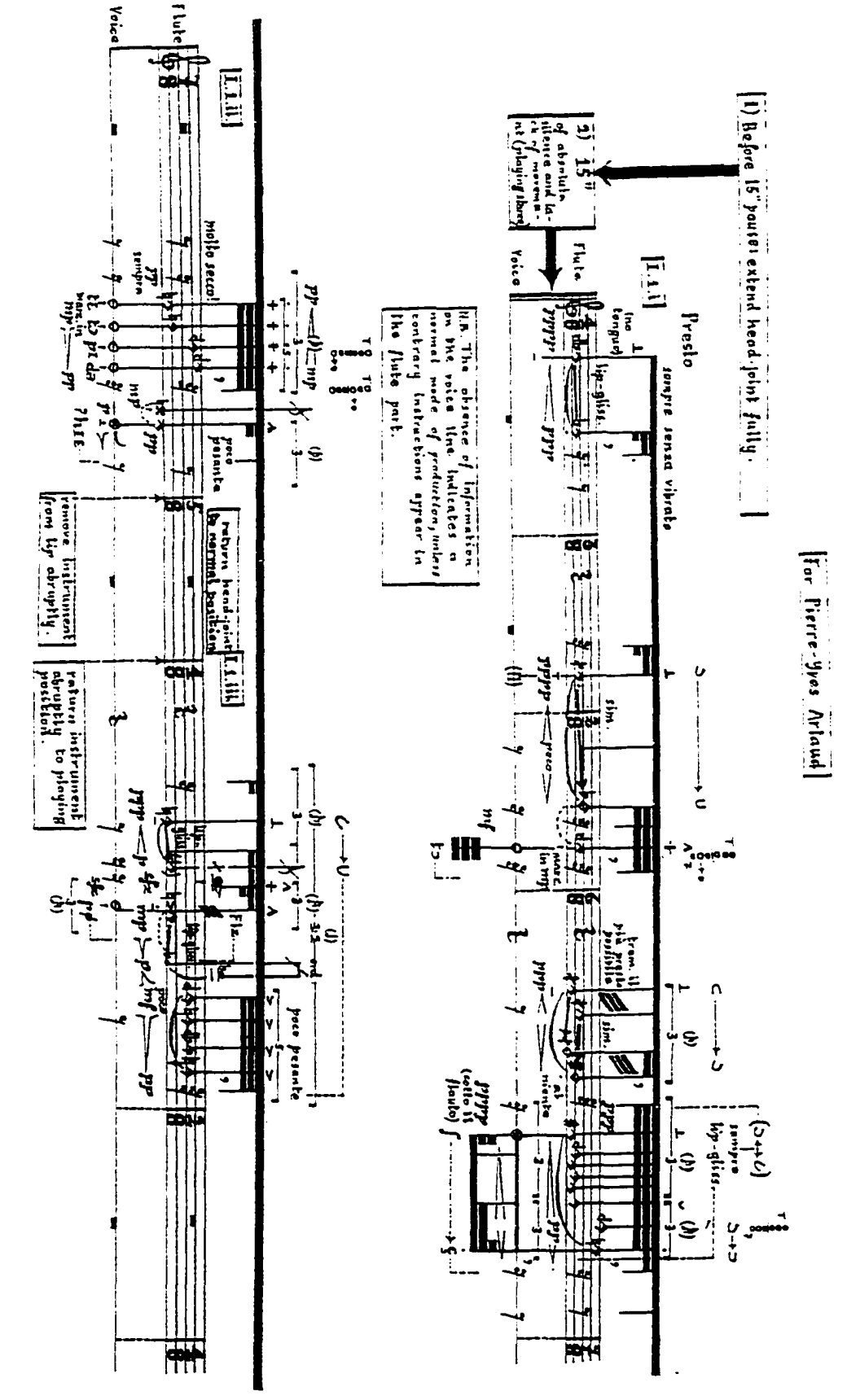
Other characteristic notational devices of Ferneyhough's are present in the seventies, however, including the interest in notating a sound-picture that is precise, intricate, and multi-layered, where every aspect of a sound-composite is accounted for. An excellent example of this occurs in the *Time and Motion Study III* (1974) for sixteen solo voices with percussion and electronic amplification, a page of which is presented in Example 4.6. In the performance notes to *Time and Motion Study III*, there are 109 paragraph-length vocal instructions which are indicated in the score by an asterisk and labeled *1-*75, *A-*Z, and *aa-*hh; each time one sees one of these asterisks one needs to refer back to the notes.[33] Ferneyhough even outlines formal subdivisions by use of theorem numbers that one would find in a mathematics or logic treatise; for example, "I.4.ii" means that the current section is large section I, subsection 4, subdivision ii. It is as if these works are developments of a logico-philosophical argument. Notable as well are the extremely intense and expressive character markings in the *Time and Motion Studies*, such as "exaggeratedly expressive and effete" (*Time and Motion Study II*), "like the sound of a single giant lung," "with divided loyalties," and "hallucinatory; surrealist: on the purest peak of violence" (*Time and Motion Study III*). The physical choreography in these works is so strenuously attended to that, as shown in a page from *Unity Capsule* in Example 4.7, Ferneyhough even notates all movements

[33] The Stuttgart Schola Cantorum reports that it took them a total of eighty rehearsals over a period of one-and-a-half years before *Time and Motion Study III* was ready to be premiered at the Donaueschingen Festival in 1975. This did not include the time necessary for each of the sixteen vocalists to learn to play the additional percussion instruments assigned to them. Sleeve-note for *Neue Chormusik. III* (Schola Cantorum Stuttgart. Wergo 60111).

Example 4.6 - *Time and Motion Study III*, p. 30.



Example 4.7 - *Unity Capsule*. p. 1.



of the head, eye, and tongue.

Ferneyhough characterizes the works of this period as being informed by an interest in the possibility of achieving total textural homogeneity,

> a notation of such analicity that...the density of information remains relatively constant until the smallest compositionally meaningful unit of articulation has been attained... It is in these works that I felt myself to have most nearly approached and defined the outer limits of a potential self-critical formalism, and to have demonstrated this fact in the specific notational models employed.[34]

The debate regarding Ferneyhough's notational project, and the "unplayability" issue

> One gets nothing out of this music unless one first of all grants it respect.
> David Bruce, 1997[35]

> The fake issue of "unperformability" is really a red herring.
> Brian Ferneyhough, 1990[36]

Contra: Roger Heaton/Roger Marsh

Needless to say, Ferneyhough's views on notation (as with other components of his compositional enterprise) are not shared by the majority of practitioners in the mainstream of musical opinion. In fact, he has faced severe criticism from several quarters -- performers, critics, and composers alike. One of the more representative and slashing anti-Ferneyhough polemics is by the British clarinetist Roger Heaton. In a 1987 critique in the British contemporary music journal *Contact* entitled "The Performer's Point of View," Heaton indicts Ferneyhough and his fellow travelers with a long, lamentable, and predictable litany of compositional crimes: engaging in absurd excess, invitation to performative fakery, using complexity to cover up a lack of real ideas, and incompetence in the form

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[34] Ferneyhough, "Aspects of Notational and Compositional Practice," 7.
[35] David Bruce, "Triumph of the Will," *The Musical Times* 138/1853 (1997): 41.
[36] Bons, comp. and ed., *Complexity?*, 3.

of various rhythmic mistakes such as bars that don't add up, insufficient beamings, and incorrect groupings.

Mocking "the few circus-freak soloists who hawk their "most-difficult-piece-in-the-world" shows from festival to festival," Heaton contends that Ferneyhough obviously cannot hear what he writes, and therefore does not work in and with *sound*.[37] The most wretched of excesses, he believes, exist in the area of unnecessary rhythmic complexity; this factor also makes Ferneyhough's music impossible to play accurately. This results in the performer being thrown into a realm of approximation, then improvisation which is operating at cross-purposes with a hyper-detailed notation that by nature is attempting to control every aspect of performance. When the notation is of greater importance than the music it is presumably there to serve, the effect on the player is one of subjugation and manipulation:

> (the performer) ...can only conclude that his efforts are ultimately of secondary importance. The player, confronted by these impossible works, is defeated before even beginning, and ultimately discouraged and depressed by the approximations which occur, challenging his integrity. In performance, the listener may be impressed by a great flurry of things and a show of techniques. But, finally, how much of this has anything to do with the composer?[38]

As an example, Heaton takes strenuous issue with one of the afore-mentioned notational calling cards of the "black score," the slow metronome marking:

> Why is it necessary for the basic meter of a piece to be a quaver, and then to have a metronomic mark of, say, quaver=40? This means that the piece looks black, fast, and more complicated than it really is, when in fact it is quite slow; in other words, it does not look like it sounds. Since notation is only a set of signs to be

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[37] Roger Heaton, "The Performer's Point of View." *Contact* 30 (1987): 32. Heaton makes the same point in his contribution to the *Complexity?* questionnaire, where he compares Ferneyhough unfavorably to a number of other composers who write "complex and difficult music...which, with time, any capable and experienced performer is perfectly able to play: Carter, early Stockhausen, Donatoni and so on." Heaton also goes on to cite Carter and Xenakis as two composers who hear and communicate their music in a fashion superior to Ferneyhough. In *Complexity?*, 26.

[38] Ibid., 33.

> translated into sound, and not an end in itself, one can only assume that in such cases the look of the score, its calligraphy, is all-important.[39]

A source of this failure, according to Heaton, is the fundamentally conventional nature of Ferneyhough's notation. On one hand, such a notational system sets out its terms of reference within the tradition from which the performer's instrument comes, placing his/her approach within a well-trod context. On the other hand, since the pieces are impossible to render accurately, the performer must resort to faking and improvising in a manner familiar to the style -- what one often hears called "*that* kind of thing." Heaton sees an unhappy consequence arising out of this dichotomy:

> imaginative, but technically less competent, players performing these pieces, whereas a player with a sound traditional technique...would not attempt something which has no regard for the instrument.[40]

The composer/critic Roger Marsh uses different means to prove a similar conclusion in his 1994 *Musical Times* article "Heroic Motives." Marsh takes apart the various layers of some isolated passages in Ferneyhough's scores, and compares them with recorded performances. Marsh finds that the recordings totally "rationalize" and normalize what is written, sounding nothing like what Ferneyhough allegedly intended.

Marsh brings to his work an attitude rather more reasonable than that of Heaton; he begins willing to be persuaded of the notation's validity and necessity and does not seem to have any blanket objection to the very nature of the enterprise. Marsh views the typical Ferneyhough measure as

> a collection of fragments which result, in all probability, from the collision of a number of independent compositional strategies working at independent tempos determined by (possibly simple) numerical ratios.[41]

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[39] Ibid., 32.
[40] Ibid.
[41] Roger Marsh, "Heroic Motives," *The Musical Times* 135/1812 (1994): 83.

Marsh's first example comes from Irvine Arditti's recording of Ferneyhough's *Intermedio alla ciaccona* (1986) for solo violin. He takes the first four measures of the piece, which contains a 5:3 polyrhythm nestled within a larger unit of seven eighth-notes in the time of four: (Example 4.8a)

and transcribes it off the recording as: (Example 4.8b)

First of all, Marsh converts the dotted eighth pulse to that of a simple eighth-note. The metrical scheme of 6/8 2/8 6/8 5/8 is altered to 5/8 6/8 4/8, meaning that four beats are eliminated. Marsh perceives the first and third dyads of the piece to be of equal duration in Arditti's performance. The nestled 5:3 within a 7:4 in measure two still occurs within the space of two beats, but Marsh has radically renegotiated and rationalized it to two thirty-seconds/one sixteenth/one eighth. The 7:4 polyrhythm in the time of 5/8 in measure four is changed to a sixteenth-note triplet followed by a dotted quarter note in 4/8.

> No performance of this opening would be able to convey the rhythmic relationships which Ferneyhough notates so precisely. There is nothing to convey the conceptual tactus (quaver) short of foot-tapping or head-nodding.[42]

Marsh takes apart another passage from the first page of *Intermedio*, this one at measures 14-15. The passage is originally notated as a 14:12 figuration nestled inside a larger group of 5:3 with a time-signature of 3/8, followed by a thirty-second triplet inside a grouping of 5:4 in 2/8 (Example 4.9a). Marsh once again rationalizes the passage, renotating it in this fashion: (Example 4.9b)

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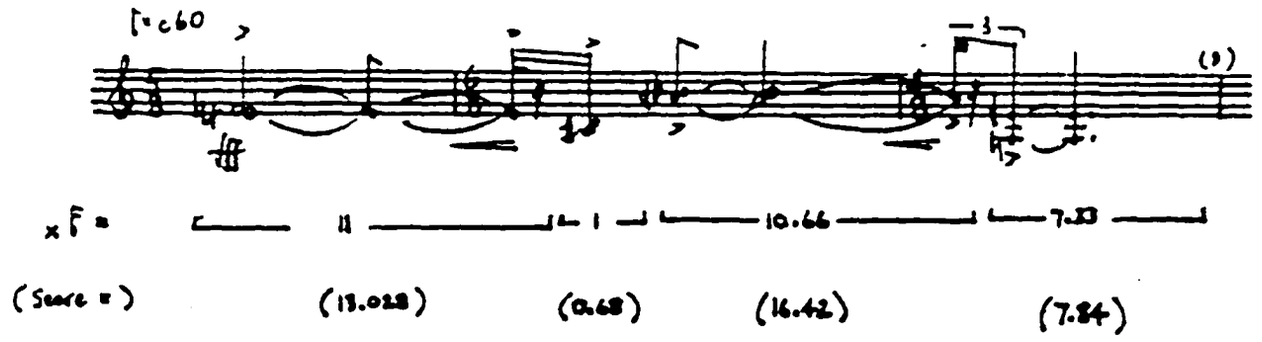
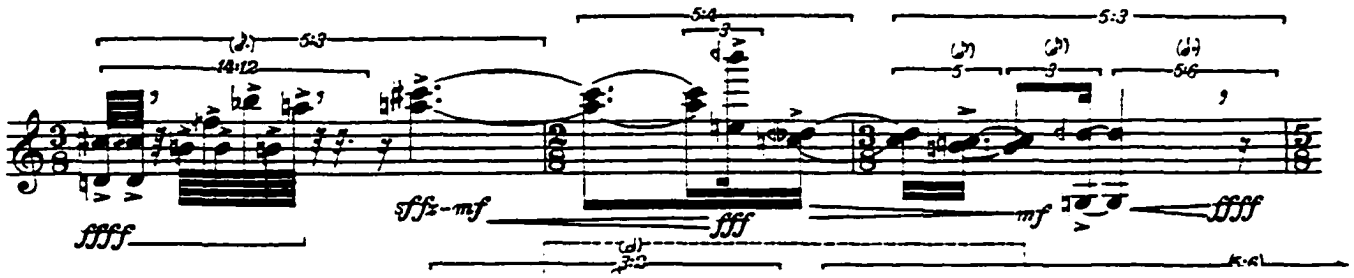
[42] Ibid., 83-84.

