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**A Vast Simplicity: Pitch Organization in the Works of
Carl Ruggles**

by

Stephen P. Slottow

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

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Abstract

A VAST SIMPLICITY: PITCH ORGANIZATION IN THE WORKS OF CARL RUGGLES

by Stephen P. Slottow

Advisor: Professor Joseph N. Straus

Carl Ruggles's œuvre, although small, is powerful, finely crafted, and intensely individual: his compositions are not easily mistaken for those of any other composer. An individuality so audibly recognizable points to distinctive musical characteristics and procedures. This study focuses on procedures of pitch organization, examines them in detail, and, to some extent, puts them in the context of Ruggles's spiritual aesthetic--the striving towards the transcendent and the sublime. The study draws on recent theories of contour and atonal voice leading, as well as on Fortean set theory and Charles Seeger's dissonant counterpoint. It consists of a series of linked sections, each exploring a different parameter, grouped together in three analytical chapters framed by an introduction and conclusion.

The introduction describes Ruggles's role in the ultra-modern movement, and includes a survey of the analytical literature. The conclusion discusses the relation between Ruggles's compositional procedures and his aesthetic/spiritual ideas, taking the form of a commentary on Charles Seeger's 1938 critique of the composer.

The analytical material is grouped under chapters on melody, motive, and polyphony. Chapter 2 (melody) explores linear pitch-class nonrepetition, interval

distribution, chromatic completion, and contour. Chapter 3 (motive) begins with a short discussion of motivic parameters, and goes on to describe a series of motivic processes, many derived from the theories of Charles Seeger: immediate repetition, regular and split transposition and inversion, extension, intension, fragmentation, and liquidation. After a description of motives in sequential contexts, the chapter ends with a consideration of Ruggles's use of combinations of IC5 and 1. Chapter 4 (counterpoint and harmony) begins with a clarification of Seeger's term *dissonant counterpoint*, describes Seeger's classification of intervals, examines Ruggles's two-part counterpoint (including voice exchange), discusses chord construction and voice leading, and ends with a description of Ruggles's canons.

Throughout, a steadily developing theme is the tension between consistent compositional procedures in Ruggles's music and the composer's determination not to use them systematically. This "consistent inconstancy" is integral both to Ruggles's compositional method and to his aesthetic.

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"Please tell me what you think of the enclosed long three-part polyphony in octaves. I'm after a vast simplicity. As I wrote you some time ago: there are too many notes in most of the Modern Music. Notes that have no time to sound."

Carl Ruggles, from a letter to John Kirkpatrick, 13 April 1941

Terminology and Abbreviations

Term	Example
Beat number	m.19:3. Measure 19, beat 3.
Contour adjacency series	CAS <+, ->
Contour segment	CSEG <021>
Intervals	
Ordered pitch interval	ip <+9>
Unordered pitch interval	ip (9)
Ordered pitch class interval	pci <9>
Interval class (unordered pitch class interval) IC3	
Inversion	I_9
Order position	op <u>7</u> . Order positions are underlined.
Pitch class	pc 2
Pitch class line	B_b-A
Pitch class simultaneity	B_b/A . B_b under A.
Set	set [4,6,7,T] or [E, ~~F~~ ,G, ~~B_b~~]
Set class	sc 4-12 or sc (0236)
Transposition (pitch-class)	T_9
Transposition (pitch)	T_{+9} , T_{-9}
Transposition and inversion	T/I
Whole-tone collection that includes C	WT_0

Whole-tone collection that includes C WT_1

All excerpts from Ruggles scores are taken from the most recent editions unless stated otherwise.

Glossary

ALSD (Average Length of String of Different [pitched])

The average LSDP (Length of String of Different Pitch Classes) in a line (Tenney 1977). See LSDP.

ALSDI (Average Length of String of Different Intervals)

The average LSDI (Length of String of Different Intervals) in a line. See LSDI.

Cadential complex

A group of loosely associated features typical of Ruggles's cadences, including melodic lines or sequential segments that continue in a steady (generally ascending) direction to the end of a phrase without twisting back, and whole-tone content.

Canon (prime and retrograde)

Prime and *retrograde* refer to forward and backward canons.

CAS (Contour Adjacency Series)

Indicates up (+) and down (-) motions between adjacent pitches (Friedmann 1985:226-27). For example, B3-C5-F2 has the CAS <+,->.

Crooked

Synonymous with *jagged* (see below).

CSEG (Contour Segment)

Indicates relative registral positions of an ordered line of pitches, with 0 denoting the lowest note. For example, B3-C5-F2 has the CSEG <120>. The term is taken from Marvin and Laprade 1987; also see Morris 1987 and Friedmann 1985.

Durational span

A measure for the durational continuum in any given melodic segment. Each note is given a number based on an eighth-note durational unit; the durational span is calculated by subtracting the lower number from the higher.

Extension (beginning, middle, end)

The addition of notes to the beginning, middle, or end of a motive. From Seeger 1994:152-53, 183-84.

Fragmentation

The process of breaking off a piece of a motive, often from the end, and reusing it.

Intension (beginning, middle, end)

The subtraction of notes from the beginning, middle, or end of a motive. From Seeger 1994:152-53, 183-84.

Jagged

A large-scale melodic descent containing smaller ascending motions that break up but do not negate the overall downward motion--and the reverse for a melodic ascent; synonymous with *crooked*.

Liquidation

The gradual elimination of characteristic features of a motive, often accompanied by

a decrease in length, until it completely loses its identity (Schoenberg 1967:58).

LSDI (Length of String of Different Intervals)

The number of adjacent intervals in a line without intervallic repetition. See ALSDI.

LSDP (Length of String of Different Pitches)

The number of adjacent notes in a line without pitch-class repetition (from Tenney 1977. See ALSD).

Motive Form

Schoenberg's term for the different transformations of a source motive (Schoenberg 1967:9). I use it as a blanket term for any shape taken by a motive, regardless of any particular source form.

Obligatory IC1

Refers to the nearly continual presence of at least one vertical IC1 interval in Ruggles's vertical sonorities and between his contrapuntal lines.

Split T/I (Split Transposition, Split Inversion)

A modification of normal transposition and inversion in which some notes transpose or invert by one degree and the rest by another degree. Similar operations have been explored by different theorists under different names, such as (to list only a few) dual transposition and inversion (O'Donnell 1997), near transposition and inversion (Straus 1997), pseudo transposition (Lewin 1998), and unary transforms (Forte 1988).

Straight lines

Melodic lines that trace a steady ascent or descent without a change of direction.

SWAP

The exchange of two adjacent registral order positions in a CSEG. Applying SWAP(1,2) to CSEG <10> equals CSEG <01>. This is notated SWAP(1,2) (CSEG <10>) = CSEG <01>.

Switchback

A term used in the construction of trails or roads, referring to the breakup of long steep ascending or descending stretches into a series of less steep zigzags.

VE (Voice Exchange)

In a regular voice exchange, diagonal lines between notes in verticalities connect instances of the same pitch class. In IC1-skewed voice exchanges, diagonals connect pitch classes that differ by an IC1 interval.

Chapter 1. INTRODUCTION

1.1 Dissertation goals

“People are incredulous at the small amount of music Carl produced. Small as it is, his work is reminiscent of no other man” (Seeger 1976).

Carl Ruggles (1876-1971) completed only nine works, of which the last, *Exaltation*, is a hymn only a page long.¹ Despite this minuscule output, his compositions are intense, powerful, finely crafted, and utterly individual--they are not easily mistaken for those of any other composer. The distinctiveness of Ruggles’s works is reflected in the vivid verbal imagery used by those who write about them. For instance, Eric Salzman focuses on their sustained tensile energy:

...the directness and hard power of the Ruggles speech--a remarkable way of building tremendous static energy through the arc of those great linear gestures held immobile and locked in place by the tension of the dissonance--are his own secrets. That discredited word “dissonance” really does have a meaning here that comes out of his way of building densities through the accumulation of tightly interwoven lines. Energy is constantly generated but always held in tension, never quite fully released. Here is the source of the dynamism, of the draining energy of this music; an involvement with these works--and one must approach them with a sense of active involvement--it is an exhausting experience (Salzman 1966:63).

Dorothy Canfield Fisher, in her well-known description of *Lilacs* (the second movement of *Men and Mountains*), evokes the work’s poignancy, melancholy, and sense of desolation with images of the New England landscape:

Lilacs, music wistful, frail, tenuously complicated (but always with that implacable sincerity of its racial speech), tells of the ebbing-away of humanity from the scenes of its old conquests, of sagging rooftrees and rotting farmhouses, of the soft-footed

¹ Ruggles’s published works are *Toys*, *Angels*, *Vox Clamans in Deserto* (three songs), *Men and Mountains*, *Portals*, *Sun-Treader*, *Evocations* (four piano pieces), *Organum*, and *Exaltation*. An edition chronology of Ruggles’s compositions is given in an appendix to this dissertation.

advance of the forest back over the land which man had wrested into his own hands, of dust on deserted hearthstones, of "brush in the pastures"--that New England phrase which to any Yankee brings up the whole picture. And yet, in Ruggles's music all this ruinous sadness is shot through with the green strength of the forest's rising tide and perfumed by the aroma (rich with the human association) of the old lilac-bushes, still faithfully blooming beside sunken cellar-holes beside the forgotten homes of men long since dead (Fisher 1929).²

Peter Yates describes Ruggles's music as an almost continual turbulence of shifting pressures, like the inside of a hurricane:

The melody is there, a jagged figuration, always striving to rise, to achieve sublimity, twisted and thrown back. The harmony results from the vertical simultaneity of disparate effect. Gaps open in the firmament, and sounds break through them; the musical design is continually exfoliating outward. Heights and deeps respond; one recognizes the determining presence of the melody, in broad-reaching curves upward and downward, interwoven with brief periods of softly twisting lyricism. ...The movement is that of water boiling in a pot--an expanding universe which is at the same time necessarily contracting, a motion without external limit.... (Yates 1967:280-81).

An individuality so distinctive and audibly recognizable points to distinctive musical characteristics and compositional procedures. The purpose of this dissertation is identify these characteristics and procedures, examine them in detail, and, to some extent, to put them in the context of Ruggles's spiritual aesthetic--the striving towards the transcendent and the sublime. Inevitably, I cover some of the same ground as earlier Ruggles analytical studies, although (I like to think) I do so generally more comprehensively and in greater detail; but the dissertation also includes some original contributions. These include: (1) the

² A slightly condensed version of this description was used in the program notes for the premiere of *Men and Mountain*, in an International Composers Guild concert on 7 December 1924 (Ziffrin 1994:92-93). Fisher was a close friend of Ruggles and appears to have used some of his imagery in her description. In a letter to Eugene Schoen (30 September 1924) Ruggles wrote that "Lilacs is the symbol for desolation, abandoned farms, cellar holes etc." (in Ziffrin 1994:92).

development of categories and terminology applicable to Ruggles's motivic practice, drawing to a large extent on Charles Seeger's theory; (2) the incorporation of atonal theory developed since 1973 (the publication date of Forte's *The Structure of Atonal Music*), such as contour theory and atonal voice leading; (3) an emphasis on the transformation of sets into one another via transposition, inversion, and split-transposition and inversion, rather than the nearly exclusive preoccupation with set classes that has characterized the use of set theory in Ruggles analysis up until now; (4) consideration of long-range and IC1-skewed voice exchanges; (5) a discussion of Ruggles's sequences; (6) explicit connections between musical techniques and Ruggles's aesthetic; and (7) a greater attention to the details of the musical surface than is characteristic of earlier studies.

Since boundaries must be placed on what would otherwise become too general and open-ended a project, this dissertation centers on pitch organization. Rhythm and texture (and other aspects) are touched upon, but no attempt is made to deal with them comprehensively. The study focuses on Ruggles's completed works in their final published form, supplemented by earlier versions and sketches. Ruggles never really viewed any work as finished; all of them were in a perpetual state of continuous actual or potential revision--long after he stopped seriously composing he was still seriously revising.³ I have made selective use of Ruggles's sketches, unfinished compositions, and correspondence stored in the Carl Ruggles and John Kirkpatrick Papers at Yale University (catalogued,

³ Charles Seeger speaks to this point: "The curious thing about Carl Ruggles was that he would finish a painting. Regard it as a complete work. I never knew him able to resist the temptation to touch, retouch (and sometimes not to best advantage) any of his compositions" (Seeger 1972:172). Ruggles took up painting around 1921; after 1947 it supplanted composition as his main creative activity (see Archabal 1979).

respectively, in Nesnow and Kirkpatrick 1981 and Sinclair 1993). but their comprehensive study awaits a series of separate projects outside the scope of this dissertation.⁴

1.2 Ruggles and the ultra-modern movement

Ruggles was a member of an American circle of avant-garde composers loosely grouped together under the label “ultra-modern.” This group was especially active in the 1920s and 1930s, and included (among others) Charles Seeger, Ruth Crawford Seeger, Henry Cowell, Edgard Varèse, Carlos Salzedo, and Dane Rudhyar.⁵ Charles Ives, although he had virtually stopped composing, became closely associated with the group in the late 1920s and helped to finance many of their projects. Ives and Ruggles became particularly close friends, in part because they were about the same age (Ruggles was born in 1876, Ives in 1874).

The ultra-moderns sought escape from the cultural hegemony of European musical authority and convention. This involved the creation of an independent American music,

⁴ This is not to imply that they have not been extensively used to good purpose. To give only two instances, McMahan’s doctoral dissertation on *The Sunken Bell* (McMahan 1990) is almost entirely based on these materials, as is Ziffrin’s discussion of the Kirkpatrick-Ruggles correspondence on the *Evocations* (Ziffrin 1994:149-73).

⁵ General discussions of the ultra-modern movement include Nicholls 1990, Oja 2000, and Chase 1987:449-69. Straus (1995:213-20) combines a general description with an account of the role of Ruth Crawford Seeger. Archabal 1979 focuses on Ruggles, but also contains information on the International Composer’s Guild, the Pan American Association of Composers, and Cowell’s *New Music* enterprises. Varèse 1972 contains a detailed history of the Composer’s Guild. Gilbert 1973-74 is a stylistic survey of the music published in the *New Music Quarterly*, and Mead 1981 is a definitive and exhaustive study of Cowell’s *New Music* enterprises. Cowell 1933a is a group of profiles written about and by ultra-modern composers.

but their main goal was not to write American music but to write their own music.

Nationalism was only an expedient means to escape colonial status:

American composition up to now has been tied to the apron-strings of European tradition. To attain musical independence, more national consciousness is a present necessity for American composers. The result of such an awakening should be the creation of works capable of being accorded international standing. When this has been accomplished, self-conscious nationalism will no longer be necessary (Cowell 1933a:12-13).

The rejection of European norms involved the composition of a different kind of music that was not obliged to conform to the genteel conventions of second-hand European practice. Although the ultra-moderns were a disparate group, they shared some common musical strategies, of which two are particularly applicable to Ruggles. The first is the rejection of triadic tonality by the elevation of dissonance to structural status. In Ruggles's music, dissonance is the norm and consonance the exception. To use Charles Seeger's term, Ruggles's music is "dissonated," implying the avoidance or undermining of tonal and triadic references and the creation of new structures based on a dissonant foundation. The second strategy is the avoidance of the "rich, lush, harmonies of late Romanticism in favor of a taut polyphony of independent lines" (Straus 1995:218). Ruggles's compositional evolution is characterized by the steady development of a wiry, tensile, and energetic dissonant counterpoint and the increasing use of such contrapuntal devices as imitation, canon, and retrograde.

The ultra-moderns were involved in a series of organizations that acted as focal points for the group. The first of these was the International Composers' Guild, founded

by Varèse and Salzedo in 1921.⁶ The purpose of the Composers' Guild is described in the following excerpt from its manifesto:

It is true that in response to public demand, our official organizations occasionally place on their programs a new work surrounded by established names. But such a work is carefully chosen from the most timid and anemic of contemporary production, leaving absolutely unheard the composers who represent the true spirit of our time.

Dying is the privilege of the weary. The present day composers refuse to die. They have realized the necessity of banding together and fighting for the right of each individual to secure "fair and free presentation of his work." It is out of such collective will that the International Composers' Guild was born

The aim of the International Composers' Guild is to centralize the works of the day, to group them in programs intelligently and organically constructed, and, with the distinguished help of singers and instrumentalists to present these works in such a way as to reveal their fundamental spirit.

The International Composers' Guild disapproves of all "isms;" denies the existence of schools; recognizes only the individual (Varèse 1972:166-67, in Archabal 1979:197).

Ruggles was very active in the Guild. He served on its technical board, and five of his works were performed in Guild Concerts.⁷ Varèse functioned as both friend and taskmaster,⁸ and exerted considerable pressure on Ruggles to produce new works, with the result that Ruggles finished more compositions in less time during his Guild years than at

⁶ Most of my information on the International Composers' Guild is taken from Archabal 1979.

⁷ *Angels* (1 December 1922), *Toys* (22 March 1923), *Vox Clamans in Deserto* (23 January 1924), *Men and Mountains* (24 December 1925), and *Portals* (25 January 1926) (Archabal 1979:212).

⁸ For that reason, according to Louise Varèse, there was "a certain amount of *Sturm und Drang* in their friendship" (Varèse 1972:185, in Archabal 1979:92).

any other period in his career. Indeed, the cause of Ruggles's break with Varèse and resignation from the Guild was his failure to finish *Sun-Treader* in time for the first Guild concert of the 1926-27 season. The two repaired their friendship shortly afterwards, but at the end of the season financial difficulties led Varèse to disband the Guild.

With the Guild's dissolution, the organizational focus of the ultra-moderns shifted to the New Music Society, founded by Cowell in 1925. The Society organized concerts in Los Angeles (1925-26) and San Francisco (1927-36), and eventually encompassed a series of enterprises that included the *New Music Quarterly*, the *New Music Orchestra Series*, and the *New Music Quarterly Recordings* (begun in 1927, 1932, and 1934 respectively) (Straus 1995:214). Cowell's activities became even more of a focal point for the ultra-moderns when Varèse founded the Pan American Association of Composers in 1928, devoted to performing new music of the Americas. Cowell directed the North American section and Carlos Chávez the South American section.

The ultra-moderns depended almost entirely on Cowell's enterprises for the dissemination of their works. Seven of Ruggles's nine compositions were published in *New Music* editions (all in the *New Music Quarterly* unless specified otherwise): *Men and Mountains* in the inaugural issue--October 1927 (I/1), *Portals* in April 1930 (III/3), *Sun-Treader* in 1943 (*New Music Orchestra Series* 14), *Angels and Evocations* 1-3 in April 1943 (XVI/3), *Evocations* 4 in January 1945 (XVIII/2),⁹ John Kirkpatrick's piano arrangement of *Organum* in October 1947 (XXI/1), and the full score of *Organum* in 1947

⁹ In the 1956 (American Music) edition the numbering of the New Music *Evocations* 3 and 4 is reversed.

also (*New Music* special editions)(Mead 1981:585-95).¹⁰ *Toys* and *Lilacs* were recorded on New Music Quarterly Recording 1012A-B (1934). In addition, in 1931 and 1932, *Men and Mountains* and *Sun-Treader* were performed in concerts sponsored by the Pan American Association in Havana, Paris, Budapest, Berlin, and Vienna. These concerts were conducted by Nicolas Slonimsky (Slonimsky 1988:120-32), except for the one in Vienna, which was conducted by Webern (Archabal 1979:138-39).

The sole dependence of the ultra-moderns on Cowell's enterprises for publication, recording, and performance was in marked contrast to their rivals in the League of Composers, which had its own publication, *Modern Music*. The League, which originated as a secessionist group led by Claire Reis within the International Guild of Composers,¹¹ was much more oriented towards Europe, and represented composers such as Stravinsky, Bartók, and the numerous American students of Nadia Boulanger (e.g., Copland, Thomson, Piston, Sessions, etc.). League composers were championed by Serge Koussevitzky and the Boston Symphony, and had a much easier time securing commercial publication and recorded performances (Gilbert 1973-74:284).

Although Ruggles has often been viewed as very much an isolated figure--he became more so in his later years--he was actually an active member of a close-knit group

¹⁰ Green (1995:15) erroneously states that *Vox Clamans in Deserto* was published in a New Music edition in 1923. The New Music Society didn't even exist in 1923. A catalog appended to the 1943 score of *Sun-Treader* lists *Vox Clamans in Deserto* (with no date) in the list of orchestral and chamber music manuscripts "available on loan (with parts) through New Music Edition for examination for possible performance," but the work wasn't published until 1977 (by Theodore Presser). This is only one of numerous errors in Green 1995 concerning the publication dates of Ruggles's works.

¹¹ An account of the events leading to the schism is given in Archabal 1979:44-52.

of composers bound by close personal and professional ties and similar musical views.

Although individual, iconoclastic, and ornery, he was not an isolated phenomenon, but an integral part of the ultra-modern movement.

1.3 Selective survey of the literature

The Ruggles literature is more extensive than is generally supposed, and I will not attempt to examine it in its entirety.¹² Rather, this survey will concentrate on theoretical and analytical treatments of Ruggles's music, and will be organized by topic, roughly corresponding to the order of topics in this dissertation. Since my study focuses on pitch organization, I will not survey the literature on theoretical topics not discussed in this dissertation, such as rhythm, texture, and form, nor examine biographical sources and musicological discussions of specific works.¹³ My procedure will be to discuss how the topic has been dealt with in the literature, followed by a short summary of my own approach, including the relevant dissertation section number. Thus this survey will provide a preview of the dissertation proper.

Melody

¹² Green 1995 is the only attempt at a complete annotated listing of the Ruggles literature.

¹³ So as not to leave the inquiring reader completely bereft, I will give the relevant citations here, without commentary. Rhythm is discussed in Robison 1991:55-58 and Herlin 2000:41-54. Form is examined in Robison 1991:59-103, Woo 1993:120-137, and Herlin 2000:55-73. Texture is discussed in Herlin 2000:20-40 and, in part, in Woo 1993:86-119. For a long time, the main biographical source was Kirkpatrick 1968, supplemented by Ziffrin 1979; it is now Ziffrin 1994.

Pitch-class nonrepetition (Section 2.2)

The refusal to repeat a pitch class until it has sufficiently receded from aural memory is Ruggles's best known technique, and is at least mentioned in virtually everything written about the composer. Accounts by Ruggles's colleagues include Rudhyar 1927, Cowell 1930, and Seeger 1932; this last contains the most complete contemporaneous discussion and criticizes Ruggles for his inconsistent application of the technique (Seeger's comments are repeated and slightly amplified in Perle 1960:56-58). The definitive study of pc nonrepetition is Tenney 1977. Tenney constructed a computer program to measure the number of consecutive notes without pc repetition for the principal melodic lines (Lengths of Strings of Different Pitch Classes, or LSPD) of every Ruggles work. Averaging the LSPDs for each composition shows that the average LSPD more than doubles during Ruggles's compositional career----from 4.17 in *Toys* (1919) to 8.89 in *Organum* (1944). Herlin 2000 is a comparison of Ruggles's *Men and Mountains* and *Portals* with Schoenberg's *Five Pieces for Orchestra*, op. 16 and with Webern's *Six Pieces for Orchestra*, op. 6 (in this survey I will confine my comments to his findings on Ruggles's music).¹⁴ Herlin uses Tenney's methodology to calculate LSPDs, but, unlike Tenney, includes some chordal passages. Herlin's work suggests that pc nonrepetition may operate vertically as well as linearly. This constitutes a possible area for future research, but requires a larger sample and a more extensive consideration of methodology.

I summarize Tenney's work, and then qualify Tenney (following up on Seeger's

¹⁴ Herlin 2000 appeared in the final stages of my own dissertation writing; therefore I have not been able to integrate his findings to the extent that I have of some other scholars' work.

comments) by pointing out that, regardless of the *average* LSPD, the *actual* LSPDs vary widely, and that sometimes the method is suspended altogether in the interests of motivic repetition. Ruggles strongly defended this flexibility, citing it as proof that he was not imprisoned within a compositional formula (Ruggles interview, *New York Herald Tribune*, 10 February, in Howard 1943:242).

Interval distribution (Section 2.3)

Tenney 1977 gives percentages for the frequency of occurrence of ordered and unordered linear pitch intervals from 1 to 13, and shows (among other findings) a steady increase in ip (1), (6), and (11) throughout Ruggles's oeuvre (but slightly decreasing in *Organum*). He does not, however, investigate whether or not there exists a principle of interval nonrepetition analogous to the principle of pc nonrepetition. I take this step (albeit with only a few examples), applying Tenney's techniques to ordered pitch-class intervals instead of pitch classes, and find that the same interval tends to repeat far sooner than the same pitch class.

Chromatic completion and aggregate completion (Section 2.4)

Chromatic completion refers to filling in a pitch-class zone of any size. Aggregate completion, of course, is chromatic completion applied to all twelve pitch classes. Chromatic completion short of the aggregate appears, oddly enough, not to have been discussed at all in the literature. I do discuss it, giving examples in both pitch and pitch-class space, and showing how smaller zones of chromatic completion can create larger

zones of aggregate completion.

Aggregate completion is examined in the literature. Several scholars focus on Ruggles's tendency to present what I call *near-aggregates*, that is, eleven pitch classes (Herlin allows ten), with or without pc repetition. The missing twelfth pitch class usually shows up soon after some boundary--in the next phrase, after a double-bar, or after a fermata. Near-aggregates in the opening of *Sun-Treader* are briefly discussed in Gilbert 1971:46-47 and 1972:228. Woo (1993:42-45) gives an example of a simultaneous near-aggregate in *A Clear Midnight* (*Vox Clamans in Deserto* III), where the piano part has eleven pitch classes and the voice supplies the twelfth pitch class. However, the most comprehensive and systematic study of aggregate completion is Herlin 2000. Most of his sixty-one examples (from *Men and Mountains* and *Portals*) are linear, but some include verticalities as well. Herlin finds that Ruggles usually completes an aggregate within ten to seventeen notes (Herlin 2000:16), with an average of 16.4 (Ibid:142), and that the average number of notes between the eleventh and twelfth pc is 3.2 (ibid:142).

Contour (Section 2.5)

Ruggles's music has distinctive contours, usually in the shape of huge jagged waves composed of smaller jagged waves, with occasional straight lines at cadences. The wave shapes are briefly mentioned in Seeger 1932:587 and Tenney 1977:38-39, and discussed at greater length in Robison 1991:25-31. Kramlich 1982 states that the opening jagged ascent in *Angels* is replicated on several levels (ibid: 60-62), and points out a similar contour and its inversion in *Organum* (ibid:69-71).

The most extensive study of contour in Ruggles is Orkiszewski 1988:29-40.

Orkiszewski demonstrates the evolution of Ruggles's characteristic jagged arch shape with meticulous contour graphs of the principle melodic lines in *Toys*, *A Clear Midnight* (*Vox in Clamans in Deserto* III), and sections of *Lilacs* (*Men and Mountains* II), *Portals*, *Sun-Treader*, and *Organum*. These graphs are visually quite striking, resembling nothing so much as silhouettes of rugged mountain ranges.

My discussion of contour is the first treatment that draws on contemporary contour theory, a subset of atonal theory developed since 1985 by (among others) Morris (1987 and 1993), Friedmann (1985), and Marvin and Laprade (1987). I contrast Ruggles's typical jagged wave shapes with his atypical straight lines, argue that the latter usually have a cadential function, and relate both contours to Ruggles's aesthetic of the sublime.

Motive (Section 3)

A motive is a concatenation of musical features that takes on a temporary identity; as the features change, the motive transforms. If too many features change too rapidly or drastically, the motive loses its identity, dissolving or mutating into another motive. Ruggles's motivic practice is highly fluid, and his music is full of recognizable but shifting shapes.

Motive is a slippery topic, because any parameter--set class, contour, rhythm, etc.--can be treated motivically, without the author necessarily placing the signpost "motive" over the discussion. For Gilbert (1970, 1971, 1972, and 1974), the first theorist to apply set theory to Ruggles's music, set class is clearly the primary motivic parameter, although

he also mentions secondary aspects such as rhythmic signatures and falling or rising gestures. His most substantive article, a study of the *Evocations* (Gilbert 1970), deals with sets of various cardinalities, but his 1971, 1972, and 1974 articles focus mainly on trichords and tetrachords. Gilbert is more interested in set classes than in sets; although he occasionally relates sets by transposition (especially in sequences), he much more often relates set classes via the inclusion relation. This focus on the set-class level of abstraction has left its mark on subsequent Ruggles analysis.

In Woo 1993 the most important component of a motive is the intervallic cell, a concept derived from George Perle, who defines it as “a kind of microcosmic set of mixed intervallic content, storable either as a chord or as a melodic figure or as a combination of both. Its components may be fixed with regard to order, in which event it may be employed, like the twelve-tone set, in its literal transformations: prime, inversion, retrograde, and retrograde-inversion” (Perle 1991:9-10). Woo sometimes treats cells as ordered lines of pitches or pitch classes, but more often as unordered set classes, complete with identifying Forte numbers. She typically partitions a musical passage vertically and horizontally into trichord and tetrachord cells, which relate via the twelve-tone operators or permutation if considered ordered, or by the inclusion relation (or occasionally by transposition) if considered unordered. I find the lack of clarity in Woo’s definition of an intervallic cell to be a disadvantage of the concept.

Kramlich 1982, in contrast with Gilbert and Woo, is less interested in motives as fixed entities and more interested in how they change and mutate. He identifies several processes, some of them fairly general, but quite real nonetheless. These include octave

displacement, rhythmic change, gradual expansion (in length) of a small unit, and fragmentation, especially the repetition of the last few notes of one phrase in the beginning of the next, creating what he calls a “chain-link” construction (Ibid:100).

My own approach, like that of Kramlich, is more focused on identifying processes of transformation than on relating static entities. First I lay out my basic motivic parameters and terminology: cardinality, set, set class, contour, registral span, registral layout, pitch-class voice leading, rhythm, and intervals. Then I discuss the following series of motivic operations, many derived from the theory of Charles Seeger: immediate repetition (Section 3.2.1); regular and split transposition and inversion (Section 3.2.2);¹⁵ and operations that affect cardinality--extension, intension, fragmentation, and liquidation (Section 3.2.3). After examining motivic aspects of sequences (Section 3.2.4), I consider Ruggles’s motivic use of combinations of the perfect fifth and the semitone, or, more generally stated, of IC5 and 1 (Section 3.2.5). This last topic is also discussed in Kramlich 1982:11-16 and in Ferneyhough 1982.

Counterpoint and harmony

Dissonant counterpoint (Section 4.1)

The term *dissonant counterpoint* was invented by Charles Seeger. Although he eventually used it to denote his entire theory of composition, it originally referred to his reverse species counterpoint, in which dissonance replaced consonance as the normal state.

¹⁵ In regular transposition or inversion, all of the notes transpose or invert by the same degree. In split transposition or inversion, some notes transpose or invert by one degree and the rest by another.

The primary sources for dissonant counterpoint are Seeger 1930 and 1994; the latter, Seeger's theoretical magnum opus *Tradition and Experiment in (the New) Music*, was written ca. 1931 but not published until 1994. Various aspects of Seeger's theory are discussed in Nicholls 1990, Straus 1995, and Rao 1997. Greer 1998 is an overview of Seeger's philosophy of music, including but not limited to his theoretical writings. Only a few discussions of Ruggles's music invoke Seeger's theory: a series of acrimonious exchanges between Seeger (1923) and Rudhyar (1922 and 1924), Seeger 1932, Nicholls 1990:97-104, Greer 1998:107-111, and Greer 1999.

In this dissertation I use Seeger as a touchstone, because there is no getting away from the fact that Ruggles was strongly influenced by him: as he told Marilyn Ziffrin, "my style began with Seeger" (Ziffrin 1994:71). I use many of Seeger's concepts and terms, examine his opinions of Ruggles's music, and discuss how various aspects of Ruggles's compositional technique conform to or differ from Seeger's theory.

Vertical intervals (Section 4.2)

A common component of Ruggles's sonorities is what I call *obligatory* IC1--the tendency for almost every verticality to contain at least one IC1 interval. This often takes the form of an IC1 frame, either between outer voices or between one outer and one inner voice. Obligatory IC1 is almost universally mentioned in the literature, but by different terminology. Harrison writes that Ruggles's counterpoint is bound together by the "interval persistence" of the major seventh and the minor ninth (Harrison 1955:17). Thomson mentions Ruggles's "secundal counterpoint" (Thomson 1970:32). Kramlich emphasizes

“the omnipresence between parts (in contrapuntal and chordal contexts alike) of IC1” (Kramlich 1982:95).¹⁶

My own approach is to consider vertical IC1 within a larger intervallic context. I first discuss Seeger’s classification of consonant and dissonant intervals, which posits perfect or *tense* dissonances (IC1), imperfect or *poised* dissonances (IC2 and 6), and consonances (*relaxed* intervals), which are either perfect (IC0 and 5) or imperfect (IC3 and 4). I then examine Ruggles’s use of vertical intervals in two-part counterpoint. Although little of Ruggles’s music is actually written in a two-part texture, much of it is constructed on a two-voice framework that conforms to the ideals of Seeger’s dissonant species counterpoint—that is, the frame consists of perfect dissonances into which imperfect dissonances and consonances are occasionally introduced. I discuss the role of IC1 in chord construction in a later section (see below).

Voice exchange (Section 4.3)

Discussions of voice exchange in Ruggles’s music have been limited to dissonant voice exchanges between adjacent IC1 vertical intervals, which are endemic in Ruggles’s music. This type of voice exchange creates movement within an IC1 stasis, and is discussed in Woo 1993, Peterson 1967 and Kramlich 1982 (termed “note trading”), and Robison 1991 (called “note swapping”).

However, voice exchange in Ruggles’s music is both more important and more

¹⁶ Similar comments can be found in Ziffrin 1968:190, Kirkpatrick 1968:153-54, Dombek 1980:30-31, Kramlich 1982:95, Orkiszewski 1988:76-79, Robison 1991:35-38, and Carl 1995:31-33.

complex than previously considered. Voice exchanges can occur between non-adjacent as well as adjacent intervals, and between consonances and imperfect dissonances as well as between perfect dissonances. Because the area bounded by a voice exchange is experienced as a unified space, long-range voice exchanges can, in a sense, govern an entire passage. A local voice exchange can nest within a larger one, defining different structural levels, at least provisionally. Moreover, voice exchanges can be IC1-skewed; that is, diagonal intervals--pci <0> in a normal voice exchange--can expand to pci <1> or contract to pci <11>.

The construction of vertical sonorities (Section 4.4.1)

Chord construction in Ruggles's music has posed a challenge to commentators, partly because vertical sonorities often appear to be incidental to contrapuntal motion, and partly because set class membership and cardinality of verticalities tend to vary widely and continuously. The usual approach has been to focus on common intervals or subsets.

As a starting point, most Ruggles scholars mention obligatory IC1 as a nearly omnipresent component in chord construction (see previous citations under the heading "vertical intervals"). A number of authors, especially in reference to Ruggles's early works, also discuss consonant intervals or triads. Nicholls writes that the dissonant outer voices in *Angels* and *Vox Clamans in Deserto*, "as well as the subsidiary middle line, are shadowed quite consistently by secondary parts, often at the third or sixth" (Nicholls 1990:97). Ziffirin too remarks that the vertical dissonances in *Angels* and later works are "softened" by thirds and sixths below the treble line (1968:195). Kirkpatrick points out a

recurring Ruggles chord, which he describes as “a spread-out major triad undergirded by its subdominant” (Kirkpatrick 1968:151).

Angels in particular has attracted tonal interpretations. Lou Harrison states that the work “is clearly and simply in A $\flat$ major” (1955:19). Ziffrin (1968:190-91) believes that most of the verticalities are altered or dissonated triads, and argues for the presence of a tonic/dominant axis, although more so in the first version of the score (1925) than in the second (1943). Dombek 1980 is the most thorough attempt to analyze *Angels* as a tonal piece in A $\flat$ major—he constructs a Schenkerian graph on two levels with Roman numerals. A tonal interpretation, of course, necessitates the classification of a great many “non-chord” tones as incidental dissonances, a stance which, as demonstrated by Robison (1991:47-53), is quite difficult to sustain convincingly, since “every moment is fraught with ambiguity” (Ibid:50). Moreover, sections of *Angels* appear to be constructed more on a whole-tone than on a tonal basis (see mm. 23-30, shown in Example 2-27). Therefore, I personally incline towards Wilfrid Mellers’s more cautious view that *Angels* has “an A $\flat$ key flavor” (1975:67). Seeger (1972:173), in a harmonically dualistic interpretation, reads the final chord of *Angels* as a pair of major triads extending from A $\flat$, one upwards (right-side up) and downwards (upside-down).

In his analysis of *Organum*, Orkiszewski (1988) focuses on obligatory IC1 and on common trichordal subsets that contain IC1. He writes that “the harmonic basis for *Organum* is provided by the three trichords 3-3 (014), 3-4 (015), and 3-5 (016). The unifying element between these sets is IC1” (Orkiszewski 1988:76).

I identify three intervallic characteristics in Ruggles’s chords: (1) obligatory IC1,

(2) dissonated fifths, and (3) thirds--that is, the tendency to fill in a fifth with a third, double the treble at the lower third, or construct chords from stacked thirds of different qualities. To a certain degree each characteristic is typical of a different period in Ruggles's compositional career. Thirds are most frequently found in the early music such as *Toys* and *Angels*; obligatory IC1 reaches its maximum density in *Sun-Treader*, and dissonated fifths are most dominant in his later works *Evocations* and *Organum*.

Voice leading between vertical sonorities (Section 4.4.2)

Unlike chord construction (which emphasizes objects), chordal voice leading (which emphasizes process) has been almost completely ignored in the literature. Ziffrin (1994:94-95) mentions that the voice leading to the final chord in *Men* (*Men and Mountains* I) moves entirely by step or consonant skip. Kramlich (1982:11-17) and Gilbert (1970:84-88) remark on the chromatic motion between adjacent instances of the same interval or chord in *Evocations* 3 and 4. The most extensive consideration of voice leading is Dombek 1980, because it is built into his Schenkerian graph of *Angels*. But Dombek's reading presupposes a tonal structure.

My approach to atonal voice leading between sonorities involves *pitch-class counterpoint*, that is, the mapping of pitch-classes in one sonority onto pitch classes in another sonority via the operations of regular or split transposition and inversion. Because many voice-leading paths can connect any two chords, and because the possibilities multiply as cardinality increases, I try to clarify my criteria for choosing particular paths. In atonal voice leading, I feel, the process is as important as the result, and should be made

explicit.

Canon (Section 4.5)

Ruggles's canons have been described in various degrees of detail, with the exception of the one in *Lilacs* (*Men and Mountains II*). The only description of the latter (Woo 1993:100) neither identifies it as a canon nor adequately describes it. The *Sun-Treader* canon, perhaps Ruggles's most intricate, has been analyzed by Nicholls (1990:98-101), Robison (1991:152-60), and Carl (1995:34-38). Carl is the only one of the three that details the retrograde.

The *Evocations* contain two canons. The one in *Evocation 2* is described in Kramlich 1982:28-30. The one in *Evocation 4* has been described by several theorists. Kramlich (1982:31-32) gives a short general description, Gilbert (1970:80-84) discusses set class (016) and aggregate completion, and Brown (1999:160-61) discusses the canon in terms of IC1 and IC5 pathways.

Ruggles's most extensive canons are in *Organum*, where they comprise most of the piece. They have been summarized in Kirkpatrick 1968:162 and described in detail in Kramlich 1982:77-85 (which includes a chart) and Orkiszewski 1988:14-17, 22-23.

In my discussion of canon I stress the tension between free and strict imitation, and concentrate on the canons in *Lilacs*, *Sun-Treader*, and *Evocations 4*, each of which expresses this tension to some degree. The *Lilacs* canon has both a strict and a free comes; the canon in *Sun-Treader* has a strict three-voice canonic layer and a free three-voice layer; and the *Evocations 4* canon (the strictest of the three), like the *Sun-Treader* canon, contains

only a partial retrograde that is intervallically strict but rhythmically free.

Aesthetics (Section 2.5 and Chapter 5)

Ruggles's music is an expression of his preoccupation with the aesthetic of the sublime and the transcendent. This has been widely commented on both during and after his lifetime. Among accounts written by colleagues, Seeger 1932 and 1972 are the most interesting, but also see Rudhyar 1927, Harrison 1955, Salzman 1966, and Thomson 1970. Of the accounts written by scholars after Ruggles's death, Archabal 1979, an art history dissertation, is the most extensive, linking Ruggles's music and aesthetic stance to contemporary movements in art, photography, and literature. Crawford 1993 includes a brief examination of expressionism and mysticism in Ruggles's music. Robison 1991 contains a short but excellent discussion of Ruggles's tension between (as he puts it) sound and formula, or (as Seeger puts it) between organization and method.

I first discuss Ruggles's aesthetic in Section 2.5, where I relate his typical jagged wave contours, and especially his ascending straight lines, to the struggle towards the transcendent. I return to the matter in the conclusion (Chapter 5), which is largely my response to Seeger's statement that, despite what he sees as the music's technical faults, it nonetheless evokes "intimations of the sublime" and "an unforgettable intimation of the clear, unsullied crystal," although Seeger cannot quite figure out how it does that (Seeger 1932:589-90). I make the following points: (1) Ruggles's music is more organized than Seeger thinks; (2) the "intimations of the sublime" are directly related to specific musical characteristics and compositional procedures, in addition to Ruggles's references to the

poetry of Whitman, Browning, and Blake; and (3) Ruggles's refusal to be bound by "formulas" (even his own) is part and parcel of his effort to transcend the known for the unknown.¹⁷

1.4 Succinct outline of the dissertation, plus the reason for the appendix

A preview of this dissertation has been built into the foregoing survey. However, for the sake of clarity and convenience, I will recapitulate it here in brief.

Chapter 2 focuses on aspects of melody. After converting an eleven-note Ruggles tune (from a 1960 letter to James Tenney) into a sort of analytical sampler of everything I want to say about melody, I go on to discuss linear pitch-class nonrepetition, interval distribution, chromatic completion, and contour.

Chapter 3 focuses on motive. After laying out my motivic parameters and terminology, I discuss the following motivic processes: immediate repetition; regular and split transposition and inversion; and extension, intension, fragmentation, and liquidation. Then I examine how these processes operate in sequences, and end with a consideration of Ruggles's motivic use of IC5-IC1 combinations.

Chapter 4 deals with polyphony. I begin by clarifying the term *dissonant counterpoint*, proceed to an examination of Ruggles's two-part counterpoint (including voice exchange), progress to chord construction and chordal voice leading, and end with canon. The conclusion (Chapter 5) considers the question of why Ruggles explicitly

¹⁷ This is a reference to the first line of Whitman's *Portals* (from *Songs of Parting*), used as an epigram in Ruggles's work of the same name.

refused to use his own techniques systematically--an attitude that irritated Seeger--and relates it to the aesthetic of the sublime and the transcendent.

An appendix gives publication dates for the various editions of Ruggles's works, and includes citations and miscellaneous annotations. A major reason for the inclusion of this appendix is that the publication information in Jonathan Green's apparently authoritative *Carl Ruggles: A Bio-Bibliography* (Green 1995) is unsound. Most of his information appears to be taken from Kirkpatrick 1968, which does not attempt to be bibliographically complete. Green often misconstrues Kirkpatrick's composition and revision dates for publication dates, although Green does not cite the sources for any of his information. Apparently he did not often consult the actual published scores, issues of *New Music*, or such authoritative sources as Mead 1981. Green's bibliographical information for every Ruggles work contains errors. A partial list follows (my own sources are given in the appendix):

1. The only publication information given for *Toys* is H.W. Gray, 1919 (Green 1995:11). *Toys* was published by H.W. Gray in 1920 and republished in a revised edition by Theodore Presser in 1983.
2. Green says that *Angels* was first published by Curwen in 1921 (Ibid:12), but there was no 1921 publication--the first Curwen publication was in 1925. Green also says that the revised edition was published by American Music Editions in 1938 (Ibid:13), but this edition appeared in 1960.
3. As previously mentioned, Green says that *Vox Clamans in Deserto* was published in a *New Music* edition in 1923 (Ibid:15). Further down on the same

page he says that “this work was available in manuscript only for many years.”

These statements are contradictory. In fact, the work was never published in a *New Music* edition--its first publication was by Theodore Presser in 1977.

4. Green says that the revised edition of *Men and Mountains* was published in a *New Music* edition in 1936 (Ibid:17), but in fact it was published by American Music Editions in 1951; *New Music* only published the original 1924 version.

5. Green says that *Portals* was published by American Music Editions, but gives no publication date (Ibid:19). In fact, it was first published in *New Music* in 1930, and in a revised version by American Music Editions in 1957.

6. Green says that *Sun-Treader* was published in a *New Music* Edition in 1931 (Ibid:21); but the correct date is 1934. Green does not mention that Presser published a revised edition in 1981.

7. Green says that three out of the four *Evocations* were first published in *New Music* in 1943 (Ibid:23). This is correct, but he doesn't add the information that the missing *Evocation* (number 4 in the original ordering and number 3 in the revised ordering) was published in *New Music* in 1945. He goes on to say that the revised version of the complete *Evocations* was published in 1954, but doesn't give the publisher. In fact, it was published in 1956 by American Music Editions.

8. Green say that *Organum* was published in a *New Music* edition, and gives the dates 1944-47. Kirkpatrick gives these dates for the *composition* of the work (Kirkpatrick 1968:162-63), but it was actually published in 1947 in both Kirkpatrick's piano arrangement (*New Music* journal) and in full score (*New Music*

special edition). Green also says that a later Kirkpatrick two-piano arrangement exists only in manuscript (Green 1995: 28), whereas Presser published it in 1947.

9. Green says that *Exaltation* is unpublished, but it was published by Presser in 1977.

Chapter 2. MELODY

2.1 The Importance of the Line

Carl Ruggles placed maximum emphasis on the melodic line. In a 1927 letter to Henry Cowell about *Sun-Treader*, he wrote: "More and more I'm gaining that complete command of line which, to me, is the basis of all music" (Kirkpatrick 1968:156-57). Charles Seeger wrote about their working sessions: "One could keep at it for the better part of a whole night, as we did once with *Angels*. The criteria were very seldom vertical but almost invariably horizontal--the momentum, the goal, of the melodic line" (Seeger 1972:172). George Perle described Ruggles' s music as "a pure and supple polyphony of long, expansive, constantly unfolding lines" (1960:56) . Five years before his death, Ruggles said: "They [twelve-tone composers] forget that the line must sing, always sing...My whole conception is based on the rhythm and movement of the line"(Newsweek 1966:80). He reiterated the point in a 1967 interview conducted by John Carton (Carton 1970:5; in McMahan 1990:25):

Carton: What is the most important element in your music?

