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SPEECH-BASED COMPUTER MUSIC COMPOSITIONS: SELECTED WORKS BY CHARLES DODGE AND PAUL LANSKY

by

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

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Abstract

SPEECH-BASED COMPUTER MUSIC COMPOSITIONS:
SELECTED WORKS BY CHARLES DODGE AND PAUL LANSKY

by

Madelyn Byrne

Adviser: Professor Philip Lambert

This paper discusses speech-based computer music compositions by Charles Dodge and Paul Lansky. A brief history of each composer is given as well as an historical outline of the creation of certain computer music programs. The compositions analyzed are *In Celebration*, *The Waves*, and *Word Color*. The analyses focus primarily on pitch structure but also give careful consideration to computer programming information and textual considerations.

ACKNOWLEDGMENTS

Philip Lambert has been a great resource for intelligent and challenging guidance in writing this dissertation. I also appreciate his responsiveness to ideas in their beginning stages.

Charles Dodge and Paul Lansky have been exceedingly generous. Both composers have promptly and patiently answered all of the questions that I have emailed to them or telephoned them with. Paul Lansky and Hannah MacKay opened their home to me, Paul Lansky shared his sketches and computer files with me, and Charles Dodge sent me his score for *The Waves*. Their openness and encouraging advice allowed me to better understand their work.

Linda Fisher has been patient and encouraging throughout the writing of this dissertation. Her kindness and support have helped to make this a much more surmountable task.

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Chapter One

Introduction

My interest in speech in tape and computer music was piqued when I heard Luciano Berio's *Thema, Omaggio a Joyce* for the first time. *Thema, Omaggio a Joyce* consists of fragments of James Joyce's *Ulysses* as its sole sound source. In this piece, Berio used the text in its entirety or fragmented into phonetic sounds. This allowed him to use the voice as pure timbral material.[1] I was struck by the inherent beauty and musicality of the sound source as well as the skillfulness of the composer in employing the available technology to create a such an outstanding composition. This impression propelled me to further explore this niche of new music and I subsequently discovered the work of Paul Lansky and Charles Dodge.

What was, and still is, immediately apparent to me was the successful balance that Lansky and Dodge achieved in breaking new technological ground while respecting and enhancing the intimately expressive and musical qualities of their sound sources. While they share this goal, their compositional styles are quite distinctive.

It is my intention to demonstrate in the following chapters that Charles

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1 Claudio Annibaldi, "Luciano Berio," *The New Grove Dictionary of Music and Musicians*, vol. 2, ed. Stanley Sadie (London: Macmillan Publishing, Ltd., 1980): 554-559 [556].

Dodge and Paul Lansky have created compositions that are rich in musical detail and, at the same time, ground breaking with regard to technology. I believe that this is a valuable contribution to the field of musical research.

This dissertation includes information pertinent to the computer programs used to create the sounds in the analyzed pieces, but discussions of timbre are limited due to a lack of a codified language for objectively analyzing this aspect of the music. Nevertheless, in order to provide the reader with some understanding of the sounds that he or she is hearing, I include definitions of the relevant programs with a description of the sound manipulations they were used to create. This is presented initially in this chapter along with an explanation for the fascination that speech based computer music holds for many composers, and an outline of the historical steps that led to the creation of some of the discussed programs. The historical outline is especially germane to the developments of formant tracking and linear predictive coding.

Although the analytical chapters (chapters four, five, and six) contain a more detailed characterization of the programs used in the given pieces, far more attention is given to pitch class analysis. This is due, in part, to the concerns already addressed as well as to the high degree of musical detail

and complexity presented in each of the pieces as contrasted with a limited number of programs used. In each of the analyzed pieces the composers called upon two to three programs, but created pieces with complex pitch and harmonic structure. More attention is given to pitch class analysis for these reasons.

General Background on the Human Voice in Computer Music

Perry Cook, who has done pioneering work in the physical modeling of the vocal tract, has stated that the compositional interest in vocal analysis/synthesis rests on three basic foundations. The first is the human being as a linguistic organism. Cook notes that the creation of speech holds a high degree of fascination for all people. The second is a need for systems that decompose sounds in a source/filter paradigm, which allows for cross-synthesis. Cross-synthesis involves the analysis of two instruments, typically a voice and a non-voice instrument, with the parameters exchanged and modified on resynthesis. The third foundation is the fundamental desire to independently manipulate pitch, resonance, and time in resynthesis. The elusive goal of being able to stretch time without changing pitch, to change pitch without changing timbral quality, etc., are

all of high interest to computer-music composers. [2]

General Overview of Selected Computer Music Techniques

Linear Predictive Coding: Linear Predictive Coding, or LPC as it is commonly referred to, is an analysis and resynthesis technique. LPC allows one to edit and resynthesize analyzed data in such a way that it is possible to manipulate pitch and speed independently of one another. [3] This technique is used extensively in *In Celebration* by Charles Dodge.

Comb Filter: A comb filter creates a regular series of peaks and dips, equally spaced in frequency, in the spectrum of the input signal. [4] Comb filters are routinely implemented to create chords and bass tones. This technique is heard throughout *Word Color* by Paul Lansky.

Formant Tracking: Formant tracking is a process that analyzes and reconstitutes a voice by creating a record of the formant frequencies and their levels versus time. (A formant is a peaking in the spectral envelope of a tone. A formant is caused by resonances in the instrument or voice.

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2 Perry R. Cook, "Singing Voice Synthesis: History, Current Work and Future Directions," *The Computer Music Journal* 20/3 (1996): 40.
3 Curtis Roads, *The Computer Music Tutorial*, (Cambridge: The MIT Press, 1996), 200.
4 Ibid, 412.

Formants make an important contribution to our perception of timbre.)[5] This technique is most effectively employed in reconstituting an adult male voice because high fundamental frequencies make it difficult to accurately track the formants.[6] Charles Dodge used this technique in the first three songs of *Speech Songs,* and to lesser degree, in *In Celebration.*

Music 11: Music 11 is one of a family of synthesis languages designed to allow the composer to create an "orchestra" and a "score" on the computer.[7] The orchestra is comprised of unit generators. A unit generator is a software module that emits an audio signal or a modification of an audio signal.[8] The score specifies the parameters to be played, such as pitch, duration and amplitude. Charles Dodge made extensive use of Music 11 in *The Waves.*

Background: Bell Telephone Laboratories

Bell Telephone Laboratories (Bell Labs), laid the foundation for a great deal of computer-music technology, especially that which is concerned with computerized speech. Bell Labs began research in computerized

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5 Charles Dodge and Thomas Jerse, *Computer Music,* (New York: Schirmer Books, 1985), 361.
6 Ibid, 200.
7 Music 11's predecessors will be discussed later in this chapter.
8 Roads, *The Computer Music Tutorial,* 787.

speech in the 1950s and their research scientist Max Mathews, who is also an amateur violinist, was the first to have successfully developed and implemented computer technology to create music. [9]

F. Richard Moore has written about the historical motivating factors for Bell Labs behind this research. Moore states that in 1876, Alexander Graham Bell knew that sound pressure waves could be converted into analogous electrical signals, and vice versa, through the use of microphones and loudspeakers. Moore explains that the advantage of electrical signals is that they travel much faster through wires than sound does through air, allowing electrical signals to travel much farther in a small amount of time; hence the name *tele* (far off) plus *phone* (sound). When electrical signals travel through wires, however, they pick up the electrical equivalent of dust and dirt, called *noise*. If the wire is long enough, the original sound becomes so contaminated that it is no longer possible to understand. Practically the entire history of telecommunications concerns ways to prevent, or at least to slow, this inevitable noise degradation. For these reasons, the telephone company has a strong commercial interest in finding a way to carry high-quality sound over long distances. [10]

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9 Peter Manning, *Electronic and Computer Music* (Oxford: Clarendon Press, 1984), 217.

10 F. Richard Moore, "Dreams of Computer Music – Then and Now," *The Computer Music Journal* 20/1 (1996): 25–41.

By the 1950s, the scientists at Bell Labs were well aware that digital signals could be transmitted from one place to another more reliably than could analog ones. Moore explains that in a digital signal, information is encoded as a series of binary digits (bits), each of which can have only one of two possible values ("on/off," "1/0," etc.). When a bit is transmitted electrically from one place to another it picks up noise like any other signal, but this noise can be eliminated completely as long as it is not too powerful. The receiver only needs to distinguish whether an "on" or an "off" was originally transmitted; this makes digital transmission and recording far superior to analog for many purposes. This fact was not lost on the telephone company, and by the mid-1950s Max Mathews was working to investigate the potential of digital technology at Bell Labs.[11]

Using a special device called a digital-to-analog converter, a computer can control the movements of loudspeakers with a precision never before available. Max Mathews and others reasoned that because computers could be used to investigate improvements in telephone speech analysis, processing, and synthesis, they could also be used to improve the analysis, processing, and synthesis of musical sounds.[12]

In his own writings about the work that was undertaken at Bell Labs in

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11 F. Richard Moore, "Dreams of Computer Music – Then and Now," 28–29.
12 Ibid., 29.

the 1950s, Peter Manning confirms Mathews's relevance and place in history and adds that,

> The telephone company system only required an acceptable fidelity over a relatively small frequency bandwidth, concentrated toward the low end of the audio spectrum. The research team quickly realized that, despite some major technical obstacles, there was a distant possibility that full audio bandwidth transmission systems could be developed, capable of handling broadcast–quality music information.[13]

It was in such a climate of investigation that Max Mathews began exploring the use of the computer itself as a means of calculating and generating sound samples. His first attempts consisted of two experimental programs: MUSIC I, which was completed in 1957, and MUSIC II, which quickly replaced MUSIC I early in 1958. Both of these produced very simple sounds, MUSIC I being restricted to one and MUSIC II to four triangle–wave functions (triangle waves are formed by odd multiples of the harmonic series).

Manning notes that by the early 1960s several composers and engineers were showing an interest in the project. James Tenney became directly involved with developments at Bell Labs, soon to be followed by Hubert Howe, Godfrey Winham, and J. K. Randall at Princeton University's computer music facility. (Charles Dodge studied with Godfrey Winham at

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[13] Manning, *Electronic and Computer Music*, 217.

Princeton.) The next improved version of Mathews' program, MUSIC IV, was completed in 1962 with Joan Miller. MUSIC IV provided the basic model for many derivative programs that were used in computer music centers throughout the world. [14]

John Kelly and Carol Lochbaum at Bell Labs were the first to adapt a physical model of the human vocal tract to a digital computer. Their rendition of *Bicycle Built For Two* (1962) became a world–famous symbol of the increasing capabilities of digital computers. It played a significant dramatic role in Stanley Kubrick's film *2001: A Space Odyssey*, as it signaled the defeat of the insurgent computer HAL.[15]

It should be noted that some important advances were also being made at Stanford University by James Moorer, who transformed highly complex and time–consuming computational procedures into musically understandable ones.This was accomplished by developing procedures that were more computationally efficient and by incorporating more musically intuitive language into his programs. During the 1970s he produced a number of short pieces to illustrate the use of such techniques, including *Perfect Days* (1975) and *Gentlemen Start Your Engines* (1977). Both incorporate speech sources and make extensive use of pitch and durational

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14 Manning, *Electronic and Computer Music*, 218.
15 Roads, *The Computer Music Tutorial*, 267.

manipulations. *Perfect Days* also employs cross–synthesis, where one sound is used to control the articulation of another. In *Perfect Days* speech elements are used to articulate the sounds of a solo flute.[16]

16 Manning, *Electronic and Computer Music*, 228.

Chapter Two

Charles Dodge

Charles Dodge is a composer of both computer-music and acoustic music. He has also co-authored the book, *Computer Music,* with the engineer Thomas Jerse. While Dodge's compositional career encompasses a wide variety of works, he is best known for his pioneering work in speech-synthesis. This is due, in part, to his having provided a link between composers of electroacoustic music and the research being done at Bell Labs. Evidence of this link, as well as a chronology of technological developments made in speech synthesis, may be found in his *Speech Songs,* which was realized at Bell Labs in 1972–73. The composer writes,

> *Speech Songs* is a group of four short songs for which I used synthetic voices to articulate texts by the American poet Mark Strand. I realized these songs at Bell Telephone Laboratories. These songs constitute one of the first computer music works to be based directly on the computer analysis of recorded sound. While working on *Speech Songs*, I was most fortunate to have access to a succession of computer speech synthesis systems developed by Bell Labs research scientist Joseph Olive. The four songs trace a change in speech synthesis technique. The first three songs were made with a formant tracking system for voice synthesis. The fourth song, "The Days Are Ahead," was realized with Mr. Olive's implementation of the linear predictive coding technique that had

been recently invented, also at Bell by B.S.(Bishnu) Atal.[1]

Peter Manning writes about Dodge's pioneering work with speech synthesis as well as the influence that Milton Babbitt's work has had on Dodge:

> Speech generation and manipulation feature in the works of Charles Dodge, a composer closely involved with the development of direct–synthesis facilities at both Columbia and Princeton Universities. His strong commitment to serial principles of musical organization results in a style of composition which contrasts sharply with the freer methods of expression adopted by West Coast composers. In *Speech Songs* the phonemes of his text are subject to strictly ordered permutation. Such indebtedness to the teachings of Milton Babbitt is evident in his computer generated works. *In Celebration*, like *Speech Songs*, incorporates vocal syntheses, cross–synthesis leading to a convincing parody of vocal part singing within a strongly sectionalized formal scheme.[2]

Dodge never formally studied with Milton Babbitt, but has spoken of the powerful influence Babbitt's music has had on him in some of his lectures at Brooklyn College.

The IBM Watson Laboratories, Princeton University, and Bell Labs, proved to be important places for the development and expansion of computer–music technology in the 1960s. Dodge explains that the earliest work in computer music at Princeton was made possible by the donation to the University by Bell Labs of the digital–to–analog conversion system. He

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1 Charles Dodge, "On Speech Songs," in *Current Directions in Computer Music Research*, ed. Max V. Mathews and John Pierce (Cambridge: MIT Press, 1989), 9–10.

2 Peter Manning, *Electronic and Computer Music*, (Oxford: Clarendon Press, 1984), 229.

continues by recounting that Max Mathews came to Vladimir Ussachevsky's electronic music class at Columbia University in 1964 to lecture on computer music. The following year, Dodge attended Godfrey Winham's computer music class at Princeton University. (At that time, Columbia University only offered classes in tape-music techniques, but Dodge was able to obtain permission to take the computer music course at Princeton.) Dodge also did computer music at the IBM Watson Laboratories in 1966-67. There he used the IBM 1130. [3]

Dodge recalls that he and Paul Lansky took Godfrey Winham's computer music class at the same time in the mid 1960s. Also attending that class was Elie Yarden, who suggested to Dodge and Lansky that if one could control various acoustical parameters the way one can with the computer programs that they were learning, it would be possible to get the computer to "talk." Having studied the physics of acoustics as an undergraduate at the University of Iowa, Dodge realized that Yarden's assertion was correct. [4]

In 1971, Charles Dodge worked with Joseph Olive and Max Mathews at Bell Labs on synthesizing speech. Dodge's initial conclusion was that

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3 Ed M. Theiberger, "An Interview With Charles Dodge," *The Computer Music Journal* 19/1 (1995): 11.

4 Ibid. As an undergraduate, Dodge became especially interested in vowel formants and the acoustics of singing. From this point forward, he studied acoustics, computers, as well as composition.

computer speech was not good for music. He soon realized, however, that the fault was with his preconceived idea of what speech should be (a beautiful bel canto voice) rather than with computer speech itself. This realization was due, in part, to a recent trip to Sweden where he heard the text–sound compositions of Lars Gunnar Bodin, Sten Hanson, and Bengt–Emil Johnson. Shortly thereafter, in 1972, Dodge returned to Bell Labs with some of Mark Strand's poems. This time, however, he did not try to make vocal music but rather "speech music." [5]

From 1971 to 1973, there were tremendous strides in advancing the quality of computer speech. As a result, the first song in this composition, "A Man Sitting in the Cafeteria," is somewhat crude sounding, while the last one, "The Days Are Ahead," sounds relatively natural. The composer states that the natural sound he obtained for the fourth song is attributable to the development of Linear Predictive Coding by Bishnu Atal in 1973. [6]

Since the realization of *Speech Songs,* Charles Dodge has continued to compose computer-music, acoustic works, and radio plays.

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[5] Ed M. Theiberger, "An Interview With Charles Dodge," 14.

[6] Ibid.

Chapter Three

Paul Lansky

Paul Lansky is a highly regarded composer of both computer music and music for live performers. He is also known and respected for his lucid and thoughtful philosophy on computer music composition.[1] A primary consideration for Paul Lansky, in this regard, is the viability of music that lives on a recorded medium (tape or CD). For Paul Lansky, this is computer music. In order for this type of music to have a viable life, Lansky believes that it must hold the potential for a perpetually active and intelligent engagement with the listener as it lives on in its recorded medium. Lansky states that he prefers to think of CDs of his music as being more like books than "concerts in a box." He aspires toward a relationship with the listener that is something like an author's relationship with a reader because he views this type of relationship as being an intensely active communication between minds. The idea of a "concert in a box," on the

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[1] This philosophy is discussed in articles by Joshua Cody, "An Interview with Paul Lansky," *Computer Music Journal* 20/1 (1996): 19 - 24; Jeffrey Perry, " The Inner Voices of Simple Things: A Conversation with Paul Lansky," *Perspectives of New Music* 34/2 (1996): 40 - 60; Michelle Denise Ondishko, "*Six Fantasies on a Poem by Thomas Campion*: Synthesis and Evolution of Paul Lansky's Music Composition." Ph.D. dissertation, The University of Rochester, Eastman School of Music, 1990; and Paul Lansky, "A View from the Bus: When Machines Make Music," *Perspectives of New Music* 28/1 (1990): 102 - 110, as well as my interview in Appendix D.

other hand, is more appropriate for music that lives on stage, or that is activated by performers, because it is documentation of that live event.[2]

In order to compose music that has a viable life on a recorded medium, a myriad of interrelated problems particular to this medium must be solved. In recounting his initial efforts to write computer music, Lansky recalls, "I would do something that sounded great the first time, okay the second time, and rotten the third time." [3] Lansky concluded that this perceived erosion of quality was caused by a failure to consider the fundamental differences between computer music and music for live performers. Lansky explains the differences in two ways:

1. Performers bring a sense of excitement to concert settings that cannot be fully captured by tape music; 2. Live performers provide an important alternative focus of attention.

On the first point, Lansky explains that the performers bring a sense of tension, excitement and danger to the stage which is not present in music that lives on tape. In this regard, Lansky believes that his role as a composer of computer music is analogous to that of a filmmaker, whereas

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[2] Personal interview conducted by myself with Paul Lansky at his home studio in Princeton, New Jersey, on July 17, 1998, lines 85–92. Lansky refers to his computer music compositions as "silicon-based pieces" and his music for performers as "protein-based pieces."

[3] Personal interview, lines 98–103.

when composing music for live performers, he feels more like a playwright. Just as a film of a live play pales in comparison to the live performance, so too does simply transferring acoustic music's compositional goals and practices to the tape-music medium.[4] The second concern is the lack of an intermediary between the listener and the composer. In tape music concerts, Lansky believes that the composer is uncomfortably close to the audience; " you essentially have the composer screaming in your ear, and there's no escape." Performers at least provide an alternative point of attention for the audience.[5]

In working to address these problems, Lansky came to the aforementioned realization that computer music, or music that lives on tape, must have the ability to engage the listener *actively* on repeated listenings. Building this type of a relationship is a central concern for Lansky. He seeks to achieve this by writing music that requires the listener to "compose" as he or she listens.[6] Such "composing" may take a number of different forms, but frequently some type of musical and/or textual ambiguity is involved, fostering an oblique relationship between the music

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4 Lansky spent the first part of his musical career as a French horn player and therefore is very conscious of performance concerns.

5 Joshua Cody, "An Interview with Paul Lansky," *Computer Music Journal* 20/1 (1996): 22.

6 Personal interview, lines 105–106.

and the listener. The oblique relationship requires listeners to choose their focal points, a process usually mandating an active role of the imagination. In his speech pieces Lansky uses stories without content, lists, and other types of textual ambiguity to call upon and engage the listener's imagination.

Word Color and *Things She Carried* illustrate several aspects of this approach. Lansky explains,

> I'm very interested in the idea of a list because you don't have to worry about the real consequence of one phrase after another. Also, I want to construct something where the listener has got to invest herself in the process. As you listen, you build an image in your head. One thing that's always interested me is the sort of prototypes that people have in their imagination. Like when you read a book and it talks about a staircase, what it is that you imagine, and I think that everyone has something different. That was interesting to me, to build something that would invest in a little bit of this kind of inner thinking. [7]

Lansky also gives careful consideration to the role that loudspeakers can play in activating the listener's imagination. Lansky regards loudspeakers as windows into a virtual reality that the computer creates. As an example he cites his *Still Time*, which creates the illusion that the space of the speakers is being manipulated. Lansky enjoys creating worlds that need to be fleshed out by the listener in this way.

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[7] Personal interview, lines 77–83. Lansky credits Richard Kostelanetz with inspiring him to use lists. I also pointed out that all of the isolated words in *Word Color* (as well as *Now and Then*, and *Still Time*) pertain to time in some way. Lansky confirmed this and stated that he has always been fascinated with time and that this fascination has grown as he has gotten older.

> When you have a recording of somebody speaking or of somebody playing an instrument, you have a pretty good mental model of what it is, but when it's not quite clear what's going on, the listener has to do a lot of work. That's why the early reaction to electronic music was that it was "space music" because there was no physical correlate to the sound....The real power of the medium is to create a world in which the listener has to work to imagine what's going on. What I find the computer so good at is manipulating all kinds of familiar sounds to stimulate our consciousness in an endless variety of ways. [8]

Musique Concrète

Lansky is endlessly fascinated with the way the computer can help people see the sounds of the world in a new way.[9] He is interested in using the power of familiar musical conceptions to enhance our perceptions of the sounds of the world. [10] He explains that in the real world, we need to know where a sound is and what its coming from. But like film, recorded sound eliminates the need to do this – it eliminates the sound's sense of danger. For this reason, a recorded sound may be temporarily entertaining, but it quickly loses its vitality after the second or third listening. Lansky believes that music changes this, that music can restore that lost sense of danger.[11]

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8 Jeffrey Perry, "Inner Voices of Simple Things: A Conversation with Paul Lansky," *Perspectives of New Music* 34/2 (1996): 54.

9 Ibid, 44.

10 Cody, "Interview with Paul Lansky," 21.

11 Perry, "The Inner Voices of Simple Things," 44.

Among the real world sounds that Lansky likes to work with is speech. The composer has often stated, with regard to his speech-based compositions, that he seeks to explicate the implicit music in speech. In this area, he frequently collaborates with his wife Hannah MacKay, an actress who has worked in a number of films and television shows. Lansky finds her reading exceptionally beautiful, and notes that she is able to modulate her speaking voice in a very "musical" way. The first piece that they collaborated on was *Six Fantasies on a Poem by Thomas Campion* (1978-79). [12]

In his speech-based pieces, Lansky is interested in making simple things sound more interesting. He believes that sometimes what someone is saying is not as important as how they are saying it. In reference to *Six Fantasies on a Poem by Thomas Campion*, Lansky states, "It has a kind of didactic function, to make you listen to the music in speech, or to explicate the implicit music in speech." [13]

Lansky also uses tonality to build an active relationship with the listener. He acknowledges that many of his recent pieces have been quite tonal. He does not want to require the listener to parse a dense timbral texture,

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12 Personal interview, lines 162–168.

13 Perry, "The Inner Voices of Simple Things," 48.

complicated rhythms, and an elaborate harmonic structure all in the same piece. In his works of the mid–1980s, Lansky presents triads as bands of pitch color, saturating a stretch of time in a piece with the tonal "color" of that triad. Lansky compares this practice to the way the painter Mark Rothko might saturate a canvas with a band of color. Lansky explains that his tonal saturation allows the listener to focus on other details of the music.[14]

> In *Idle Chatter*, when I first started doing it, the chattering sounded great,but I was using all kinds of chords, pitch charts, and arrays and it really fell apart. Then as soon as I started doing it on an F and unfolding a Bb triad I started to listen to all kinds of other things. In the years since then I think a lot of the things that I worry about have to do with keeping one thing constant and taking something else that's new. After I wrote the *Idle Chatter* pieces, people would talk to me about it, but nobody ever said the same thing. That was interesting.[15]

Another problem that concerns Lansky is what he views as an exploitative and superficial relationship developing between artists and the latest technology, keeping the popular music industry especially in constant "trade–show" mode. The danger here is that people never really master an instrument or program, because the average life span of most equipment is approximately eighteen months.[16] In the academic community, there is the

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14 Cody, "An Interview with Paul Lansky," 23.

15 Personal interview, lines 98–106.

16 Paul Lansky, "A View From the Bus: When Machines Make Music," 104.

analogous problem of composers being pressured to demonstrate the superiority of their latest software. Furthermore, Lansky believes that many people are drawn to electronic music because they believe that it is an easy medium in which to do "dazzling" things. These "dazzling" things can create a very attractive and awe-inspiring impression on a superficial level. On this issue, Lansky quotes Milton Babbitt's well-known axiom that "no sound grows older than a new sound." [17]

Lansky believes that a command of computer music should be pursued in much the same manner that a serious command of a musical instrument would be: with practice, discipline, and patience. He goes even further to state that computers make it much harder, not easier, to do musical things.[18]

Lansky creates a performance/compositional paradigm to explicate some of these ideas. He regards the traditional composer–performer–listener triangle as a conservative paradigm that discourages evolution and promotes institutional stability. Lansky proposes instead a model more suited for computer music that retains elements of the aforementioned triangle while adding two additional nodes: the sound-giver and the instrument-builder. A

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17 Perry, "The Inner Voices of Simple Things," 45.

18 Perry, "The Inner Voices of Simple Things," 57.

sound-giver, Lansky states, may either be someone who is simply giving a cassette to a friend, or someone who is publishing a compact disk. Prior to the availability of recording technology, the only way one could be a sound–giver was to be a performer. At present, however, giving and receiving sounds on tape or disk is, for most people, the most active part of their musical life. A sound-giver, therefore, absorbs some of the roles of performer, composer, and even listener.[19]

In his definition of an instrument-builder, Lansky again broadens the traditional definition to accommodate computer technology. Instrument building in the form of creating computer hardware or software can either overtly incorporate compositional decisions, or endeavor to be fairly neutral. But even in the latter case, Lansky believes, the instrument-builder's musical vision is always present to some degree. Therefore, Lansky has always written his own programs for all of his compositions.

In his argument for using his proposed expansion of the classic triangle, Lansky states,

> The elegance of this reconstruction is in the capability technology creates to recast and recolor the sending and receiving abilities of any of the nodes on the network. From this perspective the social implications of the classical model become much more cleanly aligned with the nature of the music it was designed to accommodate, and in our

19 Lansky, "A View from the Bus, " 107.

expanded social network the unique facilities offered by the technological agenda of computer music find a much more congenial home. [20]

20 Lansky, "A View from the Bus, " 109.

Chapter Four

In Celebration (1975) by Charles Dodge

Introduction

In Celebration utilizes a synthetic voice modeled on a recording of the composer reading the Mark Strand poem of the same name. It uses a type of speech synthesis called speech synthesis by analysis. In this type of speech synthesis, as opposed to speech synthesis by rule, the synthetic speech is based upon a recording of a natural voice. (Charles Dodge and Thomas Jerse define speech synthesis by rule as having grown out of recorded-voice systems in which the parts of speech were concatenated to make spoken sentences or phrases.

The synthesizer uses phonemes derived from research in acoustic phonetics and applies rules for connecting the phonemes into speech.)[1] Synthetic speech from analysis, however, holds all of the transitions, timings, and individual characteristics from the person who made the recording. Dodge analyzed and resynthesized his own voice in this manner by using linear predictive coding and formant tracking. This allowed him to alter pitch and duration without one effecting the other. The resynthesis uses a pulse

[1] Charles Dodge and Thomas Jerse, *Computer Music*, (New York: Schirmer Books, 1985), 202.

generator that simulates a glottal wave for voiced speech (i.e., vowels and diphthongs), and noise that simulates turbulence in the vocal tract for unvoiced speech. The latter technique is sometimes employed by Dodge in this piece to create the illusion of a whisper. Formant tracking allows him to alter the resonance of the vocal patterns.[2]

There are two major stages of computer operations performed on the recording of the speech to obtain these choices; these are an analysis operation, and a synthesis operation. The first converts a digital recording (typically made on a Digital Audio Technology, or DAT, tape) into information that may be read and analyzed by a computer program. The resultant data is then used and edited in the second operation, when building a synthetic voice. The desire for a synthetic voice comes from the great malleability that it offers. With a taped voice, one cannot alter pitch and duration without one factor profoundly impacting upon the other. With a synthetic voice, however, a composer has the ability to independently control pitch and duration as well as to create a number of effects on the voice. Dodge explains the synthesis-by-analysis program implemented for *In Celebration*, and some of the musical choices that are the product of

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2 Charles Dodge, "*In Celebration*," in *Composers and the Computer*, ed. Curtis Roads (California: William Kaufman, Inc., 1985), 47–74 [48].

this program:

> Two major techniques are introduced into the system for musical purposes: (1) altering the analysis parameters to cause the synthetic voice to differ from the original, and (2) mixing the synthesis output with the output on other runs of the synthesis program. The analysis program reduces the speech data from 15,000 samples per second to a set of 120 frames per second....In the synthesis stage of the program, the first parameter required is the frame length, the next determines whether the frame is to be voiced or unvoiced.The option of altering the speech parameters–the principal means by which the synthetic speech can be made to sound musical– is implemented in an editing program. The composer uses the editing program to create musical voices out of the frames of analyzed speech. The first step in shaping the frames into musical passages is to search through the printed record of the analysis for word and syllable boundaries of the spoken text. From these parameters it is possible to scan the speech for word and syllable boundaries. Once the syllable boundaries are determined, pitch and time alterations can be introduced into the speech for musical purposes. [3]

Examples 4.1 and 4.2 illustrate the analysis and synthesis stages respectively.

Dodge has used these processes to create a voice with a five octave range, remarkable control over pitch and rhythm, and simultaneous vocal layers with the same voice. Dodge has referred to this piece as a madrigal, perhaps for this reason. *In Celebration* holds a tremendous variety of textures as well; monophonic singing, polyphonic singing with up to six voices, melismas, glissandi, and a variety of spoken articulations.

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[3] Charles Dodge, " *In Celebration*," 61-62.

Homogeneity is achieved by having a single reader as the sound source. This also makes for a highly personal interpretation of the text. The complex pitch structure and variety of articulations heard in this piece, coupled with the single sound source, makes this a unique and compelling composition – and one that could only be achieved with this technology. There are three basic categories of altered articulation;

1.) slow, elongated speech to convey sickness and weakness;

2.) a fast whisper to convey conspiracy and terror; and

3.) a slow whisper to convey intimacy. [4]

These categories are most apparent in the latter half of the composition. [5]

(Appendix A contains an annotated score of *In Celebration.*)

Analytic Overview

In Celebration is structured in two parts. The second occurrence of "in a chair" begins the second half of the composition, in measure 56 (the first occurrence of this text segment occurred in measures 7 and 8). The piece has its climax in the middle of the second half (m.71–72) with the poem's climactic phrase, "you know that this is different." This is

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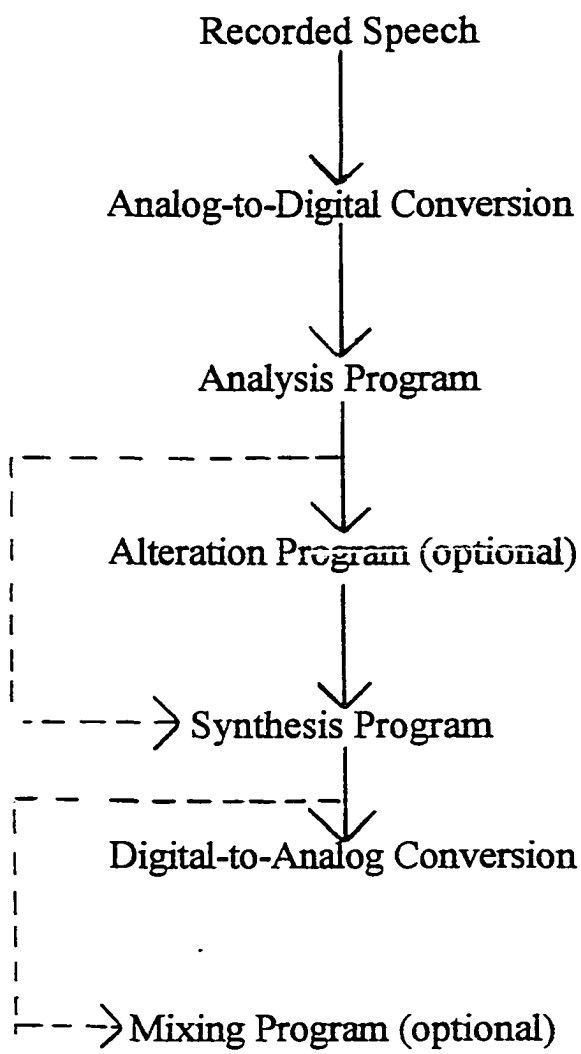
4 Dodge, "In Celebration," 60.

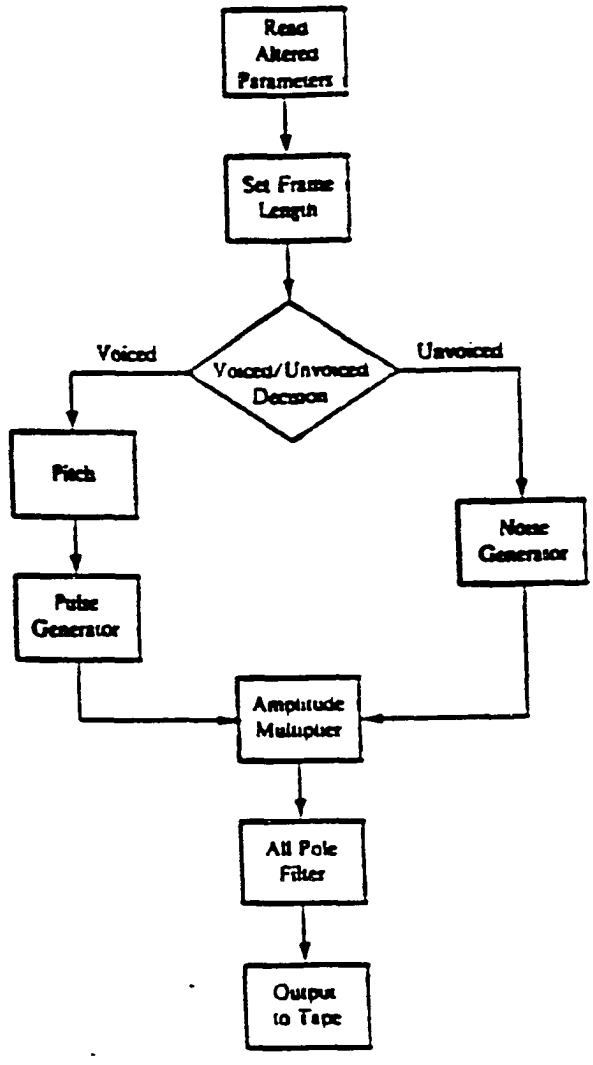
5 Ibid.

"In Celebration," EXAMPLE 4.1



Synthesis-by-analysis flow chart, reprinted from Charles Dodge, "*In Celebration,*" in Composers and the Computer, ed. Curtis Roads (California: William Kaufman, Inc., 1985), 47–74 [61].

"In Celebration," EXAMPLE 4.2



Linear predictive coding flow chart, reprinted from Charles Dodge, *"In Celebration,"* in Composers and the Computer, ed. Curtis Roads (California: William Kaufman, Inc., 1985), 47–74 [63].

followed by a denouement ending in measures 87 – 108. [6]

Interval classes 1, 3, and 6 and pentachords are the two most important components of the pitch structure of *In Celebration.* Interval classes 1, 3, and 6 are used almost exclusively in the melodic contours and harmonies of this piece. The numerous set classes discussed in this analysis are cited as proof of the salience of the aforementioned interval classes. These interval classes will also be used to shape diminished triads or tritones heard over long stretches of time. For example, the diminshed triads [47T] and [8E2] are heard over measures 1 through 25, the tritone 0-6 is heard over measures 34 through 44, and pitch classes from the opening are brought back into prominence in the second part of the composition.

Pentachords have a cadential role in this composition. In concurrence with the importance of interval classes 1, 3, and 6, pentachords will either be composed of those interval classes when functioning on a local level or they will be led to by those interval classes when functioning on a more global level. When functioning globally, these pentachords are comprised of either rolled Bb's over five octaves or five articulations of a whispered word. The rolled Bb cadences are often led to with pcs 4 and E (see example 4.3).

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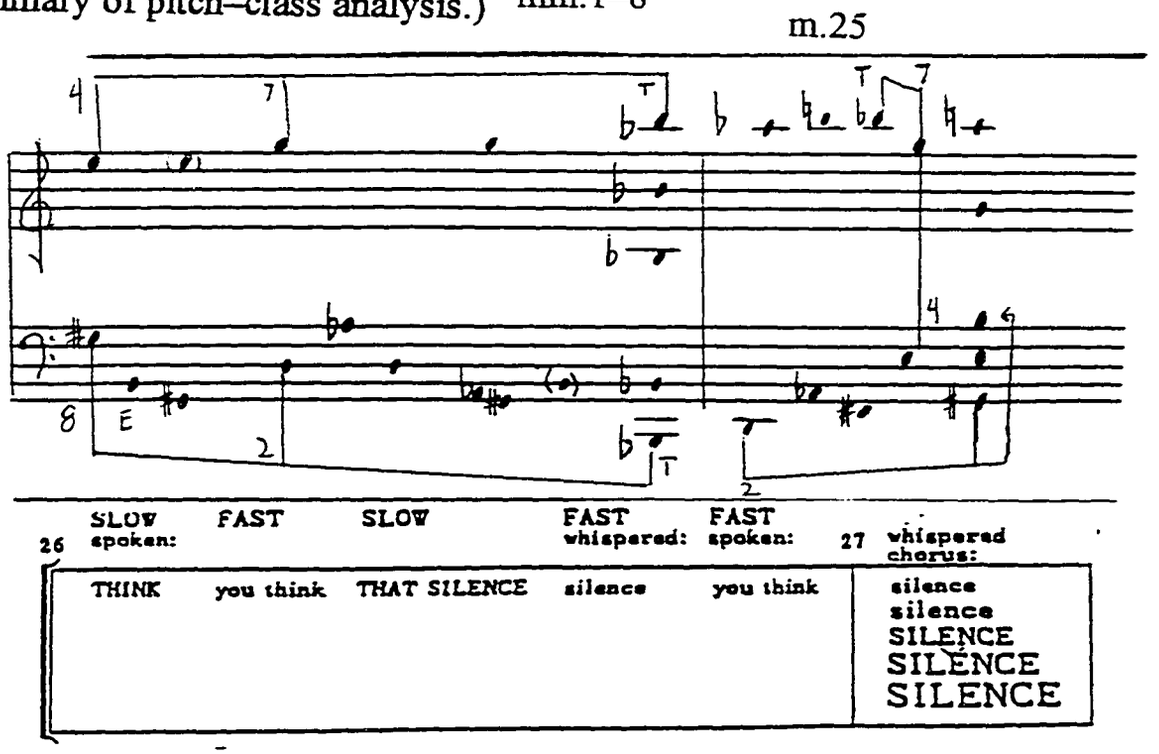
[6] Ibid.

The synthetic voice carries an otherworldly timbre that aids in depicting the dissociated emotional quality of the poem. The use of the personal pronoun "you," initially generates some ambiguity as to whether the narrator is speaking about himself, speaking in general terms, or addressing a second person. It quickly becomes clear that the former case is intended as the text becomes more detailed with personal observations. It is my interpretation of the Strand poem that the subject is using "you" in the general sense, where "you" is in the third person as "one" would be. The choice of third person narration underlines the dissociation that permeates the subject's emotional state. (Dissociation is also evident in lines such as, "You want to wave but cannot raise your hand.")

Dodge honors this quality effectively with his settings of "you." The composer has stated that his settings of "you" represent maximum pitch activity with a minimum of text. For example, this approach is apparent in the first four measures of the piece. "You" is the only word set for this time span and it is articulated in a variety of ways: with widely displaced sixteenth-notes in measures 1 and 2, and is followed by pentachords at the end of each of those measures. The pentachords function locally as punctuation to the sixteenth-notes in those measures, (pentachords either

EXAMPLE 4.3

(Summary of pitch–class analysis.) mm.1–8



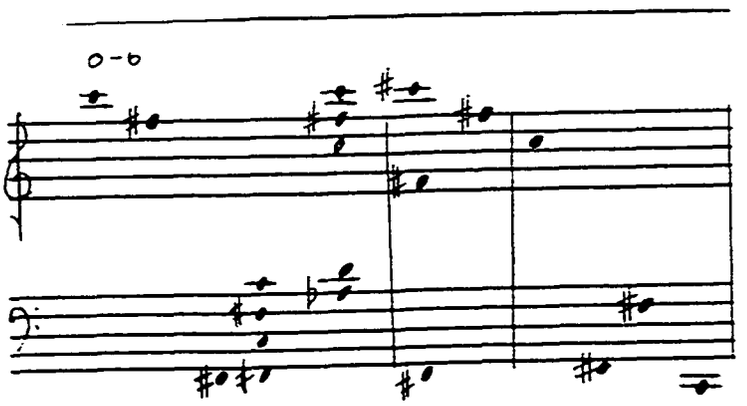
Bb rolled over five octaves will serve as a cadential figure throughout the piece. This figure will most often be led to by pcs 4 or E. This voice leading reinforces the importance of interval classes 1 and 6.

The diminished triads [47T] and [8E2] are heard over measures 1 through 8, and again in measure 25 before a whispered cadence.

The five whispered articulations of "silence" create a cadence that closes the second subsection of this piece. This cadence parallels the one that was heard in measure eight.

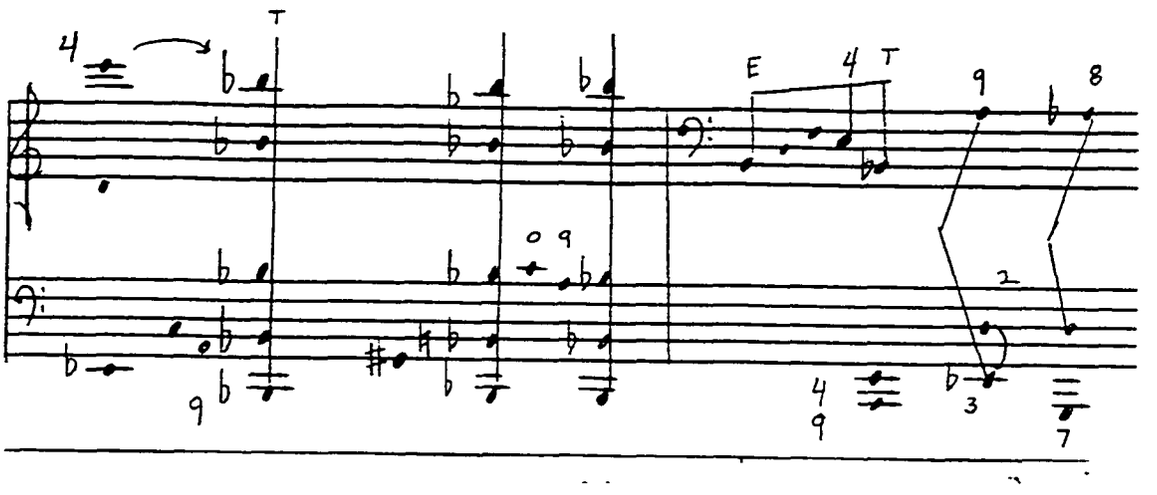
EXAMPLE 4.3 continued

(Summary of pitch–class analysis.)



The tritone 0-6 is heard over measures 34 through 40.

mm.54–58 mm.84–87 mm.101–106



Pitch classes from the opening are brought back into prominence in the second part of the composition. In keeping with this reference, there are three rolled Bb cadences heard over measures 58 through 87.

The final cadence of the composition is five articulations of both "wander" and "darkness."

summarize a line of rapidly moving notes or have a cadential function in this piece). "You" is also set as a glissando, and finally in rapidly moving notes as heard in measure four (see example 4.4).

Dodge's harmonic language suitably animates the directionless and bleakly macabre nature of the text. This complexity of harmonic language also works well because the piece's timbre is fairly homogeneous, consisting entirely of the analysis of Dodge's voice. Listeners, therefore, are not overwhelmed with too much information, but are also not left wanting more diverse material. Saturating the piece with music that is both rich and cohesive makes this a perpetually engaging composition.

Detailed Analysis

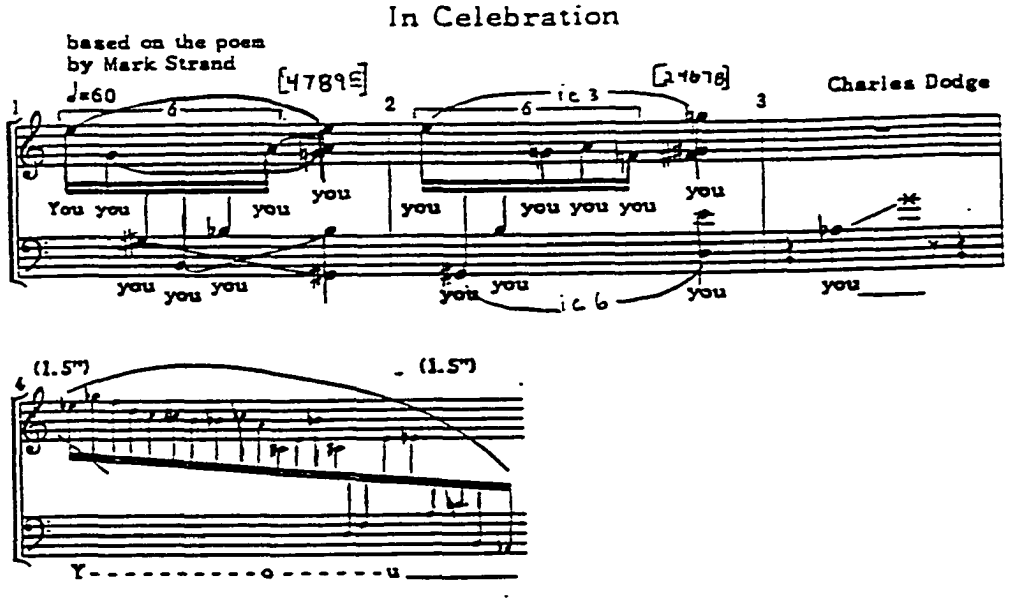
Measures 1 through 14

The prominence and structural significance of interval classes one, three and six is firmly established in the opening phrase of the piece (mm. 1–8). These interval classes are most conspicuous in the two outer voices which shape the diminished triads [47T] and [8E2] respectively over the progression of the phrase.(see example 4.5).

The peaks of measures one and two outline interval class 3. The top voice, after three articulations of pc 4 in these measures, rises a minor third

"In Celebration," EXAMPLE 4.4

("You" as an example of maximum pitch activity with a minimum of text.)



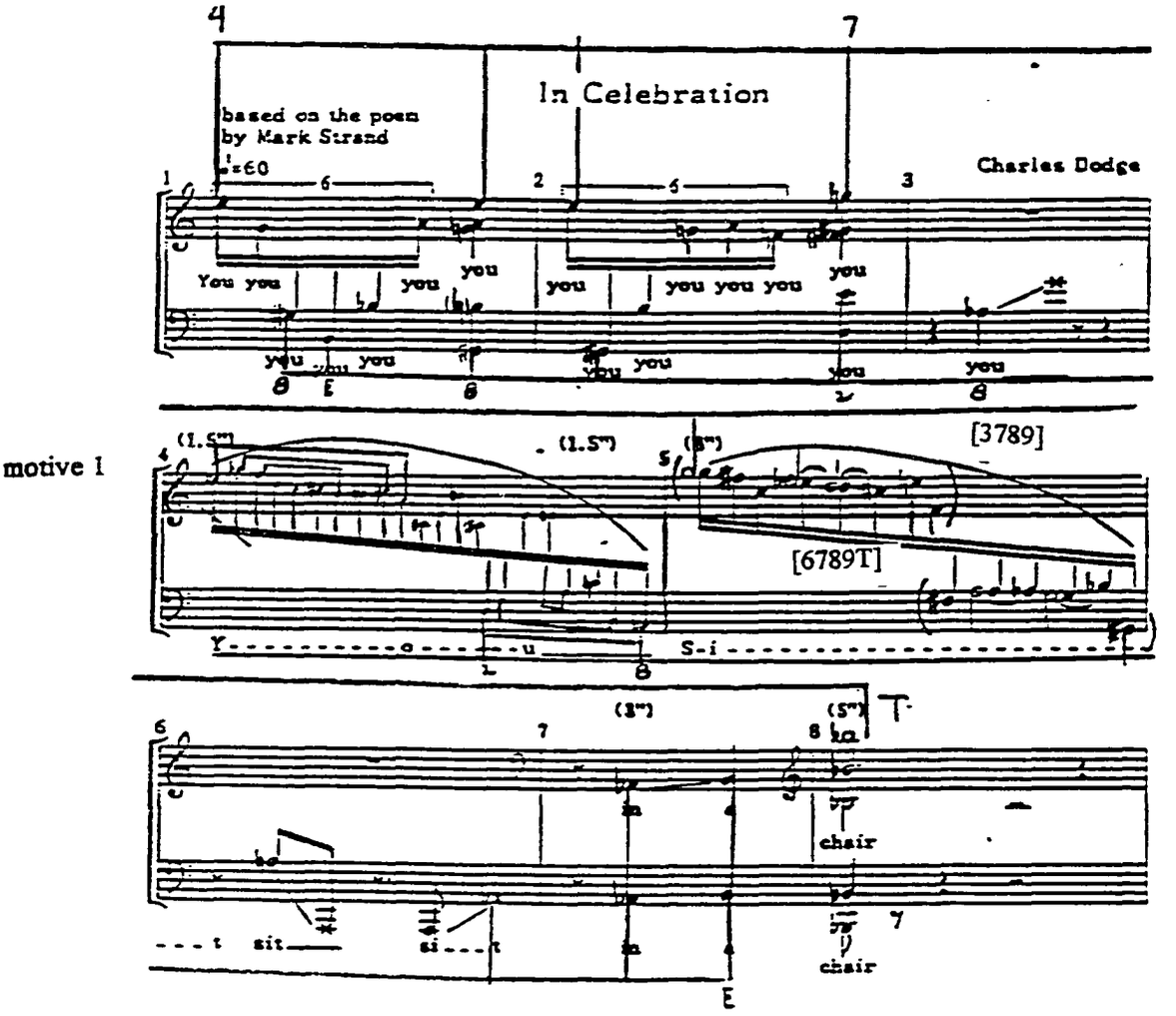
Pentachords often have a globally cadential, or locally punctuating, function in this composition. In measures one and two, they punctuate the preceding sixteenth-notes.

in the chord at the end of measure two. This minor third is most audible because it is created with the two chords that summarize measures one and two respectively. Pitch class 7 is emphasized again at the beginning of measure five, and is linked with the next prominent note in the soprano register in the cadence in measure eight on pc T. The overall shape of the lines and chords is an ascent, as if to pose "you" as a question. The upward glissando in measure three exaggerates this characteristic.

Measure one contains the hexachord [4789TE] (012347) with pcs 4 and 8 emphasized by rhythmic placement and register. Interval classes one and three are used exclusively in this melodic segment. These sixteenth notes accumulate in a [4789E] (02347) pentachord on beat two, eschewing the pitch class T that was heard in the sixteenth notes on beat one. Measure two is almost a reiteration of measure one, as the two measures have a similar melodic shape, share many common tones, and both emphasize pitch classes 4 and 8. Measure two's sixteenth note run presents [45789E] (013457), the tritone being between pcs 5 and E this time. This culminates in a [24678] (01246) pentachord, which asserts the prominence of the 2-8 tritone in this portion of the piece. a [4789E] (02347) pentachord on beat two, eschewing the pitch class T that was heard in the

"In Celebration," EXAMPLE 4.5

(Structurally salient pitches over the opening eight measures of the piece, highlighting the diminished triads [47T] and [8E2].)



sixteenth notes on beat one. Measure two is almost a reiteration of measure one, as the two measures have a similar melodic shape, share many common tones, and both emphasize pitch classes 4 and 8. Measure two's sixteenth note run presents [45789E] (013457), the tritone being between pcs 5 and E this time. This culminates in a [24678] (01246) pentachord, which asserts the prominence of the 2-8 tritone in this portion of the piece.

Pitch class 8 is of special importance to the construction of the first phrase of the piece: it is the lowest note in measures one through five, the bass pitch in measure three for the first glissando of the piece, it ends the highly chromatic motives of measures four and five, and it will lead to the first cadence of the piece in measures 7 and 8.

The bass line outlines a major sixth and minor third in measure one when it moves from pc 8 to pc E, and down to pc 8 one octave lower as the bass tone heard in the first chord of the piece. This pitch is carried over to measure two where it is the will rise back to pc E again before moving to the tritone on pc 2 at the end of the measure. This tritone's reference functions antecedently (to the preceding and lower pc 8), concurrently (with the simultaneous pc 8 in the chord) and consequently (to the pc 8 that it will ascend to in measure 3).

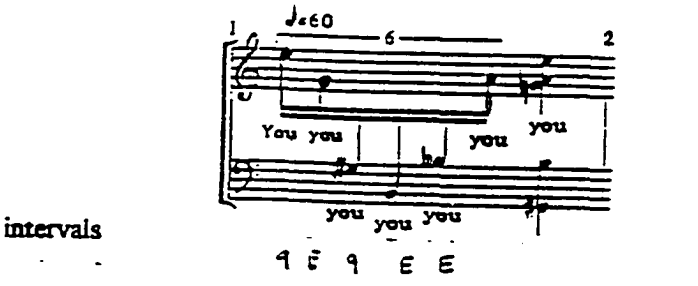
Measure four presents the first of three "you" motives. These

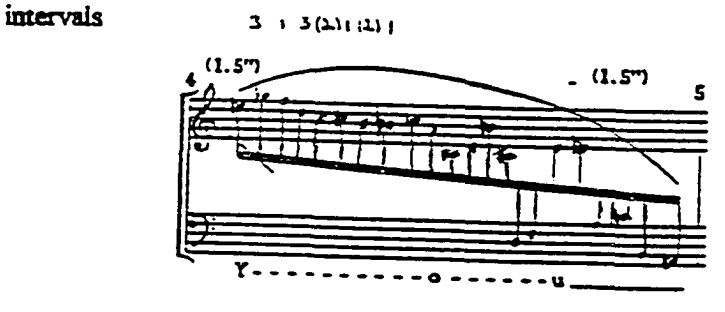
motives will be heard throughout the first half of the piece. This motive contains all of the pitch classes of the chromatic collection except pc 7, and the first four notes of this measure are an intervallic inversion of the opening four notes of the piece
(see example 4.6). This motive may be broken into three segments using note repetition, register, and interlocking arches created with tritones as criteria (see example 4.7). Pitch classes 3 and 9 create the outer tritone, pcs 6 and 0 the second, and pcs 5 and E the third. The nine pitch classes that comprise this segment are [9TE012356] (012345689). This is a superset of an octachord type that will be used in each of the "you" motives. The second segment contains three pitch classes, [T14], a diminished triad, and the final segment is [89E02345], T1 from the opening segment. This segment is also constructed with interlocking arches of tritones: 2–8, 5–E, and 3–9. They have the common tritone 5–E .

Set class (0126) is emphasized in measures 5 and 9. In measure five, "sit" is set with interval classes one and three which are used almost exclusively in this measure. The exceptions are interval classes 6 between pcs 6 and 0, and interval class two which is created when pc 8 concludes the segment. This measure may be divided into two chromatic chords using register as a criteria: The first is an [01234567] octachord, and the

"In Celebration," EXAMPLE 4.6

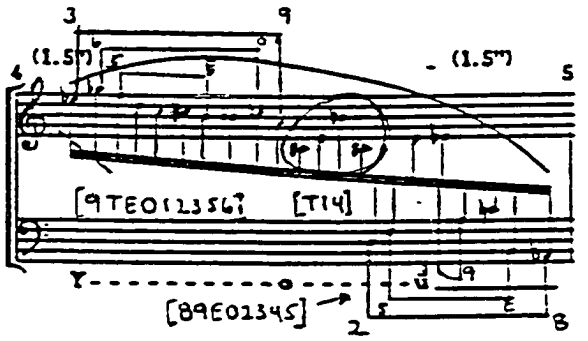
(The first of the three "you" motives. The first four notes of the motive shape an intervallic inversion of the opening four notes of the piece.)





"In Celebration," EXAMPLE 4.7

(The first "you" motive may be broken into three segments using note repetition, register, and interlocking tritonal arches as criteria.)



second is a [6789T] pentachord. The two chords present the chromatic collection with the exclusion of pc E. The emphasized notes of this measure are [3789], set class (0126), this type of tetrachord will recur in measure nine.

Measures six and seven prepare for the piece's first cadence in measure eight on the word "chair." This cadence is on pc T and spans five octaves. The use of octaves in this context is highly distinctive, and Dodge uses Bb octaves in a very deliberate manner throughout the piece. The articulations are similar to a rolled chord, and in measure 8, the higher notes are sustained for the longest time span. The preparatory nature of measures six and seven is both textual and musical. Pitch classes 8, 9, and E in these measures may be heard as cadential figures to pc T in measure eight. This sets the text segment "in a chair," with the cadence occurring on the last word. The absence of text repetition in measures seven and eight is also distinctive. The direct setting of the text has the effect of moving words from being malleable sound objects to having contextual meaning (see example 4.8).

Dodge has referred to his setting of "touched by nothing" as an example of chorus mixing due to the variety of types of articulation Glissandi pitted against distinct notes.). Measure nine has pitched, spoken and glissando

textures in staggered rhythmic patterns for its articulations.[7] The glissando in measure 9 is the longest in the piece so far, as it takes a full 10 seconds. The magnified sliding portrays the subject's feeling of lethargy and hopelessness (see example 4.9).

The most prominent pitches in measure nine are 3 and 9, creating another tritonal relationship. All four pitches create a [3459], (0126) tetrachord. This is similar to measure five's emphasized tetrachord, as they share the same tritone. The most prominent pc in this measure is 9, which may be linked with the preceding pcs 8 and T. Pitch class 9 spans the same registral range that pc T did in measure 8, and pc 8 has been heard in conjunction with pc 9 in measures 5, 6 and 7. Pitch class 9 also fills the half-step gap between pcs 8 and T.

The tritone 6 - 0 outlines measure ten. Both voices begin and end with the same notes, Gb and C respectively. The lower voice articulates specific pitches against the top voice's glissando. This lower voice's line can be parsed into three segments using breaks in contour as a criteria for the first two, and consistent chromaticism for the last. The first two segments belong to set class (016); [56E], [127], and the last is a chromatic pentachord. The first trichord is T1 from the opening three notes of

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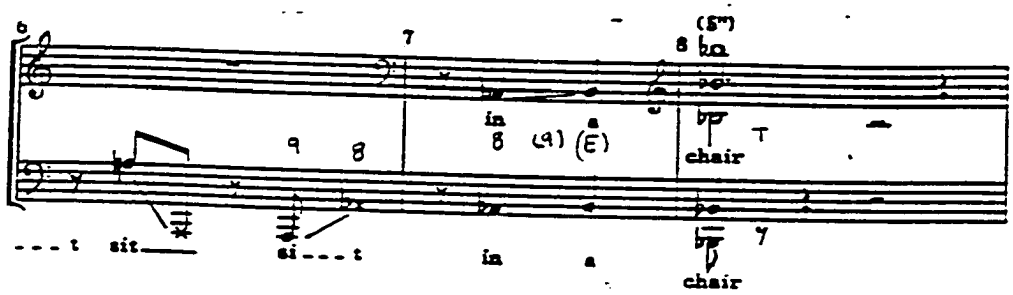
7 Dodge, "*In Celebration*," 50.

"In Celebration," EXAMPLE 4.8

(Measures six and seven prepare for the piece's first cadence in measure eight on the word "chair." Pitch classes 8, 9, and E in these measures may be heard as cadential figures to pc T in measure eight, which spans five octaves.)



measure five and the second is T5 from that opening. The chromatic pentachord that closes this measure is [89TE0] TT from measure five's concluding pentachord [6789T].

Measure 11 has a three-part chorus which consists of two chromatic complementary chords, [789TE0] and [0123456]. Pitch class 0 is a common pc between the two chords as well as the lowest and concluding pitch class of measure 10. Pitch classes 0 and 6 of measures ten and eleven, in combination with pcs 9 and 3 of measure nine, create interlocking tritones that comprise a diminished seventh chord.