Example 4.8a - *Intermedio alla ciaccona*. mm. 1-4.

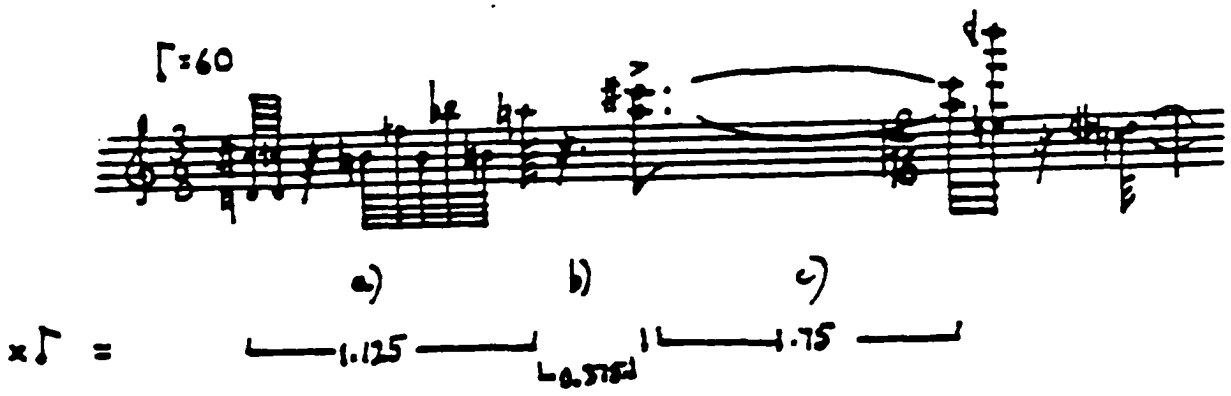
Example 4.8b - Marsh's transcription of Example 4.8a.



Example 4.9a - *Intermedio alla ciaccona*, mm. 14-16.



Example 4.9b - Marsh's transcription of Example 4.9a.



The first eight attacks in Example 4.9a are meant to be executed within two-thirds of an eighth-note's duration, but Marsh hears Arditti performing them as straight sixty-fourths followed by a dotted-eighth. Marsh ascribes three time-ratios to the first measure: (a) from the first attack to the eighth; (b) from the eighth attack to the next one, the held A/C-sharp dyad; and (c) from the A/C-sharp dyad to the next attack in the following measure, the E/B-quarter-flat. The ratio of (a) to (c) in Example 4.9b is roughly 2:3, while in Ferneyhough's score it is more like 2:11. The next measure is one-half the original's duration, again rationalized to straight thirty-second notes in 2/16.

Marsh concedes that in the case of *Intermedio alla ciaccona*, Arditti's fluctuations and rationalizations do not substantially change the meaning of the music. However, in the case of the Arditti Quartet's recording of Ferneyhough's Second String Quartet (1981), he believes that "performer rationalization does appear to come perilously close to changing the music into something which the composer almost certainly did not intend or predict."[43] The beginning of the quartet, due to the rhythmic unison between Violins I and II, provides greater pressure on the performers to rationalize or simplify what Marsh terms "rhythmic absurdities."[44] Marsh takes the frenetic intensity and rhythmic asymmetry as notated by Ferneyhough (Example 4.10a):

and renotates it in the manner of what he hears as a "Schoenbergian bucolic dance."[45] (Example 4.10b)

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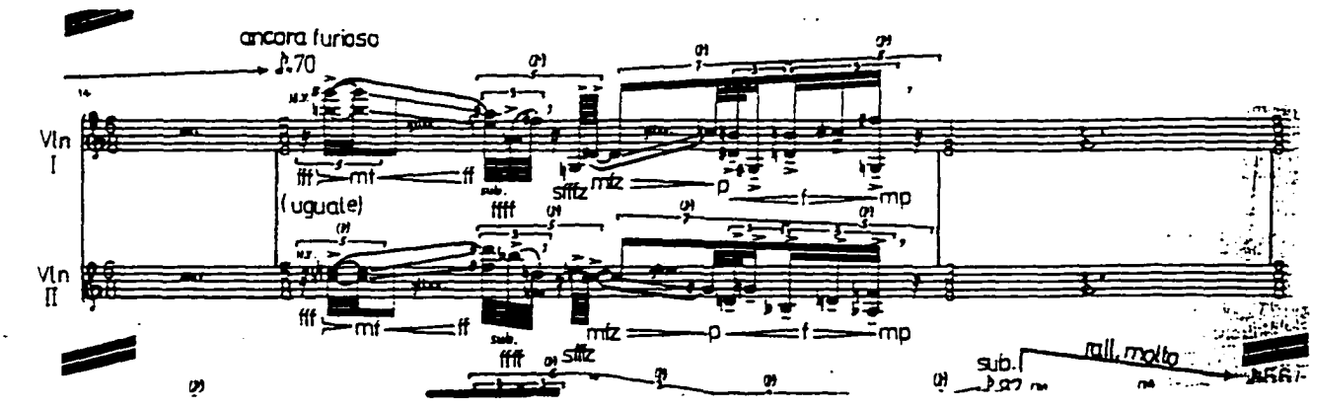
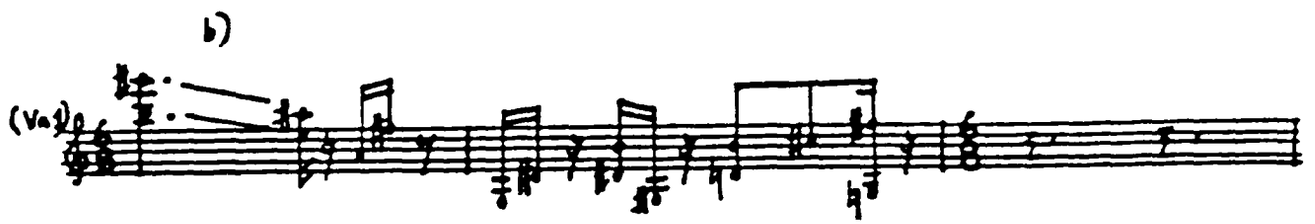
[43] Ibid., 84.
[44] Ibid.
[45] Ibid., 85.

Example 4.10a - Second String Quartet, mm. 14-16.



Example 4.10b - Marsh's transcription of Example 4.10a.



The shortest values in Marsh's version are twice the prescribed length, and the insertion of rests further increases the overall duration. In addition, the upward glissando is omitted in the Violin I part (though Marsh observes that the Violin II glissando (not shown in Example 4.10b) is "almost detectable."[46] For Marsh, the issue is not whether the Arditti Quartet has rendered an accurate performance of the Second String Quartet or whether the score is even playable as written:

> We must assume that the commercially recorded performance is acceptable to the composer and is therefore close enough to his intentions. Either that, or the composer has no clear intentions despite the minute specifications in the score which would suggest otherwise. The latter would seem unlikely, except that it may be argued that the realization of the score (the performance) is actually of secondary importance to the score itself. Ferneyhough has himself stated quite clearly that this is not the case.[47]

This ambiguity, embodied in the disconnect between what one sees (notated hyper-frenetic intensity) and what one gets (bucolic, "rustic" dance), is at the root of what Marsh considers to be Ferneyhough's chief failure. Marsh sees this failure as a result of linguistic incoherence that creates an irreconcilable problem of contextualization. Borrowing a phrase originated by the linguist Nicolas Ruwet, that of "the kingdom of the more or less," Marsh contends that

> a proliferation of fine distinctions, however organically derived, are unlikely to contribute significantly in linguistic terms, since the only meaningful oppositions are those which can be clearly perceived as such...precise relationships in this music can be no more than conceptual so long as the composer is content to leave his interpreters...adrift on the sea of approximation.[48]

Ruwet refers to the linguistic concept of the "safety margin" (*marge de sécurité*) in describing such an oppositional discourse. Since Marsh

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[46] Ibid., 84.
[47] Ibid., 85.
[48] Ibid.

believes that Ferneyhough has sacrificed any notion of a "safety margin" at the altar of superficial, undifferentiated, and hyper-redundant complexity, he finds that precise detail is paradoxically of little importance in his music. One would assume that it *ought* to matter, "yet for Ferneyhough, Arditti and probably most listeners, at appears not to."[49] Instead, one is dealing with "a music of generalized, if often spectacular, effect. It is not a music concerned with organic continuity or evolution, except in theoretical terms."[50]

Pro: The Arditti Quartet/Steven Schick

Being that Heaton and Marsh have essentially accused musicians such as the Arditti Quartet of collaborating with Ferneyhough on a conspiracy of educated fakery and willful misinterpretation, it seems only fair to allow members of the quartet some sort of response. In the booklet *Complexity? in Music: An Inquiry into its Nature, Motivation, and Performability*, which accompanied a three-day festival of the same theme in Rotterdam in March of 1990, Irvine Arditti and David Alberman, the two British violinists from the group, each responded to a questionnaire on relevant performance-practice issues prepared by the festival's organizer, Joël Bons. Arditti takes the stance that, whatever one's reservations or apprehensions, the performer must approach music such as Ferneyhough's with an spirit of maximum good faith:

> What a player might find futile, a listener might perceive as relevant. It is the player's (or conductor's) duty to first assume that the composer knew what he was doing, and then find a way to balance the sounds so that they make sense.[51]

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[49] Ibid., 85-86.

[50] Ibid., 86.

[51] *Complexity?*, 9. In the same booklet, the Dutch cellist Taco Kooistra attests to Ferneyhough's legendary ability to validate and communicate his music to the wary performer: "The most amazing thing was, that this composer could actually clarify this intricate score of his, with sounds and gestures, singing and clapping. What he did at the rehearsals actually made very good sense to what was on paper!... I never could have mastered the piece on my own" (*Complexity*, 27).

Arditti addresses the entire issue of "overnotation" (meaning the slaving over endless subtleties of rhythm, articulation, dynamics, and extended playing techniques) that Marsh believes de-contextualizes the work, reducing its "safety margin" and its linguistic/communicational potential. To Arditti, saying that a work is "overnotated" is to make a highly relative judgment. Such a state may exist if the minute, fetishized subtleties are gratuitous and inaudible, or if the performer believes they are not being heard anywhere in the musical surface. However, in Ferneyhough's case there is a very thin line between that which is completely inaudible and that which is barely perceptible due to the multi-layered complexity of the surface. And as noted previously, a listener might perceive what seems to be barely perceptible as aurally important.

When posed the question of when a performance can be qualified as a reasonable attempt and when as a failure, Arditti counters by raising more questions. Who is equipped to decide which music can be played and considered a legitimate performance? Why would a less accurate performance of, say, a Ferneyhough work be more acceptable than one of Scriabin, Schoenberg, or Ives, for example? Why should not the performer's approach be just as conventional and desirous of perfection as it would be when learning a more classical work (this remark reminiscent of Alban Berg's wish that new music should be played as if it were old, and old music as if it were new)? If the composer is satisfied that his/her work comes across sufficiently without a high degree of accuracy, only then could that become for Arditti the criterion for judging performative validity. But, after all, *should* the composer be able to hear what he has written in order to know if it is being performed accurately?

Of course, Irvine Arditti is *the* prototypical Ferneyhough performer, and his questionnaire responses betray a certain measure of elitism that

calls to mind both Toop's "protective commentary against uncommitted performers" and Heaton's "circus-freak soloists who hawk their "most-difficult-piece-in-the-world" shows from festival to festival.":

> Works that require the player to perceive information on different and unorthodox levels require a facility that most, even highly trained, traditional players might find impossible. It is only the most facile and willing brains that can cope with these scores. These works can be seen as a challenge to the performer, who can be both elated and frustrated. Elated in that he is at all able to realize such a work, and frustrated in that he will probably never be able to achieve absolute accuracy... With Ferneyhough, many works often require mathematical pre-calculations in order to solve rhythmic problems... These are the complications that place Ferneyhough's music in the category of the most extreme difficulty and render his scores only accurately playable by experts or extreme devotees.[52]

Alberman's defense of Ferneyhough is chiefly on linguistic grounds and as such can be regarded as an engagement of Marsh on his own turf. He notes that a primary factor informing current tendencies towards complexity is a preoccupation with the linguistic functions of music. Specifically, Alberman sees Ferneyhough, Barrett, etc. as challenging the functional limits of musical language, in part influenced by the work of such playwrights and literary theorists as Samuel Beckett and Jacques Derrida. Therefore, in Ferneyhough's aiming "for an effect of kaleidoscopic flickering too fast to be anywhere than at the periphery of the listener's consciousness...not only is the message complicated: the medium is too...the medium surely begins to fuse with the message."[53] Alberman cites Ferneyhough's enterprise as proof that George Steiner's distinction between contingent and innate difficulty can be applied to music as well as to literature:

> Most of Ferneyhough's music shows that difficulty is a mode of communication... It is optimistic to assume that the content of the message, and the form of the language used to convey it, could be separated... The creative urge...comes fully-armed with a complexity of language in which it is experienced. Thus the aesthetic

[52] Ibid., 9.
[53] Ibid., 8.

> and complex linguistic components of music are inextricably bound from the moment they can be identified within the mind of the composer. The mind is not always the best tool for investigating the mind, and a performer's mind is probably a very bad tool for investigating a composer's mind.[54]

Where Heaton unfavorably compared Ferneyhough with Carter in terms of a composer's working in sound and being able to hear and communicate one's music, Alberman tosses the issue right back at him. He views Carter as a composer whose medium may be complex while his message is not. Carter "would not find it odd if the compositional process were 'visible' to the listener...this is not comparable with the sort of things which Ferneyhough et al., are attempting to express"; namely, these aforementioned tortured, flickering kaleidoscopic textures achieved by overloading the audience's perceptive faculties.[55]

The most detailed defense of Ferneyhough by a performer who has learned and championed his music is that of the American percussionist Steven Schick, who commissioned the work *Bone Alphabet* (1991). In his article "Developing an Interpretive Context: Learning Brian Ferneyhough's *Bone Alphabet*," Schick writes of how he "de-layered" the work, stripping it of its coexistent polyrhythms and making choices regarding structural hierarchies.[56]

Schick's documentation of his learning-history for *Bone Alphabet* is remarkable, one reason being that he actually finds it a virtue that the work takes so long to learn, in this case nine months.[57] His reasoning for this is

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[54] Ibid.

[55] Ibid.