Ruggles: Melody.

Carton: What do you feel about rhythm, harmony...

Ruggles: (interrupting) Melody, line is everything!

Carton: What should a composer do who has trouble dealing with melody?

Ruggles: Drive a truck.

Not all melodic lines are equally highlighted within the musical texture, however. In early editions of many of his works, Ruggles indicates "principal voices"--usually the

highest moving voice, less often two or more homophonic lines, and occasionally the outer voices (*Angels*, 1943). Arrows or brackets indicating where principal voices start and stop¹ are found in *Angels* (1925, 1943), *Men and Mountains* (1927), and *Portals* (1930). All such signs were removed in the later American Music editions of these works (*Angels*, 1960; *Men and Mountains*, 1970; and *Portals*, 1957). Evidently, Ruggles felt that they were no longer needed. In the later works--*Sun-Treader* (1934), *Evocations* (1943, 1945), *Organum* (1947), and *Exaltation* (1958)--they never appeared at all. These markings also appear in some sketches. For instance, two early sketches for *Lilacs*² not only mark the principal voice with $\lceil$ and $\rceil$ signs, but consist for the most part of little else. The sketches includes only two full simultaneities: the final chords of the piece's two main sections. This suggests that Ruggles's early conception of the piece was primarily linear, with particular emphasis on the principal voices. It is suggestive that the only two vertical harmonies in the sketch are cadential.

Ruggles's lines bear a strong personal stamp and style; their characteristics will be explored at length. First, however, as an introduction and a point of entry, I will begin with a general look at a single melody, which I call the *Woodpecker* melody.

¹ Ruggles's signs marking the principal voice have the same function as the *Hauptstimme* sign in works of Schoenberg and others. Ruggles may have taken the idea from Schoenberg, since he was certainly aware of Schoenberg's works and had arranged "Der kranke Monde" from *Pierrot Lunaire* for horn and clarinet.

² These sketches are held in the New York Public Library Music Research Collection at Lincoln Center.

2.1.1 The Woodpecker Melody

In Example 2-1, a reproduction of a page from a letter (5 May 1960) to James Tenney (Ruggles 1984:27), Ruggles writes: “Now Jim, how about the Woodpecker? Do you think he could write this?”³ The following melody is a short, characteristic sample of Ruggles’s mature melodic style. Although Ruggles had given up serious composing by this time, he still occasionally worked at short melodies. One is reproduced in Marilyn Ziffirin’s biography (1994:216); the *Woodpecker* is another.

Ruggles’s slurring suggests a division into two unequal sections, the first consisting of the ~~F~~-G (set off by a caesura), the second of everything else. The second section is divisible into two different subsections on the basis of grouped common note-values: the beamed 16th-notes and the beamed 8th-notes. This arrangement has a certain rhythmic logic to it: the melody begins with the longest duration (a quarter note), proceeds via an eighth-note to the swift sixteenth-notes, and ends with the broader, longer 8th-notes. Note that Ruggles mistakenly wrote “7” over the group of five beamed 16th-notes.⁴

³The composer James Tenney became Ruggles’s friend and assistant in the 1950s while studying at Bennington College, Vermont. During graduate work at the University of Illinois (1958-61) Tenney and his wife Carolce Schneemann maintained a correspondence with Ruggles, portions of which were later published in *Soundings* 13 (Ruggles 1984). Schneemann donated these letters, plus photographs, drawings, tape recordings, and a short film, to the Carl Ruggles Papers at Yale University. Schneemann, Tenney, and Ruggles had been discussing a woodpecker during one of their visits (Schneemann: private communication).

⁴ My reasons for interpreting the indecipherable squiggle on the left as a treble clef include the following: (1) in his correspondence, Ruggles almost invariably put short melodies in the treble clef; (2) as a violinist, he was conditioned to consider the treble clef as the “default” clef; and (3) in the bass clef, the enharmonic equivalence of F and ~~E~~ involves an uncharacteristically early repetition of the same pitch for such a short melody, especially since the notes are highlighted, each initiating a different beamed rhythmic grouping.

Two common characteristics of Ruggles's lines are pitch-class variety and the avoidance of early pitch-class repetition within the complete melodic sequence (I will refer to this as pitch-class nonrepetition). Both are found in *Woodpecker*. Each of the eleven notes in the melody is a different pitch class--only F[♯] is missing. In contrast to this maximal pitch class variety, intervallic variety is limited: only five different ordered pitch class intervals are represented between the eleven adjacent notes, with pci <7> dominating--four <7>s, two <1>s, two <6>s, one <3>, and one <9>--these last two are complements (Example 2-2a). Much of the cohesion of the phrase, as will be shown below, derives from the mixture of pitch-class variety and intervallic uniformity.

Although the melody is quite chromatic, it is framed by two semitone ascents: F[♯]-G at the beginning and B-C at the end, giving the line a faint reference to the dominant and tonic of C major, each approached via its leading tone. Triadic references are avoided, with the exception of the adjacent notes E-C[♯]-G[♯]. In this context, however, it is difficult to hear these notes as a C[♯] minor triad. The preceding E[♭] and B[♭] form dissonant intervals with E[♯], and the C[♯] is quickly dissonated by C[♮], the final note in the melody.⁵ Moreover, the upward leap to C[♯], the largest leap so far and a change of direction after three descending intervals, creates a break in the line that makes it easier to hear C[♯] as the start of a new descent grouped with the two following rather than the two preceding notes, an impression strengthened by the change from sixteenth to eighth notes. These faint tonal or triadic references within a prevailing dissonant environment recall Charles Seeger's statement

⁵ *Dissonation*, a term invented by Charles Seeger, refers to undermining the traditionally consonant and tonal implications of intervals and triads by the close juxtaposition of dissonant (usually IC1-related) notes. It will be discussed further in Chapter 4.

about the role of consonance in dissonant writing:

As in consonant writing the aim was the effective introduction of dissonance, so in dissonant writing the aim is the effective introduction of consonance. It is better discipline to maintain a rigorously dissonant fabric and to introduce consonance only when it can be well done. Theoretically there is no limit to the amount of consonance that can be used in dissonant writing (Seeger 1994:173-74).

Ruggles's lines tend to take the shape of jagged ascents or descents, or most commonly the one followed by the other, forming a large jagged wave. I am using the term *jagged* (synonymous with *crooked*) to mean that a large descent will contain smaller ascending motions that break up but do not negate the broader descending motion (and the reverse for an ascent). The *Woodpecker* is a jagged descent. Overall, the line descends, but the descent is anything but direct: there are four ascending motions, two of them large leaps. The two ascending semitones F#5-G5 and B3-C4 frame the line. Once underway, the line switches back on itself in two upward leaps, the first from D5 to A5 (followed by three descending notes), the second from E4 to C#5 (followed by two descending notes). These jagged switchbacks in a generally ascending or descending line are typical of Ruggles's contours.

The leaps open up pitch space, but this space is not afterwards filled in, creating an angular open quality, like a large structure full of tall arches. Ruggles's lines tend to be jagged and spacious, extending but not filling registral space. Here, however, a distinction should be made between pitch and pitch-class space.⁶ Since the line consists of the

⁶Pitch space (p-space) and pitch-class space (pc-space) are terms invented by Robert Morris and first used in Morris 1987. P-space is "the familiar linear pitch-space consisting of twelve pitches per octave....enharmonic equivalence is operative; octave equivalence is not" (Morris 1991:1). Register and contour apply in pitch space. Pitch-class space is a closed space, "a modular, or circular, pitch-space consisting of twelve pitch-classes

aggregate less $F^{\sharp}$, the melody as a whole almost constitutes a pitch-class chromatic zone.

But since this filling-in occurs in different registers, the melody is not tightly packed in pitch space. Of the available 23 pitch slots between (and including) B3 and A5, 12 remain open. If all the notes of the melody are vertically stacked (Example 2-2b), the resulting ascending pitch interval succession is <1-4-4-2-3-1-1-3-1-2>, leaving many gaps.

Ruggles's lines are characterized by pitch-space gaps within a tightly compacted pitch-class space.

The registral frame can be viewed as a symmetrical structure (Example 2-2c). The highest pitch, A5, is 22 semitones above the lowest pitch, B3. The vertical midpoint, B~~4~~4, eleven semitones from each registral extreme, is also the horizontal midpoint, preceded and followed by five notes, and each group of five is durationally equivalent to nine sixteenth-notes. Such simultaneous vertical and horizontal symmetry, however, although present in *Woodpecker*, is not characteristic of Ruggles's lines in general.

The contours can also be parsed symmetrically (almost). As shown in Example 2-2d, the line begins and ends with two <01> CSEGs.⁷ These are highlighted by position

(1991:2).” Octave equivalence is absolute in pitch-class space and register and contour don't exist. Pitch-class space is more abstract and circumscribed than pitch space; pitch-space is more detailed and nuanced, and far larger, than pitch-class space.

⁷ <1320> denotes an ordered segment of four pitches whose relative registral positions are denoted by numbers from 0 (the lowest) to 3 (the highest). I use the term “contour segment” (CSEG) for this device, after Marvin and Laprade 1987. It is termed “contour” in Morris 1987 and “contour class” (CC) in Friedmann 1985. I also occasionally refer to twist or line contours or neumes, meaning simply a crooked or straight CSEG. This usage borrows informally from Charles Seeger's more precise terminology (Seeger 1994:138-43; summarized in Straus 1995:20-22). Seeger would describe CSEG <1320> as an up-down-down ternary twist-line neume--neume denoting the smallest melodic unit, ternary referring to the three adjacent intervals in the four-note neume, and up-down-down specifying the

(the beginning and end), register, stepwise motion, and in the case of the first, by the caesura. The notes inbetween comprise two adjoining <1320> CSEGS; the second overlaps on B with the last <01> CSEG. This segmentation parses the melody into two four-note twist neumes between two binary neumes.

In terms of three-note contours, the melody is pervaded with members of the <021> CSEG class, which is strongly represented in Ruggles's lines.⁸ The line begins with the retrograde form <120> and ends with the inversion <201>; in between, the prime form <021> occurs twice (Example 2-2c). Each CSEG overlaps one note with its neighbor: <120> (F $\sharp$ -G-D) shares D with the following CSEG <021> (D-A-E $\flat$); the next <021> (E-C $\sharp$ -G $\sharp$) shares G $\sharp$ with <201> (G $\sharp$ -B-C). In this partitioning, B $\flat$, the vertical and horizontal midpoint of the melody, is entirely left out, as if it were the still center around which the <021> CSEG class members operate.⁹ If the pattern of neighboring ternary CSEGS with an overlap of one note is respected, however, the CSEG that contains B $\flat$ is neither a <021> CSEG-class member nor a twist neume at all, but rather the line neume <210>.

This descending line neume points to an aspect of the melody that is perhaps the

direction of each interval. Seeger's terminology is similar to Michael Friedmann's (1985:226-27) Contour Adjacency Series (CAS), which shows up and down motions between adjacent pitches. Seeger's description, however, specifies cardinality.

⁸ A CSEG class is "an equivalence class made up of all CSEGS related by identity, translation [=transposition], retrograde, inversion, and retrograde-inversion" (Marvin and Leprade 1987:255).

⁹ It is possible to take B $\flat$ as the beginning of the retrograde-inversion <102> (B $\flat$ -E-C $\sharp$). However, this interpretation disrupts the one-note overlap pattern, instead overlapping two notes with <021> (E-C $\sharp$ -G $\sharp$). While it is possible to hear one or the other CSEG, it is difficult to hear both without a sort of a mental flip.

most noticeable but that neither partitioning particularly highlights--the linear descents. As shown in Example 2-2f, these can be shown by overlaying CSEGS <3210> for A-E $\flat$ -B $\flat$ -E $\natural$, followed by <210> for C $\sharp$ -G $\sharp$ -B. However, as will be shown below, in a sense the A-E $\flat$ -B $\flat$ -E $\natural$ descent is completed two notes later by B $\natural$. This larger <43210> descent includes the <3210> and encloses the smaller <210> descents.

Thus we see that at the basic trichord level, the *Woodpecker* is saturated with members of the <021> CSEG class arrayed symmetrically around a central B $\flat$; but a reading that takes into account the articulation of the framing semitone dyads results in a near-symmetrical interpretation of two <1320> CSEGS within two <01> CSEGS. Running crosswise through both of these interpretations are the linear descents <3210> and <210>.

The *Woodpecker* melody is quite disjunct. Although framed by rising semitones at the beginning and end, the intervening adjacent pitch intervals are all a perfect fourth or larger. Nonetheless, the line is strongly connected and directed, partly because each descending segment so clearly drives towards its lowest note. As shown in Example 2-2g, the falling sixteenth notes A-E $\flat$ -B $\flat$ -E $\natural$ form a ip <-6-5-6-5> chain completed by the low B $\natural$ two notes later: in this sense the intervening C $\sharp$ -G $\sharp$ are interpolated notes that break up the larger descending line. The alternating ips <-6> and <-5> form interlocking instances of ip <-11> between every other note: A ^{5} and B $\flat^4$, E $\flat^5$ and E $\natural^4$, and B $\flat^4$ and B $\natural^3$, each <-11> resulting from ips <-6-5> or <-5-6>.

Viewed from a slightly more abstract level, the pattern begins one note earlier. A ^{5} is preceded by D ^{5} , which is separated from the sixteenth-note descent by a change of

direction. But in terms of ordered pitch class intervals, D-A-E $\flat$ -B $\flat$ -E $\sharp$ -B $\sharp$ forms the symmetrical pattern pci <7-6-7-6-7>. If C $\sharp$ and G $\sharp$ are reinstated, the descending ip <-5> between them replicates the larger ip <-5> between surrounding notes E $\sharp$ and B $\sharp$ --one <-5> nested within the other. Also, ip <+9> between E and C $\sharp$ is mirrored by ip <-9> between G $\sharp$ and B. Expressed in terms of interval classes, the note succession E-C $\sharp$ -G $\sharp$ -B forms a smaller symmetrical zone of IC (3-5-3). This segmentation of the melody is summarized in Example 2-2h.

Ruggles often slightly changes a recurring intervallic pattern by altering one of the intervals by a semitone. In this sense, the pattern composed of adjacent pci (7) and (6) begins on G, the second note of the melody. Example 2-2i registrally rearranges G and D to form a continuous descent, resulting in an interval succession pci <7-7-6-7-6-7>. Beginning the line here throws off the symmetrical pattern of alternating pci (7) and (6); however, a more general symmetry is now apparent. The ascending semitones between the first two and the last two notes act as a frame enclosing a process that involves all of the intervening notes, but that does not overlap with any of the framing notes. Note that G-D-A forms pitch class intervals <7 7> instead of the usual <7 6> or <6 7>, resulting in <2> between G and A rather than <1> between the subsequent alternating notes. The alteration of a pattern by an IC1 skew is one of Ruggles's most typical techniques.

IC1 is an important interval class both horizontally and vertically in Ruggles's music, and is often contrasted with IC2, which appears slightly less often. Different linear pitch-space realizations of IC1 and 2 have different effects, because in Ruggles's lines the traditional tonal contrast between stepwise motion and dissonant leaps has not totally

disappeared. In tonal music, semitones and whole steps--ips (1) and (2)--are vertical dissonances but linear voice-leading consonances, whereas the octave compounds of these intervals, such as ips (11)/(13) and (12)/(14), are both vertical and linear dissonances, as illustrated in the rules for species counterpoint.¹⁰ In free composition, of course, mod 12 equivalents of ips (1) and (2) can be heard as steps, depending on context, but the stepwise connection is perceived through and in spite of the registral displacement, which acts as a dissonating factor. Ruggles's lines, with their strong sense of downward gravity, maintain to some extent the traditional association of steps with connected motion and leaps with disjunction, although the consonant/dissonant associations are not operative, since the entire environment is dissonant.

Linear steps in Ruggles's music, as in tonal music, have the strongest connective power when they are between adjacent notes, such as the F⁴-G and B-C on either end of the line. But the sense of linear connection is not totally absent even when the notes are not adjacent, although there does seem to be an inverse relation between the number of intervening notes and the sense of stepwise connection between them. The framing ascending semitones are the only stepwise adjacencies in the melody, but other nonadjacent stepwise movement threads through the disjunct lines (Example 2-2j). The rising line F⁴-G⁵ continues, past D⁵, to A⁵. Although this line bridges the caesura, the stepwise ascent is easily heard. The D⁵ in its turn proceeds, past A⁵, to E⁵, and, two notes later, down to

¹⁰ The distinction between vertical and horizontal (in the sense of voice-leading) consonance and dissonance was suggested to me by David Gagné. Charles Seeger, a major influence on Ruggles, made the same distinction (1994:127-31). For more on Seeger's view of intervals, see Greer 1998:124-31.

C♯5--a forking road to a semitone above and below. Only a single note separates D5 and E♭5, and the registral connection is clearly perceivable. The connection between D5 and C♯5 is harder to hear, but the two notes are highlighted in similar ways--each is approached and left by leap, each initiates a change in direction, and each initiates a beamed group of notes of a single metrical value--sixteenth-notes with D, eighth-notes with C♯. The descending whole tone between B♭ and G♯ is the most tenuous connection, since these notes occur as part of the process of two different linear descents. However, for that very reason, they hold roughly cognate positions to each other.

There are many instances of IC1 and 2 realized as descending leaps (ip <-11>/<-13> and <-10>/<-14>), as shown in Example 2-2k, but never between adjacent notes. In the sixteenth-note group, A5-B♭4 and E♭5-E♭4 form interlocked ip <-11>s within ip <-10> between D5 and E♭4--two instances of IC1 within IC2. In the eighth-note group, C♯5-B♭3 forms ip <-14> within ip <-13> between C♯5 and C♯4--IC2 within IC1. A parallel pattern of internal versus framing intervals holds in both the sixteenth- and eighth-note groups: each contains instances of one interval framed by an interval a semitone larger or smaller. Intervals in the sixteenth-note group are smaller than an octave; in the eighth-note group they are larger than an octave. This increase in interval size is analogous to the increase in durational value.

However, some IC1 and 2 leaps bridge the eighth- and sixteenth-note groupings: the ip <-11> between B♭5 and B♭4 and the ip <-22> between the first and last notes of the descending ip <-6-5> chain (A5 and B3). The entire group of notes after the caesura is framed with an ip(14) between D5 and C4. This interplay between IC1 and 2 is typical of

Ruggles's lines, manifesting itself as both stepwise lines and dissonant leaps.

Expanding from intervals to trichordal set classes, the relationship between IC1 and 2 is reflected in a similar interplay between set classes 3-5 (016) and 3-4 (015). The *Woodpecker* melody is saturated with (016), an important set class in Ruggles's music (Example 2-2l).¹¹ The sixteenth-note descent consists entirely of overlapping (016)s; since this descent is completed two notes later by B[♯], it forms an interwoven chain of four (016)s. Moreover, both the sixteenth-note passage and the melody itself are framed with multiple overlapping (016)s. Regarding segmentation criteria: every note marked as part of an (016)-member set is either adjacent to another note in the set, or begins or ends a note-group. There are three note groups: (1) the initial F[♯]-G; (2) the sixteenth notes A-D-E[♭]-B[♭]-E[♯]; and (3) the eighth notes C[♯]-G[♯]-B-C. B[♭]-E-B[♯] is the only exception: B[♯] is not adjacent to another note in the set and neither begins nor ends a note group. The reason for this grouping has already been given--namely, that B[♯] completes the pci <7-6> chain that began with D. These criteria also apply for set class membership decisions in the succeeding examples.

Instances of sc (015) are not as numerous as (016), but the set class is represented nonetheless. Example 2-2m shows three examples: the first three notes--(F[♯]-G-D), the initial notes of each of the three note-groups (F[♯]-D-C[♯]), and the nested (015)s towards the end: (C[♯]-G[♯]-C[♯]) within (E-B-C[♯]). These last two relate by I₀ and converge on C, which is not only the last note of the melody, but also the pitch-class axis around which each note

¹¹ The importance of set class (016) in Ruggles's music was first pointed out in Stephen Gilbert 1971.

relates to its inversive partner: B with C $\sharp$, and E with G $\sharp$, and, of course, C with C.¹² Indeed, the entire passage after the caesura can be viewed in terms of I₀, since D-A-E-B $\flat$ can be viewed as I₀ partner A-E $\flat$ nested within I₀ partner D-B $\flat$ (Example 2-2n).

Amid these myriad (016) and (015) segmentations, the melody as a whole can readily be heard as a central descent characterized by overlapping (016)s, framed by a single (015) at the beginning and two linked converging (015)s at the end, as shown in Example 2-2o. Note that the triad (037) (E-C $\sharp$ -G $\sharp$) appears, as discussed, in precisely the role that Charles Seeger advised--as a de-emphasized consonance in a dissonant environment.

The final three notes (G $\sharp$ -B-C) form a member of sc (014). All of these set classes--(016), (015), and (014)--contain sc (01) as a common subset. In addition, the set classes can be related by the expansion or contraction of their largest interval by IC1 (4 to 5 to 6). Thus IC1 is a characteristic both of the set classes themselves and of the relations between the set classes.

Many of these instances of (016) and (015) share common tones and can be amalgamated into the tetrachord set class (0156), which contains two instances of sc (015), two of (016), and two of (01) (Example 2-2p).

In summary: the *Woodpecker* melody demonstrates many of the characteristics that apply, as will be demonstrated, to Ruggles's melodies in general. These characteristics include: pitch class nonrepetition, intervallic uniformity, the selective placement of

¹² The inversive convergence on C reinforces the quasi-C major movement towards C discussed earlier (F $\sharp$ -G, B-C).

consonant sonorities in a dissonant context, jagged switchbacks within an overall descent or ascent, pitch-space gaps within a tightly compacted pitch-class space, recurrent use of members of the same CSEG class, and a consistent preoccupation with IC1 (contrasted with IC2) as an interval between notes (both steps and leaps), as a component in sets, and as a difference between set classes, especially (016) and (015).

2.2 Linear Pitch-Class Nonrepetition

Since each of its eleven notes is a different pitch class, the *Woodpecker* melody is a concise example of pitch-class nonrepetition. Virtually everybody who writes about Ruggles discusses his technique of avoiding repetition of a given pitch class until it has sufficiently receded from aural memory--it is Ruggles's best-known compositional procedure. The comments of Dane Rudhyar, Henry Cowell, and Charles Seeger are of particular interest, since their friendship with Ruggles and knowledge of his music dates from a period when his style was still coalescing. Rudhyar emphasizes the chromatic saturation that results from pitch class nonrepetition:

Ruggles has laid out for himself a few rules which require great skill and patient effort to stand by. Not only are his various polyphonic parts in definite relationship, the ones to the others, but he avoids strictly the repetition of notes both in the horizontal and vertical writings--that is, melodically and harmonically. While writing a melodic line he will try to exhaust as many of the twelve notes as possible before returning to the original one, so that the twelve centers of his musical substance are constantly energized....we witness the birth of what might be called a true *democracy of tones*. Each one of the twelve tones he uses is independent as an individual, yet acts as a center of tone-energy within the whole. Every one is used on a basis of pure equality; none predominates; what is sought is a perfect balance between all, a perfect synthesis of all. (1927:3)

Cowell and Seeger emphasize the strength of construction, the sense of freshness that

results from maximal pitch class variety. According to Cowell,

Carl Ruggles has developed a process for himself in writing melodies for polyphonic purposes which embodies a new principle and is more purely contrapuntal than a consideration of harmonic intervals. He finds that if the same note is repeated in a melody before enough notes have intervened to remove the impression of the original note, there is a sense of tautology, because the melody should have proceeded to a fresh note instead of to a note already in the consciousness of the listener. Therefore Ruggles writes at least seven or eight different notes in a melody before allowing himself to repeat the same note, even in the octave. (1930:41-42)

Seeger in particular was a major influence. In an interview with Marilyn Ziffirin, Ruggles said: "My style began with Seeger. Cowell brought him out to me at Grantwood, New Jersey. It was *Angels* that did it, you know" (Ziffirin 1994, 71).¹³ Seeger writes :

The determining feature or principle of the melodic line is that of nonrepetition of tone (either the same tone or any octave of it) until the tenth progression.¹⁴ This applies to the leading melody and characterizes the other parts to a surprising extent....he will often tell you a melody or melodic line is bad and will point out the place where it is bad, only later discovering that it is on account of a false repetition. Reiteration (immediate repetition) is occasionally effective, but only occasionally. The repetition of tones resulting from reiteration of phrase (as in the sixth and seventh measures of *Portals* and again in the ninth and tenth) constitutes, I believe, almost the only exception to the principle. The way a melody, corrected for its repeated tones, appears "cleaned up," purged of some taint difficult to describe, is a startling thing to contemplate. The "false tone" appears, in an otherwise well-made line, as a hole in a fine fabric--it almost calls out for mending! A strand with many repeated tones is very likely to exhibit functional weaknesses, that is to say, a lack of melodic momentum, a progress that depends too much upon mere lapse of time or a "railroad" rhythm and not enough upon tendencies inherent in the tonal and rhythmic forms employed. (1932:585-86)

The most thorough and systematic investigation of linear pitch-class nonrepetition

¹³ *Angels* is dedicated to Seeger.

¹⁴ Seeger's term *progression* is similar to adjacent linear interval, although sometimes it refers to the note following the interval, i.e., the tenth progression is the tenth note from any given starting note. (Seeger 1994: 138-39).

in Ruggles is James Tenney's 1977 article "The Chronological Development of Carl Ruggles' Melodic Style."¹⁵ Tenney constructed a computer program to determine the length of melodic line without pitch-class duplication for each of Ruggles's works, and overall averages of these for each work and for groups of works from the same chronological period. The melodic line is "generally taken to be the highest part, although secondary, contrapuntal parts were sometimes included when there was a temporary cessation of activity in the upper part" (Tenney 1977:40). This description equates to what Ruggles termed *principal voices* in many of his published scores.¹⁶ The rest of my discussion of linear pitch-class nonrepetition will in large part use Tenney's methods and terminology. Consequently, I will not stay long on this topic, as I have little to add to Tenney's comprehensive treatment. My discussion focuses on how pitch-class nonrepetition, although a general principle in Ruggles's melodic writing, is actually quite flexible in practice, and can give way entirely in the interests of motivic concentration.

One effect of linear pitch-class nonrepetition is a high degree of linear chromatic pitch-class saturation--if the next note cannot repeat any of the previous nine or ten pitch

¹⁵ Tenney also addresses two other topics in this article: (1) he gives percentage breakdowns for frequency of use of linear intervals from a minor 2nd to a minor 9th (ascending, descending, and absolute); and (2) he measures the incidence of linear dissonance, defined as IC1 between adjacent notes, by measuring the lengths of strings of "consonant intervals"--that is, lines without IC1 between adjacent notes. Both of these measurements are given for each work and for groups of chronologically related works. Incidentally, I find his limitation of dissonance to IC1 overly restrictive, since it excludes both the tritone (IC6), which plays a major role in Ruggles's lines, and IC2 intervals--lesser dissonances (both in traditional theory and Seeger's theory) which Ruggles often alternates with IC1 intervals.

¹⁶ Principal voices are discussed at the beginning of this chapter.

classes, it must use one of the three or two remaining. Example 2-3 shows the main melodic line from the opening of *Portals* (1930 version). The numbers above each note denote the number of adjacent notes without pitch-class repetition preceding and including that note--each note is treated as the end of a string. In Tenney's nomenclature, this is called the LSDP (Length of String of Different Pitch Classes). For instance, in the first line, D is numbered 12, because it is the twelfth adjacent different pitch class in the line preceding and including that D. The next note, B $\flat$, is numbered 10 because it is the tenth different adjacent pitch class in a line extending back to a previous B $\flat$ ten notes back.¹⁷ Immediately repeated pitch classes are treated as a single occurrence, following Tenney's methodology. The ALSD (Average Length of String of Different [pitch classes]) refers to the average LSDP. I will also use the term "*n*-line" to refer to a line with an LSDP of *n* notes--e.g., a line of seven notes without pitch-class duplication is a 7-line.

In the quotation reproduced above, Seeger states that "the repetition of tones resulting from reiteration of phrase (as in the sixth and seventh measures of *Portals* and again in the ninth and tenth) constitutes, I believe, almost the only exception to the principle." Much of Ruggles's writing is highly motivic--a motive is presented, then repeated--sometimes exactly, more often with some change. Commonly a reiterated motive repeats the initial pitches of the first statement, and then veers off in a new direction. I will call this, somewhat imprecisely, "initial repetition"--a repetition in which the initial (number undetermined) notes preserve pitch class (and usually pitch) content and order, although the

¹⁷ In practice, the numbers are assigned on the following basis: the next consecutive pitch class in a line is assigned the next higher number in order OR the number of notes since and including its last appearance, whichever is lower.

following (number undetermined) notes may not.¹⁸ These repeated notes shorten the LSDP and break up Ruggles's long spun-out lines with readily perceivable motivic repetitions, creating a sense of stasis or pause.

This is what happens in mm. 6-8. The phrase C5-E5-D5-F5-E5-C5 is partially restated as C5-E5-D5-F5-A4-B5, repeating the first three and varying the last three notes. The repetition of C-E-D creates three 6-lines (see the numbers above the repetition). In mm. 9-10, F5-E5-D5 is repeated, forming three 3-lines. These strings stand out both because of their shortness--the average LSDP for the passage is 7.97 notes--and because of the unusual succession of three strings of equal cardinality. In the rest of the passage successive string-lengths tend to fluctuate. Table 2-1a gives the LSDP breakdown for this short passage from *Portals*. As shown in Table 2-1b, every pitch class appears between three and six times.

Lilacs (the second movement of *Men and Mountains*) provides another example of the effect of motivic exact and near repetition on the LSDP. The main melodic line of *Lilacs* is given in Example 2-4. Like many of Ruggles's works, *Lilacs* is in ABA' form, as follows:

<u>measures:</u>	1-8	9-19	20-30
	A	B	A'

Virtually the entire melodic line is motivic, much of it sequential. Exact and initial repetitions are boxed in the example. The A section contains several instances. The A'

¹⁸ I am using the terms *exact* and *initial* repetition here in a highly restrictive sense to refer only to the repetition of all or of the initial notes of a motive, in order, at T0. In Chapter 3, I will discuss repetitions at other transpositional levels.

section, which is more active, contains fewer; virtually the entire section consists of motivic repetitions, but most are transpositions at levels other than T_0 (especially the rising T_1 sequence in mm. 25-27) and other transformations. The *B* section contains no exact or initial repetition at all--the section is more forward-moving, more transitional and sequential. These differences are reflected in each section's LSDP. My calculations of the average LSDP (ALSD) for *Lilacs* in its entirety and by section are given in Table 2-2.¹⁹

In the *A* section, the three most numerous LSDPs are (in order of frequency) 5-lines (29.7%), 6-lines (16.2%), and 7-lines (13.5%). The ALSD is 5.7 notes. In the *A'* section, the cardinalities of the most numerous LSDPs are the same as in the *A* section, but the order of frequency has shifted, because the strings tend to be a bit longer: 6-lines (25%), 7-lines (23%), and 5-lines (21.2%). The ALSD is 6.2 notes. In the *B* section, by far the most active, the strings are much longer: 8-lines (29.1%), 9-lines (18.7%), and 11-lines (12.5%). The ALSD is 8.5 notes. In short, the more exact or near-repetition, the shorter the ALSD.

Tenney finds "a nearly perfect correlation between ALSD and the chronological sequence in which Ruggles's pieces were written" (Tenney 1977:41-42), that is, "a more and more effective avoidance of early pitch-class recurrences" (Ibid:36-37). Tenney's ALSD figures for each piece are given below.²⁰

¹⁹ My figure for the ALSD of *Lilacs* as a whole (6.9) differs from Tenney's (7.69). This is in part because, for easier comparison with the *A* section, I begin a completely new count at the beginning of the *A'* section, not relating it to earlier notes, as does Tenney.

²⁰ Tenney also presents calculations for the periods 1919-23 (*Toys* through *Vox Clamans in Deserto*), 1919-25 (*Toys* through *Portals*), 1931-44 (*Sun-Treader* through *Organum*), and 1919-44 (everything).

<i>Toys</i> (1919)	4.17
<i>Angels</i> (1921)	5.18
<i>Vox Clamans in Deserto</i> (1923)	6.51
<i>Men and Mountains</i> (1920-24)	6.98
<i>Men</i>	6.43
<i>Lilacs</i>	7.69
<i>Marching Mountains</i>	7.28
<i>Portals</i> (1925)	8.04
<i>Sun-Treader</i> (1st half) (1926-31)	8.81
<i>Evocations I-IV</i> (1937-43)	8.90
I (1937)	8.91
III (1940)	8.61
II (1941)	9.16
IV (1943)	8.78
<i>Organum</i> (1944)	8.89

Although Ruggles was quite flexible in his implementation of pitch-class nonrepetition, in the sense that string length constantly fluctuates, Tenney's work shows that he continued to perfect its use throughout his compositional career, gradually lengthening the average number of notes before a repetition and increasing the degree of linear chromatic saturation. Nonetheless, Tenney's averages can give a misleading impression of uniformity precisely because they are averages, and do not reflect the extremely wide variation in LSPD (from 3 to 12 in our two samples) in the actual music. Ruggles, never willing to be restrained by a rule (even his own), frequently yields the principle of pitch-class nonrepetition to a desire for motivic concentration and repetition.

2.3 Pitch-Class and Interval Distribution

Linear nonrepetition produces chromatic saturation, and, as a corollary, promotes uniform distribution of the twelve pitch classes. It never actually equalizes distribution, given Ruggles's flexible usage, but it has a levelling effect. It might be expected that both

uniform distribution and avoidance of repetition would also hold true for melodic intervals, but actually the opposite is the case. Ruggles's tendency towards equal distribution of pitch classes is balanced by his tendency towards unequal distribution of intervals.²¹ This tendency became more and more marked during Ruggles's compositional career--some of the *Evocations* and the unfinished piano works he was working on towards the end of his life are constructed almost entirely of IC5 and 1.²²

Tenney's methodology for calculating the LSDP (Length of String of Different Pitches), demonstrated in the last section for the openings of *Portals* and *Lilacs*, can easily be adapted to intervals. Of the four types of intervals,²³ ordered pitch-class intervals provide the closest parallel with the twelve pitch classes. I will call a string of different adjacent ordered pitch-class intervals an LSDI (Length of String of Different Intervals) and the average of several LSDIs an ALSDI (Average Length of String of Different Intervals). Since I use the informal term *7-line*, for instance, for a line of seven pitch classes without duplication, I will use the analogous term *7-interval-line* for its intervallic counterpart.

Example 2-5, like Example 2-3, gives the opening ten measures of *Portals* (1930). Now the numbers written immediately above the music show adjacent ordered pitch-class intervals; the numbers above those are the LSPIs, which are calculated exactly like the

²¹ This contrasts markedly with the music of Ruth Crawford Seeger, another ultra-modern composer who, like Ruggles, was influenced by the theories of Charles Seeger. In Crawford Seeger's music, the tendency towards equal pitch class distribution is paralleled in the intervallic realm (Straus 1995: 5-8, 16-17).

²² See Section 3.2.4.

²³ Ordered and unordered pitch and pitch-class intervals.

LSPDs: each number represents the number of adjacent pitch-class intervals without repetition up to and including that interval. These are tabulated in terms of frequency and percentage in Table 2-3a. Table 2-3b shows the distribution for ordered pitch-class intervals and interval classes, again in terms of frequency and percentage.

A comparison between Tables 2-1 and 2-3a shows that in the opening of *Portals* the same interval will tend to repeat far sooner than the same pitch class. The average pitch-class string (ALSDP) is 7.5, but the average interval string (ALSDI) is only 3.1. The most numerous LSDPs are 8- and 9- lines (17.4% each); the most numerous LSDIs are 2- and 3- interval-lines (28.9% each). The longest LSDP is a 12-line, but there is no LSDI longer than a 6-interval-line.

Not only is interval distribution unequal, but within the same interval class one ordered pitch-class interval occurs far more often than its complement. IC1 accounts for 33.3% of all adjacent intervals, but 26.7% are pci <11>, almost all of them descending semitones. Likewise, the next most numerous interval class, IC4, is represented by twice as many instances of pci <8> (mostly descending perfect fourths) as by pci <4>. IC3 has 15.6% of pci <3> (mostly ascending minor thirds) as opposed to only 2.2% pci <9>, and IC2 is mainly descending whole-steps. At least within the opening to *Portals*, it appears that each interval class tends to establish its own signature ordered pitch-class interval, and, to a great extent, its own ordered pitch interval as well.

Example 2-6 and Tables 2-4a and 2-4b give similar information for *Lilacs*. Once again, the ALSDI is consistently shorter than the LSDI, although by a smaller amount than in *Portals*. This holds true both for the entire movement and for the individual sections. The

ALSDI for the entire movement is 3.5, about half the length of the corresponding ALSD of 6.9.

As shown in Table 2-4b, interval distribution is not weighted towards one interval class to the same degree as in the *Portals* opening, where one third of all adjacent intervals are members of IC1. In *Lilacs* (complete) IC4 has the largest percentage (22.8%), followed by IC2 and IC3 (both 19.9%). As in *Portals*, an interval class will tend to be represented more by one ordered pitch-class interval than by its complement. IC1 occurs more often as pci <11> (11.8%, mostly descending semitones) than as pci <1> (2.9%), IC2 more often as pci <10> (15.4%, mainly descending whole-tones) than as pci <2> (4.4%), and IC3 and IC4 as pci <3> and <4>. In both *Lilacs* and the *Portals* opening, differences in frequency of occurrence of ordered pitch-classes within the same interval class tend to be higher in the lower- than the higher-numbered interval classes.

As part of his 1977 study, James Tenney has exhaustively charted the frequency of occurrence of both ordered and unordered pitch intervals from 1 to 13 for the principal melodic lines of each Ruggles composition and for chronological groupings of compositions. The results are presented in in both table and graph form. Tenney drew the following conclusions from his data:

- (1) "There is a decisive trend from a relatively diatonic to a highly chromatic idiom, shown by the increased use of minor seconds and major sevenths, and a corresponding decrease in the use of major seconds and minor sevenths. In addition, there is a significant increase in the frequency of tritones, and (to a lesser extent) perfect fourths and fifths, with a decrease in the frequency of minor thirds,

major thirds, and major sixths, all of which suggest a progressive elimination of triadic/tonal implications” (Tenney 1977:37).

(2) *Sun-Treader* (1931) represents a “radical change” in the direction noted above, and Ruggles’s last completed work, *Organum* (1944) marks a partial return to less dissonant practices (ibid 1977: 37-38).

(3) There are significant differences between ascending and descending interval frequencies for certain intervals, especially IC4 intervals. Perfect fourths occur 1.75 times more in descending than ascending form; perfect fifths are the opposite, occurring 2.17 times more in ascending than in descending form. Ordered pitch class interval <7> occurs more often than <5>.

Tenney conjectures that one reason for point (3) is that the tendency of the descending fifth (or ascending fourth) to evoke a V-I cadential root movement, implying unwanted tonal associations and “‘rooting’ the melodic line (harmonically) at the second tone and thus obstructing the ongoing momentum of the line” (1977-39). I believe that, in addition, Ruggles was strongly attracted by the stability and strength of the perfect fifth (as opposed to the perfect fourth), in this matter agreeing with virtually every theorist from Tinctoris to Charles Seeger. In practice, Ruggles usually offset the stability of the perfect fifth by “dissonating” one or both notes with IC1-related pitches.²⁴

2.4 Chromatic completion, aggregates, and near-aggregates

The chromatic saturation created by pitch-class nonrepetition does not necessarily

²⁴ Dissonated fifths are discussed at length in Sections 3.2.5 and 4.4.1.

involve the filling-in of registral gaps. Linear gaps in pitch-class space are usually filled in timely fashion: after all, pitch-class space is a circular, circumscribed space of only twelve members. However, as mentioned in the *Woodpecker* discussion, gaps are often unfilled in pitch space, an unlimited linear space.²⁵ Holes are left in the fabric. This characteristic, in tandem with switchback contours and large dissonant leaps, gives Ruggles's melodies an angular, open quality.

A short, but very typical, example can be found in *Sun-Treader*, mm. 15-16, strings and harp (Example 2-7a). The line begins with the notes E-D $\sharp$ -D $\sharp$ -C $\sharp$ -C $\sharp$ -B $\sharp$, a chromatic pitch-class zone. The most economical, if uninteresting, pitch realization would be a simple descending stepwise line; however, by alternating pitch intervals <+11> and <-1> (both realizations of pitch class interval <11>), Ruggles creates an ascending series of semitone descents covering four different octave registers: E3-D $\sharp$ 4-D $\sharp$ 4-C $\sharp$ 5-C $\sharp$ 5-B $\sharp$ 5.²⁶

The next note, F $\sharp$, extends the chromatic pitch-class zone but skips F $\sharp$ (B $\sharp$ -C $\sharp$ -C $\sharp$ -D $\sharp$ -D $\sharp$ -E $\sharp$ --F $\sharp$).²⁷ The succeeding notes in the phrase add B $\natural$, A, G $\sharp$, and G $\sharp$, extending the zone to G $\sharp$ (G $\sharp$ -G $\sharp$ -A-B $\natural$ -B $\natural$ -C $\sharp$ -C $\sharp$ -D $\sharp$ -D $\sharp$ -E $\sharp$ --F $\sharp$). In pitch-class space, the line is now almost completely packed--the only remaining gap is between E and F $\sharp$. But in pitch space, gaps remain unfilled, and the line is quite spacious, as shown in Example 2-7b, which shows

²⁵ This is equally true of Ruggles's vertical chords.

²⁶ This example is also characteristic in terms of contour, since it is composed of interlocking <021> CSEGs. See discussion in Section 2.5

²⁷ In the text, chromatic pitch-class zones are indicated by chromatically ordered pitch classes connected by hyphens. Two hyphens between pitch classes denotes a gap (of any size) in the chromatic zone.

unfilled gaps ranging in size from ip (2) to (9). The pitch-class zone from G to F $\sharp$ constitutes the aggregate less one note, F $\sharp$: a *near-aggregate*, so to speak. The missing F $\sharp$ appears almost immediately in the trumpet (m.16)--highlighted by its half-note value--and is reinforced in a less highlighted way in the following phrase for strings and harp (m.17).²⁸

Near-aggregates are common in Ruggles's music.²⁹ The drive towards completion pulls the music forward, and the missing note almost always appears soon after some boundary--in the next phrase, after a double-bar, or after a fermata.³⁰ The *Woodpecker* melody (see Example 2-1) is a near-aggregate, lacking F. Had the melody continued, the missing F would likely have appeared towards the beginning of the next phrase. This is precisely what happens in the beginning of *Visions* (Example 2-8).³¹ The first phrase--a

²⁸ The *Woodpecker* melody is also a near-aggregate--uncompleted, since it consists of only eleven notes.

²⁹ Herlin comments: "...in most cases all but one or two pitch classes sound relatively early in a melody. The twelfth pitch class is held in reserve and often given emphasis by its placement at a registral high point, or a metrical or agogic accent. In the absence of traditional tonal expectations, Ruggles creates the expectation that a certain pitch class will sound, then fulfills the expectation, often in emphatic fashion" (Herlin 2000:10).

³⁰ This is similar to pattern completion in Stravinsky's music (Straus 1982).

³¹ *Visions* is an unfinished piano work reconstructed by John Kirkpatrick after Ruggles's death from sketches dating from the period 1942-50. It can't be accepted as a finished Ruggles composition, of course, but its collaborative authorship is not unusual. Ruggles often worked with collaborators, among them Charles Seeger (see Seeger 1972), James Tenney, and John Kirkpatrick, who was deeply involved in the composition of *Evocations* (see Ziffirin 1994:141-71 and the correspondence in the Kirkpatrick archives at Yale University). It was so important for Ruggles to be able to trade musical ideas back and forth with a trusted friend that it might almost be said to be part of his compositional process, and it certainly helped him to bring a composition to completion.

wave shape lasting three measures--is a near-aggregate lacking C, which arrives four notes into the next phrase. Like *Woodpecker* and the *Sun-Treader* passage just discussed, the opening of *Visions* fills a pitch-class rather than a pitch chromatic zone.

The beginning of *Sun-Treader* (Example 2-9)³² provides more examples of near-aggregates. A long jagged ascent consisting of three ascending waves, each lasting a shorter time and climaxing at a higher pitch, is followed by a shorter jagged descent. Each of these waves constitute a near-aggregate that is completed in the next wave. The first wave contains every pitch class but D $\flat$, the highest pitch of the next wave. Wave 2 lacks B $\sharp$, the second highest pitch in wave 3. Wave 3 lacks F $\sharp$, which appears five notes later towards the beginning of the descent. The urge of each near-aggregate towards completion helps to impel the forward momentum of the line.³³

As a contrast to his usual disjunct open lines, Ruggles occasionally writes registrally compact lines with more stepwise movement and smaller leaps. These do fill in registral gaps chromatically. The opening of *Sun-Treader*, with its surging turbulent spiky lines, ends in a long disjunct descent ending at m. 14, where a contrasting section begins marked *serene--lento*.³⁴ This section features an alternation between both types of lines. Three statements of a lyrical, mainly stepwise, motive in the winds alternate with two contrasting disjunct answers in the strings and harp (Example 2-10).

³² The reduced score of *Sun-Treader*, mm.1-19, is reproduced from Steven Gilbert 1971:44-45.

³³ Steven Gilbert notes that whereas the first wave contains some pitch-class repetition, the second and third waves are 11-lines (1971:47 and 1972:228).

³⁴ The passage discussed in Example 2-7 (mm.15-16) is part of this section.