In measure 12, Dodge uses text painting to set " the patience of water, the boredom of stone." [8] The peak of the first segment is pc 4, and the trough of the second segment is pc T, creating a tritonal framework. Pitch class 4 will continue to be highlighted. The top line's sliding movement, higher register and wide leaps lend a sense of fluidity to the melodic line, while the low register and predominantly descending motion of the subsequent text segment gives the impression of heaviness and apathy. The initial text segment is set with [TE1234], (012356) and the second with a [9T01236], (0123569). The second chord type is an abstract superset of

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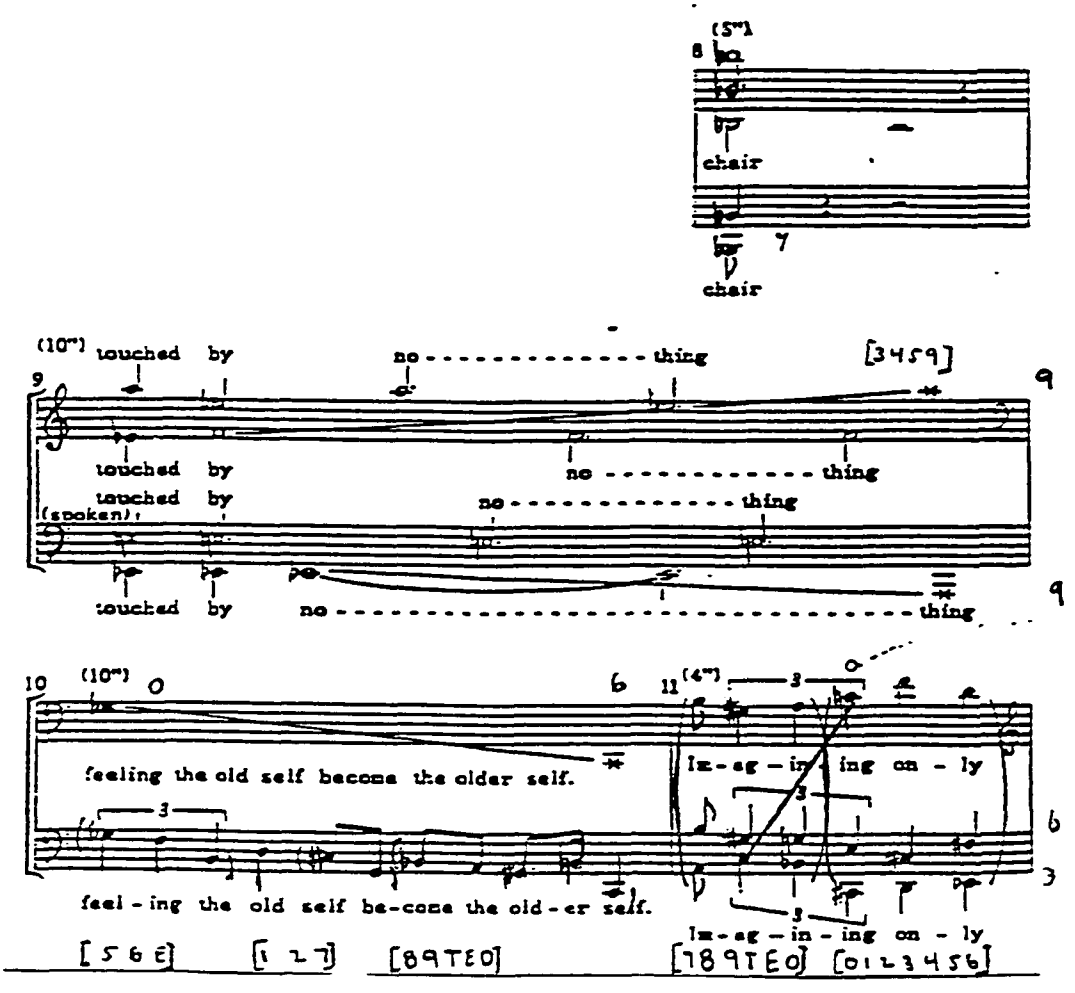
[8] Dodge, "*In Celebration*," 48.

"In Celebration," EXAMPLE 4.9

(Pitch class 9, in measure 9, spans a similar registral width as did pitch T in measure 8. Pitch classes 0 and 6 of measures ten and eleven, in combination with pcs 9 and 3 of measure nine, create interlocking tritones that comprise a diminished seventh chord.)



the first and the two chords are T1 apart. These chords types are also expansions of the (0126) tetrachords heard in the opening eight measures of the piece.

Dodge brings back the first half of measure 11 in measure 13 before combining his text painting segments on measure 14. These combined textures are almost in contrary motion with each other and conclude the second phrase of the composition (mm. 9 - 14).

Measures 15 through 27

Dodge uses rapidly moving lines, layering, and metric modulation to create a sense of momentum in measures 15 through 24. This makes for an especially

striking cadential section in measures 25 through 27. The rapidly moving lines are abruptly ended with dense chords that move progressively slower in measure 25. This creates the impression of the reader at last catching up with himself. This combination of rapidly moving melismas culminating in chords is heard in the first two measures of the piece. Measures 15-25 may be heard as an expansion of these opening measures.

The three melismatic "you" motives are presented in measures 15 through 21. All three motives are highly chromatic. Each of the three motives begin in a lower register than its predecessor and after all three

have been heard, the first motive is repeated for a third time in measure 20. This measure is the last monophonic presentation of a "you" motive until measure 30. Interval classes 1, 3, and 6 continue to be of structural importance in these measures. The first motive's concluding pitch class 8 is interval class six from motive two's opening pitch (pc 2) and interval class three from motive three's opening pitch pc E. All of the adjacent pairs of notes, with few exceptions, form interval classes 1, 3, or 6 in each of the three motives (see example 4.10).

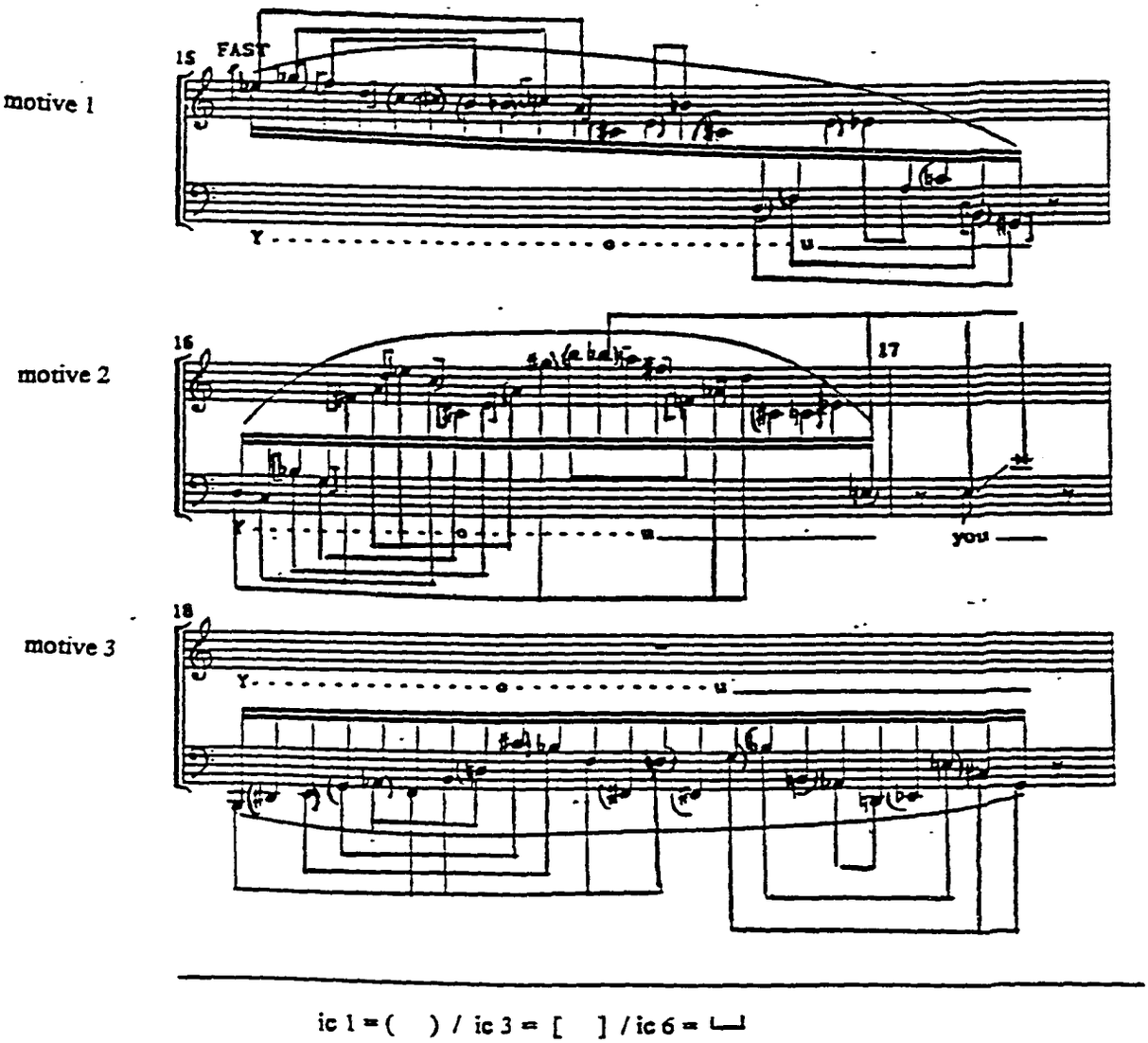
Motives two and three are played simultaneously in measure 21. The adjacent pairs in these two motives form melodic inversions of each other, and this property is clearly brought out in this type presentation. Motive one is somewhat self inversional.

The first "you" motive, which contains all of the pitches of the chromatic scale except pc 7, has C#4 as its central note. C#4 falls symmetrically in the middle of the pitch space, as it is 17 half-steps from both the highest and lowest notes of the motive, and it is also the eleventh note of this twenty-two note motive (see example 4.11).

Motive two contains all of the notes of the chromatic scale, and pitch classes 2–8 make-up its overriding tritone. Pitch classes E–5, 0–6, and T–4 pairs in these two motives form melodic inversions of each other, and this

"In Celebration," EXAMPLE 4.10

(The three "you" motives, their interlocking tritones, and the prevalence of interval classes 1 and 3.)



property is clearly brought out in this type presentation. Motive one is somewhat self inversional.

The first "you" motive, which contains all of the pitches of the chromatic scale except pc 7, has C#4 as its central note. C#4 falls symmetrically in the middle of the pitch space, as it is 17 half-steps from both the highest and lowest notes of the motive, and it is also the eleventh note of this twenty-two note motive (see example 4.11).

Motive two contains all of the notes of the chromatic scale, and pitch classes 2–8 make-up its overriding tritone. Pitch classes E–5, 0–6, and T–4 are also prominent tritones. Pitch class 4 concludes this motive, is picked-up and connects this motive to the quickly moving glissando in measure 17.

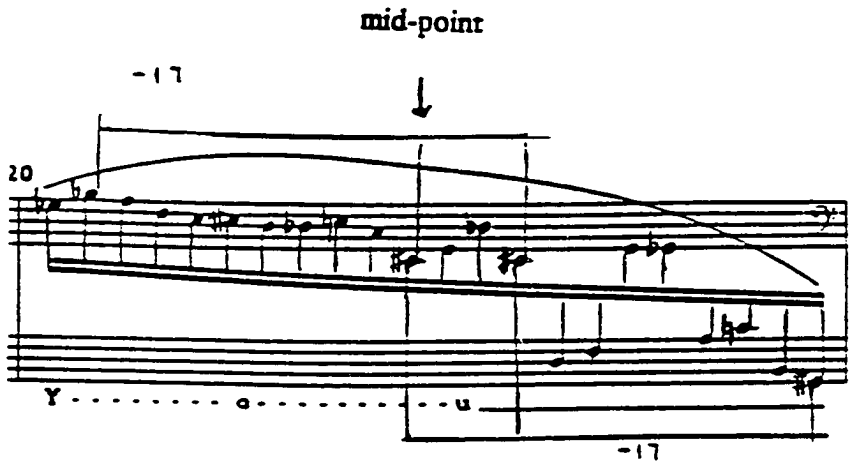
Motive three (m.18) contains all but pcs 0 and 9 of the chromatic collection. The overriding tritone in this motive is pcs E and 5. The repetition of pcs 5 and 6 is a gesture that will return later in the piece in measure 44. In this motive, it serves to underscore the prominence of both ic 1 and the aforementioned tritone.

Measure 19 contains a minor third downward glissando that is substantially slower than the preceding glissando in measure 17. Its opening pc 3 is picked-up with the reiteration of motive one in measure 20.

The pitches that comprise the glissandi heard over measures 17-23 are

"In Celebration," EXAMPLE 4.11

(C#4 falls symmetrically in the middle of the pitch space in the first "you" motive, and it is the eleventh note of this twenty-two note motive.)



[9034]. In measure 23, two glissandi in contrary motion are concluded with the tritonal subset [3-9] both vertically and horizontally. This can be linked with the diminished triad connecting measures 19 and 20 (see example 4.12).

Measures 24 and 25 present the final layering of voices on "you" before reaching the spoken and whispered climax. The metric modulations are heard in measure 24. The soprano voice, which always has the smallest note values, does not actually accelerate but stays at approximately the same rate of speed as a result of the tempo changes. The bass voice assumes the note value of the soprano voice in the preceding group. In the last group, the alto voice picks up the quarter-note triplets from the bass and the tenor continues with quarter notes. The overall effect is that of simultaneous voices either in stasis or shifting durational values at different rates. Employing metric modulation in this manner contributes to the subject's ineffectual disposition. The outer voices are in contrary motion to each other, and the inner voices provide doubling (see example 4.13). This is followed by the series of five chords in measure 25.

Chords one and two are related to each other: [12458] (01347) T6 [78TE2] (01347), while chords three and four are related as [679TE] (01245) T3 [34678] (01245). The top voice of the last chord fills in the

pitch space left in the top voice by the first four chords. Pitch class 8 in the bass ties in with the tritone already established with the first two chords. The chords have progressively longer durations.

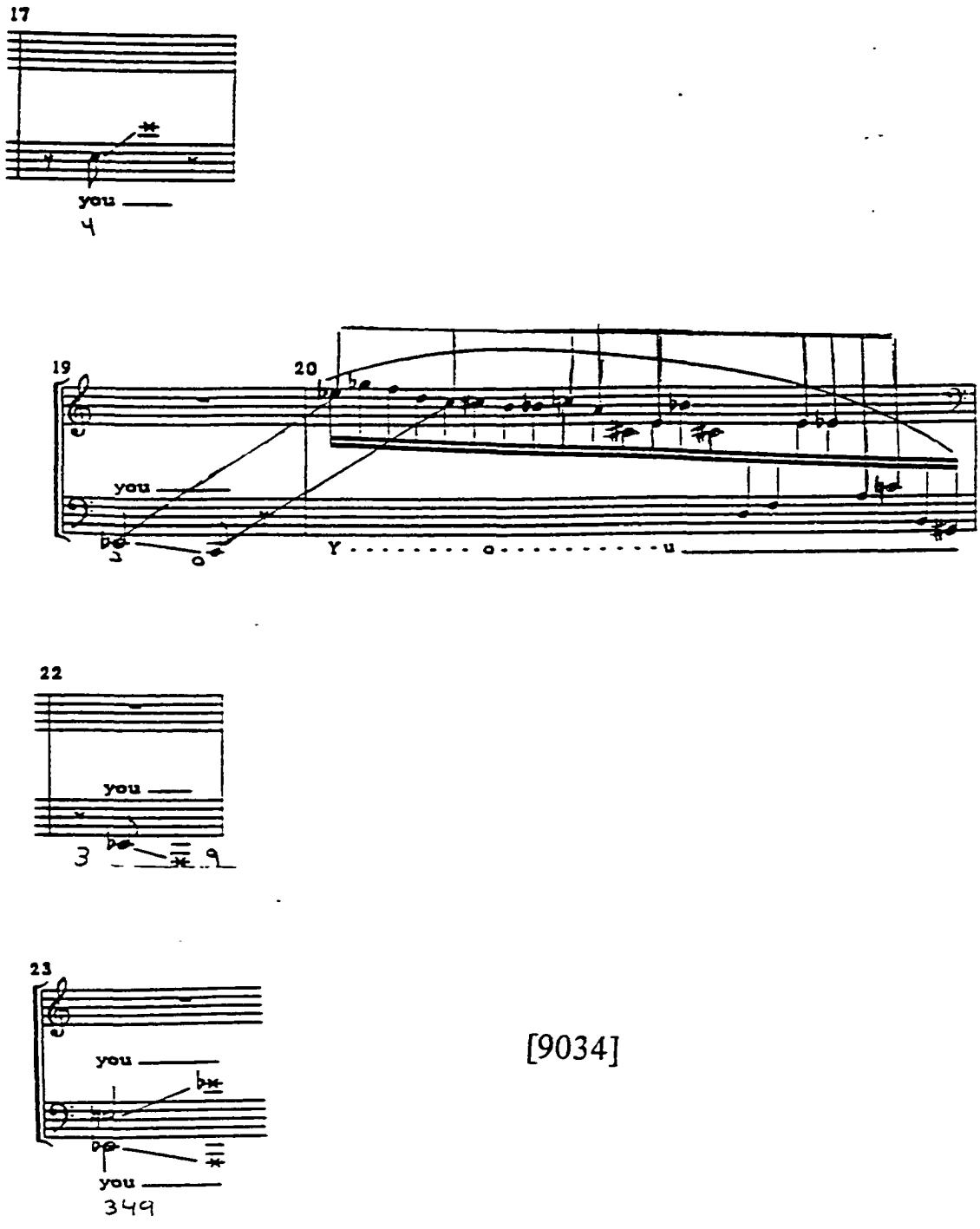
The prevalence of contrary motion, inversional relationships, and the metric modulations in this piece create the effect of movement or gestures canceling each other out, or of the futility of movement. This stresses the hopeless sentiment of the poem.

Spoken and whispered textures are presented for the first time in measures 26-27, which occur in the middle of Part I. Measure 27 is an important dramatic climax in the piece and concludes the first half of Part I. This climax is framed by melismas and glissandi on the word "you" that begin in measure 15, cadence in measure 25 with a series of chords, and resume again in measure 30.

The first spoken and whispered text of the piece culminates on a chorus of five whispered articulations of the word "silence" in measure 27. This chorus is preceded by five monophonic, spoken segments of text. The whispered chorus of five articulations of "silence" parallels the sung chorus of five Bb octaves in measure 8, on "chair." This treatment heavily emphasizes "silence" and foreshadows the subject's ultimate decision to give himself "over to nothing," heard in measure 75. This phrase may be

"In Celebration," EXAMPLE 4.12

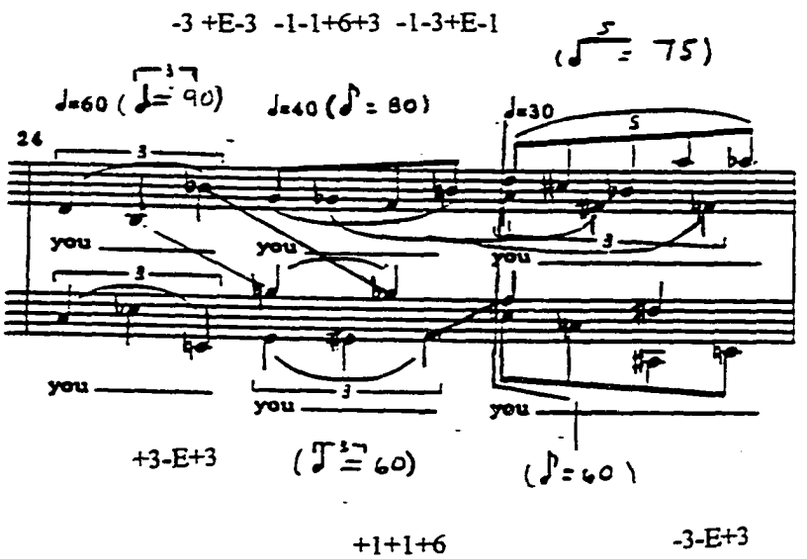
(The pitches that comprise the glissandi heard over measures 17-23 are [9034]. These pitch classes can be linked with the highlighted pitch classes in measures 19 and 20.)



[9034]

"In Celebration," EXAMPLE 4.13

(Metric modulation and contrary motion add to the portrayal of the subject's ineffectual disposition.)



interpreted as a decision to commit suicide. Dodge achieves a stunning dramatic effect in this climax in measures 25 and 26 with layering and by adding noise to the synthetic voice. By adding noise, the composer obtains the timbre associated with a whisper, but is able to have more volume than a natural whisper could carry. This creates an otherworldly and chilling articulation of the text.

Analysis of measures 28 through 46.

Measures 25 through 27 end the first half of part one of the piece and also create a transition to the second half of part one. In measure 28, Dodge sets the rest of the line, "is the extra page," with glissandi, an articulation that is similar to measures 12 and 14.

In measure 28, the voices sing two complementary hexachords, and both conclude with pc 3 at the end of the measure (the lower voice's pc 3 may be heard as a simple doubling of the soprano's pc 3). The top voice sings [123458] (012347), while the bottom voice sings [679TE0] (012356). All of the horizontal interval classes are either 1 or 3, with the exception of ic 2 between pcs 5 and 3 toward the end of the measure in the top voice. There are tritonal relationships both vertically and horizontally, as the third notes of both voices are 4 and T, there is a 0 – 6 relationship across the bottom line, and there is a 9 – 3 relationship that ends the measure. The 9–

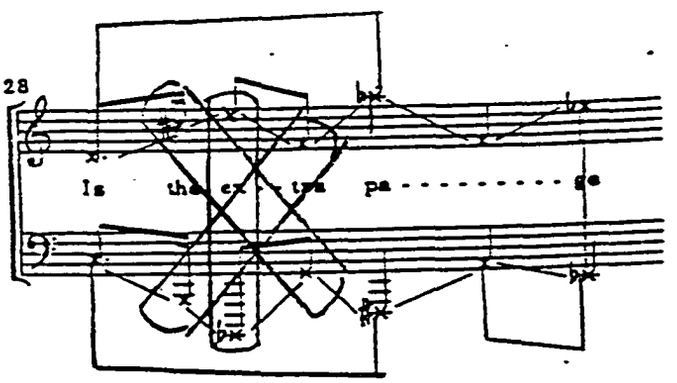
3 tritone was important to the glissandi in measures 22 and 23, as well as in measure 9. The top voice highlights a diminished triad with pcs [258] (see example 4.14). Complementary hexachords were used earlier in the piece in measure 11. A spoken texture on "you think" precedes material from earlier in the piece returning. The hexachord from measure 1 is heard again and is followed by each of the three "you " motives in succession. Measure 34 presents new material which is related to measure 5 in that it contrasts sixteenth-notes with half-notes. The entire chromatic collection is present in this measure, and the highlighted pitch classes are 0 – 6, and 2 – 8 with pc 1 falling roughly in the midst of these rapidly moving pitches (m.34). Pitch classes 0 and 6 are further highlighted by means of placement and register. A fast spoken voicing of "you think" follows in measure 35, and the fast speech counterpoints the more slowly spoken sound of that phrases previous appearance in measure 29. The highlighted pitches from measure 34 are used exclusively in measure 36 as it sings [01268] spread over four octaves. This two-chord gesture will become more prevalent later in the piece when it is used to punctuate non-pitched phrases in the first half of the second section (see example 4.15).

In measure 37, pcs 0 and 6 are brought out amid the diversity of articulations. As was the case in measure 9, the composer combines

"In Celebration," EXAMPLE 4.14

(Two complementary hexachords, and tritonal relationships.)

[123458]



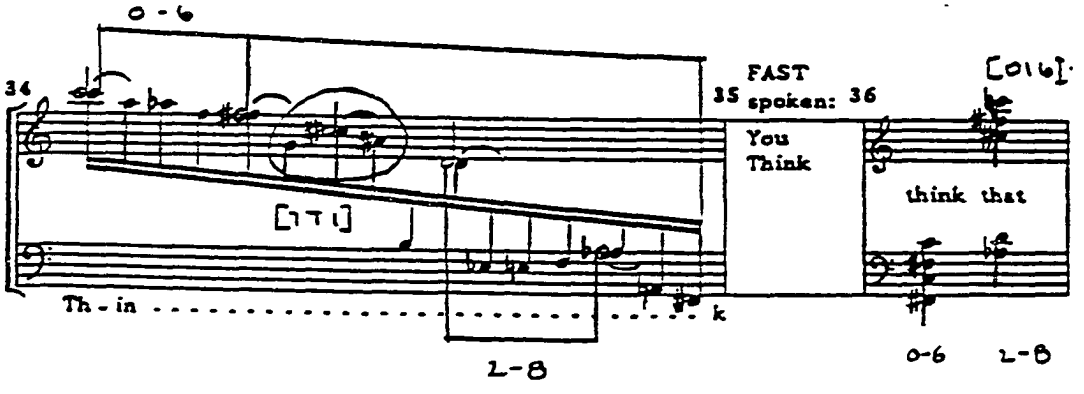
[679TE0]

glissandi, measured singing, and a *sprechstimme* like articulation. Both measures include the word "nothing." In measure 9, the primary pcs were the tritone 3 – 9. Here it is 0 – 6 over five octaves and contrary motion is once again, poetically used. "Nothing is good or bad" is set in such a manner that it is both extremely high and extremely low (see example 4.16).

"Good or bad" is set in measure 38 with three successive complementary tetrachords: [TE07] (0125), [2369] (0147), and [1458] (0347). Pitch class 0 is still structurally salient as it began this measure in the top voice and it will end measure 40 as the lowest note in these three measures. In measures 39 through 44, the words "good" and "bad" are set in a similar fashion to "you." In measure 39, "good" is set like the opening "you" measures. The hexachord here is [35689E] (023568), with the adjacent interval classes being 6, 3, and 1. Pitch class 8 is held over the barline into measure 40, where it begins a melismatic motive similar to the "you" motives. The first five notes, after the G#, are a retrograde of the "you" motive 3 (see example 4.17). Dodge deviates from this pattern by using pc 5 in lieu of pc 9. This deviation allows for two chromatic segments; [1234567] and [789TE0]. Pitch class 0 is used for the "d" sound at the end of "good," the "d" sound will tie into "bad," which is set in *"In*

Celebration," EXAMPLE 4.15

(In measure 34 the highlighted tritones are 0 – 6, and 2 – 8, and pc 1 falls roughly in the midst of these pitches. These pitch classes are used exclusively in measure 36 as it sings [01268] spread over four octaves. This two-chord gesture will become more prevalent later in the piece when it is used to punctuate non-pitched phrases in the first half of the second section.)



measure 41. Measure 41 is an intervallic inversion of measure 39. [9] Measure 42 provides transition from the slower moving settings of "bad" to the rapidly moving notes used to set that word in measures 43 and 44.

The first segment of measure 43 presents a chromatic septachord, [9TE0123], and is expanded upon in the latter portion of the measure with [789TE01234].

The tritones in the segment alternate between forming symmetrical arches and being adjacent to one another. These segments are similar to the "you" motives and to the pitch material in measures 39 and 40. The pitch class 9 that concludes the first segment in the middle of measure 43 begins a repetition of the first five pcs used for the last two settings of "good". The break in this direct repetition occurs with pc 9. Pitch class 9 begins a different type of transformation, as the last six pcs of this measure are T2 from the last hexachord of measure 40, [789TE0] , T2 [9TE012]. The opening of measure 43 is also a reference to measures 39 and 40. The upward major seventh leap followed by a descending half step is strikingly audible at measure 43's opening as well as in the last two settings of "good." This shape is a retrograde of the last three notes of the second

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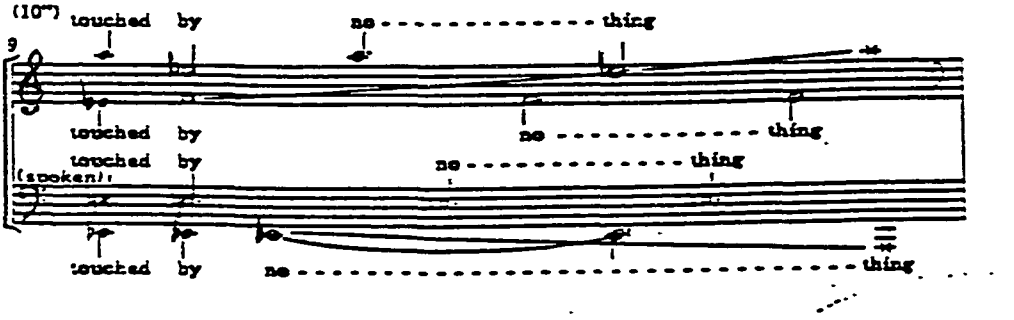
9 Dodge, "*In Celebration*," 60.

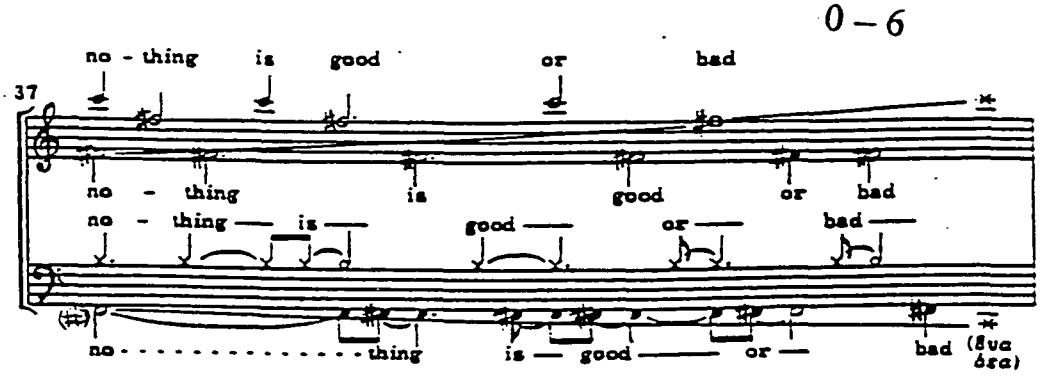
"In Celebration," EXAMPLE 4.16

(Irony is used in conjunction with extremes in regstral placement and contrary motion. This was heard earlier in the piece, in measure 9, when the primary pcs were the tritone 3 – 9. In Measure 37 it is 0 – 6 over five octaves.)

Measure 9

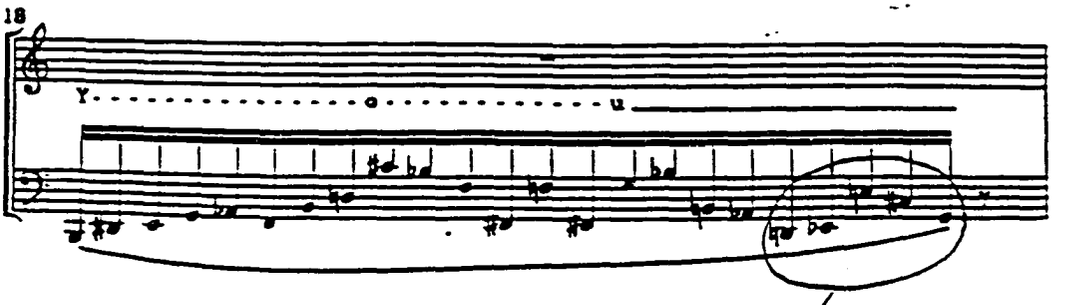


Measure 37

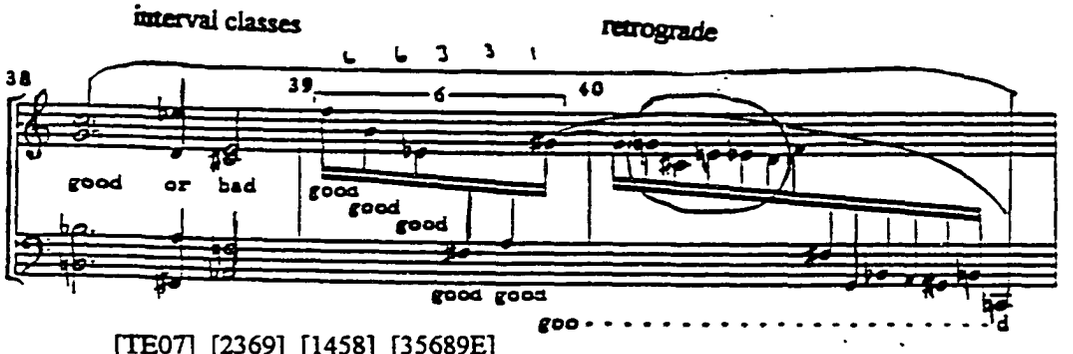


"In Celebration," EXAMPLE 4.17

(Three successive complementary tetrachords: [TE07] (0125), [2369] (0147), and [1458] (0347). Pitch class 8 is held over the barline fom measure 39 into measure 40, where it begins a melismatic motive similar to the "you" motives. The first five notes, after the G#, are a retrograde of the "you" motive 3.)



"you" motive 3



[TE07] [2369] [1458] [35689E]

[123456] [789TE0]

"you" motive (see example 4.18).

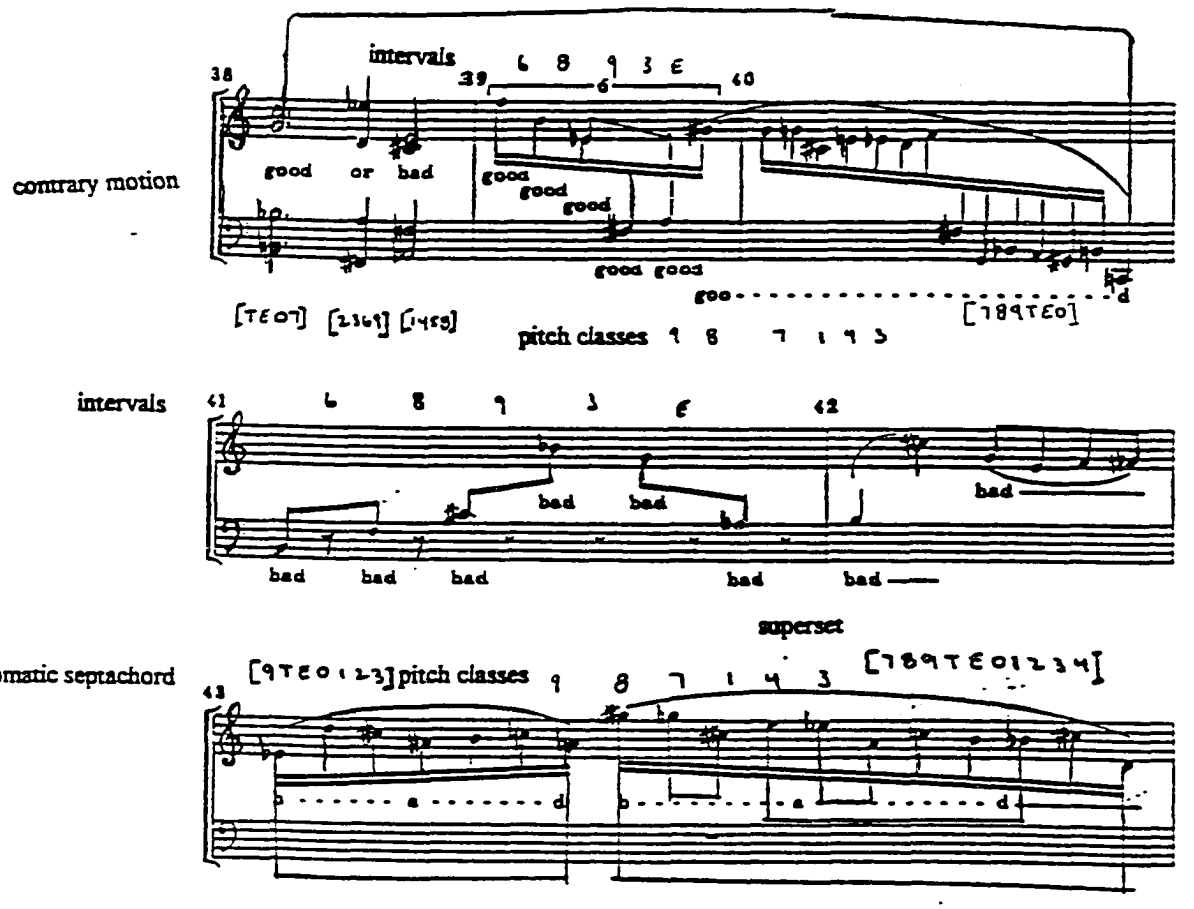
Measure 44 begins with the same three pcs as "you" motive 1, one octave lower but quickly moves away from directly repeating this motive. Pitch classes 8 and 7 break the repetition and these pcs will end the "bad" settings. This is the last articulation of "bad" and this setting has a strong physical sense of winding down. The effect is similar to that heard in the five octave Bb's that function as a stopping point in the momentum of the piece. Pitch classes 6 and 0 are repeated and comprise the most prevalent tritone in this measure. This use of pcs 6 and 0 provides a link from this segment to the next. Measures 45 and 46 bring back "you" motive (see example 4.18). the material from measures 35 and 36. In this instance pcs 6 and 0, the tritone heard twice in the previous measure, is also an important link to the proceeding music, and it ends this subsection.

Analysis of measures 47 through 55

Measures 47 through 55 comprise a subsection. This subsection is marked by full lines of text (as opposed to often repeated words rendering them as sound objects), glissandi, quarter-note triplet rhythms frequently used to arpeggiate diminished triads, a predominantly chordal texture, and a refrain setting the line, "you've seen it happen before." As was the case with measure 10, measure 47 presents a glissando texture pitted

"In Celebration," EXAMPLE 4.18

(The opening of measure 43 refers to measures 39 and 40 with the upward major seventh leap followed by a descending half step.)



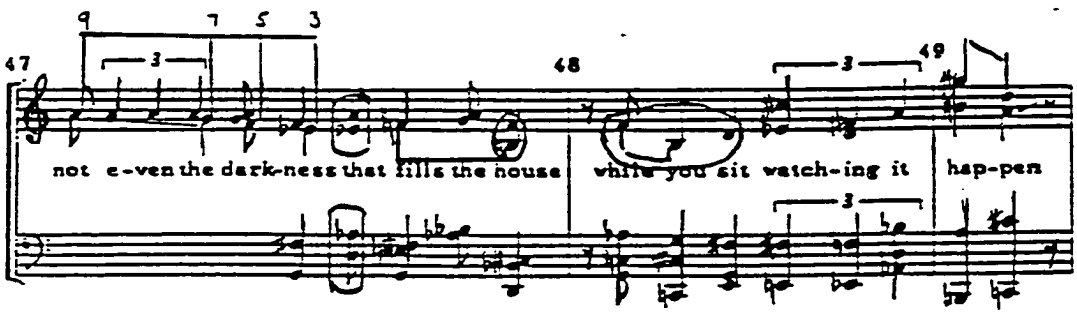
against measured notes. In measure 47, the glissando (in the alto voice) is quite short, and is begun in unison with the soprano. The pc 9 that the alto voice begins with falls a tritone to pc 3 in the middle of the measure. The topline has a series of accumulating whole steps, [3579E], with pcs 5 and 9 being heard the most prominently. The lower voices supply [124678T], which comes close to having a complementary relationship with the upper voice's pentachord, but pc 0 is missing. Instead pc 7 is doubled and created a quasi-cadential bassline to pc 2. The middle and end of this measure have prominent tritones, 2 – 8, and 3 – 9, on "that" and a 5 – E tritone in the upper voices to end the measure. Measure 48 arpeggiates the last tritone and adds the bass tone pc 2 for an arpeggiated B diminished triad. This is followed with an F# minor triad, also in the top voice, and the line is concluded with a 8 – 2 tritone in measure 49 (see example 4.19).

Measure 50 is the first presentation of a refrain setting, "You've seen it happen before." This refrain uses word painting as its "deja vu" like quality is acted out with repetition. The melody is comprised of two diminished triads a half step apart, [369] to [258]. The last note of the second triad falls a minor ninth to pc 4, supported by pcs 2 and 3. This refrain is very rich in its tonal content as it holds almost the entire chromatic collection, save pcs 7 and E. The bass line outlines the tritone 3–

9, this tritone will be heard in the next measure. Dodge again uses juxtaposed textures in measure 51 when he sets a glissando from pc 4 sliding down two octaves to the same pc, against precise pitches. The precise pitches in the middle of the measure are [9TE03] (01236), with the aforementioned tritone as well as a chromatic cluster ending on pc T, a tritone from pc 4. The line being set in this measure describes what the subject is seeing, his friends moving past the window. Measure 52 is a rearticulation of the refrain, and measure 53 compliments 51 as it describes the emotional content of what the subject is seeing. This measure is very similar to measure 10, the upper voice has an ascending glissando, pc 7 up a major seventh to pc 6 and both voices begin and end with the same note. Additionally, the opening trichord of measure 53 is [78E] (014), is close to the last trichord of measure ten [8E0] (014), they share two common tones and a downward leap of a major seventh. The bottom voice has [4678TE] with the diminished triad embedded in the middle. This measure has the same tritone that measure 51 had as its conclusion. Measure 54 is the last pitched measure of part one and the final presentation of the refrain. In this closing measure, the final pc 4 is raised two octaves higher. Wide octave spans have been employed in cadential gestures throughout this piece. This

"In Celebration," EXAMPLE 4.19

(Whole-step descendent motion and tritones in measures 47 through 49.)



outstanding register draws the music of the first half to a close (see example 4.20).

Measure 55 is the last measure of part one, and is a spoken reading of text that becomes increasingly slower. This is an example of the composer's tendency in this piece to close a subsection with something that will be a part of the material to follow. Part two consists primarily of spoken lines of text contrasted with a gesture comprised of two chords. The refrain in the last subsection of part one foreshadows the use of these chords.

Section Two

Section two begins in measure 56 with the second statement of the opening line, "You sit in a chair." Dodge states that this section speaks an opening phrase and builds a chordal texture by use of repetition and overlap. The phrase "you sit" is lengthened to the extent that it sounds pitched due to the natural contour of the spoken voice becoming audible. [10] The setting of "chair' is led up to by pcs 0 and 9. The five octave span of Bb is clearly a reference to measure 8. Dodge has stated that the durations in measure 56 are a durational inversion of that earlier presentation. [11] This is because

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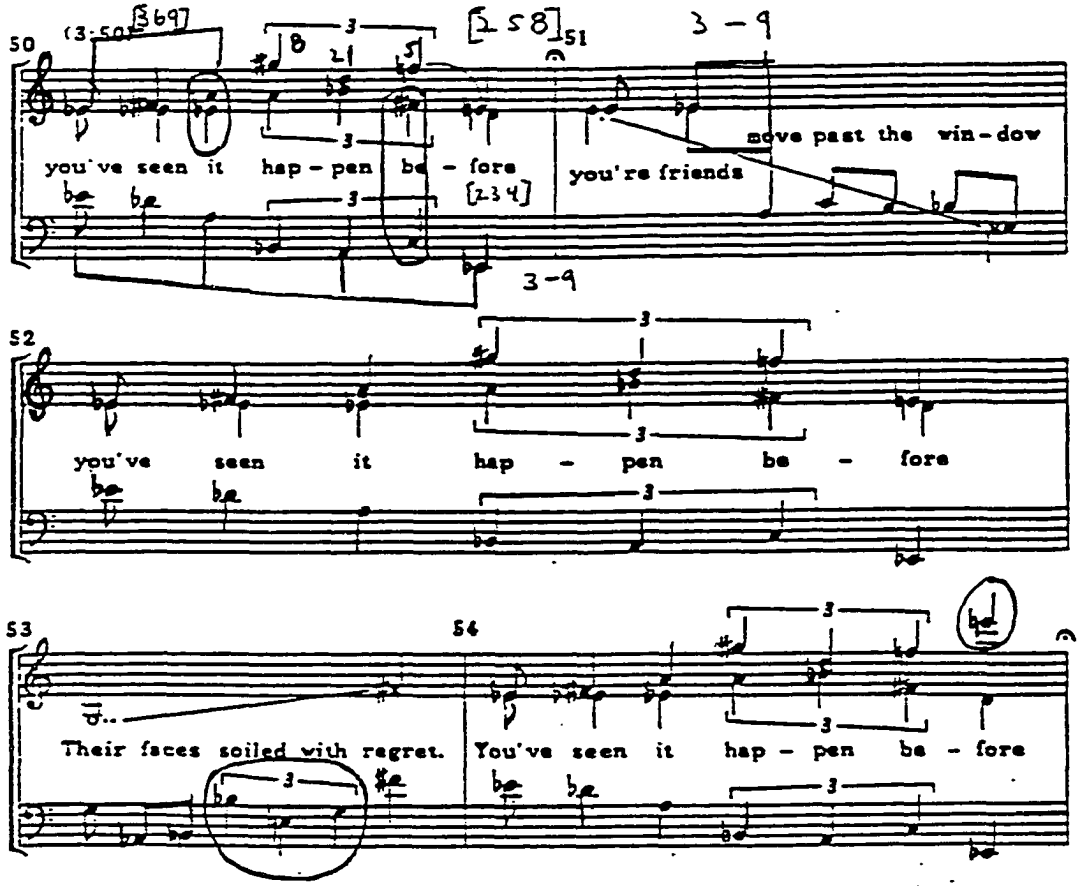
10 Dodge, "*In Celebration*," 60.

11 Ibid.

"In Celebration," EXAMPLE 4.20

(The melody in measure 50 is comprised of two diminished triads a half step apart, [369] to [258]. Wide octave spans, as heard in measure 54, have been employed in cadential gestures throughout this piece.)



in measure 8 the higher note was, the longer its value was, but in measure 56 the lower notes get the longest values.

The second half of the piece is made up of two sections, the first is mm. 56 through 87, and the second picks up from m. 87 and continues to the end of the piece. Measure 72 holds the climax of the piece as well as the climax of the poem, with the line, "You know that this is different...." [12]

The two-chord gesture that is interspersed throughout the first half of the second section occurs in measures 60, 62, 67, 71, and 83. The last occurrence in measure 83 is a literal repetition of measure 71. Each of these gestures begins with the word "you" (again, a minimum of text with a maximum of pitch material. This is a link to the opening of the piece), and they move further apart as the piece progresses. Their tonal language is in keeping with the rest of the piece in that they contain ics 1,3, and 6, and each of the measures has two tritones. These tritones usually alternate between inner and outer voices.

Measure 60 has [789E0134] (01245689), measure 62 [TE1245] (013467), measure 67 [79TE0124] (02345679), and measures 71 and 83 have [234569E] (0123479). The two pitch classes that each of these measures has in common are 4 and E. These relate to the Bb cadences in

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12 Ibid.

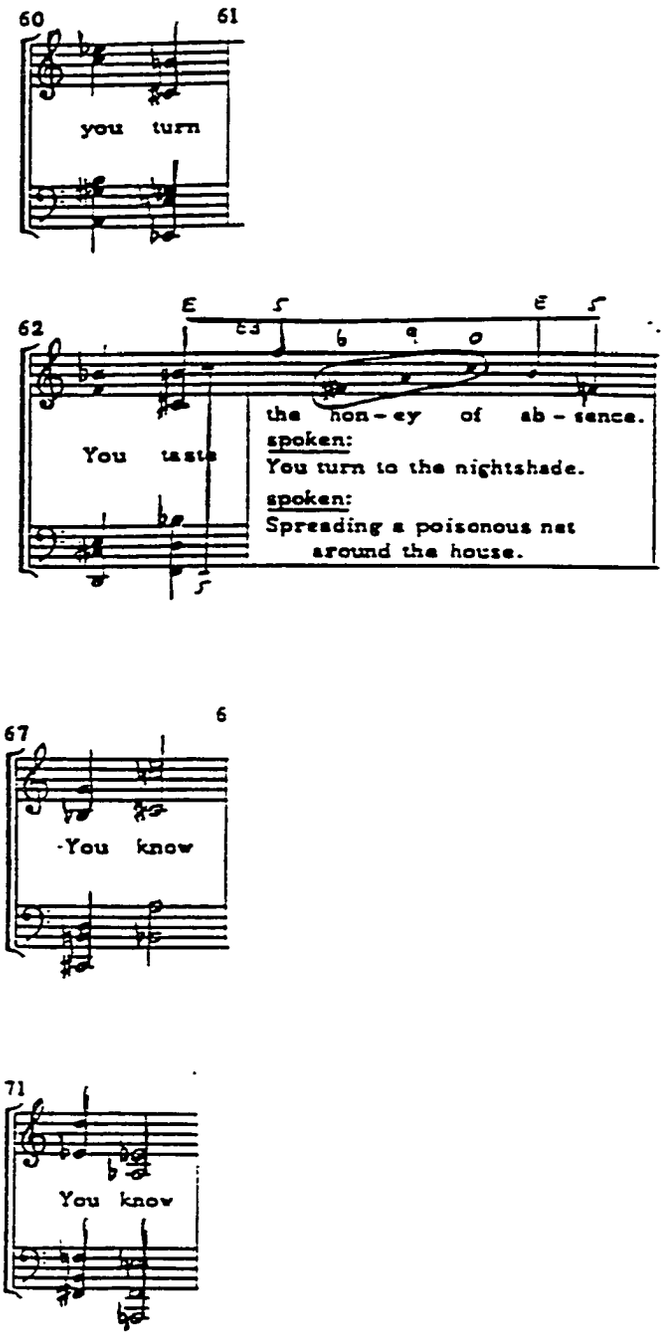
that they have both a half-step and tritonal relationship to the cadences that begin and end this subsection. This intervallic relationship is structural to the piece, as pc 4 was prominent in the opening two measures of the piece and a part of the [47T] diminished triad heard over the first phrase of the piece. Pitch class E's half-step relationship to pc T was part of a cadential figure in this opening phrase as well. In this subsection, there is little in the way of pitched material, therefore the two-chord gestures and Bb cadences are prominently heard.

In the first half of this section, Dodge layers spoken text. This will not continue into the second half of this section. In measure 63, the line "the honey of absence" accompanied by two spoken phrases. The notes in this measure are unmeasured and close to a spoken contour. This line consists of an F# diminished triad surrounded by a 5 – E tritone. The 5 – E tritone was the last tritone in the preceding measure, heard in the outer voices. The 0 – 6 tritone of the F# diminished chord holds the only tritone not heard in the two chord measures (mm.62 –63). This measure embodies Dodge's concept for the piece of repetition and overlap combined with change (see example 4.21).

Measures 84 through 87 articulate the Bb five-octave cadence twice sandwiched with pcs 8, 9, E, and 0. Pitch class T is in the middle of this

"In Celebration," EXAMPLE 4.21

(The two-chord gesture that is interspersed throughout the first half of the second section occurs in measures 60, 62, 67, 71, and 83. Measure 83 is a repetition of measure 71. The two pitch classes that each of these measures has in common are 4 and E. Measures 62 and 63 are linked with a common tritone.)



pitch-class cluster. The durations of the Bb's in measure 85 are that of the opening's measure 8, and the following Bb octaves in measure 87 are those of measure 58. These two articulations in close succession prepare for the closing of the piece.

Dodge has stated that measures 87 through 108, " proceeds with an alteration of slow speaking voice, fast and slow whispers and three part chordal settings. The chordal settings represent repetition within change, which has been present from the beginning." [13]

The closing section of the second half is also marked by consistent downward inflections at measure endings. The intervals used for this purpose are either Major or minor sevenths in measures 71, (83, a repetition of 71), 88, 91, 94, and 95. In measure 98 a minor ninth closes the measure on "you wait," and the last three sung measure close with tritones. Measure 87's reiteration of a downward movement functions to define this section as well as to shape its resolving character.

Measure 88 is an example of three-part chordal setting. In this setting, Dodge heavily emphasizes pc 3 in the top voice by means of register and repetition. Interval classes 1 and 6 are also heavily emphasized. The pcs in this measure are [01345679], and [903] is an audible diminished triad.

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13 Dodge, "*In Celebration*," 60.

Measure 91 also emphasizes tritonal relationships. In this measure, pc 0 is retained in the same register

(middle C) and combined with pc 6 in the middle of the measure. Tritones 2–8, 0–6, 5–E, and 1–7 are also heard in this measure. The text of this measure is repeated in measures 92 through 94, with measure 93 representing the five octave cadential figure on the word "ashen." "Future" is a straight-forward reiteration of the setting in measure 91, this isolation however, calls attention to the exaggerated downward inflection of the speakers interpretation of the text. Measure 95 presents pcs [789T0] (01235) and moves the voices to a lower register.

Measure 98 shares many common tones with measure 63, most audibly the [690] diminished triad as well as the 5 – E tritone. The 5 – E tritone is picked up in measure 101 and creates a [E25] diminished triad , T5 from the [690] triad in measure 98. Measure 101 also makes extensive use of voice exchanges which creates the aural illusion of the subject folding in on himself.

In keeping with tritone transformations, measure 102 retains pc 4 and embeds it in a C# diminished triad. This diminished triad in conjunction with the 6–0 tritone that follows creates a T2 relationship between these pitch classes. This measure is reminiscent of measure 11 in texture and

register. This measure holds three sets of tetrachords, and each but the last set contain two tritones. The end of the top line falls a tritone and is supported by a tritone with pc 3 in the bass. This ties in with the strong 9 – 3 tritone heard in measure 88. The register is higher as the subject becomes nostalgic about his childhood. This is a contrast with the downwardly directed motion of the lines that set the subjects thoughts of his future. The only tritone not present in measures 101 and 102 is 8. This pitch class will be part of a tritone presented in the last sung measure of the piece which is [789TE0]. The ending of this measure is [278].

The endings of measures 101, 102, and 106 are related in the following manner [49T] T5 [923], T5 [278] (see example 4.22). This chain of transformations is cadential.

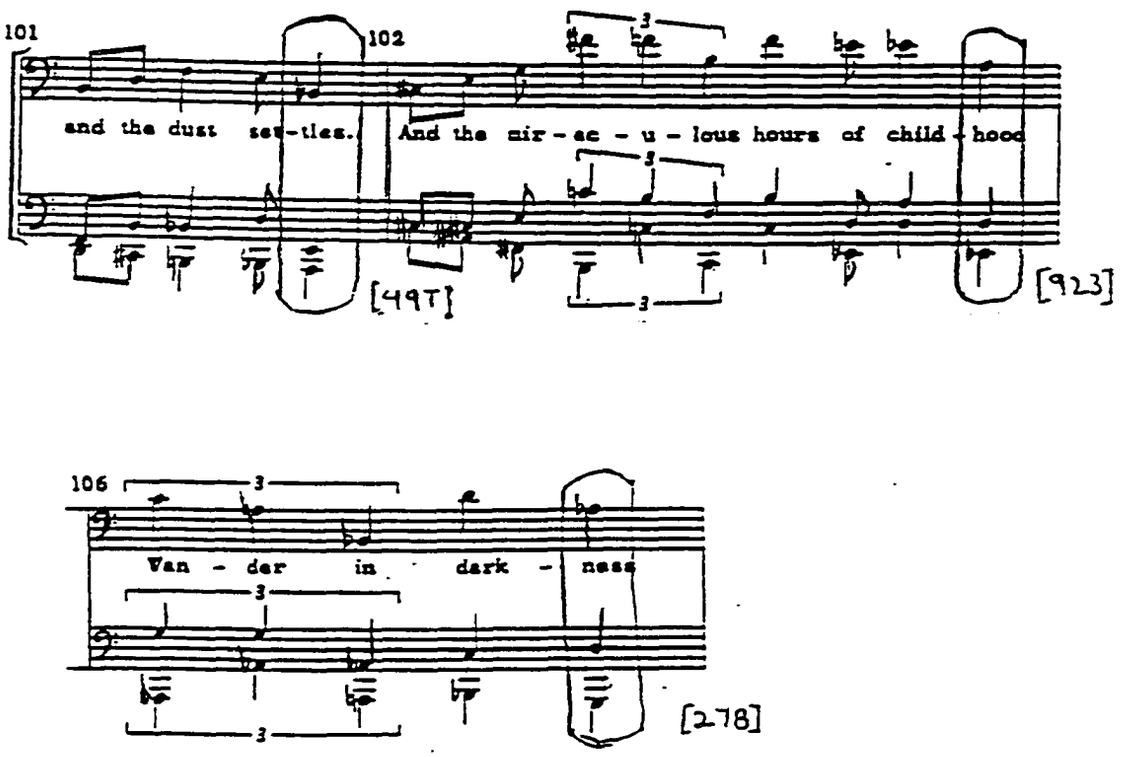
The piece is definitively closed with three measures of spoken text. The articulations are five repetitions of the words "wander" and "darkness.' The fifth articulation of darkness is a whispered solo to create a final and personal conclusion to the piece.

Interval classes 1, 3, and 6 have been used extensively throughout this piece, with strong emphasis placed on tritones alone or in diminished triads. This language has the weakest harmonic direction implied and is fitting for a poem whose subject is so profoundly hopeless and ineffectual. When it

becomes clear, toward the poem's conclusion, that the "celebration" is death turning the subject into nothing, Dodge sets the lines with T5 transformations, as heard in the last three pitched measures of the piece. T5 transformations are distinctive sounding amid interval classes 1, 3 and 6 and are similar to traditional cadential figures.

"In Celebration," EXAMPLE 4.22

(The closing cadential chain in measures 101, 102, and 106.).



[49T] T5 [923] T5 [278]

EXAMPLE 4.23

IN CELEBRATION

by Mark Strand

You sit in a chair, touched by nothing, feeling
the old self become the older self, imagining
only the patience of water, the boredom of stone.
You think that silence is the extra page,
you think that nothing is good or bad , not even
the darkness that fills the house while you sit watching
it happen. You've seen it happen before. Your friends
move past the window, their faces soiled with regret.
You want to wave but cannot raise your hand.
You sit in a chair. You turn to the nightshade spreading
a poisonous net around the house. You taste
the honey of absence. It is the same wherever
you are, the same if the voice rots before
the body, or the body rots before the voice.
You know that desire leads only to sorrow, that sorrow
leads to achievement which leads to emptiness.
You know that this is different, that this
is the celebration, the only celebration,
that by giving yourself over to nothing,
you shall be healed. You know there is joy in feeling
your lungs prepare themselves for an ashen future,
so you wait, you stare and you wait, and the dust settles
and the miraculous hours of childhood wander in darkness.

14 Dodge, "*In Celebration,*" 49.

Chapter Five

The Waves (1984) by Charles Dodge

The Waves, for live soprano and tape, was composed by Charles Dodge in 1984 for Joan La Barbara. Joan La Barbara is renowned for her great expertise in extended vocal techniques. This piece was commissioned by and created at the MIT Experimental Music Studio.

The soprano performs live to an accompaniment (computer music on tape) based upon the qualities of Joan La Barbara's voice. All of the sounds in the computer part were derived from a recording of La Barbara reading and singing using extended vocal techniques. The computer part entailed no speech synthesis.[1]

Charles Dodge uses Joan La Barbara's recording as a model for frequency and amplitude. The computer is employed to extend and enhance the qualities of La Barbara's voice as it sounded on her reading of the Woolf paragraph. Dodge had already done a number of speech synthesis pieces and wanted to move on to something new. This decision, coupled with the qualities of Joan La Barbara's voice, shaped Dodge's

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[1] Charles Dodge, "*The Waves*," *Perspectives of New Music* 27/2 (1989): compact disk liner notes.

choices of compositional tools. " She made a very musical reading of the Woolf text and I wanted to use these qualities in the piece." [2]

Dodge then used programs that were uniquely suited to give prominence to the qualities of her voice. A software program created by John Stautner, then a graduate student at MIT, allowed the user to analyze, or pitch track, the voice every fiftieth of a second. Music 11, created by Barry Vercoe, was then used to make a score from those pitches. Sine tones are used to voice the resultant pitches. [3]

Dodge then slowed down and and transposed by harmonics various tones to create the beating that is heard throughout the piece. Beating is a familiar acoustic phenomenon found outside of computer music. It is heard in ensembles when there is a slight difference in tuning among the instruments. Some computer music composers seeking to obtain the attractively rich characteristics of this phenomenon create it by transposing various tones to be slightly out of tune. Beating, as defined by Dodge, is a noticeable and periodic reduction in the amplitude of a sound caused by the interference of closely tuned frequency components. The number of fluctuations per minute is equal to the difference between the two tones. [4]

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2 Telephone conversation with Charles Dodge, June 8, 1998.

3 Ibid.

4 Charles Dodge and Thomas A. Jerse, *Computer Music*, (New York: Schirmer Books, 1985) 40.

The overall effect is that of a rich and complex sound. In this particular composition the undulating tones compliment the sentiment and imagery of the Woolf text, as it creates an ocean like soundscape. The richness of tone also allows the spare texture employed by Dodge at the beginning of the piece to sound musically appealing.

Though composed for Joan La Barbara, it was not Dodge's intention to make this a piece to be performed exclusively by her. Dodge has stated that, "Other sopranos are invited to try [performing *The Waves*], but the most successful performances have been by Joan La Barbara." [5]

The text of the work is the opening paragraph of Virginia Woolf's novel of the same name:

> The sun had not yet risen. The sea was indistinguishable from the sky, except that the sea was slightly creased as if a cloth had wrinkles in it. Gradually as the sky whitened a dark line lay on the horizon dividing the sea from the sky and the grey cloth became barred with thick strokes moving, one after another, beneath the surface, following each other, pursuing each other, perpetually. [6]

The composer states that,

> In this opening passage, Woolf's prose changes from an objective description of dawn on the sea to a more subjective response to the scene. By the end of the paragraph Woolf's use of language suggests

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5 Telephone conversation with Charles Dodge, June 8, 1998.

6 Virginia Woolf, *The Waves*, (Hogarth Press, London).

the movement of the sea by embodying a wavelike rhythm. [7]

The structure of Dodge's composition complements Woolf's shift of tone in the prose.

The piece may be divided into three separate sections. The first, section A (0:00 - 3:46), is characterized by a very spare and slow-moving texture. Dodge carefully limits the number of pitch classes being sounded (for the opening 47 seconds, the only pitch classes heard are T and 1 in a rising minor third motive), and keeps the computer part limited to single lines. The only text articulation is speaking. Later in the piece, the text will be sung and spoken with a variety of imaginative techniques. Phrases such as, "The sun had not yet risen" give the listener (or reader) a sense of stasis, or of waiting for something to happen. In section A, the music's restrained yet portentous character effectively depicts this feeling.

The B section (3:47 – 7:52) of the piece sets the latter half of the paragraph (the third sentence). Here Woolf uses more "action" words in short phrase segments as she describes what the sky and sea are doing, rather than what they look like. For example, "gradually as the sky whitened," and "pursuing each other perpetually," imply movement, and the music too becomes more animated. Musical animation is created as a result

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[7] Charles Dodge, "*The Waves*," *Perspectives of New Music* 27/2 (1989): compact disk liner notes.

of both the voice and computer parts becoming more rhythmically active, containing more layers, using a wider variety of pitches, and having a much wider variety of timbres.

The C section (7:53 - end) does not set any of the text, but focuses on La Barbara's use of extended vocal techniques and the timbral commonalties between these techniques and the sounds that one often expects to be computer-generated. Another striking characteristic of this section is an A-flat drone (introduced at 8:32). This drone introduces a new and dramatically different timbre to the piece, and brings the piece down to a much lower register than had previously been heard.

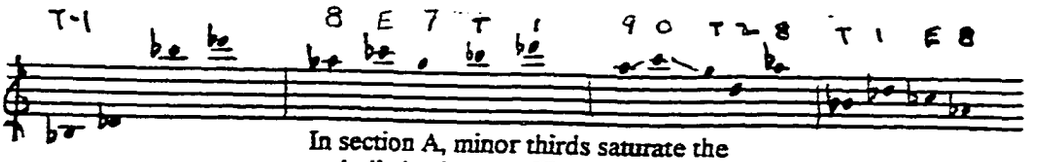
The most important pitch classes in this piece are 8, 9, T, E, 0, and 1. At times pitch classes 2 and 7 are added, creating a [789TE012] superset, but subsets of the collection are more common. The most structurally salient pitch classes from the collection are pcs T, 1, and 8. These pitches are manifest in a variety of ways over the composition, and their occurrences and transformations are the focus of the pitch analysis (see example 5.1).

Example 5.1, "*The Waves*"

(Chart summary.)