[56] Steven Schick, "Developing an Interpretive Context: Learning Brian Ferneyhough's *Bone Alphabet*," *Perspectives of New Music* 32/1 (1994): 132-53.

[57] The percussionist Deborah Moore, who performed *Bone Alphabet* at Oberlin Conservatory in April of 1998, informed me that Schick actually memorized the score, highly unusual for interpreters of Ferneyhough's music. In my view, this is not necessarily the most desirable course of action, given what has been mentioned previously about part of the drama in a Ferneyhough work being the tension between player and score. Schick's memorization of *Bone Alphabet* freezes in place such a sense of dramatic tension.

that a slower (or, in Schick's words, "positively glacial") pace of learning enforced by the score's complexity allows for the natural growth of a unique practice-structure and performative context.[58] Summarizing the notational system invented by Ferneyhough for *Bone Alphabet*, it consists of a seven-line staff in percussion notation, corresponding to seven undefined sound sources. Each sound source is located on a separate single-line staff. The player chooses the sound sources and organizes them consecutively from high to low, adjacent instruments not being allowed to belong to the same family (thus insuring a maximum sense of contrast as well as unpredictable changes of timbral direction). Example 4.11 presents the first page of *Bone Alphabet*.

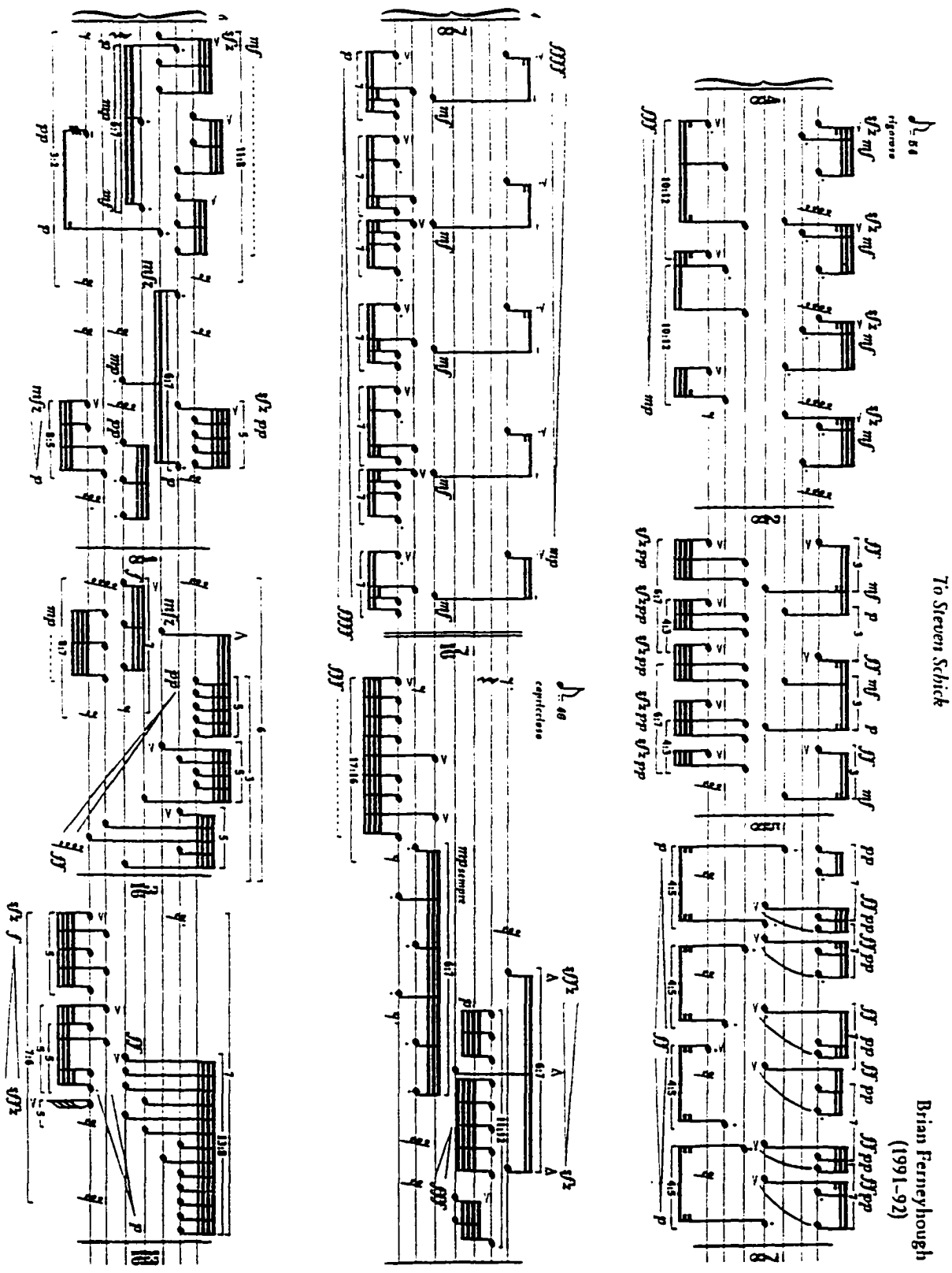
Schick's first move in learning the work was to calculate and decipher polyrhythmic relationships; at the beginning of the rehearsal process this necessitated cutting out each of the 158 measures and gluing them on to graph paper. Gradually, Schick generated three performance strategies, often fused within a single measure:

1. solving polyrhythmic problems by means of calculating the least common multiple of their constituent components;
2. translating rhythmic notations into tempo indications; and
3. bringing to the foreground one line of a polyrhythm while having other lines act ornamentally "in various degrees of rhythmic dissonance."[59]

An example of Schick's first, "least-common-multiple" strategy occurs in the very first measure of *Bone Alphabet*, presented in Example

[58] Schick, "Developing an Interpretive Context," 133.
[59] Ibid., 137.

Example 4.11 - *Bone Alphabet*, p. 1.

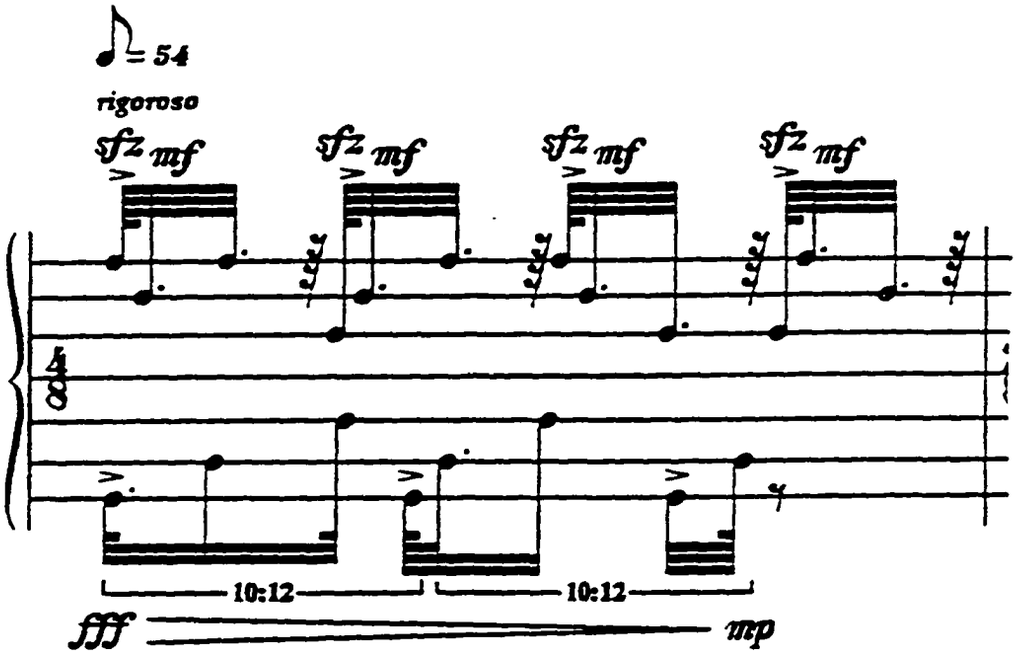


4.12a. The work begins with a two-part polyphonic texture in 4/8. The upper line is rhythmically straightforward in its use of thirty-second and sixty-fourth notes, while the lower line divides the first one-and-a half beats (or twelve sixty-fourths) into ten parts expressed as two 10:12 figurations. The measure consists of two distinct polyrhythmic phrases: from the beginning of beat 1 until the second half of beat 2 (when the two lines come back into alignment), and from the second half of beat 2 until beat 4.

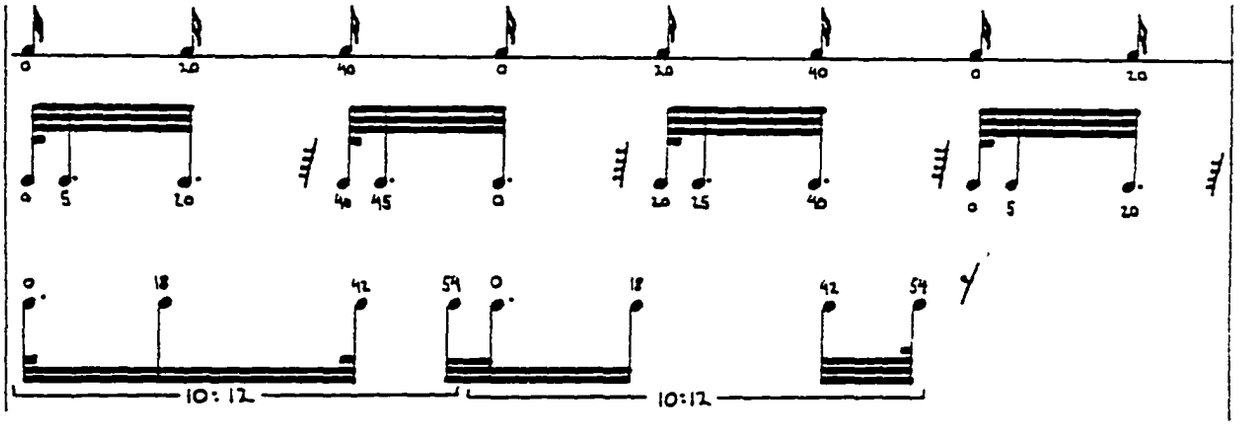
As shown in Example 4.12b. Schick constructs a grid for each group of one-and-a-half beats by multiplying the denominators of the two components together. The upper voice, expressed in its smallest subdivision as sixty-fourth notes, has twelve units while the lower voice has ten. The grid in Example 4.12b therefore has 120 increments, which can account for each potential attack of the polyrhythm. Schick simplifies the grid and makes the subdivisions more manageable by using the least common multiple of the two rhythms, namely 60. Most of the two-part polyrhythms in *Bone Alphabet* were solved by Schick according to this strategy. Of course, in the case of three- and four-part polyphony, the common multiples in the grids would need to be much larger.

Measure 2, in 2/8, is more problematic rhythmically, as the two lines do not have common points where they begin and end. As shown in Example 4.13, the second 6:7 phrase in the lower line starts between the last triplet of beat 2 in the top line and before the beginning of beat 3. Not only that, but the passage's difficulty is exacerbated by the two nested 4:3 figurations. This means that the first seven sixty-fourth notes of the lower line are divided into six parts while the last three notes of each seven are divided into four. Schick solves this measure by means of his second

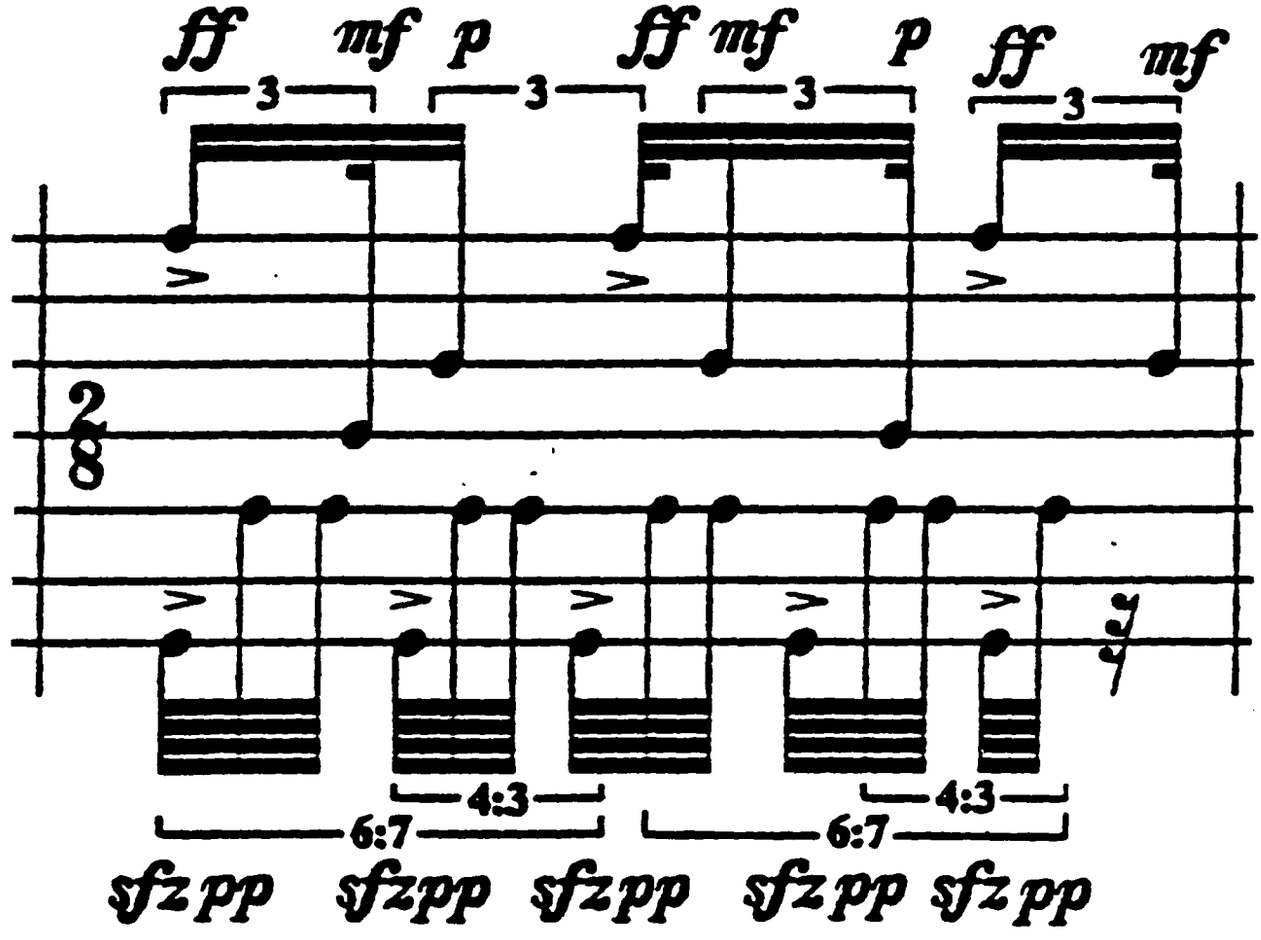
Example 4.12a - *Bone Alphabet*. m. 1.