In the lyrical motive, registral gaps are filled by closely preceding or following notes. Each statement of the motive fills its own chromatic zone, and the combined statements form a larger chromatic zone. In the first statement ($G\sharp-A-F\sharp-E\sharp-G\sharp$), for instance, the $A-F\sharp$ gap is filled by the previous $G\sharp$ and the following $G\sharp$. This first statement presents a chromatic cluster in the 5 octave: $E\sharp-F\sharp-G\sharp-G\sharp-A$. The second statement, T_{+7} higher, constitutes another chromatic cluster in the 6 octave: $C-C\sharp-D-D\sharp-E$. Combined, the two clusters lack $B\flat_5$ and $B\sharp_5$ to complete the pitch aggregate from $E\sharp_5$ to $E\sharp_6$. The third statement provides $B\flat$, leaving $B\sharp$ as the odd note out of the aggregate. In addition, the third statement (T_{-6} from the second) is missing a note from its own chromatic cluster. The first four notes ($A-B\flat-G-F\sharp$) transpose the corresponding notes of statement 2 at T_6 ,³⁵ but the expected fifth note, $G\sharp$, which would complete the chromatic zone from $F\sharp_5$ to $B\flat_5$, never arrives. In a second try in the next measure, the first four notes in the oboe are repeated by the flutes (doubled at the upper octave) as the oboe continues into a subsidiary lower line, but again the $G\sharp$ does not arrive.

By the fermata at the end of m. 19, the passage has arrived at a two-tiered state of chromatic incompleteness: on the local level, statement 3 forms an incompletely filled chromatic zone that lacks $G\sharp$ ($F\sharp_5-G\sharp_5-A\sharp-B\flat_5$); on the larger level, the three statements as a whole form a near-aggregate that lacks $B\sharp$. The resumption of the music after the fermata (mm.20-22) admirably completes both the local and the larger chromatic zones (Example 2-11). $A-B\flat-G-F\sharp$ is played for the third time, but this time proceeds to the expected $G\sharp$, now

³⁵ The transpositional pathway of the first four notes of each statement-- T_7+T_6 --forms a large-scale member of set class (016), a prototypical Ruggles trichord set class.

spelled as A $\flat$. Then the line continues in a mildly twisty descent to end on B $\sharp$, which completes the near-aggregate. This B $\sharp$ is strongly highlighted--it is the last, the lowest, and the longest note of the passage.³⁶

Ruggles sometimes writes full linear aggregates in the clearest possible way, without the 11+1 division into near-aggregates and their completion. These lines often do not contain pitch-class duplication, and as such are simply extensions of the principle of linear pitch-class nonrepetition to its maximal limit of twelve. Some form chromatic zones only in pitch-class space, others in pitch space as well. As shown in Example 2-11, the section of *Sun-Treader* under discussion (treble line only) is an example of the latter: the reiteration of the A-B $\flat$ -G-F $\sharp$ in m. 20 initiates a 12-line descent that fills the chromatic zone from B $\flat$ 6 to B $\sharp$ 5 (m. 22). Then, as the continuation of the line becomes an inner voice that continues to descend chromatically, the A-B $\flat$ -G-F $\sharp$ motive repeats yet again in an upper voice, this time followed by a circuitous ascent (mm. 22-24) to a climactic high B $\flat$ 7 (m. 25). The passage is not a complete aggregate, but a near-aggregate: the missing E $\sharp$ arrives in m. 26, five notes after the double bar. At the same time, however, the treble line of the section beginning with B $\flat$ 7 (m. 25) begins with two successive pitch-class statements of the aggregate, both 12-lines; the first from B $\flat$ 7 in m. 25 to G $\sharp$ 3 in m. 26; the second from A in

³⁶ Note that while A $\flat$ 5 (m. 20) completes the chromatic zone of statement 3 in pitch space, B $\sharp$ 4 (m. 22) completes the near-aggregate of the combined statements only in pitch-class space. Oddly enough, if one looks to the other stratum (the disjunct answers in the harp and strings) for the missing notes, the situation is reversed (see Example 2-10). B $\sharp$ 5 (m. 15), the highest point in the first answer, is in the "right" register, and G $\sharp$ 3, the lowest note in the second answer, is in the "wrong" register. Since the two strata are clearly separated, however, I feel that the aggregate-completion within the line takes precedence. Aggregate-completion involving more than one line--a related but separate topic--will be treated below in the section on counterpoint.

m.26 to G $\sharp$ in m. 31.³⁷

With near-aggregates, as discussed, the missing pitch class is supplied on the other side of a boundary or division. Speaking more generally, this is usually the case even when several pitch-classes are missing from an aggregate, and this often happens in a sort of overlapping segmentation. In *Marching Mountains* (*Men and Mountains* III), for example, the treble line of the introduction sets out the aggregate in a 12-line (Example 2-12).³⁸ This is followed by two statements of a marcato eight-note theme that dominates the beginning and end of the movement: B $\flat$ -E $\flat$ -F-D-C-A-B $\sharp$. This theme presents a chromatic pitch-class zone with a large and a small gap: C--D-E $\flat$ -E $\sharp$ -F--A-B $\flat$ -B $\sharp$. C $\sharp$, F $\sharp$, G $\sharp$, and G $\flat$ are missing. Immediately afterwards (m. 9), a contrasting lyrical section begins composed of freely imitative two-measure phrases. The first of these phrases (C-D-G-G $\sharp$ -F $\sharp$ -F $\sharp$ -E-C $\sharp$ -D $\sharp$) provides the missing C $\sharp$, F $\sharp$, G $\sharp$, and G $\flat$, forming an aggregate with the preceding marcato theme.

In its turn, the first two-measure lyrical melody can be taken as the initiation of an aggregate. It constitutes the chromatic zone C-C $\sharp$ -D-D $\sharp$ -E-F-F $\sharp$ -G-G $\sharp$. The next two-measure phrase supplies the missing A, B $\flat$, and C $\flat$, completing the aggregate.

Although aggregates and near-aggregates are characteristic of Ruggles's lines, I do not think that they are necessarily major musical concerns in and of themselves. They seem

³⁷ If the G $\sharp$ in m. 26 is taken as overlapping the end of one aggregate and the beginning of the next, the second aggregate ends with C $\sharp$, the last note in m. 30. Otherwise, it ends with the G $\sharp$ that begins m. 31.

³⁸ To save space, Example 2-12 reproduces only the string parts, which contain all the lines discussed.

on the whole to be natural consequences of the linear chromatic saturation resulting from pitch-class nonrepetition. Even clear statements of the aggregate without pitch duplication result from the expansion of the LSPD to its maximum length of twelve. Aggregate completion per se is less important than the interaction of the aggregate with other processes discussed below, such as motivic transformation, imitation at various transpositional levels, or interval cycles.

2.5 Contour: Crooked lines, straight lines, and cadences

Ruggles held decided opinions about melodic contour. In 1966, five years before his death, he told a *Newsweek* interviewer: "There shouldn't be any straight lines. It's against nature. Did you ever see straight lines in a bunch of flowers, in the sea, on a mountain"? (*Newsweek* 1966:80) Also in 1966, he said something similar to his biographer Marilyn Ziffrin about music and painting. She writes: "He always started with 'the line', adding that there were not straight lines in nature, so he didn't use any either. Then we talked about his way of writing music, for painting and composing were closely related in his mind. Everything in his music stemmed from the line, too, he said" (Ziffrin 1994:250).

As regards his music, Ruggles's statement is largely accurate.³⁹ His usual melodic lines are twisty in the extreme, forming jagged sawtoothed waves within larger waves. However, despite his disclaimer, at times he abandons his usual crooked contours for straight lines. These tend to have a cadential function, often are associated with whole-tone

³⁹ For a discussion of Ruggles's painting, see Archabal 1979.

collections, and usually ascend--a combination of characteristics that I call the cadential complex. In Ruggles's music, rising lines often bear an expressive meaning of effort and struggle--connotations that are reinforced by texture, dynamics, attack, and treatment of leaps.⁴⁰ This association is, I feel, an audible expression of the composer's preoccupation with the aesthetic of the transcendent and the sublime. Moreover, since Ruggles's lines are intensely sequential, straight ascents and descents underlie the myriad twists and turns of the linear surface. At cadences, especially at the ends of pieces or movements, these implied straight lines often reveal themselves explicitly, and, at last abandoning the evasions of the direct ascent, finally march resolutely upward.

This examination focuses almost entirely on Ruggles's principal voices--that is, usually the highest moving voice, and occasionally the outer voices.

Crooked Lines

For the most part Ruggles's lines conform to nature (as he saw it)--they are twisty, and full of sawtooths and switchbacks. They do not, however, meander aimlessly, but exist within strongly goal-directed overall ascending or descending motion. Ruggles's linear landscape resembles mountain terrain: foothills mounting to summits, then slopes descending to deep valleys--jagged ridges and twisting trails in between.⁴¹

⁴⁰ Interestingly enough, the motto of the Ruggles family crest is "struggle" (McMahan: private communication).

⁴¹ The resemblance of Ruggles's large-scale contours to mountain terrain is most clearly depicted in the contour graphs in Orkiszewski 1988:29-40. The image, although perhaps fanciful, is consistent with adjectives that persistently turn up in descriptions of both Ruggles and his music, such as "craggy", "rugged", "hard", and "granitic".

The pervasive crooked contours are in part a consequence of the fact that in Ruggles's lines, much as in species counterpoint, large leaps (or a succession of unidirectional leaps that add up to a large leap) are often followed by contrary motion, either by step or by smaller leap.⁴² This gives rise to twist contours--<021> in upward leaps and its inverse <201> in downward leaps, and supersets of <021> and <201>. Often these CSEGS occur in successive or overlapping chains. The opening of *Sun-Treader* provides some typical examples. In Example 2-13a, four linked <021> CSEGS (circled on the example) form a sawtooth ascent from B₄ to E₇; the descent to E₇ completes the last <021> and initiates the descending wave. The notes in the first circle (B₄-E₅-A₆-D₆-G₅) literally instance CSEG <01342>, an <021> superset, but the first four notes can be interpreted as a compound leap from B₄ to D₆.⁴³ Example 2-13b shows the two overlapping <201> CSEGS that end the descending wave.

An aesthetic connection can be drawn between these jagged waves--especially the ascents--and Ruggles's aesthetic of the sublime, which I will discuss further at the conclusion of this section. The ascending <021> chains in particular, especially when the leaps are large and dissonant, evoke a sense of struggling upward, like a climber reaching

⁴² This prototypical contour is related to a statistical dissimilarity in Ruggles's treatment of ascending and descending intervals pointed out in James Tenney 1977:38-39: intervals smaller and equal to a tritone occur most often in descending form; intervals larger than a tritone in ascending form.

⁴³ Eliminating intervening "passing" notes in a compound leap yields the same result as Robert Morris's *Contour Reduction Algorithm*, which progressively reduces a contour to high and low points (including beginning and ending pitches). See Morris 1993:205-228.

for a handhold, pulling up, slipping back a little, and then repeating the process, gradually pushing higher and higher.

Twist contours characterize not only the linear segment but also the larger line, which often takes the shape of a large wave composed of smaller waves, although sometimes only one side--usually ascending--of a large wave is presented, followed by a disjuncture of some kind. The full wave usually consists of a jagged ascent to a registral and dynamic peak, followed by a shorter and smoother but still crooked descent.

This shape can be seen at its simplest in the opening phrase of *Angels*, shown in Example 2-14 (1945 edition).⁴⁴ The treble line is presented in three 5-note sections: a switchback ascent from G4 to B $\flat$ 4 (by means of two overlapping <021> neumes); a resumption of the ascent, now from B $\flat$ 4 to D $\flat$ 5 (ditto); and a stepwise descent from G5 to D $\flat$ 5 (G-F-E $\flat$ -D $\flat$) broken up by low C escape tone between F and E $\flat$. Both the second and third sections end with C-E $\flat$ -D $\flat$, another <021> neume and an ending marker that confirms that the midpoint D $\flat$ 6 is reached twice, first from below (G4) and then from above (G5). The entire line is a chain of recurring <021> CSEGS, sometimes separate and sometimes overlapping.⁴⁵

Moreover, the pervasive <021> shape is projected on higher levels. If reduced to the first, highest, and last notes, phrase 1 projects <021> as G4-C5-B $\flat$ 4, phrase 2 as B4-E $\flat$ 5-D $\flat$ 5, and the entire line as G4-G5-D $\flat$ 5.

⁴⁴ In the 1945 edition arrows point out the principal voice, replacing the brackets used in the 1921 and 1925 editions. The circles around trichords are mine.

⁴⁵ Although this discussion focuses on the treble voice, the other lines also are saturated with <021> and <201> CSEGS.

The jagged wave prototype is slightly more developed in the opening of *Lilacs*, the second movement of *Men and Mountains* (Example 2-15). The principal line starts on D $\flat$ 5 and rises, again via a series of switchbacks, to B5 (violin I, m. 3). This registral peak is sustained for two measures via a varied repetition of D-G-F-B-A $\flat$ (F changed to F $\sharp$ and the rhythm altered), followed by a short but circuitous descent to A $\sharp$. In *Lilacs* the linear high point is sustained longer than in *Angels*--less of a peak and more of a plateau--and the descent is less direct. The line is saturated with two-note stepwise descents⁴⁶ which, even more than in *Angels*, recall traditional sigh motives. In *Angels*, the contour pattern is an ascending leap followed by a descending step, producing recurring <021> shapes. In *Lilacs* a pattern of descending steps separated by upward leaps is established from the outset; these are grouped into pairs (four notes divided 2+2), creating <1032> CSEGS (circled in the example). In each <1032> the last three notes form subset <021>. After the high "plateau", the motivic contour changes to <1320> (boxed in the example) in the descent to the concluding A $\sharp$.⁴⁷ Now the subset <021> has shifted to the first three notes. As in *Angels*, the contour of the line as a whole is a twist neume, but not <021>--rather, its retrograde <120> (D $\flat$ 5-B $\flat$ 5-A $\sharp$ 4).

By *Sun-Treader* (Example 2-16),⁴⁸ the basic crooked wave shape has been greatly

⁴⁶ The descending step (whole or half) is an important motive in Ruggles's music in general and in *Men and Mountains* in particular, serving as a motto that begins each movement.

⁴⁷ <0132> continues to be the dominant motivic CSEG for the next two measures, and again in the varied repeat in mm. 25-27.

⁴⁸ Reduction from Gilbert 1971:42-50.

elaborated and expanded. *Sun-Treader* opens with three small jagged ascents (marked ascent 1, 2, and 3 on the example) each lasting a shorter time and climaxing at a higher pitch. Each successive ascent begins with an approximate retake of a group of notes near the end of the previous wave⁴⁹ (shown by the vertically juxtaposed notes in Example 2-17). The first wave states the basic “motto” theme (which recurs periodically throughout the work) and proceeds with a rising gesture that ends with a A $\flat$ 6-G6 semitone descent. The next two waves are variants of this rising gesture, the first ending in m. 7 with a D $\flat$ 7-C7 semitone descent and the second in m.8 with a major seventh ascent from F6 to a sustained E7, the registral and dynamic peak of the phrase. From here the line cascades down in a series of progressively shorter descents to end on C4. As in *Angels* and *Lilacs*, the descent takes considerably less time than the ascent.

Note that these lines contain straight-line segments--the descent, for instance, begins with five such segments, the first three consisting of six notes each, the last two of three notes. Their effect within the larger line is of similar shapes replicated at lower pitch levels--a roughly sequential effect which creates twists in the large descent. Similarly, there are straight segments in the ascent, such as the series of upward skips in mm. 4 and 6, but the subsequent semitone descents introduce a change of direction before the end of the phrase.

Straight Lines

Although Ruggles’s habitual linear style is chronically twisty, occasionally he

⁴⁹ The opening of *Organum* is another example of overlapping phrase construction.

writes melodic lines that continue a steady ascending or descending direction to the end of a phrase without twisting back. These stand out against the usual linear texture. These “unnatural” straight lines often occur at cadences--ends of phrases, movements, or entire pieces. They may descend at the ends of phrases or sections but almost always ascend at the ends of movements or pieces. They occur throughout his work--from *Toys* (1919) to *Organum* (1947).

When Ruggles said that he never wrote straight lines, I am sure that he was referring to straight lines composed of adjacent notes--what I will call simple straight lines. But I would like to expand the concept a little to admit connections between nonadjacent notes,⁵⁰ especially sequences, which are ubiquitous in Ruggles’s music. There is little doubt that Ruggles would have considered sequences as natural phenomena, but since the sequential unit as a whole and its cognate notes individually travel along ascending or descending lines, sequences can be considered as crooked straight lines, so to speak: straight lines once removed.

There is an association in Ruggles’s music between cadences, sequences followed by simple straight lines, and, especially in the earlier works, whole-tone collections. No one of these elements always keeps company with the others, but they are often found together, forming an association of elements, a cadential complex.⁵¹ The whole-tone

⁵⁰ A simple example is the G-F-(C)-E-D^b descent at the end of the first phrase of *Angels* (see Example 2-14), where the whole-tone descent is “broken up” by the low C.

⁵¹ This is not to say that all straight lines form are part of a cadential complex--*Evocations* 1 and 4, for instance, begin with ascending and descending straight-line motives respectively. But the association of ascending straight lines with endings is very strong in Ruggles’s music.

passages contrast with Ruggles's habitual dissonant chromatic IC1-saturated landscape just as the straight lines contrast with his usual jagged twisty lines. The contrast of the straight-line/whole-tone with the twisty/chromatic creates an especially strong cadential effect.

An early example of this association occurs in *Toys* (Example 2-18), which ends with an ascending sequence in the voice followed by a rising line in the piano. The rhythmic groupings in the vocal sequence suggest a partition into a succession of <021> contours. The upward leaps become larger, moving from pitch intervals 9 to 10 to 11, and the descending steps become smaller, moving from a whole step to a half step, as indicated in the numbers above the staves. Consequently, the trichord set classes (and the ending dyad set class) become tighter as the sequence progresses:

$$\begin{array}{ccccc} (D \ B \ A) & (D\sharp \ C\sharp \ B) & (F \ E\flat \ D\flat) & (G\flat \ F \ E\sharp) & (B\flat \ A) \\ (025) & (024) & (013) & (012) & (01) \end{array}$$

The highest notes (the second notes) of each group of three form an ascending WT_1 line--B-C $\sharp$ -E $\flat$ -F-A $\sharp$, skipping G, which, however, appears almost immediately (in a lower register) in the subsequent piano line. After the final voice note is reached, the piano line ascends via a series of switchbacks against the sustained piano-voice chord. This line continues both the <021> contours (usually with the last note of one group elided with the first note of the next) and the whole-tone groupings, alternating WT_1 with WT_0 --the only note out of place is the penultimate A $\flat$. About half-way through, the line untangles from an ascending <021> series to end with a simple straight ascent to C7, the highest note in the piece. All the elements of the complex are present in this example: the whole-tone associations, the rising sequence, the subsequent ascending simple straight line, and the cadential function.

As shown in Example 2-19, the upward series of descending steps in the voice (the last two notes of each <021> group) resembles a series of Schenkerian reaching-over operations, a common contour in Ruggles's lines. In reaching-over, ascending notes are usually preceded by upper but sometimes followed by lower embellishing tones (Example 2-20a,b).⁵² A series of reaching-over operations creates upper and lower compound lines (Example 2-20c). In tonal music one of the lines is always primary, the other embellishing. In atonal music the criteria for ranking are more contextual and it is not always desirable to subordinate one line to the other. In *Toys*, however, I take the upper line as primary and the lower as embellishing, partly because of the upper line's WT_1 membership, but also because the absence of a descending step after the final A5 suggests a retrospective emphasis on the second note in each group of three, reinforced by the second note's stronger metric accent and longer (and increasing) relative duration.

Notice that towards the end of m. 14 the piano treble line is $F\sharp-B\flat-D$, an augmented triad in a <201> contour, the inverse of the prevailing <021> contour. This WT_0 augmented triad refers to the opening of the piece (see Example 2-21), where the piano has $C\sharp-F-A$ in the right hand against $D-F\sharp-B\flat$ in the left hand.⁵³ The juxtaposition of WT_0 and

⁵² The embellishing tones are usually neighbors, but can be any interval. See Heinrich Schenker 1979:I, p.47, par. 130 and II, fig. 41b2 and b3; see especially Ernst Oster's note in I, p.48, par.134). The resemblance between tonal and atonal reaching-over should not be taken too far. In Schenkerian reaching-over, the embellishing tone originates from an upward registral transfer of a preceding inner voice tone. I make no such claims for Ruggles's music.

⁵³ The crooked/straight contrast between the contours of the two augmented triads in m.1 is suggestive. The WT_0 augmented triad $D5-F\sharp4-B\flat4$ is a twist neume--a <201> CSEG--both here and in its return (now $F\sharp6-B\flat5-D6$) in mm.14-15 (see Example 2-18). The WT_1 augmented triad $C\sharp5-F5-A5$ in m.1 is an ascending straight neume, but does not recur in

WT₁ augmented triads at the very beginning of the piece establishes competing whole-tone collections as a continuing preoccupation of *Toys*.

Ruggles's cadential rising lines are often characterized by a sense of effort, of striving upward against gravity. But in *Toys* the vocal ascent is relatively easy, and the final piano ascent seems totally effortless, spinning upward, the only moving line against the final sustained chord. These lines, of course, play a programmatic role, representing the "wondrous balloon that floats way up to the stars." The balloon starts slowly floating upward in the vocal line, represented not only by the rising whole-tone line but also by the increasingly larger upward leaps. In the piano line it rises faster and faster, becoming smaller and smaller, and finally vanishes into the night-time sky.

Ruggles often rearranges the elements of the cadential complex, presenting them in different combinations. *Toys* ends with an ascending sequence containing a WT₁ line, followed by an ascent (first sequential, then simple) that alternates WT₀ and WT₁ segments. In contrast, the first section of *Lilacs* (Example 2-22 and 2-23) ends with a descending sequence containing staggered WT₀ and WT₁ lines, followed by a WT₁ simple ascent. The sequence starts forming at m.9, and by the A♭5 in m.13 it has coalesced to a stable length of six notes and runs through three more repetitions before dissipating. Considered as a single line, the sequence is not noticeably whole-tone in character--it contains pitch class intervals 3, 5, 7, and 11. Considered polyphonically, it is possible to discern three whole-tone lines, defined by register and the placement of their notes at

mm.14-15. However, it is embedded without registral change in the preceding vocal WT₁ line (as the second, fourth, and fifth notes), which is an ascending straight line, but sequential rather than simple.

corresponding points in the sequence: (1) an upper (mostly) $A\flat 5$ - $F\sharp 5$ - $E5$ - $D4$ WT_0 line;⁵⁴ (2) a lower $A\sharp 4$ - $G4$ - $F\sharp 4$ - $E\flat 4$ WT_1 line; and (3) a middle WT_0 $C5$ - $B\flat 4$ - $A\flat 4$ - $F\sharp 4$ line (the last note arrives after the end of the sequence). The lines are not highlighted, but embedded, and their presentation is implicit rather than explicit. Together the upper and middle lines present the complete WT_0 collection, but the WT_1 collection is left incomplete.

In m. 16, D appears in the upper WT_0 line in the wrong octave-- $D4$ instead of the expected $D5$. This registral disjunction (along with the out-of-order $C5$ in m. 16) weakens the effect of the upper WT_0 line, and the WT_1 line, which keeps its descent to the same register, emerges in a stronger position, confirmed by the following WT_1 A - B - $C\sharp$ - $E\flat$ simple cadential ascent. This ascent completes the WT_1 collection, left incomplete in the sequence. Registrally, the final $E\flat 5$ in m. 19 comes from the earlier $E\flat 5$ in m. 15. This nonadjacent semitone descent from $E\flat 5$ to $E\flat 5$ corresponds to the adjacent semitone ascent in m. 16 from $D4$ to $E\flat 4$ --a sort of nested semitone convergence in contrary motion on upper and lower $E\flat$ s, the latter within the former.

Unlike the freely spinning piano ascent at the end of *Toys*, the simple straight cadential ascent G - A - B - $C\sharp$ - $E\flat$ gives a strong impression of effort, of striving to make one step after another against the accumulating glue of the sustained notes that merge into the final chord, an effect heightened by the crescendo, the ritard, and the accents on each

⁵⁴ In the upper WT_0 line, $E5$ (m. 15) $D4$ (m. 16) are separated by $C5$ - $B\flat 4$. It is interesting that in both the *Toys* and *Lilacs* sequences an expected stepwise note in a nonadjacent whole-tone line is evaded by the skip of a third, only to reappear soon afterwards out of order and an octave lower. In *Lilacs* $E5$ leaps down to $C5$ (proceeding in the WT_0 path to $B\flat 4$) and $D4$ appears two notes later. In *Toys* (mm. 14-15) $F5$ leaps up to $A5$ in the voice and $G4$ unobtrusively appears two notes later in the piano (see Example 2-18).

ascending note.

Example 2-24 returns to the opening of *Angels*, but in greater detail. The first phrase ends with a G-F-E-D_b descent embellished by a low C escape tone. The effect of this WT₁ descent is strengthened by the B/D_b(C[♯]) outer-voice exchange⁵⁵ and by the total WT₁ content of the final chord.

The treble line can be scanned as a free sequence in two sections: the first to the end of the subphrase in m. 4, the second to the high G in m. 7. In the mainly elided <021> contour segments (see Example 2-14), the ascents are major or minor thirds (except for the tritone between D_b and G); the descents are whole tones. As in *Toys*, the <021>s give rise to a series of reaching-over operations (Example 2-25), but whereas the upper compound line was central in *Toys*, here the lower line is prominent. This impression is strengthened by two outer-voice exchanges: in the first subphrase between G and A_b; in the second, as mentioned, between B and C[♯]/D_b. In the second voice exchange the treble B-C-D_b line is counterpointed by its bass retrograde C[♯]-C_b-B. The bass is not quite aligned with the treble but skewed a quarter-note to the right, creating a dissonant IC1 outer-voice framework (13-13-13), one of Ruggles's trademarks. Similarly, the bass E_b-D is an semitone-altered retrograde of the treble D-E.⁵⁶

The G-F-E-D_b descent at the end of this phrase forms a WT motive that becomes intensively developed later on in *Angels*. The next four examples sketch the progress of

⁵⁵ The bass C[♯] in m.5 connects to the treble D_b in both mm. 6 and 8.

⁵⁶ Motivic repetitions with one note altered by a semitone or whole-tone are extremely common in Ruggles's music.

this elaboration. First the G-F-E-D[♯] is transposed by T3 to B[♭]-A[♭]-F[♯]-E[♯] (Example 2-26). In the first edition of *Angels* (1921), this motive is extended, very simply, into a descending WT₀ scale that ends with a repetition of the motive an octave lower.⁵⁷ The four-note descent expands into a longer, and entirely undeflected, ten-note descent. This could also be viewed as a registral expansion of the B[♭]-A[♭]-F[♯]-E[♯] motive incorporating a lower octave transfer. Some of the other instrumental parts support the treble with WT₀ segments, and the bass contains a contrasting WT₁ passage, but the whole-tone content of the other voices is fairly sporadic.

In the 1943 version (Example 2-27) the progress of elaboration is far advanced.⁵⁸ The length is double that of the 1921 version, and almost every instrument participates in the bifurcation of virtually the entire passage into competing vertically and horizontally juxtaposed WT₁ and WT₀ segments. The 1921 simple treble WT₀ descent has evolved into multiple descending sequences which involve every instrument to some extent except Trumpet IV. The sequential interval of descent is a semitone, but the sequential units themselves are whole-tone segments. The entire passage is saturated with descending gestures in all parts.

In the treble line the initial four-note motive is steadily augmented, first to five notes (m. 26), then seven (mm. 27-28) (most of this line is in Trumpet II), seven again (mm. 28-29), and finally adding an eighth note (E[♯]), the last note of the section.

⁵⁷ This excerpt from the 1921 version is transposed down three semitones to facilitate comparison with the untransposed 1943/1960 version given in Example 2-27.

⁵⁸ Actually I have used the 1960 edition, but the passage is identical.

As shown in Example 2-28, the starting points of the first three segments in the treble are $B\flat$, $A\sharp$, and $A\flat$. Then there is a jump down to F (skipping the expected G), which initiates a descent down the entire WT_1 scale to low G. WT_0 is regained by the semitone descent from G into the $F\sharp-E\sharp$ closing. In my reading, this whole line expands the initial $WT_0 B\flat-A\flat-F\sharp-E\sharp$ motive. The initial $B\flat$ moves through an $A\sharp$ passing note to $A\flat$. The descent from F to G effects a transfer to the lower register $F\sharp$ by means of the opposing WT_1 scale, and the motive is completed with the final $E\sharp$.

Whole-tone content is not an invariable component of the cadential complex, as shown in the final two pieces discussed in this section. Example 2-29 shows the conclusion of the 1924 version of *Marching Mountains (Men and Mountains, III)*.⁵⁹ Unlike the previous examples, it contains no simple straight lines, but only a cadential ascending sequence. In the last four measures, the treble line consists of an ascending sequence over dissonant (13-11) voice exchanges in the lower voices. The sequence arrives after an obsessive marcato motive ($B\flat-E\sharp-E\flat-F-D-C-A-B\sharp$) has been repeated eight times in a mounting maniacal frenzy at continuously higher registers and faster speeds (its last appearance is in m. 40 of the example). Four measures before the ending the motive is shortened to its first three notes and transposed three times in an ascending sequence. The interval pattern is $\langle -6, -1, +11 \rangle$, which, if followed faithfully, transposes each three-note group by T_{+4} , as shown in Example 2-30a. But the interval cycle as realized in *Marching Mountains* is slightly skewed, as shown in Example 2-30b. $B\flat-E\sharp-E\flat$ D-A $\flat$ -G $F\sharp$. But the next interval, $\langle -6 \rangle$, is contracted to $\langle -5 \rangle$, resulting in a descent to $C\sharp$ rather than to $C\sharp$. The

⁵⁹ In the 1951 revision a ten measure descending passage was added to form a new ending.

remaining notes of the passage are a semitone too high.

If the cycle had been strictly adhered to, the stressed (accented and syncopated) notes of the first and last groups would form two octaves: B $\flat$ -B $\flat$ and D-D (Example 2-30b). The repetitive (and consonant) effect of the octaves would have been reinforced by the B $\flat$ interlocking augmented triads outlined by the stressed notes: B $\flat$ -D-F $\sharp$ and F $\sharp$ -B $\flat$ -D.

The shrinkage of ip <-6> to ip <-5>, as shown in Example 2-30b, changes the B $\flat$ -B $\flat$ and D-D octaves to B $\flat$ -B $\sharp$ and D-D $\sharp$ augmented octaves; and the interlocking augmented triads are changed into interlocking B $\flat$ augmented and B major triads, creating a far richer, less repetitive, and more dissonant effect. The change has “dissonated” the passage and avoided premature pitch-class repetition. This cadential rising sequence has little whole-tone content, because the alteration avoids the WT₀ resonances of the six-note arpeggiated augmented triad that would have resulted from the unaltered cycle.

My final example, the conclusion to *Sun-Treader*, is in some ways the most developed example of the cadential complex, and will be discussed at some length. In m. 221, the opening theme returns in a series of five abbreviated retakes at different pitch levels, decreasing lengths, and accelerating tempos. The first three of these are separated by jagged rapid recitative-like lines. But from m. 232 to the end of the piece (Example 2-31)⁶⁰ the entire contour landscape dramatically and completely changes. From a texture of circuitous and twisty lines, the music abruptly enters a world of shifting slanted planes, of simple straight lines--an ascending series of overlapping ascents in the treble

⁶⁰ Excerpted from John Kirkpatrick's piano arrangement of *Sun-Treader*, John Kirkpatrick Papers, Yale University Music Library.

counterpointed by descents in the bass. The turn towards the cadence signaled by the change from crooked to straight contours is reinforced by the increasing length of the treble ascents, which contrasts with the diminishing lengths of the preceding thematic retakes. The number of notes in each treble segment gradually increases from 4 to 7, and the total length of each segment (reckoned in eighth-note durations) increases from 5 to 28, as shown in the following chart.⁶¹

<u>Segment beginning at measure</u>	<u>Length in eighth notes</u>	<u>Number of notes</u>
232:7	5 ⁶²	4
233	6	4
234	7	4
235	8	4
236	10	5
237	10	5
238	28	7

The turn towards the cadence is also marked by a change in affect from the urgency and jerkiness of the thematic retakes to a sense of serene clarity created by the steadily augmenting rising and falling lines. The sense of calm inevitability also partly derives from recurring linear intervallic patterns. These occur in both outer voices, but are more comprehensive and systematic in the treble, suggesting that is the more highlighted voice.⁶³

⁶¹ The lengths for each segment include the full duration of each final note. The last note of the line is sustained for the equivalent of fourteen eighth-notes, adding substantially to the length of the final phrase. Since the beginning each treble segment coincides with the bar line from m. 233 on, the increasing phrase lengths are partially reflected in the change of meter from 2/4 to 5/8 to 6/8 to 4/4.

⁶² The triplet sixteenth-note anticipation is disregarded.

⁶³ The treble voice is highlighted in virtually all of Ruggles's cadential straight lines, reflecting the need for the principle voice to ascend to the highest register unbounded and unenclosed.

The end of the piece is organized into two sections defined by two related, but different, treble sequential intervallic patterns: one from the end of m. 232 to m. 235, the other from m. 235 to the end of the piece.

As shown in Example 2-32, from the end of m. 232 to m. 235, the treble consists of successive interval patterns $\langle +1, +6, +7 \rangle$, $\langle +1, +7, +6 \rangle$, $\langle +1, +6, +7 \rangle$, and $\langle +1, +6, +7 \rangle$.⁶⁴ Starting with the second phrase (m. 233), the last note of each segment descends $\langle -1 \rangle$ to the first note of the next, and each segment begins T_3 higher than the last—on $C\sharp$, E, and G, leading to $A\sharp$ (m. 236), the first note of the second pattern.⁶⁵ These notes constitute the enharmonic equivalent of a diminished 7th chord. Meanwhile, the bass descends in long notes from $B\flat$ to E to $C\sharp$, all notes from the same diminished 7th collection as in the treble. The T_9 between the treble $C\sharp$ and $A\sharp$ is balanced in contrary motion by the T_3 between the bass $B\flat$ and $C\sharp$, creating a slightly skewed voice exchange (Example 2-33). The treble $C\sharp$ (m. 233) connects to the bass $C\sharp$ (m. 235), and the bass $B\flat$ (m. 233) connects to the treble $A\sharp$ (m. 236). The skew comes from the fact that the treble $A\sharp$ (m. 236) actually does not belong to the first pattern, but starts the second, forming a sort of overlap in the treble, which is not matched in the bass.

Within each treble segment, the registral span from the first to the last note is pitch

⁶⁴ The switch in interval order does not invalidate the sequence, but makes it freer and more flexible.

⁶⁵ It is largely because of the T_3 cycle that I regard the cadential section as starting in m. 233 and the $\langle +1, +6, +7 \rangle$ $F\sharp$ - $F\sharp$ - C - G treble segment at the end of m. 232 as transitional. Nonetheless, these pitch classes return in retrograde at the very end of *Sun-Treader*, but now mainly in the bass. The final three bass notes (m. 239) descend G - C - $F\sharp$, and $F\sharp$ immediately follows in a higher register. Even $E\flat$, which was below the segment at the end of m. 232, now returns above the segment in the sustained chord that ends the piece.

interval (14), or a whole-tone plus an octave. Arranged as an ordered line, the beginning and ending notes of the segments form an incomplete octatonic scale that fills in the T_3 cycle-- $C\sharp-E-E\sharp-F\sharp-G\sharp-A\sharp$. The octatonic scale notes are highlighted by means of both register and order positions (the first and last notes of each sequential segment). The second notes in the pattern fill in the chromatic gaps in the scale: $C\sharp-D-E-E\sharp-F\sharp-G\sharp-A\flat-A\sharp$ (Example 2-32).

In m. 236, a new intervallic pattern begins in the treble: $\langle +5, +8, +5, +8 \rangle$. The new cycle preserves many of the qualities of the preceding cycle but increases the length and registral span. The number of notes in each segment increases from four to five, and the registral span from the first to the last note expands from pitch interval (14) to (26)--that is, from a whole tone plus an octave to a whole tone plus two octaves. Similarly, the descending interval from the last note of each segment to the first note of the next expands from $\langle -11 \rangle$ to its mod 12 equivalent $\langle -23 \rangle$ --another octave expansion. The T_3 pattern continues from where it left off: the initial notes of the first three segments are $A\sharp$, $C\sharp$, and E ; G , the final note of the piece, completes the cycle. The T_9 relation from $C\sharp$ to $A\sharp$ in the first part is matched in the second part by T_9 from $A\sharp$ to G . Similarly, the octatonic scale formed by the first and last notes of each segment also continues: $A\sharp-C\sharp-C\sharp-D\sharp-E-F\sharp-G$. $F\sharp$ arrives midway through the expanded final segment (m. 239:1). In the new pattern, as with the previous, each octatonic segment is chromatically filled in, now by the third note instead of the second.

The change from the $\langle +1, +6, +7 \rangle$ to the $\langle +5, +8, +5, +8 \rangle$ pattern preserves key pitch-class intervals but changes their pitch realizations. The pitch-class intervals $\langle +2 \rangle$ between

the first and last notes of a segment, and $\langle +1 \rangle$ between the last note of a segment and the first note of the next, are preserved; but the corresponding pitch intervals are increased by 12 semitones, and the pattern itself is augmented from four to five notes. The result is that the T_3 and the chromatically-filled octatonic cycles continue, but both the registral and temporal spaces have expanded.

The final segment further increases the number of notes from 5 to 7, and extends the $\langle +5, +8, +5, +8 \rangle$ pattern to $\langle +5, +8, +5, +8, +5, +8 \rangle$. This expansion ensures that the final ascending straight line is the longest in terms of number of notes, total duration, registral span, and registral height, a treatment wholly in keeping with Ruggles's cadential practice. The final note, G7, is the highest note of the section. The arrival of G in this register is entirely due to the pattern expansion. Had a new $\langle +5, +8, +5, +8 \rangle$ pattern begun after the F#6 (m. 239:1), G would have arrived three octaves lower (G4) as the first note in the new segment. The expansion of the cycle in the last phrase delays the arrival of G, places it at the end of the pattern, and ensures its arrival in the highest register (Example 2-34).

The bass consists entirely of descending lines, counterpointing the treble's ascents. During the first treble sequence (m. 232:5 to m. 235) the bass is rhythmically quite distinct from the treble--just three long descending notes to the treble's sixteen. In the second sequence (mm. 236-241), the outer voices are far more closely matched rhythmically. At the end of each segment, they maintain a consistent intervallic pattern (Example 2-35). The last three bass notes of each segment descend by pitch intervals $\langle -7, -6 \rangle$, totalling $\langle -13 \rangle$. The pitch intervals for the corresponding three treble notes are $\langle +5, +8 \rangle$, totalling $\langle +13 \rangle$.⁶⁶

⁶⁶ The bass $\langle -7, -6 \rangle$ uses intervals from the first treble pattern (mm. 232-235).

Together the two voices form voice exchanges between the first and third notes of each of the three segments: C/B, E $\flat$ /D, and G/F $\sharp$, recalling the single large voice-exchange in the first section.⁶⁷ In each of the voice exchanges the outer voices maintain the dissonant interval pattern (11-11-13).

In the last two segments, the first bass note of the voice exchange is preceded by a descent of <-4>, the complement of the corresponding treble ascent <+8>. This prefix expands the succession of vertical IC1 intervals to (11-11-11-13)⁶⁸ and the bass pattern becomes <-4,-7,- 6>, counterpointing <+8,-5,+8> in the treble. Indeed, in each segment of the second sequence the progression of IC1 vertical intervals becomes longer: (11-11-13) in m.236 (C/B, F/E, B/C), (11-11-11-13) in m.227 (G/F $\sharp$, E $\flat$ /D, A $\flat$ /G, D/D $\sharp$), and (11-11-11-11-13) in mm.238-39 (E/F, B/B $\flat$, G/F $\sharp$, C/B, F $\sharp$ /G). The augmentation of the IC1 vertical interval chains is of a piece with the gradual expansion of temporal and registral space that characterizes the cadential section of *Sun-Treader*.

The conclusion of *Sun-Treader* is a highly developed example of the cadential complex. Although it lacks the whole-tone parameter typical of earlier Ruggles works, the

⁶⁷ The successive voice-exchanges C/B, E $\flat$ /D, and G/F $\sharp$ trace a transpositional path of T₃-T₃-T₄. The final T₄ appears to contradict the prevailing T₃ path in the treble line as a whole. But the T₄ results from the expanded <+5, +8, +5, +8, +5, +8> interval pattern. The voice exchanges consistently occur between the last and the third-to-last verticalities of each segment. In the first two segments, these are the 3rd and 5th verticalities. But in the final segment, they are the 5th and 7th verticalities, and the pitch classes have shifted by pitch class interval <1> from what they would have been in the 3rd and 5th verticalities of the unexpanded pattern (e.g., F $\sharp$ to F $\sharp$ in the treble).

⁶⁸ These dissonant voice-exchanges are a typical feature of Ruggles's outer voice counterpoint, as are IC1 intervals between outer voices in general (see Example 2-25 for an earlier instance in *Angels*).

cadential effect of the ascending straight lines is reinforced to an unusual extent by mirroring bass descending lines, temporal and registral expansion, linked treble and bass intervallic patterns, and the marked contrast of all these with the preceding musical material.

In conclusion: despite Ruggles's disapproval of straight lines as "against nature", they certainly occur in his music, both in simple form and as the larger lines under sequential motion. Moreover, ascending straight lines play an important cadential role. Traditional tonal cadences tend to descend to the tonic note, the center of tonal gravity, and closure involves a relaxation of melodic tension and the arrival at a point of resolution. Ruggles's rising cadential lines are just the opposite: they heighten tension, and seem to end at the farthest point possible from rest or resolution. The increase in tension is often reinforced by other parameters: louder dynamics, thicker textures, added dissonances, and very high registers. The ascending straight lines don't relax; rather, they reach out towards the firmament, often at the highest pitch of effort.

I would like to suggest that Ruggles's cadential straight lines are a musical manifestation of his preoccupation with the aesthetic of the sublime. This aesthetic has been commented on, among others, by Charles Seeger, Lou Harrison, Dane Rudhyar, and Virgil Thomson.

To Carl Ruggles, there are not different kinds of beauty: there is only one kind, and that he prefers to call the sublime (Seeger 1932:580).

You cannot put your finger on it. You cannot point out any melody, passage or detail that even represents it or can be characterized as such. But you know, just as surely, that in hearing the work you have been touch with or have had intimations of the sublime (Ibid:590).

The quality of sublimity which Ruggles professes as his desideratum is surely native to the spirit of great religious or philosophic composition in any

age....Sublimity in the sense of an elevated, individual, new, explorative, serious adventure on the edge of faith; sublimity in this sense Ruggles aims towards and to a great measure sets forth (Harrison 1955:19).

"Music which does not *surge* is not great music," Carl Ruggles said recently, and he intensified the term *surge* by means of a gripping motion of the hands used by conductors to rouse an intense vibrato in the violin section of the orchestra. Significant words these are, especially today! Music must surge, must rouse the fire of human emotions or energies, must be dynamic life flowing with power--be this power majestic or vehement--from the subjective consciousness of man. It must have what Arthur Machen called *ecstasy*... (Rudhyar 1927:3).

For that ecstasy in the expression, that unrelenting luminosity of interval and sound, is needful for producing the quality that was his overall interest and which he calls "the sublime." Now what does he mean, what does anybody mean, by "the sublime"? I should say that this work, when applied to a work of art, can only mean that the work expresses and hence tends to provoke a state of ecstasy so free from both skin sensuality and cerebral excitement, also so uniformly sustained, that the ecstasy can be thought of as sublimated into the kind of experience known as "mystical." Ruggles in fact one said as much, that "in all works there should be the quality we call mysticism. All the great composers have it" (Thomson 1970:35).

I haven't yet found the word "sublime" in Ruggles's correspondence--usually the word "fine" is his highest accolade--but in a dour 1954 letter to John Kirkpatrick, he criticizes a passage from *Evocations* 2 (m. 13), saying "It's dull, heavy, and without the slightest ecstasy."⁶⁹ Example 2-36, which contains a reproduction of Rockwell Kent's 1930 drawing of Ruggles in the character of Captain Ahab, possessed, driven, and ecstatic, captures this aspect of his character.⁷⁰ This emphasis is also reflected in the titles of his pieces: *Suntreader* (from Browning's "Pauline"), *Men and Mountains* (taken from Blake's "Gnomic Verses"), *Evocations*, and *Exaltation*. The title page of *Portals* quotes the poem

⁶⁹ John Kirkpatrick Papers, Yale University Music Library.

⁷⁰ Rockwell Kent, illustration for Herman Melville *Moby Dick* (New York: Random House, 1930); in Eric Salzman 1966:62.

of the same name in Whitman's *Leaves of Grass* (1881 edition): "What are those of the known but to ascend and enter the unknown?" In light of this preoccupation, if crooked lines are natural, the straight lines--especially the ascending lines--that so often end his compositions are perhaps not so much unnatural in the sense of perverse, but supernatural, or, better, transcendent. These linear ascents resist the "natural" impulse to twist and turn back and meander, and reach out with maximum effort past the mundane towards the sublime.

* * * * *

One of the most distinctive features of Ruggles's music is its "long, expansive, constantly unfolding lines" (Perle 1960:56), or, as Seeger puts it, "the sustained continuity" of "the aspiring melodic line" (Seeger 1939:397). This chapter has examined various ways in which Ruggles's lines maintain this "sustained continuity:"

- (1) The flexible application of pitch-class nonrepetition avoids weak spots caused by premature repetition and tends to create a relatively uniform distribution of the twelve pitch classes. By way of contrast, the same interval will tend to recur far sooner than the same pitch class, creating a relatively unequal distribution of intervals. Much of the cohesion of Ruggles's lines derives from this combination of pitch-class variety and intervallic uniformity.
- (2) Ruggles's lines tend to fill chromatic gaps in pitch-class space but not in pitch space, creating an airy spacious registration that Lou Harrison describes as "open and bright spacing" (Harrison 1955:15). Small zones of chromatic completion tend to combine into larger zones of aggregate completion, but in both a common

strategy is to withhold the one pitch class needed to completely fill the gap until after some type of boundary such as a cadence, fermata, or phrase ending.

(3) “Sustained continuity” over very large spans is created by Ruggles’s distinctive jagged wave shapes, characterized by signature CSEGS <021> and its inversion <201>-, which are replicated on many levels. At times, these jagged contours give way to straight lines (usually ascending). These stand out precisely because they are so different from the prevailing contoural landscape, and tend to have a cadential function.