Synopsis of pitch classes and melodic shapes in section A

0:00–0:47 0:48–1:57 1:58–206 2:07–2:50

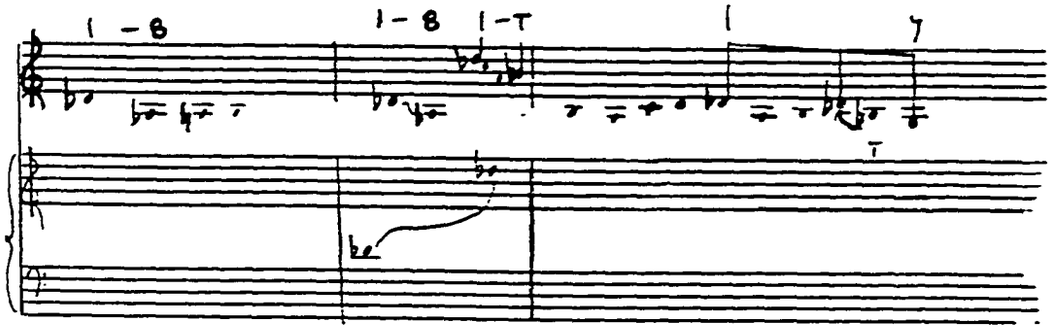


In section A, minor thirds saturate the melodic landscape. The most frequently heard minor third is T–1.

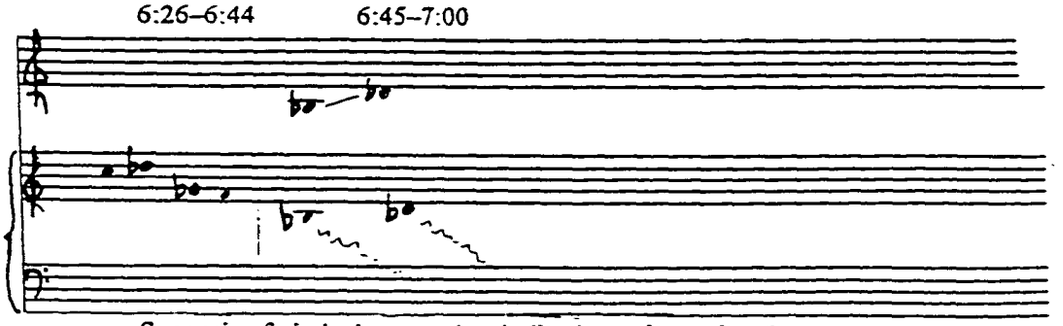
Pitch classes 7 and 2 are added at 1:58–2:06, creating a [789TE012] superset.

Synopsis of pitch classes and melodic shapes in section B

3:47–4:10 4:27–4:54 5:08–5:24

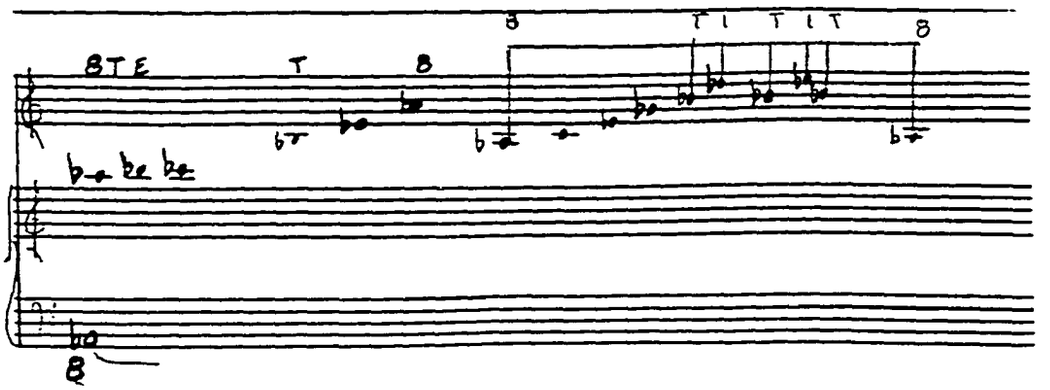


6:26–6:44 6:45–7:00



Synopsis of pitch classes and melodic shapes in section C

7:53–throughout 10:30–10:47 11:00–end



Detailed analysis

In section A, there is careful control over compositional material. New pitch classes, for example, are revealed in a gradually unfolding process. Minor third motives are established and are subsets of a chromatic hexachord; Bb -- Db, Ab -- Cb, A -- C (see examples 5.2, and 5.5). These minor thirds are combined to create an important tetrachordal motive. Contrasting pitch material in relatively short durations and noise based on consonants follow each spoken phrase. The soprano part is limited to either speaking the text or singing a vocalise in this section.

The introduction is played by the computer and consists of a rising minor third, pitch classes T-1. It should be noted, however, that the beating inherent in these two tones, coupled with their very gradual rise, creates a richer harmonic palette than the austerity of pitch class material would imply. This

T-1 figure is heard in four ascending octaves. The ascendant movement creates the impression of waiting for something to rise (perhaps from sea level to the sky). At 0:43, the voice is heard for the first time. Dodge makes this vocal entrance a straightforward spoken statement, "The sun had not yet risen." This is punctuated by a new rising third motive

in the computer part (8-E), as well as noise based on consonants. This new rising third motive is resolved at 0:57 with pitch class 7. Combined, these pitches yield [78TE1], a member of set class (01346). This pentachord may be interpreted as a subset of the octatonic collection. The intervals highlighted by these pitches will prove to be structurally significant as the piece unfolds (see example 5.3).

Register and timbre are used either to link the vocal and computer timbres or to draw attention to their differences. At 1:00, these timbres are linked. The

soprano sings the opening Bb3 with her mouth closed at the dynamic level of piano. This articulation, in combination with the register and dynamic level, results in a resonant drone-like tone that sounds strikingly similar to the computer's timbre, especially at the introduction. Thus, the introduction is effectively recalled with the singer's voice being, to some degree, "indistinguishable" from the computer's voice (see example 5.4).

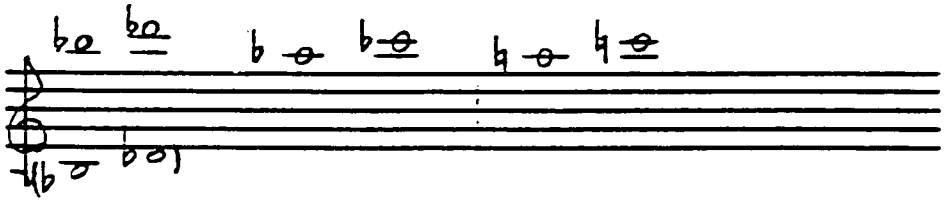
Over the next thirty seconds (1:00 --1:30), the high register of the computer part descends when it returns to the original ascending minor third motive. The singer is instructed to open her mouth gradually as her part becomes more rhythmically active and moves to a middle register.

Example 5.2, "*The Waves*"

(Three minor third motives are slowly introduced over the opening two minutes of the piece.)

Initial time spans:

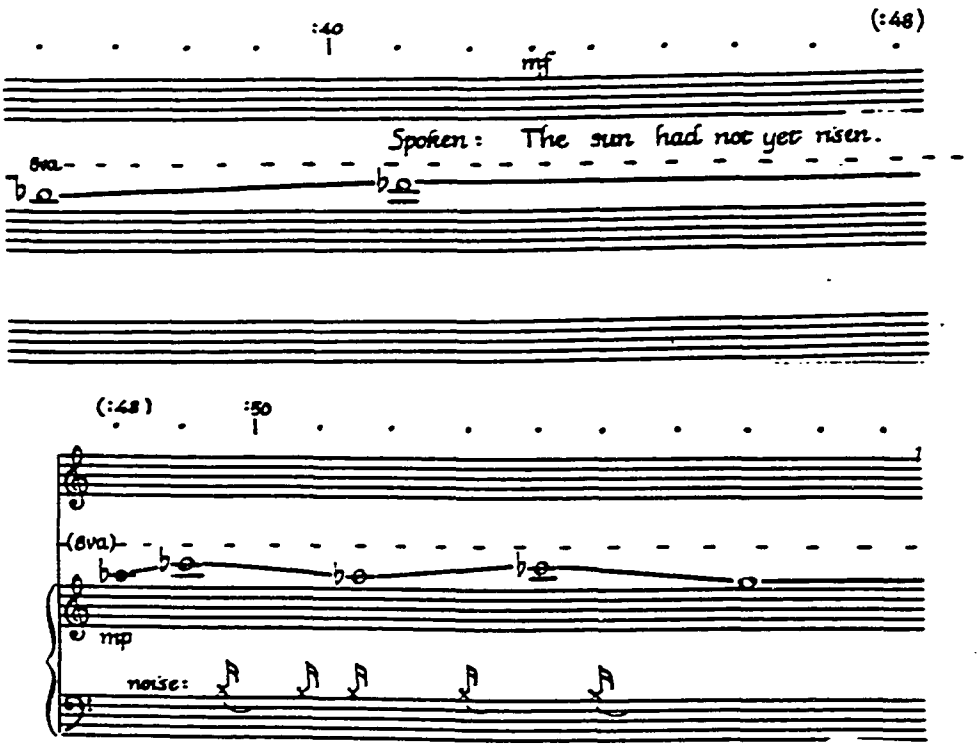
0:00 – 0:48 0:48 – 1:01 1:58 – 2:00



[89TE01]

Example 5.3, "*The Waves*"

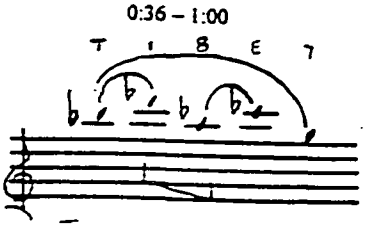
(Vocal entrance and the formation of the [78TE1], (01346) pentachord.)



[78TE1]

Tetrachordal subset [8TE1]

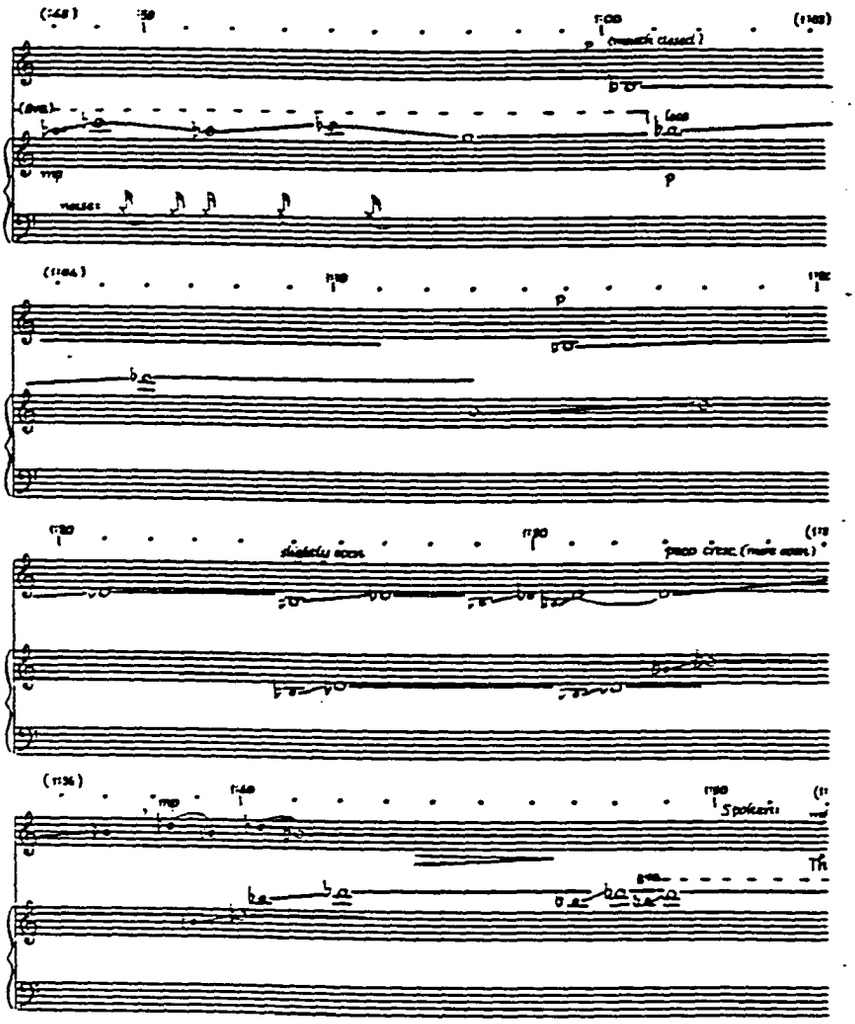
Interval vector 22311



= minor thirds

= perfect fourths

Example 5.4, "*The Waves*"
(Register and timbre are used either to link the vocal and computer timbres or to draw attention to their differences.)



This manner of singing separates her sound from the computer's, as it is less like a sine tone's drone and closer to traditional singing. At 1:48 the computer has reached the same high register that it had at 0:35, and again, this high register accompanies spoken text, "The sea was indistinguishable from the sky." (see example 5.4)

When the vocalist is instructed to sing with her mouth slightly opened at 1:25, she is almost singing in unison with the computer. When her line moves an octave higher by inverting the minor third to a major sixth (1:33 - - 1:37), she sings in contrary motion to the computer's line which is ascending two octaves above her range at this point. These distinctions (articulation, line and register) separate the voice from the computer. This process ends with the voice singing a sustained Bb4, which decrescendos and ceases at 1:47. This is followed by two quick articulations in the computer of the rising third motive in two ascending octaves.

The spoken phrase, at 1:52 to 1:58 is answered by the computer with new pitch material and noise based on consonants, as was the case with the first spoken phrase. The pentachord [78902], a member of (01257) follows

(1:58–2:06). An expanded version of this material will again be presented after the third phrase of spoken text.The new pitch classes heard at 1:58 are

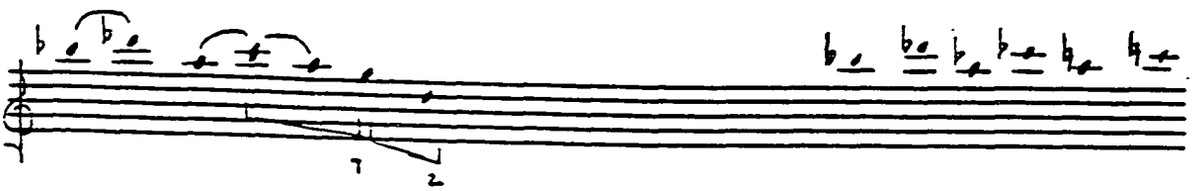
Example 5.5, "*The Waves*"

(The rising third motives create a [89TE01] chromatic hexachord, and the additional perfect fourth makes for a [789TE012] chromatic octachord.)

⌒ = minor thirds

⌊⌋ = perfect fourths

1:58 – 2:06 [89TE01] extracted minor thirds



[9T01], [8E] T1 [90]

[789TE012] chromatic octachord

9, 0, 7, and 2 respectively. The rising third at 1:58 comprises pitch classes 9 and 0 which chromatically fill the space left between the Bb – Db and the Ab and Cb rising third motives. Together, these rising thirds create a [89TE01] chromatic hexachord. The perfect fourth, formed by pcs 7 and 2, surrounds this hexachord and actually creates a chromatic octachord. Pitch classes 3, 4, 5, and 6 are yet
to be revealed (see example 5.5).

The Bb – Db motive returns at 2:07, and the voice sings in contrary motion, reminiscent of 1:38 , with the instruction, "as before."

At 2:24, the first two phrases of text are spoken again followed by an additional third phrase, "...except that the sea was slightly creased." This is accompanied by the computer with the first two minor third intervals in combination, Bb -- Db, and Ab -- Cb to create a [8TE1] tetrachord, a subset of the pentachord from 0:36 through 1:00 (see example 5.6). The shape of the line, with Db at the peak and Ab the lowest note, outlines a perfect fourth. Both the minor third and perfect fourth are structurally important intervals.

At the close of the three spoken phrases, the computer again answers with noise based on consonants and pitch material from 1:58, [789TE012]

functioning as a superset to its corresponding phrases (0:48–1:00 and, 1:58–2:06) (see example 5.7). Embedded in this passage are interval classes 3 and 5 (see example 5.4). Pitch classes 7 to 0 and E to 8 (a rising perfect fourth and a falling minor third) are the most audible. Interestingly, here Dodge spells the falling third as a B-natural and G# rather than the already established Cb and Ab. This may be to avoid confusion with the C and A naturals in the passage. Pitch classes 8 and E lead to a heretofore unheard pc 3. Pitch class 3 quickly slides down an octave and to create an aggressive and startling gesture.

The final line of the first section of this passage is spoken in a halting manner at 2:59: "as if a cloth had wrinkles in it." The computer [8TE1] tetrachordal motive from 2:24 accompanies and is followed by an expanded version of itself. Pitch class T, and to some degree, 3 are structurally important elements here. At 3:12, a high pc T is reached, slides down to pcs 5, 4, and 3 before reaching pc T two octaves lower. Pitch class 4 is an intervallic mid-point between the two Bb's and is encircled by its upper and lower neighbors. The last pitch class in this passage's high register is 3, thus it is the same note that served a quasi-cadential function at 2:57. The downward sliding movement between pitches also links the two gestures.

Example 5.6, "*The Waves*"

(At 2:24, the first two minor third intervals of the composition are brought back in combination, Bb–Db, and Ab–Cb to create a [8TE1] tetrachord, a subset of the pentachord from 0:36 through 1:00.)

2:26 – 2:29, refers to 0:36 – 1:00

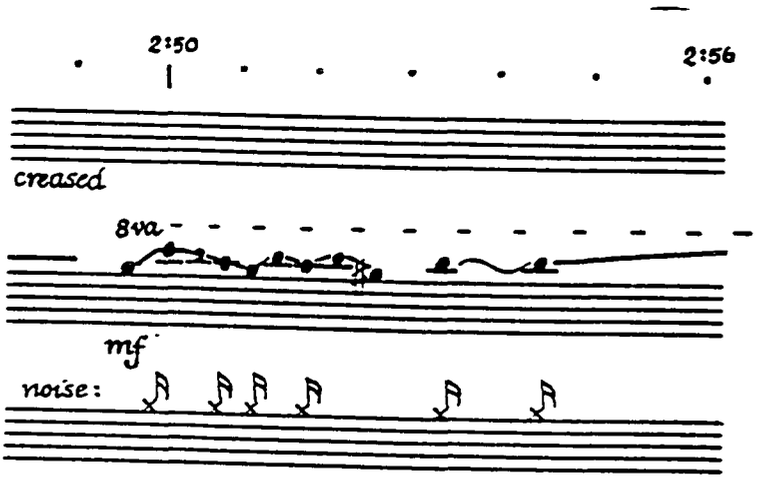
[8TE1]

Example 5.7, "*The Waves*"

(At the close of the three spoken phrases, at 2:50, the computer again answers with noise based on consonants and pitch material from 1:58, [789TE012] functioning as a superset to its corresponding phrases at 0:48–1:00 and, 1:58–2:06.)

2:50 – 2:55

(01245) [789E0], superset to [89E0]

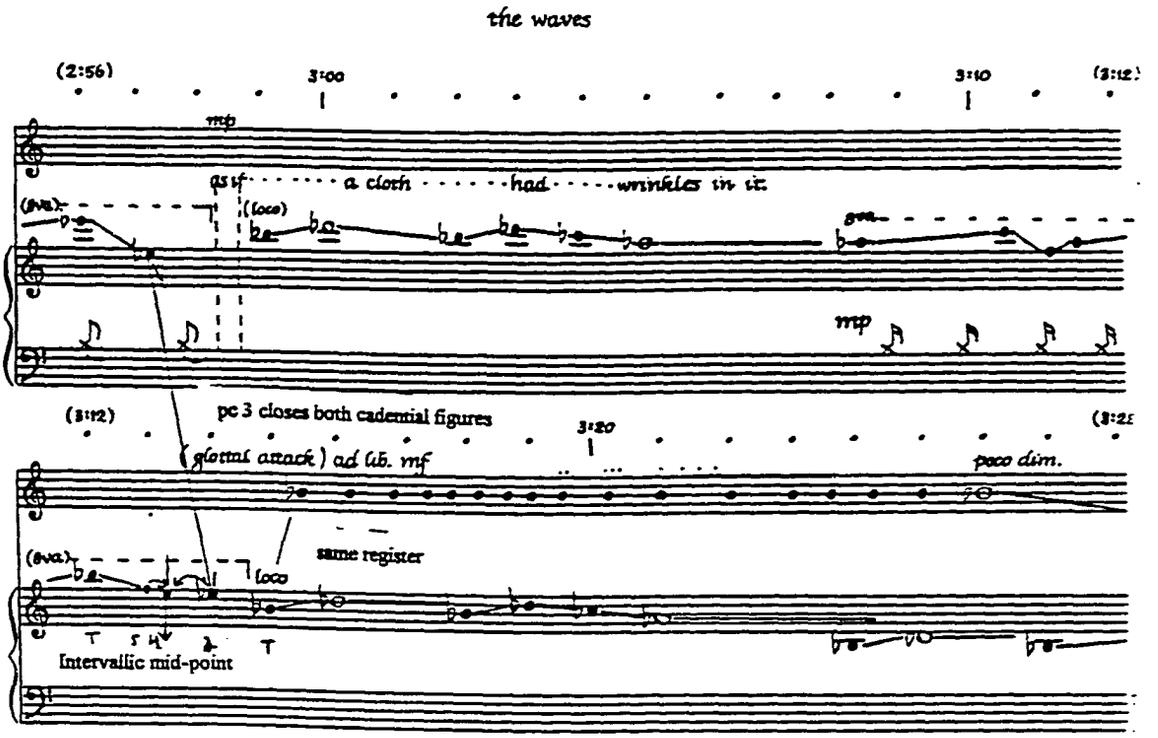


The computer part then moves into the same register as the voice to pc T . This begins a transitional segment that will lead to section B (3:15 – 3:46) (see example 5.8).

At 3:15 a glottal attack is introduced (Bb) in the voice part and interspersed with the inverted third and contrary motion lines heard at 1:33 and is accompanied by the [8TE1] tetrachordal motive until 3:33. The resultant staccato texture may be interpreted as word painting, corresponding to the text's line, "...as is a cloth had wrinkles in it." This visceral articulation accelerates, peaks, and gradually loses momentum as it falls to Db thereby providing a transition for the voice to return to its earlier contrary motion Db – Bb motive. This motive has incorporated the glottal Bb's, and the Db is a common tone between motives intrinsic to sections A and B. A transitional motive to section B is heard at 3:32. This motive consists of a falling perfect fourth and ascending second presented in the computer part. This motive is a melodic inversion of the [8TE1] tetrachord heard throughout section A and will be heard throughout section B. This has embedded in it the initial 1 – T minor third motive and will be expanded later in the piece at 4:34 (see example 5.9).

Example 5.8, "*The Waves*"

(At 2:59, the computer's [8TE1] tetrachordal motive from 2:24 accompanies and is followed by an expanded version of itself. Pitch class 4 is an intervallic mid-point between the two Bb's and is encircled by its upper and lower neighbors.)

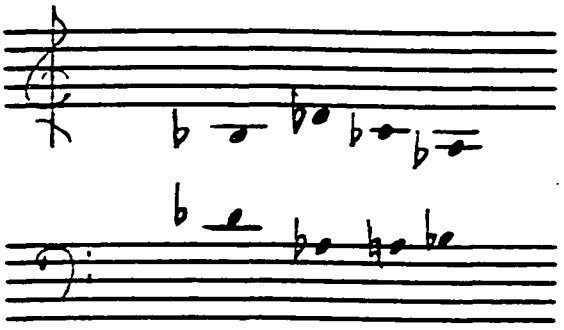


Section B begins at 3:47, the overall characteristic of which is the mutually imitative unfolding of both the computer and voice parts. At times, La Barbara will sing *sprechstimme* lines in unison or in canon with the computer. Although she is singing in a sprechstimme style, La Barbara does give a firm sense of pitch. At other times, she will take-up the wavy lines presented in the computer part (4:27, and again at 6:48). The unison/canon motive and the wavy lines are the two primary components of section B.

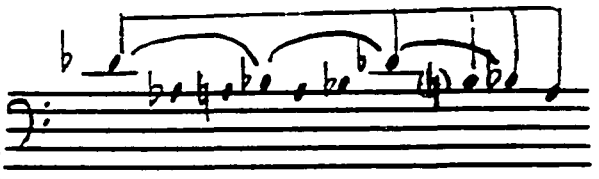
Section B may be divided into four subsections. The first is characterized by the vocalist singing the text in a sprechstimme style either in unison or in canon with the computer part. Both the computer and voice become much more active, in keeping with the increase in "action" words in this portion of the text. As this subsection unfolds, the texture also becomes increasingly layered with polyphony which creates a busy sounding texture. The second subsection begins at 4:27 when both the vocalist and computer have wavy lines that emphasize structurally significant pitch and interval classes. This is followed by the third subsection (5:08 – 6:33) which parallels the first in that it further develops material from that segment. The fourth and final subsection can be heard as a reconciliation of the differences of material (6:34 – 7:52).

Example 5.9, "*The Waves*"

(The transitional motive to section B is heard at 3:32. This motive consists of a falling perfect fourth and an ascending second presented in the computer part. This motive is a melodic inversion of the [8TE1] tetrachord heard throughout section A.)



2:26 – 2:29, and 0:36 –1:00 [8TE1]



3:32
[9TE1]

4:34

G diminished triad

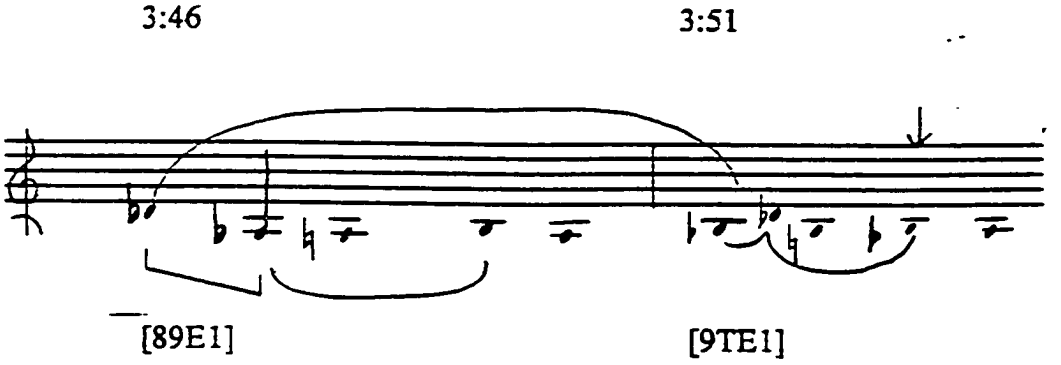
The vocalist and computer part begin section B with the melodic inversion of the tetrachordal motive, which the vocalist uses to sing the text for the first time in a sort of sprechstimme. She has several slurred pitches in unison with the computer and her voice begins to sound more computer-like, and conversely, the computer begins to take on more vocal characteristics. To further enhance this timbral merging, Dodge instructs that "...the vocalist should follow as closely as possible the nuances (glides, etc.) of the tape." (See p.4 of the score.)

The melodic material of the opening two phrases (3:47–3:58) highlights structurally significant pitch and interval classes. The first segment falls a perfect fourth from Db4 to Ab3. The line then rises a minor third from the Ab3 to B3, thereby outlining a minor third (see example 5.10). The second phrase opens with the Bb–Db rising third motive, but falls a half-step short of recalling the perfect fourth since it closes with A3 (3:51 –3:58). This line of text is answered, at 3:58, by the computer with consonants. This time, however, it becomes much more extended and an imitation of "gradually " is added.

The third phrase (4:00 - 4:05), highlights a minor third with C4 and A3 (4:02) and will eventually fall to G3. The highest note in these three phrases has been Db4. The overall interval class spanned in these three phrases

Example 5.10, "*The Waves*"

(3:47–3:58 highlights structurally significant pitch and interval classes. The first segment falls a perfect fourth from Db4 to Ab3. The line then rises from Ab3 to B3, thereby outling a minor third. The second phrase opens with the Bb–Db rising third motive, but falls a half-step short of recalling the perfect fourth since it closes with A3.)



has been a tritone (Db4 - G3), the culmination of two minor thirds, Db4 – Bb3, Bb3 – G3. C4 – G3, have filled in to create a [89TE012] chromatic septachord (see example 5.11).

The vocalist continues to sing and at 4:05 the vocalist is instructed to sing faster, in unison with "the nuances in the top line on the tape (of the computer part)." (See p.5 of the score.) The computer has parallel thirds, based on the vowels of the text. This is layered with a continuous line of consonants based on an imitation of "gradually".

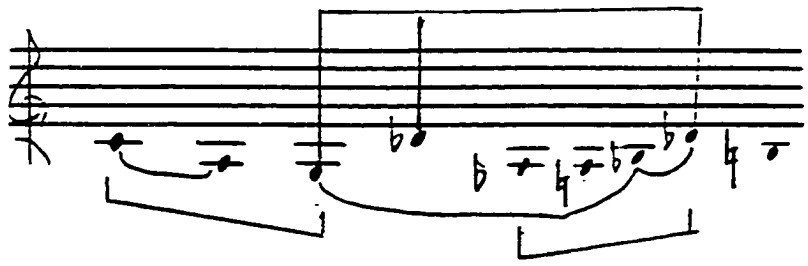
La Barbara's voice moves to a higher register T8 from 3:47, and pcs 4, 5, and 6 are added thus presenting all twelve pitch classes (beginning at 4:11). The higher register, new pitches, and faster rhythm serve to brighten the sound of the piece at this point (see example 5.12).

The computer part's activity tapers off and ceases at 4:18 when a new texture is introduced; wavy glissandi which move between two Db's an octave apart. When the vocalist finally sings the last segment of this line of the text, "dividing the sea from the sky," she too sings the wavy glissandi. Her glissandi pitches are Db4 to Ab3, and then up to Db5. She therefore outlines a perfect fourth.

At 4:34, the vocalist has two minor seconds drawn from the minor third

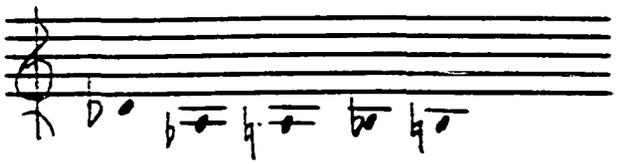
Example 5.11, "*The Waves*"

(4:02–4:10, [79TE01] chromatic septachord.)

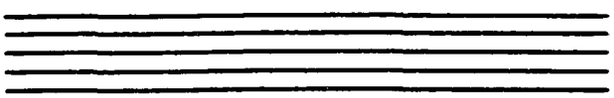


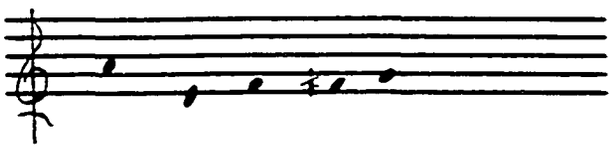
Example 5.12, "*The Waves*"

(T8 transformation from 3:47 to 4:11.)



Synopsis of pitches from 3:47 to 4:10
[89TE1]





4:11, [45679]

[89TE1] T8 [45679]

motives. These are combined to create a variant on section A's tetrachordal motive [9T01]. Pitch classes 9 and 0 are used in lieu of 8 and E. At 4:36 Bb4 in the voice slides down to G3, implying a minor third. At 4:47, she sings Db4

(a tritone from Ab3),falls to pc 8 at 4:49, and finally rises to Db5 in order to rearticulate the new tetrachord at 4:52. This is supported by the computer's Db's. At 4:53, the wavy glissandi cease and melt into consonants based on the word "perpetually" followed by a portamento-like articulation. This precedes the third subsection.

The third subsection is foreshadowed, as was the first, by the computer's line at 4:56. Dodge seems to employ word painting here as well, making the vocal

articulation employ a portamento that creates a thick and slurred sound. Calculations based on a trichordal subset of subsections one and three yield evidence of [8E1] T T I [9E2] relationship, (see example 5.13).

Parallel thirds are also brought back at 5:16. For the word "strokes," Dodge uses the 1–T motive and subsequent layers are added in the computer part.

At 5:25, the motive has moved up a major sixth and is supported in the computer part by a falling perfect fourth, Bb3 to F3. This figure will be

heard more clearly at 6:12 in the vocal part which will close this subsection at that point. With the higher register comes an increase in rhythmic activity which creates a climax

of activity in the B section. As La Barbara sings a repeated phrase segment, "and the grey cloth became barred with thick strokes," she is instructed suddenly to sing faster. At 5:34, her motive moves up a minor second and she sings "suddenly slower." She moves up again, a major second at 5:52, thus an octave from where she began. This concludes the apex of activity in section B as well as a chain of transformations. (see example 5.14).

By 5:42 there are four lines in the treble clef of the computer part. By 5:52, the texture is thinned as the lower staff, now also using treble clef, is in unison with the voice.

"Moving" is finally sung at 6:03. This newly presented word eventually leads to the conclusion of the text. As La Barbara sings, "moving -- one after another" she slows her rate of articulation.

There are two falling phrases heard at 6:11 and 6:16 respectively. Both phrases end with F4, and their opening notes are Bb4 and Db5, which highlight the initial minor third motive. Pitch classes [T15], set class (037), spell-out a Bb minor triad (see example 5.15). The outling pitch classes 1

Example 5.13, "*The Waves*"

([8E1] TTI [9E2] relationship, between 3:37 and 4:56.)

3:47 4:56

[8E1] TTI [9E2]

and 5 will be used in an upcoming [0156] tetrachord, and pc1 will be retained in a subset of that trichord to follow. At 6:21, "persuing" is set with pcs T,1 and 7, creating a G diminished triad. Pitch class T is heard again at 6:23.5 and is surrounded by neighbor tones. This precedes the aforementioned [0156] tetrachord used to set "perpetually." This tetrachord will be broken for a ransitional section, and later restored. The overall pitch palette of this time span is F-Gb-Bb-C-Db, (see example 5.15b). "Perpetually" is repeated, and the "ppt" consonants from this word are repeated several times throughout the remainder of this composition.

A transitional section begins at 6:34 with a (01) subset of the [0156] tetrachord. The wavy glissandi return with the minor second 0 -1 as the singer had at 6:34, and add the Bb3 and Db4 from the opening of the piece. The singer also brings back her opening Bb and Db motive and sings with the computer.

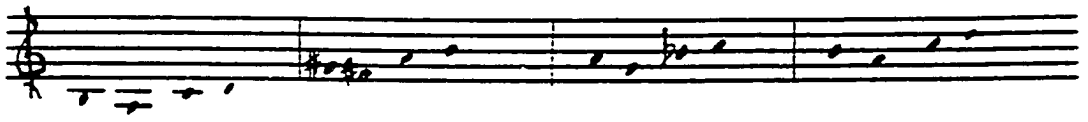
The word "perpetually" is an important component of this piece and concludes section B. The consonants from this word continue to provide percussion in section C.

At 6:58, the wavy glissandi cease and La Barbara again speaks the text, perhaps as a reference to Section A, accompanied by spare sounding

Example 5.14, "*The Waves*"

(An octave transformation.)

4:56 5:25 5:34 5:52

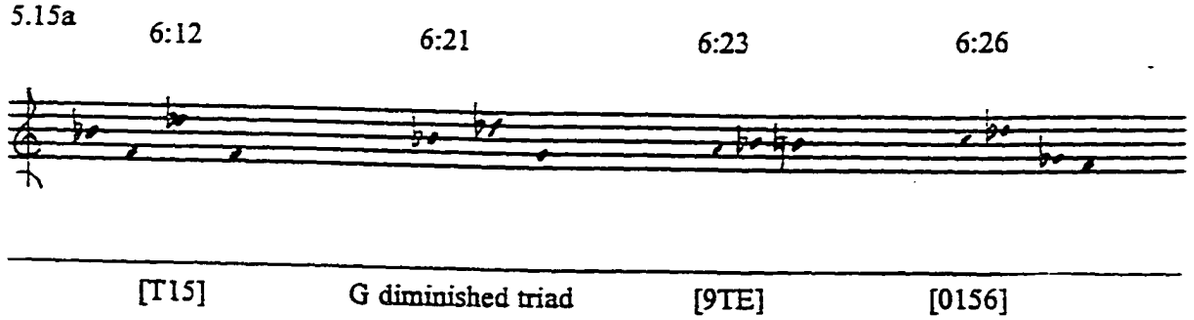


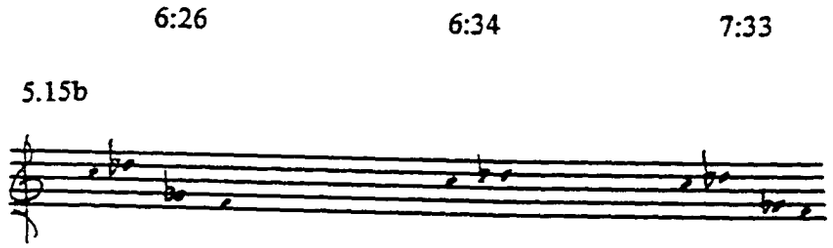
[9E02] T9 [689E] T1 [79T0] T2 [9E02]

Example 5.15a and 5.15b, "*The Waves*"

(F-Gb-Bb-C-Db, shape 6:11 through 7:33.)

5.15a





consonants in the computer's part. This reference to the opening can be interpreted as a concluding device, for the text articulation by the soprano is completed by 7:38.

Section B is also concluded shortly thereafter. The computer brings back the falling figures, pitch classes and tetrachord from 6:12 through 6:34 at 7:09 (see example 5.16). Section B is thus concluded with this reference followed by a series of unaccompanied and percussive sounding consonants. The consonants are retained through the opening of section C, until they recede completely at 8:13.

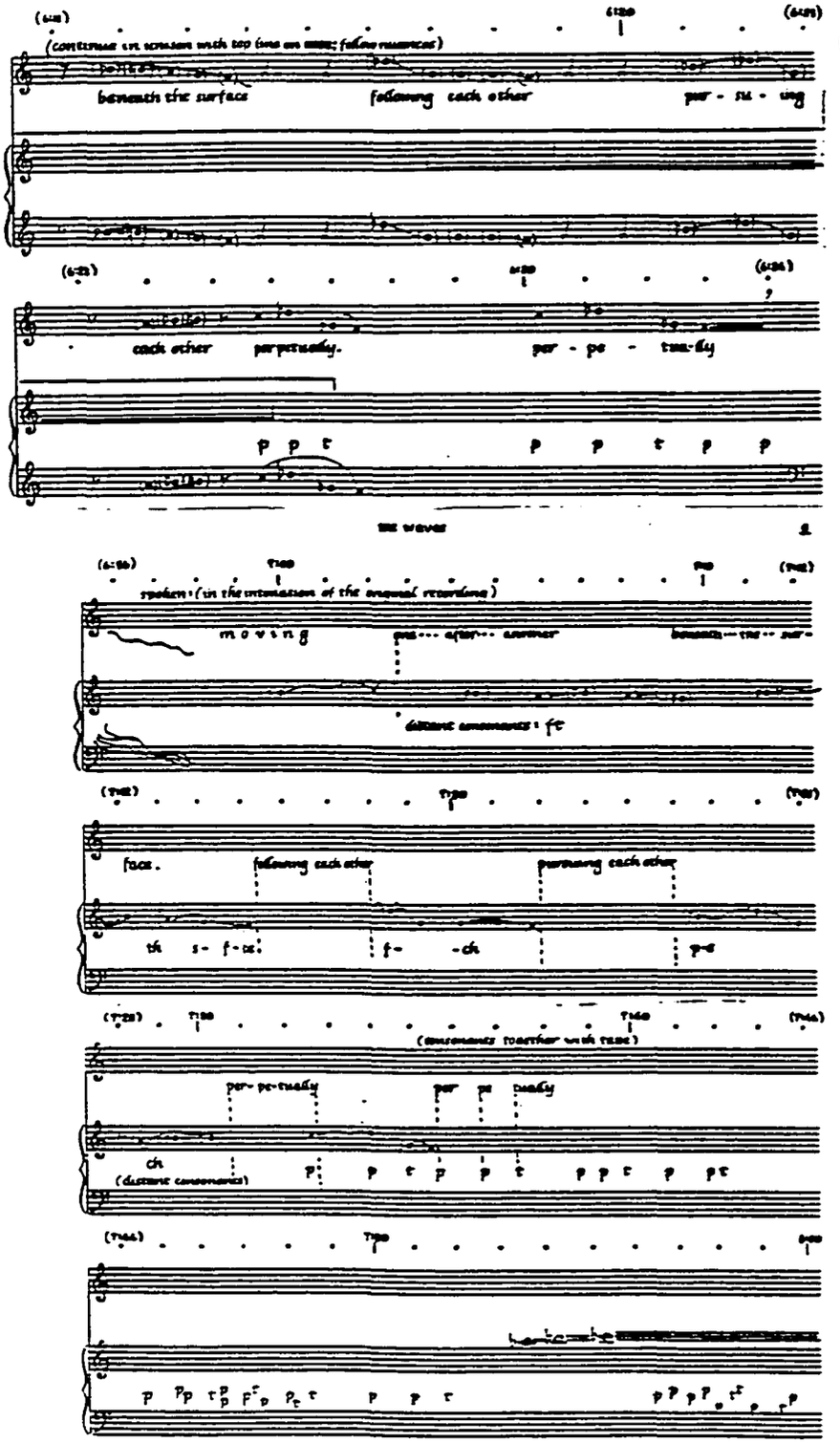
At 7:53, section C begins with three tones in close succession in the computer part, pcs 8, T and E, outling ic 3. This is pared down to pc 8 at 8:11, as the consonants recede. Pitch class 8 is the most structurally important pitch class in this section.

Time point 8:16 marks the entrance of a low pc 8 (Ab2). This sound contains a great deal of turbulence and is in a markedly lower register than the rest of the pitch material. This creates a dramatic contrast with the other timbres heard thus far in the piece. This is followed by F#5 and G5. Together these pitch classes form a chromatic trichord, [678].

At 8:41, the voice takes over the computer part's low Ab with a multiphonic. Multiphonics are defined by the Harvard Dictionary of Music

Example 5.16, *"The Waves"*

(Falling figures return from 6:12 through 6:34 at 7:09.)



as two or more pitches produced simultaneously as produced by woodwind instruments. Dodge however, defines multiphoncs in this case as "uncharacteristically low tones that have a strong frequency component at the octave." [8]

In either case, multiphonics often have turbulence in their sound, and in this composition, that turbulence associates the low Ab in the voice with the low Ab in the computer part.

From 8:41 to 9:55, La Barbara sings pitches comprising an Ab major triad while the computer part supplies the pitch classes [2345678]. Pitch class 4 may be inferred from the slides down from pc 5 to pcs 3 and 2.

At 8:58, pitch classes 2, 3, and 5 are presented in close succession, as were pcs 8, T, and E earlier in the section. The relationship between the two trichords is [235] T1I [8TE]. Pitch classes 6 and 7 were heard between these two trichords (see example 5.17).

The voice moves from multiphonics to reinforced harmonics at 9:14 and again at 9:31. Dodge defines reinforced harmonics to entail "intoning in such away that arpeggiating among adjacent harmonics can be clearly heard above the fundamental frequency." The pitch class most frequently selected for this type of articulation is pc 8, thereby reinforcing the

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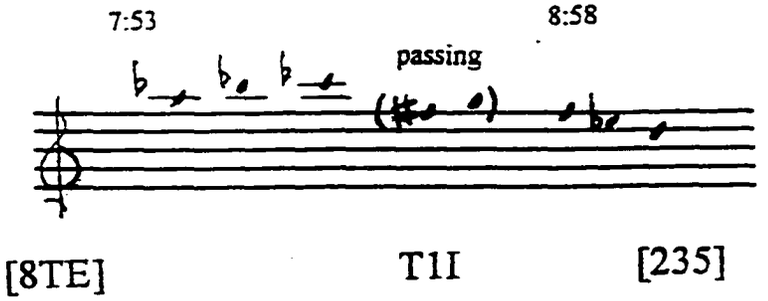
[8] Charles Dodge, "*The Waves*," *Perspectives of New Music*, compact disk liner notes.

Example 5.17, "*The Waves*"

(Trichordal transformations at 7:53 abd 8:58.)



[8TE] T1I [235]

Ab major sonority in this section of the piece. For example, at 9:31, the vocalist sings with La Barbara's recorded voice, and Ab functions as a pedal point. The computer part becomes increasingly active and presents pitch classes [789T0134]. [9]

At 9:19, the computer part intones an F diminished triad which highlights interval classes 3 and 6. Pitch class 5 moves a half-step lower to pc 4. This is followed by another minor second at 9:29 with pcs 8 and 9. This is the first time that pc 9 has been heard in this section. Pitch class 8, here spelled as G#, matches the surrounding Ab's.

Unnotated melodic segments begin at 9:41. These segments are the actual sound of the singer's adjacent pitches that are the result of the harmonics generated by her voice. Dodge refers to these segments as "folk-like tunes." He uses the computer to enhance, or make more clearly audible, these pitches. The singer is instructed to match the tape, and what few pitches are notated, for the most part, indicate half-step and minor third intervals (see example 5.18).

The vocal part becomes more aggressive as a result of shorter durations and a more rapid rate of articulation change. As the activity level of the overall texture increases, ics 2, 3, 5, and E make their way into the piece

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9 Charles Dodge, "*The Waves*," *Perspectives of New Music*, compact disk liner notes.

(10:10). The Eb octave glissando from 2:56 is brought back at 10:23. This Eb glissando opens the way for a climax of activity and is matched by the singer at 10:24.5. This is followed by an articulation of successive perfect fourths; Bb3, Eb4, and Ab4, which grow both faster and louder. With the culmination of this phrase, come the missing pitch classes 6 and 5 respectively, thus completing the chromatic scale. The computer accompanies with major and minor seconds. The small intervals in this particular register are referential to the opening of this section (see example 5.19).

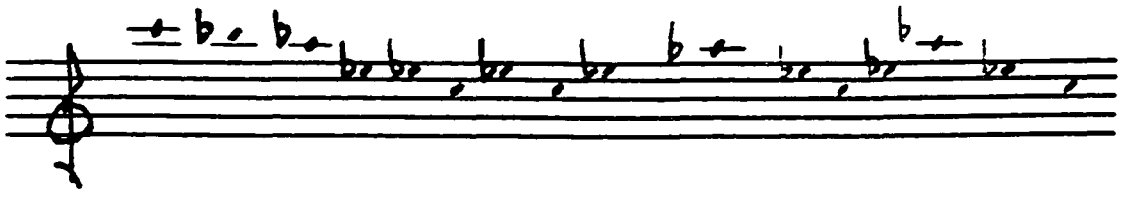
As the consecutive fourths of the vocal part accelerate and crescendo, the computer part also becomes more active. At 10:40, the Ab pedal point is reintroduced, thereby leading this section for its climax of activity to a more coda-like segment. This coda-like segment is marked by a paring down of activity and a re-establishment of pc 8.

At 10:47, the voice returns to her earlier timbre with a sustained Bb3 and eventually to the low multiphonic Ab3 at 11:00. This is matched by the computer's low Ab2 at 11:02. At 11:09, La Barbara sings, with reinforced harmonics, a series of major and minor thirds in a portamento-like fashion, not unlike articulations heard in earlier sections of the piece.

Example 5.18, "*The Waves*"

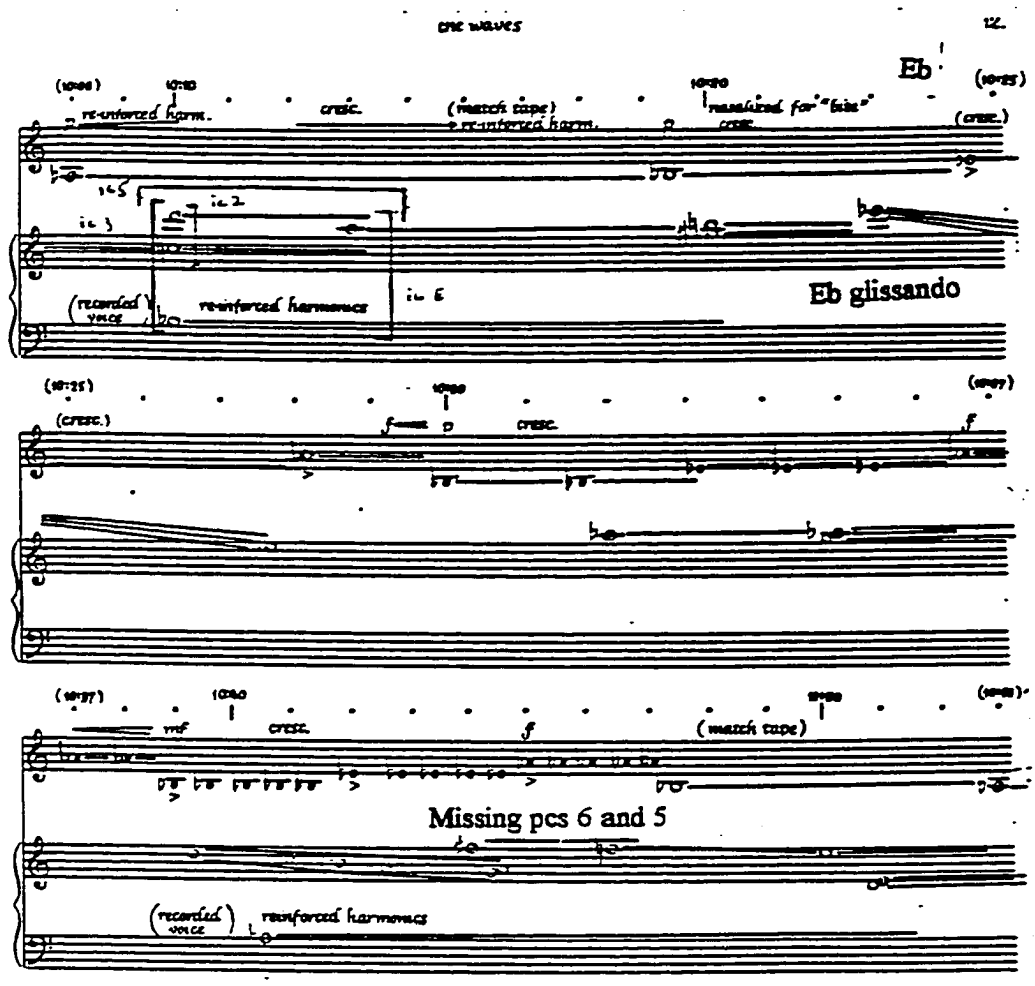
(Unnotated 'folk–tune' based on an Ab Major triad.)

9:41 – 9:51



Example 5.19, "*The Waves*"

(Interval classes 2, 3, 5, and E (10:10). The Eb octave glissando, successive perfect fourths (Bb3, Eb4, Ab4), and missing pitch classes 6 and 5, complete the chromatic scale.)



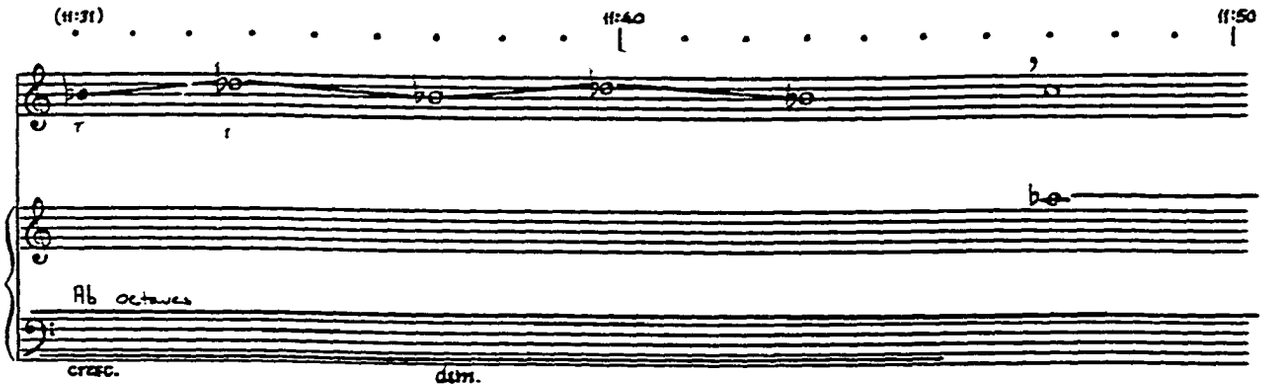
This series of thirds may be thought of as an Ab major triad linked with an Eb minor triad. The final pitch class in this phrase is pc T. Pitch class T creates an elegant transition to the referential pitches of the introduction (Bb and Db) over the Ab drone at 11:31 – 11:43 (see example 5.20).

At 11:53, the voice begins an approximate retrograde of the line heard at 11:09. Pitch classes 8 and T are accentuated with duration and register, and the line is violated in an interesting way at 12:10 when a tritone is brought out with Gb4 moving down to C4. This creates a C diminished triad. The tritone and diminished triad are referential to the F diminished triad heard at 9:19–9:22. This tritone leads to the closing Ab of the piece (see example 5.21).

The extended vocal techniques for which La Barbara is renowned for work well with computer music. In this closing section, her voice will at times sound strikingly close to typically computer generated sounds.

Example 5.20, "*The Waves*"

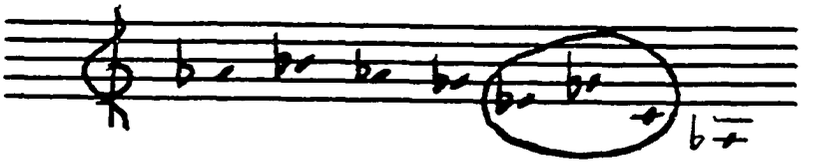
(Bb and Db over the Ab drone at 11:31–11:43.)



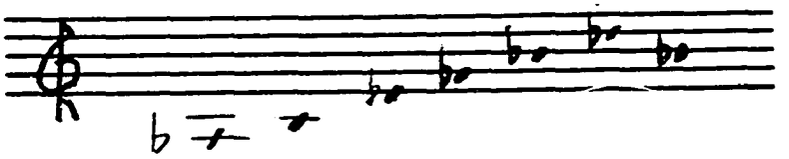
Example 5.21, "*The Waves*"

(11:53, the voice begins an approximate retrograde of the line heard at 11:09. At 12:10, a C diminished triad. The diminished triad is referential to the F diminished triad heard at 9:19–9:22.)

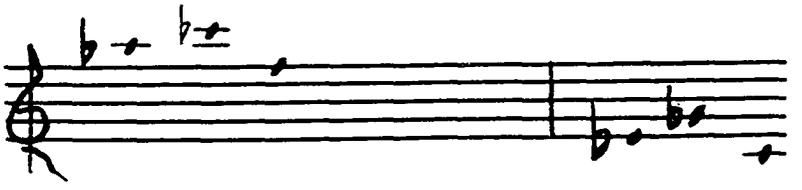
11:53



11:09



9:19 – 9:25 12:07 –12:16



Chapter Six

Word Color (1992) by Paul Lansky

Word Color is a computer music composition based on Hannah MacKay's reading of isolated words and of verse 17 of Walt Whitman's *Song of Myself*. Lansky took the isolated words from children's stories; most of them refer to time. Lansky also used these words in another piece, *Now and Then*. *Word Color* makes exclusive use of Hannah Mackay's reading for its raw sound material. The text alternates in a structured manner between fragments of the Whitman verse and the isolated words.

The Whitman verse is,

These are really the thoughts of all men in all ages and lands,
they are not original with me,
If they are not yours as much as mine they are nothing, or next to nothing,
If they are not the riddle or the untying of the riddle they are nothing,
If they are not just as close as they are distant they are nothing.

This is the grass that grows wherever the land is and the water is,
This the common air that bathes the globe. [1]

The piece was played at a festival in Delphi on a cliff overlooking the sight of the oracles. Lansky wanted a text befitting such a setting and chose the Whitman text for its "oracular" quality. He was especially drawn to the Whitman text for its broad–based character and its suggestions that

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[1] Walt Whitman, *Song of Myself*, ed., James E. Miller, Jr., (New York: Dodd, Mead, 1964), verse 17.

profound truth is both familiar and universal. This, and *The Six Fantasies on a Poem by Thomas Campion*, are the only pieces by Paul Lansky to set pre-existing poetry.

The composer writes about the double meaning of resonance:

> *Word Color* is based on the sense that words, as sounds, can ring, and have resonance in our memory. While that resonance may be regarded as purely sonic, words themselves inevitably reach more deeply into other areas of our consciousness....[2]

In our interview, Lansky elaborated on this idea,

> The piece evolves over a course of time. One of the ideas of the piece was to capture the resonance of sound. For instance, everyone has the experience of saying a word and then saying it again, and again and at a certain point it makes no sense. It becomes a timbral object. I was interested in that. The idea was that these words just hang in space. There are ten second reverbs on words and they're just sort of hanging out there. I was also interested in the arbitrary nature of these words hanging out in space. As the piece evolves, the Whitman text comes to the surface. But more than that the whole feeling of words as objects also comes to the surface. It's a complicated texture. At the end there's a series of repeated ascending chords. I was inspired by Bizet's *L'arlesienne* Suite.... The idea was to take the chords and at the end resolve them into this pattern that goes on but the harmonies change with each four. There is a sense that it gets darker, it moves inward and becomes ntrospective with the repeated chords.[3] (See example 6.1)

Lansky also spoke of his fascination with time, an interest that has

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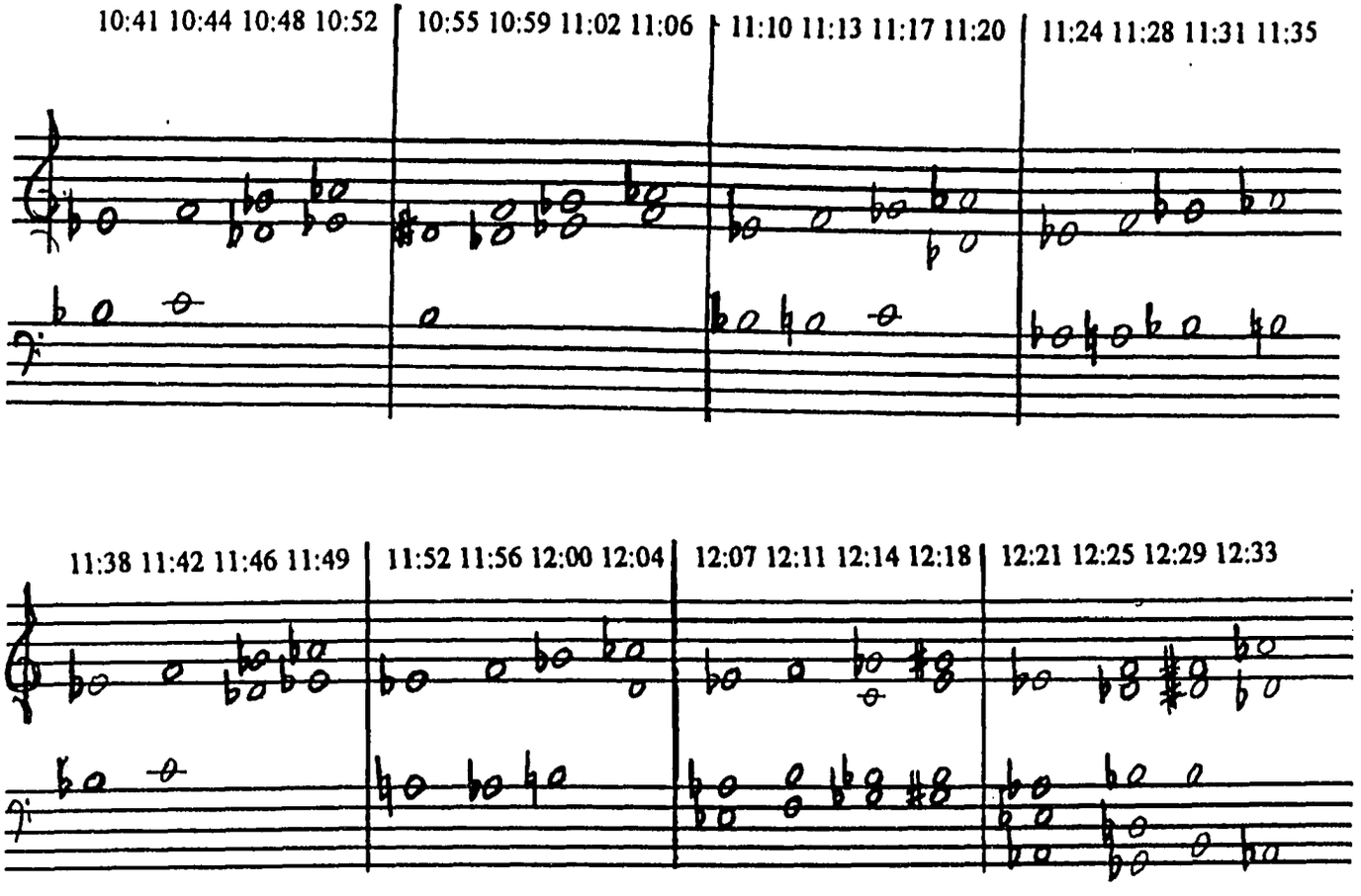
2 Paul Lansky, Liner Notes in *More Than Idle Chatter* (New York, Bridge Records, Inc., 1994).

3 Paul Lansky, Personal interview, see Appendix D, lines 232–251.

Example 6.1 *Word Color*

(Closing harmonies as inspired by Bizet's *L'arlesienne* Suite.)



grown stronger for him as he has gotten older. "It's staggering how time accelerates. A lot of my pieces , like *Values of Time*, which is for instruments and tape, and many of my pieces, refer to time in way or another."

Additional elements in *Word Color* include comb filters for harmony and bass tones (see example 6.2, computer program for *Word Color*) and a high pitched melodic accompaniment that embodies elements of a descant. The composer created the latter element with a program that he wrote in Cmix called "combpluck" (see example 6.3, computer program for *Word Color*). He explains that he fed the recording of MacKay reading into a program that looks for peaks in amplitude and reads frequency. The resultant data was then fed into a combfilter that would transpose the frequencies to a higher range (two and three octaves above middle C). In Lansky's words, "the delicate stuff is mappings of speech transposed way up." This results in the rhythms and pitches inherent in MacKay's speech realized at a higher register. [4]

Direct examples of these two approaches may be found in the musical guide for *Word Color.*[5] The "nchord" labels refer to Lansky's combfilter

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4 Paul Lansky, telephone conversation September 1, 1998.