Example 4.12b - Polyrhythmic grid for *Bone Alphabet*. m. 1.



Example 4.13 - *Bone Alphabet*, m. 2.



performance strategy, translating the 6:7 into a tempo change. Taking the base tempo of eighth note=54, he found a new tempo 6/7 as fast, which came out to MM 46.3. This replaced the 6:7 polyrhythm and essentially turns the passage into a far more simple one of four against three. Of course, given Ferneyhough's comments on how performers have approached irrational meters (thinking of them as tempo rather than metrical changes), one would imagine him being not wholly quiescent with this technique. But for Schick, the practicalities of the performer's survival oblige one to make use of whatever equipment one can bring to bear, regardless of conceptual purity:

> He (Ferneyhough) felt that polyrhythms seen as shifting tempi imply a reorientation of the overall metrical point of view. And, of course, there is a big difference between changing meters and changing speeds. Nevertheless, as a stage in the learning process, this technique can be very valuable. Eventually such passages should be heard by the performer in the original tempo.[60]

Measure 2 posed additional problems as well. Schick executed the least-common-multiple strategy, but his subdivision grid was too large to be practical. He was stuck with being rhythmically secure of one of the two lines, but only being able to approximate the rhythm of the other. Schick solved this dilemma by employing the third of his rehearsal strategies, that of "foregrounding" one of the voices. He decided to make the lower line the primary voice for two reasons: (1) since it had more rhythmic information, it would seem more obviously right or wrong to the listener; and (2) the relative simplicity of the upper line (sixteenth-note triplets) made it easier to approximate in a complex polyphonic texture. Such "foregrounding" is consistent with Ferneyhough's previous

[60] Ibid., 138-40. Another passage in *Bone Alphabet*, at mm. 20-22, is composed of triplet material in the upper voice of a two-part texture which is repeated at various speeds. In this instance Schick constructed a temporal wedge for each triplet having the following proportions: MM eighth note=60,52.5,75,44,79. Schick found that "starting from a value serving as a central axis and proceeding to longest and shortest extremes...is an operating principle in macrostructural proportions also." Ibid., 141-43.

performance-practice, as evidenced by the manner in which he recommends the performer approach the "interruptive polyphony" of *Mnemosyne*.

Schick went about realizing this passage in a highly resourceful manner. He learned the lower line at MM 46.3, considered it to be the primary voice, and then guessed where approximately the triplets in the upper line would fall. He recorded himself playing the lower line on his leg (a surface which would produce very little sound), and played the upper line on instruments along with the tape. In this fashion, Schick could tell how accurate the upper-line triplets were, adjusting them by playing either slightly earlier or later.[61] That Schick would make use of his entire body to learn *Bone Alphabet* is apropos to Ferneyhough's conception of the work embodying (pardon the pun) a kind of corporeal theater.[62] The intense physical component is much of the reason behind the first word of the work's title; the notion of an "alphabet" implies an aesthetically detached, clinical, no-nonsense gestural catalogue:

> An accurate performance of *Bone Alphabet* leaves no unused strength or concentration which can be spent for choreographic affectation. Meaningful gesture is the ultimate measure of a committed performance, a kind of Richter Scale of the musical tectonic forces underlying the composition.[63]

Reviewing *Bone Alphabet* in a 1996 issue of *The Musical Times*, Jonathan Cross speculates that the score's seven-line staff system

> stands as a sort of metaphor for Ferneyhough's attitude to his musical heritage: it's as if he were holding a magnifying glass to his musical material and analyzing even its smallest features in painstaking detail.[64]

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[61] Deborah Moore told me that she used similar recording techniques when preparing her performance of *Bone Alphabet*.

[62] This view expressed by Ferneyhough in an unpublished 1992 interview with Arun Bharali.

[63] Schick, "Developing an Interpretive Context," 152.

[64] Jonathan Cross, "A Necessary Violence (Review of *On Stellar Magnitudes* and *Bone Alphabet*)," *The Musical Times* 137/1841 (1996): 22.

Cross is also interested in exploring the Artaud connection with regards to *Bone Alphabet*, in particular relating the work to Artaud's proposition from the 1932 *First Manifesto of the Theater of Cruelty*: "in our present degenerative state, metaphysics must be made to enter the mind through the body." Cross believes that witnessing the spectacle of the percussionist engaging in an almost sadomasochistic act of ritual violence "is to be made sharply aware of the intimate connection between physical action and metaphysical speculation."[65]

Cross marvels at Ferneyhough's notational precision, though he feels that scores such as *Bone Alphabet* can hardly capture the essence of the music. In this sense he sees a great kinship between Ferneyhough and Cage, in the way that both their bodies of work expose the gulf in Western culture between performance and representation.

> Lovely though they are to contemplate in their own right, Ferneyhough's scores cannot tell us much about what the music is really about. For that, we continue to rely on that dedicated breed of performer who is prepared to take on the challenge - and the very necessary violence - of Ferneyhough's scores.[66]

Conclusions

In closing, I must say that I am appreciative of the fact that reasonable, intelligent, and educated musicians and listeners can and do react to this enterprise by simply asking the question: *why*? What is all this effort really in the service of? Is not life too short for all this trouble? In addition, a Ferneyhough score may indeed contain too many elements of conventional notational discourse which gives it a misleading impression of wanting to be something that it is not. This may be said to reflect

[65] Ibid., 23.
[66] Ibid.

Ferneyhough's own personal *cul-de-sac*, his being caught in the vice-grip of his position in the superstory of the European art music canon in which he so clearly identifies himself. Consciously abstaining from the pursuit either of electro-acoustic music or graphic notation, he has chosen the most treacherous of possible roads.

Rather than viewing this as mere charlatanism, however, or as a manifestation of some tragic, Adornoesque dialectic, one should instead focus on the intent behind such a notational project. Viewed in this fashion, I believe that Ferneyhough is after something different, something much riskier, much more difficult to attain, and much more ephemeral. He eschews the notion of clear notational transmission simply because he is not interested at all in communicating any *thing* in particular. Rather, he is engaged in the investigation of hyper-complex and volatile states which can neither be represented nor reproduced as objects but which by practical necessity must be notationally activated processes. After all, we know the conventional things that music can do beautifully. We know both the emotional and communicational buttons it can push, the rhetorical and stock-and-trade gestural vocabulary it seems forever bent on resuscitating. However, Ferneyhough's legions of skeptics would be better counseled to start asking a fundamentally different nature of question, to entertain the possibility that maybe, just maybe, music might be capable of something more.

V. *Conclusions*

In this concluding section I shall refrain from repeating at length the direct comparisons made in previous chapters between Berio, Cage, and Ferneyhough. However, I will take this opportunity to revisit in brief some of the more salient associations. In my interview with Berio, the transcript of which is presented in Appendix A, he clearly regards as excessive Ferneyhough's mindset with regards to matters notational, as well as emblematic of a situation he feels discomfort with when it comes to his own working methods:

> I find with Ferneyhough, with musicians in London, the London Sinfonietta will tell him: "but are you aware we play whatever we want?" "Yeah, I don't care. I'm interested in the way the music is notated, not the way it sounds." ...In a way there's a great deal of intellectual investment in what he's doing. And the notation is among the cracks that cannot carry all this information. I had the same experience with my flute *Sequenza*.[1]

In the 1958 version of *Sequenza I*, then, Berio adopted proportional notation so as not to burden the performer with information overload, a situation he applies to Ferneyhough and generally means to avoid. One may characterize this as a debate between a position of relative determinacy that preserves discrete relationships, and one of hyper-determinacy that serves to transcend such issues in the interest of both enlarging and reshaping the field of discourse. In this sense, not only does Ferneyhough's project share certain aspirations with Cage (which I will touch on momentarily), but Berio is thus placed firmly in the center (or on the fence, depending on one's point of view) of such a notational/ideological spectrum with the two other composers in this study. As Berio relates to Cage, it was noted in chapter three that proportional notation is essentially a presentational vehicle (meaning one not "content-intensive") that

[1] Interview with the author, April 24, 1997, lines 65-72.

produces a "less fixed" version of a finite object compared with Cage's aversion to structural determinism found even in his late and relatively conservative notational systems such as the time-bracket.

Perhaps the most apt and interesting comparison among the three is that between Cage and Ferneyhough. The British expatriate has freely acknowledged a great debt to Cage and the entire American Experimentalist tradition; indeed, in Ferneyhough's writing of experimental texts, one of his recent enthusiasms, he expresses great interest in the work of the American poets Clark Coolidge and Jackson Mac Low among others.[2]

There are several loci of potential intersection between Cage and Ferneyhough that are hinted at in chapter four, where the two can be found making common cause. The first is Ferneyhough's taking as given indeterminacy's assumption of the "mantle of progress" and its dispensing once and for all with the illusion that the work is something tactile that can be "directly transmitted." The second is the indeterminacy of intent that the two share, the lack of any fixed formal/expressive location. The third is Cross's notion of Ferneyhough and Cage both exposing the gulf in Western culture between performance and representation, the fact that their scores, simply put, will tell us precious little of how their music will actually sound. Theirs may be different means, although some of Cage's "Ten Thousand Things" works from the mid-1950s such as *26'1.1499" for a String Player* (1955), cited in chapter one, necessitate the performer processing and juggling many different layers of material at once in a manner reminiscent of works by Ferneyhough such as *Mnemosyne*.

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[2] The text to Ferneyhough's *Fourth String Quartet* (1990), which features a soprano part in homage to Schoenberg's *Second*, consists of Mac Low's mesostics on Ezra Pound's *Pisan Cantos*, making this work informed by two generations of American experimental poetry.

However, as noted above, Cage and Ferneyhough share many of the same "ends" and arrival-points, in spite of the wide and sometimes radical surface control disparities between indeterminacy and hyper-determinacy which *becomes* indeterminate in a manner of speaking. It is as if their notational systems are both so extreme that they travel around the edges of the ideological spectrum to meet their purported polar opposites.

Reflecting on the respective importance of the three, the future influence of the kind of notational thought each embodies, one could find answers by examining recent and current technological applications. Cage and Ferneyhough in particular could potentially wield a great deal of influence, by computers performing bigger, better, faster, and more powerful versions of their methods in the form of programming routines. Time-brackets were the product of Cage's only totally computer-aided period; Andrew Culver has gone on to extend them into illimitable and far more complex vistas in his orchestral score for Merce Cunningham's dance *Ocean I-95* (1996). Cage usually employed time-brackets in relatively economical form, and for usually monolithic purposes; the accumulation of simple parts would bring about a complex situation. In *Ocean I-95*, on the other hand, Culver establishes all manner of cross-relationships between instruments, brackets, and the material therein. The entire structure is exponentially more complex than anything Cage was interested in pursuing.

Not only has Ferneyhough been using computer programs such as Random Funnels to generate macro-compositional templates, but he also sees technology as helping to validate his notation of complex polyrhythms and irrational meters as well:

> Most recently, research into computer-assisted learning of complex rhythms at San Diego and elsewhere has offered a way out of this dilemma by providing aural ("ideal") models by means of which the very characteristic "sound" of sound structures can be absorbed globally, as an idiom, rather than piecemeal. This

> possibility seems to me the one most significant development of recent years in the interpretation of such music as mine and parallels in importance the already quite advanced familiarization process in the area of microtonal intervals.[3]

One cannot, however, discuss these kinds of applications without addressing the entirely deleterious aspects of technology as well. Computer notation programs such as Finale and Score have become the main source of normalizing pressure and conformism, doing more to bring about a codification of notational practice than any textbook's author could ever have wished. These programs, to be fair, are not only capable of helping realize a "Tower of Babel" situation where a thousand notational flowers bloom, but doing so with far greater sophistication (as I mentioned earlier in the case of Cage's time-brackets). In addition, I do not mean to infer that there are no programs in use today that encourage graphic experimentation. However, the fact that one can compose a large-scale work in conventional notation on a program such as Finale, and have one's parts prepared in such short order is often too seductive to resist -- the temptation to normalize thus becomes all the greater. The impulse to make a work more "performer-friendly," even if it reflects a brutal compromising or rationalization of one's original concept, has never been more potent than it is today. In our current state of affairs, time is short but expensive, practicality is at a premium, and easier-to-play works are by nature "better." Notation thus becomes an intrinsically *economic* issue.

Younger composers are now, and will be in the future, raised on computer notation programs, with a consequent deprivation of tactile

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[3] "A Verbal Crane Dance: Brian Ferneyhough Interviewed by Ross Feller," in *Brian Ferneyhough: Collected Writings*, eds. James Boros and Richard Toop (Amsterdam: Harwood Academic Publishers, 1996), 447-48. Ross Feller examines in more detail Ferneyhough's use of the Random Funnels program in his article "Random Funnels in Brian Ferneyhough's *Trittico per Gertrude Stein*," *Mitteilungen der Paul Sacher Stiftung* 10 (1997): 32-38. In addition, the composer Eric Dries, who has recently worked as a copyist for Ferneyhough, informed me that his current practice now often includes using the computer to maintain notational templates that can be extended and mutated from one work to another. *Bone Alphabet* is an example of such a process, based on a template from *Allgebrah* (1991-95) for oboe and strings.

graphic contact with the page and an inherent conservatism based on assumptions that will not be questioned because the technology has done all their work for them. The creation of an experimental notational system may be infinitely more difficult if access to its inner workings is barred by the presence of a technological scrim that reifies centuries of latent formalism.