Chapter 3. MOTIVE

Motives and their transformations are major sources of coherence in Ruggles's music. Ruggles's motives rarely repeat exactly, but change or mutate constantly in the course of a composition. A statement from Schoenberg's *Fundamentals of Musical Composition* describes the behavior of motives in general and applies to Ruggles's motives in particular:

A motive appears constantly throughout a piece: *it is repeated*. Repetition alone often gives rise to *monotony*. Monotony can only be overcome by *variation*. Variation means change.... But changing every feature produces something foreign, incoherent, illogical. It destroys the basic shape of the motive. Accordingly, variation requires changing some of the less-important features and preserving some of the more important ones (1967:9).

Since it is not my purpose in this chapter to rank features of Ruggles's motives in order of importance, but rather to describe how they interact and change, I will simplify the last sentence to: "Accordingly, variation requires changing some features and preserving others."¹ The motivic progress through a Ruggles piece involves a continual overlap of stable and changing parameters from motive form to motive form.²

I will use the word *shape* as a synonym for *motive*, but with slightly different associations. *Motive* carries a subtle connotation of solidity and definition; motives are clear-cut things. Shapes are more fluid, their outlines are not as sharp; they flow into one

¹ Boss 1992, a study of developing variation in Schoenberg, explores how different combinations of operations create varying degrees of remoteness from a source motive. In Ruggles the emphasis is not so much on a source motive that undergoes modifications as on a continuous succession of changing shapes.

² *Motive form* is Schoenberg's term for the different transformations of a source motive (1967:9). I use it as a blanket term for any shape taken by a motive, regardless of any particular source form.

another. They are more forms that emerge from the ongoing process of the line than solid objects that undergo modification. Ruggles's music is full of roughly similar shapes--of approximate similarities. In part, cohesion in Ruggles derives from the proliferation of similar shapes, development from their expansion and transformation (via real or altered imitation), and contrast from the abrupt juxtaposition of different shapes.

I will begin this chapter by laying out the motivic parameters and terminology used in the subsequent discussion, and continue with an examination of motivic processes or operations, many adapted from Seeger. After considering how motives operate in sequences, I will end with a discussion of Ruggles's increasingly concentrated focus on combinations of the perfect fifth and semitone.

3.1 Motivic Parameters

I will discuss motives in terms of the following aspects: cardinality, set class, pitch-class set, contour, registral span, registral layout, rhythm, and intervals. These parameters are discussed below with reference to Examples 3.1a, b, and c, the opening four notes of each of the three movements of *Men and Mountains--Men, Lilacs*, and *Marching Mountains*. These openings can be viewed as three forms of a single motive.³

(a) Cardinality

³ I disagree with Thomas Peterson's statement that "the three movements of *Men and Mountains* have no internal connection to one another" (1969:49). Although I am here discussing only the opening motives, there are other motivic connections between the movements.

Cardinality refers to the number of notes in a motive form. In Example 3-1a, each motive form has a cardinality of four. However, some motivic processes change cardinality, as will be demonstrated later in this chapter. These processes include extension, intension, and fragmentation.

(b) Set, set class (and transposition)

As shown in Example 3-1b, all three openings are members of sc 4-2 (0124). *Men* and *Marching Mountains*⁴ belong to set [E, F, F#, G] and *Lilacs* to [C, D, D#, E]. The two sets are related by transposition (T_8), which is by definition a pitch-class space operation. In addition, however, *Lilacs* relates to *Marching Mountains* by pitch transposition (T_{+4}), a closer and more audible relationship. In this instance, the ordered line (as opposed to the unordered set) of pitches is transposed, preserving contour, interval succession, and registral span, therefore increasing the similarity even more. Thus, *Men* and *Marching Mountains* share the same pitch class set, but sound dissimilar due to differences in contour, registral span, and interval succession. *Lilacs* and *Marching Mountains* have different pitch-class sets but sound nearly alike because the ordered pitch transposition preserves these parameters.

(c) Contour

Contour will be described using the CAS (Contour Adjacency Series) and the

⁴ To avoid repetition, in the present discussion the titles of the movements *Men*, *Lilacs*, and *Marching Mountains* will refer only to their opening four-note motives.

CSEG (Contour Segment). As previously explained, the CAS, which is the more general description, indicates up (+) and down (-) motions between adjacent notes (Friedmann 1985:226-27). The CSEG indicates relative registral positions of each note, with 0 denoting the lowest note (Marvin and Laprade 1987). As shown in Example 3-1c, the CAS for *Men* is <-, -, +> and that for *Lilacs* and *Marching Mountains* is <-, +, ->. These rather neutral looking binary pluses and minuses reflect very audible features of the motive-forms. Due to the rest after the second note, the motive forms are strongly perceived as bisected into 2 + 2 notes. In all three motive forms, the first dyad descends. In *Men*, after a leap down, the second dyad ascends; but in *Lilacs* and *Marching Mountains*, after a leap up, the second dyad descends. The two moves are inversely related--down-up in *Men* and up-down in *Lilacs/Marching Mountains*. The CSEGs for *Men* and *Lilacs/Marching Mountains* are <3201> and <1032>. The relation between these CSEGs will be discussed below (in the section on SWAP).

Tools for describing relationships between contours will include the CSEG-class (Contour-space segment class) and the C-subseg (Contour-subsegment). The CSEG-class is an equivalence class composed of CSEGs related by "identity, translation, retrograde, inversion, and retrograde-inversion" (Marvin and Laprade 1987:255).⁵ A C-subseg is any ordered adjacent or nonadjacent subgrouping of a given CSEG (Ibid.:255).

⁵ Translation is "an operation through which a c-subseg is renumbered from 0 for the lowest c-pitch to (n-1) for the highest". C-pitches are "elements in C-space, numbered in order from low to high, beginning with 0 up to (n-1), where n equals the number of elements." C-space is "a type of musical space consisting of elements arranged from low to high disregarding the exact intervals between elements" (Marvin and Laprade 1987:255). For the definition of a C-subseg, see below.

Retrograde, inversion, and retrograde-inversion are the familiar twelve-tone operators (TTOs), adapted to the contour environment. In addition to these, however, Ruggles uses an idiosyncratic contour operation which I call SWAP.⁶ In SWAP, two adjacent registral order positions in a CSEG exchange positions. This will be notated SWAP(*x*,*y*), where *x* and *y* are CSEG order positions. The lowest order position is 1 (not 0). For example, taking the simplest example, applying SWAP(1,2) to CSEG <10> equals CSEG <01>—the same result as the retrograde operation. A shorter way of notating this is SWAP(1,2) (CSEG <10>) = CSEG <01>. The CSEG that is the “operated on” is enclosed in parentheses on the right, and the SWAP operation itself is notated on the left. The order of operations is from right to left.

In CSEGS with a cardinality of 3, there are more possibilities. Two SWAPS apply to CSEG <201>: SWAP(1,2) (CSEG<201>) = CSEG <021>, and SWAP(2,3) (CSEG<201>) = CSEG <210>. In a CSEG of cardinality 4, Ruggles’s most common cardinality for SWAP, it is possible to have two swaps at once: in CSEG <3201>, swapping ops 1 and 2 and 3 and 4 results in <2310>. This operation is notated SWAP(1,2 and 3,4)(CSEG<3201>).

SWAP can be combined with the TTOs. For instance, in Example 3-1c, the retrograde operation followed by SWAP(3,4) transforms CSEG <3201> (*Men*) into CSEG <1032> (*Lilacs and Marching Mountains*). The retrograde of CSEG <3201> equals <1023>; then SWAP(3,4)(CSEG<1023>) results in CSEG <1032>. This dual operation

⁶ The contour operation SWAP is similar to Lora Gingerich’s pitch operation EXCHANGE (Gingerich 1986:82). The difference is that SWAP is limited to adjacencies. My SWAP notation is modelled on the notation in Gingerich 1986.

can be notated as SWAP(3,4)(RET)(CSEG<3201>).

Although <1032> is derivable from <3201> via the retrograde plus SWAP operations, in other ways the two CSEGS are quite different. This is underscored by the lack of any shared trichordal C-subsegs. Any four-note CSEG contains four three-note C-subsegs. The more C-subsegs held in common, the more alike the CSEGS sound. In Example 3-1d and the following list, the underlined numbers are order positions in the four-note CSEGS. The C-subsegs are order positions <123>, <124>, <134>, and <234>. As shown in the following chart, <3201> (*Men*) and <1032> (*Lilacs* and *Marching Mountains*) have no C-subsegs in common for any given sequence of three order positions.⁷ Order positions (abbreviated *ops*) are indicated by underlined numbers.

	CSEGS	C-SUBSEGS			
		<u>123</u>	<u>124</u>	<u>134</u>	<u>234</u>
<i>Men</i> (G6-F#6-E#4-F4)	<3201>	<210>	<210>	<201>	<201>
<i>Lilacs</i> (D#5-C#4-E#5-D#5)					
<i>Marching Mountains</i> (F5-E#5-G5-F#5)	<1032>	<102>	<102>	<021>	<021>

Contour is an important element in Ruggles's motivic transformations, partly because Ruggles uses it so purposefully, and partly because it is so audible. The identical CSEGS of *Lilacs* and *Marching Mountains* are immediately perceivable, as are the down-up motions of the dyads in *Men* versus their down-down movements in *Lilacs* and

⁷ For a contrasting example, see the discussion of the marcato theme in *Marching Mountains* (Example 3-4), in which the two halves of the motive have the same CAS and share two out of four trichordal C-subsegs.

Marching Mountains. It is not hard to intuit some kind of connection between the two tetrachordal CSEGS, but the fact that the relating operation (SWAP)(RET) is two-staged and rather indirect is underscored by the lack of any trichordal C-subsegs held in common.

(d) Registral span

This refers to the registral space occupied by a motive-form, and will be represented by the unordered pitch interval between the lowest and highest notes. The registral span for *Lilacs* and *Marching Mountains* is ip (4); the registral span for *Men* is ip (28), seven times larger (see Example 3-1e).

(e) Registral layout

In registral layout the pitch classes of a motive-form are stacked in registral order (see Example 3-1f). Unlike the CSEG, linear order is ignored. Passages with different CSEGs may have identical registral layouts, and passages with different registral layouts may have the same CSEGs. *Men* has a different CSEG than *Lilacs* and *Marching Mountains*, but their registral layouts are identical. Registral layout can be described in terms of the succession of ordered pitch-class intervals from the lowest to the highest note--in this case <2-1-1>.

(f) Pitch-class voice leading

Registral layout is especially useful in depicting voice leading in operations such as

transposition and inversion.⁸ In Example 3-1g the lines connecting pitch classes in the registral layouts depict mappings between corresponding elements in the sets in the operations T8 and T4. Such mappings can also be referred to as pitch-class voice leading. The second set of lines underneath shows the pitch-class voice leading between *Men* and *Marching Mountains* and demonstrates that the overall transpositional motion is T0 (T8 + T4). Note that, in this instance, the pitch-class voice leading exactly matches the registral voice leading.⁹

(g) Rhythm

Ruggles's motives often have strong rhythmic signatures. Three rhythmic characteristics are common to all of the motive-forms: (1) the initial note is the longest; (2) the first note is twice as long as the second; and (3) the motive is bisected into 2+2 notes by a rest after the second note. However, *Men* differs from *Lilacs* and *Marching Mountains* in terms of rhythm just as in terms of contour and registral span. In Example 3-1h, each note is given a number based on an eighth-note durational measure (numbers for rests are given in parentheses). The *durational span*, calculated by subtracting the lower number from the

⁸ The use of registral layout to depict pitch-class voice leading derives from Klumpenhouwer 1991.

⁹ I am using the term *voice leading* here to describe a succession of notes that "have an identical value in some musical domain" (Straus 1997:241, describing Hasty 1981). *Pitch-class voice leading* consists of pitch classes mapped onto each other through a single operation such as (but not limited to) transposition or inversion. Registral lines, in this example, consist of notes with the same CSEG number (in CSEGs of identical cardinality): one line is all <4>s, one is all <3>s, etc. However, registral lines could also consist of the highest or lowest notes, for instance, regardless of CSEG cardinality.

higher, is given underneath. The note durations in *Lilacs* and *Marching Mountains* are identical except for the added length of the anticipated third note in *Lilacs*. But in *Men*, the contrast in durational values is heightened--it has a durational span of 5, as compared with 2 for *Lilacs* and *Marching Mountains* (parallel to its greater registral span). Its two beginning notes are longer, and its two ending notes are shorter.

(h) Intervals

I will refer to the four types of intervals, depending on context: unordered and ordered pitch and pitch-class intervals. Following standard practice, unordered pitch-class intervals will be referred to as interval classes and abbreviated IC. In Example 3-1i the use of ordered pitch intervals reinforces the considerable contrast between the registral spans of *Men* on the one hand and *Lilacs* and *Marching Mountains* on the other. They also emphasize the contrast between the conjunct motion at either end of the motive and the disjunct motion in the middle. All three motive-forms begin with a descending step--a half-step in *Men* and a whole-step in *Lilacs* and *Marching Mountains*. They also end with a step--an ascending whole-step in *Men* and descending half-steps in *Lilacs* and *Marching Mountains*. The division of the motive into halves (strengthened by the rest) is reinforced by contrasting disjunct motion in the middle: a leap of <-27> in *Men* and <+4> in *Lilacs* and *Marching Mountains*. The <+4> is mirrored on a larger scale in the transpositional levels between the motive forms-- T_8 between *Men* and *Lilacs* and T_4 between *Lilacs* and *Marching Mountains*.

In sum: All three motive-forms in Example 3-1 are identical in terms of cardinality,

set class, registral layout, and certain rhythmic features. Between *Men* and *Lilacs* many parameters change: CSEG, order, registral span, and transpositional level, which is why they sound so different. Between *Lilacs* and *Marching Mountains* only the transpositional level changes--everything else remains the same, which is why they sound so alike.

3.2 Motivic processes

Ruggles's music is fluid and dynamic--contours, intervallic successions, and rhythms tend to constantly mutate. However, the rate of mutation is variable. Sometimes a motive seems quite definite and stable (especially in its first few appearances), but then starts to change shape, elongate, shrink, fragment, dissolve, or transform into a different motive. Because Ruggles placed such importance on the continuity and seamlessness of the line, it is often difficult to isolate a motive as a clearly defined object that undergoes a definite transformation into another clearly defined object. Because the mutation is gradual, segmentation boundaries are often unclear.

On the other hand, the music is not so fluid that motivic shapes are absent. Rather, they are readily perceivable, but fade in and out, and rarely recur without some change. In addition, there are passages where motives seem to dissolve into even more elemental components. Usually these passages lead to presentations of new motives or the return of old ones.

One way to approach Ruggles's motivic practice is to recognize certain recurring processes. Some (not all) of these processes are described by Charles Seeger in his *Tradition and Experiment in the New Music* (1994), which, although written in 1931-32,

was not published until 1994. The work is divided into two sections: the *Treatise on Musical Composition*, which is more theoretical in approach, and the *Manual of Dissonant Counterpoint*, which is more concerned with practical compositional applications.¹⁰ Seeger was a close friend and strong influence on Ruggles, and although I doubt that Ruggles read Seeger's treatise, he was undoubtedly familiar with his ideas.¹¹ However, Seeger's theory is a vast interlinked structure.¹² I am not invoking that structure, but merely drawing out certain strands of it where they seem applicable, along with other processes not mentioned or stressed by Seeger.¹³

3.2.1 Immediate Repetition (Echo)

In my usage, immediate repetition or echo refers to the reiteration of an ordered line

¹⁰ References to Seeger's treatise (lower case) refer to the whole work; references to the *Treatise* or the *Manual* (initial capitals and italics) refers specifically to these sections.

¹¹ According to Ziffirin, Ruggles and Seeger were often up all night talking about music and improvising together, experimenting with dissonant lines and chords. Ruggles showed Seeger work in progress and they "would go over every single note." (Ziffirin 1994:70-71).

¹² In addition to the *Treatise* (Seeger 1995), which is the main primary source, there are a number of useful secondary sources. Seeger's theory and aesthetics are described at length in Greer 1998, and, in much shorter form, in Greer 1994. Neumatic theory is described in Straus 1995:20-24 and Rao 1997:356-62. Seeger's concept of heterophony is discussed in Straus 1995:80-82, and his theory of the scale in Rao 1997:362-364.

¹³ To a lesser extent, I also draw on Schoenberg's motivic theory, especially as presented in *Fundamentals of Musical Composition* (1967).

of pitch-classes.¹⁴

In a discussion on the use of repetition in phrase construction, Seeger writes: “Reiteration (immediate repetition) should be avoided except for special effect” (1994:179). Elsewhere he also wrote: “Reiteration (immediate repetition) is occasionally effective, but only occasionally” (1932:585).¹⁵ However, immediate repetition is more than just an occasional technique in Ruggles’s music. It is used to create a pause or break, a sense of stasis and retrospection, before resuming the onward movement of the line. Seeger also uses the synonym *echo* (1994:179).

In Ruggles, echoes are almost never exact--that is, identical pitch successions and rhythms. There is almost always some change, although sometimes very little. The most common modification is the alteration of rhythmic values. Pitches may also change--an echo may: (1) repeat a line of pitches; (2) transpose a line of pitches by an octave or compound octave; or (3) transpose one or more notes of a line of pitches by an octave or compound octave.

An example of identical pitch succession with only the most minimal rhythmic change is the repetition of F[♯]-E-D[♯] in the treble line of *Portals*, mm. 9-10 (Example 3-2). The only change is the diminution of F[♯] from a triplet dotted eighth to a triplet undotted eighth. Another example is the beginning of the A’ section in *Angels*. The first eight

¹⁴ Seeger’s usage is considerably broader. To him, immediate repetition is either exact (same pitches and rhythms), or modified. Modifications can be rhythmic, intervallic, or both (Seeger 1994: 150-51, 179).

¹⁵ This is taken from a longer quotation discussed in section 2-2 of this dissertation in reference to pitch-class nonrepetition.

measures (31-38) exactly recapitulate the opening of the *A* section, ending with G-F-C-E~~-D $\flat$~~ in the treble (Trumpet I) in mm. 37-38 (see Example 3-3). Then, after a caesura, G-F-C-E~~-D $\flat$~~ is repeated in the treble, but with the durations of G-F-C lengthened from triplet eighths to ordinary eighths. Such rhythmic modification is so common in Ruggles that it can be considered the norm. Like the treble, the bass, consisting only of a sustained B $\sharp$, is also immediately repeated. But Ruggles's treatment of the other instrumental parts is different. The pitch (not only pitch-class) successions repeat for the most part, but the instrumental lines do not. Groups of pitches are parcelled out to different instruments. In Example 3-3, migrating linear segments are indicated by arrows connecting circled groups of pitches. For example, in mm. 38-39, C $\sharp$ -G $\sharp$ -A (Trumpet III) become, in mm. 39-40, D $\flat$ -A $\flat$ (Trombone I) followed by A $\sharp$ (Trumpet III). Similarly, B $\flat$ -A-E-F in Trumpet II becomes the simultaneity B $\flat$ /A in Trumpets II and III, followed by E-F in Trombone I.

Another common way to vary repetition slightly is to preserve pitch-class succession but alter register. The most obvious technique is simply to transpose the line to another octave. This is often accomplished by octave doubling, as in *Evocations* 1, mm. 4-7 (Example 3-4), where the repetition of the treble line G-A-C-B-F-A $\flat$ is doubled an octave higher (and rhythmically augmented). The effect of the repetition is considerably stronger than the original, not only because of the doubling and augmentation, but also because of the increased dynamic and the addition of a dissonant bass counterpoint in contrary motion, which contrasts with the sustained chord under the first statement.¹⁶

¹⁶ This is a typical example of Ruggles's dissonant counterpoint, a topic which will be discussed at length in Chapter 4.

The most extreme case of single-line repetition in all of Ruggles's music occurs in *Marching Mountains*. Throughout ten repetitions, adjacent pitch intervals are preserved and variation achieved solely through registral shifts, rhythmic diminution, and rising dynamics. As shown in Example 3-5,¹⁷ the motive B $\flat$ -E $\natural$ -E $\flat$ -F-D-C-A-B $\natural$ is first introduced in m. 7 and repeated an octave higher in m. 8 (with minor rhythmic modifications). It returns in mm. 33-43, where it is repeated eight times in different registers, faster speeds, and louder volumes until it breaks out of the loop into the ascending sequence discussed in Section 2.5. This obsessive repetition of a single line is clearly intended to evoke a sense of frenetic activity and rising tension, but it does not really achieve this aim.¹⁸ Instead the impression created is one of busy surface activity in an essentially static situation.

There are three reasons for this. First, there is simply too much repetition to create any real sense of change. In the balance between stable and changing motivic parameters, the stable elements (pitch-class order, contour, and pitch intervals) are not outweighed by the changing elements (rhythm, register, and dynamics). Secondly, the contrasting accents set up by the bass voices and 2nd and 3rd trumpets are slow and regular, counteracting the activity of the upper line. The bass voices punctuate the beginning of each measure with A/G $\sharp$, and the trumpets (notated in B $\flat$) accent the midpoint of the measure with E $\flat$, usually

¹⁷ Example 3-4 shows only the piano and second and third trumpet parts. *Men and Mountains* is written for a large orchestra, but the texture (especially in this section) consists of a only few lines with multiple instrumental doublings, all of which are represented in these parts.

¹⁸ I am not alone in this assessment. Marilyn Ziffrin writes: "This buildup, however, is too obvious and too flat-footed. We feel screamed at rather than uplifted by the final chord" (1994:96).

joined by bass **G|G#**. These accents at the beginning and half-way point of each measure become the primary rhythmic frame, segmenting the principal voice into 4 + 4 notes. Not until the ascending sequence in m. 41 does the bass become more active and less repetitive.

The rhythmic 4+4 segmentation is reinforced by similar contours in each 4-note grouping (see Example 3-6). Both groups have an identical CAS of <-, -, +>. Their CSEGS (<3102> and <3201>) are not related by the TTOs or by SWAP (as presently defined). I have restricted SWAP to adjacent CSEG numbers, because that is the usual way it operates in Ruggles's music. However, if this restriction is lifted, then SWAP(2,4) (CSEG<3102>) = CSEG<3201>. In addition, two out of four possible 3-note C-subsegs are identical. As shown in the following chart, both halves have CSEG <210> for op 123 and CSEG <201> for op 134.¹⁹

	Bb6-E6-Eb6-F6	D6-C5-A5-B5
CAS	<-, -, +>	<-, -, +>
CSEGS	<3102>	<3201>
OPs	C-subsegs	C-subsegs
(<u>123</u>)	<210>	<210>
(<u>124</u>)	<201>	<210>
(<u>134</u>)	<201>	<201>
(<u>234</u>)	<102>	<201>

The similarity indicated by the shared CAS and two shared trichord C-subsegs is reinforced intervallically by the fact that each half ends with ascending whole-steps, which are readily heard as occupying parallel positions.

Often pitch class succession is preserved but isolated pitches (instead of an entire

¹⁹ Shared C-subsegs and CAS are by no means inevitable: the 4-note CSEGS for *Men* and for *Lilacs/Marching Mountains* (Example 3-1) have no 3-note C-subsegs in common, nor do they share the same CAS.

line of pitches) change register. In *Evocations 3* (Example 3-7), the passage from the third beat of m. 9 to the middle of m. 10 is repeated with registral changes in the bass notes B and G#. There is also some rhythmic alteration in both voices, which affects their juxtaposition: some outer-voices notes struck simultaneously the first time occur successively the second time, and vice-versa.

A more substantial alteration occurs in *Evocations 2*. In mm. 42-44 (Example 3-8), the note succession E $\flat$ -F $\flat$ -B $\flat$ -F is repeated three times--once per measure. The first and last instances are identical and maximally compact--E $\flat$ 5-F $\flat$ 5-B $\flat$ 5-F5, with pitch intervals <+1 +6 -5> and a registral span of only 7. The middle repetition, however, drastically expands the registral span (also slightly lengthening the durations and slowing the tempo), adding an octave to every interval but the last and doubling the last two notes at the upper octave. Now the pitch intervals are <+13, +18, -5> and the registral span is 53. The third repetition is followed by B4-C5-D5-C $\sharp$ 5, a more drastic motivic transformation in which the registral span (3) is even more tightly condensed than before, and in which pitch classes, pitch intervals, and rhythms are altered. All four motive-forms, however, share the CSEG <0132>. In the succession of the four motive-forms one pitch interval is always preserved (and in almost identical rhythmic values), enhancing the sense of continuity. The first three motive-forms end with a descending perfect 4th, and the fourth motive-form (like the third) begins with an ascending minor second. Thus, in addition to identical CSEGs and pitch-class successions (for the first three motive-forms), the fact that one pitch interval is held invariant from each motive-form to the next further contributes to the sense of smooth succession.

Echos can occur on more than one level. Example 3-9, the treble line of *Sun-Treader*, mm. 30-34, contains a short triple echo nested within a longer (but incomplete) triple echo. After the caesura in m. 30, the winds play a 10-note line that begins with D-C♯-G♯-A, continues with E♭-B♭, and ends with E♭-F-C-B♭.²⁰ Both the first four notes (set [G♯, A, C♯, D]) and the last four notes (set [B, C, E, F]) are members of sc 4-8 (0156), and the first five and last five notes (that is, both halves of the line) are members of sc 5-7 (01267). The line is then repeated in the strings an octave lower with the rhythm and intervals of the last four notes slightly modified. This is followed by a three-fold repetition of the first four notes, D-C♯-G♯-A, varying only instrumentation and register. After the third repetition the larger line continues (E♭-B♭-E♭-F-C) but changes course and does not reach the final note B♭.²¹ In brief, the larger line D-C♯-G♯-A-E♭-B♭-E♭-F-C-B♭ is repeated three times, and at the beginning of the third (incomplete) repetition the first four notes D-C♯-G♯-A are also repeated three times.²²

To sum up: Immediate repetition or echo consists of the repetition of a line of ordered pitch classes. In Ruggles's practice adjacent pitch intervals are often preserved as well, resulting in similar contours that render the repetition easily perceivable.

²⁰ Actually, m. 30 begins with E-F-C-B. I take D-C♯-G♯-A as the start the line in the present discussion largely because of the segmentation suggested by the caesura, and because the first E6-F5-C6-B4 ends a line rather than begins a new one.

²¹ B♭ does not occur in the treble line until four measures later (m. 38). This is a form of pattern completion--every note of a repeated ordered pitch-class succession recurs as expected except the last, which arrives in the next phrase. As such, it is related to the aggregate pattern completion discussed in section 2-4.

²² I will have more to say about this passage in the beginning of the next section.

Aesthetically, the effect of an echo is the creation of a sense of stasis, of retrospection, of lingering and looking back, before resuming the onward fluid movement of the line.

3.2.2 Transposition, Inversion, Split Transposition, and Split Inversion

Although immediate repetition is an important technique in Ruggles's music, it is also highly restrictive, since it applies only to ordered lines of pitch classes. Transposition and inversion, the canonical operations of set theory, are more powerful and abstract tools that apply to both ordered lines and unordered sets of pitch classes.²³

Transpositionally or inversionally related motive-forms are found throughout Ruggles's music, and are especially common in sequences.²⁴ However, a cautionary note is called for. The operations of transposition and inversion create a certain stability, since they only occur between members of the same set class. But this stability is present only transiently in Ruggles's lines. Ruggles habitually varies the set class of successive motive-forms just as he varies every other parameter. Therefore, in addition to transposition and inversion, I will discuss a modification called split transposition or inversion (as opposed to "regular" transposition or inversion), in which some notes transpose or invert by one

²³ Transposition and pitch transposition will be notated in the standard fashion: T_n for transposition, where n is an ordered pitch-class interval, and $T_{+/-n}$ where n is an ordered pitch interval. Inversion will be notated in the form I_n , where n is the index number--the sum of the numerical labels of the two pitch classes exchanged by the inversion operation. The following abbreviations will be used: T (transposition), I (inversion), and T/I (transposition and inversion).

²⁴ Sequences will be discussed below in a separate section.

degree and the rest by another degree.²⁵ But eventually in the progress of a given line even this modification is insufficient to account for the increasing tendency of notes to transpose or invert by different degrees, and ultimately the group dissolves into a loose collection of individuals who go their own ways. At this point both regular and split T/I disintegrate into general intervallic or contoural resemblance. This gradation from uniform to varied intervallic repetition is analogous to the characteristic Ruggles pattern of emerging, mutating, and disintegrating shapes.

The comparison of Ruggles's notes to individual creatures recalls Schenker's "will of the tones" (*Tonwille*), although Schenker would have been appalled by the comparison. The fact that Ruggles's notes are rather individualistic and antisocial is consistent with his distrust of systems and strict procedures. Ruggles has his own procedures (such as pitch-class nonrepetition), but they are flexible and not always observed.

Transposition has come up in previous examples, although mentioned only in

²⁵ Split transposition and inversion are my names for Shaugn O'Donnell's dual transposition and inversion, two of several dual operations explored in his dissertation (1997:47-67). Similar operations include Joseph N. Straus's near transposition and near inversion (Straus 1997:237-74), Steve Nuss's ABO (All But One) relationship (Nuss 1996), David Lewin's pseudo transposition (Lewin 1998); and Allen Forte's unary transform (Forte 1988). Unlike split T/I, all of these operations limit the number of "rogue" operations (T or I at a different level) to one. In near T/I Straus does not account for the rogue operation, but only indicates that there is one. Nuss's ABO is a more restricted operation where, if the group transposes or inverts by x , the rogue transposes or inverts by $x+1$ or $x-1$. Lewin's pseudo transposition is a pitch-space operation where the group moves up or down by the same number of semitones and the rogue by another--the difference between the two being the *offset* number. Forte's unary transform, "the mutation of one pitch-class set into another by a change of a single element" (Forte 1988:5), is more concerned with common tones. The group moves by T_0 and the rogue by T_x . The resulting operation is called a V- x transform.

passing. In *Sun-Treader*, mm. 14-19, the line $G\sharp 5-A5-F\sharp 5-E\sharp 5-G\sharp 5$ moves by T_7 to $D\flat 6-E6-C\flat 6-C\flat 6$ (Example 3-10). Then the first four notes ($D\flat 6-E6-C\flat 6-C\flat 6$) move by T_6 to $A5-B\flat 5-G5-F\sharp 5$. The four-note motives that begin *Men*, *Lilacs*, and *Marching Mountains* trace a transpositional path of $T_8 + T_4$, and the latter two are connected even more closely by the (ordered) pitch transposition T_{+4} (Example 3-11).

In *Sun-Treader*, mm. 30-34, both halves of the line $D-C\sharp-G\sharp-A-E-B\flat-E-F-C-B$ are members of sc 5-7 (01267). As shown in Example 3-12, the two sets relate by I_1 . The example contains the following elements, listed from top to bottom: the pitch succession as it appears in mm. 30-31, the line of pitch classes, and the ordered pitch-class interval succession. The slurs represent mappings between corresponding set elements. It is remarkable, and rather unusual in Ruggles's music, that the passage is RI symmetrical; that is, that the inversive mappings exactly match the retrograde symmetry of the temporal interval ordering.

Ruggles's lines often use a combination of regular and split T/I. Split T/I can be described by dividing a set into two subsets. One subset is transposed or inverted by one degree, and the other by a different degree. Transposition and inversion do not combine in a single operation: split-T consists of two transpositions, split-I of two inversions. In the notation of split operations the different T or I levels will be separated by a slash, with the T or I level of the larger subset (if there is one) on the left.²⁶ In registral layout diagrams, the pitch-class voice-leading of the operation on the left of the slash will be shown by a solid line, and that on the right by a dotted line. For example, as shown in Example 3-13a,

²⁶ This notation is taken from O'Donnell 1997.

the split operation that maps A-B-C-E_b onto C[♯]-D[♯]-E-G[♯] is T_4/T_5 . A-B-C moves by T_4 to C[♯]-D[♯]-E and E_b moves by T_5 to G[♯]. Similarly, the operation that maps A-B-C-E_b onto D-F[♯]-G-A is notated as I_6/I_5 (Example 3-13b). However, although I have given equal emphasis so far to both, in practice Ruggles tends to use split-transposition more often in his lines than split inversion.

Split T/I operations can relate sets of different cardinalities, since two pitch classes in one set can map onto the same pitch class in another set, and vice-versa. In Example 3-14a, A-B-C-E_b maps onto B_♭-C[♯]-E_♯. Both B and A map onto B_♭ via a contracting pitch-class T_{11}/T_1 wedge that is commonly found in Ruggles's split-transpositions. Although more unusual in Ruggles's music, split-I operations can also relate sets of different cardinalities. In Example 3-14b, A-B-C-E_b maps onto C[♯]-D-E via I_1/I_4 ; both C and E_b map onto C[♯].

In Ruggles's music, both regular and split T/I often (not always) involve interval class 1 in some way. In split operations, the most usual way is for T-numbers (or, less often, I-numbers) to differ by 1, as they do in Examples 3-13a and b.²⁷ A very short and clear example can be found in *Portals*, mm. 6-8, viola I (Example 3-15).²⁸ The line can be divided into two phrases, separated by the sixteenth-rest in m. 7. In the first phrase, the operation T_3 maps A-B-C onto C-E_♭-D, both instances of sc 3-2 (013) that overlap on C. Then the split operation T_2/T_1 maps C-E_♭-D, a member of sc 3-2 (013), onto F-E-C[♯], a

²⁷ This is the same as Steve Nuss's ABO (All But One) relationship (Nuss 1996). See footnote 24.

²⁸ This passage was discussed in Section 2.2 in reference to pitch-class nonrepetition.

member of sc 3-3 (014). E $\flat$ maps onto F, D onto E, and C onto C $\sharp$. After the sixteenth-rest, C-E-D is repeated (in smaller note values) and maps onto F $\sharp$ -A-B $\flat$, another (014) set, this time by T $_5$ /T $_6$. In both split transpositions, the group and rogue T-numbers differ by 1.

Two other examples can be found in *Sun-Treader*, mm. 30-35.²⁹ Example 3-16 shows mm. 33-35 of the treble line. The repetition of the 10-note line D-C $\sharp$ -G $\sharp$ -A-E $\flat$ -B $\flat$ -E $\sharp$ -F-C-B $\sharp$ (from mm. 31 and 32) is incomplete, since the C in m. 34 does not proceed to B, but to G $\sharp$ -G $\sharp$ instead. But then the line does get back on track, after a fashion, with a segment consisting of the first six notes of the line with A $\sharp$ altered to A $\flat$. As indicated on the example, the original and the altered segments relate via T $_0$ /T $_{11}$.³⁰

The second example involves vertically juxtaposed versions of the D-C $\sharp$ -G $\sharp$ -A motive. As shown in Example 3-17, the line after the caesura in m. 30 begins with D-C $\sharp$ -G $\sharp$ -A in the treble (winds), C $\sharp$ -D-G-B $\sharp$ in the cello, and C $\sharp$ -D-G-A in the contrabass. The last two notes of the cello and contrabass motives are rhythmically augmented, so that the three motives begin homophonically but end contrapuntally. This passage contains two vertical instances of T $_0$ /T $_1$, one from the contrabass to the cello (A changing to B $\flat$), and the other from the contrabass to the treble (A changing to G $\sharp$).

In addition to T-numbers that differ by 1, a second type of IC1 involvement in split-T is to make the T-number 1 and 11. In this situation the IC1 involvement does not lie in the difference between T-numbers (which is 2, not 1), but in the T numbers themselves.

²⁹ This passage is also discussed in reference to Examples 3-9 and 3-12.

³⁰ It may seem counterintuitive that G $\sharp$ does not map onto A $\flat$, since both hold the lowest registral positions. But because the note order in both segments is identical, it is obvious that G $\sharp$, which holds order position 3, is transferred up an octave.

Both types are present in the next example, from the opening of *A Clear Midnight* (*Vox Clamans in Deserto* 3). As shown in Example 3-18a, the cello and contrabass parts in m. 3 and the first half of m. 4 present a split-T network of four motive-forms in the shape of a square. The four corners of the square are the four motive-forms, as follows:

<u>Instrument</u>	<u>Measure</u>	<u>Notes</u>	<u>Set Class</u>
Cello	3	F-G-D $\flat$ -C-A $\sharp$	5-29 (01368)
Cello	4	F $\sharp$ -G-C $\sharp$ -C $\flat$ -A $\sharp$	5-19 (01367)
Contrabass	3	F $\sharp$ -C-B	3-5 (016)
Contrabass	4	E $\flat$ -F $\sharp$ -C-B	4-9 (0167)

The sides of the square are IC1-related split-T operations. The left and right sides represent mappings from the cello to the contrabass in mm. 3 (left) and 4 (right), indicated with downward arrows. The top and bottom sides of the square represent mappings from m. 3 to m. 4 within the cello (top) and contrabass (bottom), indicated with right-hand arrows. Three out of the four split-T operations relate sets whose cardinalities differ by 1.

The left and right sides of the square are T_{11}/T_1 operations. As part of each operation, two notes map onto a single note in a wedge contracting from top to bottom: on the left F and G converge on F $\sharp$; on the right, C and A $\sharp$ converge on B. The top and bottom sides of the square are T_0/T_1 and T_0/T_{11} operations respectively. The combination of T_1 and T_{11} forms an wedge expanding from left to right. On the top T_1 maps F onto F $\sharp$; on the bottom T_{11} maps F $\sharp$ onto F. As shown in Example 3-18b, this expanding wedge creates a chromatic voice exchange between F and F $\sharp$.

The cello II-contrabass network is repeated (with identical instrumentation) in mm. 22-24. In mm. 35-36, shortly before the end of the song, the motive returns in the piano as B-C $\sharp$ -G-F (Example 3-19), a WT_1 motive derived from the first four notes of the cello

motive-form from m. 3 (F-G-D $\flat$ -C) via T $_6$ /T5 (Example 3-20). Here (i.e., Example 3-19) the motive is counterpointed with only the two bass notes C and F $\sharp$, but the two voices still relate by T $_{11}$ /T $_1$, exactly like the motive-forms in the upper and lower corners in mm. 3-4.

In addition to the split-T relationships already discussed, there is also a split-I relationship (I $_5$ /I $_4$) between C-B $\flat$ -E-F-F $\sharp$ in the flute part, m. 1, and F-G-D $\flat$ -C-A $\sharp$ in cello II, m. 2 (Example 3-21). Here, as in many of the split-T operations, IC1 involvement takes the form of a difference of 1 between I-numbers.

There are other links as well between the two motive forms. The rhythm is identical, and both the contour and the adjacent pitch intervals are related. The CSEGS of the first four notes are related by SWAP. In SWAP, as noted previously, two adjacent CSEG order positions change places. As shown in Example 3-22, between C-B $\flat$ -E-F and F-G-D $\flat$ -C there are two SWAPS: SWAP(1,2 and 3,4)(CSEG<3201>)=CSEG<2310>.

This examination of relationships between six forms of a single motive in *A Clear Midnight* has demonstrated a proliferation of split-operations, mostly (but not exclusively) split-transpositions.³¹ Every split-operation has involved IC1--either through T-numbers or I-numbers that differ by a single degree, or by the presence of both 1 and 11 T-numbers in a single split-transposition.

The next examples, from mm. 1-9 of *Lilacs (Men and Mountains III)*, provide more instances of motive-forms related by T/I and split T/I operations, many of them

³¹ Wha-Houng Woo discusses these and related motive-forms from *A Clear Midnight* in her dissertation (1993:36-38). However, aside from pointing out the similar rhythmic pattern and the replacement of F by F $\sharp$ in the motion from NW F-G-D $\flat$ -C to NE F $\sharp$ -G-D $\flat$ -C, she does not specify the transformations that link the different motive-forms.

involving IC1, and many of them forming small networks composed of interlocking linear and vertical motive-forms. Ruggles marked the principal voices of *Lilacs* in the 1927 edition, and in Example 3-23 I have added his indications to the 1970 edition.³² Following his usual practice, Ruggles marked the highest moving voice; in addition (in mm. 7-8 only), he marked its homophonic doubling in the second highest voice. The principal voice of mm. 1-10 is constructed for the most part of 4-note motives that are related via T, I, and split-T operations. In the following discussion I will focus on the treble voice, but will also to some extent relate the treble to other voices and to verticalities.

Since I will make reference to formal sections of this passage, I will outline them here. Mm. 1-6 constitute the first large phrase, characterized by a complete arc in the principal voice. Mm. 7-8 are a short call-and-response section, and m. 9 initiates a three-voice canon (*dux* in viola I, *strict comes* in violins I and II, and *free comes* in cellos and bass).

Example 3-24 is an overview of the treble line in mm. 1-9, segmented into a chain

³² See Section 2.1 for a discussion of principal voices in Ruggles's music in general and in *Lilacs* in particular. These indications were intended to help the conductor follow the main line (which I will sometimes use as a synonym for *principal voice*), especially where it meanders among different instrumental voices. Ruggles stopped indicating principal voices after *Portals* (1930). Thus, for instance, they do not appear in the last example, *A Clear Midnight* (*Vox Clamans in Deserto* III), which, although composed in 1923, was not published until 1977. Partly because Ruggles's music is so intensely polyphonic, and because, as Lou Harrison wrote, "each voice is a real melody, bound into a community of singing lines" (1955:16), Ruggles's indications can help determine the course of a particular line, and this in turn can help to delineate motives. It is of course true that analytical investigation should not be limited to the composer's perceived conceptions and intentions, but it does not follow that these should be ignored, or that they cannot provide relevant information.

of tetrachord motive-forms linked by T, I, or split-T (set classes are labelled). In all but two operations, IC1 is involved either as a T-number or as the difference between two split-T numbers.

The first four chords form a tiny network of interlocking and crisscrossing vertical/horizontal I3 and I3/I4 relationships that is so intricate that several examples are required to clearly explicate it. Examples 3-25a-f present different dimensions of this configuration. The music is given in Example 3-25a. As shown in Example 3-25b, the passage consists of four chords labeled I, II, III, and IV. Each chord is composed of four voices, labeled S, A, T, and B (soprano, alto, tenor, and bass). Slurs indicate that two notes (F[♮] and F[♯]) are sustained for the time period of two chords. For clarity of presentation, I will count F primarily a member of chord I (sustained into chord II) and F[♯] as primarily a member of chord IV (anticipated in chord III).

This group of four chords and four lines forms a sort of magic square. As shown in Example 3-25c, the four corners of the square are the notes D and D[♭] (C[♯]), which map onto each other by I₃. In the progress around the periphery of the square, these notes always alternate. The movement from the left to the right sides comprise an expanding symmetrical pitch-class wedge with D[♭]-D[♯] in the treble over D[♯]-C[♯] in the bass, forming a D[♯]/D[♭](C[♯]) voice exchange. The soprano and bass voices, both members of sc 4-2 (0124), also map onto each other at I₃.

Now let's consider the outer chords (I and IV). Chord IV consists of the same pitch classes as chord I, but in reverse order, and with one change--F in chord I becomes F[♯] in chord IV. As shown in Example 3-25d, both the outer-voice (soprano-bass) and inner-

voice (alto-tenor) notes of chord I map onto each other by I_3 . In chord IV, the outer notes relate by I_3 , but because of the change from F to F $\sharp$, the inner voices relate by I_4 . Because of the relationship between the makeup of the two chords, the mappings *within* chords I and IV are also the mappings *between* chords I and IV. The internal configurations are externalized on a larger level.

There still remain chords II and III. The sustained notes F and F $\sharp$ have been included in chords I and IV, so there remains three notes in each chord to account for: C, A $\flat$, and C $\flat$ in chord II and E, G, and E $\flat$ in chord III. As shown in Example 3-25e, both of these three note groups are members of sc (014) related by I_3 .

In short, then, the magic square created by the first four chords of *Lilacs* is characterized by multiple instances of IC3 (and, to some extent, IC4)--between corners, between soprano and bass voices, within and between chords I and IV, and between chords II and III. The alteration of F to F $\sharp$ that turns what would otherwise be I_3 into I_3/I_4 is very characteristic of Ruggles--within every pattern and every procedure can be found a skew, a twist, a divergence, that more often than not involves IC1.

An alternative mapping between chords I and IV and between the soprano and bass voices is T_0/T_1 (Example 3-25f). This reading has certain attractions--for instance, it highlights the move from F to F $\sharp$ and the D/D $\flat$ (C $\sharp$) voice exchanges--but it does not have the explanatory power of I_3/I_4 for the passage as a whole. That is, T_0/T_1 neither relates chords II and III nor occurs on two levels in chords I and IV.

To return to the treble line (see Example 3-24), the first motive-form, D $\flat$ -C $\flat$ -E $\flat$ -D $\sharp$, maps onto G-F-B-A $\flat$ via T_6/T_8 . G-F-B-A $\flat$ then in turn maps onto G-F $\sharp$ -B-A $\flat$ (mm. 4-5) via

T_0/T_1 . Every pitch remains the same but $F\sharp$, which moves to $F\flat$ (Example 3-26a). This transformation, however, is only one aspect of a more complex network of transformations in mm. 3-5 that involve an oscillation between F and $F\sharp$. This preoccupation with F and $F\sharp$ is a common feature of all three of the networks discussed thus far. In the first four chords of *Lilacs*, the only change in pitch class content between chords I and IV is the movement from F to $F\sharp$ (Example 3-26b); and in mm. 3-4 of *A Clear Midnight*, F changes to $F\sharp$ (or vice-versa) between every vertically or horizontally aligned motive-form (Example 3-26c). The chief difference between the three networks, besides the actual operations involved (split-T in *A Clear Midnight* and I and split-I in the first two mm. of *Lilacs*), has been their shapes. The *Clear Midnight* example involves four linear motive-forms arranged in the shape of a square. Mm. 1-2 of *Lilacs* involves four four-voice chords, also in the shape of a square, but including both linear and vertical motive-forms. The network presently under discussion in mm. 2-5 of *Lilacs* involves two linear motive-forms in the treble supported by two vertical motive-forms, shaped rather like two right-hand T-squares in a row.

There is a textural change in *Lilacs* between mm. 1-2 and 3-5. While mm. 1-2 clearly consist of four 4-voice chords, mm. 3-5 split into two registral strata composed respectively of the four highest and the two lowest instrumental voices. Each stratum is characterized by its own loosely homophonic texture and outer-voice exchanges. The network to which I am referring occurs in the upper stratum and is detailed in Example 3-27a. It consists of two linear motive-forms whose first notes (G) also function as the top notes of two vertical motive-forms. Both vertical and linear motive-forms have cardinalities of 4. I will refer to the two vertical motive-forms as chords I and II, and to the two linear

motive forms as lines I and II. Movement between lines I and II, and between chords I and II, derives solely from the change of $F^\sharp$ to $F^\natural$ and vice-versa--every other pitch repeats.