5 See Appendix C.

Example 6.2, *Word Color*
(Computer program for comb filter, italicized text are explanations for commands.)

```
words = load_array(11, 6,11,6,11,6,11)
Arguments to access the eleventh word in the sixth soundfile listed below (0-...)
pitches = load_array(13,8.00,8.02,8.04)
octave point pitch class
rhythm = load_array(12,1) One Beat

revtime=9  Reverberate for nine seconds
sndlist =
load_array(14,"fs/src/take26mono.snd","fs/src/take29mono.snd","fs/src/take30mono.snd"
,"fs/src/take31mono.snd","fs/src/take32mono.snd","fs/src2/page1.mix.sndh","fs/src2/page
2.mix.sndh","fs/src2/page3.mix.sndh","fs/src2/page4.mix.sndh","fs/src2/page5.mix.sndh","
fs/src2/story.mix.sndh")
data to be accesed
expenv(0)  generic envelope
count = 0  Skip 0 seconds, start at the beginning of the sound file.
output("fs/nchords1") write output to this named file.
punch(1,32767)  Programming argument
dur=revtime+1
time=0 track=1 beat=0 beatpoint=-1 beatpoint2=-1
voiceamp=5
for(count=0; count < words/2; count=count+1) {
        pch = get_array(13,count)
        snd = get_array(11,x=count*2)
        input(get_array(14,snd))
        num = get_array(11,x+1)
        skip = getstarttime(snd,num)
        end = getendtime(snd,num)
Algorithm
                setcombs(x=1/cpspch(pch),revtime,1,
                        y=1/cpspch(pch+.001),revtime,1,
                        y=1/cpspch(pch+.002),revtime,1)  to create detuning

xsetreson(z=cpspch(pch),1*z ,z=1*cpspch(pch+.001),2*z,    didn't use
                        z=1*cpspch(pch+.002),3*z)
                beat = trunc(count/rhythm)*dur
                multicombd(beat,end-skip,skip,voiceamp,0,.0005,.2,.4)
                }          .0005= amplitude deviation
        .2,.4= between .2 and .4 times per second
                This is to create vibrato
```

Example 6.3, *Word Color*
(Computer program used to create the "combpluck accompaniment.")

```
input("fs/src/take26.snd") /* just a dummy */doesn't belong
output("fs/pluck57")  Name of output soundfile
dataset("fs/src/take29.pch")name of input data/sound which is speech
float rise,decay,threshhold,realduration,dynamlow,dynamhi
makegen(1,7,512,0,512,1) Basic envelope argument
float seed,extra,start,incr,inskip,framedur,pluckdur,inputamp,pluckamp,grouping
float beat,quant,coef  Program arguments
seed=.1944
punch(1,1)

map(0,1/1, 7,3/2, 2,9/8, 9,27/16,  4,81/64,  11,243/128,  6,729/512,
   1,2187/2048, 8,6561/4096,  3,19683/16384, 10,59049/32768,
   5, 177147/131072)
 The above is to tune the chomatic scale so that adjacent fifths are a 3/2 ratio.
words = load_array(20,1,7)

float noisefloor,fps
float bunchlimit
float lowpluckdur,lowpluckrise,highpluckdur
beat = 1/9  /**************************NB *was 1 over17**********************/
fps=176.4
start=0  inskip=0 framedur=1/fps pluckdur=1
inputamp =.00001 pluckamp=100 grouping=1 beat=beat quant=4 dynamlow=100 dynamhi=5000
rise=.05 decay=.5
threshhold=0  /* was 20 */
coef=.522
lastframe=1200
incr=lastframe/fps
incr = 16
inskip=3
ringdown = pluckdur

globals(rise,decay,threshhold,realduration=pluckdur,dynamlow,dynamhi,coef,noisefloor=0,fps,0,bunchlimit
=90,lowpluckdur=0,lowpluckrise=0)

minor=pitchlist(seed=seed+.01,5.09,6.04,6.09,7.04,7.09,8.00,8.04,8.09,8.11,9.00,9.02,9.04,9.05,9.07,9.
09,9.11,10.00)
Pitches from A minor scale
transpose(.03)  Transposed a minor third up.
rmsoff(1)
skipin =  3
endtime =  16.317460
pmap(start,x=endtime-skipin,skipin,framedur,pluckdur,inputamp=0,pluckamp,
grouping,beat,quant,ringdown )
This is an algorithm that reads a pitch analysis (of speech), quantizes the pitches and amplitudes and
looks for peaks to create the audible rhythms and pitches.  This is subsequently put through combpluck
to be filtered.
minor=pitchlist(seed=seed+.01,6.04,6.09,7.04,7.09,8.00,8.04,8.09,8.11,9.00,9.02,9.04,9.05,9.07,9.09,9.
11,10.00,10.02)
transpose(.03)
rmsoff(1)
skipin =  3
endtime =  16.317460
pmap(start,x=endtime-skipin,skipin,framedur,pluckdur,inputamp=0,pluckamp,
grouping,beat,quant,ringdown )
```

STRUCTURE

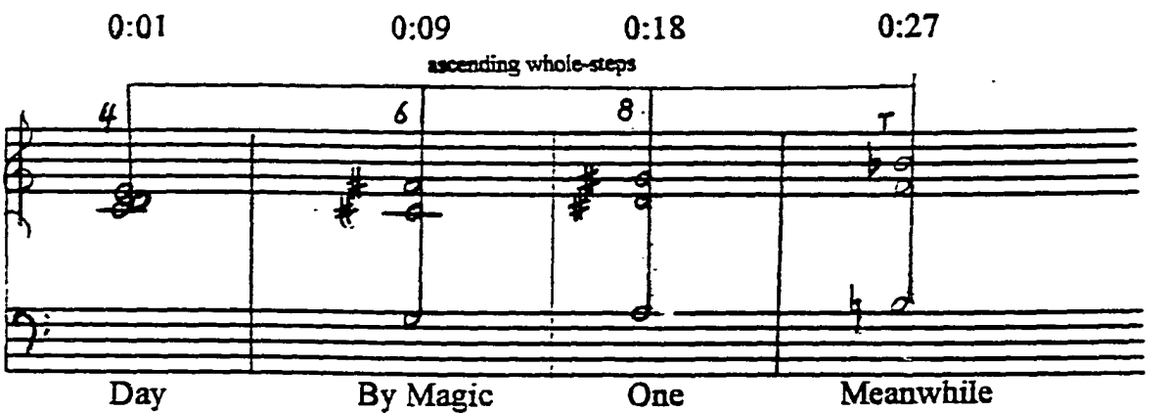
The piece may be divided into three main sections, and will often use groups of four chords or clusters to support an ascending melodic motive. This motive consists of four ascending whole-steps or ascending whole and half-steps in irregular combinations (see example 6.4).

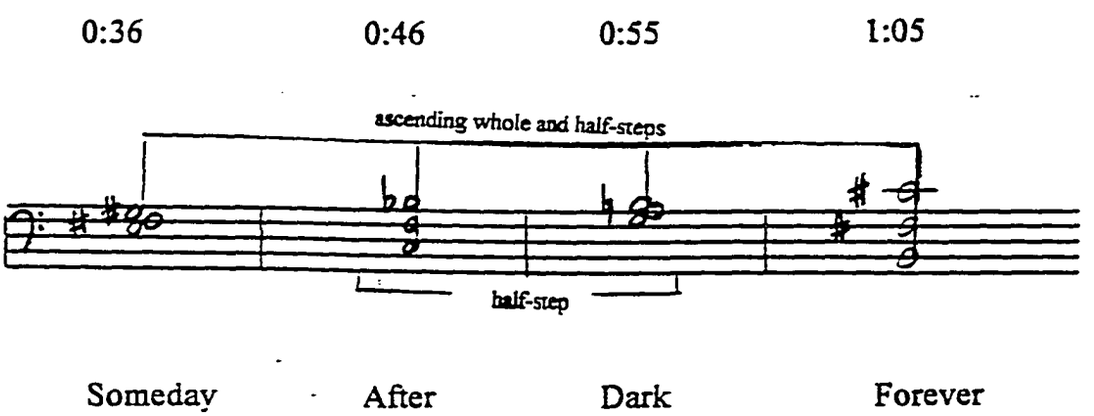
The first and last sections are the most austere. The first section (0:00-3:18) uses the compluck accompaniment very sparingly, and the introductory portion of the first section (0:00-1:12) and last section exclude it completely. Additionally, the introduction is comprised of isolated words grouped into two units of four. The last section also focuses on isolated words, but in eight units of four. Furthermore, the chord types and voicings of both the introduction and the closing section is very similar.

The first section's role is somewhat comparable to an exposition's since it introduces the elements of the piece (0:00–3:18). These elements include the melodic motive, comb filter harmony, bass tones used for demarcation, and the combpluck accompaniment. The introduction opens with the word "Day" and closes with "Forever." "Day" will open several subsections in this piece, and "Forever" closes the piece entirely. Section one also builds the text dichotomy by interspersing the isolated words and the text segments.

Example 6.4, *Word Color*

(Groups of four chords or clusters support an ascending melodic motive, consisting of ascending whole-steps or whole and half-steps in irregular combinations. This example shows the first two four-chord progressions of the piece.)





The middle section (3:19–10:40) is the longest and most elaborate of the piece. The combpluck accompaniment becomes increasingly dense as this section evolves. The ascending lines become static when the accompaniment's activity reaches its apex at 8:56 - 10:38. This is especially apparent at 9:47 when the harmony holds a dominant seventh chord for twenty seconds. After 10:38, the accompaniment ceases and the ascending progressions resume in the third and closing section. The bass is also the most active in the second section and plays an important role in the piece's harmonic progression.

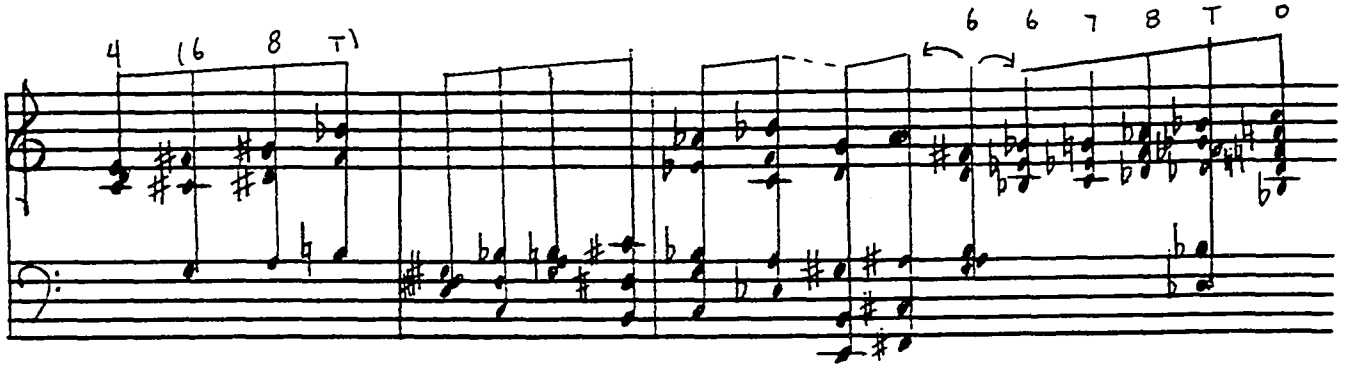
The last section is centered on the melodic motive with underlying and changing harmonies (10:41–12:45). This section evolves as the chords become more full. The piece ends with an open perfect fifth resonating under the word "Forever."

The pitch class analysis of this composition will focus on the two most prominent features of that aspect of its structure: manifestations of the ascending melodic motive, and the cadential figures. The melodic motive is present throughout most of the composition while the cadences occur at the close of several phrases in this piece. The most distinctive cadence takes place toward the end of the second section (9:47–10:17) when it supports the climax of activity in this piece (see example 6.5).

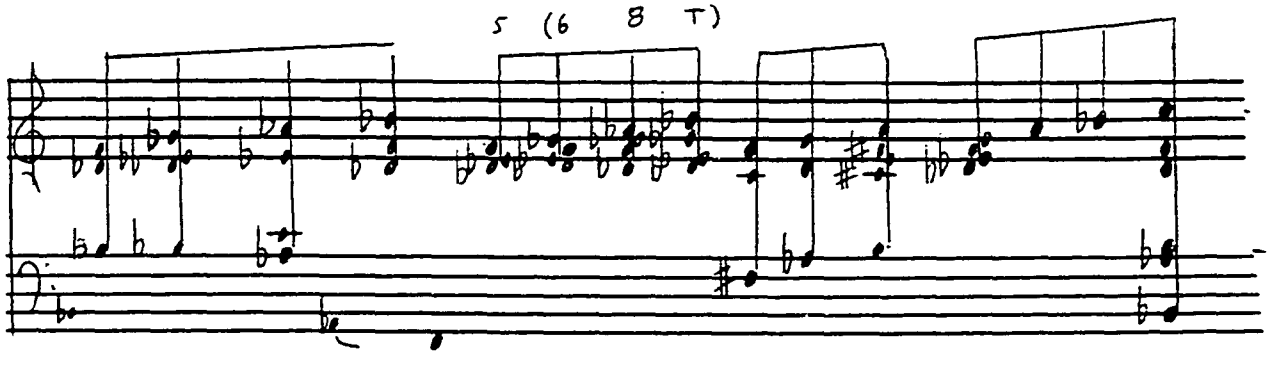
Example 6.5, *Word Color*

(Chart summary of the ascending melodic motives and cadential figures: At 2:11, pc 6 is a common tone with its surrounding segments, 1:38–1:45 and 2:18–2:35. The top notes of these segments create a [6789T0] hexachord. The tritone that is traversed over this time span is T2 from the trtone that began this piece. T2 transformations are also used within the 1:38–1:45 segment. The segment heard at 3:22 is defined by Bb minor and its top line is the same as that heard in the 6:41–7:03 segment. The 6:41–7:03 segment recalls the beginning of the piece. It opens with "Day" and the trichord that sets that word is T1 from the opening trichord of the piece. The remaining three notes of the top line of this segment are the same as the opening line's top notes. The pcs 7–9–T–0 are heard four times between 8:56–9:52. This is ended with a Bb major ninth chord, functioning as an applied dominant to the segment that follows.)

0:00–0:27 0:36–1:05 1:38–1:45 2:11 2:18–2:35



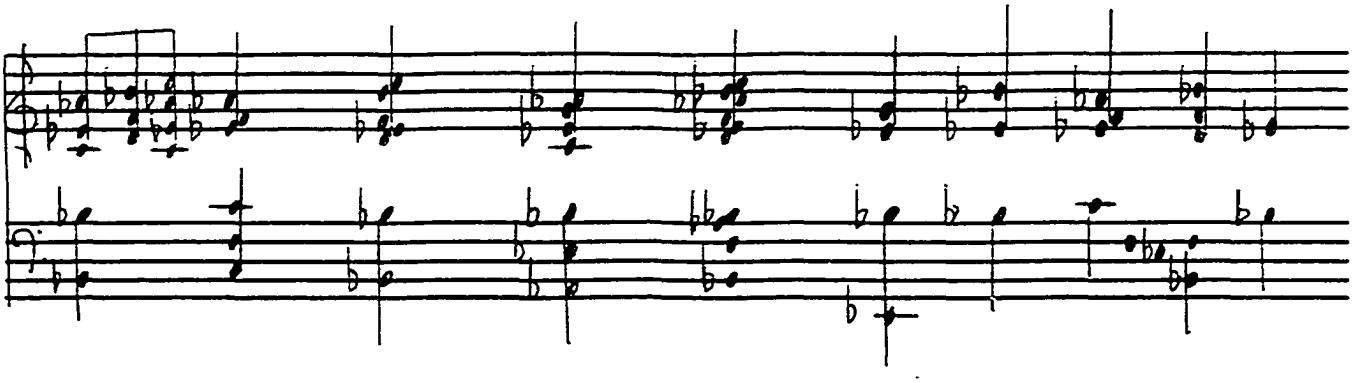
3:22–3:32 6:41–7:03 7:24–7:45 8:56–9:52



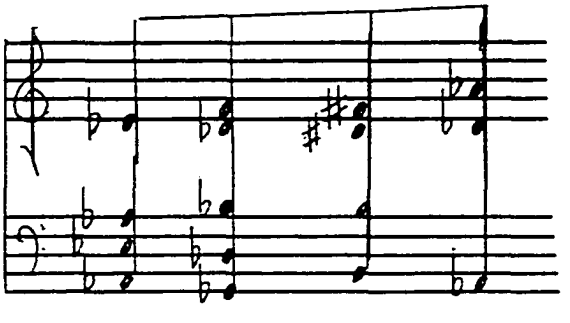
Example 6.5, *Word Color* continued.

(I–IV–V progressions in Eb major are implied in the harmony heard over 9:01 through 10:17. This is followed by a brief reiteration of the progression. The closing section ends with an open perfect fifth on the word "Forever," effectively recalling the first cadence of the piece on that word at 1:05.)

9:01–9:11 | 9:16–9:21 | 9:27–9:35 | 9:36–9:42 | 9:47–10:17 10:23 10:28 10:34 (10:41)



12:21–12:33



SECTION ONE (0:00-3:16)

Introduction, Subsection One (0:00-1:12)

The introduction unfolds with two phrases (0:00-0:35, 0:36-1:05). The trichords of these two phrases are used in groups of four to create ascending lines in the top voice. The word "Day," with its supporting trichord, is the first sound to be heard in *Word Color*, and as such, creates an opening phrase that begins the piece with a strong sense of immediacy and brightness. The first phrase of the piece continues with isolated words supported by the comb filters playing dissonant trichords. The first ascending line comprises three whole-steps and, as such, outlines a tritone with pitch classes 4-6-8-T. The first trichord is a whole-step cluster, but the intervals in the second, third and fourth trichords are tritones and major sevenths (0:00-0:27), and the last two trichords have perfect fourths. The bass voice in these three trichords also ascends by whole steps.

The second phrase (0:36-1:05) introduces a lower register and inserts a half-step between two whole-steps in the middle of the top line. This line rises a perfect fourth with pitch classes 8-T-E-1. This segment also begins with a whole-step cluster, as did the first, but the structure of the subsequent trichords varies. At 0:46, there are two perfect fourths

followed by a cluster (7,9,E). This cluster at 0:55 (7,9,E) functions as a kind of dominant chord to the final trichord of the segment at 1:05. The final trichord consists of two perfect fifths on the word "Forever." The intervallic content and preparation that this resolution holds creates an ominous beginning. The stacked fifths are distinctive in this context and serve as a resolution to the numerous unresolved trichords heard heretofore in the piece. The word "Forever," is in keeping with the resoluteness of this quasi-cadential chord as it often closes children's stories. This word and interval (ic 7) will close the entire piece.

I/Subsection Two (1:13-3:16)

This subsection introduces segments from the Whitman text that are supported by thicker, accumulating harmonies from the comb filters. This is juxtaposed with single words as well as brief and sporadic phrases from the combpluck accompaniment. The repetitions of isolated words are set with a rising whole step, while the phrase segments are more likely to be set with rising half steps. Pairings of elements such as this are common throughout this subsection.

The first text segment from the poem, "These are really the thoughts of all men in all ages and lands..." (1:13) is supported by pcs [0257] in the

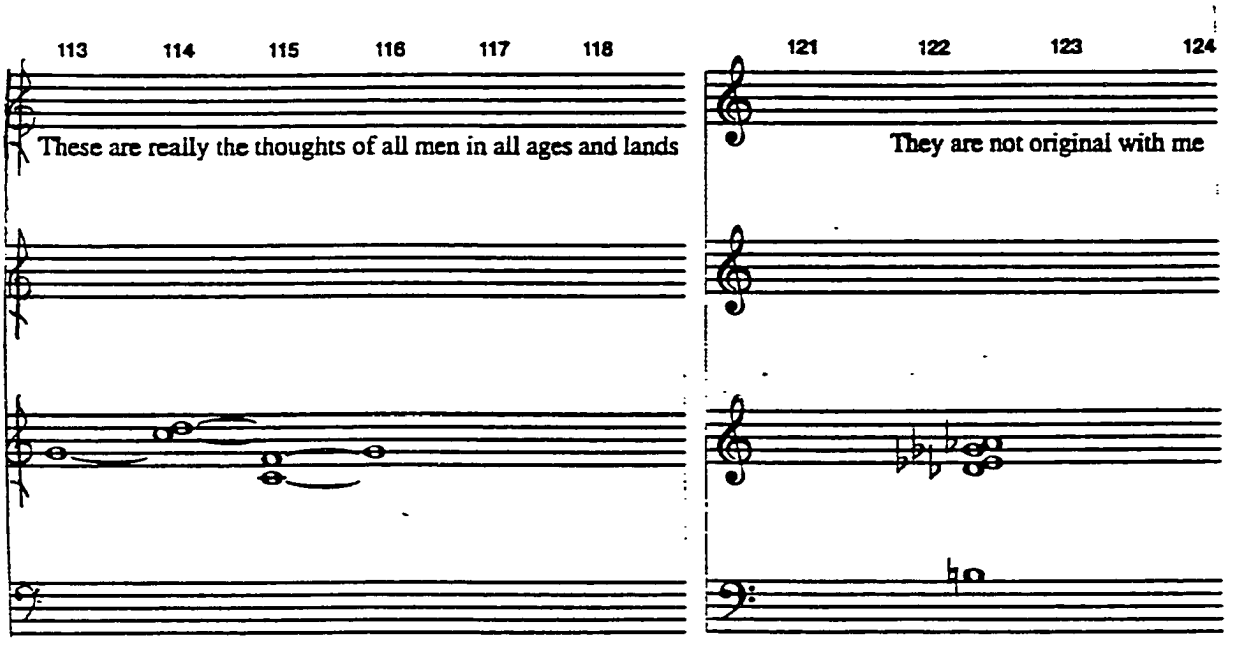
comb filters. At 1:23, the line "They are not original with me" is supported with [E1368]. Its [1368] subset is T1 from [0257] (see example 6.6).

More paired transpositions follow when the texture returns to single words. "Once" initially appears at 1:38 with pcs [78T03], and is repeated at 1:45 with [9T035]. The upper three voices ascend in parallel fourths (T2) with a minor third. This transposition results in the two chords having several common tones. The resultant effect is a statement followed by an emphatic restatement.

The word "Time" is treated in a similar fashion. The first articulation of "Time" occurs at 1:57 with an [78E24] pentachord, comparable to an E major/minor, plus a minor seventh chord. At 2:05, this moves to a [469T1] pentachord comparable to an F# major/minor, plus a minor seventh chord. The perfect fourth and major seventh intervals of the top three voices link these chords with the introductory trichords. This is resolved at 2:11 with a [679E2] pentachord comparable to a B minor chord. The pitch classes below both articulations of this word imply a minor chord progression, similar to a IV-V-I pattern. The resolution is a cluster cognate to a Bm7 chord on the word "Someday, " at 2:11. The top line that encompasses the first four text articulations (1:38-2:05) is 8-T, 7-9. This line shapes two ascending whole-steps which are a half-step apart. With the F# in the top

Example 6.6, *Word Color*

(Segments from the Whitman text are supported by thicker, accumulating harmonies from the comb filters. In this segment, the [0257] tetrachord is transposed T1 to a [1368] subset.)



[0257] T1 [1368]

voice of "Someday" a [6789T] chromatic superset that is unfolded in the upper voice is created. This resolution may be linked with the one on "Forever" at 1:05 (see example 6.7).

At 1:29, the combpluck accompaniment enters and spells out a C# minor chord. At 1:33, this shifts to pcs (0249). At 1:51, the combpluck accompaniment plays pcs (02359) with the tritone between 3-9 most audible. At 2:00, the combpluck shifts to pcs (4570).

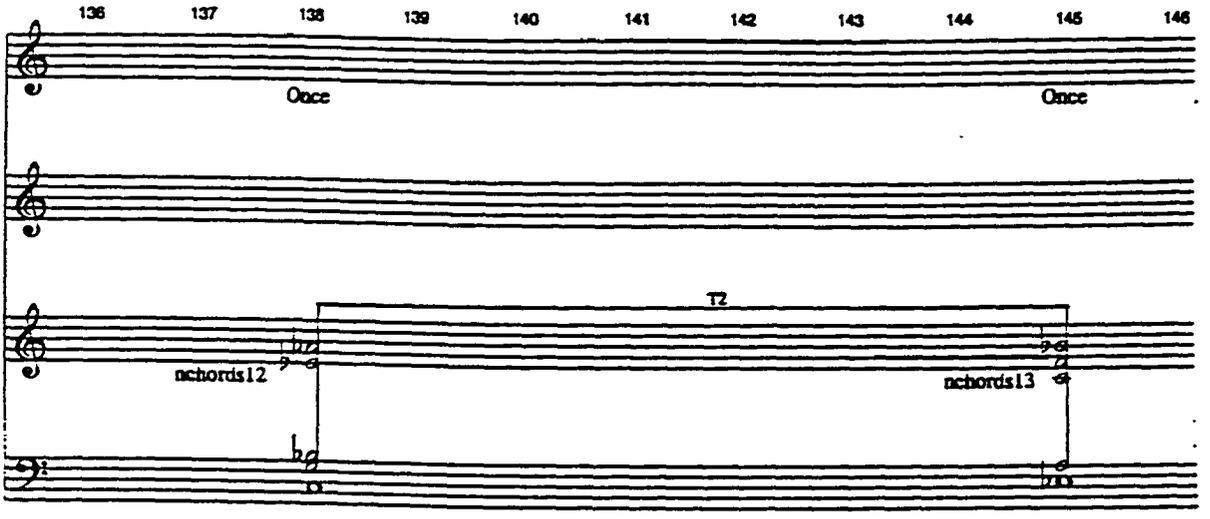
I/Subsection Three (2:15-3:16)

This subsection is more rhythmically active than the preceding material due to the introduction of a bass motive. From 2:15 through 3:09, the bass creates this rhythmic motive using phase vocoded words and changes the pitches to match the comb filtered notes. Some of these rhythmic patterns can be seen on page eight of Paul Lansky's sketches (see example 6.8).

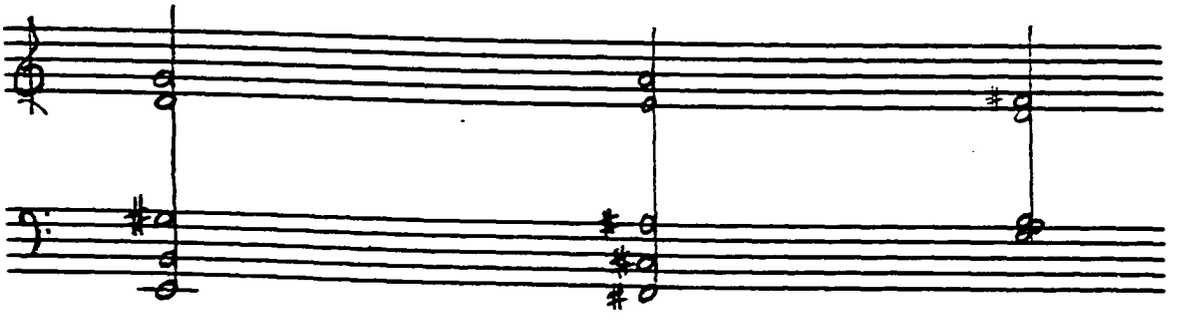
Above this is an ascending line with pcs (6, 7, 8, T,0), spanning a 6-0 tritone. This is a whole step higher than the opening's ascending tritone line. The harmony consists of a mixture of major and minor harmonies centered around Eb minor. This line reaches its conclusion (2:35) with the word "Day" on a bright sounding Bb major 9th chord (see example 6.9).

Example 6.7, *Word Color*

(Paired transpositions work in conjunction with reiterated isolated words, 1:36–1:46, 1:57–2:05–2:11.)



1:57 2:05 2:11

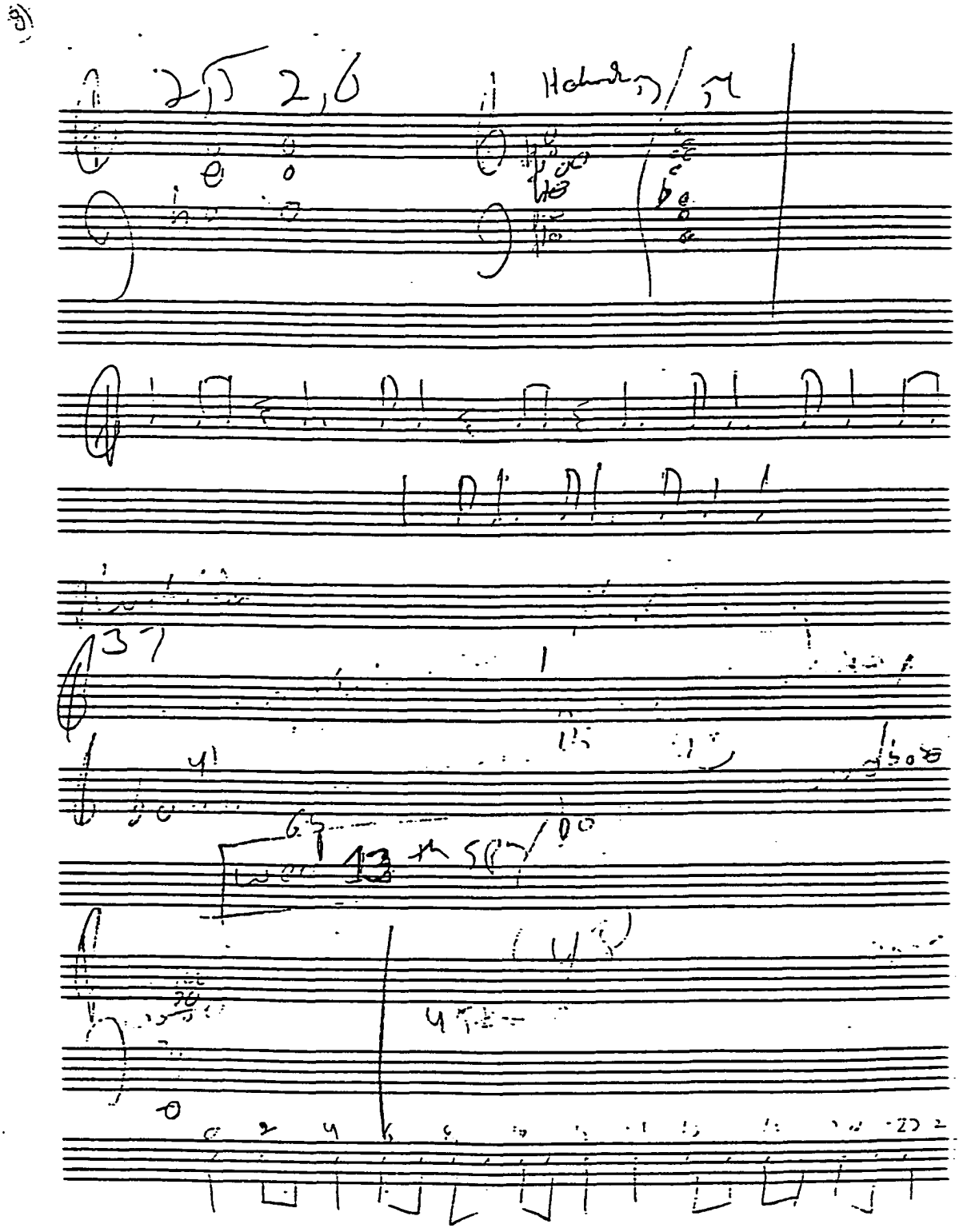


Time Time Someday

IV T2 V I

Example 6.8, *Word Color*

(Page eight of the composer's sketches.)

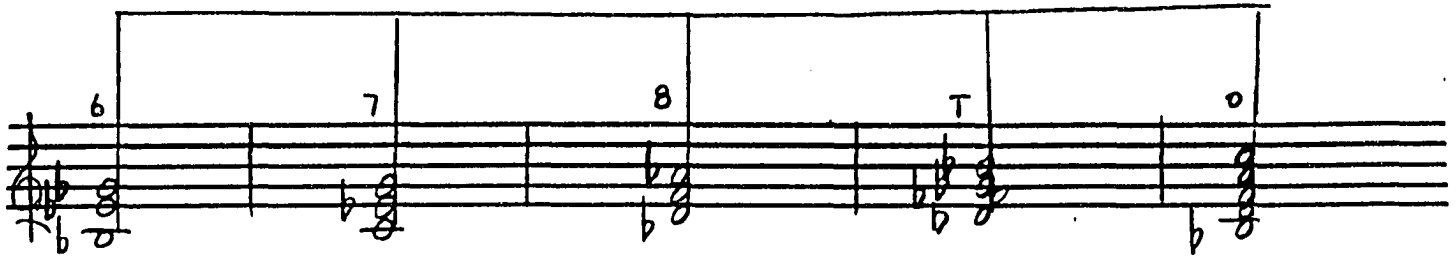


Example 6.9, *Word Color*

(An ascending line with pcs (6,7,8,T,0), spanning a 6–0 tritone. This line reaches its conclusion (2:35) with the word "Day" on a bright sounding Bbmajor 9th chord.)

2:18 2:22 2:23.5 2:28 2:35

Tritone



If they are not yours as much as mine | They are nothing | or next to nothing | Occasionally | Day

Section one is completed with phrase segments that move between F# minor and C# minor, and lead to a G#/Ab major chord (V of C# minor) with an added fourth on the isolated word "Grass" at 3:09. This word stops the rhythmic motives of the bass. The prominent pitch class 8 in the top voice links this word with "Once" at 1:38 and the phrase "They are not original with me" from 1:23. The glottal attack on "Grass" provides a link to section two which begins with "Go."

SECTION TWO (3:19–10:40)

Section two initially alternates isolated words with text segments. Bass tones are used for demarcation under the single words and, as was the case in section one, thicker harmonies are used with text segments. Section two is by far the longest of the three main sections of the piece and may be divided into five smaller subsections. Of these five subsections, one (3:19 - 4:44), three (6:41 - 7:18), and five (8:56 - 10:40), correspond to each other by primarily focusing on isolated words and bassline demarcation. Subsections two (4:45 - 6:40) and four (7:19 - 8:55) work together in a similar fashion by focusing primarily on text segments. The fifth and final subsection contains the most active accompaniment and focuses exclusively on isolated words. The harmonic progression in this subsection

is also the most goal-oriented.

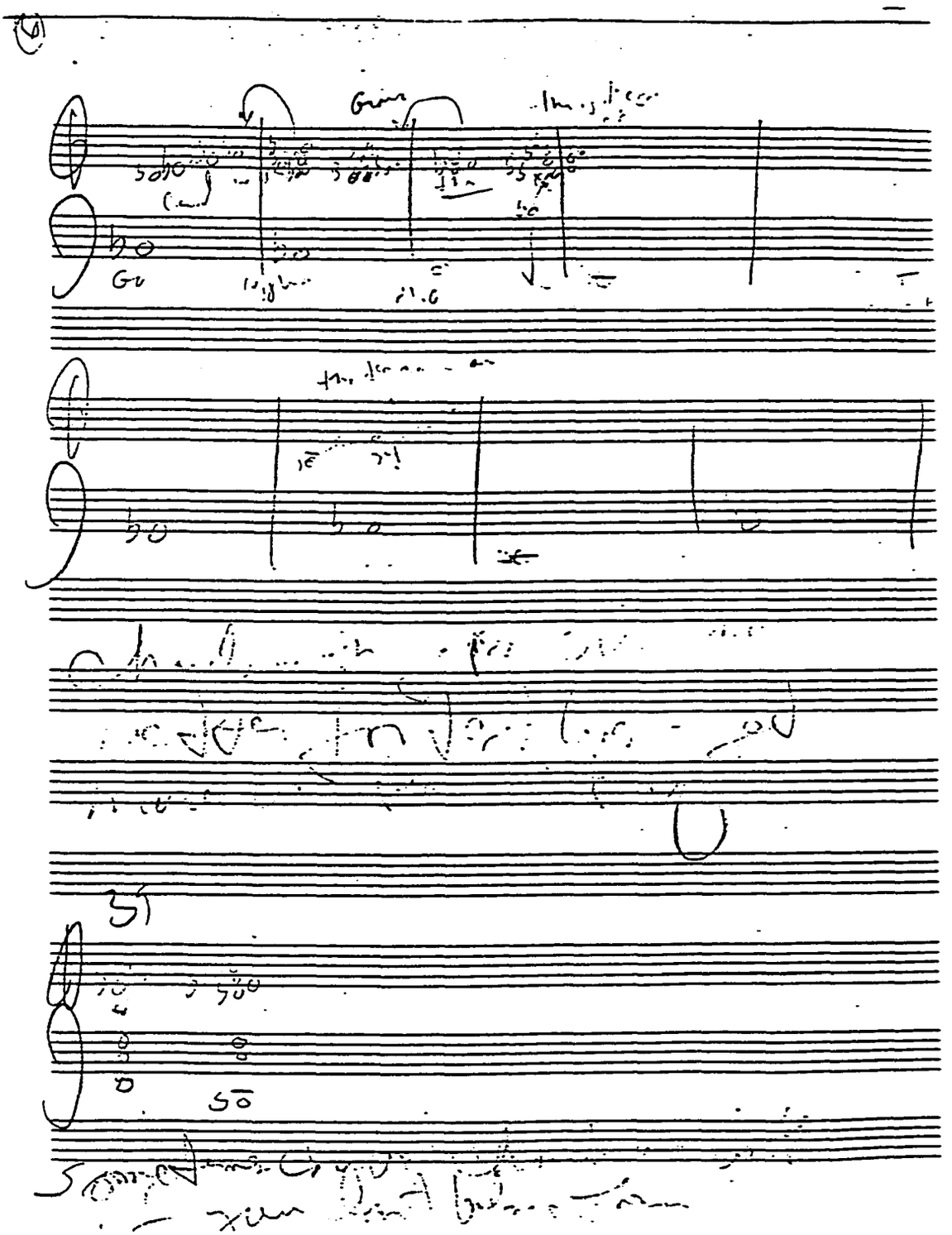
The top line on page six of Lansky's sketches (see example 6.10 sketches) shows the pitch collections, bass notes and corresponding words for this subsection (3:19 - 4:44). This subsection begins with seven isolated words and a clearly defined bass line. This bass line is set in motion with a low Bb bass tone under the word "Go" at 3:19. This bass tone establishes a pedal point for the ascending Bb minor, Eb minor 4/3, and Ab major chord progression that follows (3:19-3:32). "While" provides the next bass tone at 3:30, with Ab and is immediately followed by another Bb minor chord at 3:32 under "This"
(see example 6.11*)*.

The turbulence heard in the F bass tone at 3:41 under "Time" corresponds to the timbre of "Go." This is followed by phrase segments alternating with isolated words.

At 3:47, a text segment is initially set with two parallel fourths, consisting of pcs (1,5,6,T). The Gb resolves down to F and creates a Bbm chord with an added fourth. This pitch collection is notated in the composer's sketches with the first word of the text segment (refer to example 6.10 Sketches). This is followed by an Eb bass tone under the word "count" at 3:52. Settings of "count," serve as punctuation in this

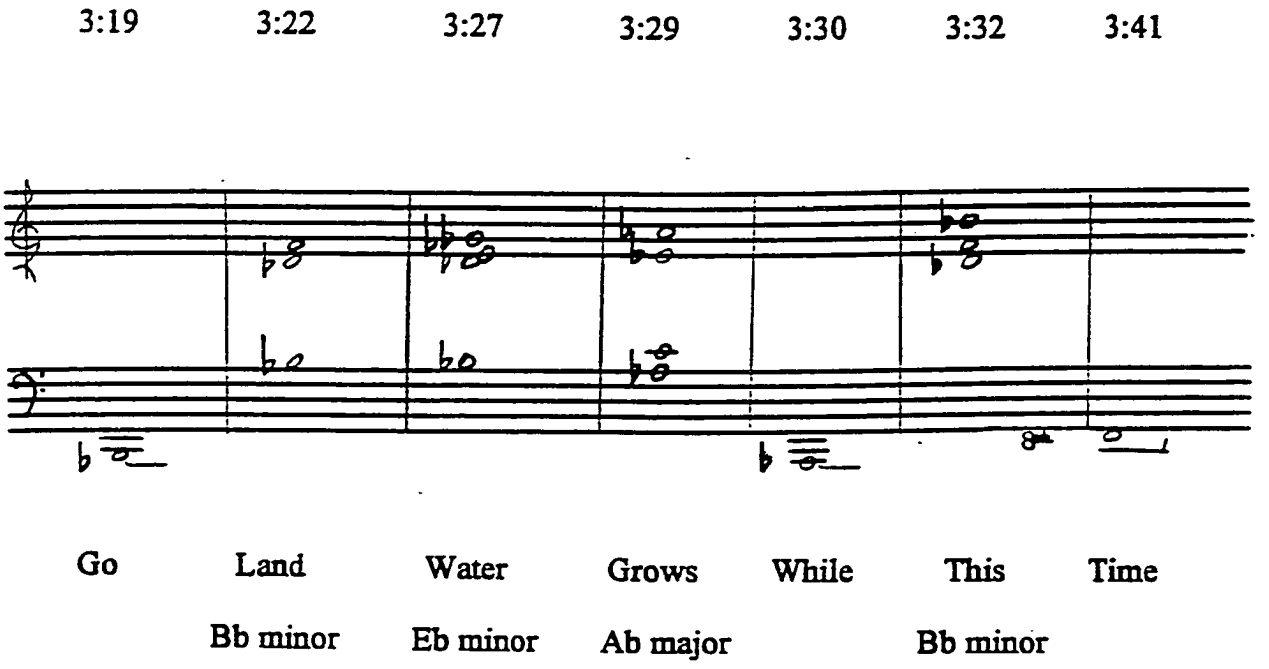
Example 6.10, *Word Color*

(Page six of the composer's sketches show the working out of pitch collections, bass notes and words for 3:18–3:32.)



Example 6.11, *Word Color*

(Ascending Bb minor, Eb minor 4/3, and Ab major chord progression, 3:18–3:32, and subsequent bass tones.)



subsection. This word is heard three times in fairly close succession and is set with either Eb or Gb bass tones. The bass tones, coupled with the marcato-like articulation of the word parallel the words "grass" and "go" at 3:09 and 3:19 respectively. Like "grass" and "go," "count" temporarily halts more florid activity.

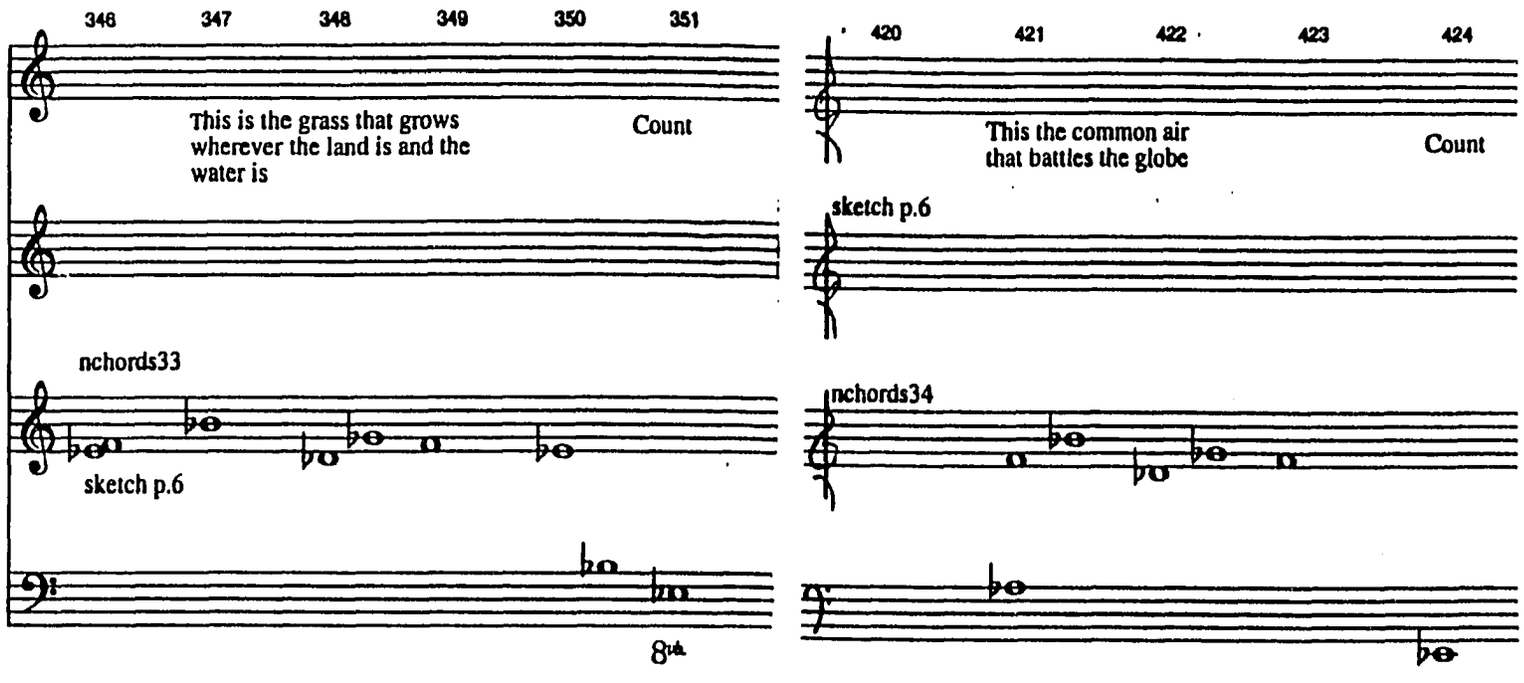
The combpluck accompaniment's melodic motives at 3:54 and 3:58 are TT apart, (356T) TT (1358). "Count" is quickly repeated at 4:03 with a Gb in the bass. The combpluck accompaniment is retained and will continue to be a consistent presence throughout this section. At 4:13 an Ab bass tone on "Be" is presented and will be answered by the punctuating Eb bass tone under "Count." The phrase segment at 4:21 answers the phrase segment heard earlier at 3:47. The low Bb on "All" (4:34) closes this subsection and ties in with "Go" at 3:19. Both the timbre and pitch create a sense of closure to this subsection (see example 6.12).

II/Subsection Two (4:45 - 6:40)

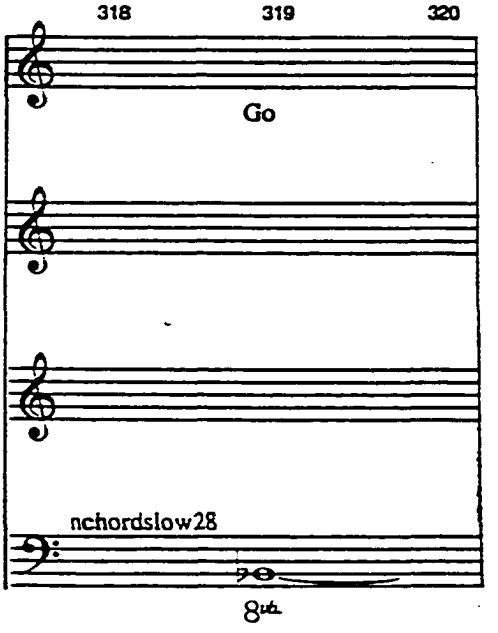
Subsection two consists of five pairs of text segments. These segments are connected to each other with both text and harmony. For example, the segment, "This the common air..." at 4:49 is set with a [T015] cluster. (These pitch classes were played melodically under the same text segment

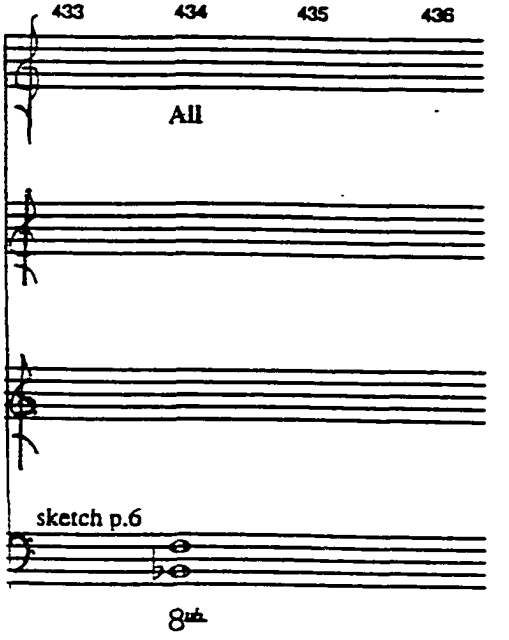
Example 6.12, *Word Color*

(Instances of parallel phrases; the phrase segment at 4:21 answers the phrase segment heard earlier at 3:47. The low Bb on "All" (4:34) closes this subsection and ties in with "Go" at 3:19. Both the timbre and pitch create a sense of closure to this subsection.)



Example 6.12, *Word Color* continued.





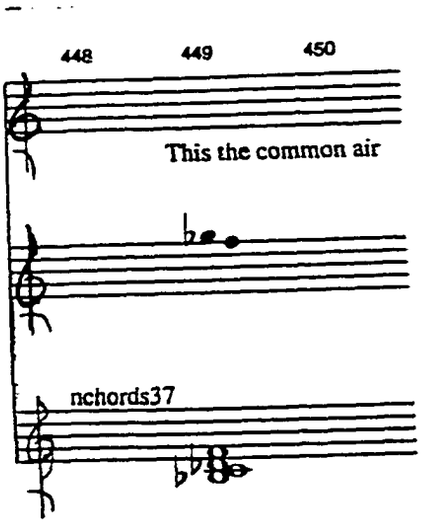
at 4:21 and under a different segment at 3:47.) At 4:58 this resolves to a Bb minor chord under, "that bathes the globe." At 5:10 an F minor seventh chord is heard under "These are really the thoughts ..." and is answered by that chord with a fuller version at 5:16 [80135] under, "of all men in all ages and lands." (see example 6.13).

From 5:06 to 5:08 there is a short break in the combpluck accompaniment. This is followed by a modulation in this part. Pitch classes [57T0] are heard and from 5:20 to 5:29, there will be a strong presence of pitch classes 0,5, and 7.

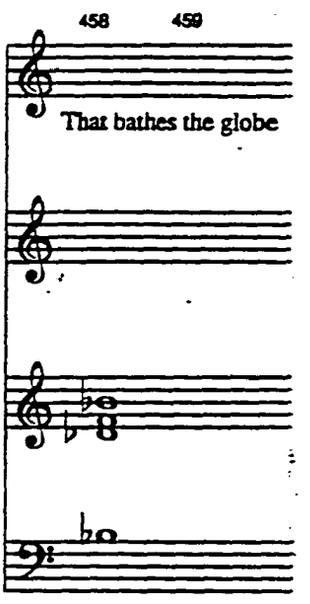
At 5:30 the combpluck accompaniment and text accompaniment move to B major, but resolve on B minor at 6:25. (There is a B major 6 chord with an added second under, "They are not...." at 5:33.) The corresponding phrase at 5:38 under "original with me" also has nonharmonic tones,among them C#, but the chord is in root position. This C# is resolved at 5:56 under "If they are not yours..." with a C# major chord functioning as a V/V. This harmonic implication is maintained at 6:04 with an [E136] cluster under "as much as mine." Pitch classes 1 and 6 are retained in a [124689] hexachord at 6:18. The audibly strong presence of pcs 1, 6, and 9, make this chord sound closest to an F# minor chord, thereby creating a quasi–dominant chord to the B minor seventh and ninth resolution at 6:25

Example 6.13, *Word Color*

(Pairs of text segments; [T015] resolves to a Bb minor chord, the F minor seventh chord is answered with a fuller version of itself.)

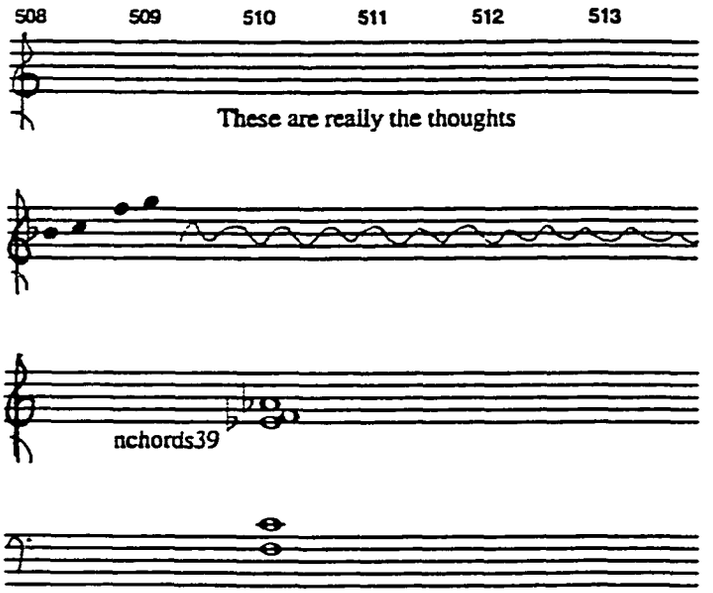


[T015]

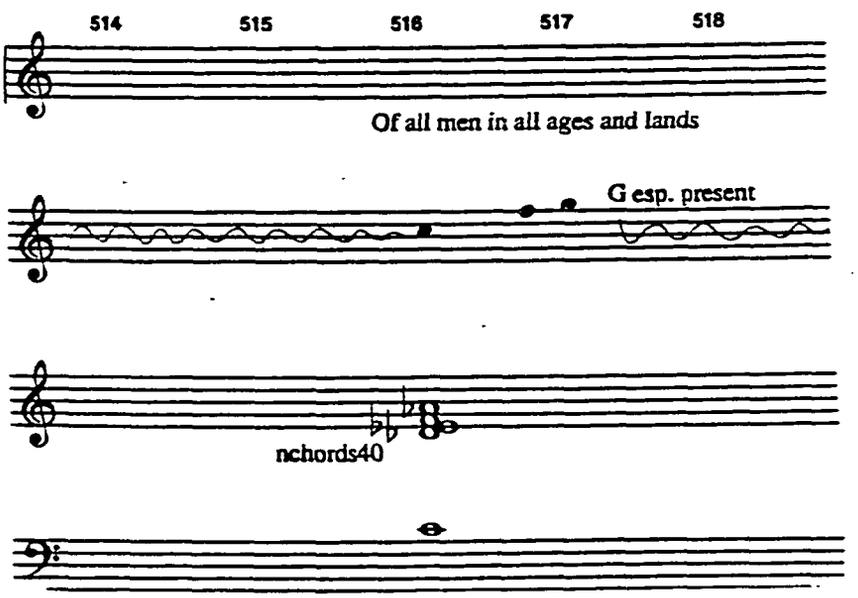


Bb Minor

Example 6.13, *Word Color* continued.



F Minor seventh chord



under "or next to nothing." The dominant harmonic quality is supported by the cadential figure heard in the combpluck accompaniment at 6:15. Here the combpluck accompaniment plays two major seconds a perfect fourth apart, 4-6, and E-1. The resolving chord is a [9E1246] hexachord with pcs E and 6 having a strong presence (6:25) (see example 6.14).

The octave doubling (of pc 9 in the B minor seventh/ninth chord at 6:25) is uncommon in this piece, and its occurrence under the last text segment of this subsection creates a definitive sense of closure.

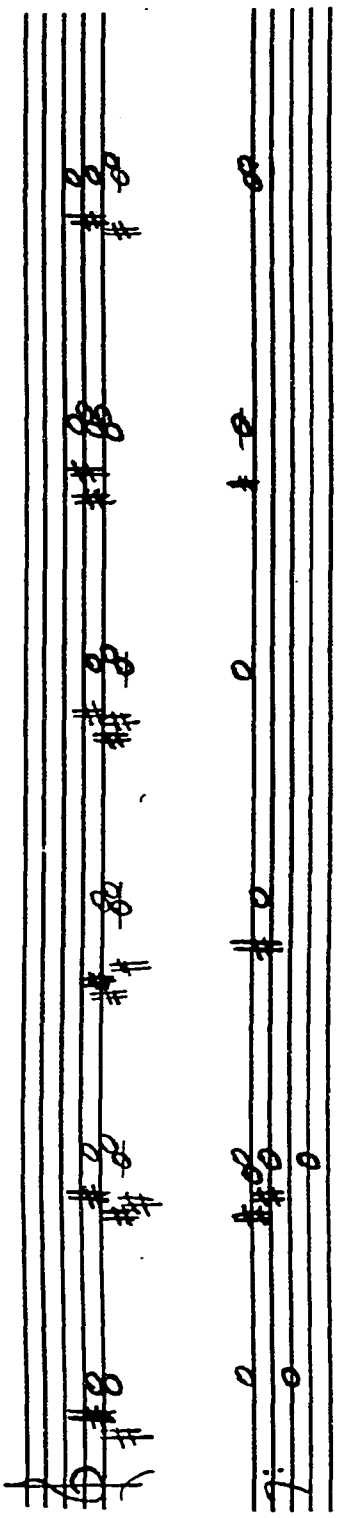
From 6:30 -6:40 only the combpluck accompaniment is heard, and its content implies a C# minor collection. Pitch classes 1 and 8 will be common tones with the material at the beginning of the third subsection.

II/Subsection Three (6:41 - 7:18)

Subsection three occurs slightly after the midpoint of the piece and recalls some salient features from the opening. This subsection is very brief, as it consists of four isolated words (Day, Born, Be, Time). These four words are supported by an accompaniment whose top voice creates a 5-6-8-T line. This melodic line is almost the same as the opening's melodic line. The word "Day" is supported by a [135] cluster. This is T1 from the opening cluster that supported the same word. This cluster is retained at

Example 6.14, *Word Color*

(Progression from 5:33 through 6:25.)



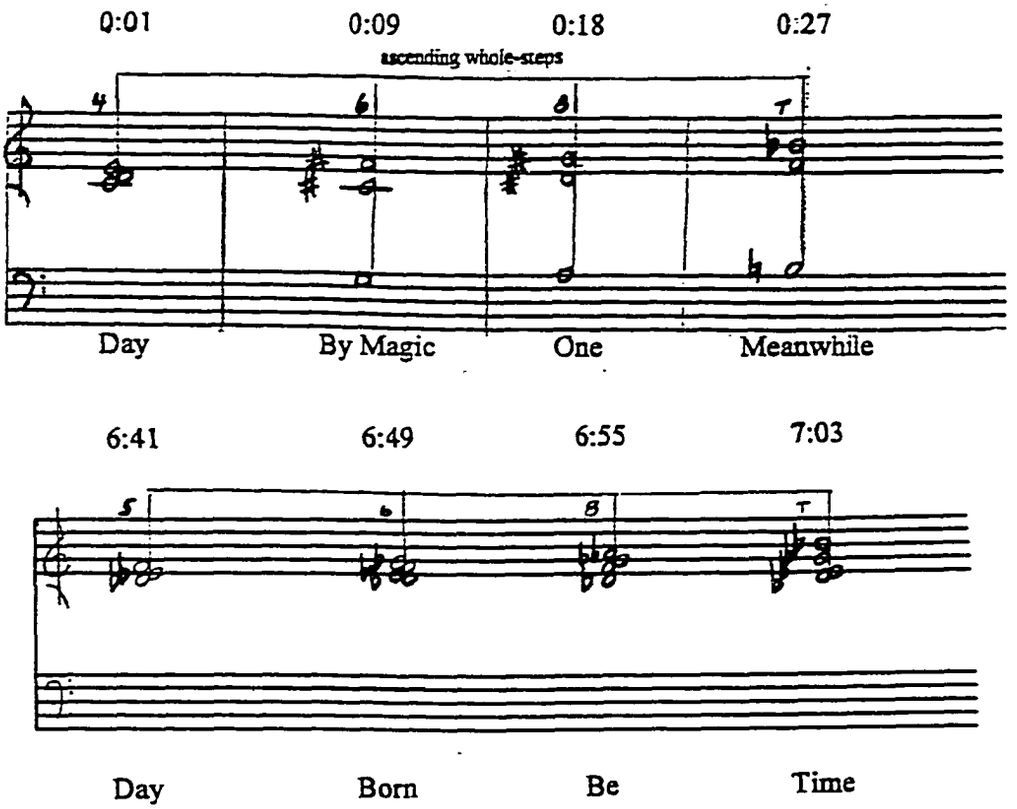
6:49 under "Born" and pitch class 6 is added in the top voice. This pitch class, as well those that follow it, make the remainder of the top line in this subsection the same as the topline in the opening. "Be," at 6:55, is supported with pcs [1568] and "Time" with [T136] (see example 6.15). with a [056] trichord.

At 7:33, "and the untying of the riddle..." has a [278] trichord, transposed up a whole-step from [056]. The combpluck accompaniment shifts to a B major tonality at 7:39. Shortly thereafter, the segment "they are nothing" at 7:45 is heard with a [9E146] pentachord, and is linked with the combpluck accompaniment, as pc E is the lowest note. This is followed by two paired text segments, the first of which is consistent with the established pitch collection. The second pair, however moves away from this collection and by doing so, creates a transition to the last subsection of section two (see example 6.16).

The two subsections that follow are the most rhythmically active of the piece. Subsection three is a marker for the climax of the piece.