It is far more difficult to speculate on Berio's future notational influence. Though proportional notation was long ago absorbed into the contemporary composer's palette, Berio himself has fundamentally abandoned many of the innovations he introduced a generation ago. However, he may reflect current realities better than do Cage and Ferneyhough. Besides the fact that for all three, notation is inseparable from compositional identity (whatever Berio's protestations to the contrary), the one other thing they all share is a formative orientation and self-location in *modernity*; in fact, they embody roughly three successive generations of it. As I touched on at the beginning of chapter four, Berio, Cage, and Ferneyhough all represent different strands of the Late High Modernist project, where "making it new" (to quote Ezra Pound) and gratuitous abstraction were more presumptions than they were postures or choices. Therefore, experimentation with what was considered the graphic element of music was a logical outgrowth, or to paraphrase the title of chapter two, it reflected a sense of play within what was still a defined historical/narrative context -- perhaps for the last time. One of the calling cards of Late High Modernism in any discipline was a certain quality of "navel-gazing," where the practice turned upon itself and its constituent materials in order to occasion a heightened sense of "purity" and formal/expressive perfection. In today's practice, for better or worse, we are in the process of reacting against such "narrow" concerns in favor of

looking outwards and either endorsing or critiquing various pre-existent cultural constructs and assumptions. It only follows that in composition, and especially in notational practice, this would be reflected in our current reaction against the graphic experimentation and general ramifications of Late High Modernism, an unwillingness and disinterest in addressing certain issues. In this environment, such devices as proportional notation might be used for mainly theatrical purposes, as Berio says he does in the interview in Appendix A, or notational non-conformity might be used to reference and re-orient clearly referential material. Therefore, for reasons not only political and economic, but cultural, one must distinguish between what is *possible* and what is *likely*.

Appendix A - Interview with Luciano Berio, Cambridge, Mass., April 24, 1997

Benedict Weisser: A very important issue in your music is how notation becomes a matter worthy of its own exploration. I find that one of the most interesting aspects of your music. Especially starting in your early works, it's almost as if the notation has its own kind of autonomous function, because you're exploring it almost for its own sake. But, on the other hand, you manage to integrate it so much into the character of the music, especially in dramatic and gestural ways. Can you talk generally about the role notation plays in your music and how that has changed over time?

Luciano Berio: I don't agree particularly with what you said before. Usually, I'm not concerned with notation itself. When I'm concerned, that means there's a problem. The issue of notation comes out, at least in my own musical perspective, when there is a dilemma, when there is a problem to be solved. And that pushes me to find solutions that maybe I was never pushed to find before. That happens, of course, mostly when there is a certain amount of indeterminacy that is needed in order to obtain a certain result. In a score like *Circles* (1960), I need the maximum density of events, so this can be obtained only if the performer is not difficultly (sic) tied, but he has to perform a gesture with a certain amount of, I wouldn't call it freedom, but a certain amount of indeterminacy that is not specified only as an aspect. He has to play it fast, as fast as possible, on all instruments in a circular way, you see. So the notation had to express this, to give this possibility

to the performer. But the notational problem is always a secondary problem.

BW: So the first order of business has always been in terms of solving localized, technical issues.

LB: Not *even* that, because localized, technical issues are part of a larger issue, and so the larger issue, the scope of the work, the *reason*, if you want, both the technical and expressive reason of the work, *that* justifies the local situation. That must be seen in perspective. For example, I have a certain dislike for notations that are not homogeneous, that are not harmonically connected within themselves. Even now, even this morning (Berio was meeting with composition students), you have a conventionally written score, and suddenly there are strange graphic things that don't belong. It means there is a problem there.

BW: One of the things I think is interesting about that is that a number of composers believe the notational innovations you came up with almost stand as a kind of language on their own which has been appropriated for different contexts and situations. Speaking most generally, the use of spatial notation--especially spatial notation as applied to gesture, dramatic types of situations--whereby your innovations in that regard became part of a certain kind of code that composers would use in which they would take that type of notation, take it out of the context which you had written it for, and then use it for just something totally different. These are pieces which may not be dramatic pieces, which may not be gestural,

but they draw upon your notational language nonetheless.

LB: Yes, but there is a certain amount of fluidity in notation. The history of notation is very long, very complex. And gradually notation--taking the responsibility of notating everything--once was a code, even in Mozart's time, you know. There are many, many aspects of the music that were not written; they were implied according to the common codes of the time. And now these codes cannot be...there are no implicit codes as once, as you see. Now we have to express, to notate everything. And so this is why it's a fact that already Stravinsky started, at really all the aspects of performance, the dynamics, the phrasing, the speed, and even the fingering of something. And so there was a moment where there was an excess of information in the notation, when the notation broke down.

You mentioned Ferneyhough, for instance. Sometimes there's a reason behind it, but there is an excessive notation. I find with Ferneyhough, with musicians in London, the London Sinfonietta will tell him: "but are you aware we play whatever we want?" "Yeah, I don't care. I'm interested in the way the music is notated, not the way it sounds." (Laughs) In a way there's a great deal of intellectual investment in what he's doing. And the notation is among the cracks that cannot carry all this information. I had the same experience with my Flute *Sequenza* (1958). At the time, I was writing something that was very difficult. Now, it's easier to perform in a way. And so I didn't dare give all this information to the performer. So I decided to write the piece in such a way, notate it in such a way that very flutist could wear it in a way,

could adapt to its own technical body in a way--

BW: As a dress rather than a straitjacket, as you've said recently--

LB: Exactly. This is the reason I adopted that notation. But then I went back, I rewrote the rhythmical notation because too many flutists were taking advantage of that, and making nonsensical things.

BW: But when you went back a few years ago and redid the notation, the version *before* the one in spatial notation, that original version was then changed again, was it not? I mean, certain things-

LB: In the *Sequenza*?

BW: Yes. The original version of the *Sequenza*, before the spatial notation, was extremely complex. And then in the new version, this latest version of the Flute *Sequenza*, were certain rhythms from the original version regularized or "rounded off" so they would fit into rational kinds of meter?

LB: You're talking about the third version.

BW: Yes, the one from 1992.

LB: Yes, I eliminated some excess of complexity.

BW: I think that's very interesting--

LB: (Points) Is that an ashtray over there?

BW: Yes.

LB: Do you mind?

BW: No, not at all (brings the ashtray over). In regard to that, does that reflect a change in your view about the open work, because the Flute *Sequenza* is a paradigm of the work as a text which presents the performer a certain amount of opportunities within a field. A delineated field, but a field. And in this new version of the Flute *Sequenza*, although you get the original precision which you would have wanted from the very beginning, do you feel like anything in the process was sacrificed, in the sense of the indeterminacy or the openness, and in the performer's relationship to the score? Because it's a new relationship.

LB: Yes. Actually, the way it works out, from talking to many flutists in performance, what's happening is that they are continuing to perform, if they don't learn it by heart, from the older spatial notation, and they use the rhythmical (new version) as a reference.

(At this point a librarian comes in--the interview is being conducted in a room inside the Harvard music library--and asks Berio to put out his cigar.)

BW: The tobacco industry in America is being put out of business.

LB: But the state of Virginia is going to suffer for that, huh?

BW: Very badly. They're going to have to grow something else.

LB: Maybe coke! (Both laugh)

BW: Yes, something much more profitable! So in the case of the Flute *Sequenza*, now what the player does is produce a kind of composite version, using one of them as a reference?

LB: Yes, this happens very often, a reference, yes. Actually, in the spatial notation *everything* is notated, but the visualization of this sometimes is not simple. Sometimes it invites enormous flexibility, an excess of flexibility. So the rhythmical notation becomes a reference.

As for the open work, no. The concept of the open work has been revised; Umberto Eco himself wrote that book (*The Open Work*, Harvard University Press, 1989). And the fact is the open work is not involved with the performer but the listener. When you have a certain complexity, layers of meanings, the listener or the reader, whatever, is facing an open possibility of the notation. *Ulysses* by Joyce is an open work, because you don't have even to read it from beginning to end, you can jump from one place to the other--

BW: *Finnegans Wake* even more so--

LB: Yes, *Finnegans Wake*. So the notion of the open work is very dubious now. The real open work would be in a dramatic situation, a narrative situation where you can choose the ending. A happy end, or a tragic ending, or when Boulez in his *Third Piano Sonata* (1957) suggests that the pianist...

BW: ...Distribute the pages...

LB: Which is beautiful piano music, huh? But who cares? It's not relevant: it's not *saying anything*, this possibility of modifying the order of the pieces. Not even for the interpreter, not to speak of the listener, he couldn't care less if the *Trope*, or whatever, *Formant* comes before or after...That means simply there is a "spatial form," if you want--the form is suspended. You can float around, but already it's the music that doesn't need a perspective, a million perspectives.

BW: The possibilities in that sense are quite limited. I've listened to pianists do all of the different kind of "shufflings" in that piece, and there is a certain kind of sameness after a while. The same can be said of *Klavierstück XI*--

LB: Yes, yes...

BW: ...a certain kind of sameness to the possible realizations. So the process is active only up to a certain point, then it just stops and becomes an object.

LB: That is because there is a suspension of a very important parameter, which is the syntactical parameter. There's no syntax; there's a grammar in that music. But then, you know, if a phrase or a word comes before or after it, it's not in the nature of the music to become a relevant factor.

BW: In a piece I like of Boulez, *Eclat* (1965), is that a piece which concerns itself more with syntax?

LB: Maybe, yes, it's a beautiful piece...

BW: *That* work, in terms of the way it's notated, reminds me of certain of your pieces. There are certain points, certain attack points...it's a piece which is kind of a "concerto for conductor," where the conductor has various attack points and (imitating a conductor cueing different players) chooses that instrument, that instrument, that instrument. So there's a certain beautiful logic to the notation as well, which is very much tied in a logical way to the whole notion of the piece, even though it's not in the solo piece (*Sequenza I*). The syntax which is missing in that piece (*Third Piano Sonata*) almost is present in this piece (*Eclat*), which is also one of his best pieces.

LB: Yes, yes, yes, you're right. Very sensitive, what you're saying, very good.

BW: Another thing about the Flute *Sequenza* which seems to me a thread running through the way you work is the use of a temporal grid with which you can plot things, plot points, plot attacks. I believe that the temporal grid is something you still use in the way you work, is it not?

LB: Temporal grid?

BW: In which you have a page, and a certain amount of space will refer to a certain amount of time or a certain amount of beats...

LB: Yes, yes...

BW: (sketching a grid on a piece of paper)...one beat, for example. Is that a connection running through the way you work, the way you think of duration and tempo, and the way you articulate that on a page?

LB: There, too, there's not one level of consideration, and that touches on the aspect of notation. I think there are simultaneous considerations of a temporal, what do you call it, a grid? But within this temporal grid there are other temporal considerations, other temporal....if you want, "organizations." So very often what happens, there is a temporal grid, maybe static, but the other ones are moving in a constantly mobile way. Sometimes the temporal grid is completely abstract, indifferent, like... metaphorically, like a "meter" that is indifferent to the rhythm, if you want.

BW: Kind of a phantom?

LB: Yes, kind of a phantom, exactly. Like in the *Sequenza* for flute, or in *Tempi concertati* (1958-59), this happens very often. But I will never be able to conceive...to attempt a time-conception in a "univocal" way. There are always different phases that are important.

BW: Do you still use spatial notation in your recent music?

LB: Sometimes, yes. Occasionally. It depends when it is required. When the polyphony gets very dense or almost unpredictable, I

prefer to give to each voice, to each player or singer temporal suggestions. But no, there is something very basic sometimes with very difficult articulations, and proportional notation makes things definitely easier. And the performer plays better. You know, if you have experience with singers, or a chorus, and there are difficult passages, then the vocal output is changed. They don't produce the voice so freely, if you want to say, so "nicely" as when they are free.

BW: So there is certain music that, if you wrote it in a way that it was metered, the player would look at it and then immediately recoil, and that would be reflected in a certain stiffness of performance...

LB: Sometimes, yes. Especially with orchestra musicians.

BW: One of the things which I've been examining is how a composer uses notation to affect the behavior of a player. You know, we were talking about Ferneyhough before; I think there's a great amount of "behaviorism" going on in the notation--

LB: Yes--

BW: Because it conditions a certain kind of response. You mentioned *Circles* before; I think what's remarkable about that piece is how in a very calibrated way, there is on the one hand a certain amount of freedom that all the players have, but on the other hand, there's also something extremely controlled about it.

LB: Yes, it's a limited freedom, because this is a work is based on the listening response. That is very fundamental for not only for

the timing and the solution of the events, but also even for the color of it, the timbre, the spectrum. There are moments where everybody is very "unanimous," you know, in their own respect-- the voice imitating the attack of the harp or vice versa, the noise of the voice with the noise of the percussion, certain really "spectral" kinds of organization. And this demands the aural perception of the "other."

BW: And the invention of the notation for that piece came out of the same impulse?

LB: Yes. Absolutely.

BW: When you first came up with proportional notation, what were some of the influences? Were you influenced by the electronic work that you were doing?

LB: Maybe. It's a fact that the experience in the electronic studio was fundamental. Actually, this is something that I should be studying more carefully in the creative output of a composer, if he works in the studio or not. If he works on something more interesting, it's a teacher, because you learned a lot there, even if you did not put your learning in electronic pieces as such. You know, even orchestra writing for me has been influenced by the experience in the studio. "Acoustical gymnastics," (laughs) learning about these things. And *certainly*, the effort to notate electronic music influenced the notation.

BW: Just in the way that...

LB: Proportional--

BW: ...a certain amount of time would be represented by a certain amount of space?

LB: Space of time, yes. A piece of tape was in a way a symbol of that time.

BW: Another piece which I'm looking at is a piece you mentioned before, *Tempi concertati*, which is one of my favorite pieces of yours. And one thing which I find absolutely fascinating about it is the mixture of metered notation and proportional notation in the flute, I believe, when everybody else, all the different groups are in metered notation. Can you talk about the impulse behind that mixture of notations? In a lot of other pieces by other composers who have tried to do that, it just doesn't work in that regard. And in my work, whenever I've tried to do it, I always pull back because I don't feel I can do it quite as well or in as integrated a way as you do it in that piece...the mixture of different types of notations in one continuum.

LB: It's some time...as I did even more recently in, say, the concerto forpiano, *Echoing Curves* (1988), there is a constant dialogue between metered, rhythmic notation and proportional notation. There are two main reasons. One is to allow a certain freedom for the soloist, whether you accompany, you can intervene or insert yourself, the soloist plays something sometimes so complex that it cannot be metered. And then another reason is to overcome any feeling of a rhythmical situation, to "go over rhythm" in a kind of freer situation, a more flexible, more...what

is the English word...

BW: Fluid?