Chord I/line I and chord II/line II are interlocking vertical/linear structures. Both chord I and line I are members of sc 4-12 (0236) related at T_1 . In the movement from chord I to II (T_0/T_{11}), $F^\sharp4$ is lowered a semitone to $F^\natural4$, changing the set class to 4-13 (0136). In the movement from line I to II (T_0/T_1), $F^\sharp5$ is raised a semitone to $F^\natural5$, changing the set class to 4-4 (0125). Thus, $F^\sharp4/F^\sharp5$ moves in an expanding wedge to $F^\natural4/F^\natural5$. As a result, chord I maps onto chord II at T_0/T_{11} , line I maps onto line II at T_0/T_1 , and chord II maps onto line II at T_1/T_2 . This structure is very similar to the one in *A Clear Midnight*, mm. 3-4 (Example 3-18), although their shapes are different. Both match T_0/T_1 in the treble with T_0/T_{11} (in the bass in *A Clear Midnight* and between verticalities in *Lilacs*), and both incorporate an expanding wedge between $F^\sharp/F^\natural$ and $F^\natural/F^\sharp$, which creates a chromatic outer-voice exchange (Example 3-27b).

To continue: As shown in Example 3-24, the principal voice in mm. 6-9 can be considered a large-scale T_0/T_{11} from set $[A, C, D^\flat, E^\flat]$, a member of sc 4-12 (0236), to set $[A, B, C^\sharp, D^\sharp]$, a member of sc 4-21 (0246). The principal voice at this point splits into two strata. The upper stratum consists of set $[A, C, D^\flat, E^\flat]$, the lower of set $[B^\flat, C^\sharp, D, E]$. Reiterating statements of the two strata alternate in call-and-response fashion, leading to alternating T_1 and T_{11} (or T_{11}/T_{10}) moves between statements: $T_1-T_{11}-T_1-T_{11}/T_{10}$. The last linear segment in the antiphonal section, $A5-C^\sharp6-B5-D^\sharp6$, maps onto $G6-E6-C^\sharp6-F^\sharp5$ via T_4/T_5 . As shown in Example 3-28, in m. 9 the descending treble line (first violin and viola) $G-E-C^\sharp-F^\sharp$ and the ascending contrabass line $C-B^\flat-D^\sharp-A$ are both members of sc 4-16

(0136) and relate at I_4 .³³

To summarize: T/I and split T/I operations are nearly omnipresent operations in Ruggles's music, connecting both linear and vertical motive forms. IC1 involvement is especially common, usually taking the shape of split-T or split-I numbers that differ by 1, or using 1 or 11 for T or I numbers. Ruggles often constructs small vertical/horizontal networks in various shapes that are modelled around identical or similar T/I or split T/I operations, and which involve a chromatic voice exchange between IC1-related pitch classes.

3.2.3 Processes that change cardinality: Extension, intension, fragmentation, and liquidation

The processes discussed thus far, with the exception of split T/I, do not allow for changes in cardinality between motive-forms. Actually, however, Ruggles varies cardinality to a considerable extent--motive-forms extend and contract, fragment and consolidate. The variable lengths of Ruggles's motives are an important component of his freely evolving motivic shapes. In this section I will explore three processes that change cardinality: extension, intension, and fragmentation (often associated with liquidation).

Extension and *intension* are Seeger's terms for adding and subtracting notes from a motive-form.³⁴ Like immediate repetition, they are discussed in the sections of his treatise

³³ Viola I and violin I have the same ordered pitch-class succession but different rhythms. Only viola I is shown in Example 3-29.

³⁴ Seeger, of course, applied them to the neume.

on phrase construction (1994:152-53, 183-84). Seeger distinguishes three types of extension and intension: notes added or subtracted at the beginning, the middle, or the end. For the sake of concision, I will refer to these types as beginning, middle, and end extension and intension.

Seeger's typology of extension and intension is simple and general: notes are added or subtracted at different locations. What is interesting about extension and intension, however, is not only that notes are added or subtracted, but the relationship between the added or subtracted notes and the original motive-form. Although Seeger's typology is general in the extreme, his examples are necessarily concrete and specific, and demonstrate particular relationships (they could hardly do otherwise). It might be expected that his examples for extension and intension would be similar to each other--for instance, the former adding notes to and the latter subtracting notes from the end of a motive. Actually they demonstrate very different relationships.

Examples 3-29 and 3-30 reproduce Seeger's examples 73 and 74 (Seeger 1994:152). Extension is illustrated with excerpts from the prelude to Wagner's *Tristan und Isolde*, and intension with excerpts from Beethoven's Fifth Symphony.³⁵ Seeger focuses entirely on interval and contour, never on pitch or pitch class. The fact that each excerpt begins on a different pitch is irrelevant to Seeger's concerns.

³⁵ Example 3-29 (Seeger's example 73) reproduces the following passages from the prelude to *Tristan und Isolde*: (a) oboes, mm. 2-3; (b) oboes, mm. 10-11; (c) violins I and II, mm. 16-17; (d) cellos, mm. 17-18; (e) violin I, mm. 23-24, and (f) cellos, mm. 25-26. In Example 3-30 (Seeger's example 74), the music on the upper staff is taken from mm. 15-19 of the second movement of Beethoven's Fifth Symphony; the excerpt on the lower staff is from mm. 1-4 of the fourth movement.

Most of Example 3-29 illustrates end extension. Part (a), the basic motive, consists of three ascending semitones. Part (b) adds another semitone. Part (c) adds seven semitones, expanding the original motive from three to ten ascending semitones (plus two repeated notes). Although it is not entirely clear if the added semitones are placed at the beginning, middle, or end of the basic motive, rhythmic considerations suggest that they are added at the end. Both the basic motive and the extended line in part (b) begin with a long note (the longest in the phrase) followed by a shorter unstressed note, making it easy to hear the two beginnings as rhythmically parallel. Similar considerations place the added notes in part (c) at the end. In part (c), Seeger indicates that an additional process, tonal opposition, is involved in the extension. Tonal (as opposed to rhythmic) opposition means that the line ends with a descending contour, the opposite of the previous ascending contour.

Example 3-29d illustrates intension. Here a semitone has been subtracted from the line of three ascending semitones, resulting in a minor third (A-C) filled in by a whole tone plus a semitone. Thus the intension subtracts notes from “the middle” of the basic motive. The passage ends, like (c), with a tonal opposition.³⁶ Part (f) has the notation “opposite of (d).” Part (d) begins with a rising line (a whole-tone plus a semitone) and ends with a descending minor 7th; in (f) the order of these events is reversed.

Example 3-30, a longer demonstration of intension, primarily illustrates a motivic correspondence between two themes from Beethoven’s Fifth Symphony. The end of the

³⁶ Under (d) Seeger writes “tonal intension, with tonal opposition and probably modification of (b) and (c).” I think that the last part of this simply means that since (b) and (c), like (a), consist of ascending semitones, the intension in (d) applies to all three.

first theme in movement II (upper staff) is juxtaposed with the beginning of the first theme in movement IV (lower staff).³⁷ It seems an odd example to illustrate intension, because very few notes are subtracted, and most of these are repetitions. However, it is somewhat similar to Example 3-29d, which can also be considered a sort of motivic correspondence on a very small scale--that is, a minor third filled in by a whole tone plus a semitone versus a minor third filled in chromatically. It is a little difficult to fit Example 3-30 into Seeger's classification scheme. Most of the excised notes are taken from the end, with some from the "middle", for want of a better word. But the ending notes themselves are not excised--both excerpts end with $\hat{2}-\hat{1}$. This differs from Seeger's extension examples, in which notes are appended to the end of a motive. Here notes are not subtracted from the end of a motive, but from inside the motive.

Although Seeger's examples treat extension and intension differently, his threefold classification clearly allows for other possibilities, such as beginning or middle extension, or intension that does not occur only from "within", but that excises beginning or ending notes. Seeger's examples are clearly not intended to be exhaustive. Even so, he definitely considers them as representative, since he writes: "In making use of these devices [extension and intension] the composer can find no better model than the quotations given in examples 73 and 74" (my Examples 3-29 and 3-30) (Seeger 1994:183).

Ruggles often uses end extension. The simplest type involves cumulative additions of identical ordered pitch intervals. It would be difficult to find a clearer example than mm.

³⁷ I have corrected two mistakes in Seeger's example. Seeger connects lower D to upper C, whereas D should connect to B $\flat$ ($\hat{2}$). I have also connected the same two notes at the cadence (Seeger neglected to do so).

63-66 of *Sun-Treader* (Example 3-31), in which a four note motive (G[♯]-A-E[♯]-D[♯]) in the treble is expanded successively to five (G[♯]-A-E[♯]-E[♯]-D), six (G[♯]-A-E[♯]-E[♯]-D-C[♯]), and finally eight notes (G[♯]-A-E[♯]-E[♯]-D-C[♯]-C[♯]-B) by the addition of descending semitones to a chain of descending semitones.³⁸ This example of end extension is very like Seeger's *Tristan* examples (b) and (c) (Example 3-29), except that the pitch is preserved as well as interval.³⁹ As shown in Example 3-32, this passage is retrograded (as part of a much larger retrograde) in mm. 119-120, resulting in a beginning intension in which the motive shrinks from eight to six to five to four notes: (B-C-C[♯]-D-E[♯]-E[♯]-A-G[♯]) to (C[♯]-D-E[♯]-E[♯]-A-G[♯]) to (D-E[♯]-E[♯]-A-G[♯]) to (D[♯]-E[♯]-A-G[♯]). This type of intension is not represented in Seeger's examples.

A somewhat similar example of additive end extension occurs in *Angels*, mm. 23-30, with the whole tone instead of the semitone as the main interval of extension (Example 3-33). A four-note whole-tone descending line expands successively to five, seven, and eight notes. Unlike the *Sun-Treader* examples just discussed, but like Seeger's examples, intervallic succession is preserved but pitch succession is not.⁴⁰

However, end extension is usually more complicated than simply the repeated

³⁸ Examples 3-32 and 3-33 are excerpted from John Kirkpatrick's piano arrangement of *Sun-Treader*, John Kirkpatrick Papers, Yale University Music Library.

³⁹ The treble line is doubled an octave below and also, for most of its length, by dissonating lower voices at T₆ and T₁, creating parallel (016) chords. In the retrograde (mm. 119-120) the dissonating lines are present only sporadically. The T₁ line is often replaced by dissonant treble-bass voice exchanges of the same type as discussed in *Lilacs* (Example 3-28a) and *A Clear Midnight* (Example 3-18b). I will discuss the dissonant counterpoint of both passages in section 4.1.

⁴⁰ This passage is more fully discussed in Section 2.5.

addition of identical pitch intervals. More often than not a fragment of the motive is appended, rather than just a single note. *Fragmentation*, a ubiquitous technique in Ruggles's music, is the process of breaking off a piece of the motive, often from the end, and reusing it. A fragment is subject to exactly the same motivic processes as any other motive form, and the degree of similarity between a fragment and the piece of the motive it is based on varies. The fragment may retain every aspect of the original, but more commonly only retains some aspects--usually rhythmic proportions, contour, or interval succession (most often pitch intervals but sometimes only pitch-class intervals). Although appending a fragment onto the end of a motive-form is a straightforward process, describing it with Seeger's typology is both problematical and paradoxical, because fragmentation is a type of intension--in fact, it is the only type of intension that Ruggles uses on a regular basis. For instance, taking a fragment from the end of a motive is beginning intension--the beginning notes disappear but the ending notes remain. However, appending a fragment onto a motive-form is a type of extension. Thus end extension by fragment is, so to speak, extension by intension.

End extension by fragment occurs in the first nine mm. of *Organum* (see Example 3-34).⁴¹ The first eight measures trace a jagged rising line that spans an immense registral distance from G $\flat$ 3 to E7 (m. 9), after which the line begins an equally jagged descent to A $\flat$ 4 in m. 20. The entire opening is a canon--the *dux* is in the treble and the *comes* begins in the bass in m. 7. However, the canon plays no role in the present discussion, which will focus

⁴¹ Example 3-35 uses John Kirkpatrick's piano arrangement of *Organum* from *New Music* (October, 1947): 4-7.

on the principal (treble) voice.

The ascending wave (mm. 1-9) consists of a motive followed by increasingly altered repetitions. Each repetition is in a higher register and shorter note values than the last. The first two measures present the motive $G\sharp 2-A2-C\sharp 3-B\sharp 2$ (henceforth called the basic motive), which contains the ordered pitch succession $ip \langle +1, +4, -1 \rangle$. In mm. 3-4, the motive repeats an octave higher and is extended by the interval fragment $ip \langle +4, -1 \rangle$, which adds $E4-D\sharp 4$, expands the interval succession to $ip \langle +1, +4, -1, +4, -1 \rangle$ and changes the four-note basic motive into a six-note extended motive. In a third statement (again an octave higher), no further extension takes place, but the previous $ip \langle +4, -1 \rangle$ is changed to $\langle +6, -1 \rangle$, which has the effect of transposing the $E4-D\sharp 4$ extension from statement 2 by T_{+2} to $F\sharp 4-F\sharp 4$.

At this point the motive begins to dissolve, and parallels between cognate notes in different statements become ambiguous. No literal fourth statement follows. On the one hand, the next three notes in m. 6, $B4-D5-E5$, can be construed as T_3/T_5 of $G\sharp 4-A4-C\sharp 5$ (m. 5), preserving the ascending contour and perfect 4th frame but altering the interval succession. On the other hand, the five notes $B4-D5-E5-B\flat 5-A\flat 5$ can be considered the beginning of an open-ended fourth statement, based on contour similarity to the basic motive $G\sharp 4-A4-C\sharp 5-B\sharp 4$ (m. 5). Both motive-forms start with the lowest note, ascend to the highest note, and end in the middle: that is, both reduce to CSEG $\langle 021 \rangle$, but $B4-D5-E5-B\flat 5-A\flat 5$ expands the initial rising gesture of $G\sharp 4-A4-C\sharp 5-B\sharp 4$ from three to four notes.⁴²

⁴² As mentioned in Section 2.5, this reduction is based on Robert Morris's *Contour Reduction Algorithm* (Morris 1993), which progressively reduces a contour to high and low points, including beginning and ending pitches, by eliminating intervening contour

The three note-pairs in mm. 7-8 ($B\flat_5-A\flat_5$, $E\flat_6-A\flat_5$, and $G_6-C\flat_6$) are fragments based on $F\sharp_5-F\sharp_5$ in m. 6, which, however, has lost its intervallic identity. The three note-pairs retain rhythm (dotted 8th + 16th), descending contour, and cardinality (2), but expand the descending semitone first to a whole-tone and then to a tritone--the fragment itself is mutating. In the next three notes the mutation continues. $C\flat_7-F\flat_6-F\flat_6$ (m. 8), expands the cardinality of the fragment from 2 to 3, but retains the descending contour and the tritone between notes 1 and 2. Oddly enough, the addition of a third note to the fragment reinstates the $F\sharp-F\sharp$ descending semitone between notes 2 and 3.⁴³ In the last repetition of the rapidly mutating fragment ($E_7-B_7-E\flat_6$, m. 9), only the descending contour is retained--all the other aspects of the fragment have disappeared. By m. 10 even that is gone.

Fragmentation is often associated with *liquidation*, a descriptive but sinister term invented by Schoenberg. The following is Schoenberg's description of liquidation from *Fundamentals of Musical Composition*.

Liquidation consists in gradually eliminating characteristic features, until only uncharacteristic ones remain, which no longer demand a continuation. Often only residues remain, which have little in common with the basic motive....The liquidation is generally supported by a shortening of the phrase. (Schoenberg 1967:58)

In the opening to *Organum*, the motive is first altered by end extension (statement 2), then by the transposition of the extension (statement 3), then by the split transposition of its first three notes (or, from another point of view, the expansion of its first two notes to three),

"passing" notes. <021> is Ruggles's most common trichordal CSEG (see Section 2.5 and Example 2-13).

⁴³ Actually, the entire pitch-class segment $C\sharp-B\sharp-F\sharp-F\sharp$ from mm. 5-6 is repeated in m. 8 (with $B\sharp$ spelled as $C\sharp$).

and finally by the successive mutation of the fragment based on its last two notes (the descending semitone), which progressively loses every aspect of the original except descending contour. By m. 10, even that has disappeared--the motive has been completely liquidated.

In addition to end extension, Ruggles often uses middle extension, that is, inserting notes within a passage rather than appending them before or afterwards. Although Seeger includes no examples of middle extension, Ruggles uses it far more than middle intension, which Seeger does illustrate. The opening to *Evocations I* is largely based on this technique (Example 3-35). The first three measures consist of three sequential statements of an ascending line whose cardinality increases from four to five to six notes. As is so often is the case with Ruggles, the motive mutates with each repetition, and by m. 4 has changed into an entirely different motive. There are intervallic parallels between the three statements: each ends with ip <+2>, the first two begin with ip <+7,+6>, and the third skips over <+7> and begins with <+6>. In addition, the connecting interval between the last note of each statement and the first note of the next is pci <+1>.⁴⁴ Because of the intervallic similarities at the beginning and end of each statement, the added notes are heard as being placed in “the middle.” This is especially clear in the first and second statements.

The interval pattern of the first statement is ip <+7, +6, +2>--a series of increasingly smaller ascending intervals. In the second statement this pattern is preserved, but ip <+5> is inserted, resulting in <+7, +6, +5, +2>. In the third statement, the interval succession is

⁴⁴ Daniel Kramlich (1982:17-19) observes that each phrase is connected with an IC1 interval. Ip <-11> connects statements 1, 2, and 3; statements 3 and the new motive in m. 4 are connected by ip <+1>.

considerably more scrambled: the initial <+7> is excised, the <+2> and <+5> change order positions, and an additional <+1, +2> is added, resulting in <+6, +2, +5, +1, +2>. Note that the last interval, ip <+2> (between E4 and F#4), is repeated at the beginning of m. 4 (between G4 and A4), providing a seamless transition between the two motives.

A considerably more complex example of middle extension, involving many instrumental voices, occurs in *Angels*, mm. 18-22 (Example 3-36). Mm. 18-19 (X) form a two-measure segment; mm. 20-21 (Y) are an elaborated repetition incorporating multiple middle extensions. Parallel X and Y material will be referred to as an X-Y pair. In Example 3-36, each X-Y pair is connected with arrows. Very much as in mm. 37-38 (Example 3-3), in the outer voices and one inner voice (trumpets 1 and 2, and trombone 2), each X-Y pair keeps to the same instrumental voice. But in the other three inner parts they are divided between two different instruments. X-trumpet 2 is paired with Y-trumpet 3, X-trumpet 3 with Y-trumpet 2, and X-trumpet 4 with Y-trumpet 3. Thus the outer three parts (the treble and the two bass parts) remain stable; the three middle parts swap. Usually the total duration of X and Y are identical, but in two cases (trumpet 4 and trombone 1) Y extends over the barline to end with the first note of m. 22.

Examples 3-37a-f vertically juxtapose each X-Y pair for easy comparison. Solid lines connect cognate identical pitches in each pair. In most cases, Y expands X with middle extensions, but sometimes end extensions are used. I will first discuss the three X-Y pairs that do not change instruments (a, e, and f), and then the pairs that do (b, c, and d).

In (a) two middle extensions are used: B4-C#5 is chromatically filled as B4-C#4-D#5, and A#5 is inserted between D#5 and E#5, opening up a new register, which, in typical

Ruggles fashion, is not filled in. There are no middle extensions in (e) and (f). (E) changes the length of B3 from an eighth to a quarter note, pushing the following C4 across the barline. (F) appends E $\flat$ 4 in an end extension.⁴⁵

The X-Y pairs that switch instruments use more middle extensions. In (b), B4-F5 is inserted between A4 and C $\sharp$ 5, again extending but not filling registral space. (C) contains the most extravagant middle extension in the whole passage. The original G4-F $\sharp$ 4 become merely the beginning and ending notes for an eight-note line that expands the registral span from the original G4-F $\sharp$ 4 semitone to the C $\sharp$ 4-C $\sharp$ 5 octave, adding a tritone above and below G5. (D) contains both a middle and an end extension. In the former, G4-G $\sharp$ 4 is inserted between E $\flat$ 4 and A4; in the latter, G is tacked onto the end.

Although middle extensions are common in Ruggles's music, middle intensions are not, although they are the only type of intension that Seeger illustrates. A comparatively rare instance occurs in the vocal part of *Toys*. Example 3-38 vertically juxtaposes parallel passages m. 2 (X) and mm. 7-9 (Y). One difference in the look of the two passages is the enharmonic respelling--flats in X become sharps in Y. In terms of pitch succession (respelling aside), the first two notes are identical. The next two notes of X (C4-E $\flat$ 4) are

⁴⁵ I do not know why Ruggles respells E $\sharp$ as F in the trombone II line E-E $\sharp$ -F-E $\flat$. Ruggles usually follows the tonal convention of notating a chromatic approach to a goal tone as a minor second rather than an augmented unison, but the intent of this enharmonic respelling would seem to be to give E $\sharp$ the quality of a passing tone on its way to F, even though the two notes are enharmonic equivalents. The spelling is identical in both the 1943 and 1960 editions; however, the 1925 version, which was pitched a minor third higher, has G-G-A $\flat$ -F $\sharp$, suggesting that the later E $\sharp$ may be a misprint. Since the two versions of *Angels* differ in many ways (see Ziffirin 1968), it is impossible to be sure. In such cases, it is best to keep in mind Seeger's comment on Ruggles's chromatic notation: "...one often wonder why he uses accidentals the way he does. Often as not, ease in reading seems to be the guide--convenient for the performer, but devastating to the student" (Seeger 1932:587).

replaced with the single (and much longer) note G $\sharp$ 4 in Y. The rest of the X line relates to the rest of the Y line by T0/T1. The pitch succession is the same, except that two notes are raised a semitone: A $\flat$ becomes A $\natural$ and the final D becomes E.⁴⁶

However, as previously stated, by far the most common type of intension in Ruggles's music is neither middle nor end intension but fragmentation, which is integral to Ruggles's motivic practice, and usually associated with liquidation. Fragmentation and liquidation have already been discussed in reference to the opening of *Organum* (see Example 3-34). Another instance of fragmentation occurs in *Sun-Treader*, mm. 30-34 (see Example 3-39) where the four notes D-C $\sharp$ -G $\sharp$ -A are fragmented from the larger line and repeated three times in succession.

Other types of intension are less common. Sometimes a beginning-intension results from the retrograde of a previous end-extension (such retrogrades are always part of larger retrogrades, often of canons). For example, as discussed at the beginning of this section, the beginning-intensions from *Sun-Treader*, mm. 119-120 (Example 3-32) are retrogrades of the end-extensions in mm. 63-66 (Example 3-31). Example 3-40 shows an end-intension: G $\sharp$ 5-A5-F $\sharp$ 5-E $\sharp$ 5-G $\sharp$ 5 is transposed at T7 to D $\sharp$ 6-E6-C $\sharp$ 6-B $\sharp$ 5-D $\sharp$ 6, but in the third statement (transposed from the second statement by T4) the last note is left off, resulting in A5-B $\flat$ 5-G $\sharp$ 5-F $\sharp$ 5.

To sum up: extension and intension are important techniques of motivic transformation in Ruggles's music, since they alter cardinality; and motives alter cardinality

⁴⁶ The change of A $\flat$ (X) to A $\natural$ (Y) may have something to do with the desire to avoid a premature repetition of A $\flat$ so soon after the highlighted appearance of G $\sharp$ in m. 7, only two notes before.

as much as they alter contour, interval, rhythm, or any other parameter. The most common types of extension are end- and middle-extension. By far the most usual form of intension is fragmentation, which is closely associated with liquidation and transition to a new motive. Other forms of intension are relatively uncommon.

3.2.4 Sequences: Motivic aspects

Sequences are pervasive in Ruggles's music. His lines are usually constructed in the shape of huge jagged waves, and the content of these waves largely consists of motives that undergo varied repetitions in the process of transformation into new motives. The placement of mutating motive forms on the ascending or descending slopes of the jagged waves results in rising or falling sequences of varied motivic repetitions. All of Ruggles's motivic processes can be found in his sequences, which comprise one of his most typical contexts for motivic transformation.

The role of sequences in the cadential complex (straight lines, whole-tone collections, and cadential function) was discussed at length in section 2.5, and frequent reference will be made to those discussions and examples.⁴⁷ Here my intent is to examine sequences in terms of motivic process. There will, however, inevitably be some overlap with the concerns of the earlier discussion.

Charles Seeger treats sequences in some detail in both the *Treatise* and the *Manual*.

⁴⁷ The following sequences were discussed in section 2.5: *Toys*, mm.8-14 (Example 2-18); *Lilacs (Men and Mountains 2)*, mm.9-17 (Example 2-22); *Angels*, mm.1-8 (Example 2-25); *Marching Mountains*, 1924 version, mm. 40-44, 1951 revision, mm. 40-43 (Example 2-29); and *Sun-Treader*, mm. 232-241 (Examples 2-31, 2-33, and 2-35).

My Examples 3-41a-d reproduce Seeger's examples 76-79 from the *Treatise* (1994:154).⁴⁸

He writes:

Example 3-41a gives a distinct feeling of *progress*, as does a sequence, but the pivoting on C gives predominance to a feeling of repetition. Change it as in example 3-41b, and a feeling of sequence increases. Altered again (ex. 3-41c), the sequence is unmistakable. Opposition of neumes decreases the sequential feeling (ex. 3-41d). (Ibid:153).

In Examples 3-41a, b, and c, the sequential units all share the same cardinality (3), CAS (contour adjacency series) <+,->, rhythm, and metric placement. The differences between the examples lie solely in how many notes of the sequential units trace an ascending line from statement to statement. The more notes that ascend, the greater the feeling of sequence; the fewer that ascend, the greater the sense of repetition. In Example 3-41a only the second notes of the three-note units trace a rising line; in Example 3-41b, initially only the second and third notes, and then the first note as well (in the last statement); in Example 3-41c, all of the notes ascend together. In Example 3-41d, Seeger gives the neumes opposite shapes--in my terms, he alternates the <010> CSEG with its inversion <101>; this decreases the sense of sequence by camouflaging the motivic resemblance.

In the *Manual* (1994:179-182), Seeger gives many examples illustrating how sequences can be modified rhythmically or tonally (intervallically). His examples 111-115 are reproduced as my Examples 3-42a-e.⁴⁹ Seeger writes:

⁴⁸ In Example 3-41a-d I have retained Seeger's captions, but in both the example and the quotation I substituted my example numbers for his.

⁴⁹ As in Example 3-42, in Example 3-43 and the following quotation I have substituted my own example numbers for Seeger's.

Exact sequence of a dissonant neume may be made, but it is not recommended (ex. 3-42a). Modified sequence of the several kinds are illustrated in examples 3-42a-e. Rhythmic modification interferes with a feeling of sequence to a greater extent than tonal (ex. 3-42d). Combined tonal and rhythmic modification tend to destroy sequential feeling. (1994:179-180)

Seeger's examples and descriptive captions are largely self-explanatory, but since they are occasionally incomplete, I will briefly summarize and comment on them here. Example 3-42a illustrates exact sequence, which "is not recommended."⁵⁰ In Examples 3-42b-c respectively, intervals are diminished and augmented. Not all intervals are altered, nor are all alterations by the same amount or proportion.⁵¹ The process is selective and free (not to say arbitrary)--some intervals are altered to some degree. Examples 3-42d-e illustrate rhythmic contraction and augmentation (and intervallic contraction, although Seeger does not say so). Again, as with the two previous examples, the rhythmic changes neither apply to every note nor involve a uniform durational value or proportion. Seeger comments that the rhythmic change interferes with a sense of sequence more than intervallic change. One reason may be that the rhythmic change tends to alter perception of note groupings. In Example 3-42d, the lefthand motive tends to be perceived as 2 + 3 notes, largely because of the identical rhythmic values in the triplet eighth notes, and because they fill one 1/4 measure. In the rhythmically diminished righthand motive, for identical reasons, they are more readily perceived as 4 + 1, and in Example 3-42e as 3 + 2. The

⁵⁰ In m. 4 of line 1, the A $\flat$ is undoubtedly a misprint for A $\sharp$, since in the other examples the two last triplet notes always span $\langle +11 \rangle$. It is not clear why Seeger felt that D-F $\sharp$ at the end of line 1 is "not good." Perhaps, since the line starts with D-F $\sharp$, he simply felt that it was too soon to return to those pitch classes.

⁵¹ To give an example, each interval is not augmented or diminished by a major third, nor is each interval halved or doubled.

change in groupings disturbs the sense of motivic resemblance. Seeger's examples 116 to 119 (not reproduced here) illustrate various combinations of tonal and rhythmic modification.

The common element in Seeger's examples is modification and variation versus exact sequential repetition.⁵² This applies to Ruggles's sequences as well. Ruggles does sometimes use exact imitation, especially in the first few statements, but the motive is always modified before the end of the sequence. The number of voices that participate in a sequence varies. The treble voice is always involved, and usually other voices, especially the bass, are sequential in various degrees. But some sequences only involve a single voice. Several examples can be found in *Men and Mountains*.

Mm. 33-35 of the first movement, *Men*, consist of a chromatically ascending sequence of five half-measure statements. The first four are exact repetitions, but the fifth is slightly altered (see Example 3-43). There are three different lines. The lowest consists of four chromatically ascending ip <+4> dyads followed by a rhythmically augmented ip <-8> dyad. In the middle line, the sequential unit is a rising semitone. The second note is a syncopated anticipation sustained into the first note of the next unit. The top line is divided into two antiphonal instrumental voices that alternate higher and lower registers. The higher register is the more prominent, since it begins and ends the sequence. The first four statements in the top line consist of the whole tone motive ip <-2,-2,-4>. The fifth statement is altered, and the alteration is related both to the motivic permeation of the

⁵² Since sequences in tonal music are either real or tonal, it is tempting to describe sequences in atonal music as real or atonal, which (unfairly, somehow) sounds silly. So I will simply use the terms *exact* or *real* versus *altered* or *modified*.

sequence by IC4 and to the related tendency towards whole-tone partitioning. Accordingly, I will take up these topics first and afterwards take up the fifth statement.⁵³

IC4 manifests on many levels, as shown in Example 3-43. On the largest is the T_4 (subdivided $T_{1+1+1+1}$) traversed between the first and last statements in every line, with the sole exception of the altered fifth statement in the top line, in which only the first three notes participate in the large-scale T_4 .⁵⁴ On the smaller level of the sequential unit, the two notes of each bass statement are related by T_4 , as are the first and last notes of each treble statement but the last. On a still smaller level, in the top line T_8 connects notes 1 and 3 in all statements, and also connects notes 3 and 4 in every statement but the last. Thus IC4 manifests on three levels (keeping in mind the exceptions just noted): (1) between the first and last statements in all lines; (2) between the first and last notes of statements in the bass and treble; and (3) in the treble, between notes 1 and 3, and 3 and 4.

Notes related by IC4 are members of the same WT collection, and WT segmentation is evident throughout the sequence (see Example 3-44). The bass is composed of alternating WT segments from (listed in order) collections 0, 1, 0, 1, and 0. The starting notes of every measure are metrically stressed, highlighting the WT_0 line E-F-G. The middle voice has the same alternation, and highlights the WT_0 line F-A-B. In the top line, the first four statements are WT segments, and the first three notes of all five statements are WT lines, alternating collections 1, 0, 1, 0, and 1--the opposite order of the

⁵³ Another middle line (Cello 1, English horn) does not participate in the sequence, but selectively dissonates the bass line with IC1-related notes.

⁵⁴ This T_4 is labeled "incomplete" on the example.

lower two lines. Furthermore, the two WT collections are distributed by register in the antiphonal segments of the top line--the highest statements are WT_1 segments, and the lower statements are WT_0 segments. In the top line, the first notes of each measure form the whole-tone 1 line $E\text{-}F\text{-}G$, which is highlighted by registral prominence as well as metric stress.⁵⁵ Thus whole-tone segments from different collections are juxtaposed both horizontally (within each line) and vertically (between lines). A graph showing the implicit stepwise WT lines is shown in Example 3-45.

Now, to return to a topic too long neglected, what is the relation of the fifth top-line statement to the preceding four statements? Statement 5 is altered, one might say, in two aspects. The first is cardinality: the length is increased from four to six notes via an extension. The second aspect is WT content. Notes 1, 2, 3, and 6 belong to WT collection 1: $G\text{-}F\text{-}E\text{-}A$. Ruggles could also have made notes 4 and 5 WT_1 notes, resulting in the line $G\text{-}F\text{-}E\text{-}C\text{-}B\text{-}A$. Instead, by a sort of semitone slippage, $C\sharp$ and B are pushed down a semitone to $C\flat$ and $B\flat$, thus introducing a WT_0 segment into a WT_1 line.⁵⁶

This sequence is strongly reminiscent of the one in *Angels*, mm. 23-30.⁵⁷ In both, the sequential units are descending whole-tone segments, but the interval of repetition between sequential statements is an IC1 interval--usually semitones (descending in *Angels* and ascending in *Men*). Both sequences are bifurcated vertically and horizontally into

⁵⁵ In the next measure (not shown) G6, the first treble note in m. 35, proceeds to F6, which begins the closing passage of the movement.

⁵⁶ Another instance of sequential modification by semitone slippage can be found in *Marching Mountains*, mm. 41-42. See the discussion of Example 2-30 in Section 2.5.

⁵⁷ See the discussion of Examples 2-27 and 2-28 in section 2-5.

alternating segments from different whole-tone collections. In both, one line does not participate in the sequence. And in both the final treble statement is extended with a linear segment from the other whole-tone collection.

In the sequence just discussed (*Men*, mm. 33-35) the sequential interval is stable (an ascending semitone) and the ordered pitch-interval lines in each sequential unit are identical until the extension in the last statement. The next example, *Sun-Treader*, mm. 25-30, is freer and more irregular. There is no regular sequential interval, and the statements do not consist of identical lines of ordered pitch intervals. Rather, resemblance between statements derives from similar rhythms and from saturation by set class (014) and CSEG <210>. These manifest in pitch space as related but not identical lines of ordered pitch-class intervals. The sequence is fairly regular for the first three statements (mm. 25-27), but starts to alter and disintegrate in mm. 28-30, which function as a transition to the next section.⁵⁸

As in the last example, there are three sequential voices (Example 3-46), which, on a more fundamental level, derive from only two voices.⁵⁹ The treble is doubled at the octave, and the bass is doubled at IC1--that is, the interval between the lower two parts is ip (13) in the first three measures, and either ip (13) or ip (11) in the last three. I will refer to the octave-doubled top lines as the treble voice, and the IC1-coupled lower voices as the

⁵⁸ The end of this example (m. 30) dovetails with the beginning of the passage (mm. 30-34) discussed in Section 3.2.1 with reference to Example 3-9. A varied repetition of this sequence with a different bass line occurs in mm. 35-38.

⁵⁹ The only instrumental voices that do not participate in the sequence are two IC1-related homophonic descending lines in the horns--these are not shown in the example.

tenor and bass voices. The voices are canonically related.⁶⁰ The treble line is the *dux* and the coupled tenor-bass lines are the *comites*. However, only the interval succession is imitated, not the rhythm. Indeed, the temporal relation between the *dux* and the *comites* is somewhat irregular. The first note of the *dux* precedes the first notes of the *comites*, but the second and third notes of the *comites* precede the second and third notes of the *dux*. The pitch-class interval between the *dux* and the tenor *comes* is pci <7>, and pci <6> between the *dux* and the bass *comes*. The result is that parallel notes of the *dux* and *comites* form members of sc (016), a Ruggles signature set class.⁶¹ Similarly to the sequence as a whole, the canon is intervallically exact in the first three measures but thereafter rapidly disintegrates.

It is useful to consider the sequence as constructed of two overlapping sections. Section I is fairly strict and regular, and consists of statements 1-3 plus the first three notes of statement 4. Section II, which is irregular and transitional, starts with the beginning of statement 4 and continues to the end of the excerpt. Thus the first three notes of statement 4 belongs to both sections, because they can bear one interpretation in relation to the preceding material and another in relation to the following material. I will discuss the two sections in order.

In section I, each statement (in each voice) has a cardinality of 3, and (as stated) similarity between statements derives from repeating rhythms and saturation by set class (014) and CSEG <210>. Members of set class (014) are circled in Example 3-47. Every

⁶⁰ Other canonic sequences will be discussed in Chapter 4.

⁶¹ See Gilbert 1970, 1971, and 1972.

instance has a <210> CSEG and either of two pitch-class interval successions: <11, 9> or its retrograde inversion <9, 11>. These form inversionally related (014) sets. The outer voices share the same symmetrical ordering of the two pci successions: <11, 9>, <9, 11>, <9, 11>, and <11, 9>. A similar symmetry is apparent in the T/I-levels between statements in the outer voices: I_1, T_{10}, I_1 . In statement 4, the tenor breaks ranks with the outer voices with a pci <9, 11> succession, resulting in the simultaneous presence of both intervallic patterns in the *comites*.

In section II, the sequence becomes increasingly irregular as it begins to mutate and dissolve. Nonetheless, it continues to be permeated with instances of sc (014), although now they overlap and bridge boundaries between statements (see Example 3-48). In statement 4 (m. 28) the cardinality of the motivic units in both the treble and tenor voices expand from three notes to four via opposite types of extensions (see Example 3-49).⁶² The treble adds A (a semitone above what would otherwise be the last note) with an end-extension, and the tenor adds F $\sharp$ (a semitone below what would otherwise be the first note) with a beginning extension (instead of sustaining G $\sharp$ across the barline). The extensions change both the treble and tenor fourth statements from members of set class (014) to members of superset class (0134). In terms of ordered pitch-interval succession, tenor ip <+1, -3, -1> is the retrograde-inversion of treble ip <-1, -3, +1>. Their CSEGS are related

⁶² In section II as a whole, the treble motivic units definitely expand from the three-note units of section I to clearly segmented and articulated four-note units. However, in the tenor and bass lines the segmentation is more obscure. I think that in statement 4 the cardinality in the tenor expands to 4 via the beginning extension, but that it remains at 3 in the bass. In both voices, statement 5 begins with C $\sharp$ /D (m. 29) and ends incompletely on B $\flat$ /A. In general, the lower voices respond to the increased cardinality of the treble statements not with a corresponding increase of their own, but by rhythmic augmentation.

by SWAP: $\text{SWAP}(1,2 \text{ and } 3,4)(\text{CSEG}\langle 3201 \rangle) = \text{CSEG}\langle 2310 \rangle$.⁶³

Section II acts, in part, as a frontier region between the stricter sequence of section I and the new territory that begins with the E-F-C-B motive in m. 30. This is especially clear in the treble statements, which gradually increase registral span and change contour to effect a smooth transition to the new motive. In the progress from statement 4 to 5 to the new motive, the registral span (disregarding octave doubling) increases from 4 to 7 to 17. The CSEG changes from $\langle 3201 \rangle$, which incorporates the previously dominant $\langle 210 \rangle$ as a contiguous subset, to $\langle 3120 \rangle$, the CSEG of the new motive, which does not.

The preceding two sequences share the typical Ruggles motivic pattern of initial strictness followed by rapid mutation or disintegration, but they differ in terms of other features. The first (*Men*, mm. 33-35), which is the more strict, is characterized by a regularly recurring sequential interval (the ascending semitone), identical interval progressions in the first two statements, juxtaposed segments from different whole-tone collections, and saturation by a single interval class (IC4) on many levels. The second (*Sun-Treader*, mm. 25-30), which is freer, lacks a recurring sequential interval, swaps the order of the intervals in the statements, features canonic construction, and is pervaded by CSEG $\langle 210 \rangle$ and sc (014).

I will conclude this section with two sequences from *Marching Mountains* (*Men and Mountains* III), the first from mm. 9-18 and the second from mm. 23-32 (see Examples 3-50 and 3-51). The second sequence is based on the first, so I will refer to them

⁶³ See Example 3-20 (*A Clear Midnight*, mm. 1,3) for another example of the same SWAP operation.

as sequences I and II. They are fairly free, and use motivic processes not found in the last two examples, such as middle-extension, fragmentation, and immediate repetition. Unlike the preceding two sequences, I will discuss only the treble line, for two reasons: (1) in sequence I, the treble is the only sequential voice; (2) in sequence II, although every voice is at least partly sequential, the statements are fragmented among different instruments, much as in *Angels*, mm. 37-40 and 18-22 (see Examples 3-3 and 3-36). An adequate description would involve a great deal of dense detail, and since all of the types of motivic process in the sequence are represented in the treble, it will suffice to focus on that voice.

Sequences I and II are alike in many ways: both are ascending sequences with two-measure statements; both follow the familiar Ruggles pattern of initial stability and regularity followed by modification and mutation; both begin with two full statements followed by echos of the first half-statement; both reach a registral peak in the seventh measure followed by a freely imitative jagged descent; in both, the initial notes of each statement belong to the WT_0 collection; and both often preserve contour but alter intervals.

As in the last sequence, I will begin by discussing the more regularly patterned initial sections of the sequences, and then proceed to the less stable second sections.

In the first sections, the sequential units themselves (not just the sequences as a whole) are similar. In Example 3-52, the first three statements of sequence I and II are vertically juxtaposed. In the example, statement 3 is given only up to the end of the first echo. The statements show the following similarities:

(1) Every statement begins with a dotted quarter- plus eighth-note rhythm, an <012> CSEG, and a <+, +, -, -, +> CAS.

(2) With the exception of sequence I, statement 3, every statement ends with ip <-1,

-3, +2> and CSEG <3201>. However, in sequence II, every half-statement also ends with the same interval succession and CSEG.⁶⁴

(3) The fourth beat of each statement initiates a whole-step, descending in sequence I and ascending in sequence II. In statements 1 and 2, both types are echoed by the whole-step at the end of each statement.⁶⁵

The echoed half-statements also show similarities. The first three notes not only share the same ordered pitch-interval succession (<+1, +7>), but also the same pitches (A#5-B5-F#6). In the second echo in sequence I, the last note is raised an octave.

Each sequence contains both modified and real repetition, but sequence II contains more of the latter and sequence I more of the former. In the first two statements of sequence I, the pitch intervals between notes 2, 3, and 4 change (from <+5, -11> to <+3, -9>. Moreover, in the echoed half-statements starting in m. 13, every adjacent interval is different from those in the two earlier half-statements (mm. 9 and 11).

Sequence II is considerably more regular. Only the interval between notes 2 and 3 alters, and even this alteration follows an orderly pattern of additive semitone augmentation, expanding from ip <+5> to <+6> to <+7>, as compared to <+5> to <+3> to <+7> in sequence I. Moreover, both halves of statements 1 and 2 end with ip <-1, -3, +2> (as compared to only the last half in sequence I); therefore, in sequence II both statements 1 and 2 are themselves sequential. The two occurrences of ip <-1, -3, +2> in each statement relate by T4, which mirrors the T8 within the motive itself, as well as the T4 between the

⁶⁴ Both ip <-1, -3, +2> and CSEG <3201> saturate sequence II (not necessarily at the same times). This will be discussed further below.

⁶⁵ In sequence I, the descending whole-step also relates to the ascending whole-step between notes 1 and 2.

initial two notes of the three statements, as shown in Example 3-53.

Both sequences begin to unravel after the echoes. In sequence I, the rest of the passage consists of different material that retains little connection with the preceding sequence; in sequence II, the motivic connections are far stronger. Up to now I have discussed the two sequences in tandem, comparing them point by point. But since their courses diverge, I will treat the rest of the two passages individually.

In sequence I, the first half-statement is presented in m. 13, repeated in m. 14, and repeated again in m. 15. Both repetitions preserve pitch-class order, but the first also retains pitch order and contour (both alter rhythm). However, the second repetition changes pitch order by raising the last note from C6 to C7--the highest note in the entire passage, reinforced by the loudest dynamic (*fortissimo*). This registral change alters the CSEG from <0132> to <0123>--a major change, because up to now each half of every statement has had a twist contour. The change to an ascending line contour at the most climactic point in the passage is maximally visible, and serves as preparation for a whole chain of line CSEGS that tumble down from the C7 registral peak in the shape of a large jagged descending wave. Upon reaching E4 the direction reverses, and the passage ends with an extended ascending straight line that moves first by step, then by skip, to C6 in m. 18.⁶⁶

The material after the C7 in m. 15 has little if any motivic connection to the preceding sequence. A possible, if tenuous, connection may lie in the fact that each descending group of beamed eighth notes alternatively outlines ip <-11> or <-13>, and that

⁶⁶ This is a good example of Ruggles's use of straight ascending lines at cadences, as discussed in section 2-5.

the ascending cadential straight line contains two interlocking instances of $ip <+13>$ (see Example 3-54), which may relate to the $ip <+11>$ and $<+13>$ in the first two statements.

Earlier I pointed out that the first part of sequence II is more regularly patterned than the first part of sequence I. Similarly, in sequence II the material after the immediate repetitions (mm. 29-32) is far more integrated with the earlier sequence than in sequence I--so much so that it functions both as a free extension of the sequence and as a transition to the return of the *marcato* theme in m. 33.⁶⁷

In sequence II, the first half of the sequential unit is stated in m. 27 and repeated in m. 28 with no change other than instrumentation (strings to winds). It is repeated again in m. 29, but this time in a highly modified form that initiates a jagged descent built on the contours of the half-statement.

Example 3-55 segments A#5-B5-F#6-F#6-D6-E6 (mm. 27-28) into adjacent $<01>$ and $<3201>$ CSEGS and shows how these are repeated or transformed in the rest of the passage. CSEG $<3201>$ saturates the entire line. CSEG $<01>$, the contour of the first two notes in m. 28, is extended to $<012>$ in m. 29, and, since $<01>$ is a C-subseg of $<3201>$, continues to precede nearly every other instance of $<3201>$. The two remaining CSEGS marked in Example 3-55 also derive from $<3201>$. CSEG $<201>$ (m. 31) is a C-subseg of $<3201>$, and CSEG $<210>$ (m. 32) derives from $<201>$ via the SWAP operation.