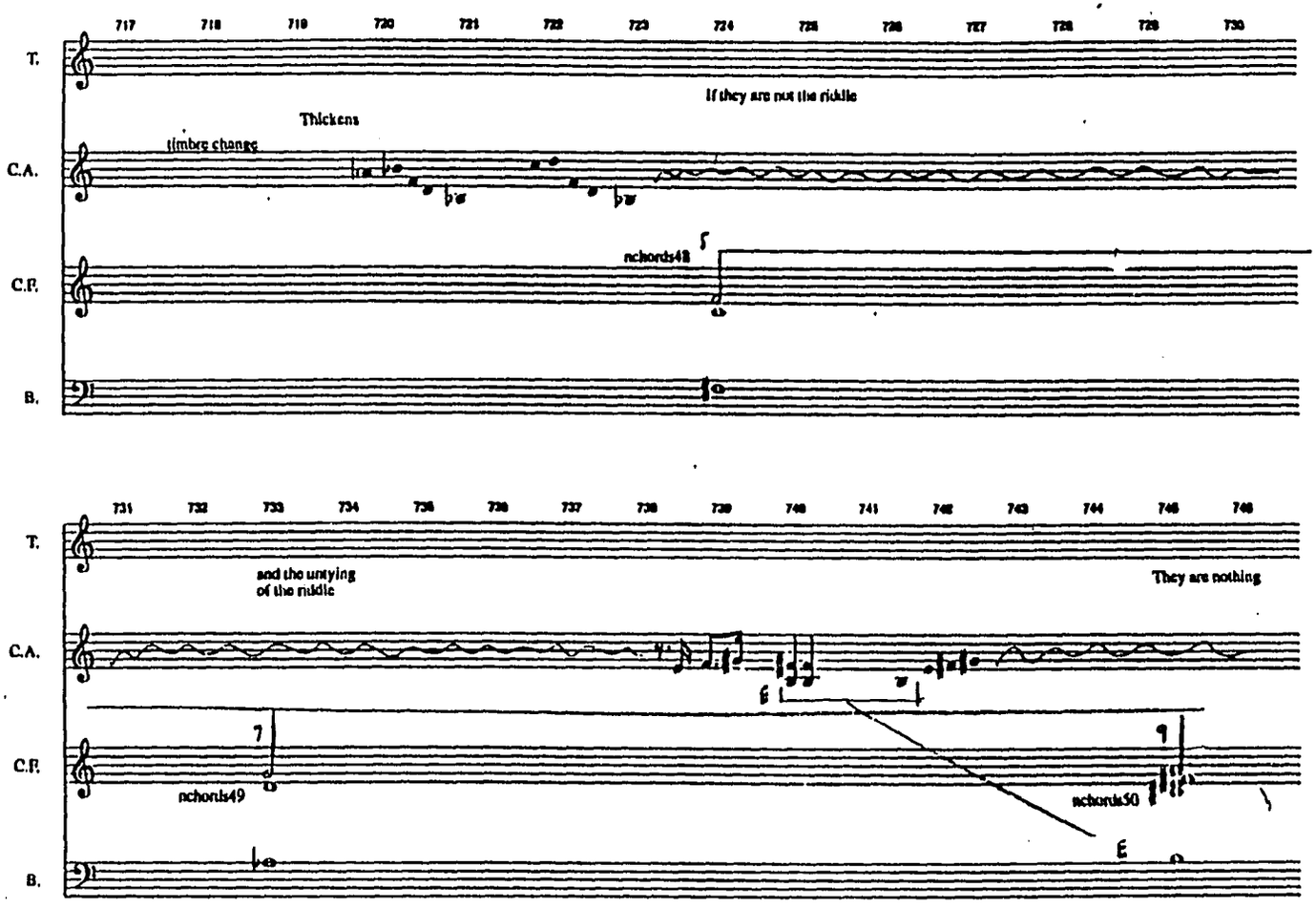
Example 6.15, *Word Color*

(6:41 through 7:03 recalls the opening of the piece and precedes the composition's climax.)

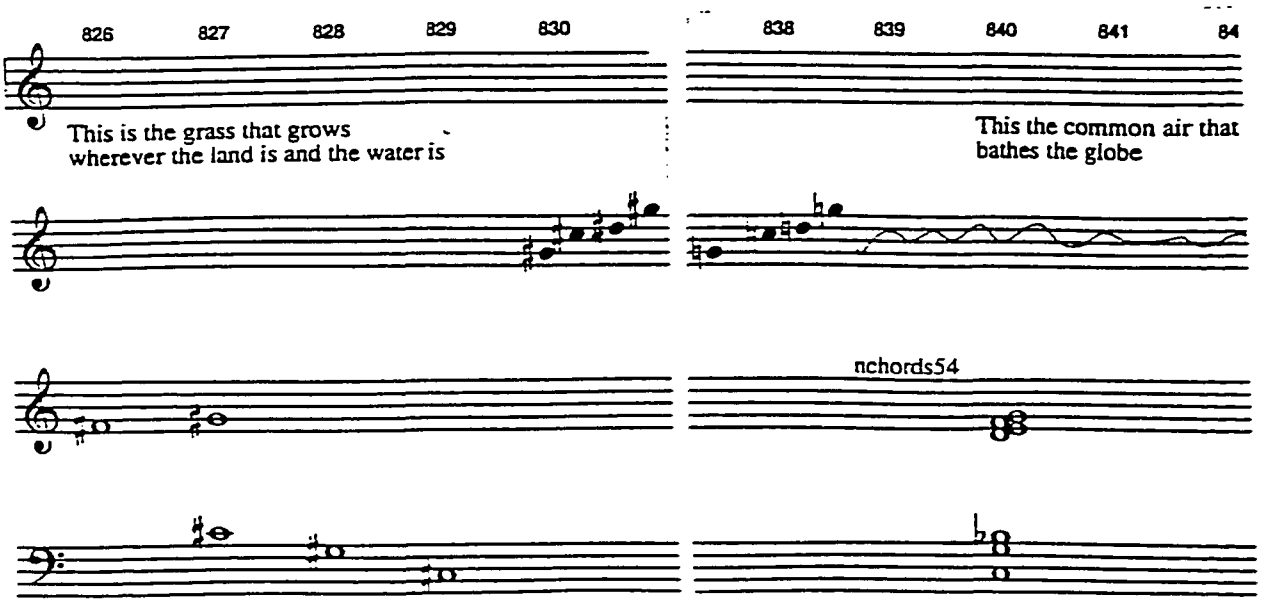


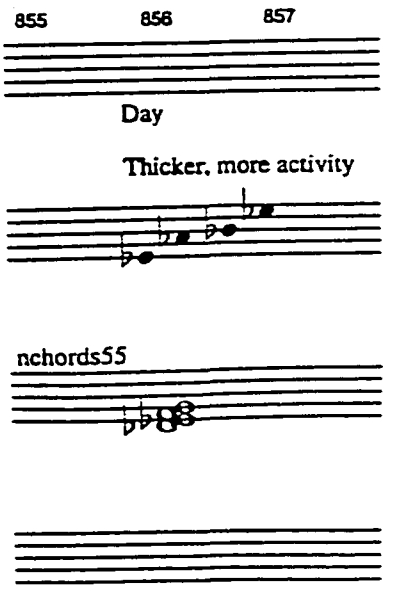
Example 6.16, *Word Color*

(The first three text segments are unified and create an ascending line, 5-7-9, and pitch class E links the combpluck and vocal accompniment parts. The paired text segments at 8:27 and 8:40 provide a transition to the next section.)



Example 6.16, *Word Color* continued.





II/Subsection Four (7:19 - 8:55)

This subsection focuses on larger and more numerous text segments. It begins by establishing a Bb major tonal center, which shifts to B major and eventually to C major. The initial Bb tonality is established by the combpluck accompaniment which introduces Bb in a rhythmic motive. The first three text segments are unified and create an ascending line, 5-7-9. The first segment, "If they are not the riddle..." heard at 7:24, is supported

At 8:00, the segment "if they are not just as close as they are distant..." is supported with a [1368] tetrachord, which moves to [9E146] under "they are nothing" at 8:14. Also at 8:14 are low B bass tones. This last segment and its accompaniment are from 7:45. The concluding pair of text segments is begun at 8:26 with, "This is the grass that grows wherever the land is and the water is." It is harmonized with [681], the same pitch classes heard in the combpluck accompaniment. At 8:41, this subsection is concluded with [T02457] under, "This the common air that bathes the globe." The voicing of the hexachord resembles a C dominant seventh chord, and thus it is heard as an applied V/V to the Bb pedal point in the subsequent section.

II/Subsection Five (8:56 -- 10:38)

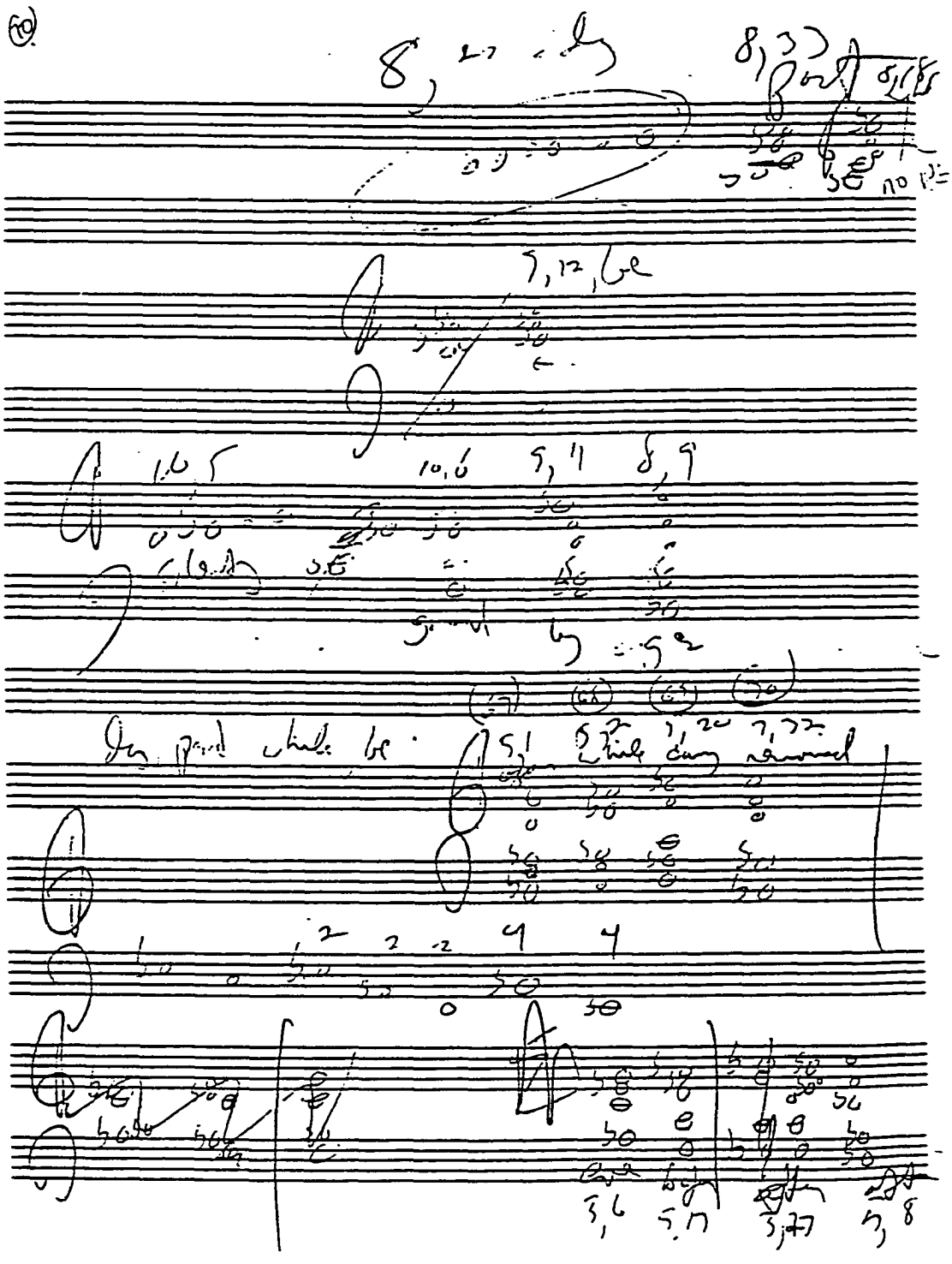
This subsection represents the apex of rhythmic activity for the piece, and from this point forward, only isolated words will be heard. Also notable is the prolonged Bb pedal point at 9:47 which is concluded with an Eb chord at 10:17. This subsection, however, ends with a Bb chord at 10:34.

Page ten of the composer's sketches shows a chord progression for this subsection (example 6.17). It is clearly audible that a much simplified progression was used in its place. This may have become necessary due to the dense texture of this subsection. Lansky has often commented that using complex chords and pitch collections can sound "muddy" in a busy texture.

The word "Day," with its accompaniment, serves once again as a structural marker in the piece. "Day" opens this subsection with a whole tone cluster, [1357] tetrachord at 8:56. The three note cluster at the bottom of this tetrachord was heard at the opening of the third subsection, 6:41(which was T1 from the opening). The pitch class 7 that is heard above the cluster begins a melodic line comprised of (7-8-T-0). In this instance, the occurrence of "Day" with its pitch classes signals that the piece is nearing its conclusion (see example 6.18).

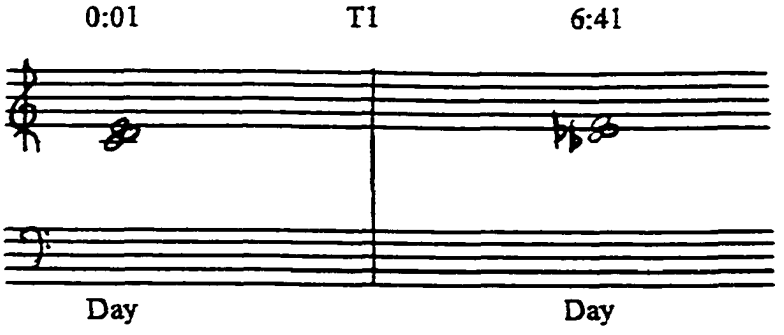
Example 6.17, *Word Color*

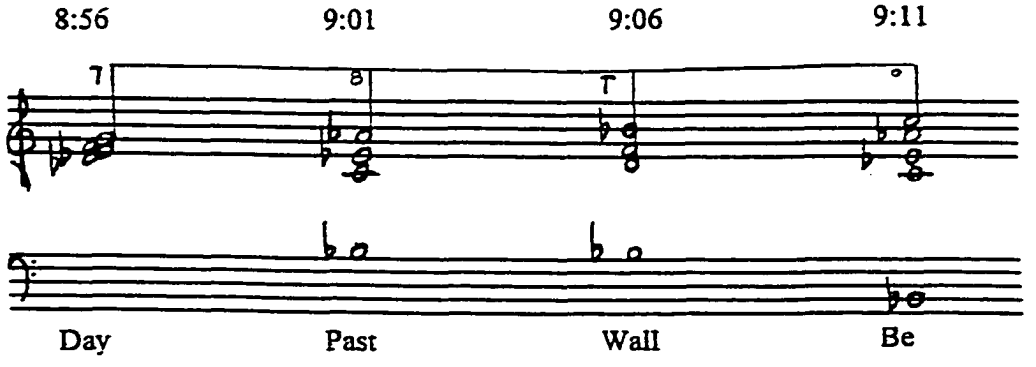
(Page ten of the composer's sketches.)



Example 6.18, *Word Color*

(Occurences of the word "day" are linked to each other and serve as a structural maker in the piece. "Day" opens this subsection at 8:56 with a whole tone cluster, [1357] tetrachord. The three note cluster at the bottom of this tetrachord was heard at the opening of the third subsection, which was T1 from the opening. The pc 7 that is heard above the cluster begins the melodic line comprised of 7-8-T-0.)





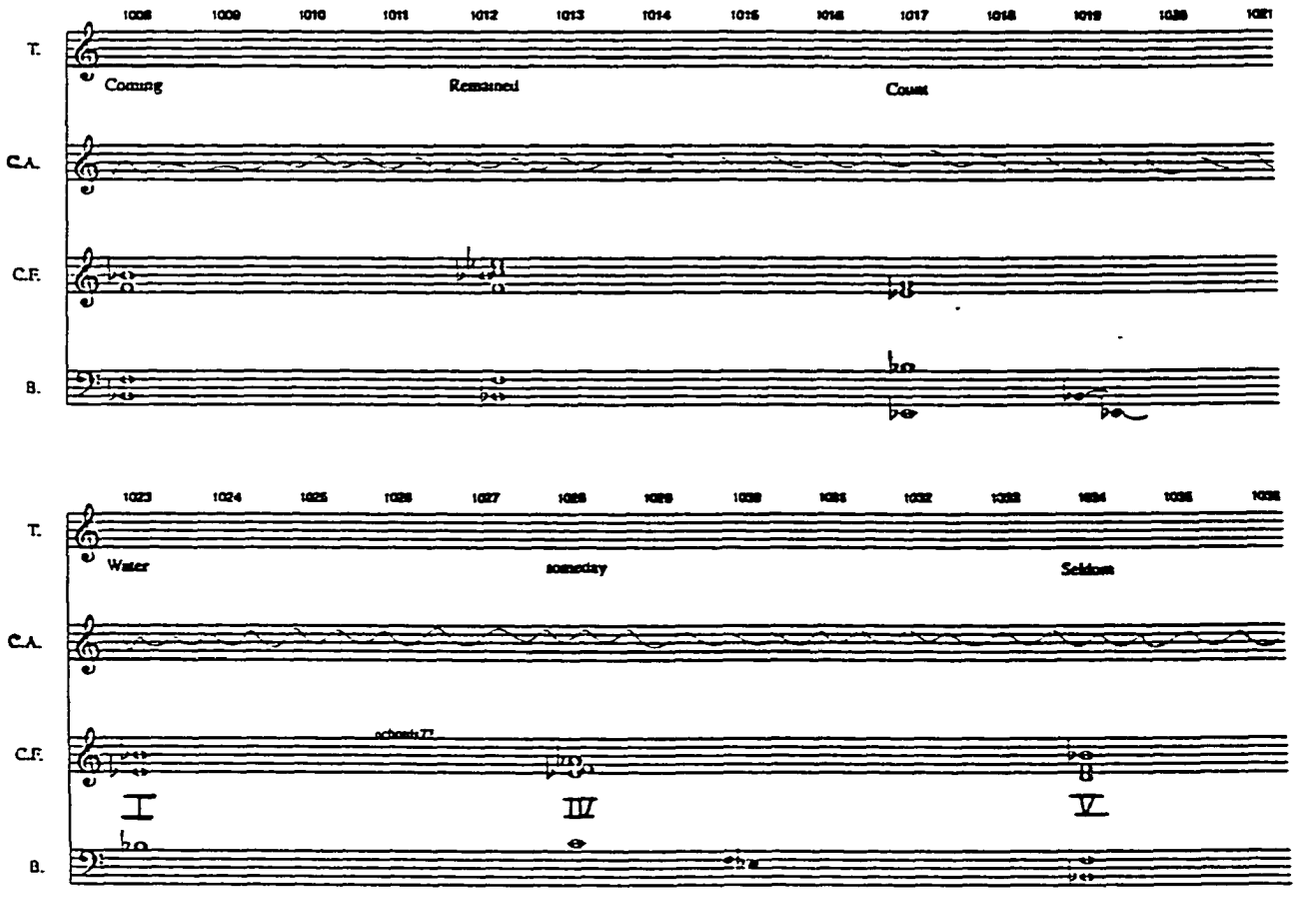
At 9:01, "Past" is heard with [8T03], implying a suspension that will be resolved with the Bb major triad at 9:06 under "Wall." The next harmonies move between chords that function as Ab major and Bb major and build a IV-V-I progression, with Eb arriving at 10:17. This portion of the piece is the most tense as well as the most goal-oriented due to the pedal points, subsequent harmony, and the accumulation of activity in the combpluck accompaniment. When Eb arrives at 10:17, the tension of this subsection begins to dissipate. A brief reiteration of I-IV-V follows at 10:23, 10:28 and 10:34 respectively, and the combpluck accompaniment ceases (see example 6.19). At 10:41, the final section of the piece begins.

SECTION THREE (10:41–12:45)

The third and final section of the piece repeats an ascending four note melody (3-5-6-8) eight times with harmony that changes, and eventually, grows more full with each repetition. The composer states that this idea of was inspired by Georges Bizet's *L'Arlesienne* Suite. As was the case with the line spanning 0:36 through1:05, this is a whole, half, and whole step progression (see example 6.20). The use of isolated words, absence of combpluck accompaniment, and harmonic texture effectively link this closing section with the introduction. Initially parallel fourths are used under "come," "body," "ever," and "while" (10:41-10:52). In this opening

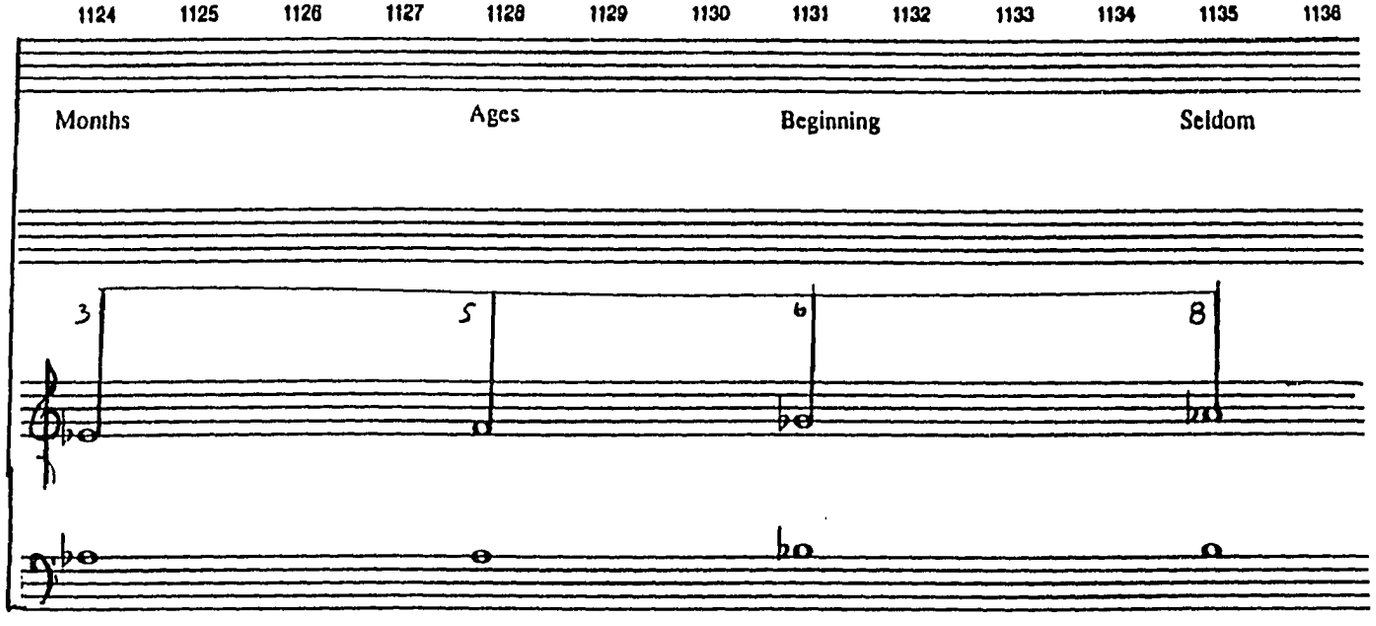
Example 6.19, *Word Color*

(The arrival of Eb at 10:17 dissipates tension and is followed by a I-IV-V progrssion. This concludes section two.)

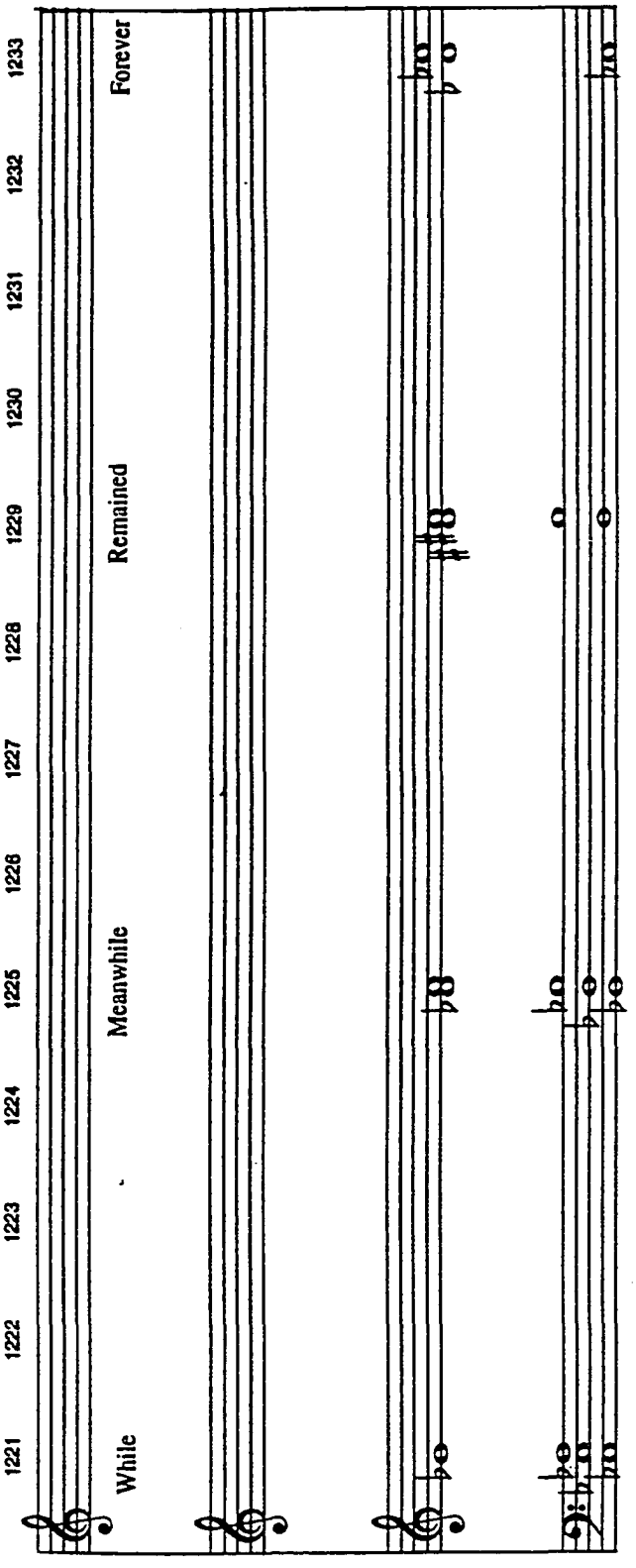


Example 6.20, *Word Color*

(The third and final section of the piece repeats an ascending four note melody, 3-5-6-8, eight times with harmony that changes, and eventually grows more full with each repetition. This melody is T5 from 0:36 through 1:05.)



Example 6.20, *Word Color* continued.



segment, the lower note of the interval is much more audible than the top note. The top notes of the following segments have a much stronger presence. There are major and minor thirds used in the next melodic segment that imply Cb and Db triads (10:55-11:06). At 11:10, a perfect fourth is heard again under "on," but is followed by two tritones and a perfect fifth. A perfect fifth is also the first interval of the next melodic segment, beginning at 11:24. This segment continues with minor and major sixths until 11:38. The segment at 11:38 repeats the intervals heard at the beginning of this section, though with different words and a stronger sounding melodic articulation. This repetition may be intended to indicate a half-way mark in this section and the commencement of another four segments. The following segment at 11:52 begins and ends with a tritone. The tritone that closes this segment is resolved by the opening harmony of the following segment. There are more full harmonies employed for the final two segments commencing at 12:07 and 12:21 respectively. The penultimate segment is bracketed by Ab/G# harmonies. "On" at 12:07, receives octave doubling as well as an Ab7 embedded within the octave. The octave doubling of the melody continues throughout this segment with additional notes added to create a harmonic progression. The second and third chords contain tritones which are resolved in the E major chord that

closes this segment.

The final segment begins at 12:21 with two perfect fifths an octave apart (Ab and Eb). This interval and low bass register create an ominous quality that will be enhanced by the subsequent harmonies. At 12:25 an F#7 chord is heard and is followed by a B major chord. The pitches Ab/G# and Db/C# close the piece under the word "forever." This open fifth successfully creates a sense of "ringing-out into space," as was the composer's intention.

Chapter Seven

Conclusion

Each of the pieces discussed in this paper is based upon a recording of a single voice reading a text: and in the case of *The Waves* also uses extended vocal techniques. This reliance on a single reader allows for a certain degree of homogeneity in the timbre of the material as well as a very personal rendering of the given text. In each of the three pieces, the text is of a high quality and its meaning is important to the composition.

The human voice is perhaps the most intimate, familiar, and yet complex of all musical instruments. The computer is, at present, the tool that offers the freshest reservoir of musical potentialities. Charles Dodge and Paul Lansky are drawn both to the voice's many attributes and to the new and challenging possibilities offered by the computer. Computer programs such as voice synthesis by analysis and phase vocoding, to name but a few, may magnify, augment or even distort the natural traits of the subject's voice allowing for a wide range of musical possibilities. Consequently, Dodge and Lansky believe that the human voice has a tremendous store of musical qualities that can be highlighted, and "played," (like a musical instrument) with the various capabilities of the computer – that computer music

technology can be used to bring out musical and expressive qualities inherent in the voice, but not always apparent in its unmodified state. Paul Lansky has often stated, with regard to his speech-based pieces, that the computer allows for "explicating the implicit music within [speech]." [1] The analyses included in this paper demonstrate that Paul Lansky and Charles Dodge have successfully ventured into new musical territory in this genre. Lansky and Dodge have composed pieces of outstanding quality created with tools that are both the most familiar (the voice) and the least familiar (the computer).

Paul Lansky

Paul Lansky's motivation for creating speech-based computer music compositions almost exclusively with Hannah MacKay is the exceptional quality of her voice as well as the familiarity that he has gained from working with her so consistently. "I think she records very well. I really like the way she reads and the way she works. It was interesting in that way, to be able to just constantly develop – I know the parameters I have to use in order to analyze the pitch contours of her voice, I know how to

---

1 Paul Lansky, liner notes for *Six Fantasies on a Poem by Thomas Campion*, (New York: Composers Recordings
Incorporated, 1982) (2-7) [2].

synthesize it and I know how to work with it." [2]

This composer also hears beauty and musical possibilities in everyday sounds. Some of the other everyday sounds that he has used in his compositions are overheard conversations (the *Idle Chatter* pieces), and his children banging on pots and pans (*Table's Clear*), to name but a few. He is interested in writing music that will enhance the aural appeal and inherent musicality that he hears in these sounds. This is done to facilitate sharing his musical view of the world with an audience.

Lansky will also use relatively tonal harmony in a number of his computer music pieces. This is to allow the listener to focus on texture and timbre. The composer explains his motivation for using tonal harmony in the following statement: "My idea essentially is that you're traveling someplace new, but you have some familiar friends with you that help you view the landscape."[3]

Charles Dodge

In describing the various factors that led to his initial motivation for creating "speech music," Dodge cites having been favorably impressed with the work of the Swedish "text-sound" composers that he had heard, being

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2 Personal Interview with Paul Lansky, lines 156 - 164.

3 Personal interview with Paul Lansky, Appendix D, lines 150-153.

drawn to Mark Strand's poetry, and, perhaps most importantly, wanting to integrate more of his own personality with his music.[4] On the last point, Dodge states,

> It was in the early 1970s that I began to discover how to get more of myself into my music. I was trying to do very abstract things up to that point. Suddenly, when I could get the computer to talk it became very personal, and it was my own voice after all. The *Speech Songs* are based on a recording that I made of Strand's poems. In making those pieces it was as though I was getting myself to talk. [5]

Dodge also describes his attraction to the Mark Strand texts, "That first poem ['When I am with you'] is just perfect. It starts, 'When I am with you, I'm two places at once,' and the idea is that the line itself is doing two different things. It's articulating speech while it's pitched."[6]

In composing *The Waves*, Dodge did not use voice synthesis because he wanted the qualities of Joan La Barbara's voice to take center stage. Therefore, the composer used programs that would highlight her voice, thereby retaining the timbre and expressive interpretation made by La Barbara and, at the same time, create a full sounding composition completely based on those attributes.

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4 Ed M. Theiberger, "An Interview With Charles Dodge," *The Computer Music Journal* 19/1 (1995): 11-24
[15 -22].
5 Ibid, 22-23.
6 Ibid, 21.

Dodge also uses a richly complex pitch class structure that deliberately veers away from tonal references. This tendency is especially apparent in *In Celebration.*

Comparison of Stylistic Approaches

While both Charles Dodge and Paul Lansky have composed a substantial number of speech–based computer music pieces, their stylistic approaches and goals are quite distinct. The most fundamental difference is in the sound world that the composers make for their pieces. Paul Lansky endeavors to enhance "real–world" sounds, while Charles Dodge creates an "other–worldly" soundscape in his pieces.

The other–worldly quality sometimes attributed to Dodge's pieces is due, in part, to the fact that the composer will sometimes create a synthetic voice which carries many human characteristics, but can sing and speak in a manner completely impossible for a human voice to perform (as heard in *Speech Songs* and *In Celebration*). This builds a fascinating dichotomy into his sound world. Many of the other sounds that Dodge uses also have no apparent physical correlate in an acoustic palette (the sine tones in *The Waves,* for example).

Paul Lansky has a strong affinity for the sounds that we hear in our day to day lives. The liner notes to his *Homebrew* compact disk state:

> It is his fundamental contention that while computers may be able to create worlds of new sounds, nothing is ultimately as interesting as the sounds of the world around us – sounds which have some physical relation to the ways in which we go about the business of living. [7]

Predecessors and Successors

Prior to the advent of speech based computer music, there were tape music composers who successfully used speech to create their pieces. Among the better known examples of this musical genre are Luciano Berio's *Thema, Omaggio a Joyce* (1958), Steve Reich's *Come Out* (1965), and Alvin Lucier's *I Am Sitting in a Room* (1969).

The composer Katherine Norman has discussed the impact that Lansky's music has had on her own compositions and has compared Lucier's *I Am Sitting in a Room* with Lansky's *The Lesson.* [8]

In *I Am Sitting in a Room*, Alvin Lucier records himself listing and describing what he is doing in order to create this composition. The composer then re-records himself in the same room, and the result is an accumulation of reverberating frequencies. [9] Norman writes:

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7 Paul Lansky, liner notes for *Homebrew*, (New York: Bridge Records, Inc., 1992) .

8 Katharine Norman, "Real-World Music as Composed Listening," *Contemporary Music Review* 15/1 (1996): 1-27.

9 Katharine Norman, "Real-World Music," 12.

> His words refer soley to a description of what we will hear. We recognize and process speech, we may reflectively contemplate the musical qualities of its patterns but in an informative rather than interpretive context. As the work progresses the reflective aspects of real-world listening take over, the context expands to encompass both 'demonstration' and musical 'performance', and our engagement with pitches, rhythms and timbral resonances is successively heightened. Yet all these phenomena happen simultaneously and our referential attention to words is imaginatively redefined. When the work ends, 45 minutes later, we are left in no doubt that *Lucier*-intended listening has directed our own intent. But we're also in no doubt that our intent made music from what we heard.... but our willing suspension of disbelief enables us to appreciate more fully the musical attributes of a natural phenomenon.[10]

Norman then compares Lucier's piece with Lansky's composition, *The Lesson* (a computer-music composition based upon J.K. Randall's voice discussing his views on Beethoven and Mozart). She states that like Lucier, Lansky is engaged with compositional activity that interacts with, rather than radically transforms, the being of the speech. She explains, "A great deal of *The Lesson's* attraction lies in the resilience of the source. As in other speech-based works by Lansky, we certainly come to perceive speech differently, reveling in its rhythmic and spectral content in a manner which enriches its being..."[11]

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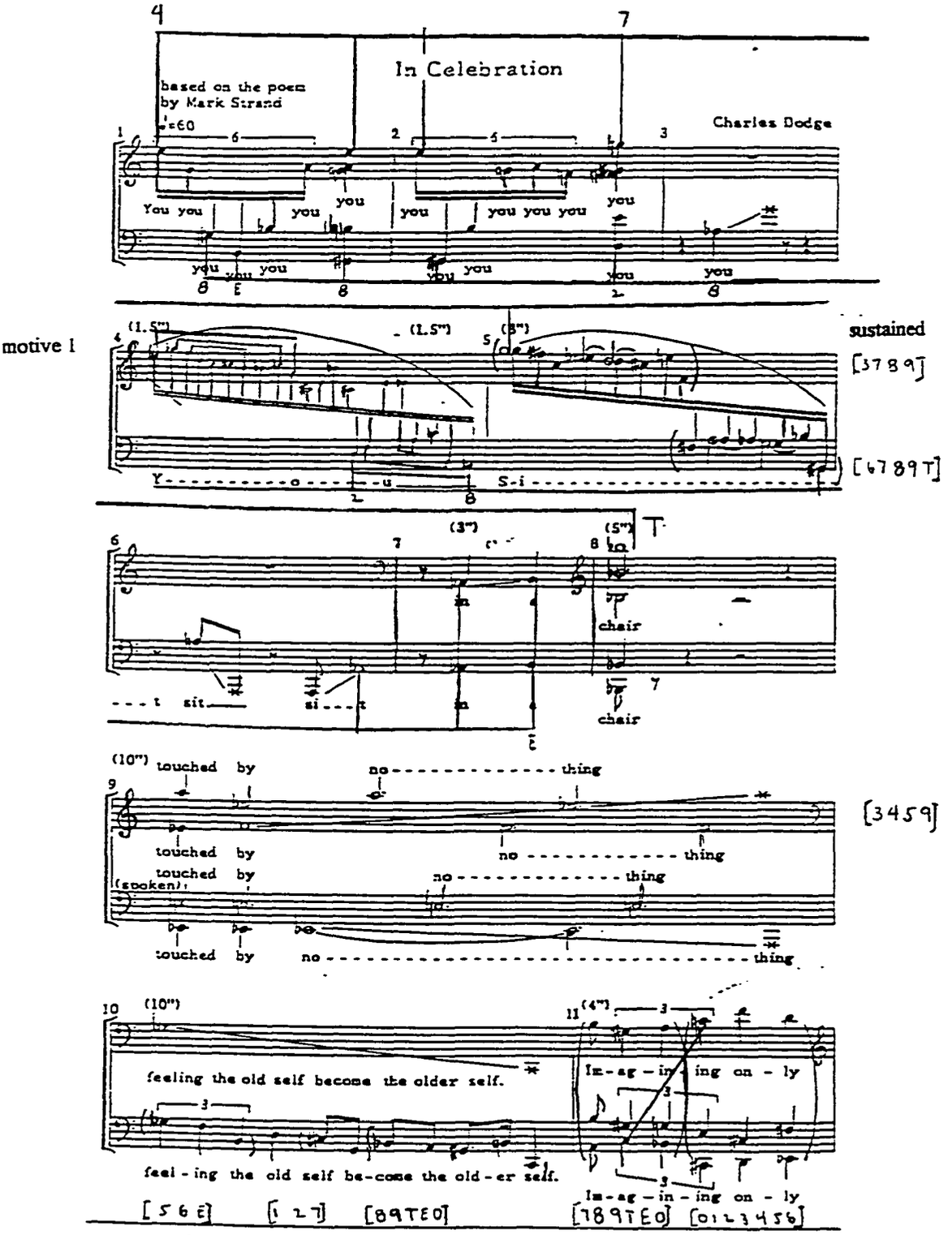
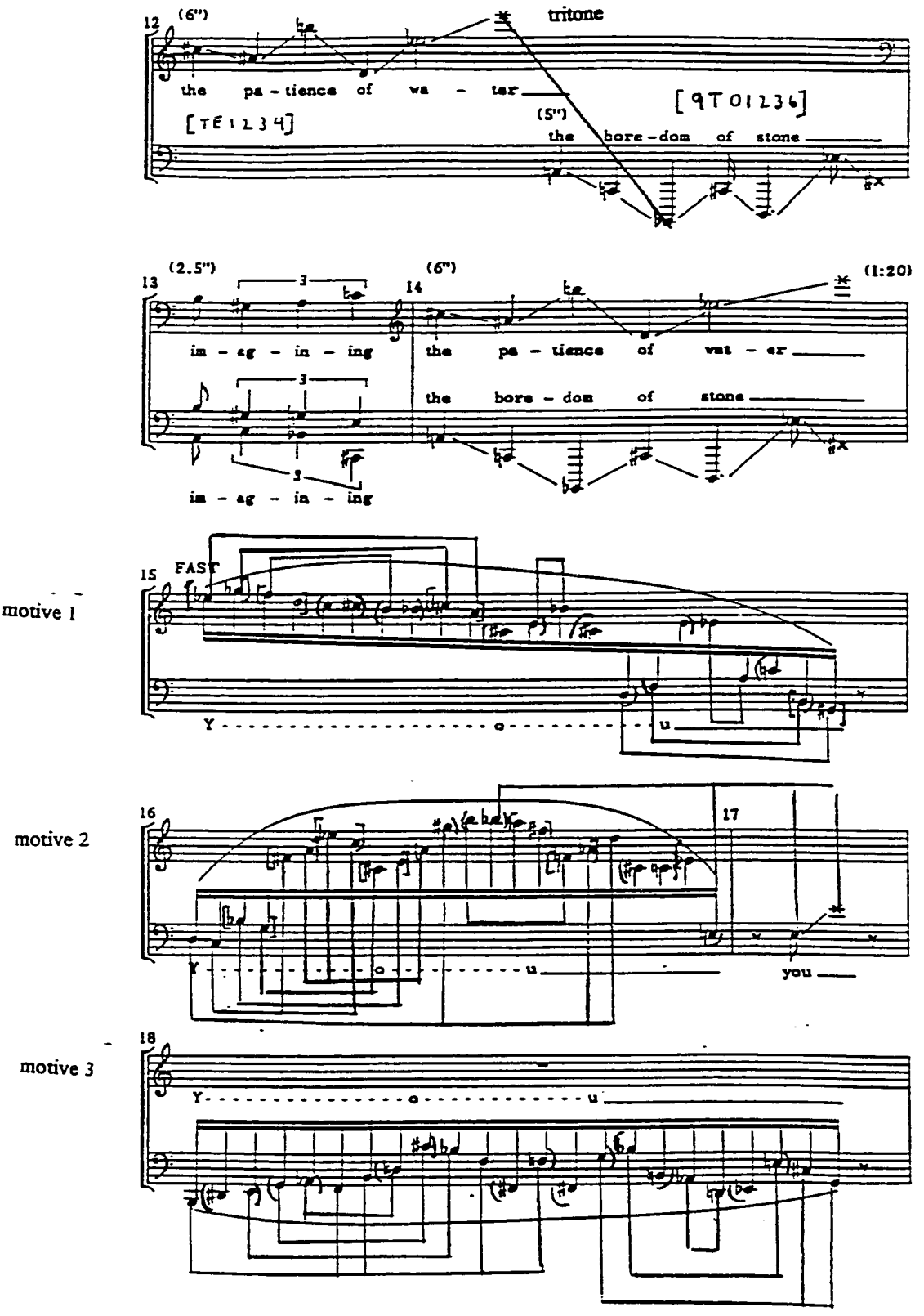
[10] Norman, "Real-World Music," 12-13.

[11] Norman, "Real-World Music," 15.

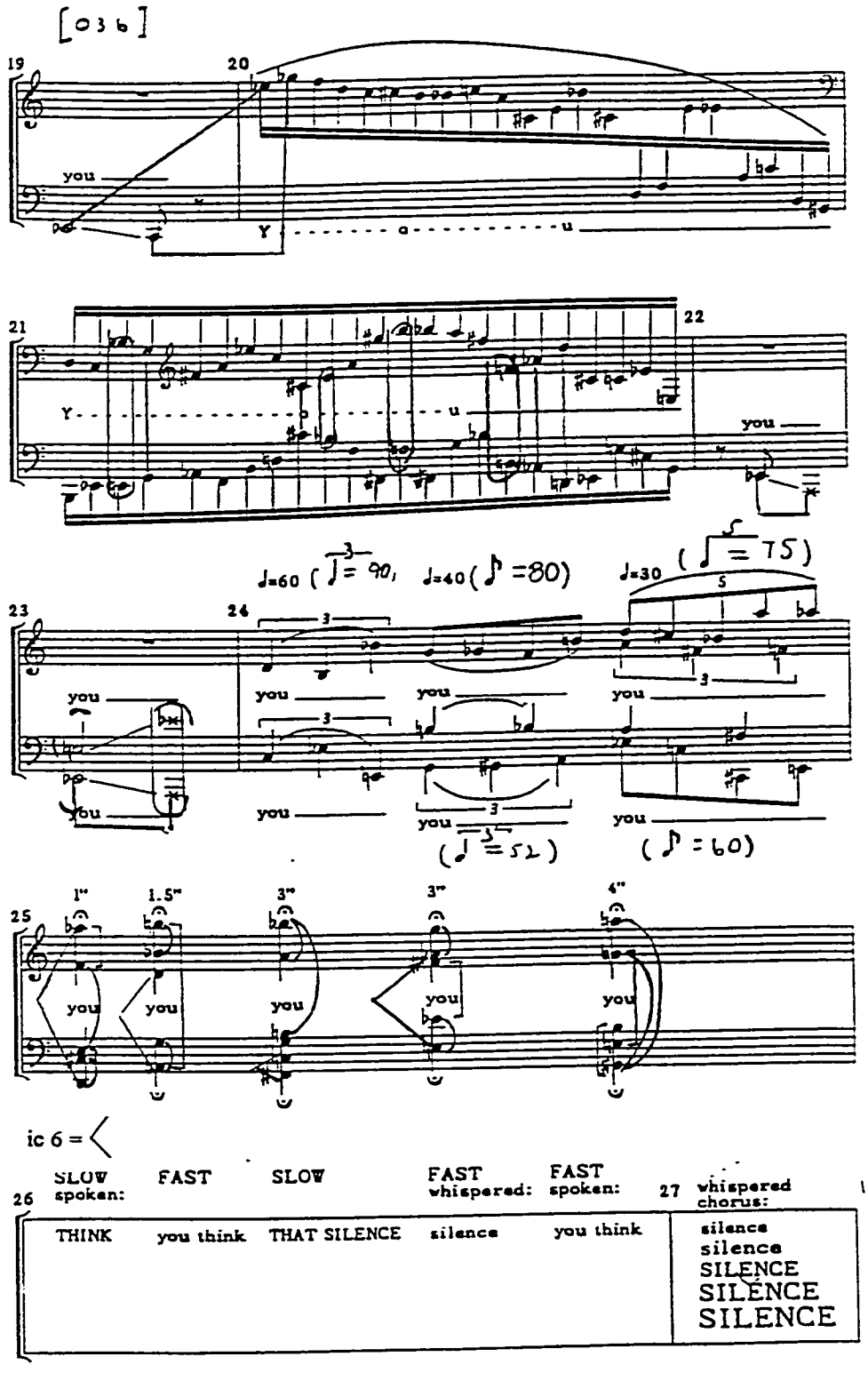
APPENDIX A



Score of *In Celebration*, a musical composition by Charles Dodge (available on CRI record number SD348). Copyright © 1975 Charles Dodge. Cape North Music. Used with permission.



ic 1 = ( ) / ic 3 = [ ] / ic 6 = ⌊⌋

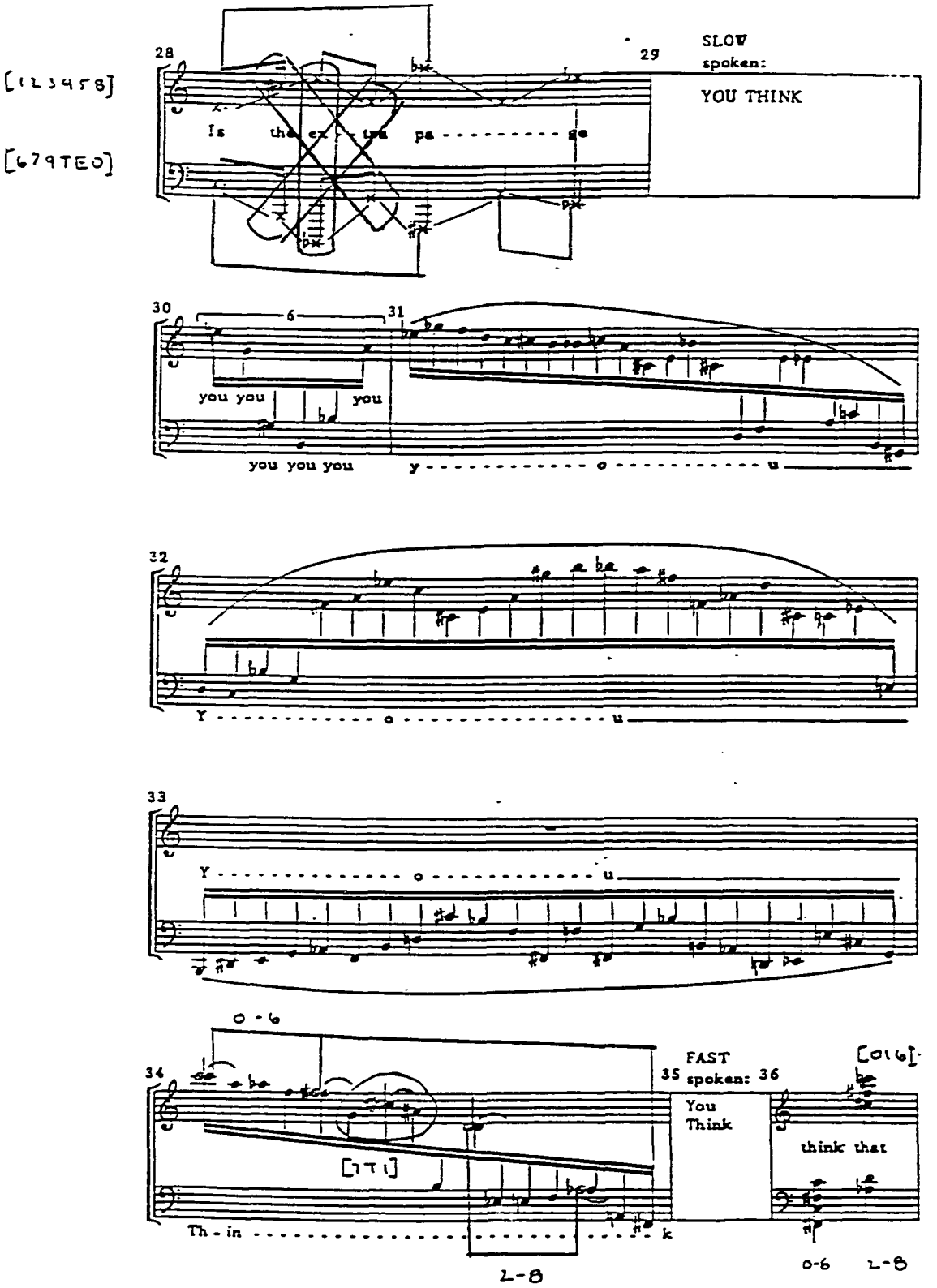


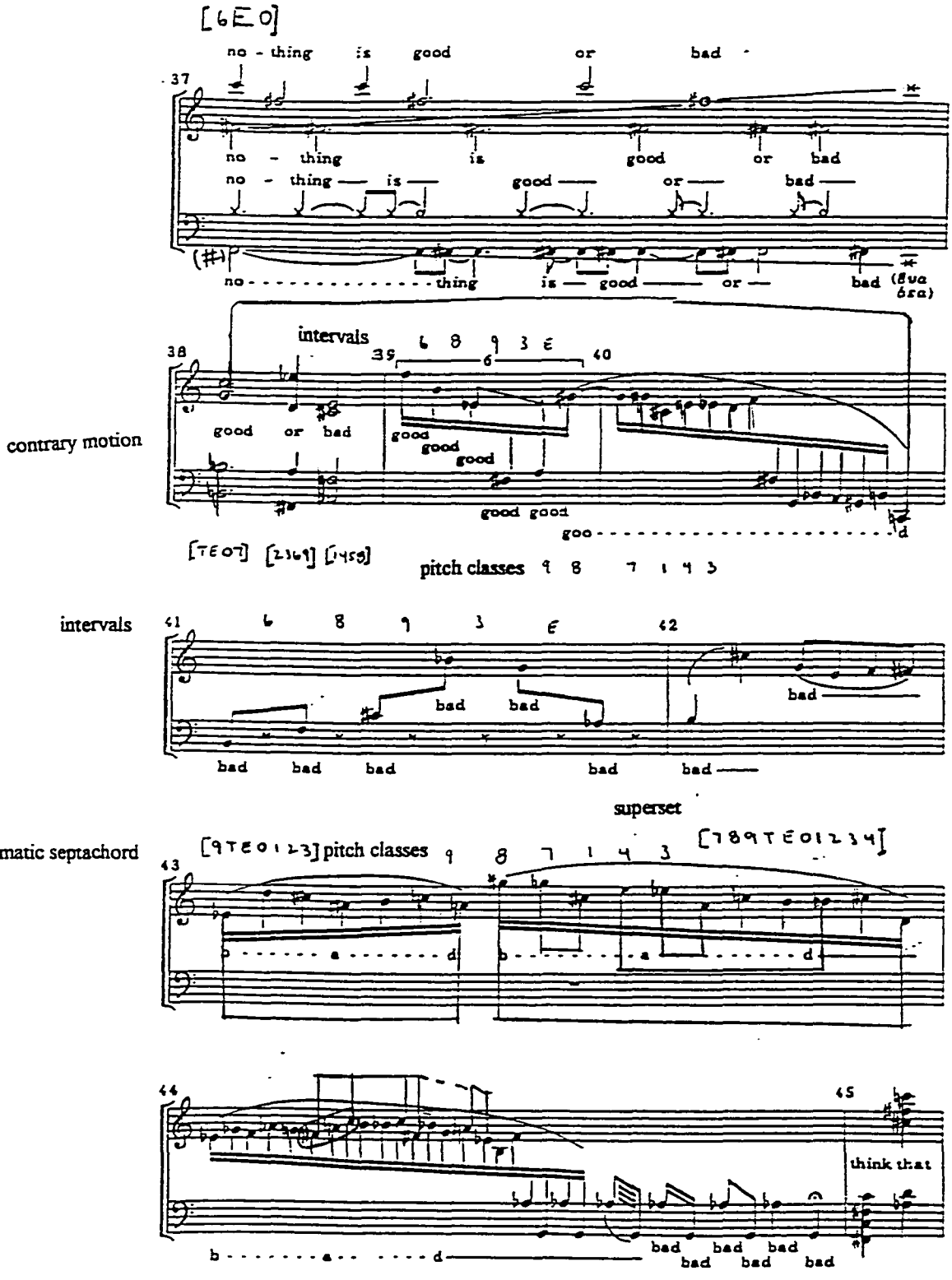
ic 6 =

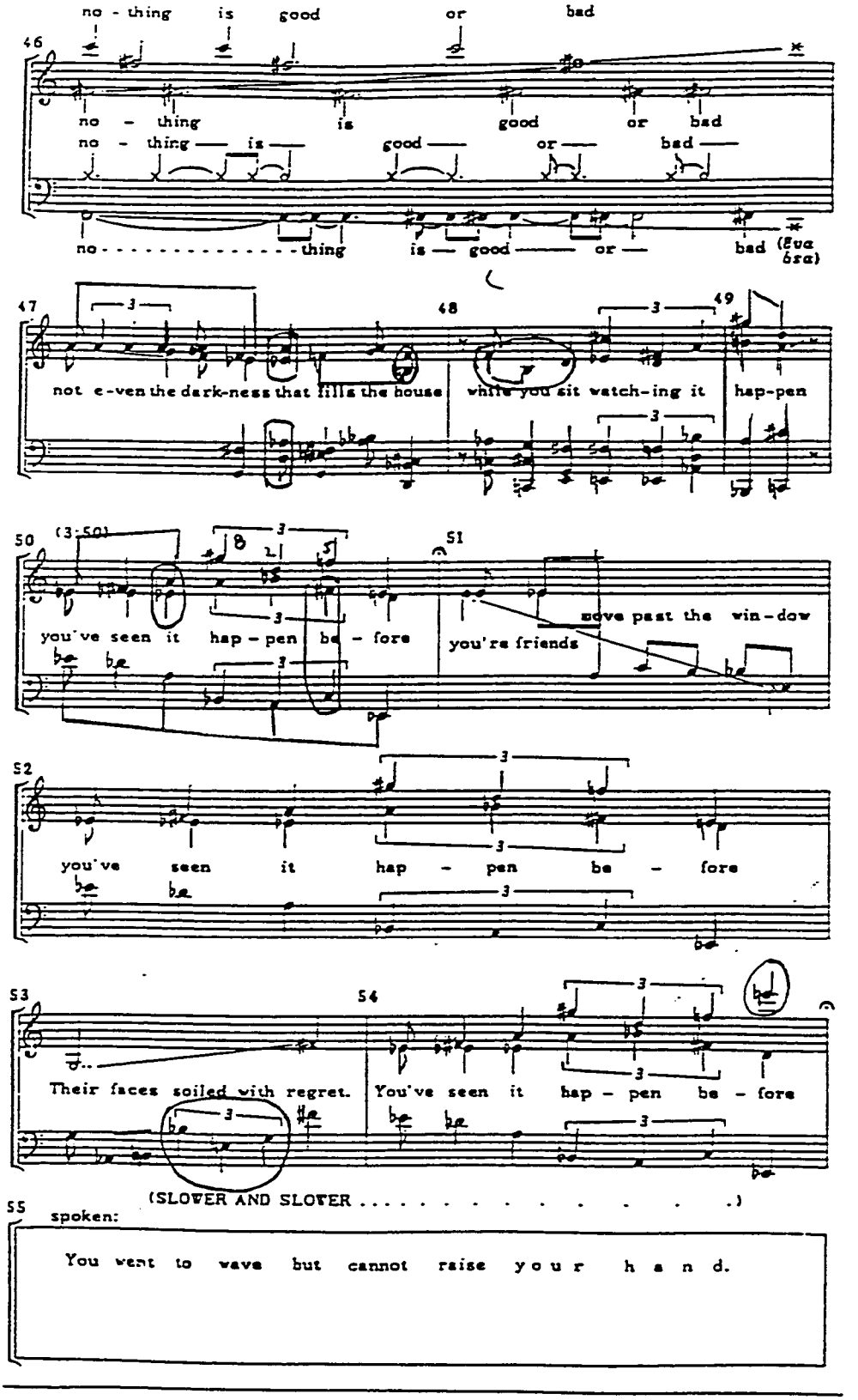
26 SLOW spoken:	FAST	SLOW	FAST whispered:	FAST spoken:	27 whispered chorus:
THINK	you think	THAT SILENCE	silence	you think	silence silence SILENCE SILENCE SILENCE