LB: Yes, a more fluid situation, so that it cannot be brought down to any formal regularity of meter, and so on. The regularity may be in the larger phrases, but inside, you overcome the feeling and the notion of rhythm. 290

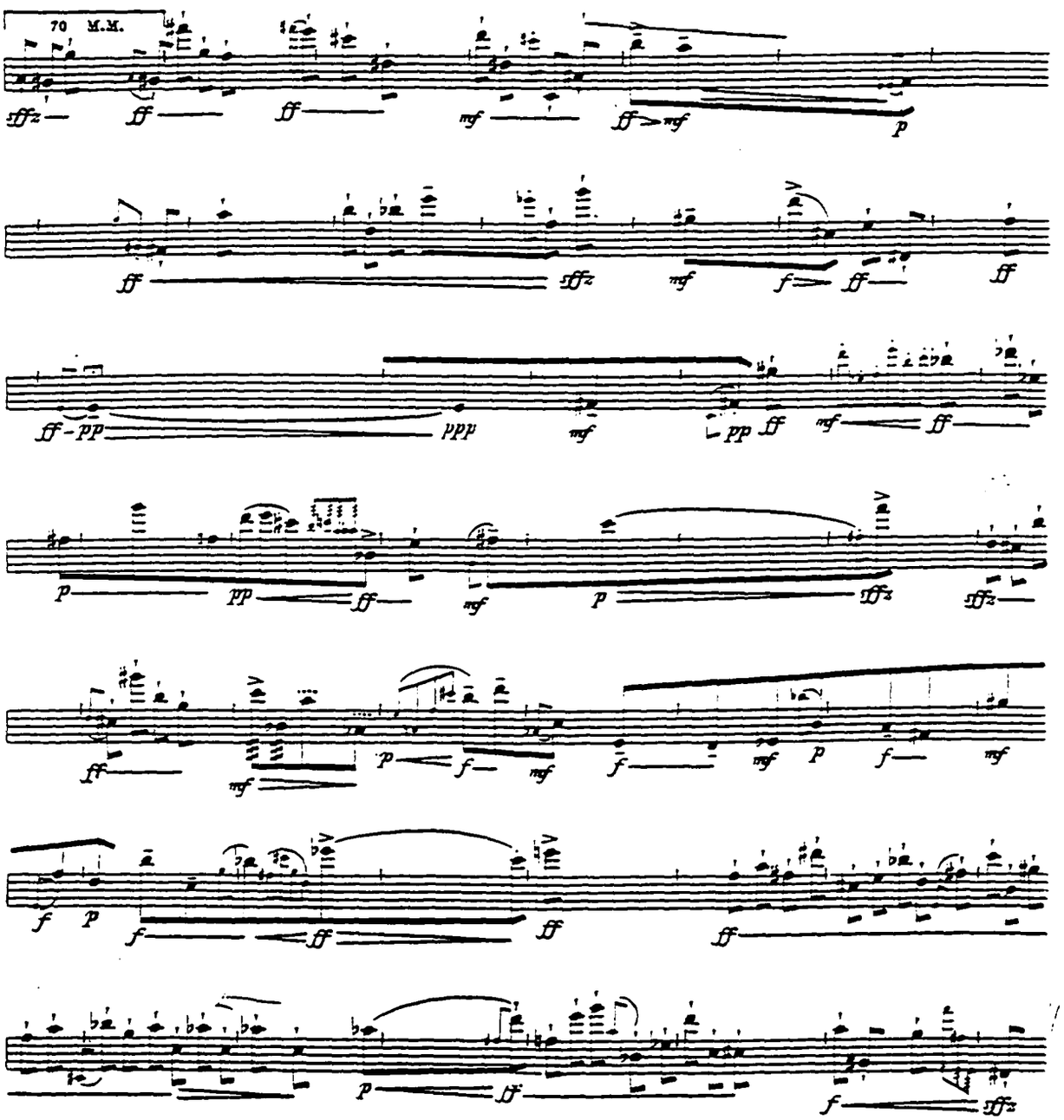
Appendix B - Berio. *Sequenza I* (1958 version)

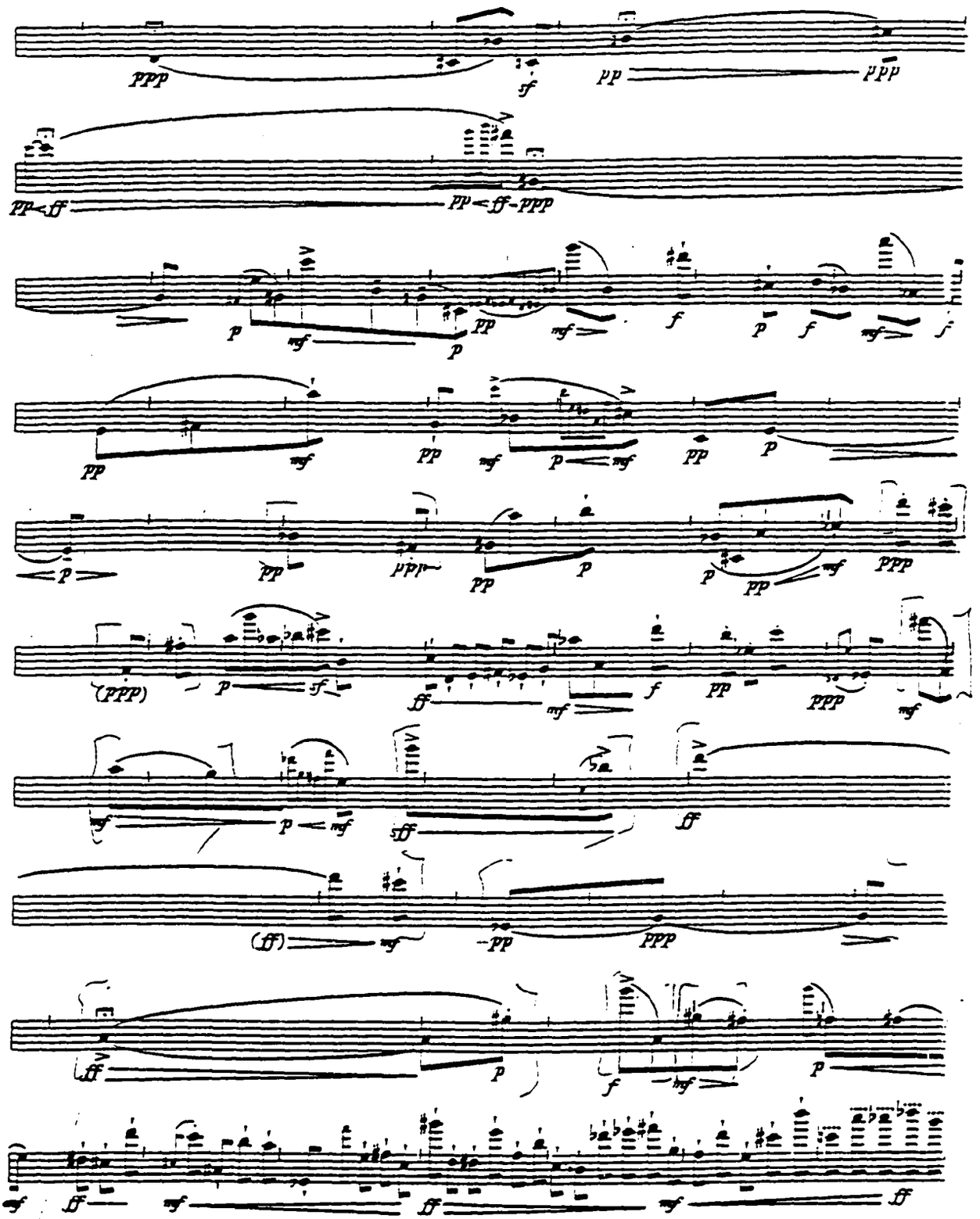
a SEVERI'