Perhaps the most surprising aspect of Ruggles's sequences is how few of them are real. In common practice music, tonal sequences are modified to stay within the key. In atonal music, where key constraints no longer apply, there would seem to be no reason to

⁶⁷ The *marcato* theme is more fully discussed with reference to Example 3-4.

avoid real sequences, yet in Ruggles's sequences, if real imitation is present at all, it lasts for only two or three repetitions. Ruggles works out of an aesthetic (partly influenced by Seeger) that involves a delicate balance between identity and change. Nowhere is this more apparent than in his sequences. Ruggles attempts to write, so to speak, different versions of the same thing. If the statements are too much alike they will not be perceived as different versions; if they are too different, they will not be perceived as the same thing. In addition, in Ruggles's music, the line must always move and change. Too much real sequence would create stasis, and the line would freeze into a predictable and motionless pattern. So in his sequential writing, and in his motivic practice in general, Ruggles usually begins with a fairly ordered pattern that becomes progressively freer as it mutates and dissolves. As stated at the beginning of this section, Ruggles applies all of his typical motivic processes to his sequences, which can be regarded as a microcosm of his compositional approach.

3.2.5 Interval combinations and combination cycles: Fifths and semitones

Throughout the latter part of his compositional career, Carl Ruggles was engaged in an ongoing effort towards what he called "simplification;" intervallically, this involved an increasing emphasis on perfect fifths and semitones--more generally, IC5 and 1.⁶⁸

⁶⁸ I sometimes refer to the same pair of notes as a perfect fifth and sometimes as a 7 (the notes connected by ordered pitch-class interval 7). My reason for this is mainly because the word "fifth" has an association that the number 7 doesn't quite have--the status of a perfect consonance. Ruggles did not write tonal music, but according to James Tenney, who worked closely with him in the 1950s, he liked the perfect fifth precisely because of its consonant qualities: its acoustical purity, open sonority, and sense of stability (private conversation with Tenney). When Ruggles juxtaposes a perfect fifth with a semitone, he is,

Combinations of these intervals start appearing in *Vox Clamans in Deserto* (composed ca. 1923), dominate *Sun-Treader* (composed 1926-31), and constitute the prime intervallic building blocks in several of the *Evocations* (composed 1935-43). Throughout his oeuvre, combinations of IC5 and 1 are a characteristic and increasingly frequent Ruggles intervallic signature.

Ruggles's emphasis on these intervals has not gone unnoticed. Steven Gilbert wrote a series of pioneering articles (1970, 1971, 1972) that stressed Ruggles's use of set classes (015) and (016), which result from combinations of IC5 and 1. In a 1982 article, Brian Ferneyhough parsed the opening of *Evocations 2* into stacked perfect fifths a semitone apart. Most recently, Stephen Brown has discussed the interactions between IC5 and 1 in Chapter 4 of his dissertation "Dual Interval Space in Twentieth-Century Music" (Brown 1999). Brown's treatment is largely taken up with an analysis of *Evocations 4*, a piece that I too will discuss to some extent at the end of this section.

I will begin by examining a sketch in which Ruggles explicitly demonstrates some of his procedures for working with fifths and semitones. Example 3-56 is a copy of the second page of a letter from Ruggles to John Kirkpatrick dated November 25th, 1940.⁶⁹ I have added some labels in square brackets. Ruggles writes that he has been working on the ascending note sequence F-C-D-A-A-E (labeled *model*) and that out of this has come two

to use Charles Seeger's term, *dissonating* a perfect consonance. This aspect of Ruggles's music does not quite come through when intervals are labeled exclusively with numerical labels.

⁶⁹ This letter is held in the John Kirkpatrick Papers at the Yale University Music Library, box 31.

unfoldings (labeled here as 1 and 2). Pleased with his work, he writes “Lovely, what?” in the lower right corner. The adjacent intervals in the model are alternating ascending perfect fifths and minor seconds.

This letter, to my knowledge, provides the only instance in which Ruggles posits a combination cycle as a basis for elaboration. The term “combination cycle,” invented by Philip Lambert (1990b), refers to an interval cycle with two alternating intervals instead of a single repeated interval. This section will explore some properties of Ruggles's model; how it serves--and does not serve--as the basis for his two unfoldings through alteration, rearrangement, elaboration, and juxtaposition with other combination cycles; and how these and other strategies for combining IC5 and 1 are implemented in sections of *Evocations* 4 and other works and sketches.⁷⁰

The Model

Clearly, Ruggles was interested in the interval succession of the model, not in the specific pitches or pitch classes, since the model begins on F, unfolding 1 on G, and unfolding 2 on B. As shown in Example 3-57, the interval succession is a 7/1 combination cycle with a cardinality of 6. Each fifth relates to the following fifth by T_8 (that is, $7+1$). The alternating 7s and 1s create overlapping instances of trichord set class (015) and tetrachord set class (0148). In Charles Seeger's terms, in the trichords each fifth is *dissonated* by a semitone; in the tetrachords, each fifth is dissonated by a semitone-related fifth. Semitone-related fifths are two fifths in which one or both notes of the first fifth are

⁷⁰ I am using the 1956 revision (American Music Edition, edited by John Kirkpatrick), where this *Evocation* is number 4. In the 1943 version published in *New Music* XVI/3 (April, 1943), 6-7, it is listed as number 3. The work was composed ca. 1940.

related by semitone to one or both notes of the second fifth. The entire cycle is a member of set class 6-20 (014589), sometimes called the hexatonic set class. Only four different 7/1 combination cycles are possible without duplicating a fifth, corresponding to the four distinct pitch-class sets in 6-20. These are shown in Example 3-57d as subcycles I through IV.

Unfoldings

Ruggles did not like to be constrained by his compositional procedures. His attitude is succinctly summed up in his 1966 statement to a *Newsweek* interviewer that "formulas should be busted" (*Newsweek* 1966:80-81). For instance, he objected to twelve-tone composition ("a dog chasing its tail"), but nonetheless used a twelve-tone row in *Evocations II*--taking care, however, to introduce permutations and truncations into the row, and using it for only part of the piece.⁷¹

Ruggles's unfoldings evince a similarly ambivalent attitude to his model, and they realize the model in rather different ways. I will start, counterintuitively, with Unfolding 2, because it is by far the most faithful to the model, pretty much preserving the 7/1 combination cycle as a basic constructive unit. For that very reason, its main strategy for avoiding premature repetition is to switch to alternative 7/1 subcycles.

As shown in Example 3-58a-b, Unfolding 2 consists of two phrases, the second an extended repetition of the first. The first phrase begins with complete subcycle III starting

⁷¹ In the same *Newsweek* interview Ruggles stated that "twelve-tone music is a worn-out formula" (Ibid, 80). The remark about the dog chasing its tail is taken from Kirkpatrick 1968:153. Ruggles's use of a twelve-tone row in *Evocations II* (his one experiment with twelve-tone technique) is discussed in Gilbert 1970:70-76 and Kramlich 1982:22-28.

on B. The final note of the subcycle, B $\flat$, is followed not by an ascending semitone to B $\sharp$, which would start subcycle III again, but by a descending semitone to A, counterpointed in the bass by G $\sharp$. Neither A or G $\sharp$ are members of subcycle III. A can be considered the first note of subcycle I, and G $\sharp$ of subcycle II. However, neither subcycle I nor II follows; instead the first phrase repeats.⁷² This time, A and G $\sharp$ do successfully initiate subcycles I and II, but each ends prematurely after four notes.⁷³

In addition to switching between subcycles, Unfolding 2 deviates from the model in two other ways. First, the ascending fifth is sometimes inverted to a descending fourth. Secondly, subcycle II (starting on bass G $\sharp$) is slightly changed: the last note is altered from the expected B to B $\flat$, changing the final linear ordered pitch-class interval from <7> (E-B) to <6> (E-B $\flat$). Therefore, the transposition between G $\sharp$ -D $\sharp$ and E-B $\flat$ is T $_8$ /T $_7$ (G $\sharp$ moves by T $_8$ to E, D $\sharp$ moves by T $_7$ to B $\flat$). Note that the T $_{11}$ relation at the end of phrase 1 between treble A and bass G $\sharp$ is continued in phrase 2 between treble A-E and bass G $\sharp$ -D $\sharp$. Similarly, the transposition from treble F-C to bass E-B $\flat$ is T $_{11}$ /T $_{10}$. There is also a T $_9$ registral connection between B and G $\sharp$ in m. 1 and between B-F $\sharp$ and G $\sharp$ -D $\sharp$ in m. 2. T $_9$ is not particularly significant here, but will become more prominent in later examples.

Unfolding II, then, elaborates the model in the following ways: (1) it retains the 7/1 combination cycle as a constructive unit but avoids monotony by switching between the

⁷² In Example 3-58b, m. 1, the T $_6$ from E $\flat$ -B $\flat$ is incomplete--only E $\flat$ moves by T $_6$ to A. B $\flat$ moves by T $_6$ to E $\sharp$ only the second time round.

⁷³ The A-G $\sharp$ simultaneity in m. 1 also initiates a typical Ruggles IC1 outer-voice frame. This is resumed in m. 2, but now in canon: after the repeated A/G $\sharp$, E-F-C is imitated a beat later by bass D $\sharp$ -E-B $\flat$. For the last notes (C-B $\flat$), the IC1 frame becomes an IC2 frame, due to the substitution of B $\flat$ for B $\sharp$, as discussed below.

four subcycles; (2) 7/1 cycles are sometimes incompletely presented; (3) pitch-class interval <7> can be altered to <6>; and (4) ordered pitch-class interval <7> is realized as a descending fourth as well as an ascending fifth.

I will now turn to Unfolding 1 (Example 3-59a-b). As demonstrated, Unfolding II preserves the 7/1 combination cycle as a basic compositional idea. Unfolding I does not. Fragments appear, but a 7/1 cycle is never presented in complete form.

Unfolding I follows two main strategies. First, the two notes of the 7 are no longer necessarily adjacent, but sometimes separated by other notes that in turn belong to other 7s, like interlocking or nesting rings.⁷⁴ One example in mm. 1 and 2 is A-E within G $\sharp$ -E $\flat$; another in m. 2 is F-C interlocked with B-F $\sharp$.⁷⁵ Secondly, successive fifths relate not only by T₈, as in the 7/1 model, but also by other T-levels—mainly T₁, but also (less often) by T₆, and (least often) by T₇. This suggests the near-complete breakdown of the 7/1 combination cycle as a referential unit, mainly by means of the introduction and partial presentation of other combination cycles. These are shown in Example 3-60.

Example 3-60a shows the possible combinations of semitone-related fifths, with F-C as the referential fifth. Transposition levels (henceforth abbreviated as T-levels) between fifths are indicated underneath; set classes, combination cycles, and combination cycle cardinalities are shown above. Combination cycles move from the lower to the higher note

⁷⁴ A 7, in this context, is a pitch class dyad defined by ordered pitch-class interval 7, for example, any G up or down to any D. Conversely, an example of a 5 would be any D up or down to any G. Neither 7 nor 5 should be confused with IC5, a more general category which includes both.

⁷⁵ This latter can alternatively be read as two tritones a fifth apart, recalling the alteration of pci (7) to (6) in Unfolding 2.

in each fifth. The five possibilities correspond to five combination cycles, but to only three set classes: (0158), (0156), and (0167). Example 3-60b is a similar reference chart for fifths dissonated by a single semitone. Here the four options correspond to the two set classes (015) and (016), but to eight possible combination cycles, because each semitone-dissonated fifth can be derived from two cycles. By the same token, either of the notes in the fifth can be considered to transpose to the dissonating semitone. It is possible to describe these by the location of the dissonating semitone: given a perfect fifth frame, placement of the semitone outside the frame (above the top note or below the bottom note) results in set class (015); placement of the semitone inside the fifth frame (below the top note or above the bottom note) results in (016).⁷⁶

In addition to the 7/1 cycle, Unfolding I (Example 3-59b) uses two other combination cycles. One is the 7/11 cycle, as in the opening notes G-D-C^b-G[#]: fifths related by T_6 , with a cardinality of only 4 notes--thus this is a complete presentation of the 7/11 cycle. Another is the 7/6 cycle: fifths related by T_1 , with a cardinality of twenty-four notes. The last measure (plus one note) is the clearest instance of the 7/6 cycle: A-E-B^b-F-B^b-F^b-C. However, sequentially repeating fragments of the 7/6 cycle dominate the final two thirds of the unfolding, from the last note of m. 2 until the end, as shown in Example 3-61. The high F[#] initiates a jagged descent composed of four smaller descending waves. Each wave consists of four notes from a 7/6 cycle, following the ordered pitch-class interval

⁷⁶ This applies if the 7 takes the form of a fifth. If it takes the form of a fourth, everything reverses: outside becomes inside and top becomes bottom. For example, if the fifth F4-C5 is dissonated by D^b5, D^b5 is outside the fifth, above the top note; for the fourth C5-F5, D^b5 is inside the fourth, above the bottom note.

succession <7-6-7>; the last note of each wave is connected to the first note of the next by ordered pitch-class interval <1>.⁷⁷ The notes in each wave form a member of set class (0156), and each set descends a minor third to the next, forming a T_9 chain with four nodes. The final <7-6-7> pattern is not followed by <1> but is instead extended to the closing C. Thus the T_9 so unobtrusively introduced in Unfolding 2 plays a far more important role in Unfolding 1, connecting sequentially repeating segments of the 7/6 combination cycle.

Another sketch, dated April 13, 1941 (about 5 months later), is a later development of Unfolding I, and will be called Unfolding I' (see Example 3-62).⁷⁸ Ruggles has transposed the unfolding up a tritone, a suggestive interval (a semitone below a fifth). The rhythm is slightly different, although the long-short proportions between notes are about the same. In this version, however, two lower lines are added, each adding a characteristic Ruggles stylistic trademark. Starting with the D in m. 1, a canon begins in which the middle line imitates the treble line at T_0 , duplicating pitch class but varying rhythm (the canon is exact up until the 3/4 bar in the second stave, where it varies a bit, but gets back on track in the next measure). Also beginning with the treble D in m. 1, an added bass line doubles the treble at T_{11} , often varying register to create contrary motion with the top voice. As shown in Example 3-63, in this version the T_9 chain between (0156) sets is

⁷⁷ An alternative and possibly more economical reading would be as three <7-6-7-1> cycles, followed by a three <7-6> cycles, and ending with a single <6>.

⁷⁸ This sketch is held in the John Kirkpatrick Papers at the Yale University music library, box 31.

extended from four to five segments, so that the last <7-6-7> segment duplicates the pitch-class order of the first. As in Unfolding 1, the last segment is extended (this time by another <6>) to close on D.⁷⁹

Despite the radical deconstruction of the 7/1 cyclic model and its mixture with other combination cycles in Unfolding 1, Ruggles wrote it in the Kirkpatrick letter *before* he wrote unfolding 2, which preserves the 7/1 cycle. Clearly he viewed both unfoldings as equally valid expressions of his model.

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Fifth-plus-semitone construction can be found in other sketches from around 1940 and afterwards and in much of Ruggles's later music. It is not Ruggles's only constructive principle, but there are many passages that can be viewed as extensions of the procedures in the Kirkpatrick letter. Echoes of both unfoldings can be found in *Evocations* 4, reproduced in its entirety in Example 3-64. Nearly the entire piece can be segmented in terms of IC5 and 1, but I will only discuss three passages: first mm. 11-12, then the opening five bars and their reprise at the end of the piece.

I will begin with a short examination of mm. 11-12 (Example 3-65), a passage somewhat reminiscent of Unfolding 2, which was based on the 7/1 combination cycle but avoided repetition by switching between subcycles and truncating the cycle from six notes to four. Measure 11 begins with a complete statement of the 7/1 cycle beginning on A $\sharp$: A $\sharp$ -E $\sharp$ -F $\sharp$ -C $\sharp$ -D-A (subcycle 4). Then, much as in Unfolding II, instead of ascending a semitone

⁷⁹ See footnote 77.

and restarting the 7/6 cycle on A $\sharp$, it descends a semitone and begins another 7/1 cycle on G $\sharp$, in the process shortening the cycle from six notes to four: G $\sharp$ -D $\sharp$ -E-B (subcycle 2). This is again followed by a descending instead of the expected ascending semitone, and another 7/1 cycle begins (or appears to begin), this time starting on A $\sharp$, the pitch class that began the first 7/1 cycle. This time, however, the cycle runs for only two notes--A $\sharp$ -F--followed not by a semitone but by a descending fourth. In the course of this ascending line, the 7/1 cycle begins three times, but is successively abbreviated from six notes (its full length) to four to two to, one might say, none: the 7/1 cycle has been liquidated. It is, however, resurrected to some extent in the very next passage.

Example 3-66a shows the opening five bars of the piece, overlaid with voice-leading and pitch-transposition indications. Underneath (3-66b) is a graph which presents much the same material in perhaps a clearer form. The material at the very bottom of the page (3-66c) will be discussed shortly.

The first three bars can be viewed essentially as a series of fifths chromatically descending a fifth from G/D to C/G: basically a 7/4 combination cycle--fifths descending by T_{11} . This fifth-descent is an example of transpositional projection--the interval of transposition is the same as the interval being transposed. In the essential voice leading, the upper line horizontalizes the initial G/D fifth. However, in the actual registral voice leading, after the initial fifth of each measure the voices exchange positions to create fourths. Because the top notes of the fifths are highlighted accentually (with accent signs), metrically (on the first beat of the measure), registrally (as the highest notes), and texturally (by octave doubling), they create a transpositional path of descending minor thirds,

subdividing the overall T_{-7} into $T_{-3} -3 -1$, and outlining the descending third sequence D-B-A $\flat$ within the D-G perfect fifth. Since the D-A $\flat$ frame of the descending third line forms a unit of its own, the overall -7 can also be parsed as -6-1: a large linear G/D fifth dissonated by A $\flat$. After the third beat of m. 3 (which repeats as m. 4), the chromatically descending fifths stop, but, as shown in the graph, the chromatic descent continues from G3 in a single line incorporating two upward registral shifts: G $\flat$ 4-F4, then E5-E $\flat$ 5-D5, reinstating the initial G/D fifth in its original register.⁸⁰

I will now turn to deferred material on the bottom of the page (Example 3-66c). On the left (from Example 3-60a) is the 7/4 model for semitone-related fifths, which applies to the chromatically descending fifths in the essential voice-leading. In the middle, registrally compacted, is the D-A $\flat$ -G just discussed, which conforms to the model of a fifth dissonated by a semitone above the bottom note. In a sense, however, this is the wrong model for the passage, because the 7/4 cycle has no dissonating semitone above the bottom note of the first fifth. Thus there is a discontinuity between the local chromatically descending fifths and the larger outlined semitone-dissonated fifth. Similarly, as shown on the right, there is a discontinuity between the large T_0 between the G/D fifths that frame the passage and the T_{11} between consecutive fifths shown on the left. As we shall see, both discontinuities

⁸⁰ B4 (m. 5) is not part of the chromatic descent, but occurs in passing between F and E, which is why I have slurred over it in the graph. However, the B is not arbitrarily chosen: F-B-E forms an IC1-dissonated IC5-dyad. In fact, the entire chromatic descent can be segmented into overlapping IC1-dissonated IC5 dyads: (G-C-G $\flat$), (C-G $\flat$ -F), (G $\flat$ -F-B), (F-B-E), (B-E-E $\flat$), (F-B-E $\flat$), and (E $\flat$ -E $\flat$ -G). Steven Brown has a different explanation for the B in m. 5 (Brown 1999:152-53). He takes the B from the previous G $\flat$ and connects it to the following E, positing a G $\flat$ -B-E IC5 line that coexists with the IC1 line (my chromatic descent).

disappear in the reprise.

Example 3-67 shows the reprise of the passage just discussed. In the reprise, the opening is transposed by T_{-3} , a large-scale reflection of the descending minor thirds in the opening chromatic fifth descent. There is one change, however. In m. 26, the G/C perfect fourth is followed not by an F/B perfect fourth, but by a F $\sharp$ /B augmented fourth, recalling the semitone expansion in Unfolding 2. The line gets back on track with the perfect fifth A/E. In the essential voice-leading, a descending semitone in each line has been replaced by a whole-step (see the “WT”s on the example), and the subsequent line to the end of m. 26 is a semitone lower than it would have been otherwise. Now the overall descent is T_{-8} (instead of T_{-7}), divided into T_{-3-4-1} (instead of T_{-3-3-1}). This forms a large-scale B-E fifth dissonated by a D $\sharp$ semitone below the bottom note. As shown in Example 3-67b & c, this is the proper semitone-dissonated fifth model for the 7/4 combination cycle, and therefore the inconsistency in the opening between the local 7/4 cycle and the larger outlined dissonated fifth is completely absent in the reprise. Because of this change, the E/B fifth that began the reprise is not regained, but replaced with a fifth a semitone lower—E $\flat$ /B $\flat$. The framing E/B and E $\flat$ /B $\flat$ fifths not only replicate the first two vertical dyads of the reprise on a far larger level, but also constitute a more general large-scale motivic reflection of the consecutive T_{11} s in the 7/4 combination cycle.

Although I have not found that Ruggles’s music generally shows evidence of structural levels in the sense familiar in tonal theory, an exception can be found in numerous instances of motivic parallelism, which by definition involves replication of a pattern on two or more levels. Many of these motivic parallelisms have already been noted

and discussed in this dissertation. In the case of the introduction and reprise of *Evocations* 4, the 7/4 combination cycle acts as such a pattern. In the introduction Ruggles sets up a dissonance, a discontinuity, between the local 7/4 chromatically descending fifths and both the larger outlined D-A-G semitone-dissonated fifth and the framing G/D fifths. In the reprise, Ruggles effects a correction, and the local and larger shapes become completely consistent and coordinated.

The intervals of the perfect fifth and the semitone (more generally, IC5 and 1) are a major focus in Ruggles's later music and sketches, representing a radical paring down of his intervallic material. Ruggles's own concrete demonstration in the Kirkpatrick letter, plus investigation of other sketches and passages from his late works, begins to show not only how he created passages of music from such spare materials, but also how he viewed his own compositional techniques--with extreme flexibility, as something to use but not to be constrained by; as a "formula to be busted."

* * * * *

Although the subject of motive in Ruggles's music has not been neglected in the literature, it has usually been discussed in a rather informal and *ad hoc* fashion (see the literature survey in Chapter 1). I have tried to approach the topic in a more orderly manner. The chapter first lays out basic parameters and terminology used in the subsequent discussion: cardinality, set, set class, contour, registral span, registral layout, pitch-class voice leading, rhythm, and intervals. These aspects are, of course, essentially static attributes. Then certain active motivic processes or operations are explored, many derived from Seeger: immediate repetition, regular and split transposition and inversion, and a

group of processes that affect cardinality--extension, intension, fragmentation, and liquidation. After discussing motivic aspects of sequences, the chapter ends with what became an increasingly single-minded preoccupation of Ruggles's later works and sketches--configurations and combination cycles based on combinations of IC5 and IC1. A common theme has been the extreme flexibility and freedom of Ruggles's application of these operations. As stated earlier, Ruggles's motivic practice is extremely fluid and dynamic--shapes are strongly presented initially, retain their form for a short while, and then quickly lose definition as they mutate or dissolve.

Chapter 4. COUNTERPOINT AND HARMONY

The basis of Ruggles's compositional approach is the individual line, but, as George Perle has stated, his music consists of "a pure and supple polyphony of long, expansive, constantly unfolding lines" (Perle 1960:56). The interaction of simultaneous voices is traditionally the domain of counterpoint and harmony. These two words are somewhat problematic when applied to atonal music, since the difference between them seems more a matter of emphasis than of substance, and it is difficult to determine where one leaves off and the other begins, especially in a texture of more than two voices. *Counterpoint* emphasizes the horizontal dimension, but necessarily involves vertical (especially intervallic) considerations; *harmony* emphasizes vertical sonorities, but necessarily includes horizontal aspects such as voice leading and arpeggiation. Perhaps, after all, Perle's word *polyphony* is best. However, Ruggles's music is closely associated with Seeger's term *dissonant counterpoint* (discussed below), so I will continue to use the words *harmony* and *counterpoint*, albeit somewhat gingerly, and bearing their nuances in mind.

The interrelation of simultaneous lines has already been touched on in Chapter 3, especially in the sections on T/I operations and on sequences. This chapter will begin by considering the history and meaning of the term *dissonant counterpoint*, and then go on to discuss two-voice counterpoint, focusing first on vertical intervals and then on voice exchange. The next section will deal with interactions between more than two voices, concentrating first on chord construction and then on voice leading. The chapter will end with a discussion of canon, a technique of central importance to much of Ruggles's oeuvre.

4.1 The term *dissonant counterpoint*

The term *dissonant counterpoint* was invented by Charles Seeger, who dated it to ca.1913 (Seeger 1930:25). It later became fairly well known through Seeger's student Henry Cowell, who devoted a chapter to it in his treatise *New Musical Resources*, written between 1916 and 1919, and published in revised form in 1930 (Nicholls 1990:135). Certainly Ruggles used the term. Dane Rudhyar wrote in 1924 that he had learned it from Ruggles (Rudhyar 1924:31), and in a 1929 letter Ruth Crawford Seeger wrote that Ruggles had given her "valuable hints on dissonant counterpoint."¹ Apparently, even in the 1920s not everyone who used the term was aware that Seeger had originated it. Dane Rudhyar neglected to mention Seeger in his 1922 article "Carl Ruggles and the Future of Dissonant Counterpoint," and elicited a withering response, "Reviewing a Review," in which Seeger wrote:

Passing to the main body of the theoretical part, that is, to the discussion of dissonant counterpoint, Mr. Rudhyar is, in spite of the commendable spirit in which writes, swimming beyond his depth. In the first place, Ruggles's *Angels* is not an example of dissonant counterpoint. It is music. Probably Mr. Rudhyar could not define the term. Certainly he is blind to its most elementary implications. The article is wrongly titled (Seeger 1923:22-23).

In his response to Seeger, Rudhyar replied: "Perhaps the composer will define the term for Mr. Seeger. I had it from Mr. Ruggles himself" (Rudhyar 1924:31).²

¹ From a letter to Alice Burrow, Oct. 23, 1929, quoted in Tick 1997:83.

² Rudhyar's ignorance of Seeger's connection with dissonant counterpoint would seem to support Cowell's statement that "he [Seeger] has rarely been given public credit for the ideas which he has initiated, since with a perverse humor which is very characteristic of him he always presents his important new ideas in such a way, at such a time, or to such people that they are never accepted at first; later when the ideas have proved to be singularly adaptable, their users often forget the source" (Cowell 1933b:119).

According to Seeger, dissonant counterpoint began as a pedagogical reverse species counterpoint which was based on a norm of dissonance instead of consonance. In his article "On Dissonant Counterpoint," Seeger wrote:

Dissonant Counterpoint was at first purely a school-room discipline--a link between the preparatory studies in harmony, counterpoint, canon, and fugue of a regular composition course and the "free" composition of the second decade of the twentieth century..... It was based upon the perception of a difference, sincerely felt but also logically postulated, between consonance and dissonance. The octave, fifth, fourth, thirds, and sixths were regarded as consonant and the tritone, seconds, sevenths, and ninths, as dissonant. The species were as in the old counterpoint. The essential departure was the establishment of dissonance, rather than consonance, as the rule. Thus, in the first species, in two parts, no consonance was allowed; and from the second onwards it was consonance that had to be prepared and resolved. The manner of this (by skip rather than by step) successfully differentiated the result from its prototype. (Seeger 1930:25-26)

When Seeger stated to Rudhyar that Ruggles's *Angels* was not dissonant counterpoint but music, he may have been conceiving dissonant counterpoint solely in terms of the pedagogical species; or perhaps his statement had a different meaning. In any case, in his treatise (written 1930-31), he uses dissonant counterpoint as a blanket term for the entire gamut of disparate techniques involved in dissonant composition as a whole. Thus the *Manual of Dissonant Counterpoint* covers many different melodic, contrapuntal, rhythmic, and harmonic techniques, not all of which apply to Ruggles's music.

Despite Seeger's general use of the term for virtually his entire theory of composition, in this chapter I will be using it in a narrower sense closer to but less restrictive than the pedagogical dissonant species. In my usage dissonant counterpoint will refer to techniques used to maintain a norm of vertical dissonance, in which consonance occurs incidentally. In Ruggles's music, the most important of these techniques is the establishment of a framework of dissonant vertical intervals.

4.2 Two-part counterpoint--vertical intervals

I will begin by explaining my notation of vertical intervals. Labels for ip (0), (1), (2) and their mod-12 equivalents will be analogous to tonal designations for unisons, seconds, thirds, and their compound equivalents. In tonal harmony and species counterpoint, unisons, seconds, and thirds are indicated by the numbers 1, 2, and 3, but their octave compounds by 8, 9, and 10, because the compound intervals have somewhat different sonorities and functions than their simple equivalents. Similarly, I will refer to ip (0), (1), and (2) as such, but to their mod-12 equivalents as ip (12), (13), and (14).³ For example, the interval between C4 and C~~4~~4 will be labeled as ip (1), but between C4 and C~~4~~5, or between C4 and C~~4~~7, as ip (13). Intervals ranging from ip (3) to (11) and their mod-12 equivalents will usually be labeled with simple interval numbers only, but I will occasionally use compound interval numbers to more clearly indicate voice leading. In oblique motion, interval numbers will be connected by a line, and in voice-exchanges, by crossed diagonal lines ("X").

Which vertical intervals are dissonant? According to the passage quoted above from Seeger's "On Dissonant Counterpoint," the dissonant intervals are "the tritone, seconds, sevenths, and ninths." However, in his treatise Seeger further classifies both vertical consonances and dissonances as perfect and imperfect, as shown in Table 4.1 (from Seeger

³ Lou Harrison makes this differentiation when he says that Ruggles's music is "dominated ...by the minor second. Or rather, to be exact, it is dominated by the major seventh or the minor ninth, since there is, perhaps, a greater difference in sound between the minor second and its inversions than between any other prime interval and its inversions. The Ruggles counterpoint, especially, is bound together by this interval persistence" (Harrison 1955:17).

1994:131).⁴

Generalized to interval classes, then, perfect dissonances are IC1 intervals and imperfect dissonances are IC2 intervals. The only conflict between the Seeger's two classifications concerns the tritone, which is listed as a dissonance in the article but as "more consonant chordally than melodically" in the treatise (1994:131). There is certainly a basis in tonal music for considering the tritone as "more consonant chordally," since it is allowed in three-part species counterpoint between the upper voices of a diminished 6/3 chord. Even in that context, however, the tritone is still a dissonance, albeit an acceptable one. Accordingly, I will treat the tritone as an imperfect dissonance. Therefore, in my own classification perfect dissonances are IC1 intervals, and imperfect dissonances are IC2 and IC6 intervals. Everything else is a consonance.⁵

In his treatise, Seeger sets up a tripartite division in which perfect dissonances are *tense*, imperfect dissonances are *poised* (as in "poised between"), and consonances are *relaxed* (see Greer 1998:125-29 and Seeger 1994:95-96). Concerning poise, Seeger

⁴ Seeger's division of dissonance (and consonance) into perfect and imperfect was undoubtedly influenced by the writings of 13th-century theorists. In *De Musica Mensurabili Positio*, Johannes de Garlandia posits three types of dissonance: perfect (major seventh, minor second, and tritone), intermediate (major second and minor sixth), and imperfect (major sixth and minor seventh) (Crocker 1962:3 and Haggh 1962:95). Franco of Cologne, in *Ars cantus mensurabilis*, categorizes dissonances as perfect and imperfect only, amalgamating Johannes's perfect and intermediate categories into his own perfect category (Haggh 1962:96-97). Seeger's source may have been Riemann 1893, but, because of his poor German reading ability, was more likely Shirlaw 1917, which introduces Franco's classification of intervals on page 1. I am indebted to Joel Lester for information on Shirlaw 1917.

⁵ Enharmonic equivalence is assumed. For instance, both E-G $\sharp$ and E-A $\flat$ are consonances, since they are both IC4 intervals.

writes:

It [poise] can be regarded as a tension (after relaxation) or a relaxing (after tension). It is a midpoint between tension and relaxation and so may partake of the qualities of both or either, according to circumstances. Like a muscle at rest, neither relaxed nor tensed but with a definite tonicity, what we mean by poise in music may easily become transformed into one or the other... (Seeger 1994:96).

Imperfect dissonances thus partake of the nature of both dissonances and consonances:

they are less tense than perfect dissonances but more tense than consonances. Therefore the tension of a perfect dissonance can be alleviated to some degree if followed by an imperfect dissonance, or to a still greater degree if followed by a consonance. Equally, the relaxation of a consonance can become taut by progression to an imperfect dissonance, and intensified still more by progression to a perfect dissonance.

The logical place to begin an examination of vertical intervals is two-part writing, but there is curiously little of it in Ruggles's music, although there are many monophonic passages (with octave doublings). His usual polyphonic texture is three or more voices. However, there are occasional passages for two solo voices, and, more often, for two active voices against a comparatively static background of sustained or intermittently struck notes in other voices.

Ruggles's usual (but not invariable) two-part practice involves the construction of a framework of perfect dissonances into which imperfect dissonances and consonances are occasionally introduced.⁶ An early, if minute, solo two-voice passage appears at the

⁶ Virgil Thomson refers to this when he writes: "By secundal counterpoint I mean that the intervals present at the nodal points of the music (say roughly at the down-beats) are predominantly seconds and sevenths" (1970:32). Lou Harrison specifies that Ruggles's counterpoint is "bound together by this interval persistence" of the minor ninth and the major seventh (1955:17).

beginning of *Parting at Morning* (*Vox Clamans in Deserto I*), repeats in m. 5, and returns in modified form in m. 8. As shown in Example 4-1, both versions of the figure begin with a ip (13-11) voice exchange, then proceed in parallel motion with ip (10-13-13) in m. 1 and ip (11-13-13) in m. 8. Except for the single ip (10), which momentarily alleviates the tension of its IC1 surroundings, every vertical interval is a perfect dissonance. Although very brief, many aspects of this passage are typical of Ruggles's two-part counterpoint, such as the IC1 voice exchanges, the alternation of ip (13) and (11) in general, and the introduction of an IC2 dissonance in a prevailing IC1 context.

Example 4-1 contains only contrary and parallel motion. Example 4-2, from *Evocations I*, consists almost entirely of oblique motion. M. 16 through the first half of m. 19 contains a short sequence with three statements.⁷ Each statement consists of a four-note ascending treble line over a bass pedal point. In the first two statements the vertical interval successions, ip (1-14-6-8) and (13-14-6-8) respectively, follow a pattern of steadily decreasing dissonance. That is, a perfect dissonance (a tense interval) is followed by two imperfect dissonances (poised intervals), and then by a consonance (a relaxed interval). This pattern is slightly altered in the third statement (m. 18), where the expected G is replaced with A^b, changing the second vertical interval from ip (2) to (3), a consonance.

As stated, true two-part writing is rare in Ruggles's music. But in his customary texture of three or more parts, at least two voices tend to be dissonantly related at any given moment. These are often the outer voices. Example 4-3 is a short passage from earlier in

⁷ The first two statements are related by T₉ and the last two by T₉/T₁₀ (B^b moves by T₁₀ to A^b). See Section 3.2.5 for other examples of T₉ sequences.

Evocations I (mm. 5-7) with active dissonant outer voices (the treble doubled at the lower octave) enclosing more sustained inner voices. I will discuss only the outer voices. The outer-voice vertical intervals are all perfect dissonances, with the sole exception of the consonant ip (3) in m. 5 between bass F $\sharp$ and treble A (boxed on the example).⁸ The interval succession ip (13-11-13-13) in mm. 6-7 demonstrates three different types of relative IC1 motion: (1) an ip (13-11) voice exchange in contrary motion; (2) ip (11-13) in contrary motion, but not a voice exchange; and (3) ip (13-13) in parallel motion. The placement of the consonant ip (3) recalls Seeger's dissonant second species. The A acts as a sort of consonant passing tone in a dissonant setting: it occurs on a weak beat over the second half of a sustained note in the bass, it is preceded and followed by dissonances, and it is left (although not approached) by leap.

The placement of outer-voice consonant intervals in Example 4-4 is very similar. In mm. 3-4 of *Evocations III* (Example 4-4) the outer voices are mostly perfect dissonances, with a few consonances and imperfect dissonances. The two consonances--ip (7-8) in m. 4--occur on weak parts of the beat between two perfect dissonances, playing very much a subsidiary role. Even the two imperfect vertical dissonances--the two instances of ip (10)--are brief, metrically unstressed, and flanked on both sides by perfect dissonances. In both Examples 4-3 and 4-4 outer-voice consonance is handled in a way that does not threaten the primacy of its dissonant environment.

In the next example, the opening to *Marching Mountains* (Example 4-5), the outer

⁸ In fact, not only do the outer voices form a consonance, but the entire four-voice chord is a consonant sonority--an F $\sharp$ minor $\frac{5}{b}$ triad.

voices are perfect dissonances, plus two consonances. There are no imperfect dissonances at all. In addition to the IC1 voice exchanges and parallel motion seen in previous examples, there are two instances of ip (13-11) oblique motion in which the treble note descends a whole-step over a sustained bass. In both cases, the bass note functions as a pitch-class axis around which the treble pitch class inverts. In m. 2, F $\sharp$ inverts around F $\natural$ to E; in m. 3, B $\sharp$ inverts around B $\flat$ to A.⁹

The two consonances are also approached by oblique motion above a stationary bass--ip (11-9). Both are dissonant suspensions resolving to a consonance. These are resolutions in the traditional sense, not in the dissonant species upside-down sense. In tonal nomenclature, they are 7-6 suspensions, resolving downward by step. But both consonances are ultimately subordinant to their dissonant environment. The second ip (9), in m. 4, occurs in transit in a metrically unstressed position in the middle of the last phrase, which ends on a solidly dissonant outer-voice ip (13). The first occurs at the end of a phrase followed by rests in all voices, and is thus fairly prominent. Indeed, it occurs about where a half-cadence would in a tonal passage, an impression strengthened by the perfect fifth in the bass between E (m. 1) and B (m. 3). However highlighted, though, it is still ultimately subordinant to both its immediate dissonant context (even within the chord the treble G $\sharp$ is dissonated by an inner voice A) and to the overall dissonant frame of the passage, especially the opening and closing ip (13)s. This is of course just the opposite of the traditional tonal situation, and is thus fully in keeping with the spirit of Seeger's

⁹ See Straus 1995:86-87 on the connection between inversional pivoting and IC1 oblique motion in the music of Ruth Crawford Seeger.

dissonant counterpoint.

It is possible to connect not only bass E (m. 1) and B (m. 2), but also the ending bass note G#, which together arpeggiate an E major triad. This connection can be made on the basis of both placement and register—all the notes are in the bass, E is the first note of the passage, and B and G# are the last and the lowest notes of their respective phrases. But although I think the connection between E and B is audible (mainly because of proximity), the connection with G# is not (because of lack of proximity). Of course, I am not claiming that the passage is “in” E major, but that this triadic bass arpeggiation, in addition to the ip (11-9) suspensions, are residual tonal vestiges surviving in an overwhelmingly dissonant environment.

Ruggles often constructs fairly long outer-voice frames composed exclusively of perfect dissonances, unrelieved by consonances or imperfect dissonances. This extreme vertical IC1 austerity reaches its peak in *Sun-Treader* (first published in 1934).¹⁰ In mm. 77-82, a representative example, every vertical outer-voice interval is either ip (11) or (13) (see Example 4-6). Monotony is avoided by a mixture of parallel and contrary motion, voice-exchanges, and register shifts, in addition to the unfolding motivic momentum of the lines themselves.

Successions of vertical IC1 intervals do not only occur between outer voices.

¹⁰ *Sun-Treader*'s high degree of vertical dissonance is paralleled by its high degree of melodic dissonance. According to Tenney, the work initiated a period characterized by the greatest frequency of linear major 7ths, minor 2nds, and tritones (between adjacencies) in Ruggles's music. *Sun-Treader* contains more linear major 7ths than any other Ruggles work (Tenney 1977:37, 66). *Sun-Treader*'s IC1 outer-voice frame is discussed in Carl 1995:32.

Actually, they can relate any two parts, but when not between outer voices, they often involve one outer and one inner voice. In *Evocations II*, mm. 10-16 (Example 4-7a), the lower two voices consist entirely of IC1 intervals in descending linear segments, forming a separate left-hand IC1 stratum within the four-voice texture. This stratum is clearly divided into three contrasting sections based on differences in register (below or above C4), type of motion (parallel or oblique), comparative interval size (small versus large), and the actual intervals themselves.

In section 1 (mm. 9-11) an initial ip (11) is followed by four ip (13)s and then by four ip (11)s; the intervals are large, the register low, and the motion parallel. In contrast, section 2 (mm. 13-14) is characterized by small intervals, high register, and oblique motion; it consists of six ip (1)s. The middle four form a series of descending chain suspensions in which the sustained note acts as a pitch-space axis around which the moving note inverts;¹¹ then the moving note is sustained and becomes an axis in its turn. As shown in Example 4-7b, at first F $\sharp$ pivots around E $\sharp$ to E $\natural$; then E $\natural$ becomes the axis around which E $\sharp$ pivots to D $\sharp$; and then D $\sharp$ becomes the axis around which E $\natural$ pivots to D $\natural$. There is a kind of conceptual semitone saturation here: the inversional axes descend by semitone and the moving notes invert from a semitone above to a semitone below each axis. This is clearly shown if the descending inversions are written in Lewin's notation as $I_E^{F\sharp} - I_{D\sharp}^{E\sharp} - I_D^E$. Section 3, like section 1, is characterized by large intervals, low register, and parallel motion; it contains four ip (13)s. My discussion of Example 4-7 has been limited to

¹¹ Contrast the pitch-space inversional pivoting in this example with the pitch-class inversional pivoting in Example 4-5.

the lower two voices, but the passage can still be considered a case study of how Ruggles can create differentiation and contrast in what might otherwise be an extremely monotonous succession of IC1 vertical intervals.

4.3 Two-part counterpoint--voice exchange

Ruggles's music is riddled with voice exchanges. The most common are ip (13-11) or (11-13) voice exchanges between adjacent vertical intervals: these have received numerous comments in the literature.¹² Less attention has been paid to Ruggles's non-IC1 voice exchanges, and no one but myself has written about his voice exchanges between nonadjacent vertical intervals (Slottow 1997) .

Seeger did not approve of voice exchanges, stating that "the alternation of tones (cross-relation of octaves) must be used sparingly" (1994:203). As shown in Example 4-8 (Seeger's example 146) the "cross-relation of octaves" refers to two vertical intervals in which the top note of one and the bottom note of the other are the same pitch class. Two simultaneous octave cross-relations equals a voice exchange. However, if Ruggles was aware of Seeger's opinion, he completely disregarded it, since voice exchanges are endemic in his music.

Voice Exchanges Between Adjacent Verticalities

Technically, a voice exchange (hereafter abbreviated as VE) in Ruggles is the same

¹² The phenomenon commonly termed voice exchange is called "note trading" in Peterson 1967:21-22 and Kramlich 1982:30, 93, 95-96; Robison calls it "note swapping" (1991:40). Woo discusses voice exchange in 1993:39-41.

phenomenon as in tonal music, except that it is more likely to connect dissonant than consonant vertical intervals. Although the two voices usually move in contrary motion, this is not always the case. Example 4-9a, the outer voices from measure 77 of *Sun-Treader*, contains three consecutive (11-13) VEs. Example 4-9b shows the linear movement in each VE in terms of both ordered pitch and pitch-class intervals. In pitch space, the first two VEs move in contrary motion, with treble ip $\langle +1 \rangle$ matched by its inversion ip $\langle -1 \rangle$ in the bass; but the third VE moves in similar motion, because the bass ordered pitch interval has changed to ip $\langle +11 \rangle$. In pitch-class space, however, treble pci $\langle 1 \rangle$ is matched by its complement pci $\langle 11 \rangle$ in the bass for all three VEs. Thus voice exchange is fundamentally a pitch-class space operation.

As shown in Example 4-9c, a VE can be viewed in terms of three aspects: (1) vertical intervals, (2) linear intervals, and (3) diagonals. In terms of (1), a VE composes out a single pitch-class interval by transforming it into its complement. In terms of (2), the upper and lower pitch-class linear intervals are also complements. Regarding (3), each diagonal connects two instances of the same pitch class.¹³ In pitch space, as stated, upper and lower lines usually (but not always) move in contrary motion, resulting in expanding or contracting wedges between verticals.

Viewed from a transformational perspective, the first verticality can be considered to map onto the second by either transposition or inversion. Each interpretation highlights

¹³ Although VE is fundamentally a pc-space operation, it of course manifests in pitch space. For this reason and for the sake of consistency I will usually continue to identify vertical intervals in VEs using my modification of unordered pitch interval nomenclature, as explained at the beginning of Section 4.1.1.

different aspects of the VE. As shown in Example 4-9d, the traditional VE sign (the “X”) literally indicates T_0 between notes connected by diagonals. This interpretation emphasizes the pitch-class identity and registral swapping between two vertical intervals. In contrast, the I_9 reading stresses the inversive symmetry between the treble and bass lines.¹⁴

IC1 VEs between adjacent vertical intervals, as in Example 4-9, are the most prevalent, and certainly the most audible, type of VE in Ruggles’s music. They are usually mixed in with other types of relative motion, as in most of the examples for the last section (4.1.1), but occasionally are more concentrated, as demonstrated in the next three examples.

Example 4-10 reproduces the string parts from the ending sequence of the 1924 version of *Marching Mountains (Men and Mountains III)*. The two lower voices (cello 2 and contrabass) consist of four consecutive ip (13-11) VEs that trace the transpositional path T_4 - T_4 - T_5 .¹⁵ Example 4-11, *Evocations II*, mm. 35-36, contains three consecutive IC1 VEs, but moves them around between different voices: first the outer voices (A $\flat$ /G), then the treble and inner left-hand voices (E/F), and then back again to the outer voices (E $\flat$ /D) at the end of m. 32. In Example 4-12, mm. 39-40 of *Evocations II*, outer-voice IC1 VEs dominate a more varied texture that includes vertical consonances and other types of relative motion.

¹⁴ I will return to the topic of multiple transformational readings in Section 4.4.2.

¹⁵ The treble line of this sequence was discussed in Section 2.5.

Voice Exchanges Between Nonadjacent Verticalities

Although most Ruggles VEs occur between adjacent verticalities, some take place over a larger span, with intervening notes in one or both voices. Because VEs compose out a single intervallic sonority, they tend to impose their own segmentation: the area bounded by the VE is experienced as a single space. Just as a VE between adjacencies unifies two verticalities into a single event (the VE), a VE between nonadjacent verticalities tends to fuse whatever happens within its borders into a single process that begins and ends at those boundaries, at least in the participating voices, and often in other voices as well.