1:55

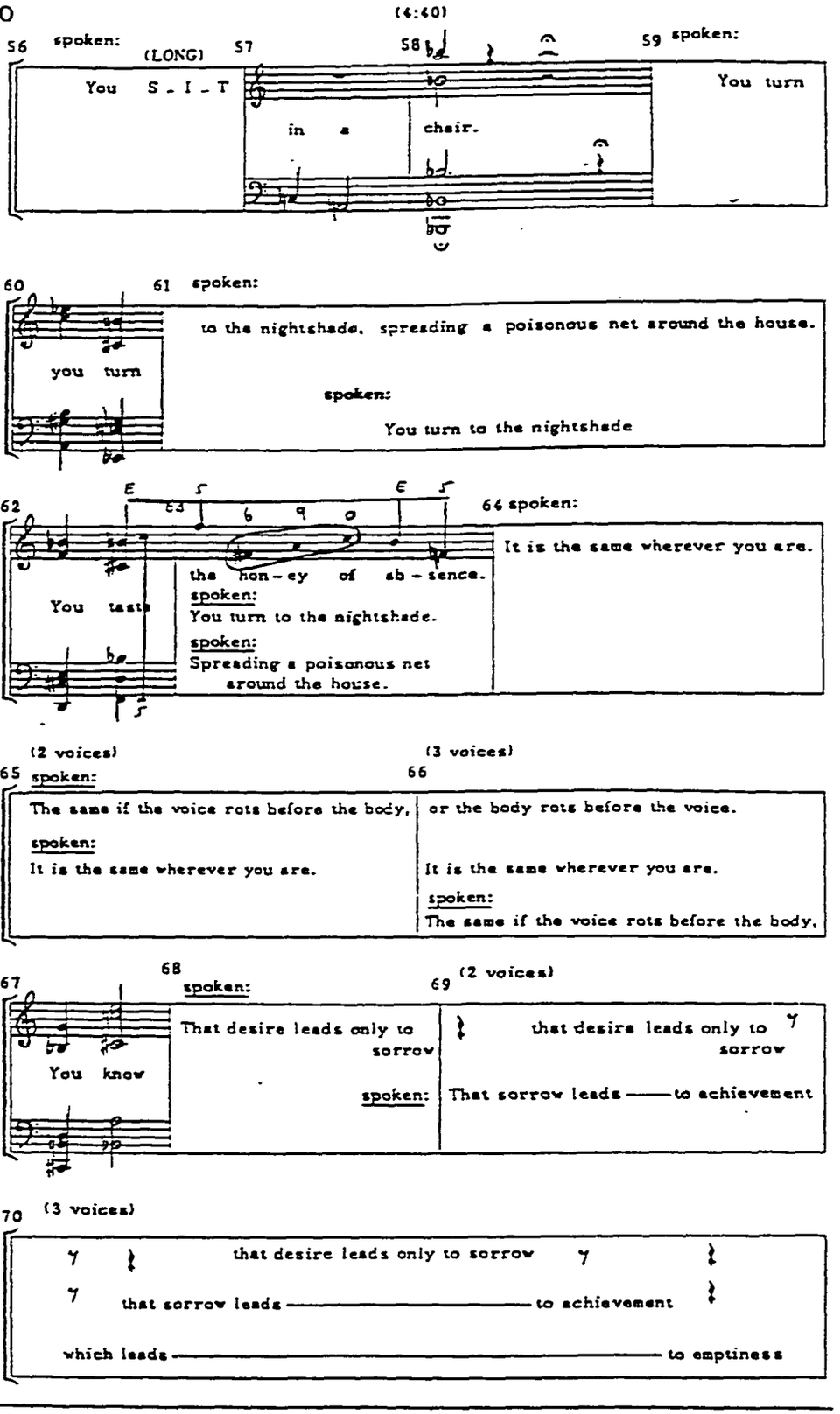
1:59 – 2:03

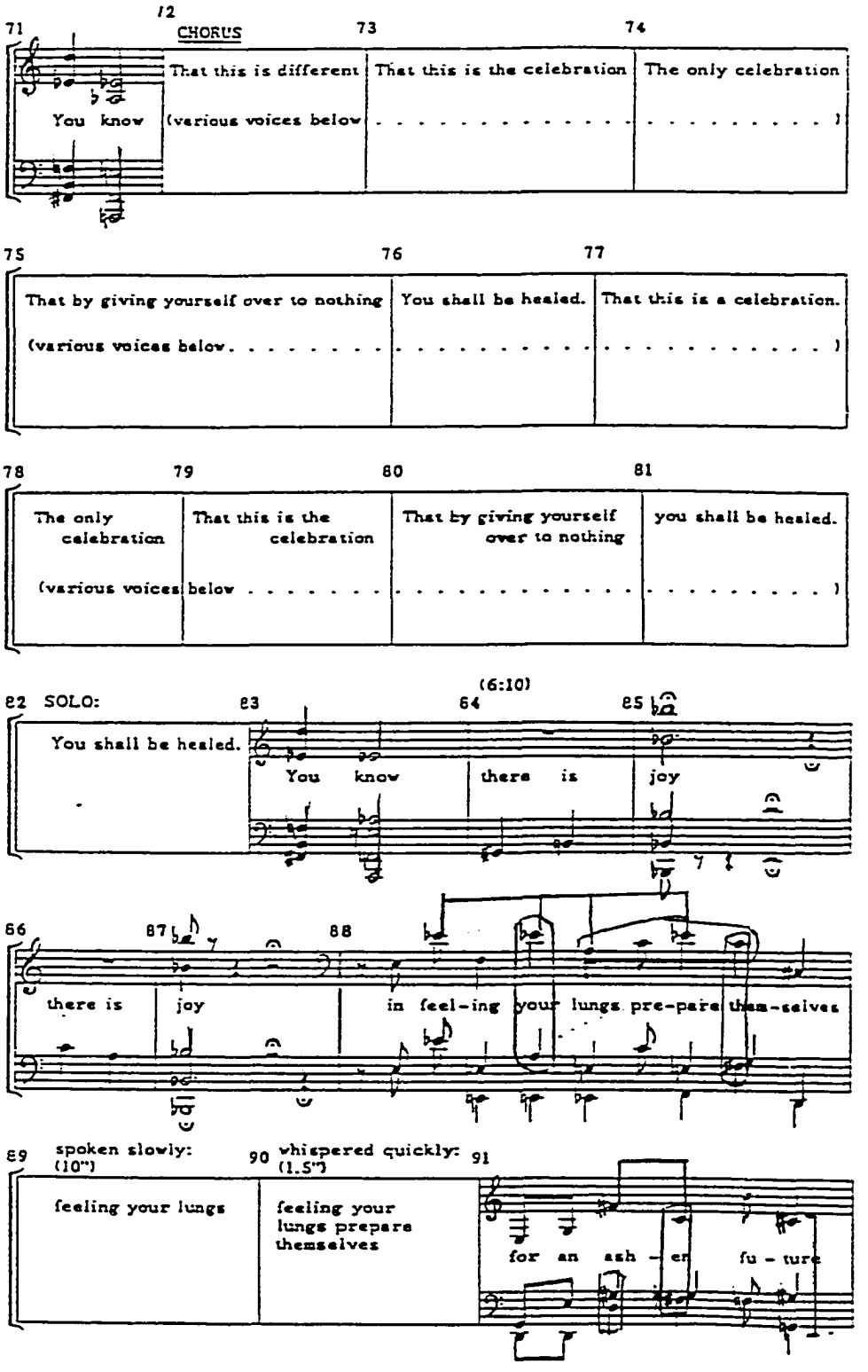


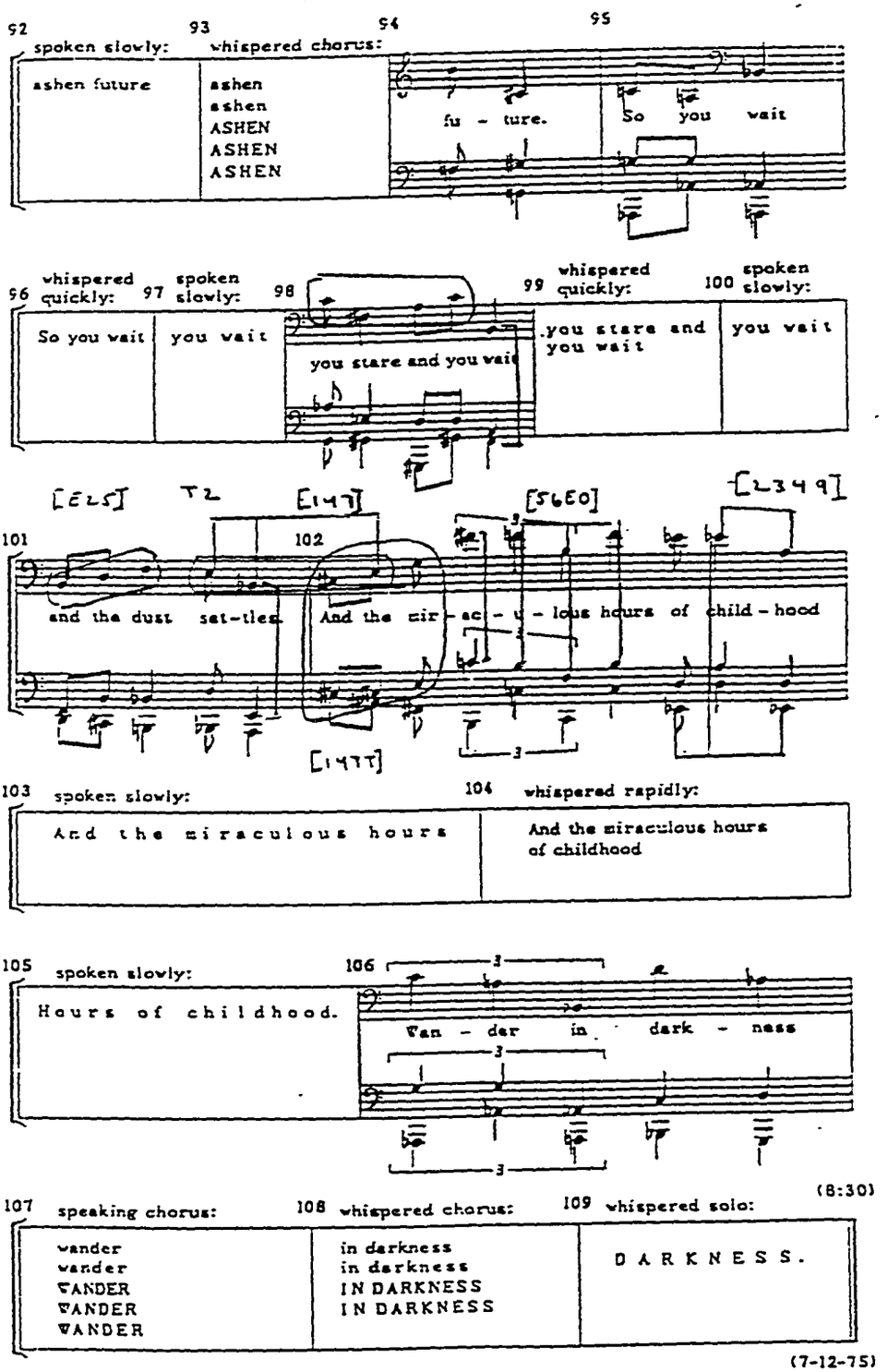




PART TWO







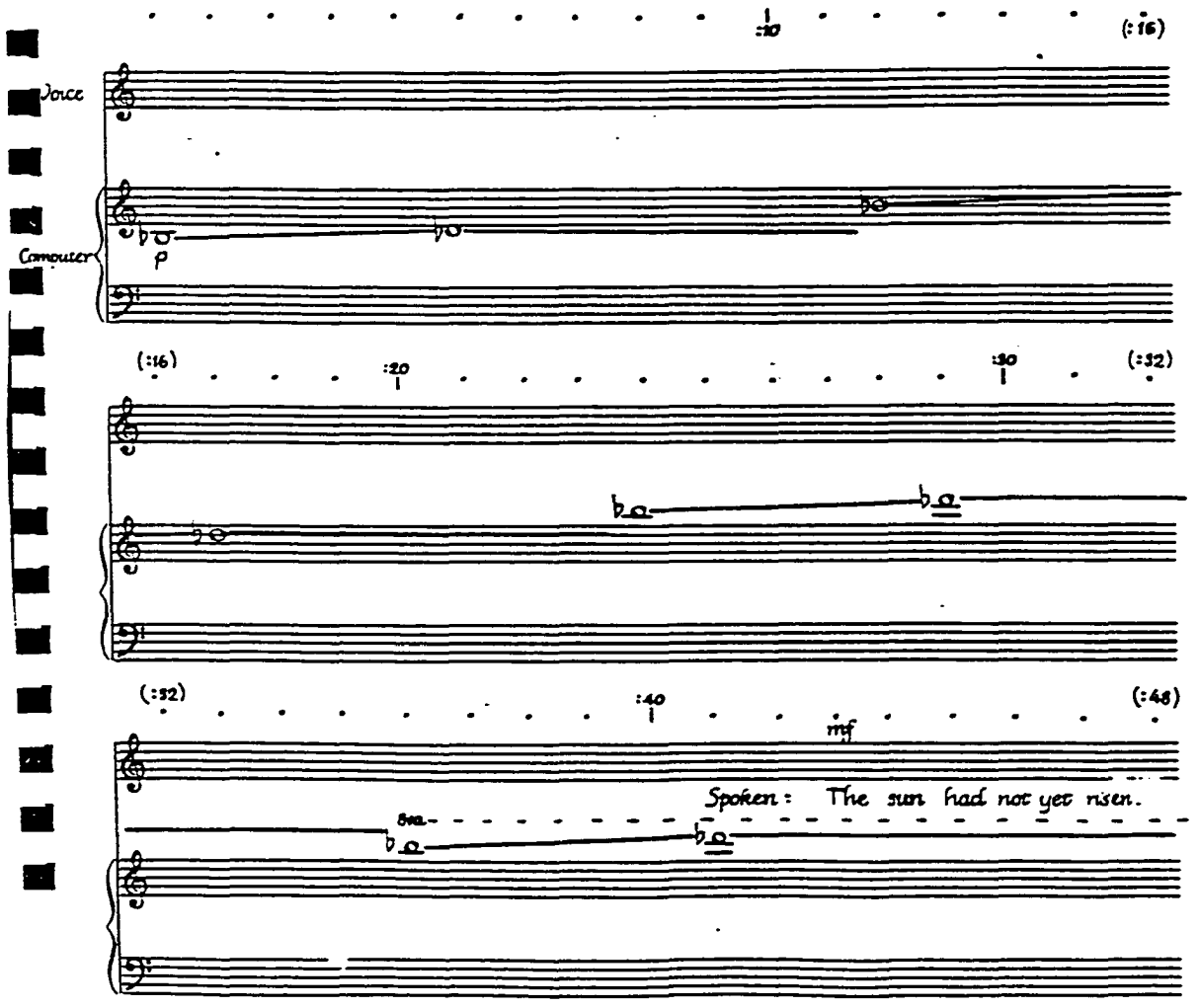
APPENDIX B

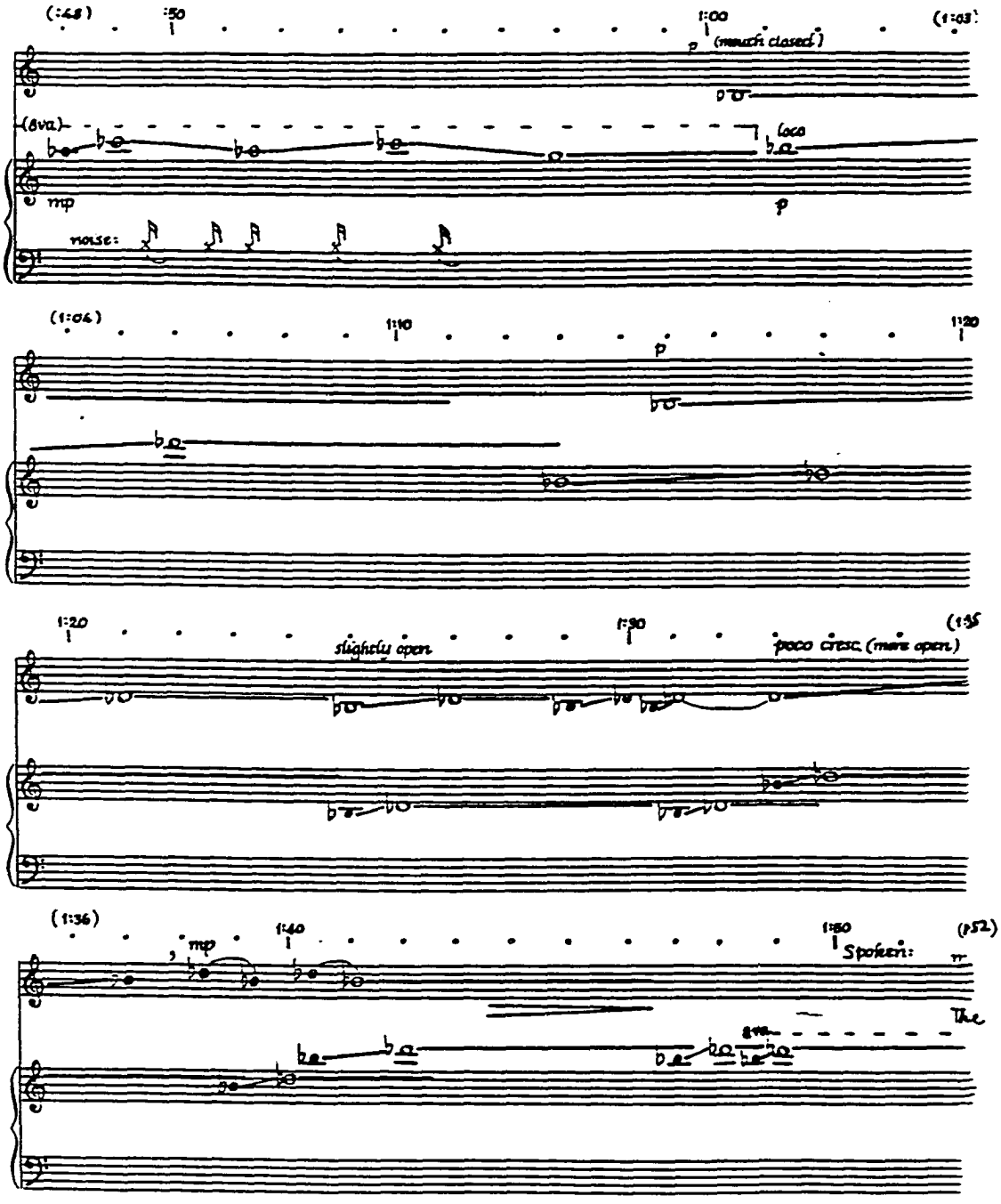
The Waves

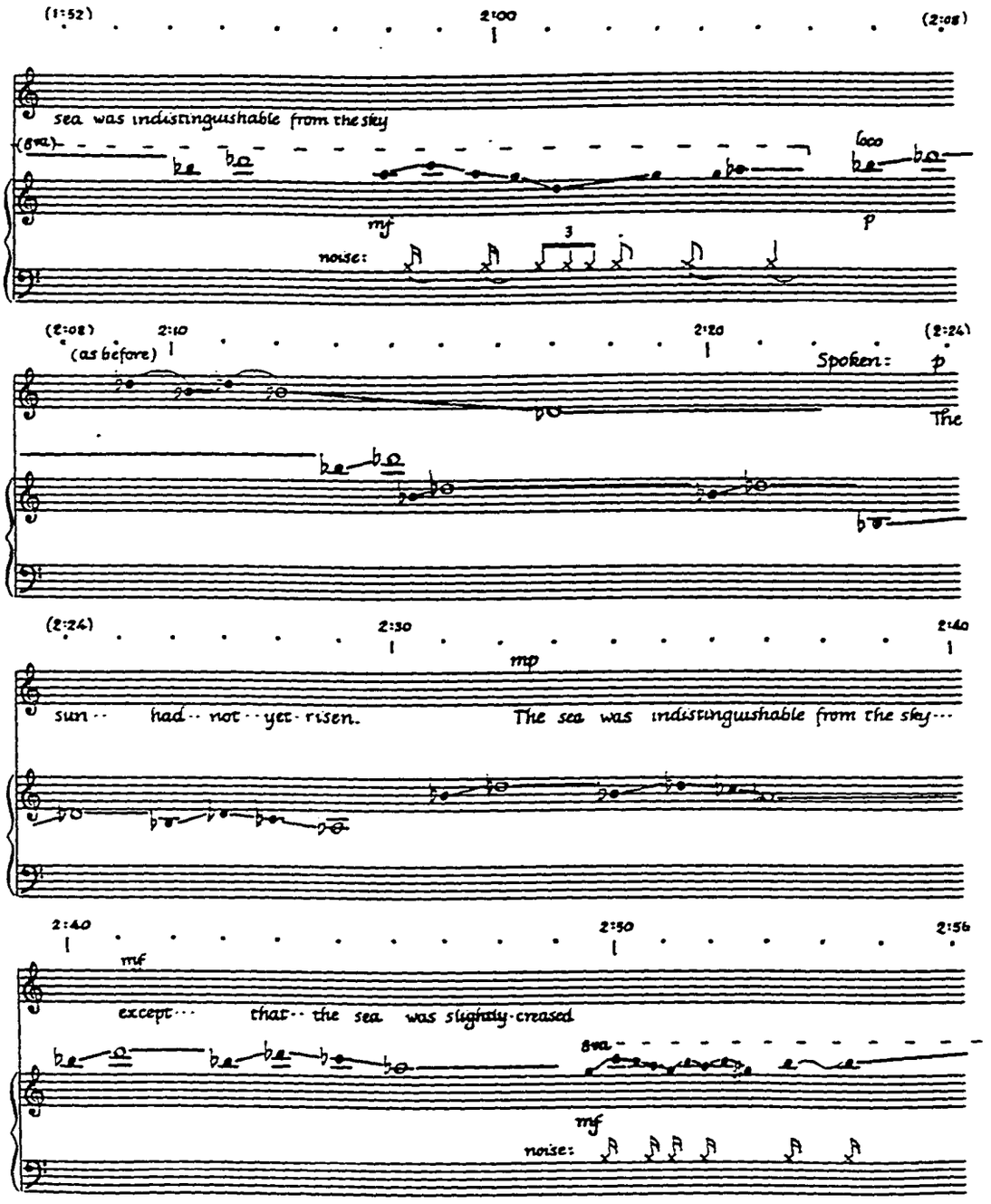
for Joan La Barbara

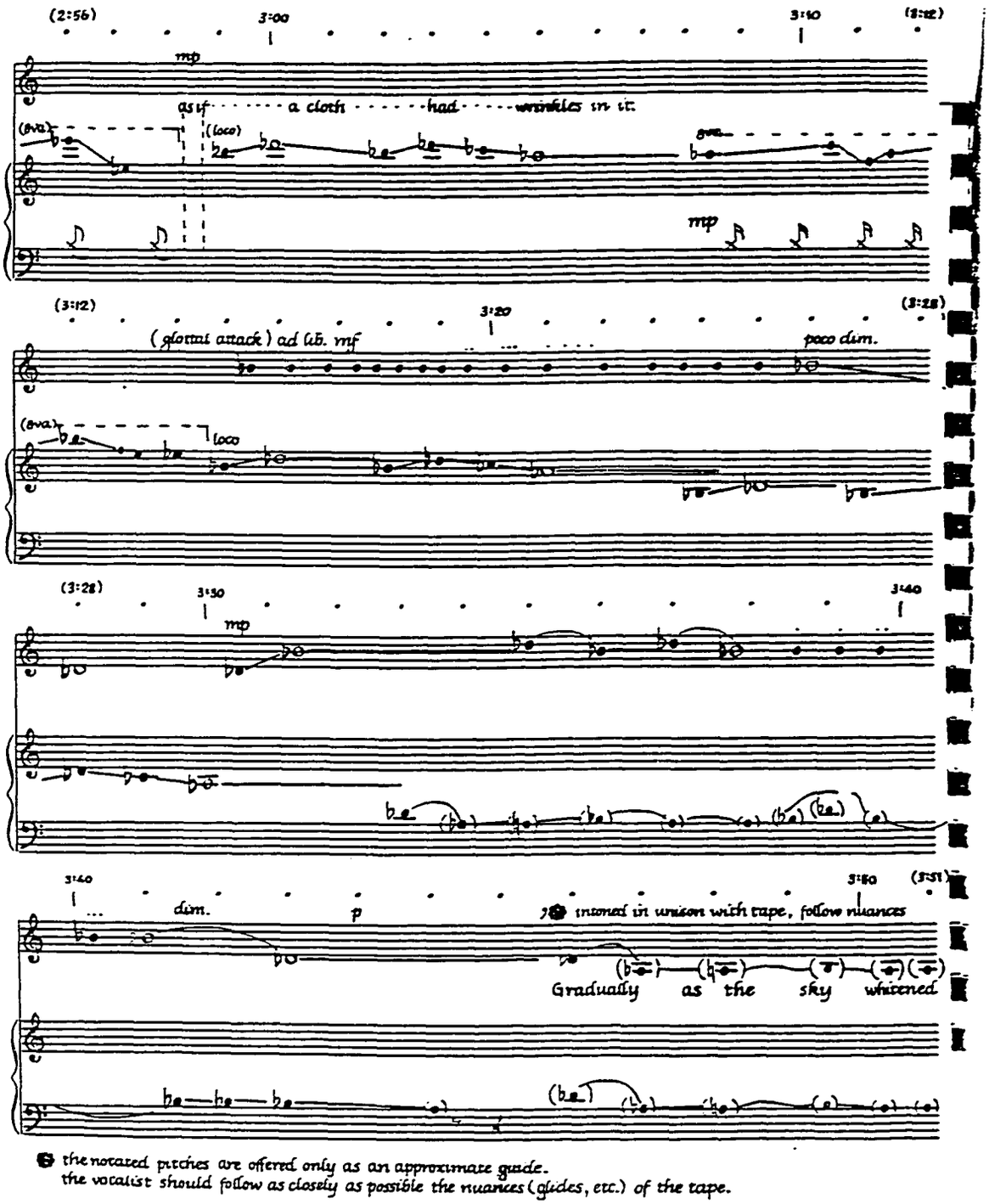
text from The Waves by Virginia Woolf,
used by permission of Hogarth Press, London.

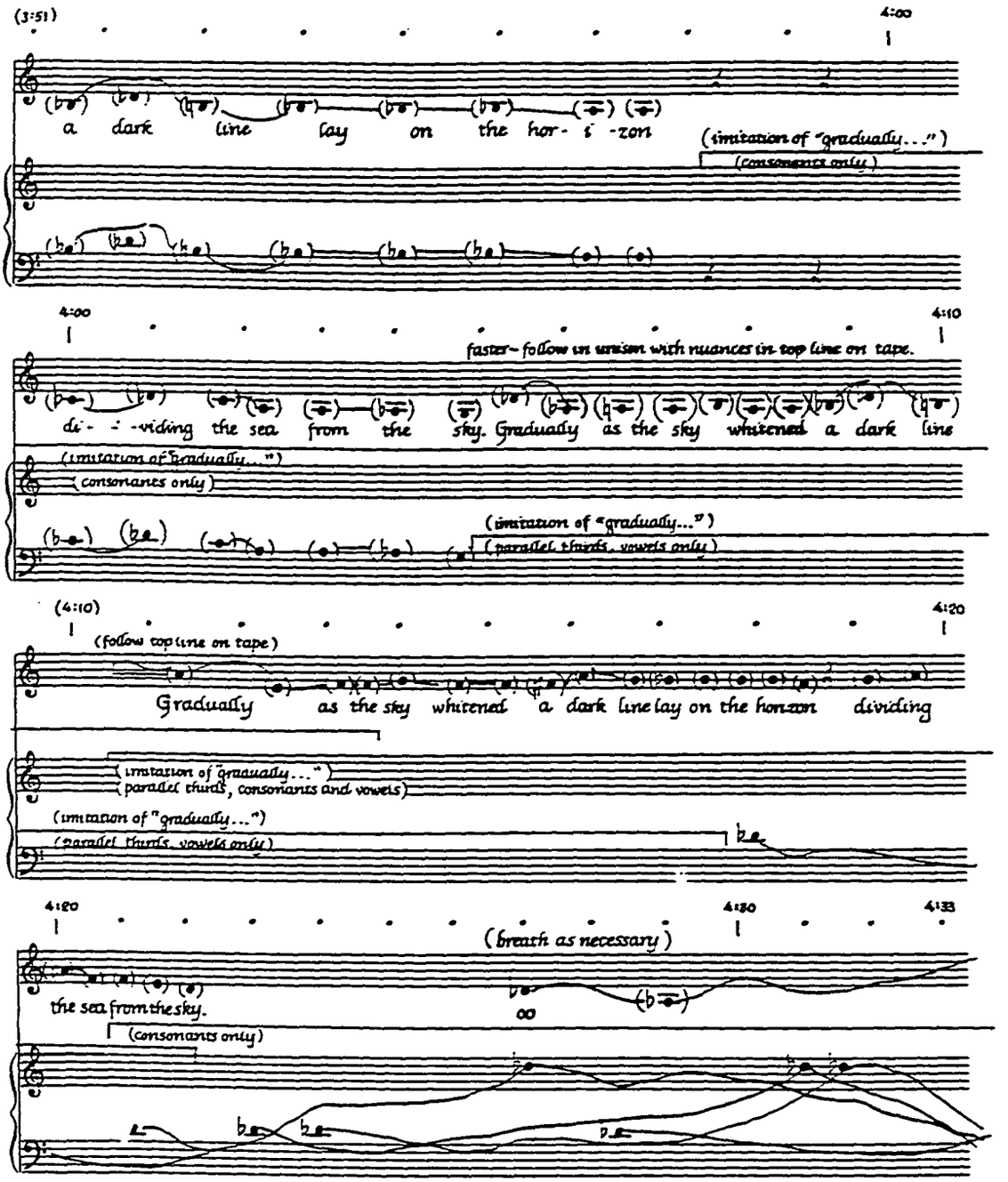
Charles Dodge

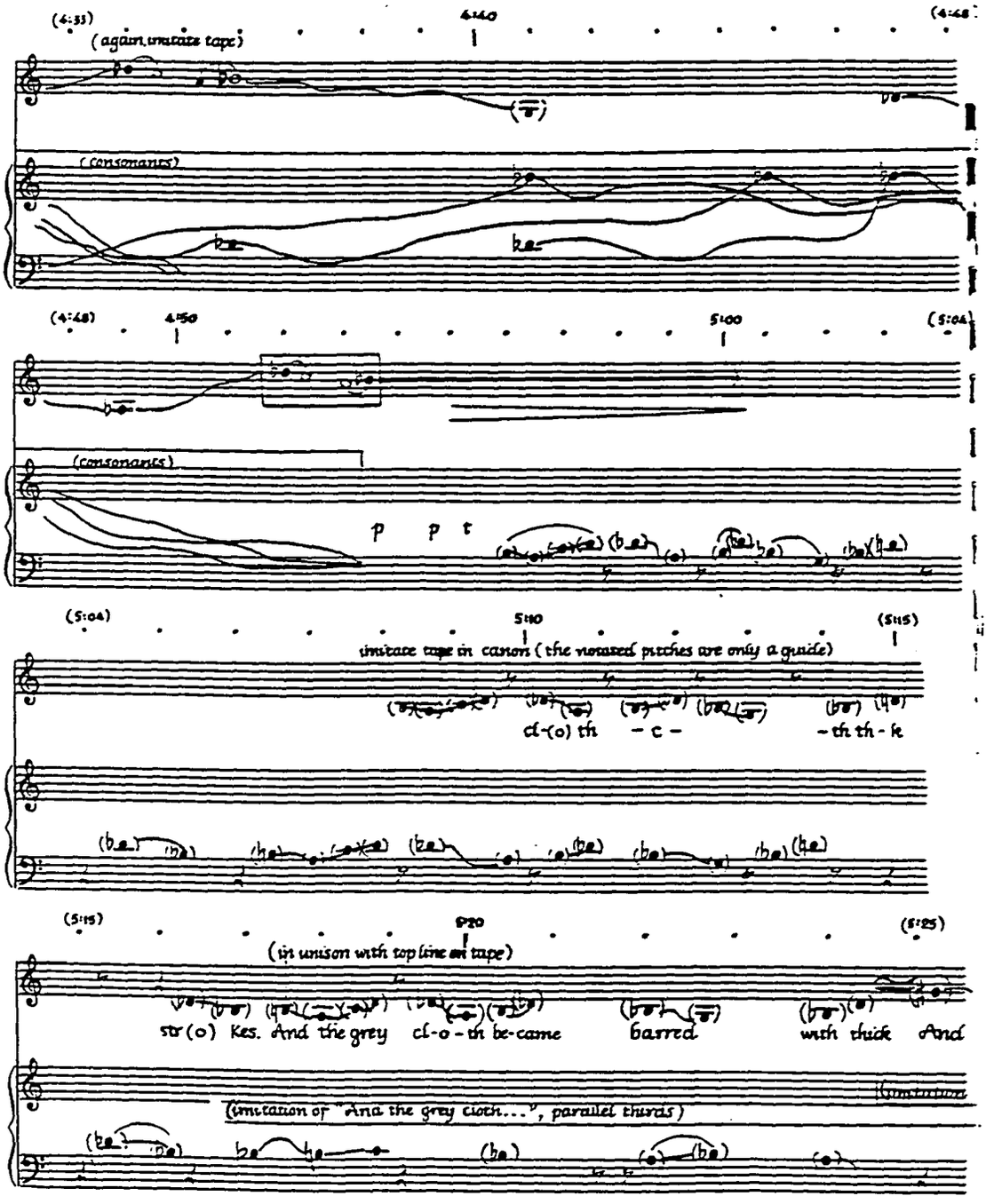


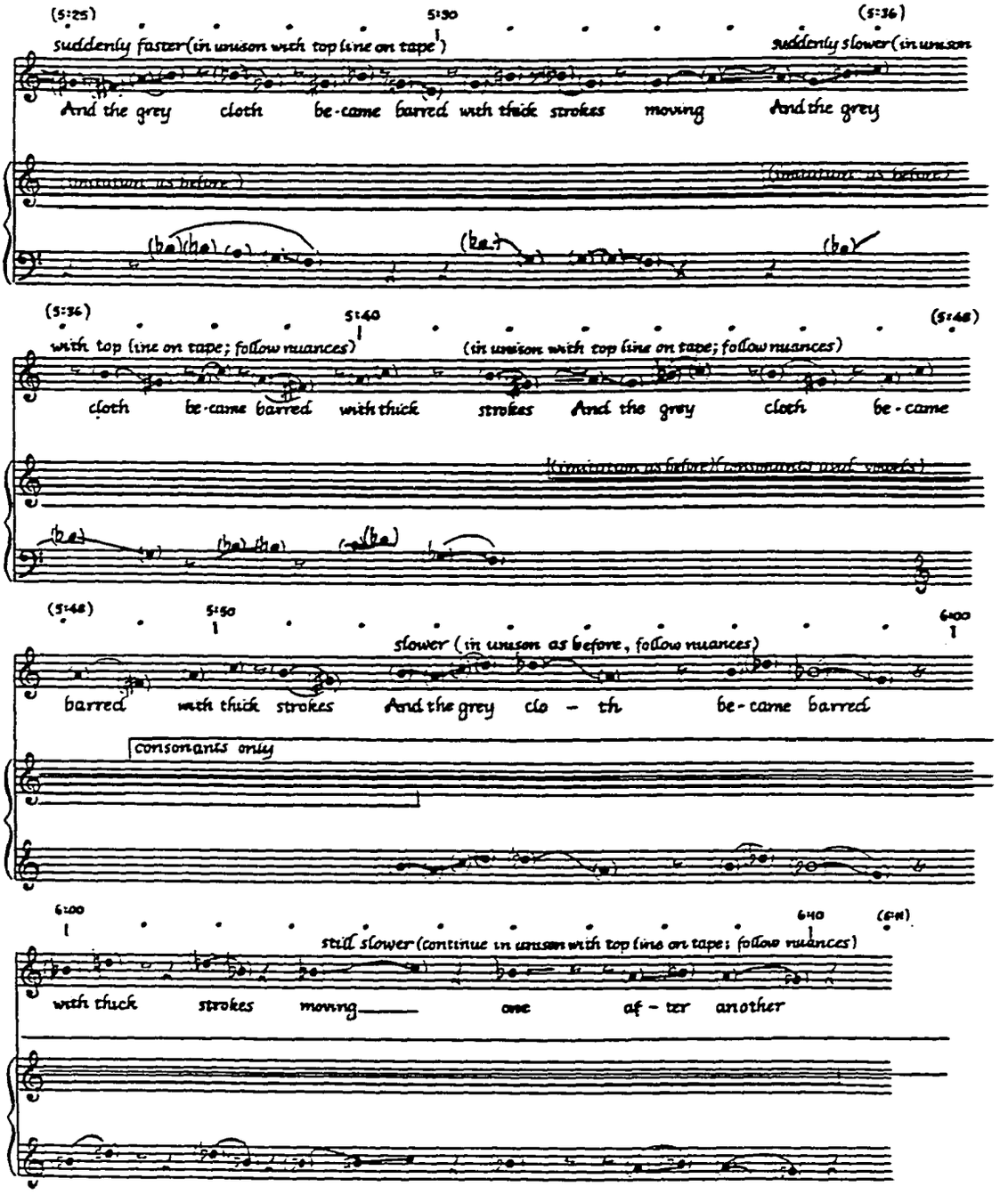


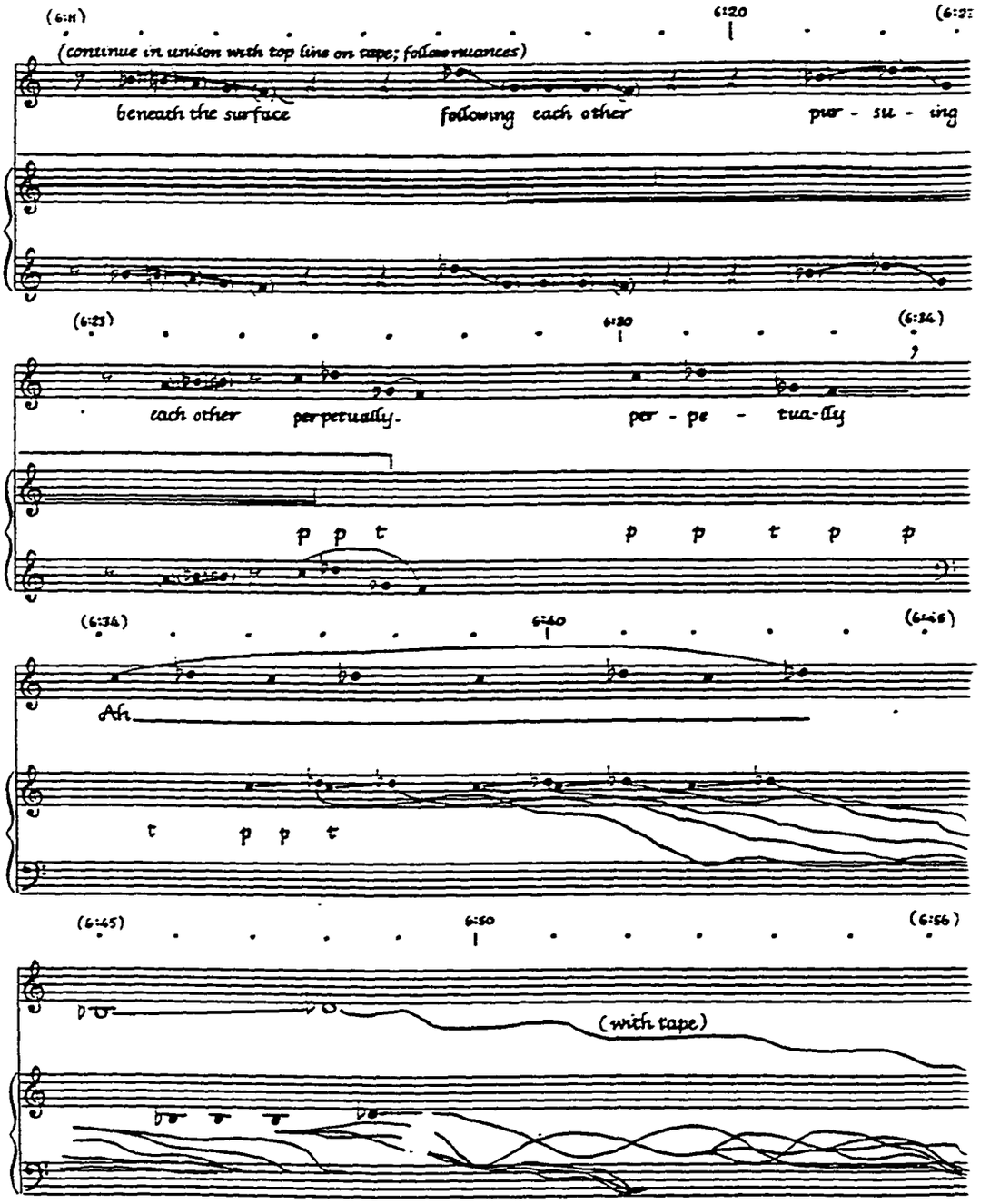


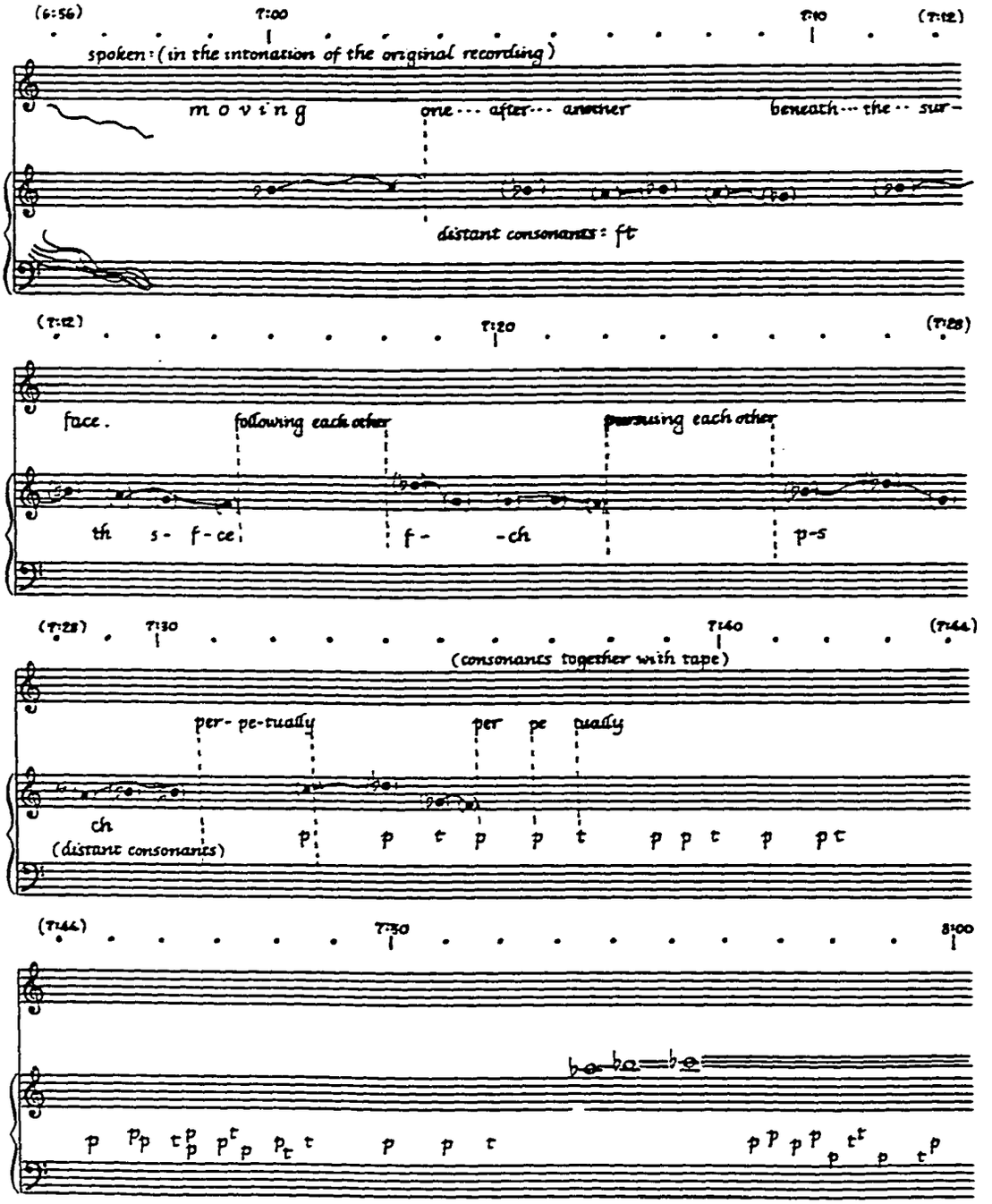


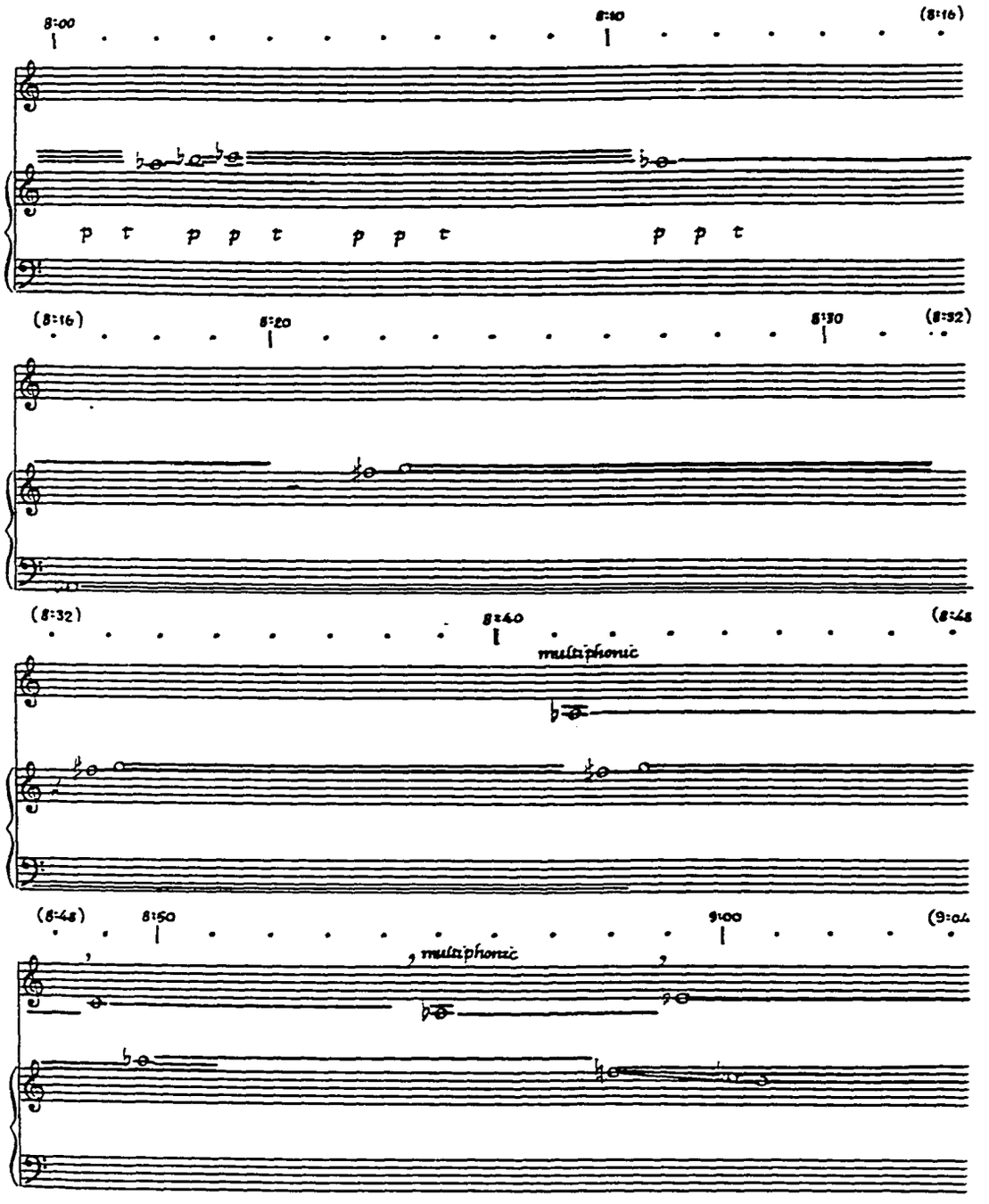


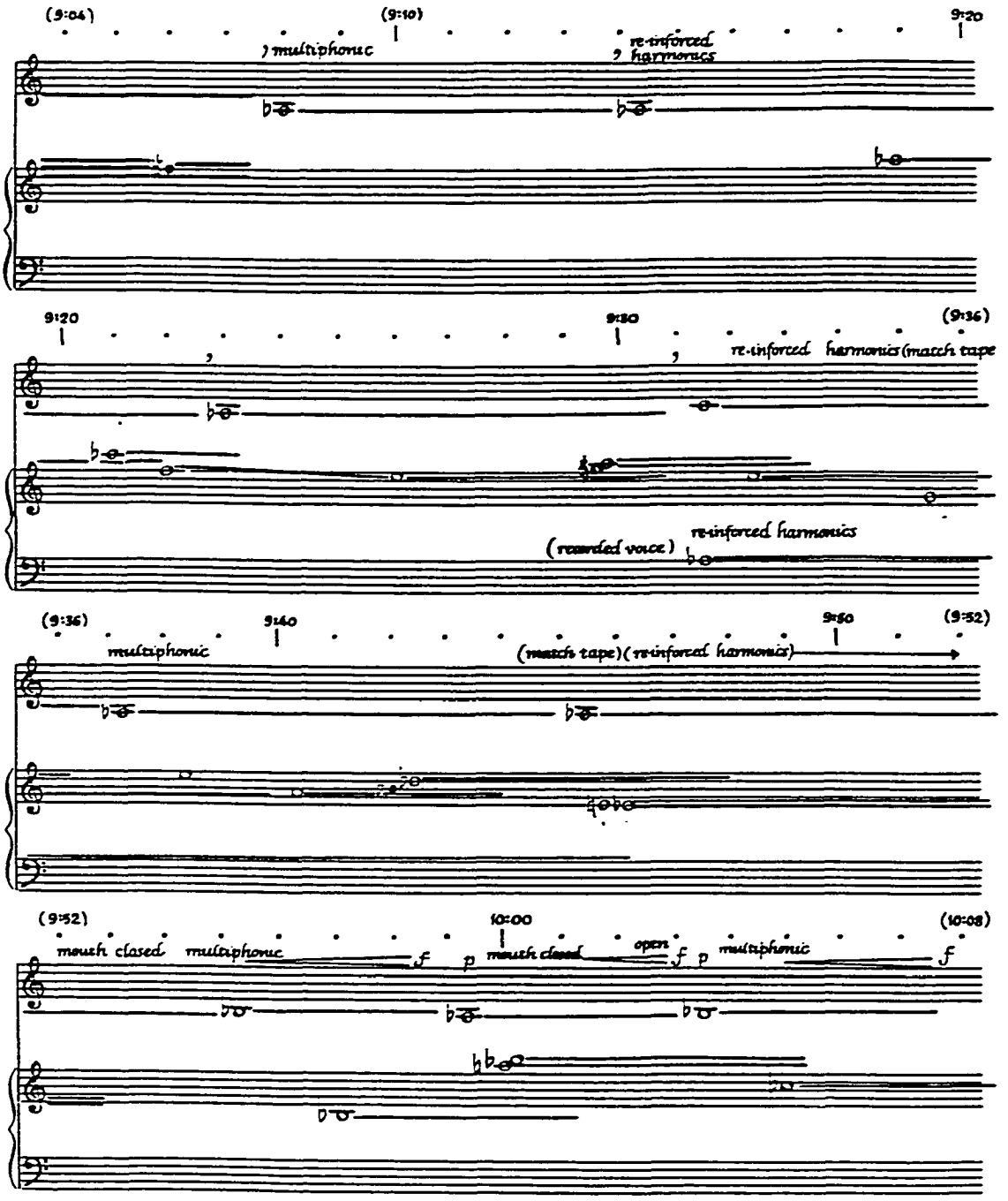


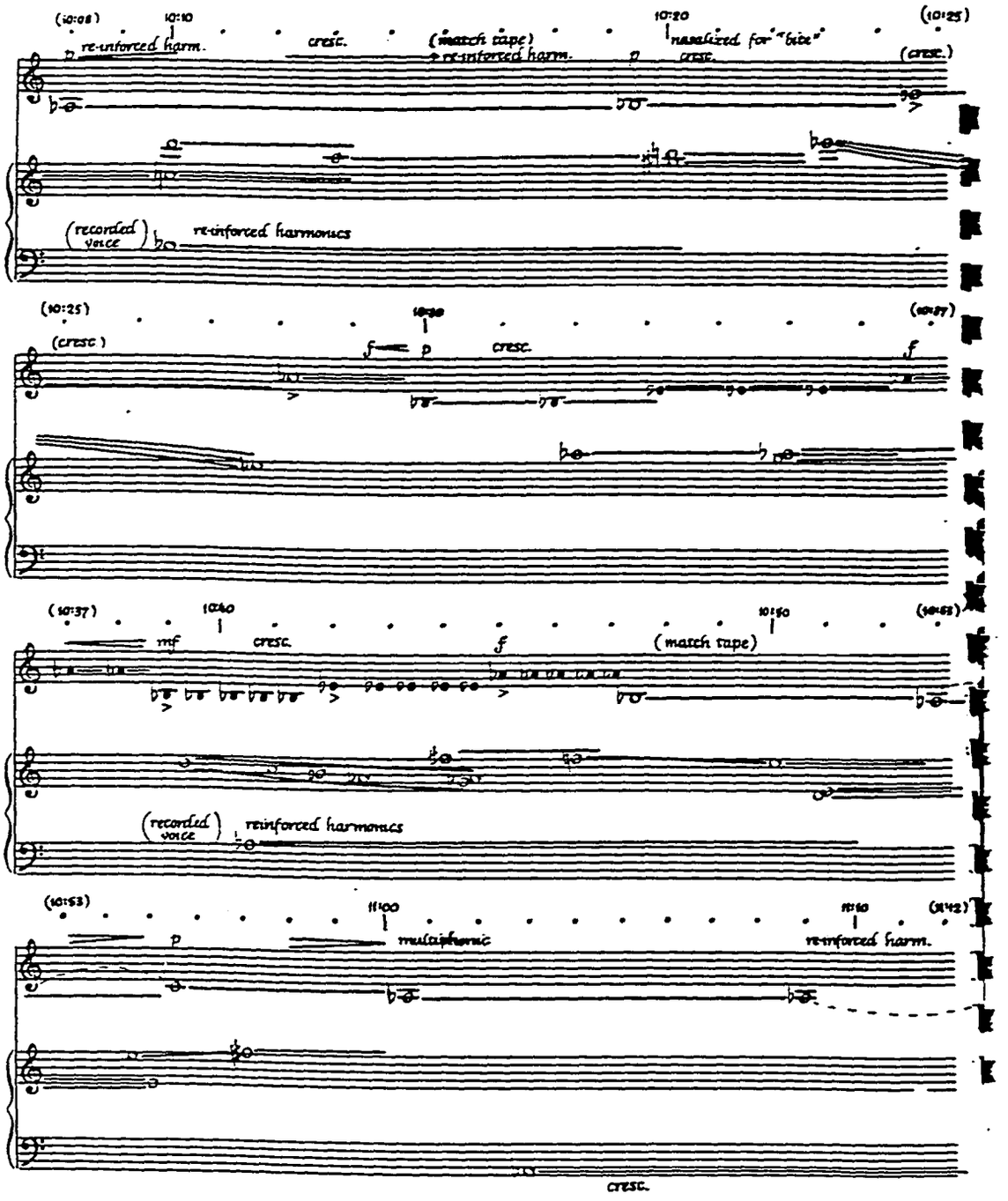


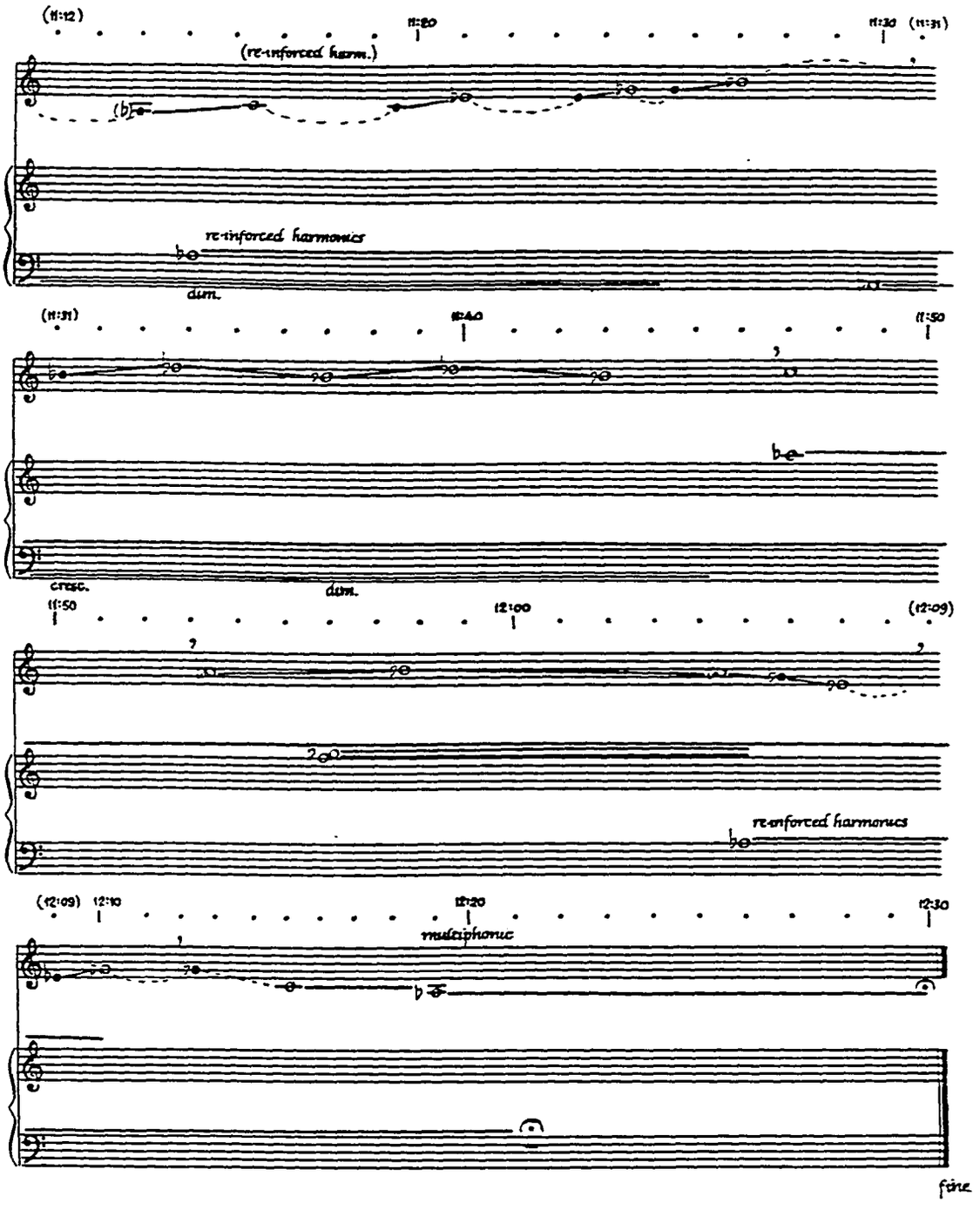










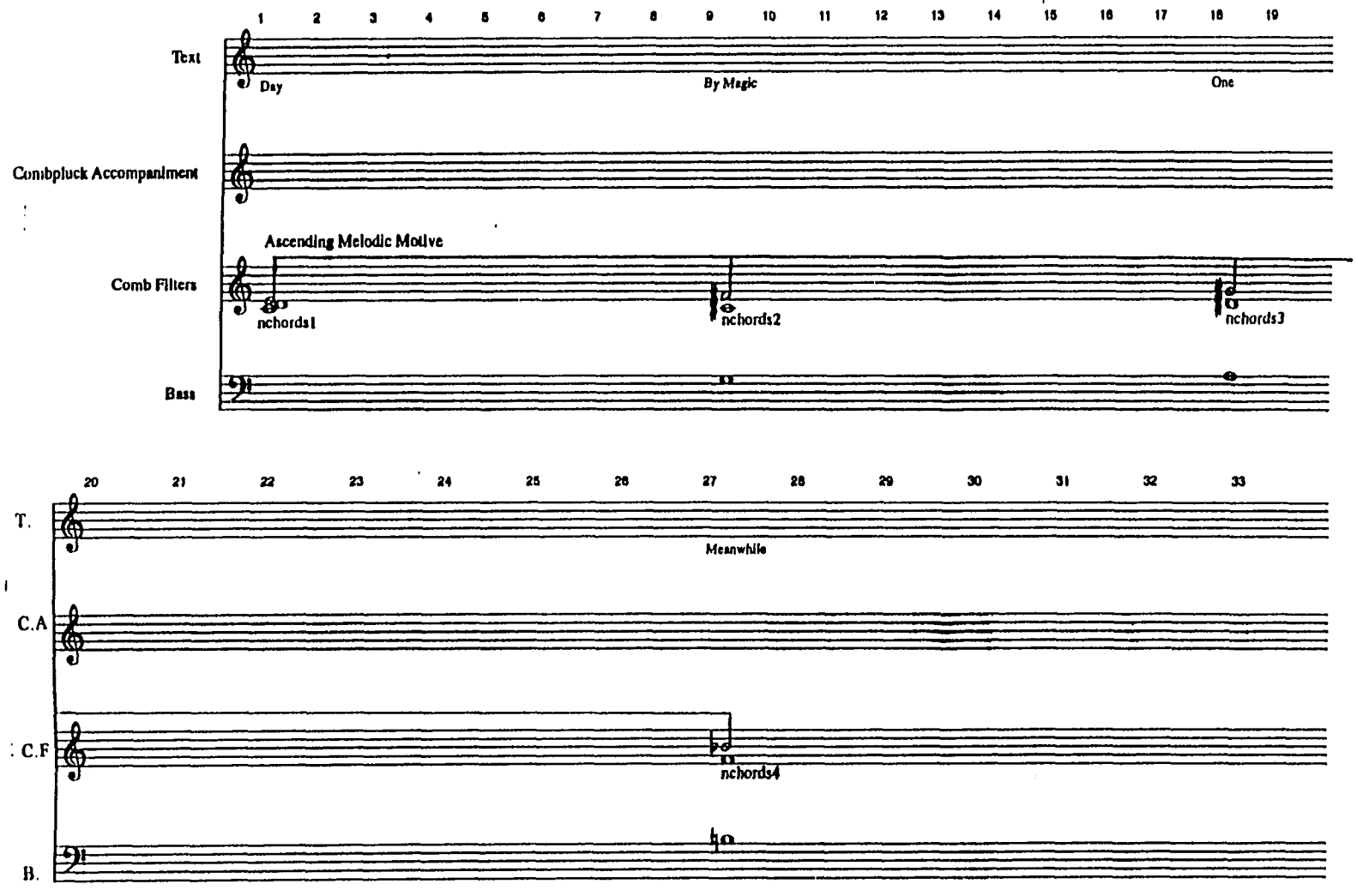


APPENDIX C

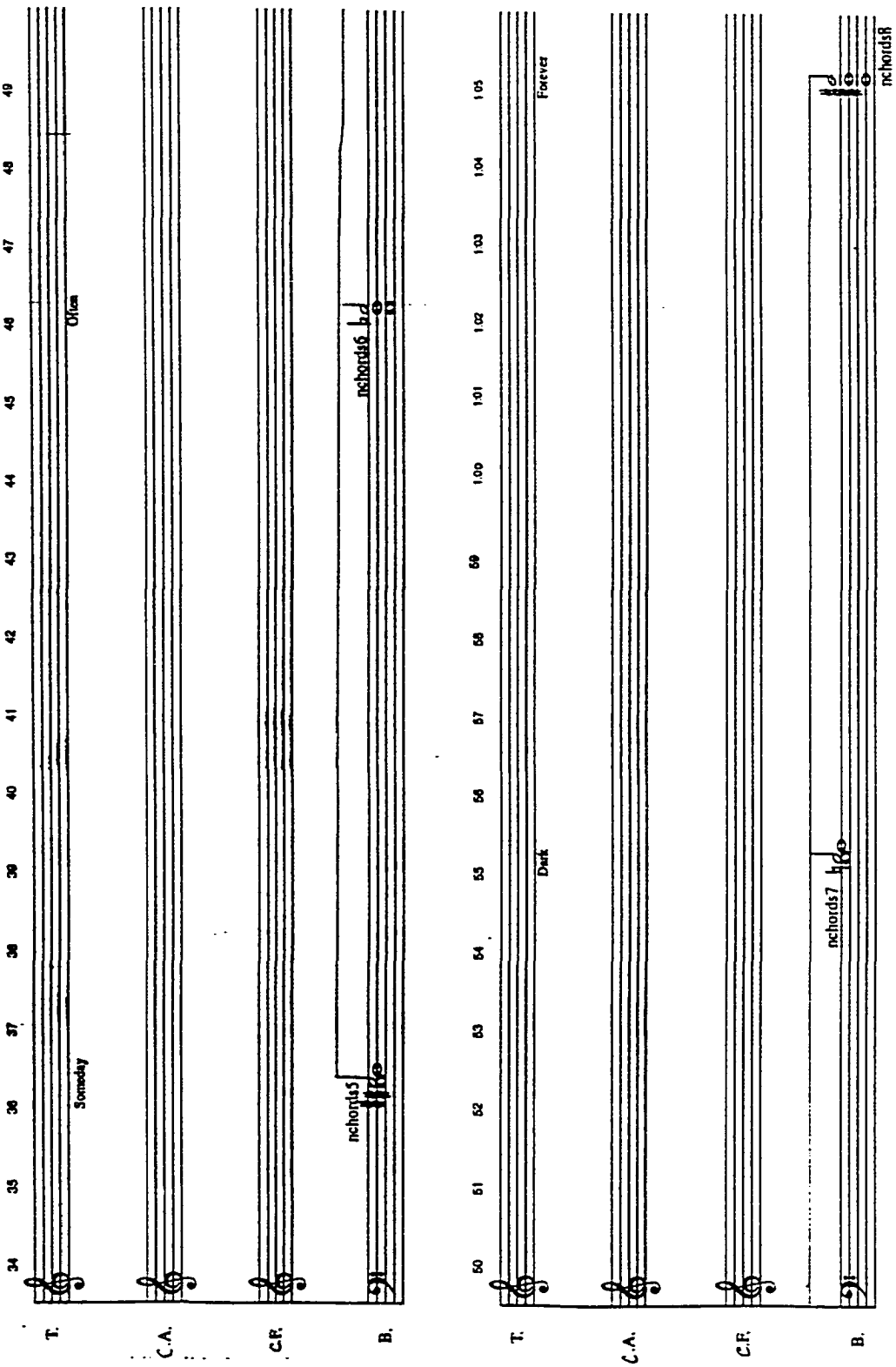
The following is a musical guide to *Word Color* which I made from the recording by Paul Lansky on his *More Than Idle Chatter* compact disk.