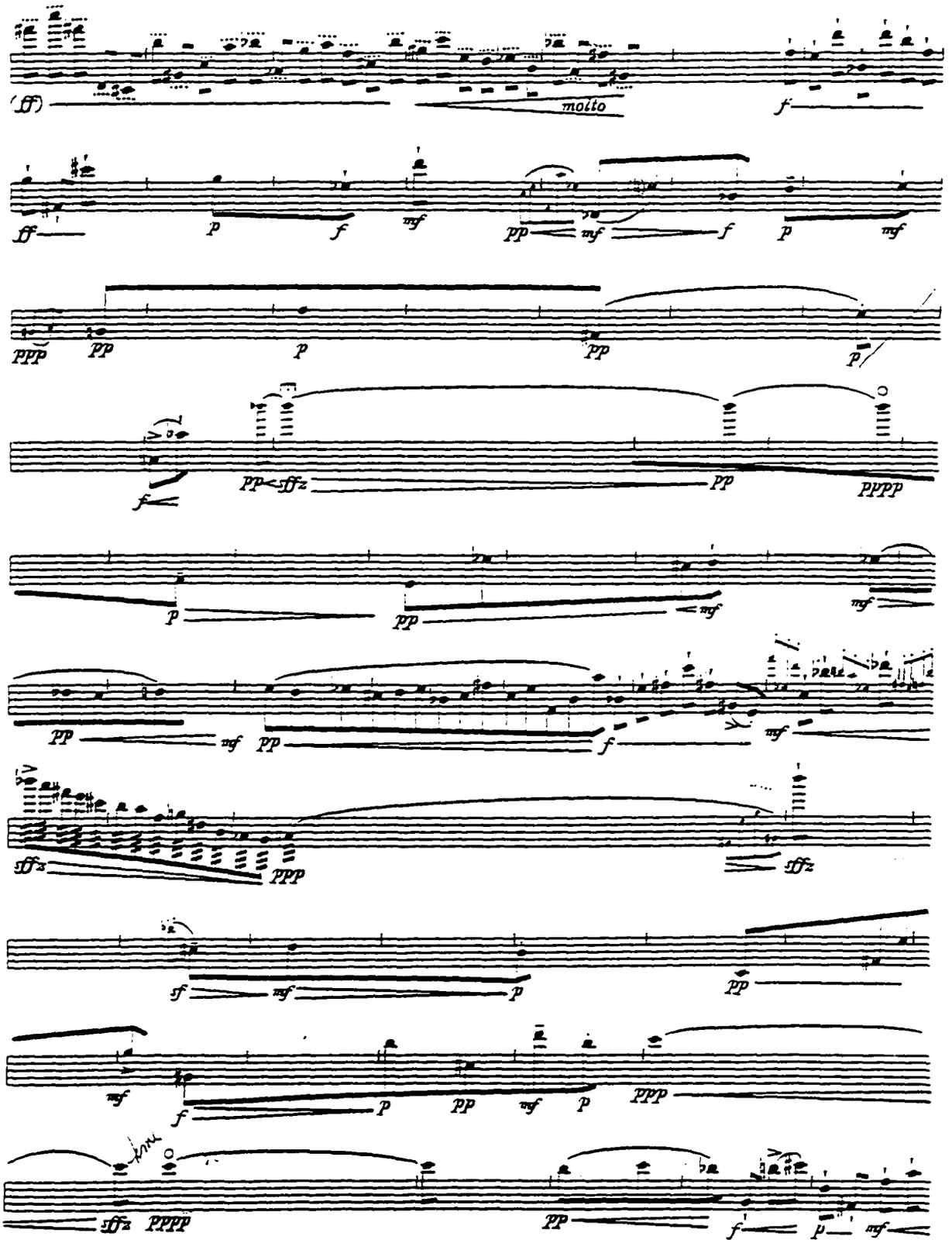
SEQUENZA

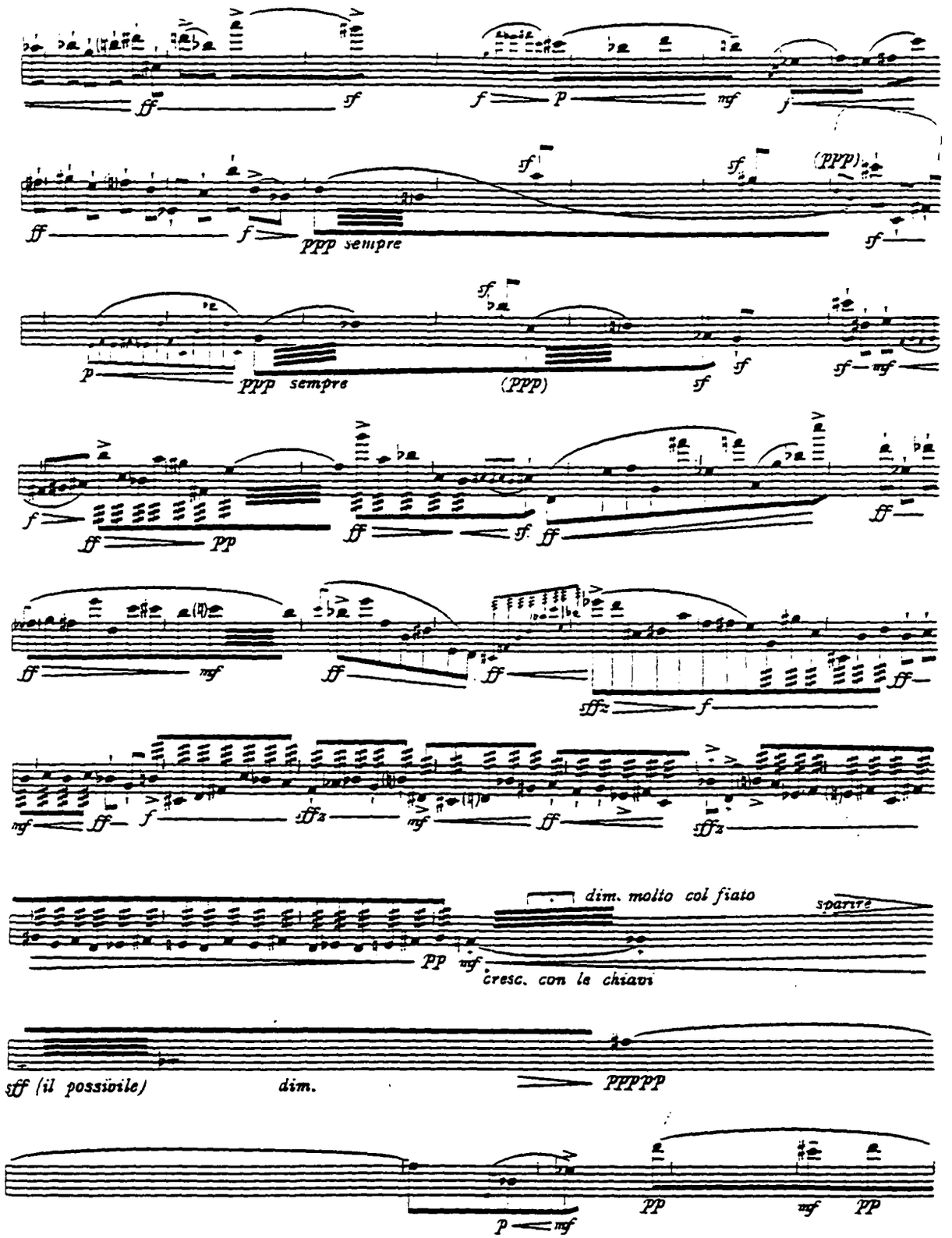
PER FLAUTO SOLO

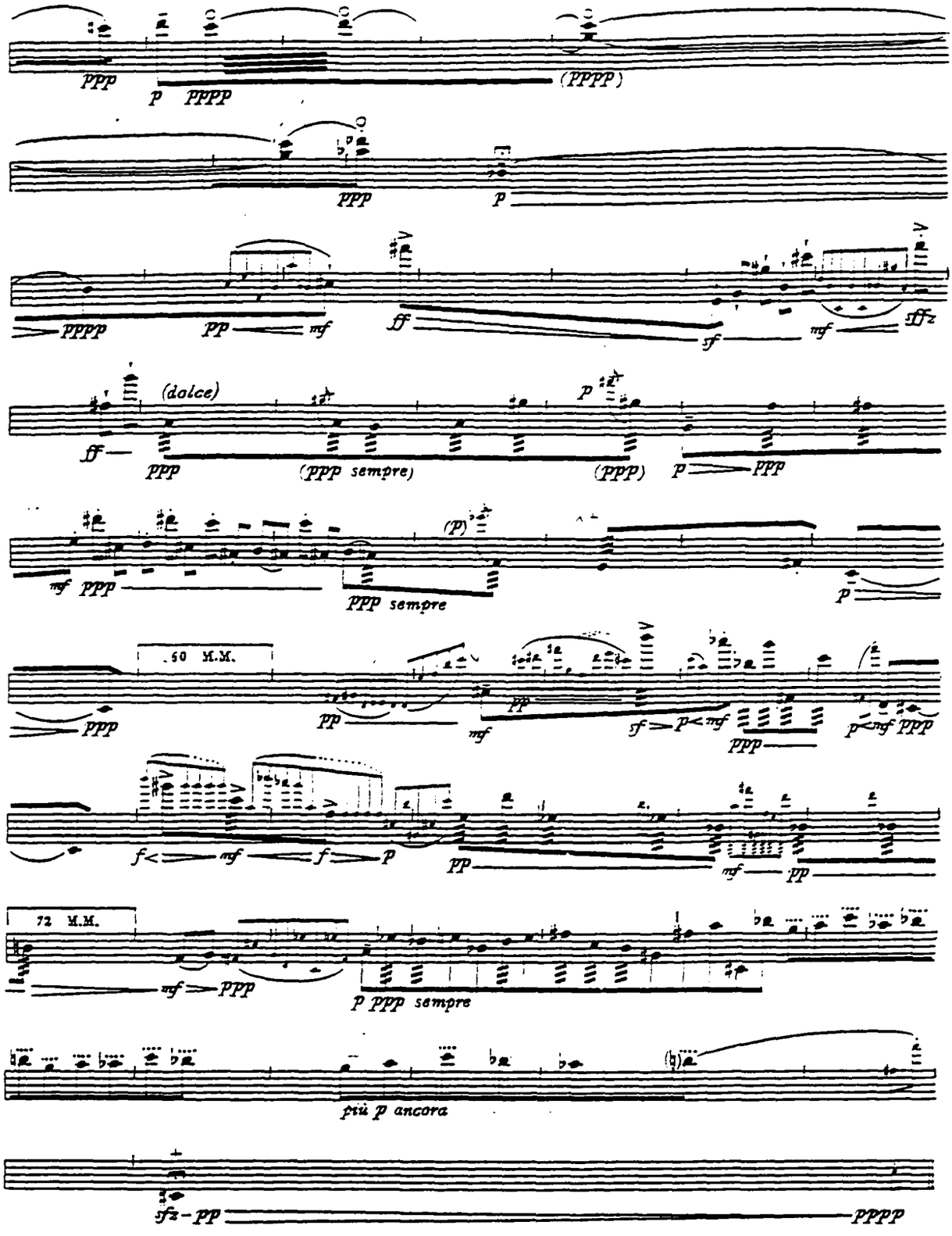
LUCIANO BERIO
(1958)











Appendix C - Berio, *Sequenza I* (revised version, 1992: marked up by B.W.)