A very simple example with one intervening note in the treble occurs in the beginning of *Angels* (Example 4-13). In the first two measures, moving outer voices enclose three sustained inner voices. The outer voices execute an ip (11-13) VE between G and A $\flat$: the bass line is A $\flat$ -G, but the treble is G-B $\flat$ -A $\flat$. Since B $\flat$ is a non-VE note, in the context of the VE it is subsidiary to G-A $\flat$, and functions as an incomplete upper neighbor to A $\flat$.

The next example is only slightly more complex. In *Sun-Treader*, m. 81 (Example 4-14), the endpoints of a B $\sharp$ /B $\flat$ VE are separated by an intervening note in each voice.¹⁶ The voices move in contrary motion--B $\sharp$ -F-B $\flat$ in the treble and B $\flat$ -F $\sharp$ -B $\sharp$ in the bass. In the immediate context of the VE, the treble F and bass F $\sharp$ serve a sort of leaping passing

¹⁶ Similar VEs from *Sun-Treader* can be found in Example 2-35.

function, bisecting ip (11) into $\langle +6, +5 \rangle$ in the treble and $\langle -4, -7 \rangle$ in the bass.¹⁷

In the first two measures of *Lilacs* (*Men and Mountains* II), the first and last chords of a four-chord progression are connected with a $D^{\sharp}/D^{\flat}(C^{\sharp})$ outer-voice exchange (Example 4-15). Later, in mm. 3-5 (Example 4-16), overlapping VEs help to divide the texture into two vertical strata--*overlapping* meaning that the verticality that ends one VE simultaneously begins another. The lower stratum (cellos) consists of a succession of four adjacent vertical IC1 intervals. The last three are connected by two overlapping $C^{\sharp}/C^{\flat}$ VEs, forming the interval succession ip (13-11-13). Likewise, in the upper stratum (violins and violas) three nonadjacent verticalities are connected by two overlapping $F^{\sharp}/F^{\flat}$ VEs, forming the interval succession ip (11-13-11). Notice that the VEs in the upper stratum are slightly skewed rhythmically. In the first two participating verticalities the upper notes arrive, respectively, an eighth- and a triplet eighth-note after the lower notes, so that strictly speaking the vertical intervals are not vertical but slanted. This rhythmic offset creates an interesting segmentation conflict with the four-note treble motives $G-F-B-A^{\flat}$ and $G-F^{\sharp}-B-A^{\flat}$, because the upper boundaries of the VEs begin on the second note of the motives. The result is a sort of cognitive syncopation or added weight on the second note.¹⁸

Another rhythmically skewed VE occurs in *Angels*, mm. 4-8, this time with the

¹⁷ I am using “leaping passing function” loosely. In Schenkerian terminology, a leaping passing tone (*springender Durchgang*) denotes a bass note (approached and left by leap) that provides consonant support to a treble passing tone (approached and left by step). See Schenker 1979:62.

¹⁸ See Section 3.2.3 for further discussion of T/I relationships between chords and lines in these two *Lilacs* passages.

lower line staggered a quarter-note after the treble (Example 4-17). A B/C $\sharp$ (D $\flat$) VE connects the endpoints of two five-note lines in the treble (B-D-C-E-D $\flat$) and bass (C $\sharp$ -E-D-C $\flat$ -B).

This VE extends from the end of m. 4 to the beginning of m. 7. However, it can be extended to the end of measure 8, since the treble D $\flat$ in m. 8 repeats the D $\flat$ from the end of m. 6, and the bass B in m. 7 is sustained to the end of m. 8. The result is two forms of the same voice-exchange--a shorter version within a more extended version.

Note that this is an IC2, not the usual IC1, VE. The horizontalization of a vertical intervals involved in a VE can invoke associated chords or collections of which the interval is a key component. IC2 tends to be associated with whole-tone collections--and indeed, there are WT elements in the passage: the notes of the B/C $\sharp$ (D $\flat$) VE belong to WT₁, the treble ends with the WT₁ descent G-F-E-D $\flat$ embellished by a low C escape tone, and the final chord is a WT₁ sonority. Oddly enough, however, the outer-voice verticalities--ip (9-13-8-13-13)--contain no IC2 intervals at all, because of the quarter-note rhythmic skew between the treble and bass. Staggering the lines has the somewhat paradoxical effect of altering the simultaneous outer-voice intervals from what would have been predominantly IC2 (in hypothetical unskewed form) to IC1 (in actual skewed form). As shown in Example 4-18a, were the outer voices aligned (de-skewed), the resulting interval succession would be ip (10-10-10-3-14), which includes four IC2 and no IC1 intervals. Staggering the bass a quarter-note to the right (Example 4-18b) results instead in ip (9-13-8-13-13), which includes three IC1 and no IC2 intervals. In effect, this enables Ruggles to have his cake and eat it too, in the sense of preserving his usual IC1 outer-voice frame: the

VE is IC2, the outer-voice simultaneities would have been mainly IC2, but the rhythmic skew changes them to mainly IC1.¹⁹

The next example involves VEs between consonances (IC4). Here, unlike the last example, there is no question of maintaining an IC1 outer-voice frame. A series of five overlapping A $\flat$ /C outer-voice exchanges occurs towards the end of *Angels* (Example 4-19), forming the consonant vertical interval succession ip (8-4-8-4-8-4).²⁰ The five small A $\flat$ /C VEs add up to one large summary ip (8-4) A $\flat$ /C VE between mm. 41 and 44, in effect creating two VE levels, an unusual phenomenon in Ruggles. In Example 4-19, the many light lines indicate the local overlapping VEs and the two heavy lines show the large encompassing VE.

As noted earlier, VE intervals can invoke associated chords or collections. Just as IC2 is associated with WT collections, IC4 (in tonal terminology, the major third and minor 6th) is strongly associated with the major triad. The passage certainly has a pronounced A $\flat$ major flavor. In addition to the A $\flat$ /C VEs, many of the verticalities are dissonated A $\flat$ major triads, and the treble line is an A $\flat$ major arpeggio.

Just as the previous example demonstrated a connection between IC4 VEs and the major triad, in my final example a large-scale IC3 VE is strongly associated with the diminished 7th chord. Ruggles's music contains many sequences where the interval of

¹⁹ My rhythmic de-skewing is essentially the same as Rothstein's rhythmic normalization (Rothstein 1990), since I take the de-skewed form as normal and the skewed form as displaced, to use Rothstein's terminology.

²⁰ A similar but less prominent series of overlapping A $\flat$ /C VEs occur in mm. 9-12. Some of these involve one outer and one inner voice.

transposition between statements is T3 or T9, and where the sequence outlines a diminished triad or seventh chord, although the content of the sequential units themselves has little or nothing to do with IC3.²¹ In *Sun-Treader*, mm. 233-36, such a sequence is enclosed within a large-scale IC3 VE between C♯ and B♭ (Example 4-20).²² The sequence is in the treble, and the first notes of each statement arpeggiate an ascending C♯ diminished 7th chord: C♯-E-G-A♯.²³ The bass is not sequential, but consists of the descending line B♭-E-C♯, all notes from the same diminished seventh chord.

IC1-Skewed Voice Exchanges

Not only do most Ruggles VEs connect IC1 vertical intervals, but VEs in Ruggles's music are sometimes "off" by IC1, or IC1-skewed.²⁴ In a plain VE, upper and lower linear ordered pc intervals are complements, and each diagonal connects two instances of the same pitch class. For instance, in a G/A♭ VE (Example 4-21a), treble pci <1> is complementary to bass pci <11>, and diagonal lines connect G to G and A♭ to A♭. Therefore, of course, the ordered pc interval from the bottom to the top of each diagonal line is pci <0>. This is notated on the example by the zeros next to the diagonal lines. Since

²¹ Many examples of these are in Section 3.2.5.

²² This passage was also discussed in Section 2.5.

²³ Strictly speaking, the A♯ should be a B♭, but since Ruggles habitually substitutes enharmonic equivalents, I do not think it matters much.

²⁴ IC1-skewed VEs are analogous to chromaticized VEs in tonal music. They are alterations, or inflections, of normal VEs.

I calculate the ordered pc intervals from the bottom to the top of each diagonal, I will call the line from bass A_♭ (lower left) to treble A_♭ (upper right) the *ascending right* diagonal (it ascends to the right) and line from bass G (lower right) to treble G (upper left) the *ascending left* diagonal (it ascends to the left).

In an IC1-skewed VE, the ordered pc interval for one or both diagonals is pci <1> or <11> instead of <0>. For instance, in the second verticality of Example 4-21b (as compared with 4-21a), bass G has been lowered to G_♭, and treble A_♭ has been raised to A[♯]. Since each diagonal is now a semitone larger, the pci intervals of both ascending diagonals have changed from <0> to <1>. The sum of the two intervals gives the degree of alteration from a plain VE, which I will term VE skew: $1 + 1 = 2$. Since both diagonals have the same pc interval, the upper and lower linear intervals are still complementary--pci <2> in the treble and <10> in the bass.

In Example 4-21c, only one diagonal has been altered from “normal” pci <0>. The intervals of the right and left ascending diagonals are pci <0> and <11>, so the VE skew is 11 ($11 + 0 = 11$). This sets up an asymmetrical situation where upper and lower pci intervals are no longer complementary. Since the diagonal intervals differ by 1 (mod 12), upper and lower linear intervals are also offset from complementation by 1. This can be easily ascertained by adding the top and bottom linear pc intervals: pci <10> + <3> = <1> mod 12.

Example 4-21d presents a situation where both diagonals have been altered from normal pci <0>, but in different directions. The interval of the right ascending diagonal has expanded to pci <1>, and the interval of the left ascending diagonal has contracted to pci

$\langle 1\ 1 \rangle$; together, they sum to $\langle 0 \rangle$. This is a special case where $\text{pci } \langle 0 \rangle$ does not denote a plain VE, but a VE where the two diagonals have been IC1-skewed in different directions, canceling each other out. This case illustrates why the interval number resulting from the summed diagonals alone is not sufficient for an accurate reading of the VE: the two diagonal interval numbers are also needed. As in Example 4-21c, the difference between the two diagonal intervals (2) is reflected in linear intervals' offset from complementation: $\text{pci } \langle 1\ 1 \rangle + \langle 3 \rangle = \langle 2 \rangle$.

IC1-skewed VEs tend to be located in the vicinity of plain VEs. Mm. 18-22 of *Angels* contains five VEs between trumpet I and trombone I--two plain and three skewed (Example 4-22). Diagrams of the VEs are situated underneath the score, with diagonal ordered pc intervals labeled above the treble notes and VE skew numbers placed on the right after equal signs. The succession of VEs alternates expanding and contracting wedges. In all of the VEs, the upper and lower linear intervals are not only complements in pitch-class space, but inversionally related in pitch space as well--for instance, in the first skewed VE, $\text{ip } \langle +2 \rangle$ between B and C $\sharp$ in the top voice is mirrored by $\text{ip } \langle -2 \rangle$ between C and B $\flat$ in the lower voice.

The effect of the IC1-skewed VEs is that of a plain VE that is slightly out of focus, slightly distorted. For example, in the first skewed VE, the mirror symmetry is immediately apparent, but the VE is not quite right--the lower line is a semitone too low. If C $\sharp$ -B $\flat$ were nudged up to C $\sharp$ -B $\natural$, it would suddenly snap into focus.²⁵ This impression of slight

²⁵ Or, of course, the upper line might be heard as a semitone too high. This is less likely, however, since the treble B-C $\sharp$ is an immediate repetition.

“wrongness” is somewhat alleviated by the immediately succeeding C/B plain VE, which is in focus. The third (skewed) VE repeats the first (with C♯ respelled as D♭), but this time is followed not by a plain C/B VE but by a different IC1-skewed version of it: treble C-B has been raised a semitone to C♯-C♯. The last VE is a plain D/E♭ VE.

Example 4-23, *Evocations* 2, m. 46, presents a more complex situation in which a plain G/A VE is followed by nested VEs of different types--a plain F/F♯ VE within a skewed VE. In the skewed VE, the right ascending diagonal connects F♯ to G (pci <1>) and the left ascending diagonal connects B♭ to B♭ (pci <1 1>), resulting in a total VE skew of 0. This is the situation presented in Example 4-21d, in which 0 does not denote a plain VE, but results from two IC1 alterations in different directions--one an expansion, the other a contraction, from the normative pci <0>. Here, as in Example 4-21d, the difference between the diagonals (2), equals the offset from complementation of the upper and lower linear pitch-class intervals: pci <9> + <5> = <2>. In this instance, the linear pitch intervals also are asymmetrical to two degrees: treble ip <-3> above bass ip <+5>.²⁶

In conclusion: the importance of voice exchange has been underestimated in the Ruggles literature. Adjacent plain IC1 VEs lie so thick upon the ground that it is impossible

²⁶ By confining my discussion to IC1-skewed VEs, I have purposely kept to the periphery of the much larger topic of general asymmetrical motion between voices, which is limited neither to IC1 nor to voice exchange. This topic is the focus of Anton Vishio's forthcoming dissertation and two related articles, Vishio 1997 and (especially) 2000. In the latter, Vishio devises two measures: *divergence*, which calculates deviation from perfect parallel motion, and *skew*, which measures deviation from perfect mirrorwise contrary motion. Both are pitch-space measures, although they generalizable to pitch-class space. Lewin 1998 develops the *offset number*, which measures departure from perfect parallel motion. O'Donnell 1997 and 1998 explore similar concerns using split T/I and Klumpenhouwer networks.

not to notice them, and indeed, these have been noticed. But the non-IC1 VEs, the longer-range VEs, and the IC1-skewed VEs have not been noticed. This is a significant omission for several reasons. One is that Ruggles's extensive use of local and long-range VEs is an example of his adaptation of venerable tonal (and pre-tonal) devices to his own idiosyncratic atonal idiom. Another is that his long-range VEs demarcate territory and establish boundaries, aiding segmentation decisions, because a voice-exchange is usually experienced as a single space. A third reason is that the interval class of long-range VEs is connected with the material within the VE: IC1 VEs tend to enclose other IC1s; IC2 VEs can be associated with WT collections, IC3 VEs with diminished chords, and IC4 VEs with major triads. The fourth reason is that IC1-skewed VEs provide further evidence both of the flexibility of Ruggles's compositional devices, and of the importance of IC1 in yet another aspect of Ruggles's music. Not only do VEs often connect IC1 vertical intervals, but their diagonal intervals can be augmented or contracted by IC1.

4.4 Relations between three or more voices

So far I have discussed relations between two voices only. In music with more voices (the usual situation), I have abstracted two voices--either outer voices or one outer and one inner voice--and ignored the others. This procedure is instructive, because Ruggles's polyphony often has a strong two-voice framework, but it is obviously incomplete. In this section I will begin to put back the other voices. I will first talk about the construction of verticalities, and then about voice-leading between verticalities.

4.4.1 The construction of vertical sonorities

It is difficult to make general observations of much precision about Ruggles's verticalities, since they vary widely and continually even in the course of a single passage, to say nothing of an entire work. Moreover, since most of Ruggles's music is primarily conceived melodically and contrapuntally, arbitrary vertical slices tend to resemble snapshots of an onrushing complex of lines whose organization lies less in their cross-sections than in their motivic processes and linear interrelationships. On the other hand, there are reasons to pay attention to verticalities:

- (1) Contrapuntal lines create vertical intervals and sonorities which, even if not governed by strict intervallic regulations, at least tend to exhibit certain recurring intervallic features. Even in Ruggles's most contrapuntal passages, simultaneities formed between lines tend to draw from a limited palette of intervallic characteristics.
- (2) Although the line was Ruggles's primary emphasis, he was keenly aware of the sonorous beauty of the dissonant chord. In Cowell's oft-repeated story about Ruggles banging out a dissonant chord on the piano again and again to "give it the test of time," it is noteworthy that Ruggles plays a *chord*, not a line or a short contrapuntal passage. He is reported to have hung a sign in his Arlington schoolhouse on which was written: "Dissonant chords should have talismatic ecstasy" (Ziffrin 1994:243).²⁷

²⁷ Ruggles and his wife Charlotte lived in a former schoolhouse in Arlington, Vermont.

(3) Not all of Ruggles's music is densely contrapuntal. Some passages are relatively homophonic, lending themselves more easily to analytical and audible segmentation into discrete verticalities.

(4) Not all chords are of equal status. A vertical slice from the middle of a double canon may primarily be a byproduct of contrapuntal activity, but (to pick the most obvious example) a cadential chord is primarily a vertical sonority, whatever the voice leading preceding it.

As mentioned, set class membership and cardinality of verticalities tend to vary continually in Ruggles pieces. However, certain intervals or interval combinations do repeat, creating recurrent subsets. Stated in brief, three intervallic characteristics apply to Ruggles's chords: (1) almost all of them contain at least one instance of IC1 (I call this *obligatory* IC1); (2) some chords contain dissonated perfect fifths, in the sense described in Section 3.2.7, except applied vertically rather than horizontally; and (3) some chords fill in a fifth with a third, double the treble at the lower third, or seem constructed from stacked thirds of different qualities. Although all three can be found in all of Ruggles's works, to a certain extent each tendency derives from and is most strongly expressed in different periods of his compositional career. Lines doubled in thirds and chords constructed from stacked thirds are found most frequently in early pieces such as *Toys* and *Angels*, and resurface again to some extent in *Organum*. Obligatory IC1, while present throughout, reaches its maximum density in *Sun-Treader*. And dissonated perfect fifths are most prevalent in Ruggles's later pieces (*Evocations* and *Organum*) and in the sketches and unfinished pieces he worked on afterwards.

Obligatory IC1

It has often been stated in the literature that IC1 is a nearly constant component in Ruggles's sonorities--the dash of salt, so to speak, that characterizes the typical Ruggles chord.²⁸ Robert Carl writes that every note must be "in dissonant relation with at least one other simultaneous note" (1995:31). This is a little extreme, although it is sometimes true, especially in *Sun-Treader*, the most IC1-saturated of Ruggles's works. I agree rather with Tucker Robison that the overall norm is at least one IC1 interval in a Ruggles verticality (1991:38). By the same token, vertical sonorities that lack any IC1 presence stand out on that account alone.

In most of the examples in Sections 4.2 and 4.3 two particular voices are related by IC1 for some appreciable period of time. But such stability is not necessary. As long as IC1 is present somewhere, even if it jumps around between different voice-pairs in every new verticality, obligatory IC1 inclusion is satisfied.

A good example of this can be found in *A Clear Midnight*, mm. 14-18 (Example 4-24). Vertical IC1s are bracketed and labeled. Almost every verticality contains at least one instance of IC1. This taken care of, other vertical intervals are not obliged to belong to IC1, although in two cases they do, forming chromatic pitch-class clusters. M. 17 begins with A2/B3/C4/B♭4, which forms sc 4-1 (0123), and m. 18 with E4/F♯4/F5, an instance of sc 3-1 (012). In most cases, the vertical IC1s are ip (11) or (13) rather than (1), which is

²⁸ See also Harrison 1955:16-18, Ziffirin 1968:190, Kirkpatrick 1968:153-54, Dombek 1980:30-31, Kramlich 1982:95, Orkiszewski, 1988:76-79, and Robison 1991:35-38.

consistent with Ruggles's preference for open spacious registration. For this reason, the short piano line that ends the passage, D4-D3-C2, with interval succession ip <-13,-13>, sounds like an arpeggiated IC1 cluster. Note that there is no consistency in which voices are related by IC1 in any given verticality. For instance, there are only two voices in the second half of m. 14 (piano E2 and voice D4), and these are connected by ip (11). But on the first beat of m. 15, the number of voices expands to four, and ip (11) shifts position, now connecting inner voice G3 in the cello and treble F4 in the voice.

Example 4-24 contains only two instances of multiple simultaneous vertical IC1 intervals, and these are nonadjacent. But sometimes two or even more pairs of IC1-related voices are present for long periods, especially in *Sun-Treader*. IC1 is operative not only within each voice-pair, but sometimes between voice-pairs as well, creating a sort of IC1 super-saturation. Example 4-25, *Sun-Treader*, mm. 73-76, contains two clearly articulated pairs of IC1-related voices. In the outer voices, every vertical interval except the very last (m. 76) belongs to IC1. This voice-pair is highlighted by register (highest and lowest), relative motion (contrary), and instrumentation (strings, winds, and tubas). Outer-voice intervals are labeled underneath the music. The trumpets and trombones constitute a second IC1 voice-pair (until the end of m. 75), which is also highlighted by register (middle) and instrumentation. Trumpet-trombone intervals are notated between the second and third staves. The horns, which play in unison after m. 72, constitute the remaining voice. They are not exclusively coupled with any other voice, but almost every horn note forms one or more IC1 intervals with notes in other voices. I have not identified these intervals on the example. Set classes for each verticality are labeled at the bottom of the example.

As in Example 4-24, the multiple IC1-related voice-pairs create pitch-class chromatic clusters of three or more notes. This is reflected in the set class nomenclature, since consecutive numbers indicate IC1 relations. There are forty-eight verticalities in mm. 72-78, all with cardinalities of 3 to 6. Twelve are complete IC1 clusters--six 5-note, five 4-note, and three 3-note; members, respectively, of set classes (01234), (0123), and (012). In addition, fourteen more verticalities have chromatic clusters as subsets--three have sc (0123), and eleven more--not counting the three with sc (0123)--have sc (012). Every remaining verticality contains at least one, and often two, IC1 intervals that do not form chromatic clusters. For instance, in m. 72 the instance of sc (0134) contains two IC1 intervals, but does not fill in a pitch-class chromatic zone.

Dissonated fifths

Combinations of perfect fifths and semitones (more generally, IC5 and 1), although present in Ruggles's earliest pieces, began appearing with increasing frequency in Ruggles's music after *Vox Clamans in Deserto* (1923), and became a major compositional preoccupation in his later years.²⁹ They can take the form of either IC1-related IC5 dyads or IC1-dissonated IC5 dyads. The former consists of two IC5 dyads in which one or both notes of the first dyad are related by IC1 to one or both notes of the second dyad. The latter consists of an IC5 dyad in which either note is dissonated by an IC1-related note. Therefore IC1-related IC5 dyads are tetrachords, and IC1-dissonated IC5 dyads are

²⁹ To avoid unnecessary repetition, the words *fifth* and *fourth* will automatically mean perfect fifth and perfect fourth unless indicated otherwise.

trichords. Sometimes the IC5 dyads are dissonated with IC2 instead of IC1, which creates a milder effect, but this is exceptional. Linear dissonated IC5-dyads are discussed in Section 3.2.7, but Ruggles also used them in verticalities. The possibilities are shown in Example 4-26, a slightly simplified copy of Example 3-60. In the example, IC5 and IC1 are represented in pitch space by fifths and semitones.

Example 4-26a shows the possible combinations of semitone-related fifths, with F-C as the referential fifth. Transposition levels between fifths are indicated underneath; set classes are shown above. The five possible combinations correspond to only three set classes: 4-20 (0158), 4-8 (0156), and 4-9 (0167). Example 4-26b is a similar reference chart for fifths dissonated by a single semitone. Here the four options correspond only to the two set classes 3-4 (015) and 3-5 (016). Transposition levels are given only from the dissonated note of the fifth to the dissonating semitone. In Section 3.2.7 I described semitone-dissonated fifths by the location of the dissonating semitone above or below the lower or upper note of the fifth. This language can be made more applicable to pitch-class space by referring to the dissonating note as $\text{pci } \langle 1 \rangle$ or $\langle 11 \rangle$ from the upper or lower note of the fifth or fourth (*fifth* and *fourth* will also denote octave compounds). Example 4-27 presents a possible version (out of many) of Example 4-26 with the fifth/semitone combinations realized as verticalities (the two examples are vertically aligned). In this particular realization the referential fifth F/C is in the bass, and vertical intervals between fifths in 4-27a and between IC1-related notes in 4-27b are labeled with my modified unordered pitch intervals.

An illustration of Ruggles's experimentation with IC1-related IC5 dyads can be

found in Example 4-28, from a 1952 letter to John Kirkpatrick (Ziffrin 1994:209, example 44).³⁰ This sketch consists of two upper and two lower voice-pairs, each (up to m. 6:3) consisting of vertical IC5 dyads, mostly perfect fifths with some perfect fourths. Upper and lower IC5-dyads are related mainly by ip (11) or (13), and sometimes by ip (6). As a result, the vertical sonorities instance only two set classes, since, as shown in Example 4-27a, IC1 between two IC5-dyads results in sc 4-8 (0156), and IC6 between two IC5-dyads results in sc 4-9 (0167). Note that the contrapuntal interaction between treble and bass IC5-dyads is very similar to plain two-part dissonant counterpoint. For instance, in m. 1 (repeated in m. 2), the bass fifth is sustained while the treble fifth pivots around it in an ip (13-11) succession, and m. 6 contains an ip (11-13) voice exchange.

There are few vertical dissonated-fifth passages in Ruggles's published works quite as baldly explicit as this sketch--Ruggles tended to show his hand less plainly in finished pieces--but similar combinations can be found in his late works. Sometimes the fifths are filled in with thirds.³¹ Many examples can be found in *Organum*, which was given its title by Varèse mainly because of its parallel fifths and fourths. Example 4-29 reproduces mm. 23-30 of Kirkpatrick's piano arrangement. The passage begins with a four-chord phrase, labeled phrase 1, followed by a modified repetition, labeled phrase 2.

In phrase 1, the outer voices of the first three chords (doubled in octaves) form a succession of parallel fifths in which the fourth chord does not participate, because the

³⁰ My comments of this passage draw from Ziffrin 1994:207 and especially from Brown 1999:147-48. I have used six of the seven plus measures reproduced in Ziffrin.

³¹ Chords primarily constructed from stacked thirds will be discussed below.

outer-voice motion changes from parallel to contrary motion--ip <+3> in the treble over ip <-3> in the bass--resulting in outer-voice interval ip <13>. This is changed in phrase 2, where the outer voices of all four chords form parallel fifths. In both phrases, as will be shown below, there is considerable shared material between vertical sonorities and horizontal lines.

The change from parallel to contrary outer-voice motion in phrase 1 groups the first three chords together and isolates the fourth. The first three chords form a unified zone saturated with vertical and horizontal dissonated fifths. Examples 4-30a, b, and c build up these chords in three stages: (1) fifths, (2) dissonated fifths, and (3) dissonated fifths plus thirds.

As shown in Example 4-30a, the outer voices form vertical fifths that descend a horizontal fifth from chords 1 to 3, creating a box whose top and left sides consist of the fifth B/F $\sharp$ (shown by solid lines) and whose bottom and right sides consist of the fifth E/B (shown by dotted lines).³²

As shown in Example 4-30b, each fifth is dissonated, but the horizontal fifths are dissonated differently than the vertical fifths. In each horizontal fifth, the dissonating note (in chord 2) is located pci <1 1> from the top note of the fifth, forming an instance of sc 3-5 (016). But in the vertical fifths, the dissonating notes in chords 1 and 3 are located pci <1> from the top notes of the fifths, forming instances of sc 3-4 (015); and the dissonating note in chord 2 is located pci <2> from the top note, forming an instance of sc 3-7 (025). Thus,

³² See the opening of *Evocations 4* (discussed in Section 3.2.7) for a similar case of fifths descending a fifth.

treble linear fifth $F^{\sharp}-B$ is dissonated by $F^{\sharp}$, but chord 1 vertical fifth $B/F^{\sharp}$ is dissonated by G ; bass linear fifth $E-B$ is dissonated by B , but chord 3 vertical fifth E/B is dissonated by C . In chord 2, the vertical fifth B/F is dissonated by G , an IC2 rather than an IC1 interval, because the dissonating G in chord 1 is restructed instead of descending to F .

In the third stage, as shown in Example 4-30c, the treble line is doubled at the lower minor third, converting the dissonated vertical fifths into sonorities that can be interpreted as dissonated major triads--sc 4-19 (0148) for chords 1 and 3 and sc 4-26 (0358) for chord 2. Doubling the treble at the lower third is a practice that dates from Ruggles's earliest published works. In summary, the first three chords of phrase 1 are constructed on a framework of two fifths, each presented in horizontal/vertical pairs; the fifth-pairs are then dissonated in various ways, which necessitates the inclusion of chord 2; and finally the vertical fifths are filled in with thirds.³³

Chord 4, which is approached in contrary rather than parallel motion, shares many of the intervals of the first three chords, but in a different registral arrangement. As shown in Example 4-30, it contains a perfect fifth (C/G), but between the bass and a middle voice instead of between the outer voices; the fifth is dissonated (by D), but by pci <1> from the bottom instead of the top note of the fifth, resulting in membership in sc 3-5 (016) rather than 3-4 (015); and the treble D is doubled by B a minor 10th below (instead of a minor third). With the arrival of chord 4 the treble line becomes a member of sc 4-18 (0147),

³³ I do not make global claims for this order of procedures. A hypothetical construction based on the elaboration of fifths works well with this passage because the fifths are prominently placed in the outer voices. In other passages (most notably in *Sun-Treader*), it would seem more plausible to accord a conjectural precedence to outer-voice IC1 dyads.

which can be parsed as a dissonated minor triad, and which is not too far distant from sc 4-19 (0148), instanced by chords 1 and 3. Both the bass line and chord 4 are members of sc 4-13 (0136). Thus the horizontal/vertical pairing based on identical 5ths (E/B in the bass line and chord 3, and B/F $\sharp$ in the treble line and chord 1) is paralleled to some extent on the set class level by sc (0136) in the bass line and chord 4, and set classes (0147)/(0148) in the treble line and chord 1.

Phrase 2, a modified repetition of phrase 1, functions very much as a contrasting echo (see Example 4-31). Rhythmically and metrically identical, the dynamics are softer, the register lower, and the texture sparser, since there is less doubling at the lower octave and almost none at the lower third. Since chord 4 is now integrated into the outer-voice parallel fifth succession, it acts as a continuation rather than a contrast. Almost every vertical fifth is dissonated, but the location of the dissonating note in relation to the fifth is different in every case from in phrase 1. Chord 1 fifth B/F $\sharp$ is not dissonated at all. The chord 2 fifth B $\flat$ /F is now dissonated by F $\sharp$ instead of G, pci <1> instead of pci <2> from the upper note of the fifth. Chord 3 fifth E/B is now dissonated by D $\sharp$ instead of C, pci <1 1> from the lower note instead of pci <1> from the upper note. The largest change concerns chord 4. Since the outer voices are now approached in parallel motion by ip <+3>, the bass has changed from C $\sharp$ to G, which is dissonated by F $\sharp$, pci (11) from the bottom note of the G/D fifth. The F $\sharp$ proceeds to E $\sharp$, changing the dissonation from pci (11) to (10). Curiously, whereas in phrase 1 chords 1-3 could be parsed as dissonated major triads but chord 4 could not, in phrase 2 the reverse is the case; and now both treble and bass lines form members of sc 4-18 (0147), which can be parsed as a dissonated minor

triad, instead of only the treble line as in phrase 1.

Example 4-32 shows phrases 3 and 4 of the *Organum* excerpt. Ten out of the twelve verticalities are constructed from IC1-dissonated or IC1-related fifths, sometimes filled in with thirds. The first chord of m. 28 contains two fifths related at T6: $F/C\sharp$ and C/G . Both pitch classes of both fifths are dissonated-- $F\sharp$ by G and $C\sharp$ by C . The $F/C\sharp$ fifth is filled in by $A\sharp$. The second chord in m. 28 is identical to the first except that bass F descends to $F\flat$, a small change that nonetheless creates new alignments of fifths. Now the two fifths are F/C and C/G , related at T7 and overlapping on C . C is IC1-dissonated by $C\sharp$, and F is IC2-dissonated by G .

Phrase 4 begins with three pairs of chords. In each pair, the two chords are related via an IC1 voice exchange--the first between $D\sharp$ and E , the second between the fifths $C\sharp/G\sharp$ and D/A (a double voice exchange), and the third between C and B . In the first two pairs, the two constituent chords form identical pitch-class sets, whereas in the third a member of sc 3-4 (016) transforms into a member of sc 3-5 (015). As indicated in the chord diagrams, all six chords are composed of IC1-related or IC1-dissonated fifths. In the first pair, A/E is dissonated by $D\sharp$ and filled in with $C\sharp$. In the second pair, D/A is juxtaposed with $C\sharp/G\sharp$, and in the third pair, F/C is dissonated by B . The two ending chords (m. 30) also contain dissonated fifths. In the first, the two overlapping fifths $D\sharp (=E\flat)/B\flat$ and $B\flat/F$ are dissonated by bass E ; in the second, G/D is dissonated by bass $G\sharp$.

Thirds

In the *Organum* excerpt just discussed, chords are primarily constructed from

dissonated fifths, but the fifths are sometimes filled in with thirds that double the treble line. Doubling the treble at the lower third is most often found in Ruggles's earliest published music (*Toys* and *Angels*), and is undoubtedly a holdover from tonal practice. Ziffrin comments in reference to *Angels* that "another aspect of Ruggles's music that softens the dissonant effect is his use of thirds and sixths to support his main melodic line. This is a characteristic that is found in some of his later compositions as well" (1968:195). A good example occurs in *Angels*, mm. 12-19, where the top two lines move almost entirely in homophonic major and minor thirds, marked on Example 4-33 as ip (3) and (4). The presence of these smooth consonant thirds in a decidedly dissonant environment creates an unsettling and somewhat eerie effect, since the thirds are sabotaged at every step by IC1-related notes in other voices (marked with brackets on the example). It is interesting that Ziffrin finds that the use of thirds "softens the dissonant effect."³⁴ This suggests the intriguing possibility that, just as consonant intervals and sonorities can be *dissonated* (usually by IC1), so can dissonant intervals and sonorities be *consonated* by thirds and sixths. It works both ways--both aspects are symbiotic.

In addition to doubling the treble in thirds, Ruggles's early published music includes chords largely constructed from stacked thirds of different qualities that can be parsed as triads or seventh chords plus dissonating notes. For instance, the strong A $\flat$ flavor at the end of *Angels* is caused by repeated A $\flat$ major triads in linear arpeggiations and

³⁴ Nicholls, writing about *Vox Clamans in Deserto* and the first version of *Angels* (1921), also mentions how dissonant outer voices "as well as the subsidiary middle line, are shadowed quite consistently by secondary parts, often at the third or sixth" (Nicholls 1990:97-98).

vertical subsets, reinforced by a network of A $\flat$ /C outer-voice exchanges (shown in Example 4-19). In Example 4-34, the linear arpeggiations are bracketed and the verticalities containing A $\flat$ triads are numbered and shown under the score.

For the most part, only a single pitch class in any given vertical A $\flat$ major triad is dissonated by one or more IC1-related notes. The dissonating notes are usually semitones--where there are more than one, they form little pitch-space chromatic clusters. The A $\flat$ triads appear in both 5/3 and 6/3 positions. Chords 2, 5, 7, and 9 contain 5/3 triads. In chords 2, 5, and 7, E $\flat$ is dissonated--in 2 and 5, by E $\natural$ and D, and in 7 by E $\natural$ and F. In chord 9, the final chord of the piece, two notes are dissonated--E $\flat$ by E $\natural$ and C by C $\sharp$. Chords 1, 3, and 4 contain 6/3 triads. Chords 1 and 4 dissonate C with C $\sharp$, but chord 3 dissonates E $\flat$ with E $\natural$. Chord 6 doesn't so much contain as suggest a 6/3 triad by its participation in the outer-voice A $\flat$ /C voice exchanges, because the chord contains only two notes that are members of the A $\flat$ major triad, and four notes that aren't. It functions more as a contrapuntal chord between two chords with a strong 5/3 A $\flat$ triadic presence.

Chord 8 is especially interesting. It is actually a pitch-class chromatic cluster, a member of sc 6-1 (012345). But due to its registration and outer-voice frame--E $\flat$ 5/C5 over bass D $\flat$ 3--it suggests a highly attenuated and mutated remnant of a chord that Ruggles used in his sketches for *The Sunken Bell* and that Kirkpatrick described as "...evidently one of Carl's favorite chords at this time, a spread-out major triad undergirded by its subdominant" (Kirkpatrick 1968:151). The bass line for chords 7, 8, and 9 is A $\flat$ -D $\flat$ -A $\flat$, suggesting a plagal cadence. This chord appears in full and undissonated form as the E major chord over bass A that begins Example 4-35, from a *Sunken Bell* sketch dated ca.

1914 (McMahan 1993:141, Example 2).³⁵

A very similar “plagal” ending occurs at the end of the coda to *Marching Mountains* (*Men and Mountains* III), which Ruggles added to the piece in 1942 (Kirkpatrick 1968:161). As shown in Example 4-36 (strings and tympani only), the piece ends on a chord with sustained notes B $\flat$ 2/A3/F $\sharp$ 4 in the top voices over oscillating bass notes D and G (labeled chords I and II), finally ending on D. Chord I is a D major 5/3 triad with A dissonated by B $\flat$. The dissonating B $\flat$, however, becomes the upper minor third of G in chord 2, Kirkpatrick’s “major triad undergirded by its subdominant,” a D major triad with G/B $\flat$ in the bass. D is not literally present in chord 2, but since it is not registrally displaced from chord I, it can be assumed. Here the chord is far less attenuated than at the end of *Angels*, where it is more hinted at than actually present.

Not all chords constructed with stacked thirds in Ruggles’s early music are major or minor triads. For instance, in *Toys*, m. 2 (Example 4-37), both the piano left hand and the vocal line (up to the last note) clearly express a C $\sharp$ 7 chord, with the voice in root position and the piano in first inversion. Since the bass determines the inversion, the overall chord is in $\frac{6}{5}$ position. In this context, the right hand piano E and D are dissonating notes that form IC1 intervals with the bass E $\flat$, and the voice A $\flat$ is a passing note between G $\flat$ and B $\flat$. However, although this reading is valid as far as it goes, it is clearly incomplete, because it fails to address the strong whole-tone component of the passage. The C $\sharp$ $\frac{6}{5}$ chord, a member

³⁵ McMahan writes that this example conflates a version from a letter from Ruggles to Rockwell Kent dated Nov. 11, 1914 (reproduced in McMahan 1993:137, Figure 1) with a version from another MS (Ibid:141).

of sc 4-27 (0258), can be viewed as a $WT_0 + E\flat$ collection--that is, every note but $E\flat$ is a member of WT_0 .³⁶ Moreover, the entire measure can be read as a larger $WT_0 + E\flat$ collection that includes the complete WT_0 collection (including E and D, of course), forming a member of sc 7-33 (012468T). This reading is consistent with the overall whole-tone concerns of *Toys*, which were discussed to some extent in Section 2.5.

Another half-diminished chord, this time a $B\flat^{\#7}$, appears in the piano left hand in m. 6, forming a $WT_0 + D\flat$ collection. In the the first two thirds of the measure, the right hand plays a sort of filigree cyclic figure consisting of (G-A $\flat$ -D) (G-A $\flat$ -E $\flat$ -D) (G-A $\flat$). If G is considered an incomplete lower neighbor to A $\flat$, and E $\flat$ an incomplete upper neighbor to D (marked "N" on Example 4-37), the first two thirds of the measure can be viewed as essentially a $WT_0 + D\flat$ collection. This reading makes mm. 2 and 6 in some sense parallel measures--both have half-diminished seventh chords in the piano left hand and both are $WT_0 +$ collections, the first a member of sc 7-33 (012468T) and the second of sc 5-28 (02368).

This discussion of chord construction has focused on three aspects: (1) obligatory IC1, (2) dissonated fifths, and (3) thirds. Although I have presented these aspects separately in the interests of clarity and chronology, it is difficult to keep them separate, because, although one aspect might be more dominant in certain works and periods, they nonetheless all tend to occur together. Obligatory IC1 is present in every Ruggles work,

³⁶ The term and the concept of the *whole tone +* collection is taken from Headlam 1996:63.

although it is most extreme in *Sun-Treader*. Dissonated fifths can be found as early as *Angels* and never quite disappear, although they dominate the *Evocations* and *Organum*. Doubling in thirds and chords constructed from stacked thirds are most common in *Toys* and *Angels*, but any dissonated fifth filled in by a third becomes a stacked-third chord. Ultimately, which aspect is considered predominant in any given piece is a matter of emphasis.

With the exception of the WT + collections in *Toys*, my discussion of verticalities reflects my conviction that, at least as concerns commonalities of chord construction, complete chords are generally of less interest than their shared subsets. These shared subsets prove to be of great importance in voice leading between chords, the subject of the next section.

4.4.2. Voice leading between vertical sonorities

The caveats given at the beginning of the section on chord construction (Section 4.4.1) also apply to chordal voice leading. These caveats concern the problem of reifying a given vertical slice by identifying it as a chord—an integral vertical entity. Obviously, homophonic textures are easy to conceive as a succession of verticalities. But in highly contrapuntal textures with fluctuating numbers of rhythmically independent lines, segmentation into discrete chords is more problematic. For this reason, most of the examples in this section are more or less homophonic.

Voice leading between verticalities usually involves T/I (transposition and inversion) and split T/I, operations previously discussed in reference to linear motivic

transformation (see Section 3.2.3). Very generally speaking, transposition is more common than inversion, and split transposition more common than regular transposition, but typically they are all combined to some extent. T/I between verticalities, as between linear motives, often (not always) involves IC1, usually in the form of split-T or split-I numbers that differ by 1, or in the form of regular T or I numbers 1 or 11.

Example 4-38, *Evocations* III, mm. 23-26, contains two particularly clear T_{11} and T_1 successions. The excerpt consists of two homophonic passages (mm.23-24 and 26) separated by a contrasting contrapuntal measure in more rapid note values (m. 25); I will discuss only the homophonic measures.³⁷ The voice leading in mm. 23-24 is characterized by T_{11} , and that in m. 26 by T_1 .

M. 23 contains three chromatically descending minor thirds: A/C-G $\flat$ /B-G $\flat$ /B $\flat$. The basic voice leading is T_{11} - T_{11} , as indicated by Ruggles's dotted lines. However, the second third, which is in a higher register, overlaps with the preceding and following thirds, increasing the number of sounding voices from two to four, altering the set class from 2-3 (03) to 4-3 (0134), and forming an ip (11-13) suspension between treble and bass thirds.³⁸ Since each third is sustained into the time-frame of the next, strictly speaking the voice leading is T_{11}/T_0 - T_{11}/T_0 , as shown on the example. Thus IC1 is present between

³⁷ Robison (1991:85-87) discusses m. 25 in terms of embedded linear and vertical instances of sc 3-5 (016).

³⁸ Ruggles often thickens texture or creates new lines by sustaining previously struck notes.

thirds both vertically and linearly.

In m. 24 the number of voices increases from four to six, and sc (0134) becomes embedded as a subset in four members of sc 6-z47 (012479), each descending by ip <-1> to the next. Since G/B^b (at the end of m. 1) maps onto $A/F^{\sharp}$ (at the beginning of m. 2) by T_{11} , in the process inverting from a minor third to a major sixth, both measures can be viewed as a continuous T_{11} chain in which the number of voices expand from two to four to six. However, only the original two voices traverse the entire T_{11} chain, both moving by T_6 from their first to their last notes: C to G^b and A to E^b . As in m. 23, the voice-leading IC1 intervals between chords are paralleled by vertical IC1s within chords, since the upper minor third and the lower major sixth of each chord (boxed on the example) form ip (13), as shown on the example.

M. 26 is in some ways a counterpart to mm. 23-24. Both passages consist of mostly homophonic chord progressions, and in both the interval of transposition is an IC1 interval-- T_{11} in mm. 23-24 and T_1 in m. 26. However, the verticalities in m. 26 are quite different from those in mm. 23-24, consisting of tritones in close position with the treble note doubled an octave below. Not only are adjacent tritones connected by T_1 , but the entire line of tritones composes out a large T_1 from $A/D^{\sharp}$ to $A^{\sharp}/E$. This occurs because the tritone maps onto itself at T_6 , so that, in terms of pitch-class content, T_6 equals T_0 . The entire line is clearly subdivided into $T_6 (=T_0) + T_1$. The second appearance of $A/D^{\sharp}$ is highlighted in three ways: (1) it is at least twice as long as any of the other verticalities;

(2) it occupies the lowest register; and (3) it is the only verticality where the treble is not doubled, making it (in terms of pitch) a dyad, not a triad.

Example 4-39, *Sun-Treader*, mm. 63-66, consists almost entirely of a succession of parallel instances of sc (016) in <5-6> registral layout.³⁹ I will omit discussion of the horn part, which runs counter to the homophonic texture of the other voices. As discussed earlier (Section 3.2.3, Example 3-31), the passage is an example of cumulative end-extension in which a motive is progressively expanded by the addition of descending semitones from four to five to six to eight notes (the segments are marked above the staff). The texture consists almost entirely of three voices, of which the treble is doubled an octave lower, but in the last three chords (m. 66) the lower octave-doubled voice sustains B instead of continuing to follow the treble, thereby expanding the texture to four voices. The passage, like so much of *Sun-Treader*, has a strong IC1 outer-voice frame--the outer voices move entirely in parallel motion at ip (11) until the final two chords, when they change to contrary motion for an F/G $\flat$ voice exchange. In the example, the outer-voice intervals are shown directly under the score.

Until the middle of m. 65, the additive semitone end-extensions occur equally in all three voices, producing a chain of parallel instances of sc 3-5 (016). Afterwards, the middle voice becomes more independent, moving less in lockstep with the outer voices. Its divergences take three forms: (1) moving homorhythmically with the other voices, but by a different interval; (2) sustaining a note while the other voices proceed to the next note; and

³⁹ As explained in Section 3.1, registral layout is notated as a succession of ordered pitch-class intervals from the lowest to the highest note.

(3) moving to another note while the other voices sustain notes. All three types of divergence produce split-transpositions, many characterized by IC1. Divergence (2) results in T_{11}/T_0 in every case except the T_6/T_0 in m. 66, where B maps onto both B and F, expanding the texture to four voices. The sole instance of (3) produces T_0/T_{11} between chords 4 and 5 in m. 66. Of the two instances of (1), the first creates T_7/T_8 in m. 65 (the other produces T_{11}/T_9 in m. 66).