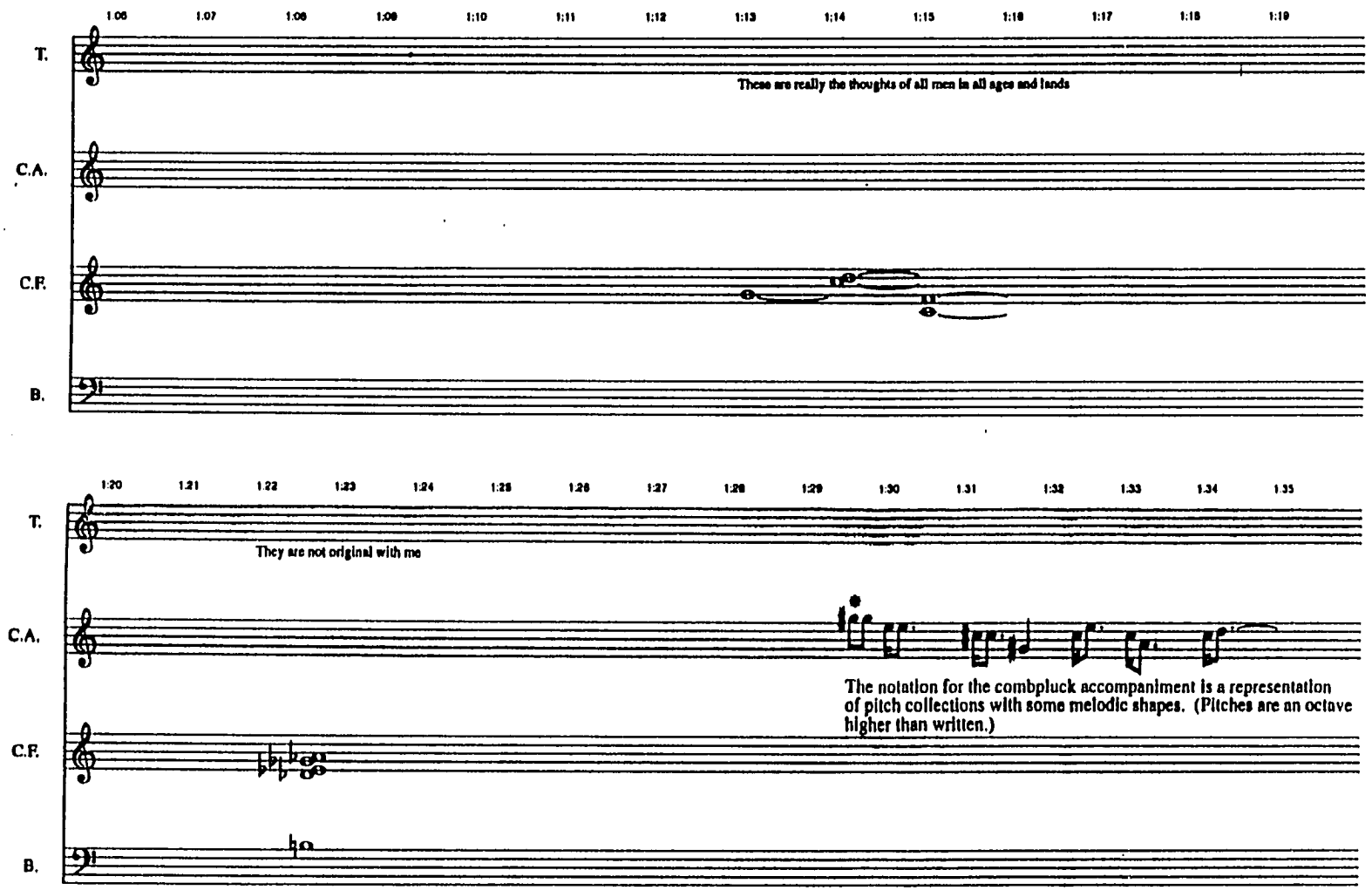
Word Color

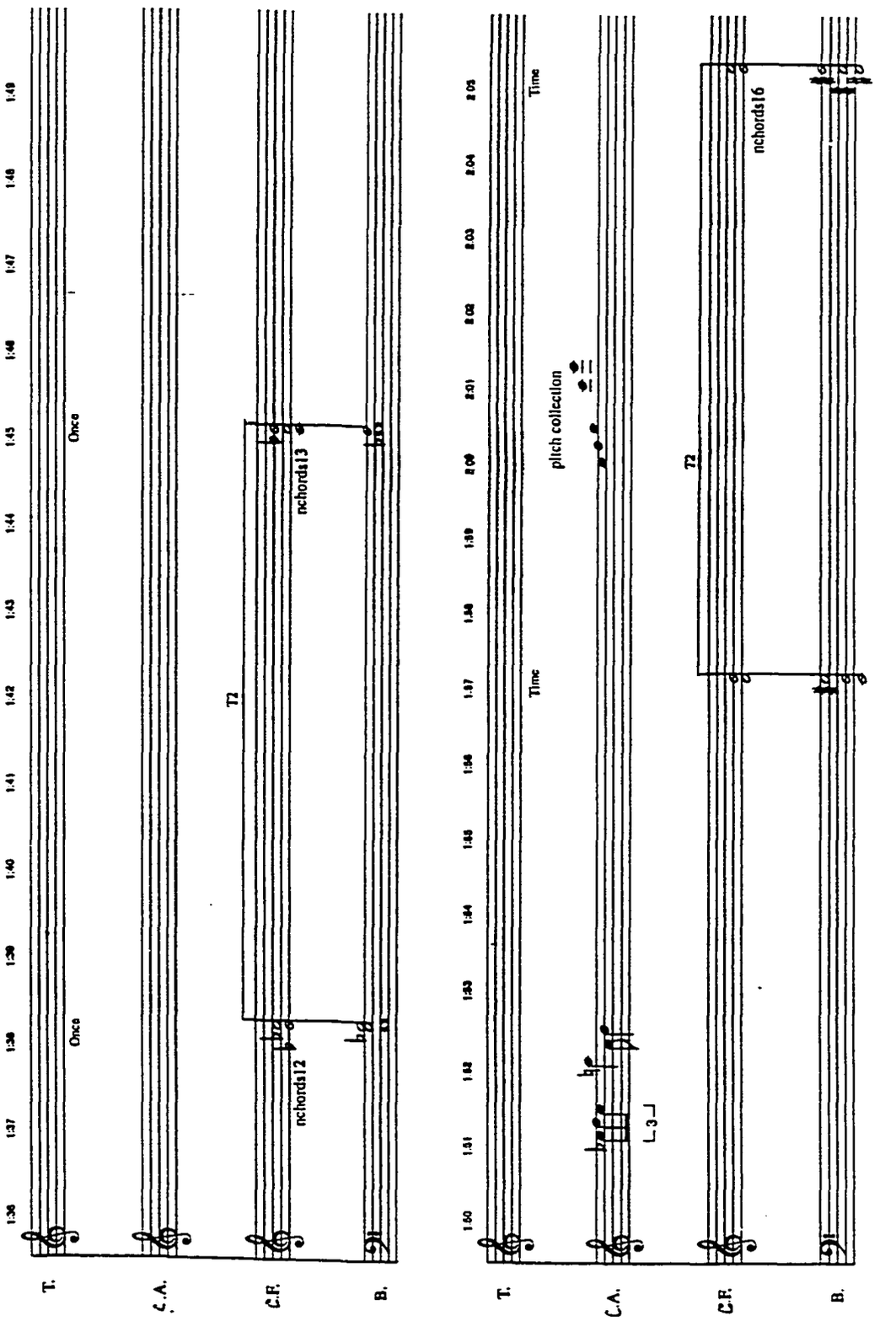
Paul Lansky



This score is not a literal transcription, but rather a guide representing salient pitch and text information as it unfolds over the course of the piece.







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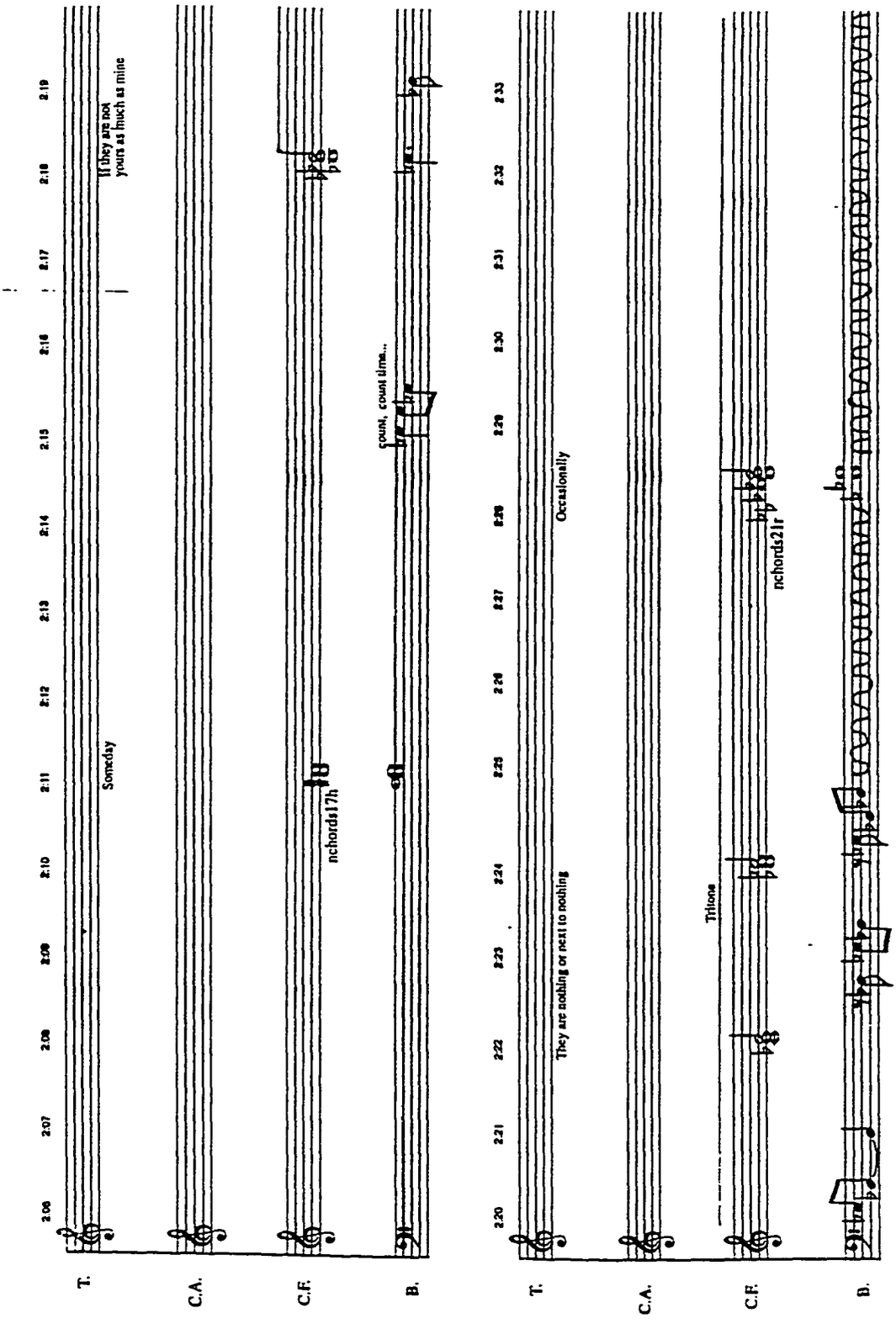

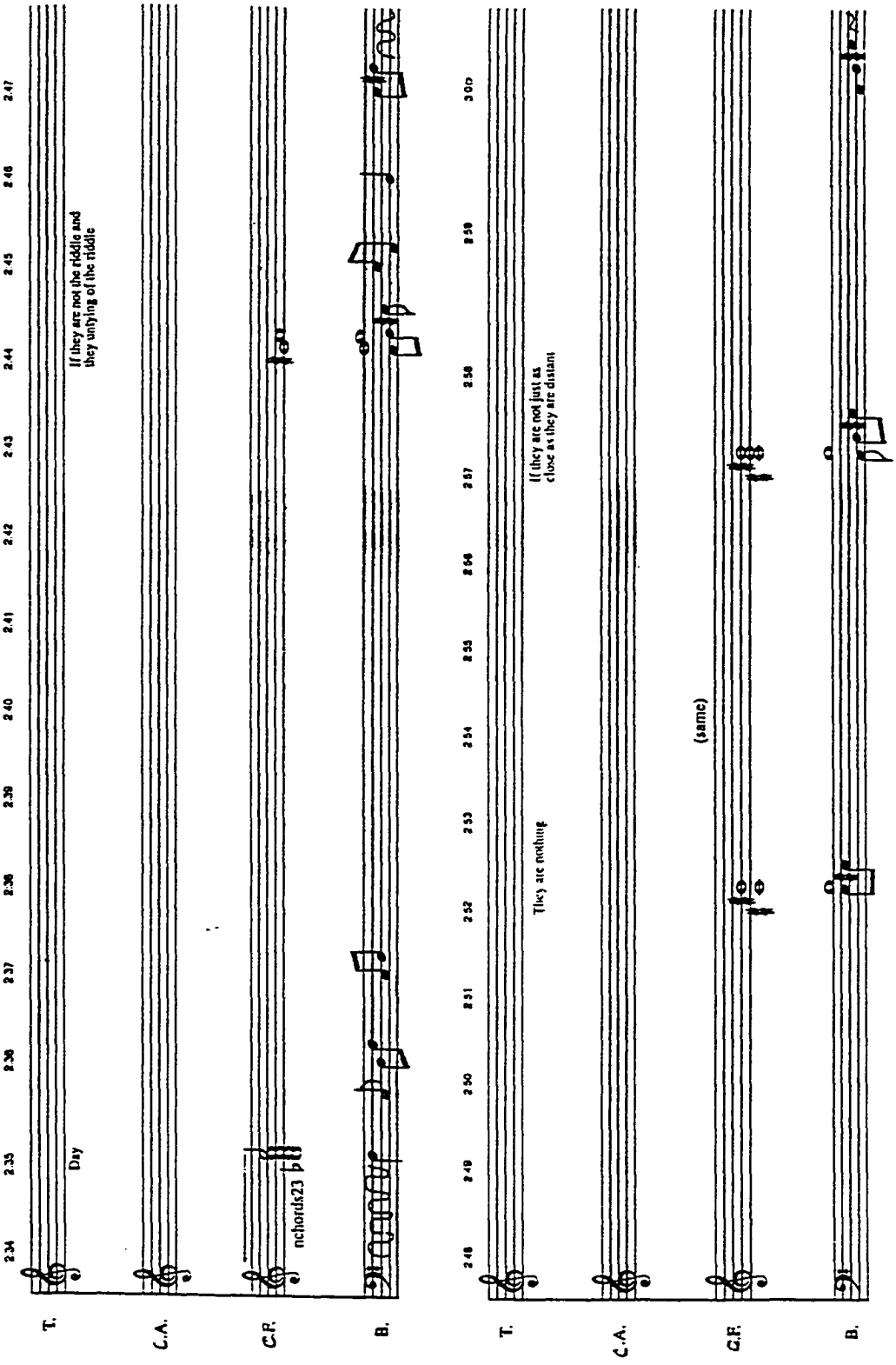

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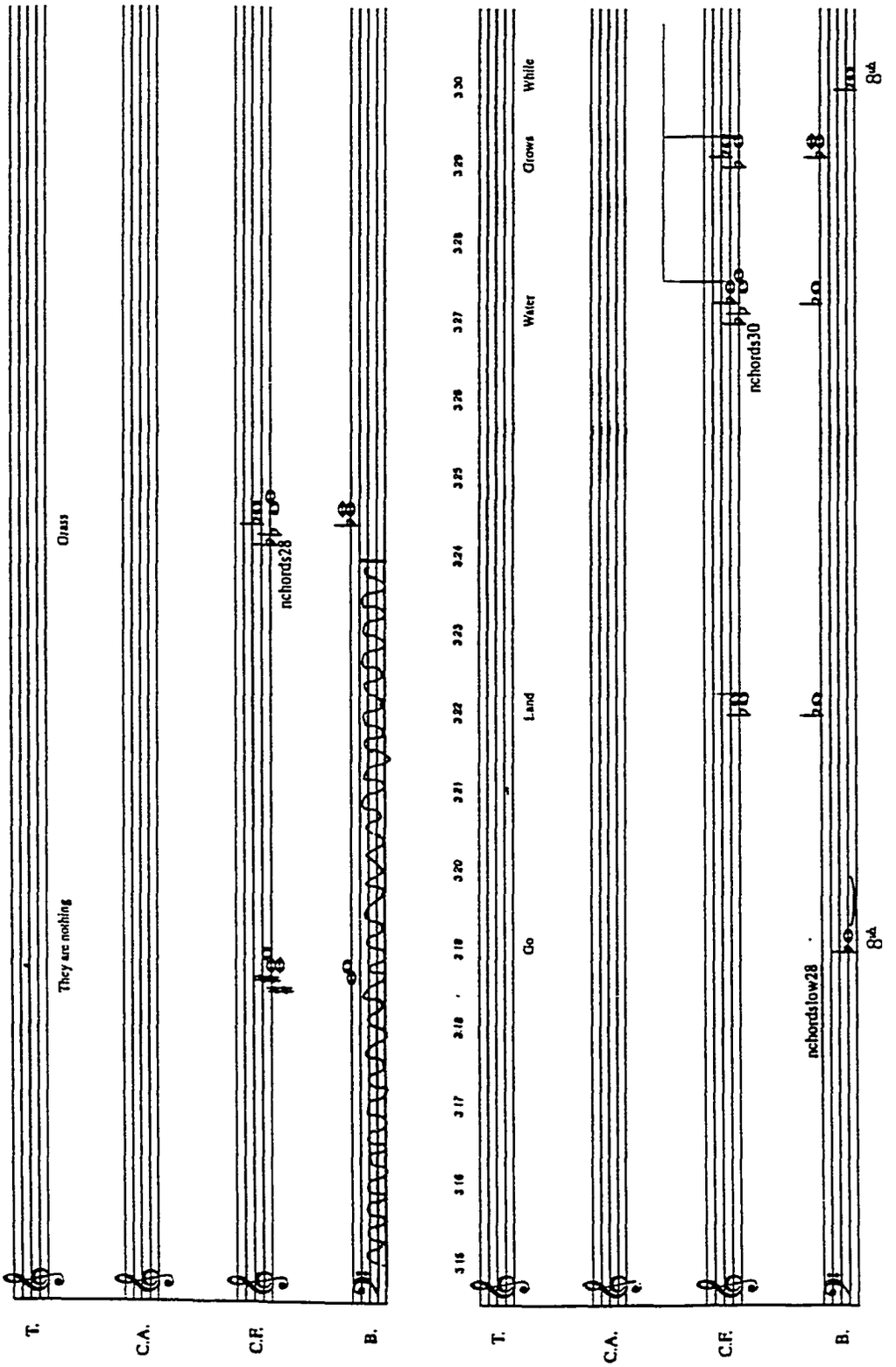

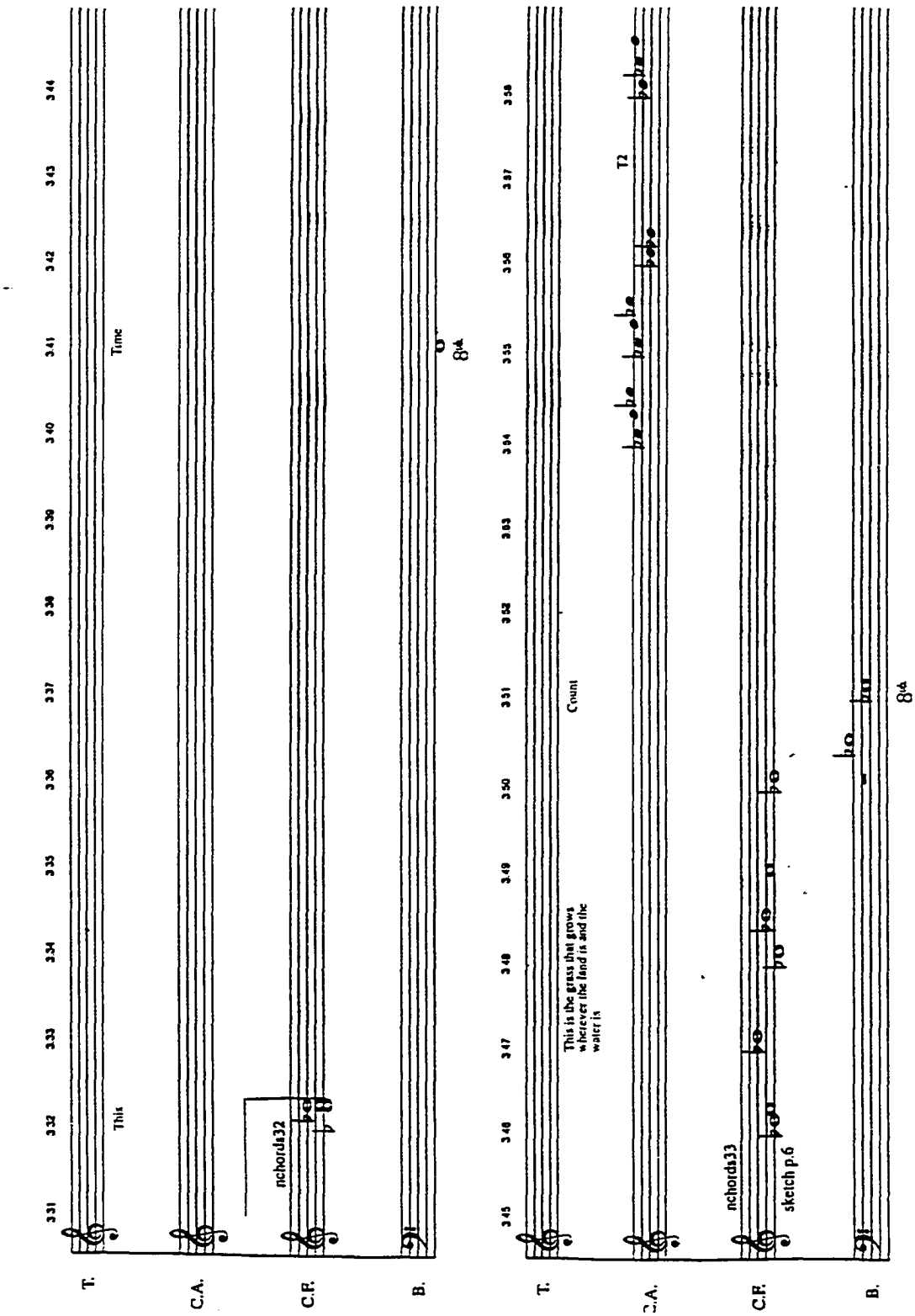

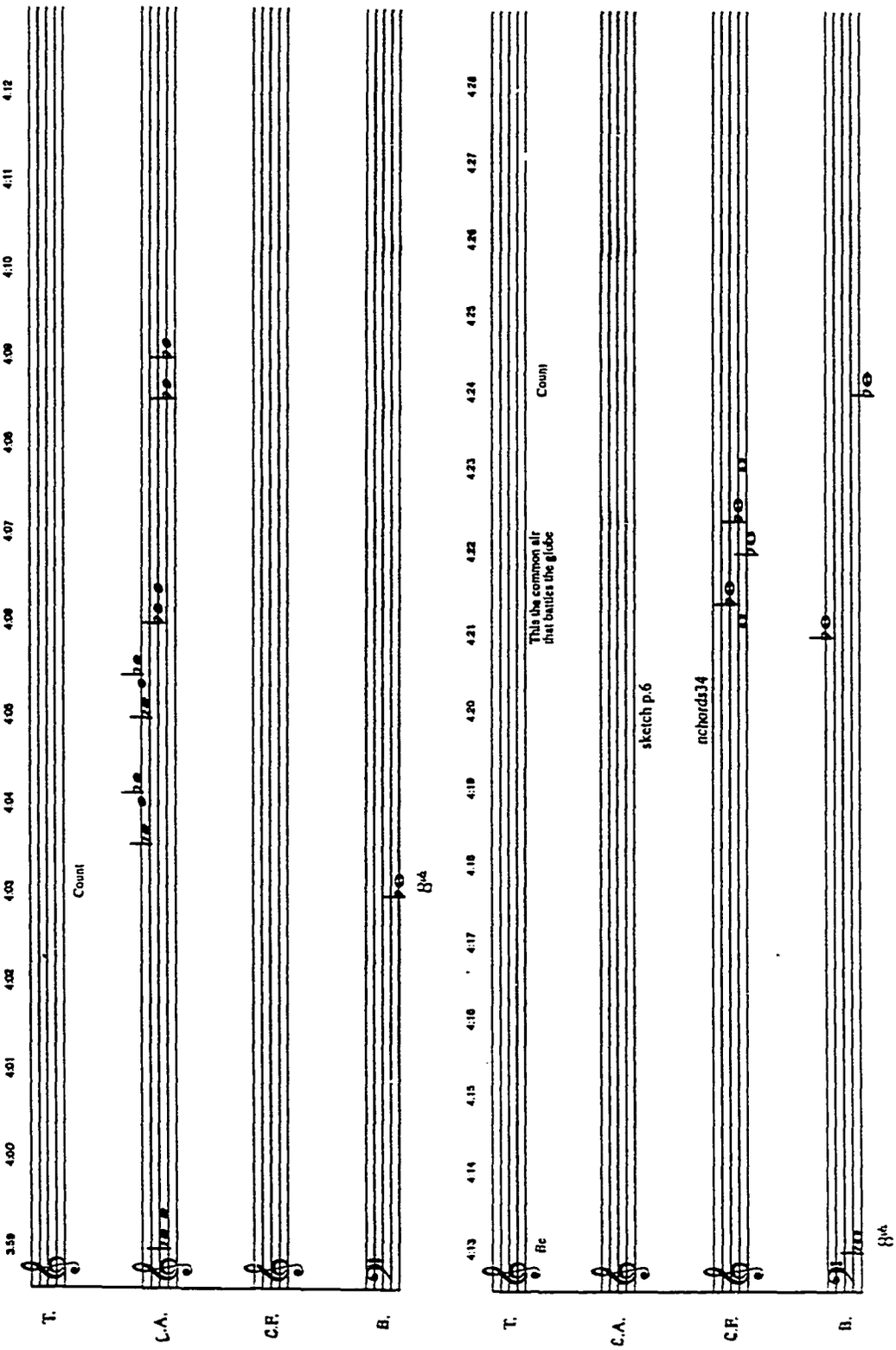

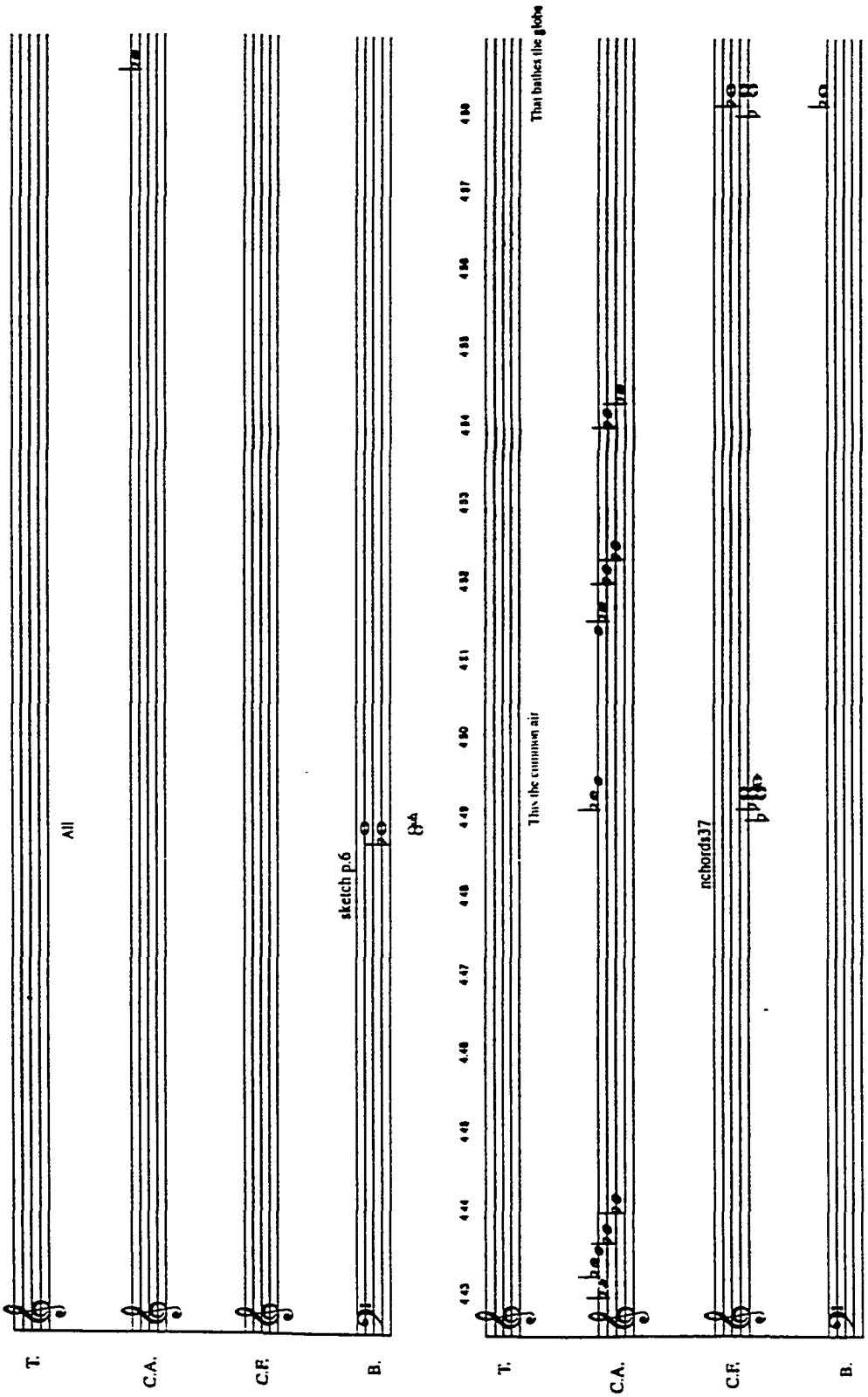

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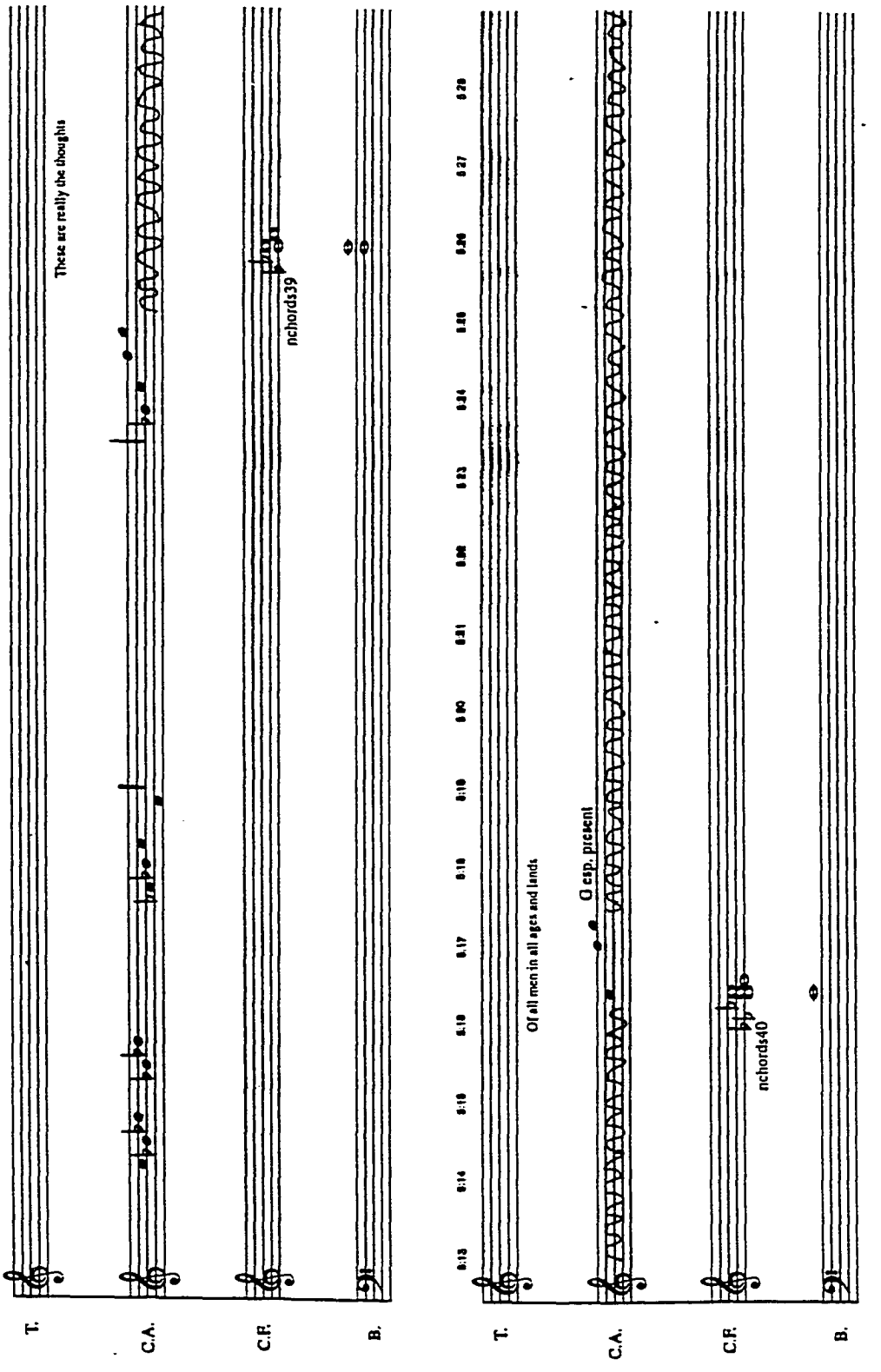

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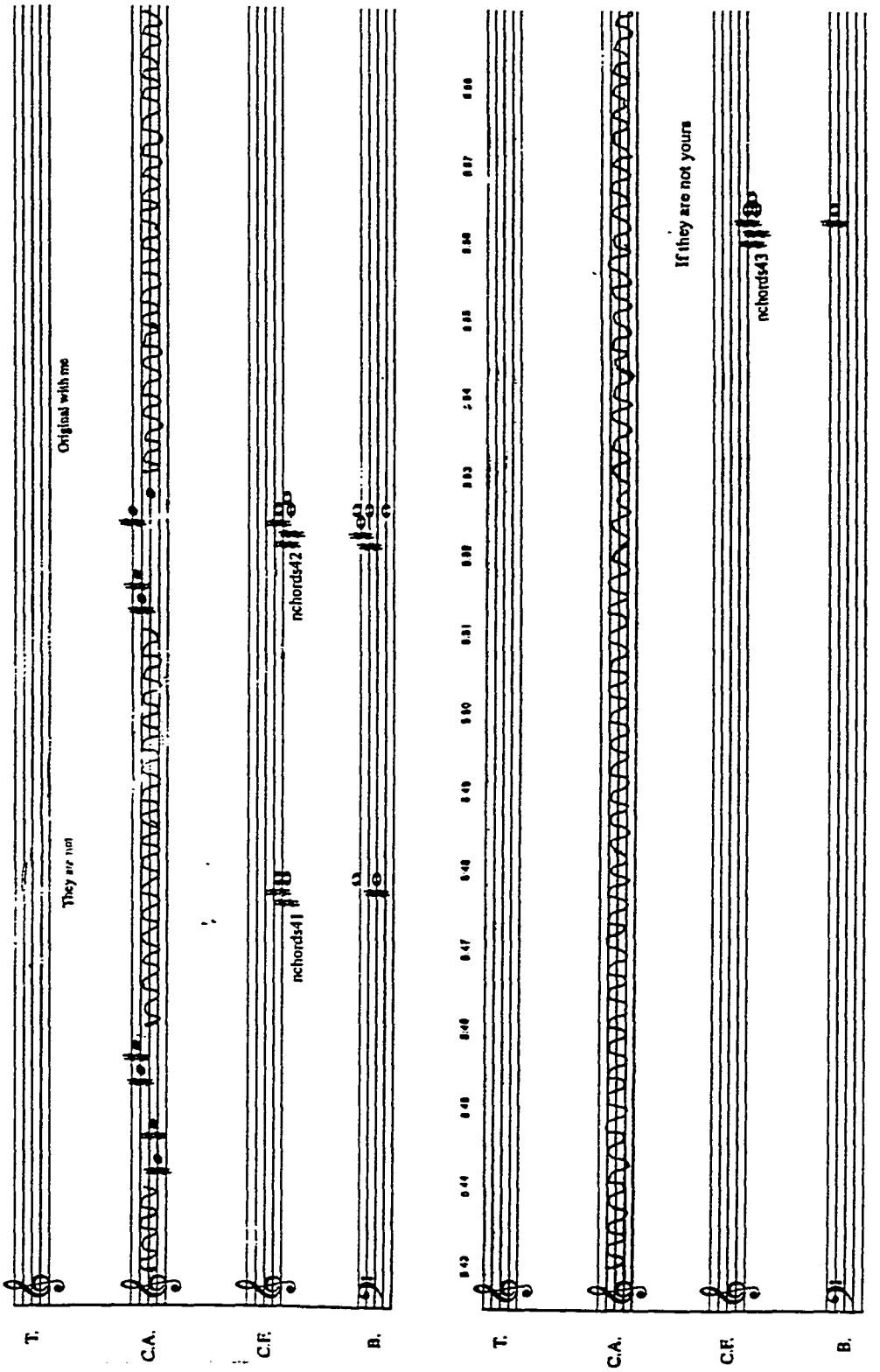

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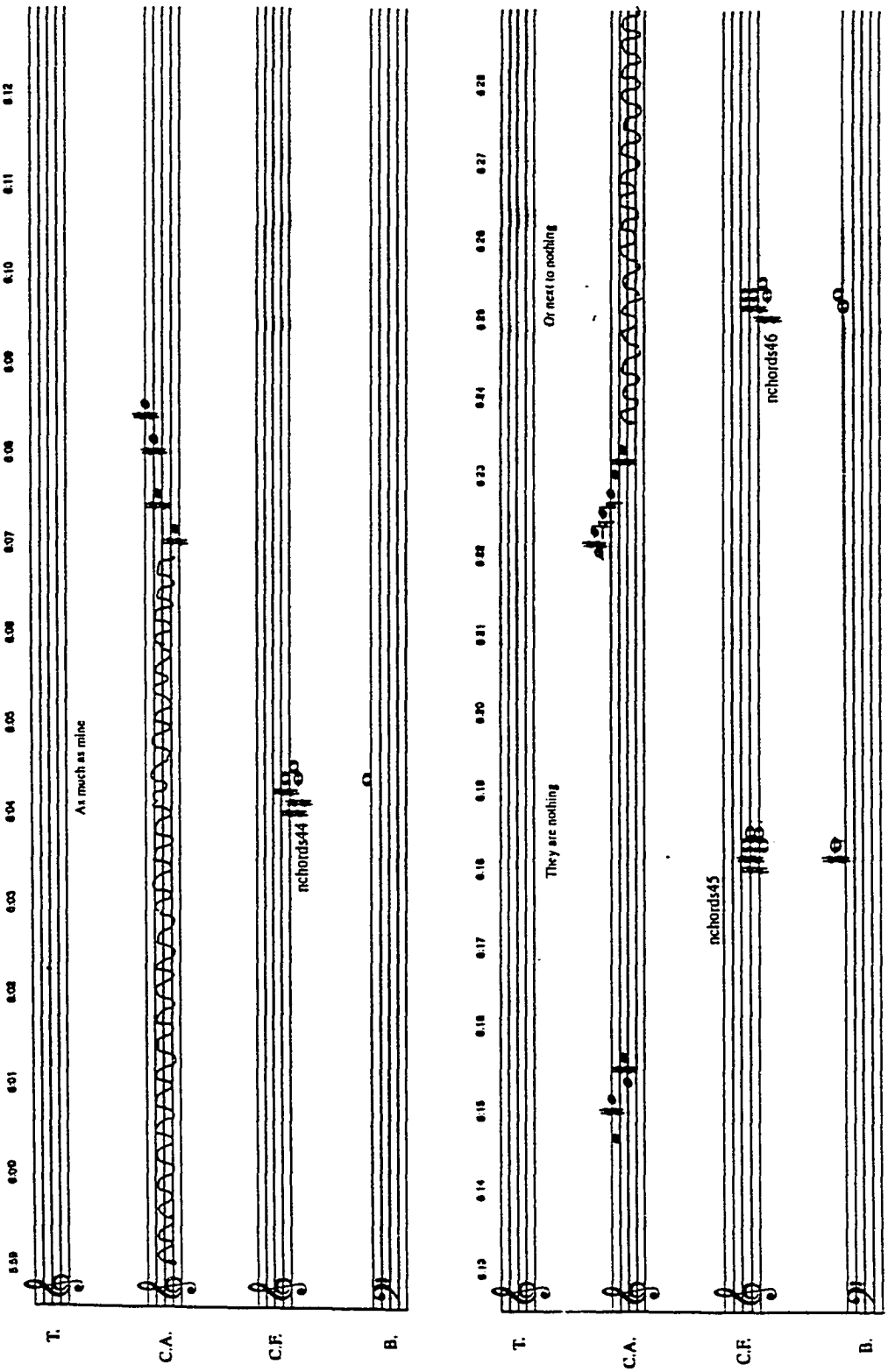

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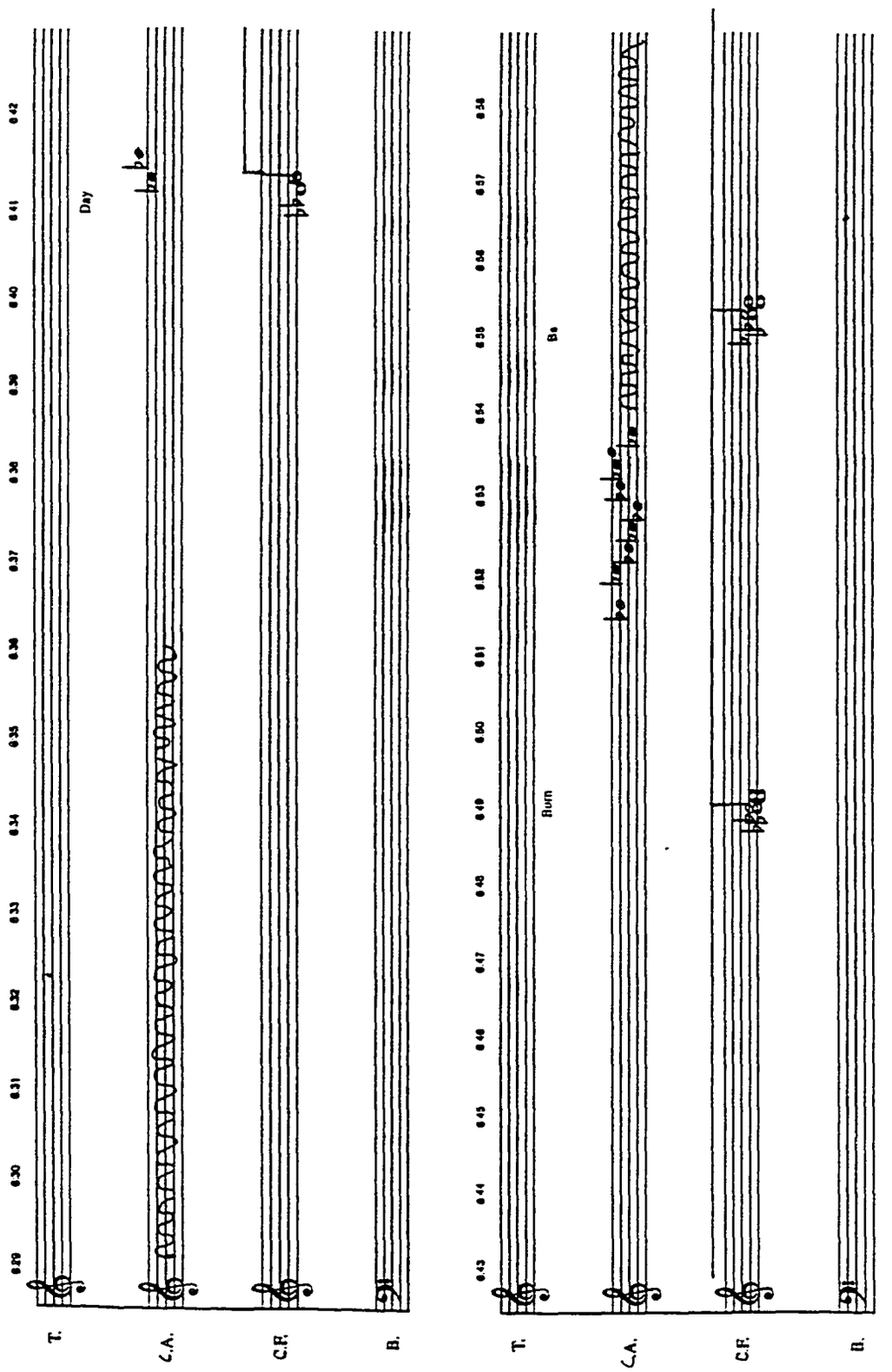

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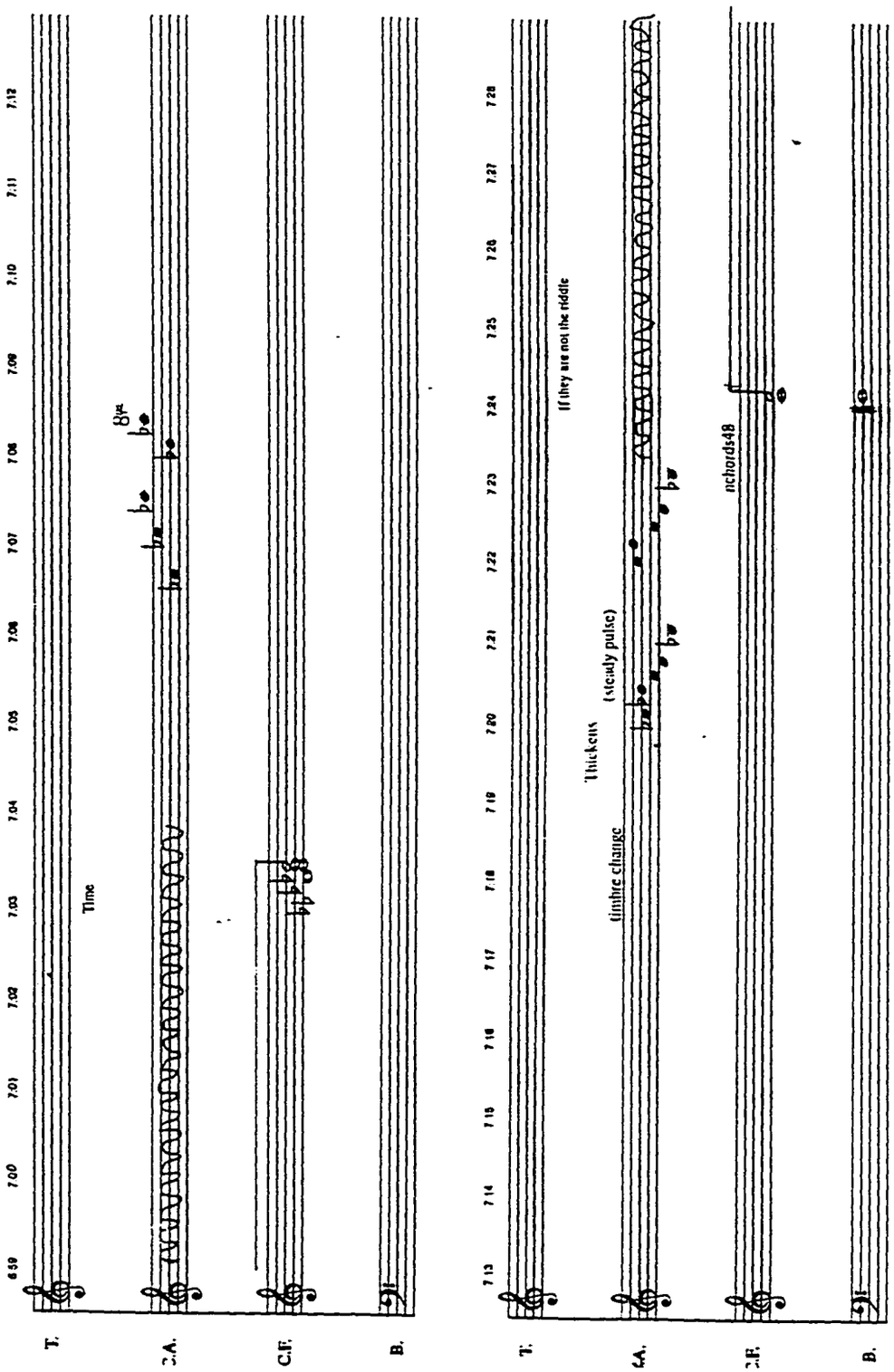

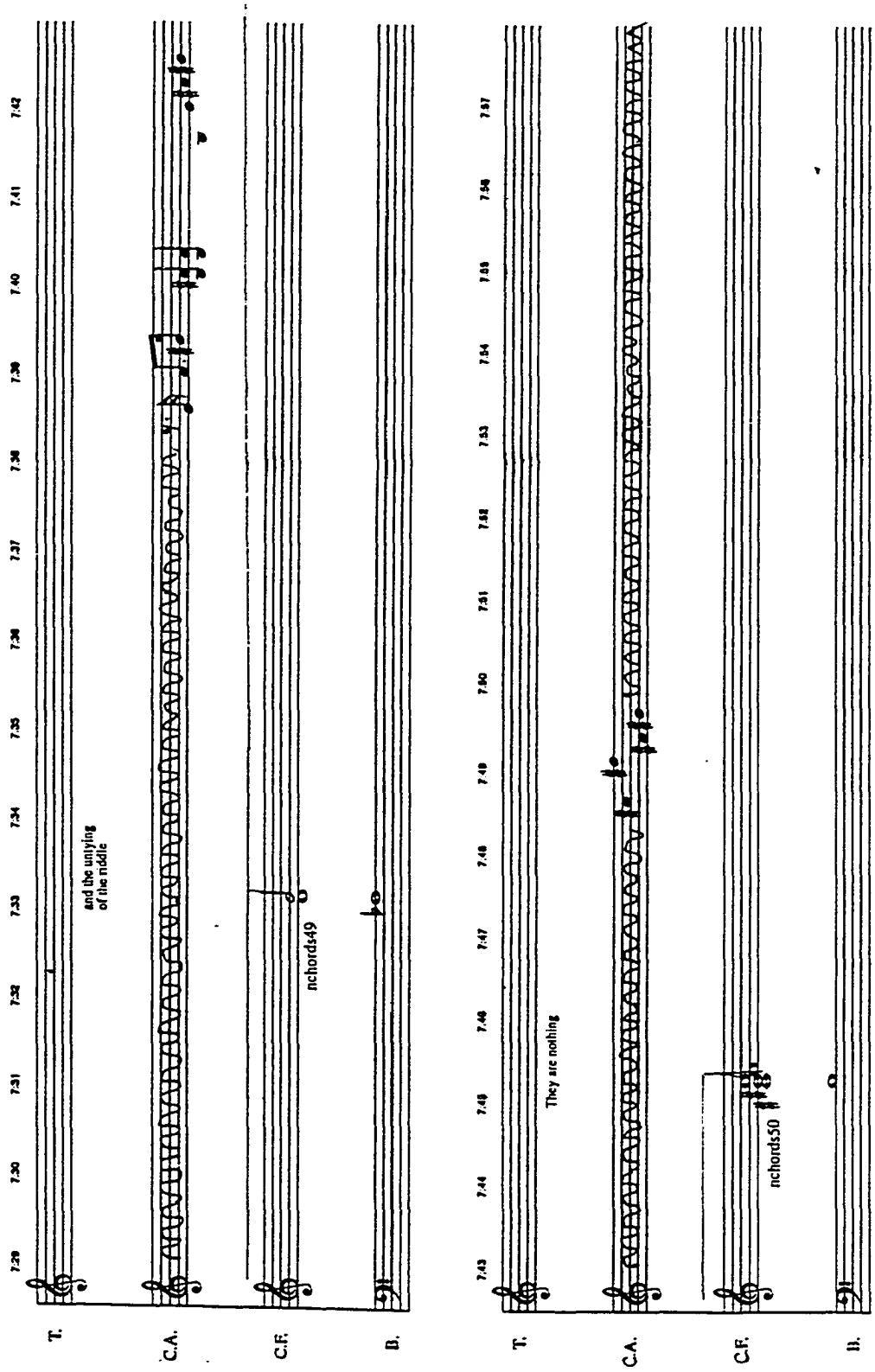

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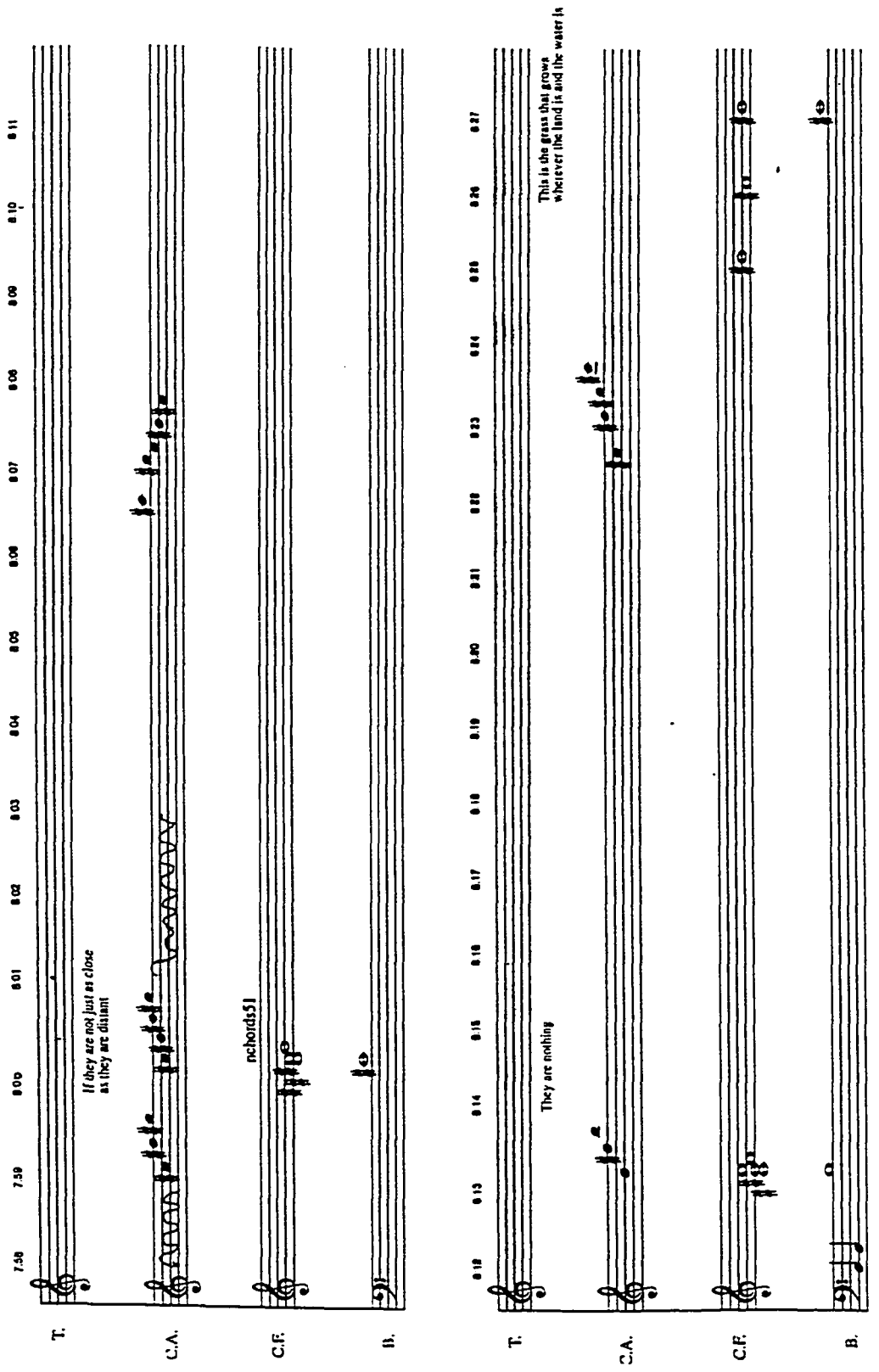

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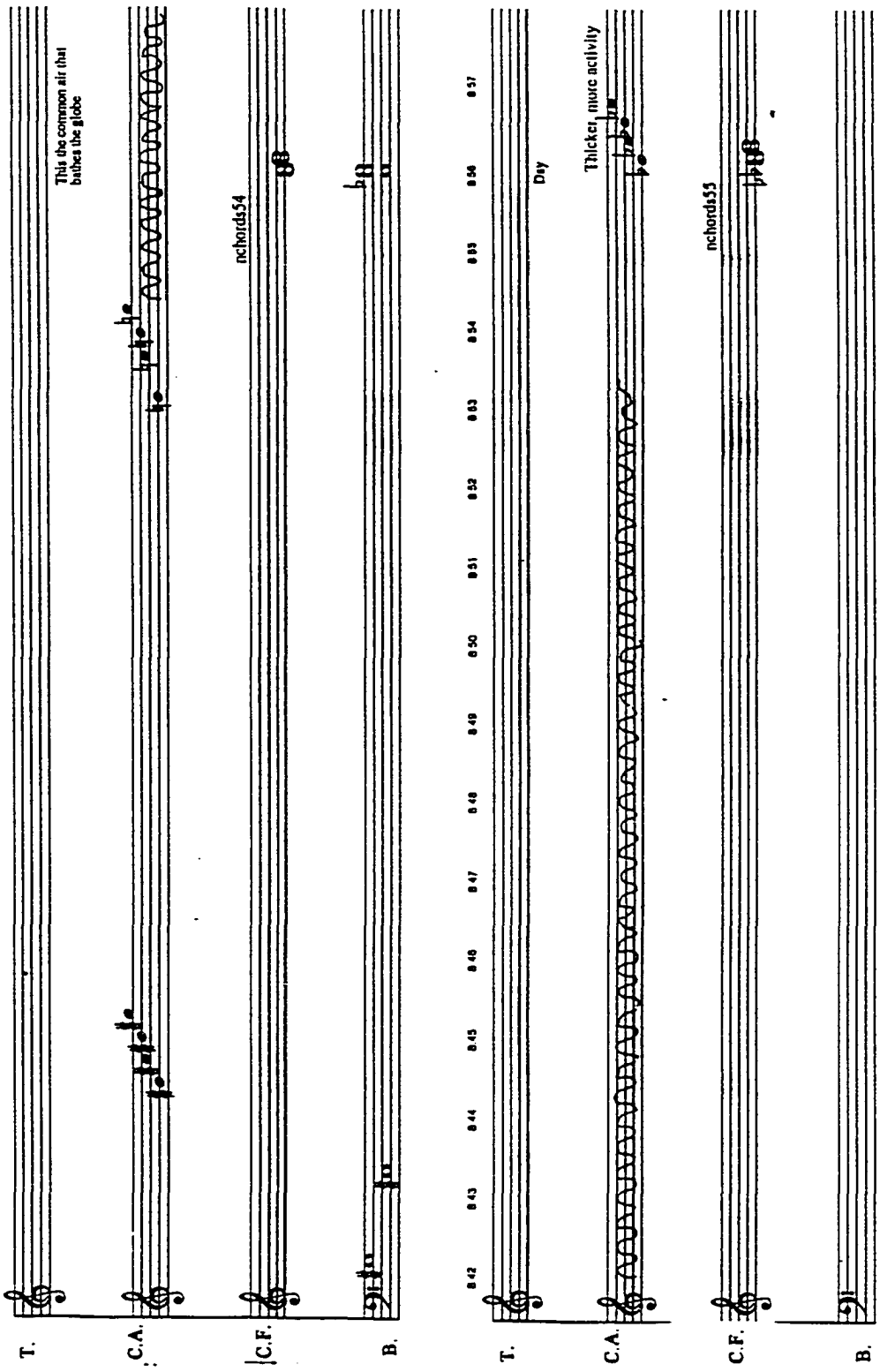

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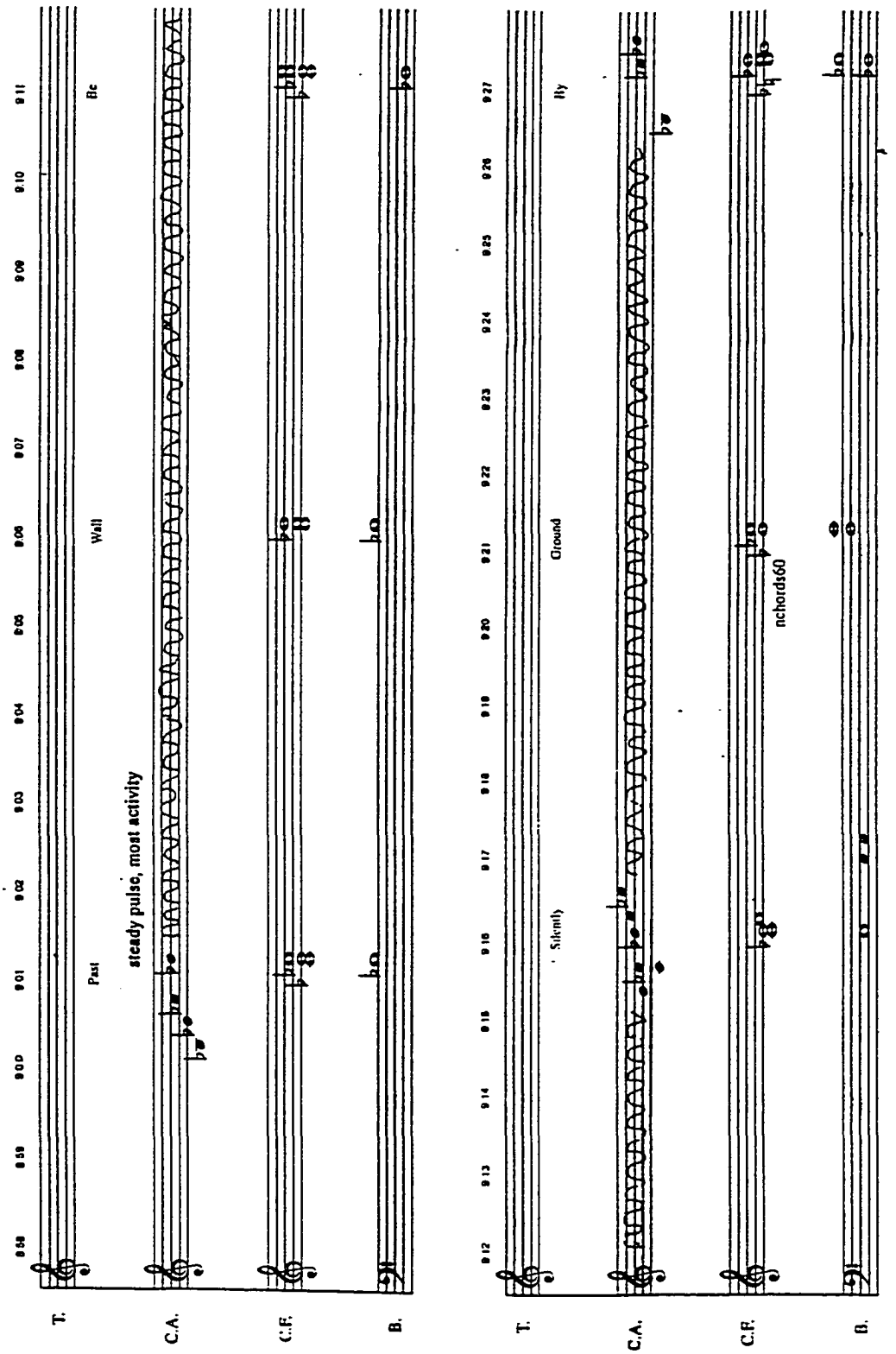