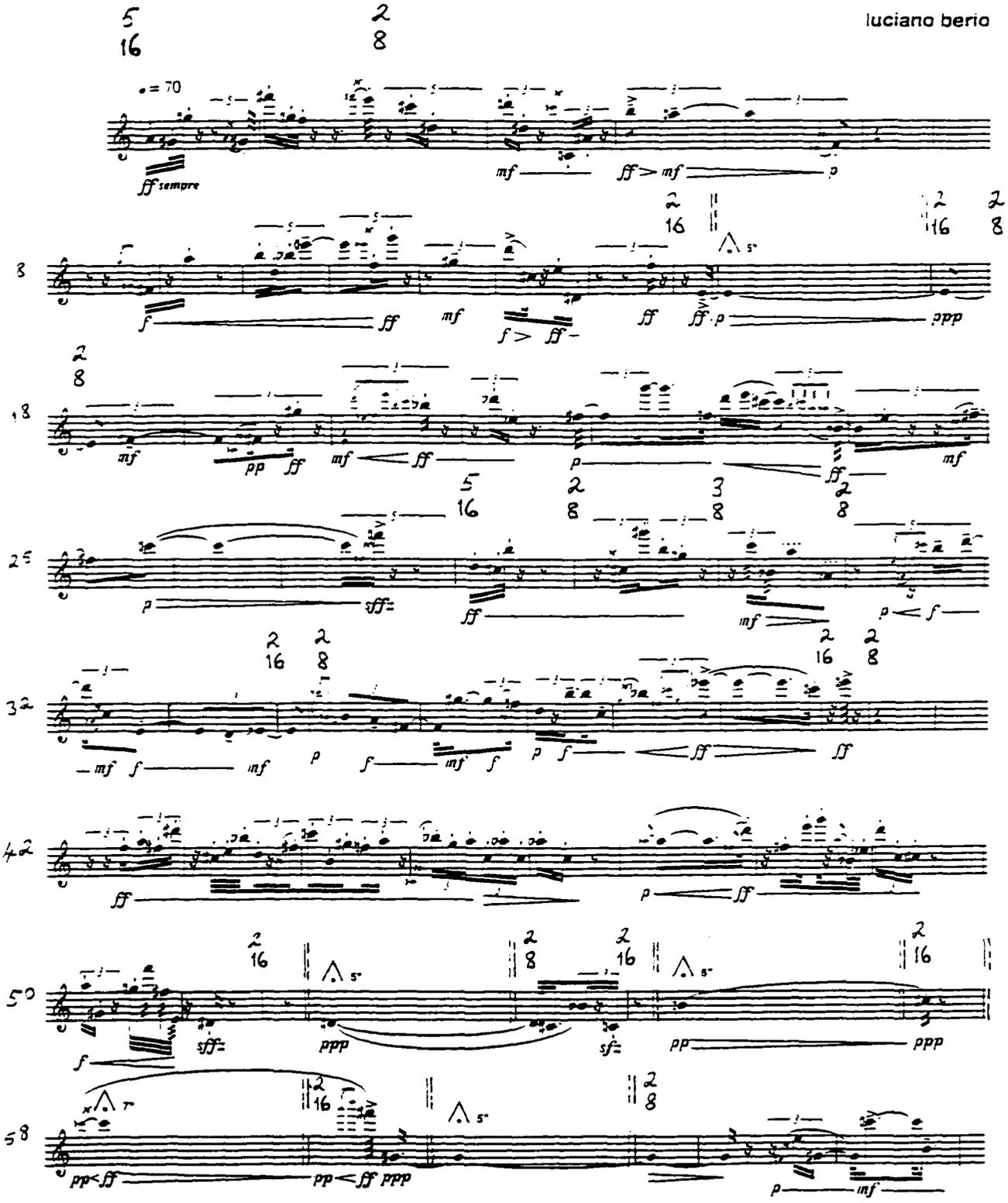
a severino gazzelloni

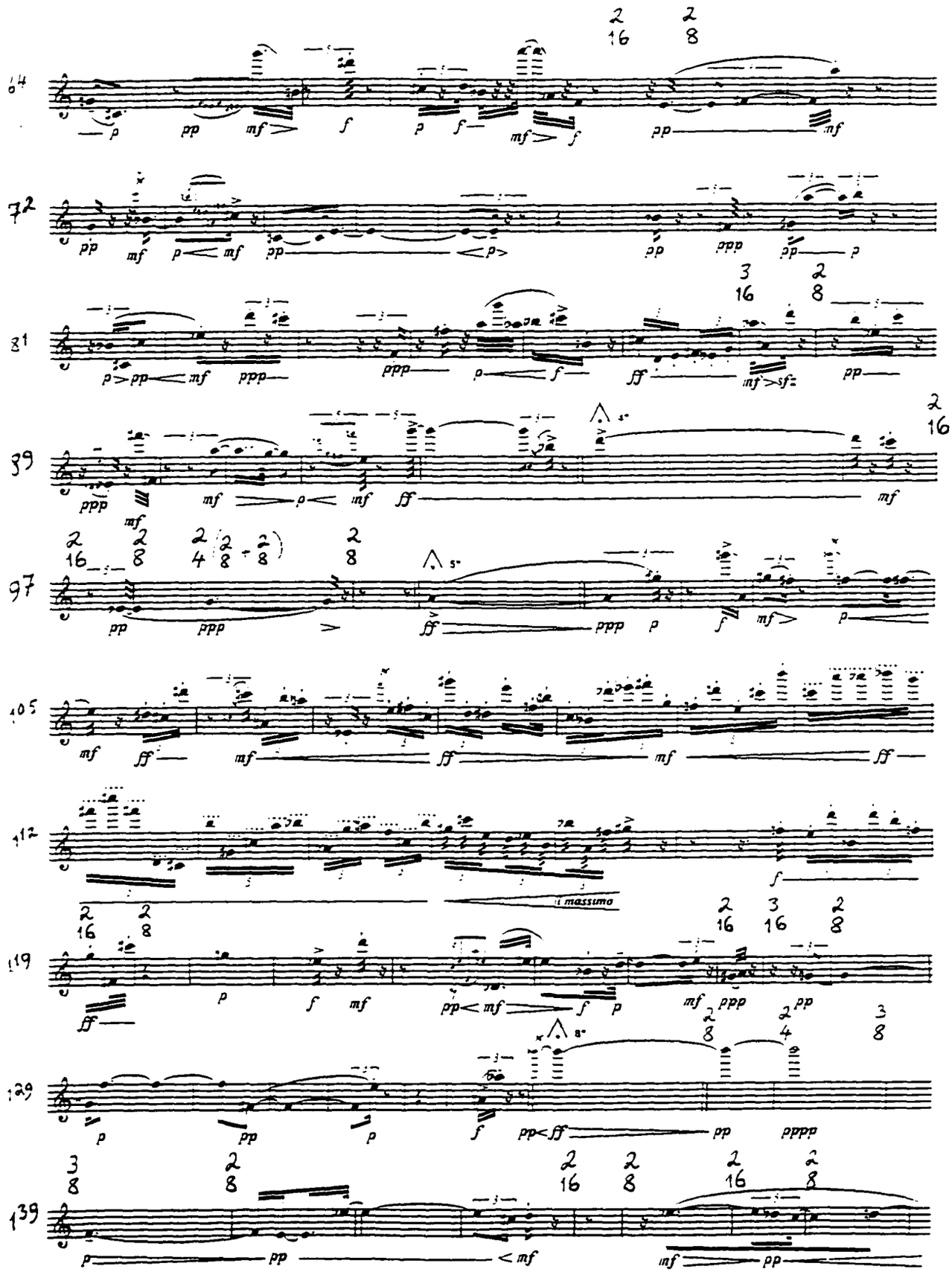
sequenza I

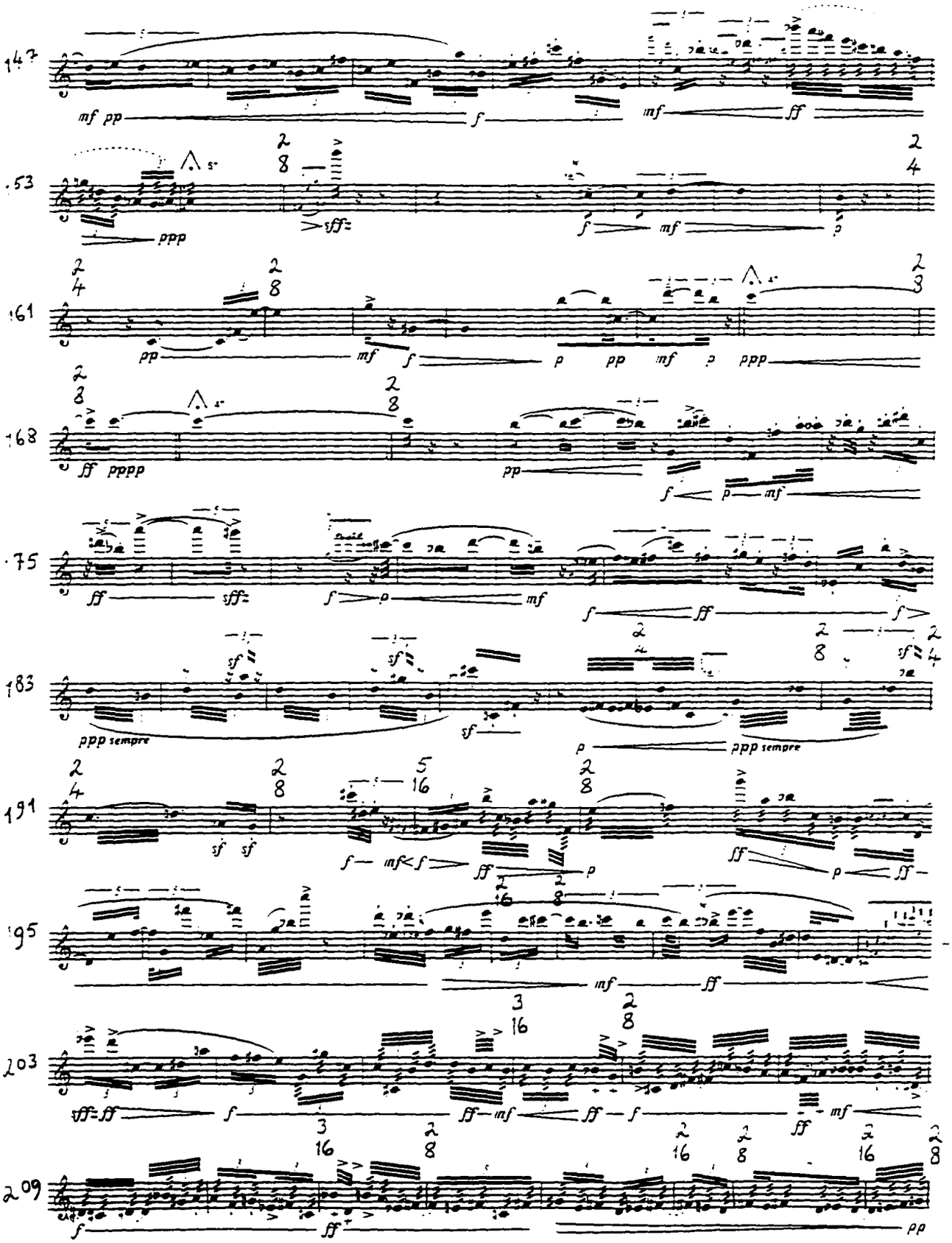
per flauto solo

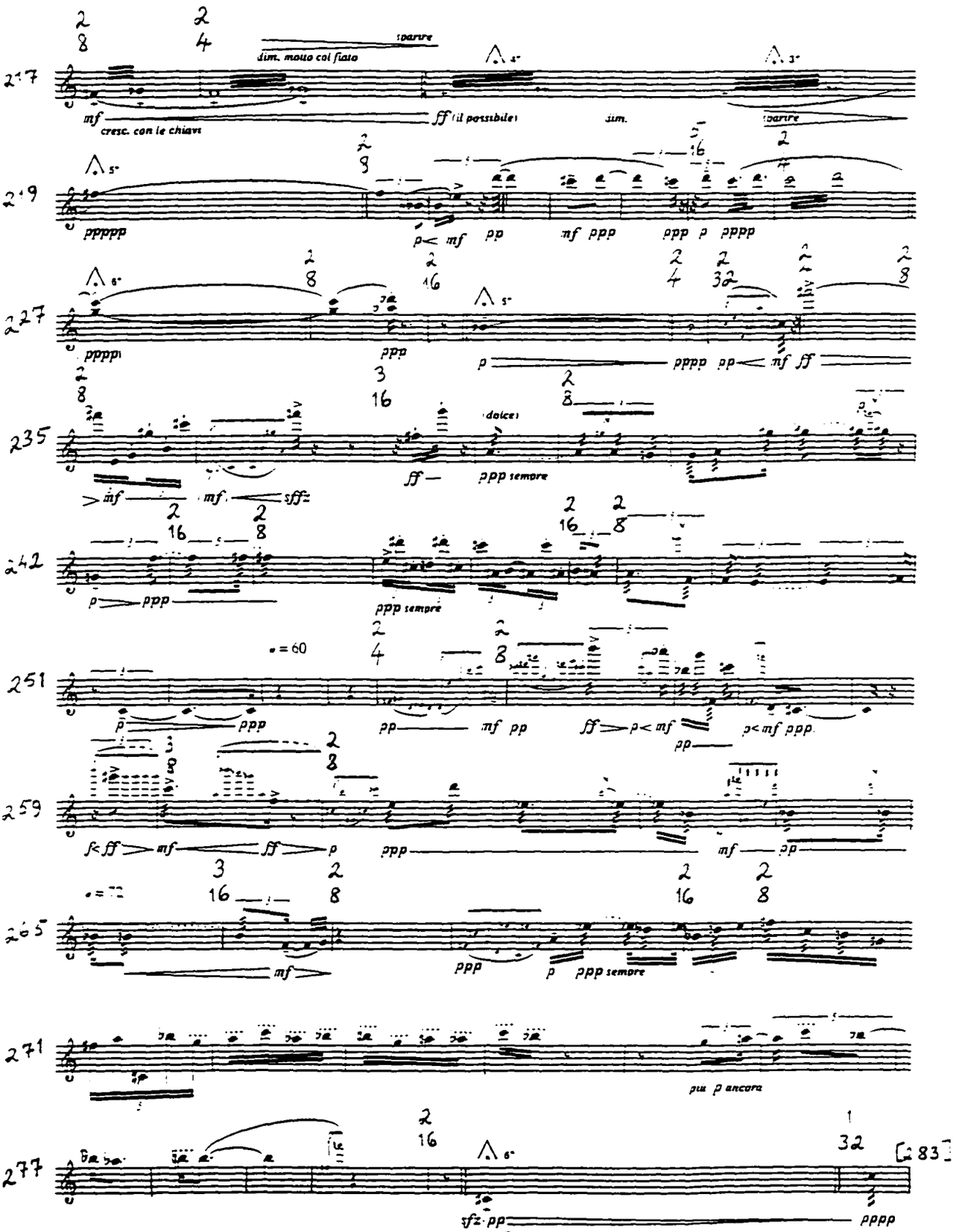
(1958)

luciano berio









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Research on the subject of contemporary music notation can be grouped into four different categories. For books and articles in all these general categories the finest bibliography is Gerald Warfield's *Writings on Contemporary Music Notation - an Annotated Bibliography*, which covers all relevant materials up until twenty years ago. The first category consists of general manuals that list the "dos and don'ts" and display new techniques and possibilities. Foremost among these manuals are: Erhard Karkoschka's *Das Schriftbild der neuen Musik* (translated as *Notation in New Music: a Critical Guide to Interpretation and Realization*); and Kurt Stone's *Music Notation in the Twentieth Century*. Stone's book presents the notational devices and procedures endorsed at the 1974 International Conference on New Musical Notation held at Ghent, Belgium. Other important manuals are Hugo Cole's *Sounds and Signs: Aspects of Musical Notation*; David Cope's *New Music Notation*; Gardner Read's *Music Notation: a Manual of Modern Practice*; *Modern Rhythmic Notation*; *Twentieth-Century Microtonal Notation*; and Howard Risatti's *New Music Vocabulary: a Guide to Notational Signs for Contemporary Music.*

The second category consists of special issues on new music notation that have been put out by journals that specialize in contemporary music. Volume 9 of the *Darmstädter Beiträge zur neuen Musik* is totally devoted to notation, with articles by, among others, Earle Brown, Carl Dahlhaus, Roman Haubenstock-Ramati, Mauricio Kagel, and György Ligeti. (Karlheinz Stockhausen's famous article "Musik und Graphik" appeared in vol. 3 of the same journal.) A number of the earliest issues of *Perpectives of New Music* contained either an organized forum on notation or a very heavy emphasis on the topic, to which David Behrman, Lukas Foss, Donald

Martino, Gunther Schuller, Kurt Stone, and Charles Wuorinen contributed important articles. (Many of these essays were compiled into *Perspectives on Notation and Performance.*) Volume 13 of *Musique en jeu* is entitled "La musique et l'écriture," and features articles by Daniel Charles and the musical semiotician Jean-Jacques Nattiez. Notation has been a steady interest of the Dutch journal *Interface-Journal of New Music Research* over the past twenty years, and the published *Proceedings of the American Society of University Composers* show many panel discussions on the subject dating from the early 1970s.

The third category consists of handbooks and articles devoted to issues of performance practice. In addition to being of use to composers, these materials are also designed for conductors and instrumentalists. One encounters general surveys such as the twentieth-century contributions by Robert Philip and Paul Griffifths to the *New Grove* compilation *Performance Practice: Music after 1600*, as well as more intensive general handbooks such as Arthur Weisberg's *Performing Twentieth-Century Music.* Particularly informative in this genre are the individual instrument treatises such as Bruno Bartolozzi's *New Sounds for Woodwinds*, Robert Dick's *The Other Flute*, and Bertram Turetzky's *The Contemporary Contrabass.*

The fourth category consists of books or other materials that address the general issue of notation in unorthodox ways. Members of this category are John Cage's *Notations*, a collection of manuscripts by contemporary composers interspersed (via chance operations) with their comments on the subject in general, and Virginia Gaburo's performance-lecture *Notation.*

The following bibliography is divided into sections reflecting the organization of chapters one to four:

I. An Introduction to Notational Practice since 1945
II. Luciano Berio: Notation-as-play within a predefined system
III. John Cage: "...the whole paper would potentially be sound": Time-Brackets and the Number Pieces (1981-92)
IV. Brian Ferneyhough: Notation-as-inventory

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BENEDICT WEISSER is Visiting Instructor of Composition at Oberlin Conservatory (1997-98; Fall 1998). Born in New York City in 1967, he received his Bachelor of Music degree in Composition from Oberlin Conservatory in 1989, where his principal teacher was Randolph Coleman. He then spent two years studying composition and music theory at Utrechts Conservatorium (The Netherlands) with David Porcelijn and Tristan Keuris. In his studies toward the Ph.D. in Composition at The Graduate School and University Center of the City University of New York, his principal teachers have been David Del Tredici and David Olan (composition), Philip Lambert and Joseph Straus (music theory), and Allan Atlas and H. Wiley Hitchcock (musicology).

Honors include a grant from the Andrew W. Mellon Foundation (1987-88), the Herbert Elwell Memorial Prize in Composition, Oberlin Conservatory (1989), the Projekt Jonge Componisten award, Netherlands Ballet Orchestra (1990), the Joseph H. Bearns Prize in Music, Columbia University (1992), an ASCAP Young Composers' Foundation Grant (1994 and 1995), and the Robert Starer Prize in Composition, The Graduate School and University Center of the City University of New York (1998). In 1992 he was commissioned by the New York Youth Symphony, as part of their *First Music 9* series, to compose a work for orchestra. Last year he was selected as a featured composer on the University of Cincinnati's *MusicNinetyseven* festival, which took place in June of 1997.

Weisser's *Al-Peh* (1990) for wind ensemble is published by Donemus Amsterdam. In 1991 it was performed in Amsterdam and Den Haag by the Netherlands Ballet Orchestra, and broadcast over Dutch radio. In May of 1993 his *Singings* (1992) for orchestra was premiered by the New York Youth Symphony at Carnegie Hall. In 1997 he joined the New York new music group *Music under Construction* as an Affiliate

Composer. Current projects include commissions from the Oberlin Contemporary Music Ensemble and the West Coast new music group *Sounding*.

Before assuming his current teaching position, Benedict Weisser was a Graduate Fellow at The Graduate School and University Center of the City University of New York (1995-97). Previously he was on the faculty of Baruch College (City University of New York) as an Adjunct Lecturer in Music Theory (1994-95). From 1987-89 he initiated and supervised a project of creative music education for children grades 1-3 at the Eastwood School in Oberlin, Ohio. During 1990 he served as conductor for the Xenakis Ensemble in Amsterdam.

Benedict Weisser is a member of ASCAP and BUMA/STEMRA.

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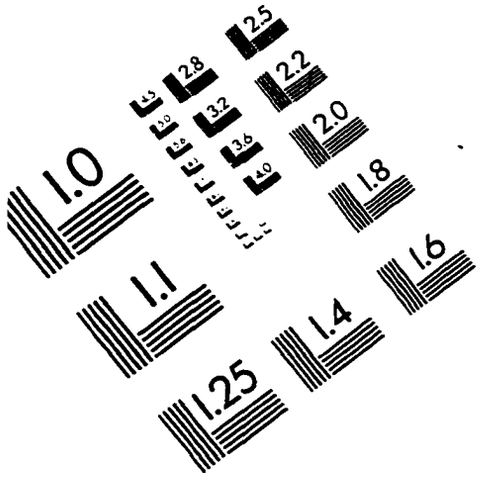

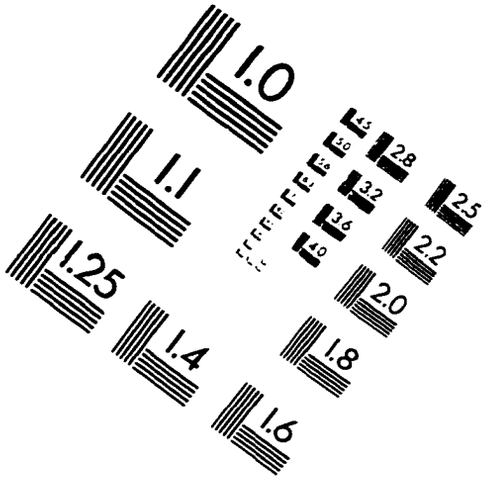

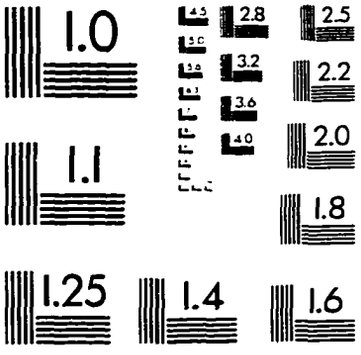

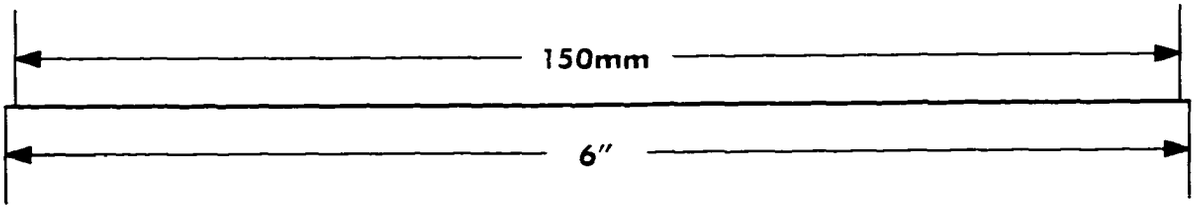

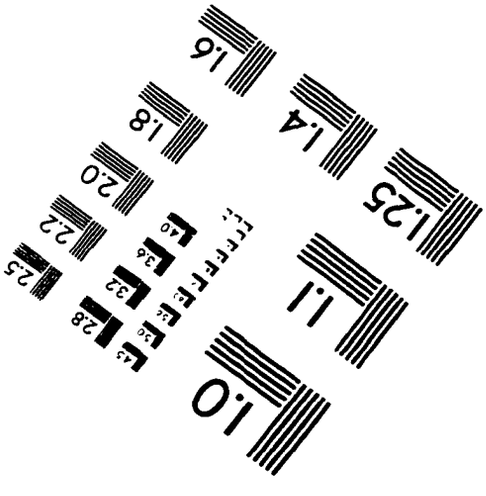

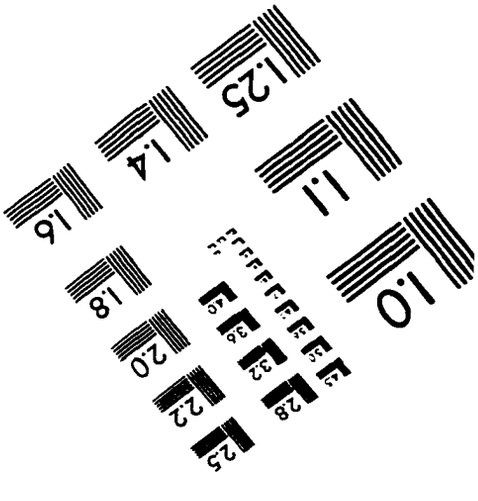

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