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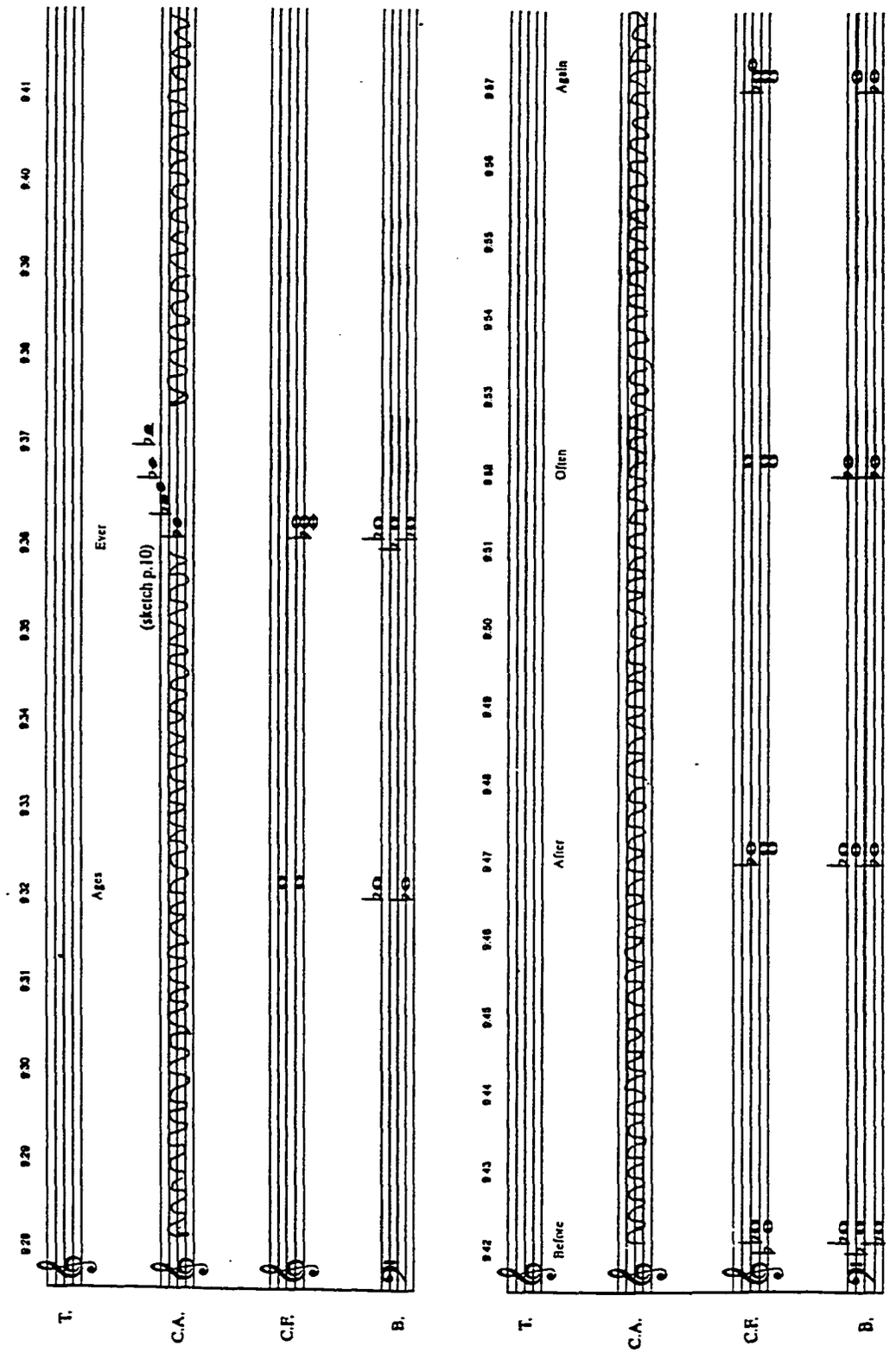

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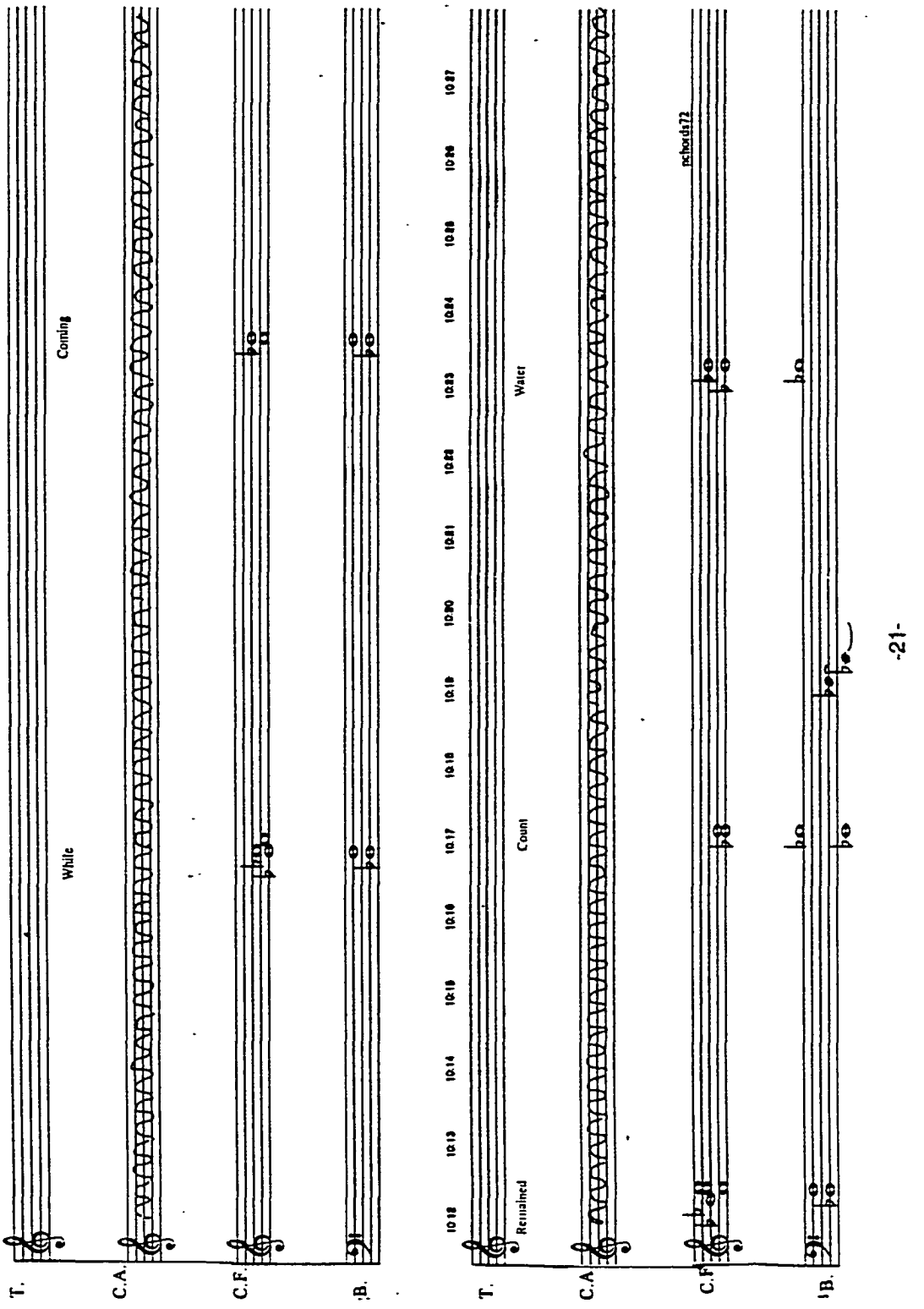

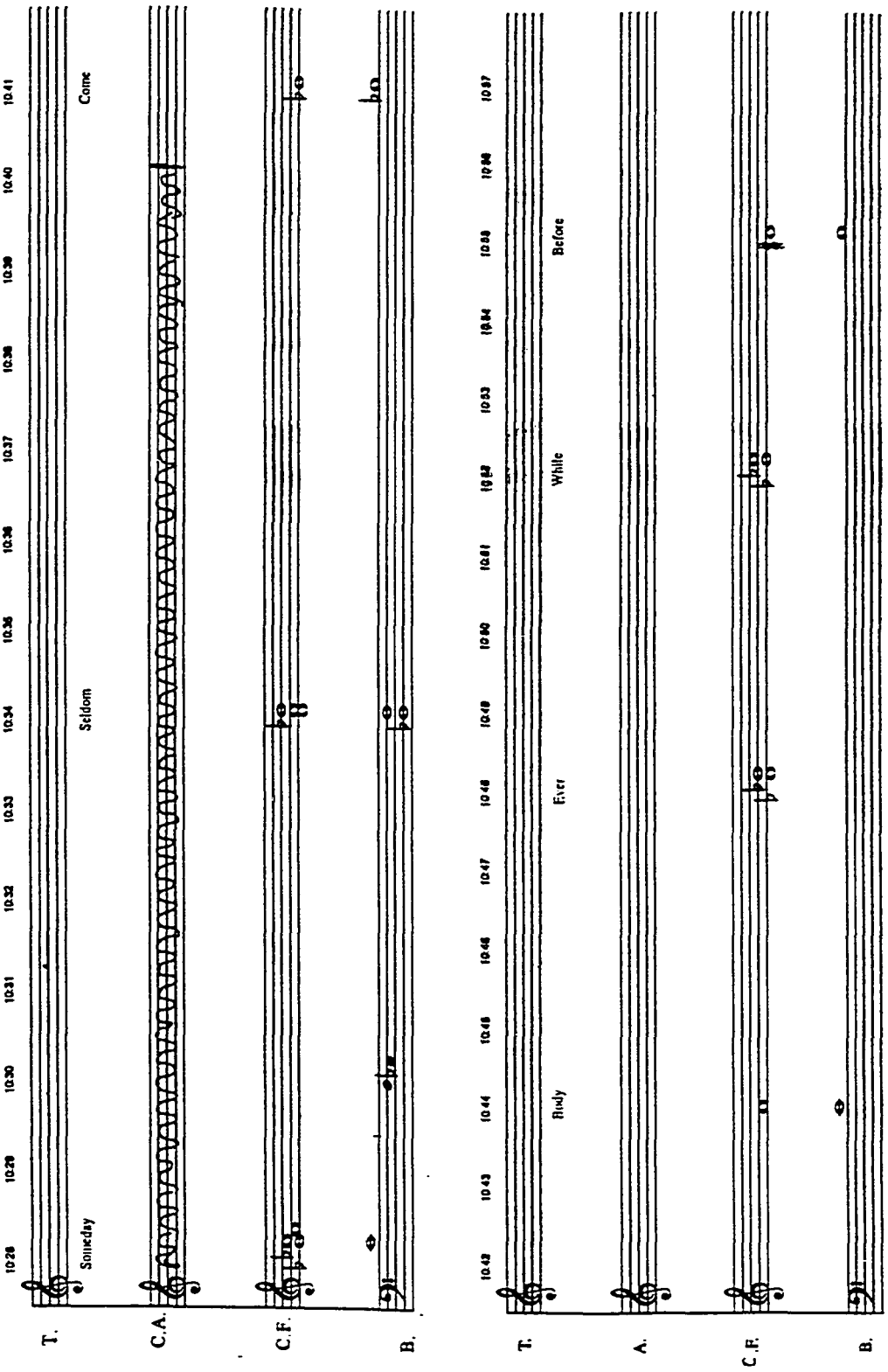

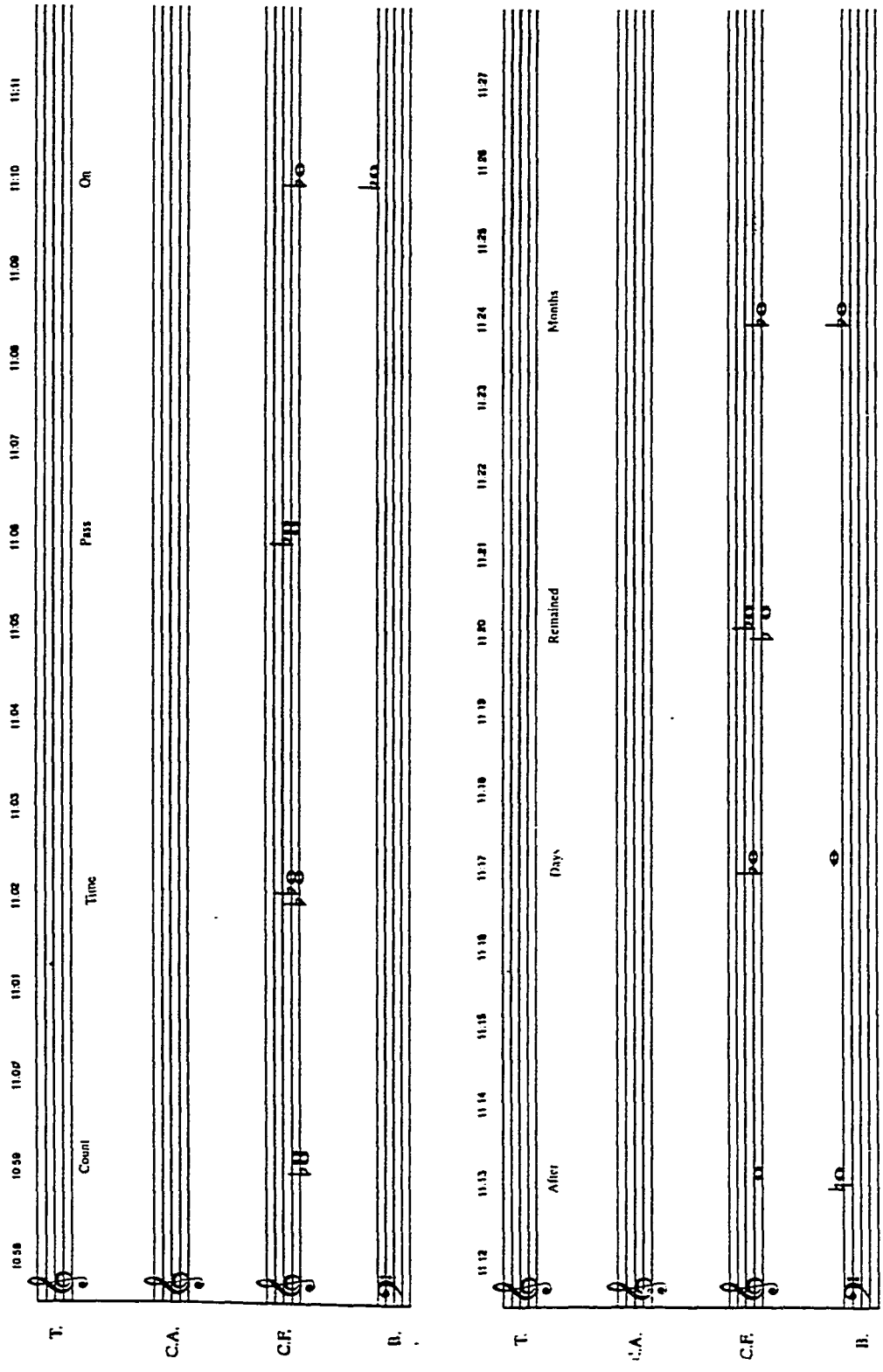

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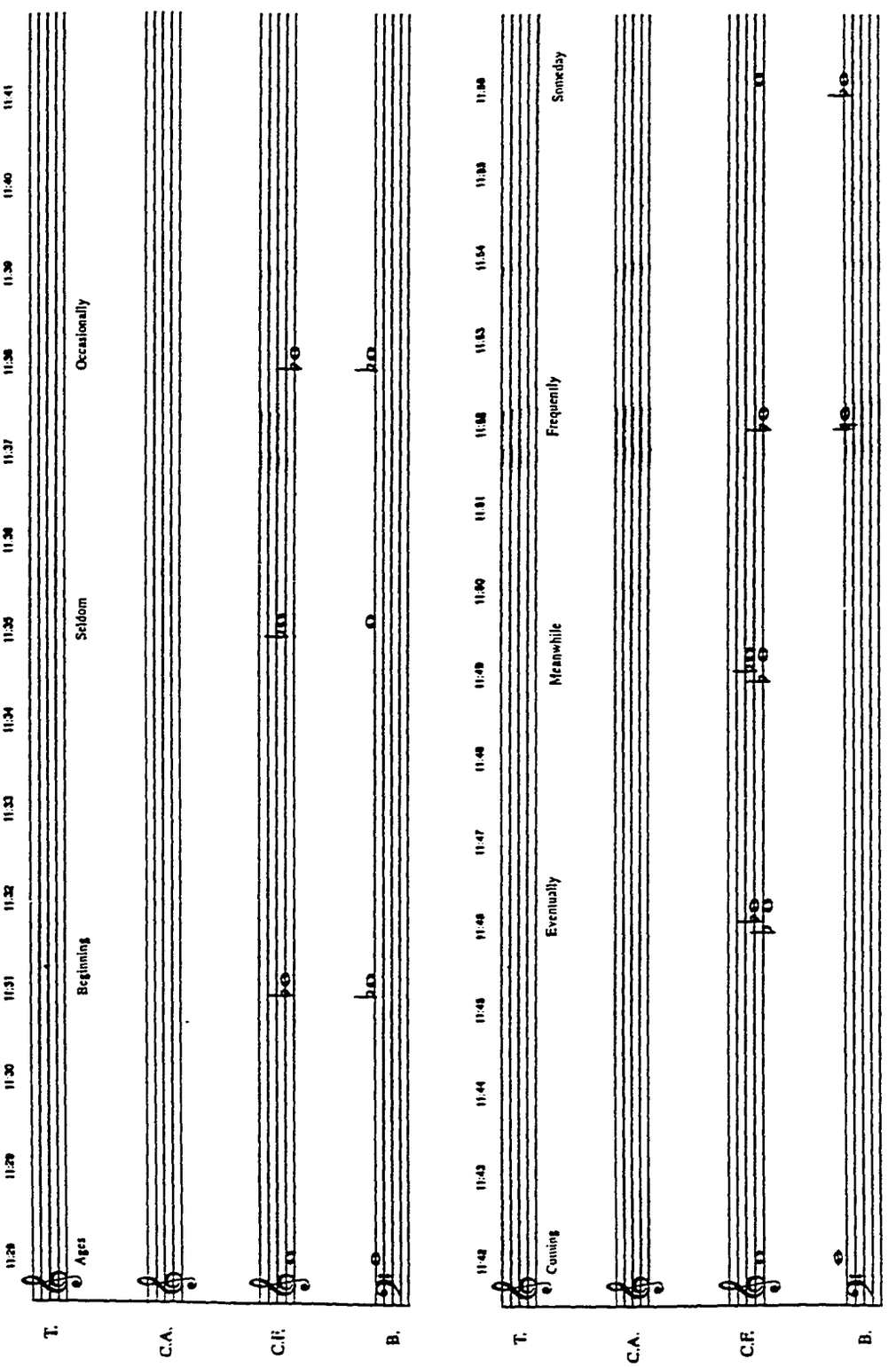

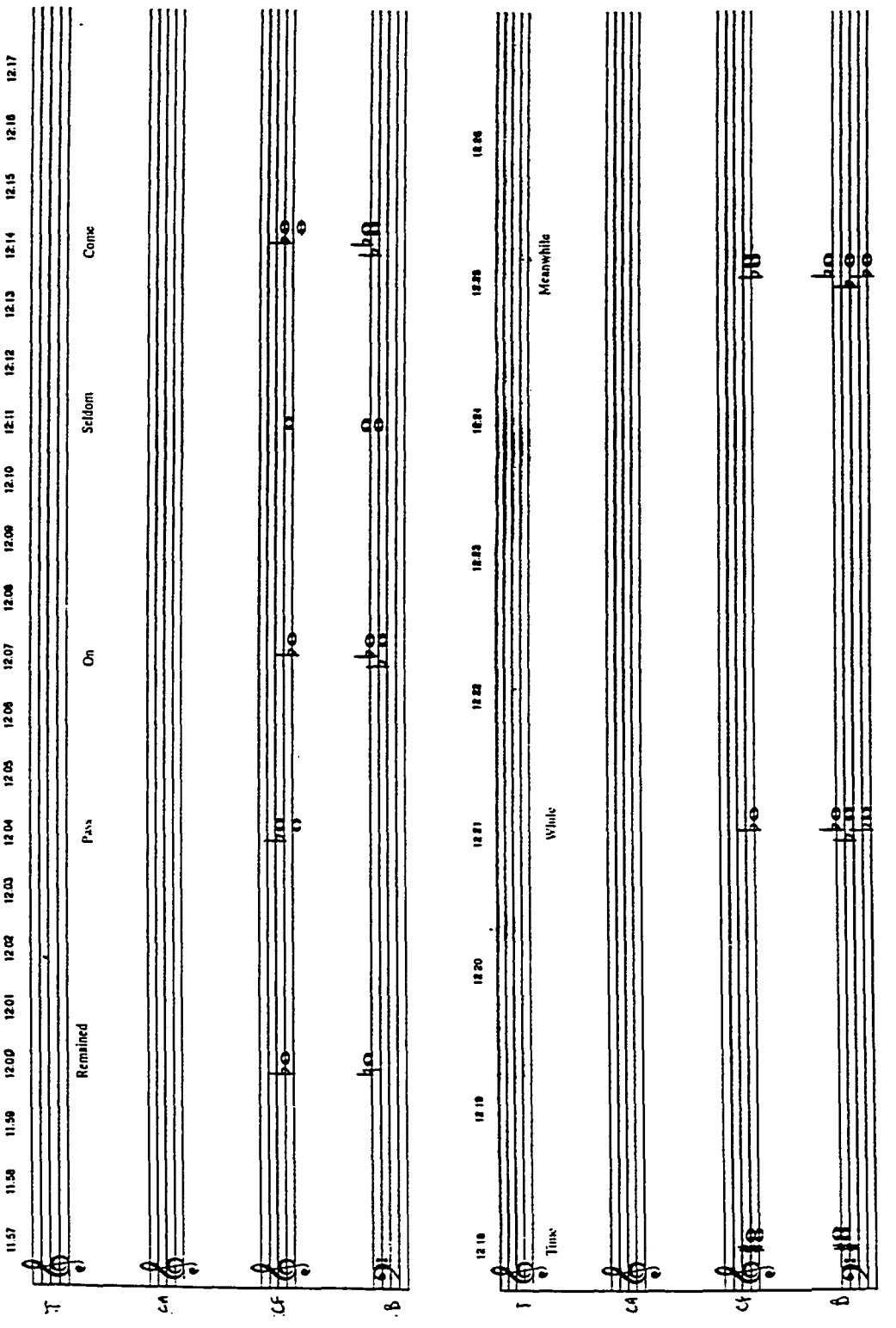

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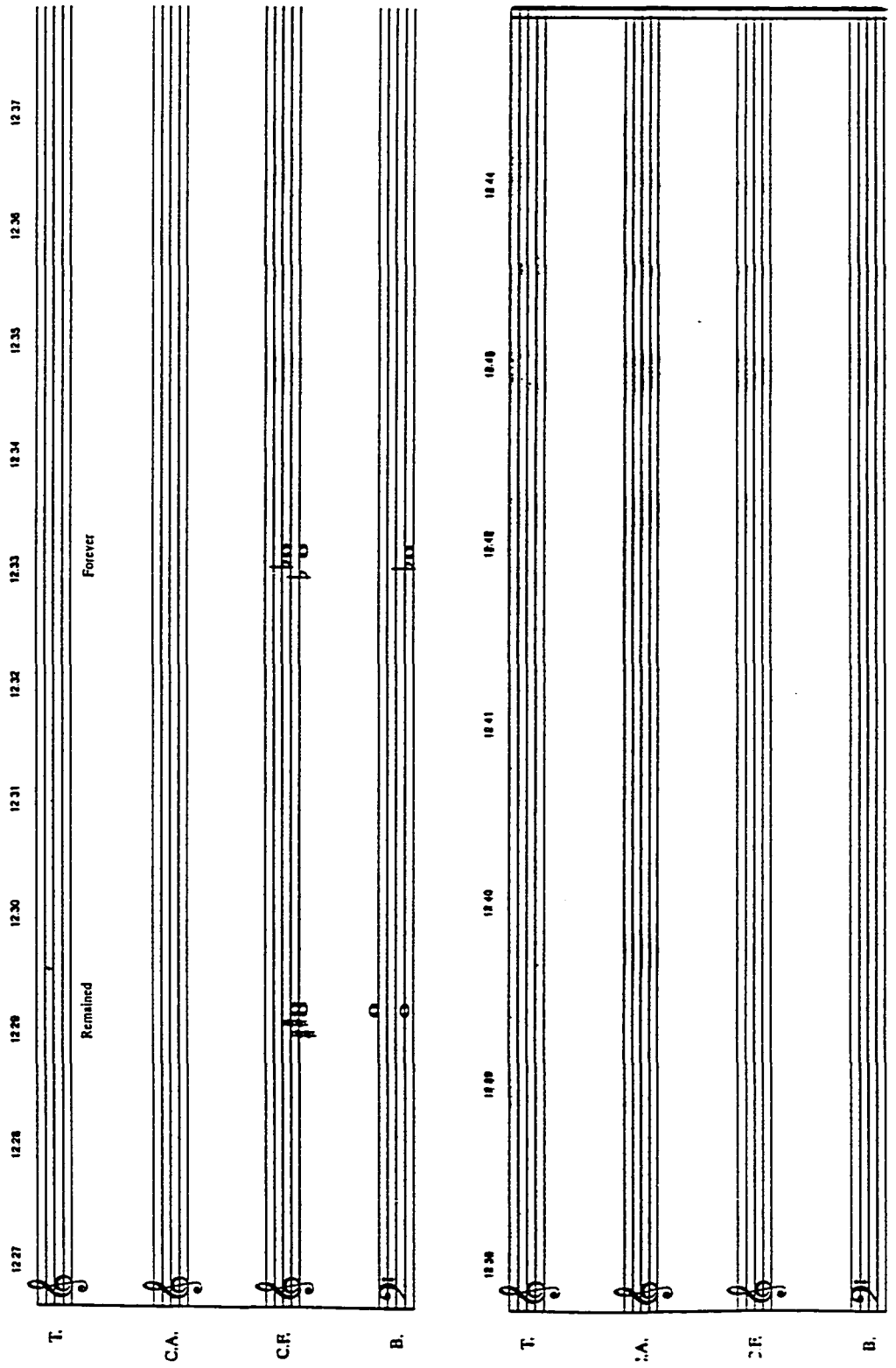

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APPENDIX D

Paul Lansky Interview Transcription
July 17, 1998 -- Princeton, N.J.

Byrne: Could you talk a little bit about your compositional process in general ?

Lansky: Well, each piece is different, but to give an example, *Things She Carried*...At a certain point I got really tired of weird sounding voices in electronic music and I became interested for the first time in narrative, and I did a piece called *Now and Then*. My idea was to do a piece in which the voice was absolutely untouched. So, with *Now and Then* I did a little bit -- very simple signal processing techniques -- to create a story which had no content.

A big issue for me is the viability of music on tape, so that the music can be listened to lots of times. I find that that means doing pieces in which the listener actually has to work in some way. You don't have a performer so the piece has to do something. So with *Now and Then*, the idea was that I would construct a skeleton of a story and all of the phrases have to do with time. What the listener does when he listens is to try to construct an inner version of the story. I'm very happy with the way that worked out.

With *Things She Carried* I wanted to do that on a big scale, to really draw a portrait of a woman. What's interesting to me is that the experience with every piece is different.

Certain things that I've done, like with the *Idle Chatter* pieces, I did once and it felt so good that I did another. I did a piece in the mid 1980s called *Small Talk* and last year I decided to see what would happen if I used the same technique again now, having nine years worth of software development and advances in technology, and also after having written pieces for nine years to see where I've come out. So I did another piece using exactly the same premises and that was the starting point of the piece. I didn't have any idea of where I'd begin, and I did a piece. It's going to come out in August on a new CD. It's called *Same Scene Nine Years Later*. There are other pieces, for example, a piece called *Night Traffic*. I had no idea what was going to happen. I recorded the sounds of traffic. I worked a couple of months -- total nonsense...

Byrne: I understand that in *Things She Carried* you co-wrote the text with Hannah MacKay and that it was inspired by the Vermeer painting "The Love Letter."

Lansky: Writing a piece of music is probably a lot like writing a novel. You start out with an abstract idea that's just totally meaningless. Then when you embed it in a context over a period of time it starts to take on a characteristic. Just like a person is a blob of protoplasm then through living a life you become an individual with some depth and dimensions. My idea with *Things She Carried* was ...I was interested in doing something that would take a long time because I hate finishing pieces. When you're working on a piece you have a reason to get up in the morning. Whenever I work on a piece for a long time, when I finish it, it feels good, but it makes life more challenging, like now what do I do ? So, I wanted to do a full length piece that would occupy me for a couple of years. It only took a year and a half.

Byrne: That's pretty quick for such a long piece.

Lansky: I know, I was surprised. The idea there was to again to construct something that lived entirely in recording. The piece was composed for CD. That was the idea, that this would be an object that you would have and would be part of your library, and you wouldn't take it in in-concert, but take it in at home. Although it's been played in a couple of concerts and works pretty well.

We started out, and the idea was simply to paint this portrait. We had no idea of where we were going. I was really anxious to get Hannah involved in it too because I felt a little strange painting a portrait of a woman, and I also wanted it to be a collaborative project. I think a man's view of a woman is very different from a woman's view of a woman. Nevertheless, I was interested in how that would work. So we started out with the first movement, "Things She Carried," which was just the contents of her purse and it went on from there. As we went on, in each movement, things became more relevant. We would have long conversations about whether she would actually have thought such and such, or whether she would do such and such. The actual text that we used is actually only a quarter of

what we wrote. For each movement we might have written hundreds of phrases and I ended up using just a fraction. Even in the composing process there's kind of an elimination. There's a series of steps that I go through, I do this and I do that.

In "Things She Knew," for example, which is the last movement, it alternates. It goes from sort of trivial things like, "she knew the back of her hand, she knew London, she knew France." Then it moves to more profound things like, "she knew the sanctity of solitude" and that sort of thing.

But I'm very interested in the idea of a list. I probably got that idea from Richard Kostelanetz . Most of his poems are lists. I really like the idea of lists. Especially because you don't have to worry about the real consequence of one phrase after another. You can do something and then simply ratchet down to the next item on the list, and that's where you are.

Byrne: It's a very efficient way of thinking.

Lansky: Yes, I think that works very well. I also wanted to construct something where the listener has got to invest herself in the process. As you listen you sort of build an image in your head. One thing that's always interested me is the sort of prototypes that people have in their imagination. Like when you read a book, and the book talks about a staircase, what it is that you imagine. And I think that everyone has a different thing that they imagine. That was interesting to me, to build something that would invest in a little bit of this kind of inner thinking that people do. I like the listener to have that kind of engagement.

Byrne: It seems that you employ ambiguity in your works in a number of different ways, requiring the listener to give attention to various elements in a piece. For example, in *Idle Chatter* there are many different layers of activity and the focus is therefore somewhat ambiguous. In *Things She Carried*, the drama is ambiguous.

Lansky: That's right. The *Idle Chatter* pieces are the ones that started me on that. After I wrote one people would talk to me about it, but nobody ever said the same thing. That was interesting. I've listened to them hundreds and hundreds of times and I still can enjoy them. When I first

started to do computer music, back in the 1960s, I had the experience a lot where I would do something that sounded great the first time, OK the second time, and rotten the third time. It was interesting. I didn't think about it at the time, but the way I got around that was by doing things that required you to compose as you listened.

Byrne: The viability of tape music is certainly a concern for you. Do you find that this approach offers something of a solution?

Lansky: Yes, I really think that there's a fundamental difference between performed music and recorded music. I do think that the tape music that works is the kind that requires the listener to perform. There's all this hoopla about interactive this and that. It just wears me out. It's fine, but I don't like getting up on stage. I do think that there's a way to make music that lives only on tape really viable. I think it's a different kind of music.

Byrne: Could you talk a little about your approach to tonality, and perhaps elaborate on the analogy you made to Rothko's painting in your interview with Joshua Cody where you compared saturating a time span in a piece with a tonal color to Rothko's practice of saturating a canvas with a color?

Lansky: *Idle Chatter* for example, before that I had done pieces like the *Jane Eyre*, *As it Grew Dark*, and *Guy's Harp* -- the harmonica piece. I was still coming off of a landscape in which really complicated operations with pitches were kind of the thinking edge of the piece like in the early 1970's I did a piece called *Mild und Liese* which had this array of the Tristan chord, the inversion of which is a dominant seventh and I was wandering through this array. The pitch is really the cutting edge of that. And I don't think that works very well in an electronic music point of view. A performer can really activate a pitch landscape. And I didn't think that I was doing that very well on the computer. In *Idle Chatter*, when I first started to do it, the chattering sounded great, but I was using kind of complicated chords and pitch charts, and arrays and things like that and it just really fell apart. It was hard. Then as soon as I settled on doing it on an F and unfolding a Bb triad I started to listen to all kinds of other things. So in the years since then I think a lot of the things that I worry about have to do with keeping one thing constant and taking something else that's new. In *Small Talk* the whole piece is a series of

transpositions of a mixolydian collection and there's absolutely nothing going on harmonically. As a listener you don't have to work very hard to parse that. As a listener that's really easy to do. Having done so, you can then move forward and concentrate on what I think is a fairly complicated texture. There's some speaking going on there and it's activating a rhythm and you can really worry about how that's working. I think that if I had tried to use pitch as a leading determinant, in that context, it would have ended up that that was the thing dragging you along rather than the actual content. I've thought along those lines in a number of ways. In a piece like *Word Color*, there I actually was using pitch in a more complicated way. I'm fooling around with trichords, where you have a major second and a third of some sort. It unfolds. So it varies from piece to piece... My idea essentially is that you're traveling someplace new, but you have some familiar friends with you that help you view the landscape.

Byrne: Is it like a pedal point in that it frees you up to focus on other things?

Lansky: That's right.

Byrne: You have collaborated with Hannah MacKay in a number of projects. Could you talk about how this has worked out ?

Lansky: There's a certain sense in which, and she'll hate it when I say this, but she's kind of an instrument that I've learned how to play pretty well.

Byrne: Well, you're familiar with her voice.

Lansky: Yes, so I've spent a lot of time working with the acoustical qualities of that instrument and I know how it works very well, starting with the Campion pieces. I think she records very well. I really like the way she reads and the way she works. It was interesting in that way, to be able to just constantly develop -- I know the parameters I have to use in order to analyze the pitch contours of her voice, I know how to synthesize it and I know how to work with it.

In other pieces that we've done, like *As It Grew Dark*, *Now and Then*, and *Word Color*, we'll simply get together for an afternoon and she'll do a

reading. But with *Things She Carried* I actually acted as a sort of director in a way. She'd read, and ask me to do something in a different way. It's amazing how good her instincts were.

Byrne: She's a trained actress, is she not ?

Lansky: Yes, that's right and her instincts were quite good. We did one piece together called *Memory Pages*, it was just amazing to me how much better her readings were than my readings. I'm on there too . And that was really hard, with both the piece and with doing the readings. It's really hard to read and so many people just take it for granted. They think it's an easy thing to do, but it's really hard. You hear so many people who say, "well I can read" and they just get in front of the microphone. But she reads beautifully.

Byrne: You have made analogies between what you do as a computer music composer and with the way in which a filmmaker works.

Lansky: The way I think about that has a lot to do with the mediation that's used in projecting the piece. When you write a piece for instruments to play, I like to think of that as very much analogous to what a playwright does. But a playwright is not usually the director as well, nor is the playwright one of the actors. But the thing that I enjoy so much about computer music is that you're eliminating the performer but you become the performer. And you become the writer and you become the producer. And you do it all. As I said before, the way in which you construct the finished product is critically important. For example, a film of a play is never going to work, and I think the analogy between that and performed music versus recorded music is also true. A recording of a piece that's a recording of a live performance works only because you're recapturing the experience of a live performance. But a piece which has no basis in live performance has to do a lot of things which don't exist in live performance.

Byrne: Perry Cook has stated that the compositional interest in vocal analysis/synthesis rests on three basic foundations. The first is the human being as a linguistic organism. The second foundation is a need for systems that decompose sounds in a source/filter paradigm, which allows for cross-synthesis. The third foundation is the fundamental desire to independently manipulate pitch, resonance, and time

in resynthesis. What do you think of this statement?

Lansky: Again, with this problem of making tape music that's going to live, you buy a lot when you use the voice. Automatically you're in a whole new ball park as soon as you use the voice. That really interests me a lot. For me, you never buy that much when you use a singer. You always sort of grit your teeth and hope for the best. When it's great, it's great, and when it's not great, it's terrible. Just using the voice in electronic music gets you in the door. It's the first thing. Then the vocal model is an interesting one to think about. The excitation and source filter model is one that lends itself very easily to electronic manipulation. All though it hasn't really worked very well. That's one of the reasons I've moved away from LPC in recent years. LPC is a crude approximation. It's funny that I got this reputation as being good at LPC, but what nobody seemed to realize is that it's a trick, and the trick is simply that I compose the music around its weaknesses. People would try to do LPC where they would actually try to get the sound of somebody talking and it always sounds grainy and awkward and buzzy. So, what I did was just compose music that avoided those problems. In *Idle Chatter* you just have it wrapped up in this complicated texture, and in the Campion pieces you have these packages of sounds. In the Campion pieces, finally at the very end you finally get the unaltered voice, and after all this stuff has been going on, it sounds great. But the voice is very interesting. Perry has moved on. I got a lot of mileage out of his flute model in *Still Time*, I had a great time with that.

Byrne: In *Word Color*, how did you tie in pitches and chords with specific aspects of the text?

Lansky: I didn't. The piece does sort of evolve over a course of time. One of the ideas of the piece was to capture the resonance of sound. For instance, everyone has the experience of saying a word and then saying it again, and again and at a certain point it makes no sense. It becomes a timbral object. I was interested in that. The idea was that these words just hang in space. There are ten second reverbs on words and they're just sort of hanging out there. I was also interested in the arbitrary nature of these words hanging out in space. As the piece evolves the Whitman text comes to the surface. But more than that the whole feeling of words as objects also comes to the surface. It's a complicated texture. At the end there's a series if repeated ascending chords. I was

sort of inspired by Bizet's *L'Arlesienne* Suite. The idea was to take the chords and at the end resolve them into this pattern that goes on but the harmonies change with each four. That delicate stuff is actually mappings of speech. Its the fundamentals but it's transposed way up. It's the same technique that's used in *Small Talk* that feeds the speech into this thing where the instrument watches the pitches as they go by a grabs them in a quantized way. It's a program I wrote in CMIX. There is a sense that it gets darker, it moves inward and becomes introspective with the repeated chords.

Byrne: It seems that you're exploiting the double meaning of resonance.

Lansky: The isolated words come from *Now and Then.*

Byrne: They pertain to time.

Lansky: That's right.

Byrne: How does the Whitman text fit in and what led you to use it?

Lansky: I knew at that point there was a festival in Delphi in the Spring and I thought it would be great to do something that had this oracular feel to it and it was played on a cliff overlooking that. That's the only poem, aside from the Campion that I've set and I wanted something that was broad based.

Byrne: And the Whitman text deals with how profound truth should be very familiar and is also universal.

Lansky: That's right, "This is the grass that grows," and so on. I did the same thing in *Now and Then.* I recorded phrases and a whole story, I did use one or two phrases from the story but not the whole story. I also used *Memory Pages.* It used to be so much work to get up a data base in the old days.

Byrne: I thought you were fascinated with time. Is that a personal fascination?

Lansky: Yes, the older I get the more fascinating it becomes. It's staggering how time accelerates. Just the experience of time and the way

things pass, it's frightening. A lot of my pieces , like *Values of Time*, which is for instruments and tape, and many of my pieces, refer to time in one way or another, and the whole business of memory too. In *Memory Pages* I was trying to recapture and work with the thing Proust talks about with the "Madelaine." That was an interesting piece to do. Hannah and I worked on that together. Everyone has this, there are certain memories that you have that just automatically transport you back to that moment and you're there. With Proust it was this cookie. It was an interesting piece. I played it for some of my graduate students and they hated it. I had just gotten much too close, and much too intense. I rewrote the piece entirely after that. This whole business of personal experience. You can't ever share it with anybody. Everyone's got their own. You can share the nature of the experience, but you can't ever share the experience.

END OF PART ONE

Byrne: I hear a lot of comb filters in *Things She Carried.*

Lansky: Yes I used a lot of comb filters, too many. I have the files and the whole directory from *Word Color* and *Things She Carried.* In *Things She Carried* there's a little bit of LPC but you wouldn't know it. On the song "Everybody Heard."

Byrne: The one with the ascending minor scales ?

Lansky: Right. That's actually me singing there. "Wish in the Dark" and "Everybody Heard," that's actually me singing in that. It's sort of a conceit. It's a piece about a woman and you have a male voice singing in a falsetto, but I didn't actually sing in falsetto. The way it works is there's a comb filter that tracks the thing an octave higher. I just have the voice singing into the comb filter and the comb filter is tuned an octave higher than the fundamental and the comb filters are actually following the pitch analysis of the voice. But I used some LPC there because there are certain tunes I couldn't get. I changed the pitches in my voice with LPC and then used that to excite the comb filters.

Byrne: And there's enough echo and a number of other things going

on so that's it's not very obvious.

Lansky: That's right.

Byrne: Did you use any stochastic techniques in either *Word Color* or *Things She Carried* ? The reason I ask actually is some of the piano sounds in *Things She Carried* sounds like it could be...

Lansky: Yes, that's right. That's one thing I've done a lot. I've done it enough so that I probably shouldn't do it anymore. The way in which I construct it is (it also comes from the *Idle Chatter* pieces) to get a bunch of notes, like twelve different notes or something like that. And you use those in some sort of random thing like in the piano solos in "Things She Read," which were done this way. A lot of things are done this way. What I do is say I have a, C, D , F#, G, A, Bb, B-natural, something like that. And I have a bunch of instances of those. They can be piano notes, or synthesized things, or comb filters or whatever. And I use a process that I think is called random selection without replacement. What that means is you have twelve things and you pick one and then you only have eleven things to pick from. And so you pick until you're down to none and then you throw them all back in. It's sort of like the twelve tone system I suppose. The thing I like about this is that it's totally uniform random distribution, but you can color it by putting two versions of one note in there. So a lot of the composing process that I will use will take a collection and do this with it and then I'll figure, "I want some more G# in there," so I put another instance of G#, so therefore, G# is going to occur twice as much as anything else. So instead of using all these random distributions that people use – calcion, or whatever, – this way I can specifically color it. So for example, very often I'll have three versions of a triad in there and then a couple of passing tones, so you get a triadic context with some passing notes in between. That's my secret. I like that way of doing things a lot. The reason that I like it is because instead of just composing one note at a time, you're composing the tonality of a texture. The way I like to think about it is you're painting with a broad brush.

Byrne: Did you use granular synthesis ?

Lansky: The only granular synthesis that I use is to create sustained sounds. Like the sustained voices in *Idle Chatter*, or in *Smalltalk*, and that's a very simple kind of granular synthesis. I developed it years ago in an attempt to emulate a choral sound, a choral effect. I just did a lot of it in the stuff on this new CD using string sounds and oboes, trumpets and that sort of thing.

Byrne: Is this your own program ?

Lansky: Yes. Basically I've never used anyone else's program. It's a bad habit I got into early on. The way it works is you take a small segment of a sound, a grain as it were, and you allocate a hundred different players for that grain and each player plays it once then chooses a random wait before it plays it again. Also a random speaker location. So you can control the density. It's not very fancy, but it works very well. I use it basically for sustained sounds, and it's nice for voices, it works pretty well. It can work disastrously too. You have to tweak the pitch contour of the source so that it's not absolutely flat. But if there's too much variation, it just comes out noise. So, it's very tricky. It works very well with Hannah's voice and doesn't work at all with mine.

Byrne: Do you think that has to do with the higher register ?

Lansky: I don't know. I think it has to do with the way she modulates her voice. Again, I've sort of learned how to play this instrument. When I talk, it's a lot of junk in there. When I look at my voice, there's all kinds of garbage all over the place. Hers is more modulated, the contours are cleaner and smoother. It's also easier to analyze a woman's voice with the techniques that I have because with pitch analysis you have more periods per frame so you get a better estimation of higher frequencies.

Byrne: A lot of the sounds in *Things She Carried* sound like instruments. The opening, for instance, sounds like a distorted electric guitar.

Lansky: It is. It's not a real guitar. That's synthetic actually. That uses this instrument that was developed by a student of mine

back in the 1980s, Charlie Sullivan. It's called Strum. Brad [Garton] uses that a lot.

Byrne: It sounds very different when he uses it.

Lansky: Yes, that's the interesting thing about it. He uses it really well in *Rough Raga Riffs*, that's a wonderful piece. Then there's a bunch of sampled piano, sampled vibraphone and xylophone. I did a piece called *Dance Tracks*, it's on Steve Mackey's CD. It's for guitar and tape. For that I piece I used one of these drum CDs, the sample CDs. So I have a bunch of those on this. It works very well.

Byrne: Did you use any physical modeling ?

Lansky: There are a lot of flutes in *Things She Carried.* Physical modeling is used for the flute sounds in "Things She Remembered," and in "Things She Noticed." There's a lot of flute models. [These are created by Perry Cook.]

Byrne: The attacks seem different on some of them. Some of the attacks are very sharp.

Lansky: In the sustained things, we hear the overtone series popping in and out.

Byrne: It has an almost wistful sound to it.

Lansky: That's right.

Byrne: Was that done to bring out the meaning of the text?

Lansky: I don't think so. I just liked the way it sounded. We're not that advanced yet -- to use the computer to do things we really want.

Byrne: In "Things She Remembered" you have these very disjunct, sort of abrasive piano chords and then sustained sounds that are very beautiful.

Lansky: Yes.

Byrne: It seemed to me that it was demarcating the different qualities of memories.

Lansky: Oh, yes, yes.

Byrne: Remembering the drive along the coast of Maine was demarcated as pleasant, while other memories were demarcated as upsetting.

Lansky: That's right. There's sort of a hint of an accident in there. She remembered the scene of an accident. And there's a thing about police reports. There's also a thing about an old geezer driving a Buick, wearing a hat, footsteps outside her doorstep late at night. Also the piano in "Things She Remembered," she remembered the things that most people do, she remembered piano recitals. So that's sort of along the lines of remembering things. But there is certainly a feeling of violence and suddenness that's something I think that people have picked up on in the piece, there's kind of a violent undertone.

Byrne: There's a sense of danger.

Lansky: Yes, and the detective story certainly exacerbates that. I haven't gotten as much feedback on the piece as I wanted. I sort of hoped people would shout at me about it, say that they really didn't like this or they did like that. So I was very pleased to hear that you wanted to talk with me about it.

Byrne: The whole thing unfolds like a detective novel, and the one movement directly addresses that.

Lansky: Right, and you've got to put it together for yourself. I thought that women would also want to talk about it. The text was written with a woman. Nevertheless, I think there is a kind of masculine viewpoint that's inherent in the piece. It's hard to say...I really don't know.

Byrne: I noticed something similar in the first movement, that there's a give and take between the abrasive guitar sound and then the sustained sound. Is that intended to have dramatic intent?

Lansky: Yes. I didn't think about these things hard as I was doing it, but one thing people have bought to my attention and have talked about is the persona of the reader in that movement. There is definitely a sense, though I didn't really intend it -- but it's there, that she's dead at that point and that it's maybe somebody in a morgue who's going through the contents of her purse, for one reason or another. You can think that if you want. I didn't think that.

Byrne: I didn't think that either.

Lansky: OK, good, good. But a number of people have. I think the kind of heavy guitar sound lays a bed in which there is a mystery about the context. If the whole context was simple and tinkly, I don't think you'd be as prone to wonder about "who's doing the reading?" The thing I like about that is the reader is actually sort of sympathetic. With the change in the change purse, " It's 25, 35, 45...." When Hannah did that I shouted at her, "Don't do that!" But it's a great part, I really like it.

The heavy guitar definitely sets an impending tone. Also I had the feeling that this is going to be an hour's worth of sound, so I did want something that lays the stage for a span of time. I like to think about imposing this sort of process of negotiation with a listener. As a composer you say, "I'm going to sit you down and we're going to have a talk, and it's not going to be a short talk – or it is going to be a really short talk. Or it's going to be a serious talk.... " I said somewhere you that you can think of two models of pieces. One model is like the bus in New York that bows down to let you on and the other is where you have to grab on to this moving vehicle and it throws you off. I definitely think of my pieces in the former category. I like to invite you in, let's get something going, and then we're done. OK, good-bye. I think that opening guitar sound was definitely an attempt to say, "You're going to be here for a while, learn to love it."

Byrne: You bring that back in the last movement.

Lansky: Right. I also bring back the whole-step harmony. Everyone notices that which pleases me.

Byrne: It gives it a sense of closure.

Lansky: Yes, right. Though I didn't actually compose the pieces in their order. I did "Things She Carried" first, then "Things She Remembered."

Byrne: The three movements that don't use Hannah MacKay's voice seem to be peripheral to the drama, is that right ?

Lansky: Yes, they're extremely peripheral. "Wish In The Dark" I did think of originally as kind of a pop song. I wanted it to be even more like a pop song, but it didn't work out that way. I was thinking of Harold Arlen. I definitely wanted a kind of urban, smoky bar type thing. But that's not the way it worked out at all. I definitely thought of it as something she would have liked. "Everybody Heard," was inspired by Louis Andreissen. The interlude I really thought of as just an interlude, just a chance to cool your heels.

Byrne: It reminded me a little bit of Steve Reich's music.

Lansky: That's right.

Byrne: In the liner notes for, "Everybody Heard," you write that it represents supplication. Supplication to what? To the events represented in the previous movement ?

Lansky: I tried to hedge my bets in the preceding movement by saying "Things She Read." It's very ambiguous. It's several levels removed from the listener. You're hearing somebody talk about something that she read. Nevertheless, it beads back up to the surface. At the end she's definitely got herself into a situation which is difficult to extricate herself from. She actually has to go to a certain place and meet somebody. The consequences of the

whole thing are unclear. I definitely did have the feeling that this is a piece about someone who has reached a point in her life where she's no longer young but she still has a good span of time ahead of her and she's got to work out the way things are going to be. She's trying to make her peace with a whole number of different things out there. That definitely for me has the feeling of, "I've gotten this far, now what am I going to do ?"
"Things She Knew," at the end reflects back on how she has threaded her way through the world.

Byrne: With regard to "Things She Read," I thought that there might be a double meaning intended in "read." Is she reading a book? Or is she reading a situation that she's actually in? It seems deliberately ambiguous.

Lansky: That's a good point, like that's the way she read it. I didn't think of that, but from now on I'll say that I did. That's a good point.

Byrne: The subsequent movements make it seem especially ambiguous, as though it had something to do with what actually happened to this protagonist.

Lansky: That's right. There's a whole string of things at the very end of the movement which are hard to hear. I covered them up, like there's one part where she says, "She knew her ass from her elbow." It gets very soft.

Byrne: In "Things She Read," there's a lot of counting. What does that refer to? You use it in *Word Color* too.

Lansky: I like counting a lot. It's sort of like lists. The way it starts out, 3, 4, 5, 6. I'm sort of thinking of an insomniac's night, and then 7, 8, 9,10 is morning in the office. It's like, you're awake and you see three o'clock, and then four o'clock. It also marks time in a way, with 7, 8, 9, 10 -- sister this is gonna be some day. That's actually a quote from Laurie Anderson. Did you notice the telephone in "Things She Noticed?"

Byrne: Yes, I almost got up to answer my phone the first time I

heard it.

Lansky: Good, I was hoping people would notice that. We were recording and the phone rang. I stole that idea from Steve Mackey, he has a piece called *Deal*, and the phone rings but nobody answers it. I like what happens (in "Things She Noticed") because it creates this kind of visual shift in the piece. You're not quite sure of what you're listening to. It also pricks your consciousness – you listen harder.

Byrne: "In Things She Read," you have a lot of organ chords.

Lansky: Originally, I wanted to get one of those cheesy organs that they use at ball games, a big Hammond organ. Perry [Cook] designed a nice model, he calls it "B3" for the B3 organs. That's also in the background of "Everybody Heard."

Byrne: I am reminded of the background music in old dramas.

Lansky: Yes, right.

Byrne: Was that intentional ?

Lansky: No, I just liked the way it sounded.

Byrne: You have a lot of ambient sounds, especially street sounds, in "Things She Read." What was your intention ?

Lansky: I really wanted an urban sound, New York City or Los Angeles. I like these seedy city sounds. I also wanted to capture the sense that you were in an apartment building. Up some floors. I used a sound effects record for that. They have a lot of city scapes. I think that's New York late at night. I was also thinking about the pacing in the whole piece. At that point, I think you're tired of comb filters and chords. I really like the way, after the Interlude, you just come in with this traffic noise. I think it's like the seventh inning stretch, you've got something different to do. At that point in the piece, you need to change gears and reorient yourself.

Byrne: At the end [of "Things She Knew"], the ambient sounds come back, but they're quite changed.

Lansky: Right, at the very end you just get cars passing, and a chance just to resonate with what has happened at that point.

Byrne: Also in that movement, about 4 minutes into it, she states, "It wasn't fair..." There's a kind of shift in the sound – there's buzzy echo on her voice and it makes it seem that there's an emotional shift in the tenor of the piece. Like a shift in reality or a pivotal point.

Lansky: I think I'm using some different processing techniques there. The voice is more processed when it does that, and other times the voice is more foreground, more unaltered and that's just before we get the high sine tones that are descending slowly.

Byrne: When she says, "This was not a game she knew how to play," it returns to the opening.

Lansky: Right.

Byrne: The jumbled piano chords come back in "Everybody Heard." Is that a deliberate reference?

Lansky: I don't think so. The piano sounds are working in a similar way to the tonal issue. It's a very familiar sound and you don't have to work hard to imagine what's making that sound. I think another issue with recorded music is that when we hear a sound, we try to make some association with what made that sound. I think that's why people initially called electronic music outer space music because there's no physical reality attached to the sounds they heard. I like piano sounds a lot. Again, it allows you to crystallize your focus. Nobody is going to say, "How did you get that sound ?" It's one of the most familiar sounds, like the voice, which is totally familiar. The piano is nice because it allows you to do a lot of things and it's not a sustained sound, and I've got a lot of sustained sounds. It's very easy to do slow things in computer music, it's very hard to do fast things. Fast things

sound mechanical or busy.

Byrne: There's a series of unintelligible words at the very end. Why ?

Lansky: My original conception of the piece was that it didn't really matter if you understood the words or not. I don't think that anymore, I think you should understand the words. That's why I printed the text with it. At the end of "Things She Knew," I didn't want you to hear those words. I just wanted you to hear the resonance of her voice, just to hear that somebody's talking. As though there's a recording session in the next room.

Byrne: Did you want to convey a sense that you're leaving her behind ?

Lansky: Yes, like she's fading out, and this human presence is getting smaller and smaller. It disappears into nothing at the end. It's a very human presence, there's no processing on it at all. If you look at the numbers, they're amplitudes of 20, 25, down in the noise range. It's amazing you can hear it at all.

Byrne: Is there anything else that you wanted to talk about in regard to *Things She Carried*? You mentioned something about concerns over gender issues in reference to the piece...

Lansky: One of my woman students was disturbed by it because of the sense that she's being stalked, and the implicit sense of violence to a woman in there. I don't take that literally, I take it more to represent the violence of everyday life that everyone goes through. This is the only time I've ever done anything like this. I've never written a text before. One thing that's interesting with this is I've had a hard time setting poetry. I really think of poetry as already music, so it's very hard for me to imagine setting poetry. The Campion and Whitman are the only things I've ever set. My thinking with *Things She Carried* was that the text itself was not poetry, it needs the music to become anything at all. Whereas I think with a lot of poetry, music is not as good as the poem. It's a real issue. I did a seminar last Fall on words and music. It was very interesting to engage a lot of

thinking about what poetry is and how a text works. T.S. Eliot has a famous essay on music and poetry – he talks about when he was approached by Michael Tippett to write a libretto and he told Tippett to write his own libretto. He said any text that I give you will already have the music in it. Any text that you write will require music in order to make it come to life. That was maybe the fundamental idea in *Things She Carried*, to really write a text that didn't work very well by itself, but required the music to survive. If you think of pop songs, if you say the words to a pop song they always sound absurd. People always do this, they quote Pearl Jam, and you say, What are these dumb words? But when you hear them in the music, they sound great. The words don't work by themselves.

APPENDIX E

Speech-based computer music pieces by Charles Dodge and Paul Lansky

Charles Dodge:
The Waves (1984)
Mingo's Song (1984)
In Celebration (1975)
The Story of Our Lives (1973)
Speech Songs (1972)[1]

Paul Lansky:
Shadows (1997)
Andalusia (1997)
Same Scene, Nine Years Later (1997)
Things She Carried (1995-96)
Memory Pages (1993)
Word Color (1992)
Now and Then (1991)
The Lesson (1989)
Smalltalk (1988)
Notjustmoreidlechatter (1988)
just_more_idle_chatter (1987)
Idle Chatter (1985)
As it Grew Dark (1983)
Six Fantasies on a Poem by Thomas Campion (1978-79)[2]

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1 Ed M. Theiberger, "An Interview With Charles Dodge," *The Computer Music Journal* 19/1 (1995): 11-24
[24].

2 Paul Lansky, "Homepage," http://silvertone.princeton.edu/~paul/compositions.html

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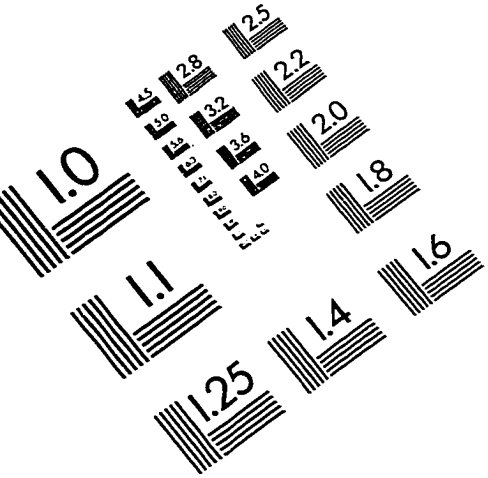

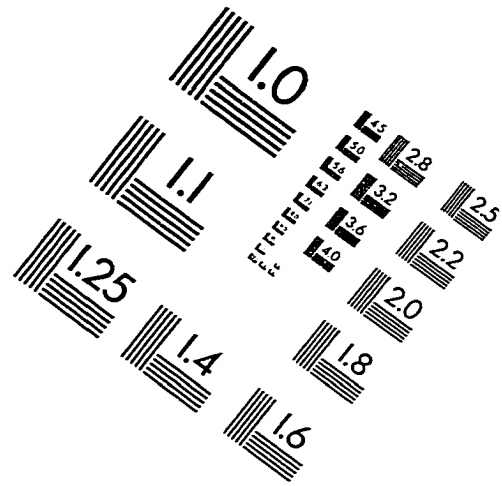

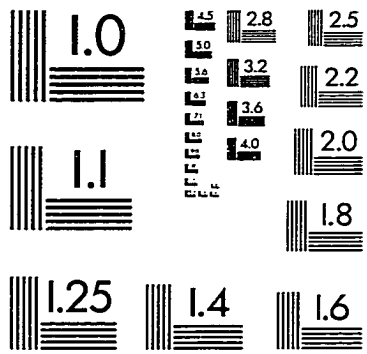

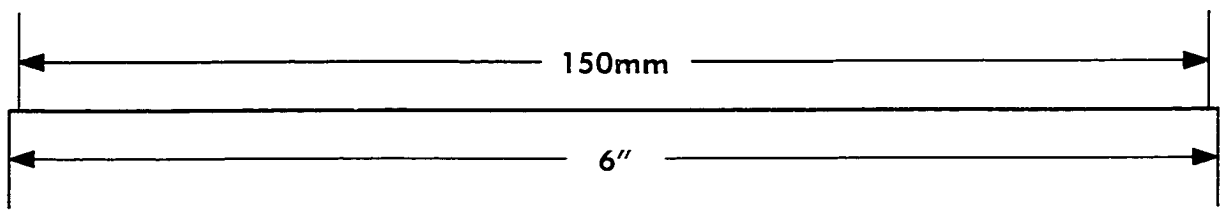

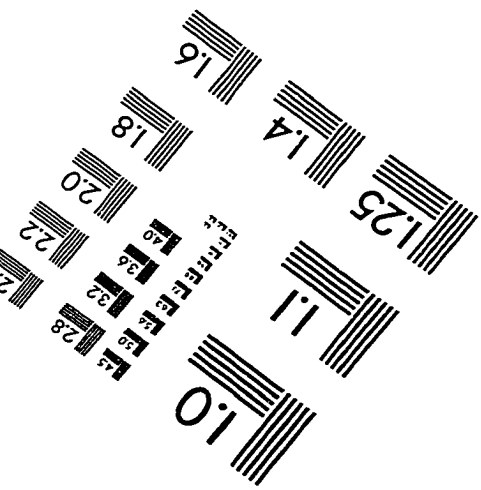

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