The passage ends with a double voice exchange in which outer voices $G\flat$ and F map onto each other, and inner voices B and C do the same. Since both chords are members of set class 4-9 (0167), which is inversionally symmetrical, they can relate by either I_{11} or T_0 , as indicated on the example.⁴⁰ Each interpretation brings out different aspects of the progression. T_0 reflects the sustained inner voices and the $F-F/G\flat-G\flat$ diagonals, but is completely static, since every pitch class maps onto itself--movement derives solely from the registral swapping between outer voices. I_{11} is more dynamic and reflects both the inversive relationship and the contrary motion between outer-voice $F-G\flat$ and $G\flat-F$. This reading involves what Joseph Straus calls a "static voice exchange" between inner voices C and B--a voice exchange in which the voices do not actually move (Straus 1997:245-46). An attraction of the idea of static voice exchange is that it charges the sustained C/B dyad with the tension of invisible motion, complementing the visible motion

⁴⁰ Straus points out that inversionally symmetrical chords can be related by either transpositional or inversive voice leading, and discusses several examples (Straus 1997:248, 254-57).

of the F/G $\flat$ outer-voice exchange. Another possible criterion for choosing between the I_{11} and the T_0 readings is the coincidence of pitch-class voice-leading lines with actual registral lines, especially since the voice-leading lines duplicate the registral lines for the entire passage up to the last two chords. But here too there is no clear choice: in the I_{11} reading, outer voices duplicate registral lines; in the T_0 reading, inner voices duplicate registral lines. Ultimately, I would decide in favor of I_{11} based on the relative primacy of outer versus inner voices. In this passage, the outer-voice ip (11) framework is completely consistent from beginning to end, whereas after the middle of m. 65 the inner voices do not relate to the outer voices by a consistent interval or interval class.

The difficulty at arriving at a definitive reading for the last two chords illustrates the fact that multiple voice leadings can connect any two chords. This is always the case when the two chords are inversionally symmetrical, but multiple readings can occur even when they are not.⁴¹ Ultimately, there is no definitive reading--the criteria for a choice between several possibilities are contextual and subjective. We shall see more instances of this in succeeding examples.

The preceding two examples contain more transposition than inversion, and more regular than split transposition. The remaining examples, rather more typically for Ruggles, contain more split transposition and inversion (both split and regular). A classic, almost textbook, case occurs in *Marching Mountains (Men and Mountains III)*, mm. 19-22 (Example 4-40a). The passage has three voices, and is unusually homophonic and

⁴¹ See Straus 1997:272-73 on multiple voice-leading interpretations.

rhythmically regular for Ruggles, rather like a dissonant species counterpoint exercise. It functions as a brief period of stasis between more active contrapuntal sections, and consists of two phrases of two measures each. In the first phrase, m. 2 is a very slightly modified repetition of m. 1; the second phrase is through-composed. Although adjacent verticalities are mostly members of different trichord-classes, every verticality contains ip (11) or (13), usually but not always between outer voices (both set classes and IC1 dyads are indicated in the example directly under the score).⁴² Put another way, every vertical trichord contains set class 2-1 (01) as a subset. These sc (01) members map onto one another by either T or I, providing a voice-leading path through the passage.⁴³ The remaining pitch classes in the trichords follow the T or I lead of the IC1-dyads. Where adjacent verticalities are members of the same set class, the trichords can relate by regular T or I (but do not always do so--see discussion below); where they are not, as is usually the case, they relate by split-T or split-I.

At this point the issue of multiple possible readings again becomes relevant. As stated, members of different trichord-classes with sc (01) subsets relate by split-T or split-I. But which one? Split-T or split-I? The answer is that both are possible, because the IC1-dyad subsets (like any dyads) can map onto each other by either T or I. One interpretation produces horizontal voice-leading, the other produces diagonal voice leading. In the case of *parallel* ip (11)s or (13)s--i.e., ip (11-11-11-11) or (13-13-13-13)--a transpositional

⁴² The last trichord is a member of sc 3-1 (012) and contains both ip (11) and (13).

⁴³ Although Robison (1991:36-38) does not discuss voice leading, he labels the set class membership of each verticality, and notes "the constant presence of minor seconds and the apparent free use of intervals other than seconds" (Ibid:36).

reading creates horizontal lines, and an inversive reading creates diagonal lines. In the case of *alternating* (11)s or (13)s, the opposite is the case: an inversive reading creates horizontal lines, and a transpositional reading creates diagonal lines. This phenomenon is demonstrated in the example by two readings of the first seven vertical IC1 dyads, the first emphasizing diagonal voice leading (crossing registral lines), and the second emphasizing horizontal voice leading (following registral lines).

When the third pitch classes in the trichords are added back into the mix, so to speak, the mappings between them conform to the T or I interpretation given to the IC1 dyads. My reading of the trichord voice leading is given towards the bottom of the example. In every case, IC1 dyads (identified for reference) map onto one another. In the last chord, which contains both ip (11) and (13), I have taken (13) as primary, since it occurs between outer voices. My interpretation of this passage emphasizes horizontal voice-leading, mainly because I feel that mappings that coincide with registral lines are easier to hear than those that do not, especially when, as here, the registral lines often act as timbral lines as well.

Sometimes it is more appropriate to read the connection between two members of the same set class as a split rather than a single operation.⁴⁴ For instance, the third and fourth trichords in m. 19 are both members of sc 3-5 (016). The simplest and most economical connection (in the sense of the fewest operations) between them is I_4 (shown as “alternative trichord mapping”), which involves diagonal voice-leading between outer-voice

⁴⁴ This possibility is discussed in O'Donnell 1998:63-65.

ip (11)s. T_7/T_8 , which coincides with the registral lines, is less economical, but highlights the parallel T_7 motion, the last link in a chain of three consecutive T_7 s-- A^b - E^b - B^b - F in the treble over A - E - B - F in the bass. In addition, the T_7/T_8 reading facilitates comparison with the cognate T_7/T_{10} progression in m. 20 (brought about by the change of oboe E in m. 19 to D in m. 20).

An especially interesting part of this passage is the slightly elaborated repetition of m. 19:1 in m. 20:1 (the remainder of the two measures are nearly identical). M. 19 begins with the trichord $A/A^b/F$. In m. 20, the A quarter note in the clarinet is replaced by the rising major third F - G - A in triplet eighth notes. F pivots around A^b/F to map onto $A^\sharp$, and A^b and F in the oboe and flute map onto each other in a static voice exchange--each note maps onto the other at I_2 . In the rising triplet, G functions as a passing tone (marked by "P").

This I_2 suggests a larger connection between the beginning and end of phrase 1 slightly different from the cumulative pathways traced by the mappings between adjacent chords. As shown in Example 4-40b, there is an approximate parallel between the local I_2 near the middle of phrase 1 and a longer-range I_2/I_6 between the first and last chords of the phrase, as if the local I_2 were surrounded by a larger and slightly distorted reflection. There is a local I_2 near the middle of the second phrase as well. This I_2 is reflected even more dimly by a surrounding I_1/I_2 between the first and last chords of the phrase, because only

one of the three notes moves by I_2 , whereas in the I_2/I_6 in phrase 1, two out of three notes move by I_2 . Note that the phrase 2 parallel takes $C\sharp/C$ in the last chord as the primary IC1 dyad, whereas the detailed voice-leading chart in Example 4-40a takes B/C as primary.⁴⁵

Example 4-40 contains three voices, and every verticality can be parsed as an IC1 dyad plus one other note. This is a relatively simple situation: once the mappings between any two IC1 dyads has been decided in favor of T or I, the transformation connecting the trichords that contain them is relatively unproblematic. In the next example, the texture expands to four voices, making such determinations more difficult, partly because there are now sometimes two sets of IC1 dyads, and partly because it is more difficult to parse the movements of four instead of three independent voices in terms of a single T, I, split-T, or split-I operation. In Example 4-41, *Sun-Treader*, mm. 119-120, the treble line is the retrograde of the treble in mm. 63-66 (see Example 4-39). Just as mm. 63-66 use end-extensions to expand segments by semitone increments, mm. 119-120 employ beginning-intensions to shrink the treble segments in semitone increments (shown above the staff in the example). Despite the retrograde relation between treble lines, the two polyphonic settings are quite different. Both have strict IC1 outer-voice frames, but whereas in mm.

⁴⁵ Consistency between chord-to-chord and longer-range mappings is an issue that has not been much discussed in the literature, to my knowledge. O'Donnell has stated that longer-range mappings should be completely consistent with local mappings, thus constituting a true middleground in a quasi-Schenkerian sense (private conversation, November 3rd, 2000). Straus tends to favor a more multivalent, pluralistic view. He writes: "I think it is futile to seek *the* voice leading of an atonal piece, because atonal works generally resist that kind of unified, hierarchically conceived linear structure. Instead, we should speak of the voice leadings of an atonal piece, of the various strands that intersect, divide, and intertwine to form the fabric of the piece" (1997:272-73).

63-66 the outer voices move entirely in parallel ip (11)s until the voice exchange at the very end, the outer voices in mm. 119-120 are characterized by a more typically varied Ruggles mixture of voice exchanges and parallel, similar, contrary, and (in one instance) oblique motion between ip (11)s and (13)s. In mm. 63-66, the middle voice moves mainly in parallel motion with the outer voices, creating a chain of sc (016) members. In mm. 119-120, the inner voices are far more independent of the outer voices, often moving in different directions and by different intervals at different times.

A comparison of the trichord voice-leading diagram in Example 4-40a with the tetrachord voice-leading diagram in Example 4-41 is instructive. Both map IC1 dyads onto IC1 dyads. In Example 4-40, parallel ip (11)s or (13)s relate by transposition, yielding horizontal voice leading, and alternating ip (11)s and (13)s relate by inversion, also yielding horizontal voice-leading. The voice crossings in the trichord mappings result from the fact that the IC1 dyads are not always between the same pairs of voices, but move around in the chord configurations. The third pitch class in each trichord either transposes or inverts to the same degree as the IC1 dyads, resulting in the overall operation T or I, or to a different degree, resulting in split-T or split-I.

In the tetrachord voice leading of Example 4-41, outer-voice IC1 dyads map onto each other (every outer-voice dyad is an IC1 dyad), and the far smaller number of adjacent inner-voice IC1 dyads also map onto each other. Verticalities containing parallel ip (11)s or (13)s relate by T or split-T, yielding horizontal voice leading in all voices. But, unlike Example 4-40, verticalities containing alternating outer-voice ip (11)s and (13)s also relate for the most part by T or split-T, resulting (usually) in diagonal voice leading. Since I relate

alternating ip (11)s and (13)s in Example 4-40 by inversion, justifying my reading on perceptual grounds (coincidence with registral voice leading), why do I relate alternating ip (11)s and (13)s in Example 4-41 by transposition? There are two reasons, one motivic and one practical.

The motivic reason is that the diagonal mappings between adjacent outer-voice IC1 dyads (usually with horizontal mapping in the inner voices) are so ubiquitous in Example 4-41 that they become motivic in their own right, and the relative consistency of the configuration becomes a strong argument for the reading, especially since the passage is based on progressive liquidation of a repeating (although steadily diminishing) treble line.

The practical reason is that, although alternating outer-voice IC1 dyads can easily be connected by inversion instead of transposition, many of the tetrachords that contain them cannot, given two conditions--(1) that IC1 dyads map onto IC1 dyads, and (2) that a split-T and split-I operation is confined to only two different levels of transposition or inversion. As a result, the alternate mappings are too inconsistent to be credible. For instance, as shown in the example, the connection between the second and third chords in m. 119, which I read as T_0/T_5 , can be alternatively read as I_4/I_2 . But the connection between the third and fourth chords, which I read as T_1/T_6 , cannot be alternatively read as any split inversion whatsoever. The outer voices can be mapped onto each other horizontally as I_{10} , but there is no way to invert the inner voices onto one another at one index number. There are many such cases in the passage; therefore I prefer my reading, with its characteristic T and split-T mappings and diagonal outer-voice crossings and outer-voice exchanges.

My final example for this section, *Angels*, mm. 1-9 (Example 4-42) is less concerned with chord-to-chord mappings and more with somewhat larger motions that Straus describes as a “transformational middleground” (1997:251). Vertical IC1 dyads do not have the dominant role here that they did in the last three examples, which date from a more rigorously dissonant period of Ruggles’s career, so I will not give them any special value. The passage consists of an eight-measure phrase divided into two four-measure subphrases, plus m. 9, the first measure of the next phrase. Three levels are given for the eight-measure phrase, plus level 1a, which differs from level 1 only as regards subphrase 1. Level 4 connects the initial chord with measure 9. Every verticality in the levels is labeled with a Roman numeral (which does not, of course, refer to harmonic function). In phrase 1, each subphrase is characterized by a prominent outer voice exchange--G/A $\flat$ in phrase 1 and B/C $\sharp$ (D $\flat$) in phrase 2. These voice exchanges also influence mappings over larger spans.

As shown in Level 1, between chords I and II the inner voices are sustained and the outer voices execute a G/A $\flat$ voice exchange--I read this progression as T $_0$.⁴⁶ Then chord II inverts by I $_3$ to chord III. The cumulative motion between chords I and III thus adds up to I $_3$ (see Level 1a). Finally, chord III moves by T $_0$ /T $_{10}$ to chord IV--the inner voices are sustained (as between I and II) and the outer voices move by T $_{10}$. As shown in Level 2, I read the overall progression in subphrase 1 as I $_3$ /I $_1$, with three notes moving by I $_3$ and two

⁴⁶ It could also be read as I $_0$ /I $_8$ (every note in chord I except B moves by I $_0$), but T $_0$ is more economical and seems a more intuitive reading for the sustained inner voices.

by I_1 . This reading features I_3 as a key component of subphrase 1.

In subphrase 2, I_0 is the key component. Chord V maps onto chord VI by I_0 . Then chord VI maps onto chord VII by T_0/T_{11} . As shown in level 1a, both subphrases have parallel voice-leading strategies--each consists of an inversion followed by a split transposition. An added resemblance is the high degree of similarity between T_0/T_{10} and T_0/T_{11} .

In Level 2, which connects the first and last chords of each subphrase, the split transpositions drop out, leaving only split inversions I_3/I_1 and I_0/I_{11} . Again, it is clear that I_3 and I_0 dominate the cumulative motion of each respective subphrase, since they account for three out of the five mappings in each subphrase.

Level 3 connects the first and last chords of the large eight-measure phrase--here I_3 disappears, and I_0 , as the majority party in I_0/I_7 , proves to have a long-range presence across the phrase as a whole: as part of this I_0 , B maps onto $D\flat$, echoing the B/C $\sharp$ ($D\flat$) voice exchange in subphrase 2.

Level 4 connects the first chord of the piece with the first chord of the second large phrase. These chords hold cognate positions, and are quite similar. I read the progression between them as T_0/T_2 : four out of the five pitch classes (G, A $\flat$, C, and E $\flat$) are common tones (T_0), and B moves to C $\sharp$ (T_2), highlighting the B-C $\sharp$ connection that dominates subphrase 2 on an even larger scale than before. The two chords are also similar on the pitch level: C4, E $\flat$ 4, and G4 from m. 1 recur in m. 9, A $\flat$ shifts from the bottom position in

m. 1 to the top position in m. 9, and B3 moves up a whole step to C#4.

It is perhaps symptomatic of the state of Ruggles analysis that his harmony has hardly ever been investigated even in terms of the canonical operations of transposition and inversion, much less of split operations, a more recent theoretical development. As detailed in Chapter 1, most of the work on Ruggles's harmony has concentrated on chord construction and classification rather than chord connection, on content rather than process.⁴⁷ I have tried to show that transposition, inversion, split-transposition, and split-inversion are relevant and useful--even obvious--tools to connect Ruggles's harmonies. However, they are only a starting point. I have limited my examples to mainly homophonic passages, because segmentation difficulties grow with increasing rhythmic and contrapuntal independence. Even relatively homophonic passages sometimes contain chord connections that cannot be read without strain in terms of two-tiered split transposition and inversion. Nonetheless, these transformations point the way to a methodology of Ruggles's voice leading, one of the most interesting and under-researched fields of Ruggles analytical inquiry.

4.5 Canon

As described in Chapter 3, Ruggles's music is full of motivic imitation, both within and between lines--this might be termed free imitation. But Ruggles also wrote in strict

⁴⁷ Two exceptions are Dombek 1962, which attempts a traditional Schenkerian analysis of *Angels*, and Chapman 1978 and 1981, which analyzes sections of *Evocations II* in terms of operations between two types of vertical intervals: AB (above bass) and VP (voice-pairs).

canonic imitation. The first canon in the published works appears in *Lilacs* (*Men and Mountains* II). Thereafter they become increasingly important, growing in size and complexity until, in *Organum*, they comprise most of the composition. **Table 4-1** is a list of canons in Ruggles's published works (excluding very short canonic passages of only a few measures), giving work, measure numbers, and type.⁴⁸ The last refers to the number of voices and subjects. Thus "3 in 1" denotes a canon with three voices and one subject, and "6 in 2" a canon with six voices and two subjects.⁴⁹ A *mixed* canon coexists with noncanonic voices. *Prime* and *retrograde* refer to forward and backward canons.

There is something paradoxical in Ruggles's use of canon, in that the strictness of the device is somewhat at odds with the composer's preference for freely mutating shapes and dislike of exact repetition (even in immediate repetition, something is usually changed). Ruggles's canons always strike a balance between strict and free repetition. There are several ways this accommodation may be reached: (1) the dux may be followed by both strict and free comites (*Lilacs*); (2) the comes may be strict intervallically but not rhythmically (*Evocations* IV and *Organum*); (3) a canon may be mixed (*Sun-Treader* and *Evocations* II); (4) a comes may begin with strict imitation of pitch intervals but gradually introduce changes in contour while retaining pitch-class intervals (*Evocations* II, *Organum*). If the canon is retrograded, the retrograde may be incomplete (*Sun-Treader* and *Evocations* IV) or apply to intervals but not to rhythm (*Sun-Treader*, *Evocations* IV, and

⁴⁸ The information on canon in *Organum* is largely taken from Kramlich 1982:77-85.

⁴⁹ This nomenclature derives from Prout 1891:217, and is also referred to in Randel 1986, s.v. "Canon."

Organum). All of these different strategies serve to temper strict canonic imitation, or at least to contrast it with Ruggles's more usual free imitation, rendering the canon more flexible and better able to blend with its surroundings.

Ruggles's treatment of canon may reflect Seeger's influence. Seeger favored concealing canon (and imitation generally) to make it less perceptually obvious. In the *Treatise*, he writes the following:

It is a question as to what is to become of the canonic mode of writing. Undoubted virtuosity in both consonant and dissonant canon seems singularly unimpressive in contemporary composition. Repetition is not one of the most important technical procedures in language, but in music it seems to be indispensable. Without some form of canonic structure it is hard to see how modern composition can pretend to rise to the heights of organization and sublimity reached in the past. Fortunately there are devices of canon still unused (1994:161).

He explains in the *Manual* that these devices consist of two specific types of canon--one that preserves rhythm but alters interval, and one that preserves interval but alters rhythm (Ibid:209). Ruggles never uses the former, but very often employs the latter. Seeger then offers cautionary advice: "Above all things is to be avoided the anemic practice of beginning a canonic process and then giving it up as soon as it becomes difficult" (Ibid:210). Finally, in a statement of particular interest, he offers a justification for his policy of concealment:

It may be asked, what is the use of canon if its existence is to be concealed. The argument is based on a belief that, even though the canon is not apparent to the intellect, the feeling of unity in the line is absorbed unconsciously by the listener despite an appearance of diversity (Ibid:210).

This statement, which can serve as a defense of "learned" devices or intricate compositional plans in general, is relevant to Ruggles's music, because some of his canons--and especially their retrogrades--are scarcely audible as such. Yet a listener can easily recognize

the material as familiar, yet different, without quite knowing where it comes from or how it has changed.

In the remainder of this section I will discuss canons from *Lilacs*, *Evocations IV*, and *Sun-Treader*. Each has a different configuration of features.

The *Lilacs* canon, the earliest in Ruggles's published works, is nonetheless fairly complex. It is a three-voice canon with both strict and free *comites* at half-note intervals.⁵⁰ I will refer to these as comes I (strict) and II (free). Example 4-43 charts the layout of the canon, connecting notes in the dux and comes I with southwest-northeast diagonals, and notes in comes I and II with northwest-southeast diagonals.

The dux, a free descending sequence, begins in m. 9 in viola I. Comes I begins at m. 9:3 in violin I at the upper octave (anticipated by the G half note at the beginning of the measure), and is doubled in two lower voices--strictly doubled an octave lower by cello I (until m. 11:2), and freely doubled by violin II in the sense that contour is preserved but linear intervals are not. The vertical pitch intervals between violin I and violin II range between ip (3) and (7), but most are ip (3) or (4), another instance of doubling at the lower minor or major third. Comes I ends at the beginning of m. 14.

Comes II begins in the cellos in m.10 and extends to the beginning of m. 13; in mm. 10-11 it is doubled in the contrabass at ip (11) or (13). Rather like the free doubling of comes I just discussed, comes II does not reproduce the intervallic succession of the dux, but fairly accurately approximates its contour and rhythm. As shown in Example 4-44, a vertical alignment of the dux and comes II, for the most part adjacent ordered pitch intervals

⁵⁰ To my knowledge, the only description of the *Lilacs* canon is in Woo 1993:100.

either differ by 1 or are identical (notably in the figure A-E-F~~F~~-B~~B~~-G). A conspicuous exception is a three-note passage in m. 10 of the dux and m. 11 of comes II, where the difference between adjacent pitch intervals is larger (this passage is boxed in the example). The intervallic succession is ip <-8, +6> in the dux, ip <-3, +1> in comes II/cello 2, and ip <-2, +1> in comes II/contrabass. However, although the adjacent intervals of dux and comes II are quite different, the cumulative intervals between the first and third notes are almost identical: ip (-2) from B to A in the dux and comes II/cello 2, and ip (-1) from C to B in comes II/contrabass.

The canon does not end as abruptly as it began, but rather fades into a transition passage that leads to the ascending cadence. The transition passage preserves many of the contours and intervals of the canon and gives the impression of a sort of seamless continuation.

As stated, Ruggles's canons can be viewed as a mixture of (or compromise between) free and strict imitation. In the *Lilacs* canon, comes I is strict, but is surrounded by free imitation in three different parameters: comes II, the lower doubling of comes I in the second violin, and the free sequential character of the subject.

The next canon, from *Evocations* 4 (*Evocations* 3 in the 1943 edition), is the latest composed, simplest, and strictest of the three canons examined in this section (see Example 4-45).⁵¹ It starts in measure 15, ends in measure 18, and is partially retrograded in mm.

⁵¹ There are several descriptions of the *Evocations* 4 canon in the literature. Gilbert (1970:80-84) discusses set class (016) and aggregate completion. Kramlich (1982:31-32) gives a short general description. Brown (1999:160-61) discusses the canon in terms of IC1 and IC5 pathways.

21-23. The subject is a strict sequence. The sequential unit is a three-note figure with the interval pattern ip <-7, -6>, which forms a member of sc 3-5 (016). The last note of each segment ascends by ip <+11> to the first note of the next, so the complete pattern is ip <-7, -6, +11>. The interval of repetition is a descending whole step; thus the first notes of each segment form a descending whole-tone scale (shown by the upper-case letters on the example), and a line composed of the first and last notes of each segment forms a descending (pitch-class) chromatic scale (shown by the upper- and lower-case letters on the example).

The dux, in the left hand, actually begins with a rest, which stands in for an implied G that is literally present in the right hand. The dux runs through the entire ip <-7, -6, +11> cycle from G to G: G-C-F F-B-E E-A-D D-G-C C-F-B A-D-A G. As shown on the example, the first notes of each segment (emphasized by accent marks) form a descending WT1 scale from G to G, and the first plus last notes of each segment form a descending chromatic scale from G to G.⁵² Note that the note values of the sequential units are not uniform, but steadily increase (from triplet eighths, to regular eighths, to two tied plus two separate eighths). This general augmentation staggers the dux in relation to the comes, heightening the rhythmic independence of both by ensuring that their notes are never struck simultaneously.

The same G that (by implication) begins the dux also acts as a tied anticipation to

⁵² Steve Brown (1999:160-61) points out that, in addition, the first and second notes of each segment form a circle-of-fifths chain from G to G: G-C-F-B-E-A-D-G-C-F-A-D-G. Thus “the line simultaneously unfolds complete descents through both the chromatic scale and circle of fifths: a ‘double tour’ of the aggregate” (Ibid:160).

the beginning of the comes (right hand).⁵³ Since the comes is composed of longer note values than the dux, it reaches only as far as C₃ by the end of the sequence: G-C-F[♯] F-B₂-E[♯] E₂-A₂-D D₂-G₂-C C₂. Starting in m. 16, the first note of each group (stressed by accent, duration, and metric position) forms a minor tenth with the bass, creating a 10-10-10-10 descent that has (in this context) a decidedly anachronistic tonal sound. These are shown on the example by “m10” (minor tenth), to distinguish them from ip (10).

The retrograde begins in m. 21. The retrograde of the comes (right-hand) is exact, starting on B (m.21) and ending on G (m.23), with the interval pattern ip <+6, +7, -11>, each (016) trichord a whole-tone higher than the last: B C[♯]-F[♯]-C[♯] D[♯]-G[♯]-D[♯] E[♯]-A[♯]-E[♯] F[♯]-C[♯]-G[♯]. Now, however, the first notes of each segment form an ascending WT0 (not WT1) scale, since the first note of each retrograde segment equals the last note of the corresponding forward segment.

The retrograde of the dux is not only far shorter than in the forward canon (partly because of rhythmic alteration and augmentation), but it does not begin where the forward canon ended, nor end where the forward canon began. Rather it is a retrograde slice from the middle of the prime statement: B₂-E-B[♯] C-F[♯]-C[♯] D-A₂-E₂ E₂ (the complete prime was G-C-F[♯] F-B₂-E[♯] E₂-A₂-D D₂-G₂-C C₂-F₂-B₂ A-D-A₂ G). In a sense, however, the notes that comprise the proper start to the retrograde--G A₂-D-A[♯]--are hidden in the left hand immediately prior to m. 22. The verticality on the third beat of m.21 is G/G[♯], and that on the fourth beat is G[♯]/A. These notes stand in for G A₂-(D)-A[♯]. D is out of order, but occurs

⁵³ Comes I in *Lilacs*, which also starts on G, begins in precisely the same way. See Example 4-43, m.9, violin I.

in the first left-hand sonority of measure 21: C/D. The vertical minor tenths that marked the start of each forward segment have here become major tenths (marked “M10”).

All in all, this canon represents a retrospective of important Ruggles intervallic themes:⁵⁴ (1) each sequential segment is a member of sc (016), one of Ruggles’s most important trichords and one that results from an IC1-dissonated perfect 5th; (2) the sequence produces whole-tone scales; and (3) the accented vertical intervals form parallel minor 10ths, recalling the thirds that are so prevalent in Ruggles’s earlier writing.

The last canon I will discuss, from *Sun-Treader*, is much more ambitious than either the *Lilacs* or the *Evocations* 4 canons.⁵⁵ It is longer, involves two subjects and six voices, and is retrograded (as part of a larger retrograde) later in the work. The canon first appears in mm. 52-62, is retrograded in mm. 124-33, and then repeats (differently orchestrated) in mm. 139-49.

The canon begins with two paired homorhythmic subjects (S1 and S2). As shown in Example 4-46,⁵⁶ S1 and S2 are IC1-related, beginning with two ip (13-11) voice exchanges and ending with three parallel ip (13)s. S1 appears to be the more prominent of the two subjects--it keeps to a single register, tracing an overall descending line that

⁵⁴ Brown calls it a “compositional synthesis...in which IC1, IC2, and IC5 cooperate on different levels of structure to generate melodic momentum” (Brown 1999:161). He does not mention the parallel 10ths--IC3 in the forward canon and IC4 in the retrograde canon.

⁵⁵ The *Sun-Treader* canon has received a fair amount of attention in the literature. My discussion is indebted to analyses by Nicholls (1990:98-101), Robison (1991:152-60), and Carl (1995:34-38).

⁵⁶ This example is based on Robison 1991:153, example 51.

chromatically fills the registral zone from D $\flat$ 6 to G5. In contrast, the registral discontinuity of S2 seems designed to maintain contrary motion with S1.

The progress of the canon is charted in Example 4-47.⁵⁷ Because each voice of the canon is divided among different instruments, the example shows canonic lines, not instrumental lines.⁵⁸ In cases of octave doubling I have shown only one register. S1 is imitated strictly in two successive voices at half note intervals (one 2/4 measure), each entrance a whole note higher than the last. I will refer to the first appearance of S1 as *dux* 1, and to its two subsequent imitations as *comes* 1 and 2.

S2 is imitated exactly like S1, but lasts for only one and a half measures (plus one eighth note). Afterwards, the S2 canonic voices continue with free material.⁵⁹ I will refer to the first appearance of S2 as *dux* 2, and to its two subsequent imitations as *comes* 3 and 4. To help orient the reader, after the first page of Example 4-46 I label the S2 voices with parentheses as (*dux* 1), (*comes* 3), and (*comes* 4), although they are now free. The

⁵⁷ In m. 54:1, *comes* 3, the Theodore Presser score (1981) has B $\flat$ 4-B $\flat$ 4-F $\sharp$ 5-G4 (in viola II and clarinet II), whereas in Example 4-45 I have written the passage a whole tone higher: C5-C $\sharp$ 5-G $\sharp$ 5-A4. I am sure the Presser version is a mistake, for the following reasons: (1) it is inconsistent with the interval of imitation (an ascending whole step); (2) the higher version is found in the New Music score (1934); (3) the higher version is found in the restatement of the canon (m. 141) in both the Presser and the New Music scores; and (4) the higher version is used in the retrograde of the canon (m. 131) in both the Presser and the New Music scores.

⁵⁸ In this I have followed the lead of Nicholls (1990:100-101, example 3.9) and Robison (1991:155, example 52).

⁵⁹ S2 has been labeled by various terms in the literature, each with somewhat different connotations. Carl simply calls it Subject 2 (1995:34-38). Robison calls it the countersubject (1991:152-54). Nicholls refers to it (and the following free material) as S1's *shadow* (1990:99-100).

parentheses indicate that these S2 voices began as a strict canon but now contain free material. The capital letter “R” followed by a left-hand bracket indicates where each voice begins in the retrograde--this will be discussed below.

The canon readily divides into two contrasting layers defined by S1 (dux 1, comes 1, and comes 2), and S2 (dux 2, comes 3, and comes 4, plus the subsequent free material). The two layers resemble planes that slant in different directions, the S1 layer generally downward, and the S2 layer generally upward (comes 3 and 4 ascend until around m. 59, at which point dux 1 begins to ascend). The two layers also contrast rhythmically. The S1 layer quickly settles into a repetitive  homorhythmic pattern in all three voices, but in the S2 layer the rhythms are freer, more complex, and more varied between voices, containing syncopations, frequent ties across barlines, dotted rhythms, and triplet and quintuplet groupings. I will first discuss the structure of the strict S1 canonic layer, and then relate one aspect of it to the free S2 layer.

A measure and a half after its entrance, each S1 voice settles into a strict sequence. The sequential unit is a three-note figure with a  rhythm and an ip <-4, -1> intervallic pattern, forming an instance of sc 3-4 (015) (a set class created by an IC1-dissonated IC5 interval). The last note of each ip <-4, -1> segment ascends by ip <+2> (ip <+14> between mm. 59 and 60) to the beginning of the next segment.

The interval of repetition between sequential units is ip <-3> (ip <+9> between mm. 59 and 60). Therefore, each of the three S1 lines forms a long chain of ip <-4, -1> nodes

descending in minor thirds.⁶⁰ Four successive nodes forms a complete aggregate. Within each S1 line, cognate notes in each node (all first notes, all second notes, or all third notes) form instances of sc 4-28 (0369), the diminished seventh chord tetrachord. Set class (0369) contains only three distinct pitch-class sets: [0,3,6,9], [1,4,7,T], and [2,5,8,E]. In each of the three S1 voices, a different one of these sets is formed from the corresponding notes in each node. For instance (see Example 4-47), in dux 1, linking the first notes of each sequential unit results in the repeating pitch-class succession A-F $\sharp$ -D $\sharp$ -C, or pc set [0369]. Similarly, the same line in comes 1 yields B-G $\sharp$ -F $\sharp$ -D, or pc set [258E]; and in comes 2, the line yields D $\flat$ -B $\flat$ -G-E, or pc set [137T]. These chains are quite long--for instance, in dux 1, the minor 3rd chain composed of first notes extends over eighteen segments from A5 to F $\sharp$ 3.

Thus the horizontal dimension of the S1 sequence emphasizes minor thirds. However, the vertical dimension emphasizes major thirds (or minor sixths), because, from m. 55:2 on, all simultaneities created by the three S1 lines form augmented triads--members of sc 3-12 (048). Every augmented triad has the same registral construction--a minor sixth above a minor sixth.

It is at this point that a curious relationship emerges between the strict S1 canon and the free S2 material: on every beat, the S1 augmented triad representing one whole tone collection is vertically juxtaposed with a S2 trichord constructed from the other whole tone

⁶⁰ Ruggles often wrote minor third sequences. Several descending examples are discussed in Section 3.2.5; an ascending example from the conclusion of *Sun-Treader* is analyzed at the end of Section 2.5.

collection.⁶¹ As shown in the bottom of Example 4-47, this leads to a vertical and horizontal juxtaposition of alternating WT1 and WT0 trichords.⁶² In almost every case, the S1 augmented triads are juxtaposed not with S2 augmented triads but with members of sc 3-8 (026). Thus, in spite of the studied contrast between the S1 and S2 layers (strict versus free, down versus up, rhythmically simple versus rhythmically complex), they prove to have a complementary *harmonic* relationship, at least as regards the whole-tone trichords on every beat.

At the end of the canon (m.62), both layers fuse in a passage composed of parallel (016) trichords that, as Robison points out (1991:156), resolves the tension between the S1 and S2 layers by combining the homophonic texture of S1 with the rhythms of S2 (syncopations, triplets, and quintuplets).

The canon is retrograded in mm. 124-33. Unlike the forward canon, where each entrance is clearly announced with accented long notes (half + quarter note triplet) that contrast with the surrounding smaller note values, the start of the retrograde is nearly imperceptible. Only when the insistent  rhythms emerge from the texture does the listener become aware of the retrograde, or at least of familiar but altered material.

The retrograde is transcribed in Example 4-48. As in Example 4-47, I have shown canonic rather than instrumental voices, and octave-doubled voices have been given in only

⁶¹ This relationship also holds, but not consistently, for many of the trichords between beats.

⁶² We have seen this sort of bifurcation into competing whole tone spaces before: see the discussion of *Angels*, mm. 23-30, in section 2.5 and of *Men*, mm. 33-35, in section 3.2.4.

one register. In the first system, notes preceding the right-hand brackets are not part of the retrograde canon.

The retrograde is fairly strict, but not entirely so--it is more or less strict in certain aspects and in certain places. Divergences are of the following types:

- (1) The retrograde is only partial. As indicated in Example 4-47 by the letter R followed by lefthand brackets, only two of the six voices (comites 2 and 4) are retrograded in their entirety.
- (2) As a corollary to (1), although in the prime canon the voices end at the same time, in the retrograde their entrances are staggered. This more effectively conceals the beginning of the canon, shortens its total length, and creates a stronger resemblance between the beginnings of the forward and retrograde canons.
- (3) Some rhythms are slightly changed. For instance, although all voices in the prime canon begin with a half + quarter note triplet, their retrogrades begins not with a quarter + half note triplet, but a dotted quarter + eighth note.
- (3) Although pitch classes are usually preserved, occasionally notes are transferred to different registers.
- (4) In the retrograde, the first few measures of comes 3 (mm. 124-128) are a paraphrase. Example 4-49 vertically juxtaposes a hypothetical strict retrograde of mm. 57-61 underneath the actual retrograde from mm. 124-128. Corresponding notes are connected with lines. If the hypothetical strict retrograde is taken as the model, it is evident that in the actual retrograde notes are altered, added, anticipated, and subtracted.

The *Sun-Treader* canon has points of resemblance with both the *Lilacs* and *Evocations 4* canons, although it is more complex than either. Like *Lilacs*, it exploits the contrast between strict and free imitation, but on a far larger scale--it is divided into strict canonic and free layers, a contrast heightened through differences in rhythm, large-scale contour, and affiliation with different whole-tone collections. Like *Evocations 4*, the S1 layer is a strict canon with a strict sequence as its subject, and both have somewhat altered and shortened retrogrades.

In conclusion: I think that Ruggles was increasingly drawn to the canon for three main reasons: (1) by definition, canon emphasizes the integrity of the line but multiplies it into contrapuntal textures, thus according well with Ruggles's predominantly linear emphasis; (2) canon provides a ready-made source of compositional organization and coherence; and (3) the contrast between strict canonic and free imitation provided a welcome and needed textural contrast and differentiation. The fact that Ruggles's canons became progressively more extensive and strict represented, I think, a facet of his purifying process of "simplification" that attempted to render his counterpoint as uncluttered, transparent, and vigorous as possible.

* * * * *

Although the foundation of Ruggles's music is the integrity of the line, simultaneous lines of necessity give rise to polyphonic textures, contrapuntal interactions, and vertical structures. This chapter begins by examining the history and meaning of the term *dissonant counterpoint*, which, according to Seeger, was already being misused in 1923 (Seeger 1923:22-23). It then proceeds to vertical intervals, stressing that the

distinction between consonance and dissonance, far from being flattened out, is essential in dissonant counterpoint. Ruggles's music is characterized by a two-part vertical frame composed of perfect (usually IC1) dissonances occasionally relieved by consonances and imperfect dissonances. After a section on voice exchange, which can be adjacent or long-range, normal or IC1-skewed, dissonant or consonant, the chapter proceeds to a discussion of chord construction and voice leading, and ends with a consideration of canon, focusing on the interaction between free and strict imitation.

Chapter 5. CONCLUSION

A persistent theme of this study has been the tension between consistent compositional procedures in Ruggles's music and the composer's determination not to be constrained by such procedures. The strong individuality of the music points to the former; several of Ruggles's statements demonstrate the latter, such as the following:

All real composers create their own formulas--I know I have created formulas of my own and some moderns have said "Ah, too bad, he goes by formula, if he wouldn't do that he would be a good composer," but I make the point that a real composer should be able to break the formula, to bust it all to hell when he felt it necessary to bust it; otherwise you are the victim of your own formula, you have created only a Frankenstein monster (Interview, *New York Herald Tribune*, 10 February, in Howard 1943:242).

Seeger makes a similar point, but as a criticism:

Ruggles's technique as a whole shows a curious ratio between organization and fantasy. Proposing, again theoretically, that a work of art should present an approximate balance (approaching though not necessarily reaching an exact balance) between the two--organization and fantasy--it would appear that in Ruggles's work there is a vast preponderance of fantasy. Of all the many factors in the technique of music (and there are dozens of them of the "size", or importance of the one he has organized) only the repeated tone is organized. And even there, in the published works, the principle evolved is often broken, almost one feels, in despair of the difficulty of the task set (Seeger 1932:589-90).

The key difference between these two statements is that the very traits that Seeger criticizes --the inconstant application of organizing principles and the preponderance of "fantasy"--are proclaimed by Ruggles as a credo.¹

Seeger feels that Ruggles's music is "organized" only in terms of pitch-class

¹ An excellent discussion of this conflict can be found in Robison 1991:15-18. Robison sums up the analytical situation as follows: "Ruggles's music, in fact, defies all attempts to make it conform to any rigid set of rules. Rather than strict systems, one finds, to use the words of Tenney, only tendencies" (Robison 1991:16). The reference is to a letter from Tenney to Robison dated 30 July 1974.

nonrepetition, and even there imperfectly, because of “despair of the difficulty of the task set”. Seeger is quite correct about Ruggles’s inconsistent application of pitch-class nonrepetition.² Although Tenney (1977) has shown that the average LSPD (Length of String of Different Pitch Classes) in Ruggles’s works gradually increases from 4.17 in *Toys* (1919) to 8.89 in *Organum* (1944), the actual (as opposed to the average) LSPDs vary widely, and sometimes Ruggles abandons the method entirely, usually in the interests of motivic concentration. This flexibility--a sore point with Seeger--is the main reason why Ruggles preferred pitch-class nonrepetition to the twelve-tone method, which he characterized as a “worn-out formula” (*Newsweek* 1966:80) and “a dog chasing its tail” (Kirkpatrick 1968:153). But Ruggles’s inconsistent application is not a result of “despair of the difficulty of the task set”, but part and parcel of his compositional method. Ruggles’s music is not *systematic*. For Seeger, this is a defect; for Ruggles, it is a necessity.

Nor is pitch class nonrepetition the only compositional procedure in Ruggles’s music, even if Seeger considers it Ruggles’s only “organizing principle.” Earlier in the 1932 article, Seeger refers to the *Sun-Treader* canon and its retrograde (Seeger 1932:583), and to such “outstanding characteristics” as Ruggles’s general “contrapuntal rigor” (Ibid:584), characteristic “upward and downward curves” (Ibid), lack of metrical accent (Ibid:587), and varied “chordal material” (Ibid: 588). However, few of Ruggles’s procedures or characteristics are applied as reliably or consistently as Seeger would wish. Ruggles is always apt to break free--to “bust the formula”, as he puts it--and do something

² “In *Angels* I disregarded it”-- a case in point (Ruggles, quoted in Kirkpatrick 1968:153).

different and unexpected.³ Even when he does not, a tension, or balance, between strictness and freedom (or, to use Seeger's words, between organization and fantasy) is often evident. This usually takes the form of a continuum of flexibility within his compositional techniques somewhat analogous to the inflection of scale steps. Some examples (besides pitch-class nonrepetition) are given below. The relevant dissertation section is included in parentheses.

1. Ruggles usually constructs jagged disjunct lines that fill chromatic zones in pitch-class but not pitch space, creating an open registration with many gaps. But occasionally, by way of contrast, he writes smoother lines characterized by stepwise movement and smaller leaps, which do chromatically fill registral gaps in pitch space (Section 2.4).
2. Ruggles's typical large-scale contour is the jagged wave, which is typically composed of smaller crooked CSEGS <021> (ascending) or <201> (descending). Ruggles has stated that he never writes straight lines, which are "unnatural." But sometimes--especially at cadences--he does write straight ascending or descending lines, which stand out precisely because they are so atypical (Section 2.5).
3. Despite the almost continual chromaticism of Ruggles's music, whole-tone collections are often emphasized in lines or (less often) in verticalities. WT_0 and

³ This is pointed out in Robison 1991: "It should be noted that the melodic, harmonic, rhythmic, and polyphonic ideals are not presented here as laws, entrenched and unbreakable. For, indeed, there are passages in Ruggles's music which relax these ideals: passages of marked rhythms, surprising consonances, brief period of repetition or homophony" (Robison 1991:15).

WT_1 segments may be vertically and/or horizontally juxtaposed. But usually the effect of the WT segments is diluted or sabotaged by their placement in a non-WT environment (Sections 2.5, 3.2.4, and 4.5).

4. Motives usually are initially presented quite strongly and imitated fairly strictly, but soon lose solidity as they begin to change shape, elongate, shrink, fragment, dissolve, or transform into different motives (Section 3.2).

5. In his sequential writing, Ruggles usually (not always) begins with a fairly ordered pattern that becomes progressively freer as it mutates and dissolves (Section 3.2.4).

6. Both linear motives and vertical harmonies often relate via regular transposition or inversion, which preserves set-class membership. But they also often relate via split transposition or inversion, in which some notes transpose or invert by one degree and the rest by another degree, and which usually does not preserve set-class membership. Eventually both regular and split transposition or inversion tend to disintegrate into general intervallic or contoural resemblance, as notes simply go their own separate ways (Sections 3.2.2 and 4.4.1).

7. Ruggles's lines and chords often include IC1-dissonated perfect fifths, creating instances of set classes (016) and (015). But sometimes the fifth is dissonated by an IC2-related note instead, creating instances of set classes (025) and (027) (Sections 3.2.5 and 4.4.1).

8. Ruggles's polyphony often is constructed upon a two-part, often outer-voice, contrapuntal frame of perfect dissonances (IC1 intervals). But sometimes the

perfect dissonances change into imperfect dissonances (IC2 and 6) or consonances (IC3,4, and 5), moving through a continuum from tense to poised to relaxed intervals (Sections 4.2 and 4.4.1).

9. Ruggles's polyphony is full of voice exchanges, often but not always between IC1 vertical intervals. In a regular voice exchange, diagonals connect members of the same pitch class. But sometimes Ruggles warps the regular voice exchange into an IC1-skewed voice-exchange, where diagonals connect IC1-related pitch classes instead (Section 4.3).

10. Vertical chords often share one or more common intervallic characteristics: (1) they contain at least one IC1 interval; (2) they contain dissonated perfect fifths; or (3) they fill in a fifth with a third, double the treble at the third, or seem constructed from stacked thirds of different qualities. However, complete verticalities tend to vary widely and continually, with few duplications (Section 4.4.1).

11. Ruggles's canons always balance strict and free imitation. Sometimes there are both strict and free comites, sometimes intervallic succession is preserved but rhythm is not, and sometimes retrograde lines are incomplete or paraphrased (Section 4.5).

As stated, all of these characteristics share a certain flexibility. They are not always consistently applied, and most of them can be "inflected" along a continuum from strict to free usage. However, unlike Seeger, I do not feel that Ruggles's consistent inconsistency is a result of "despair of the difficulty of the task set", but rather results from his refusal to be boxed in by his own procedures.

This attitude is not mere orneriness (although it is that too), but an integral manifestation of Ruggles's basic aesthetic/spiritual stance--the striving for transcendence, the effort to move beyond the known towards the unknown.⁴ Although this quest is conducted with the tools at hand--and the tools are chosen for their fitness of purpose--in the end the goal is more important than consistency in the use of the tools themselves. Systems were important to Seeger--his Treatise contains his own, which influenced Ruggles to no small extent. Seeger believed that "a work of art should present an approximate balance" between "organization and fantasy". But Ruggles did not value systems; he was more concerned with striving towards the sublime, reaching towards the unknown. But how could he reach towards the unknown if he was boxed inside a consistent, closed musical system or set of procedures? What could be more "known" than that? But if his procedures could be bent or broken at will, then they could become open-ended--not only used but transcended, in order to evoke what lies beyond them.

Seeger was quite aware of the spiritual power of Ruggles's music, and it puzzled him because he could not account for it. Later in the 1938 article he writes:

But though one feels the works to be imperfect, though one knows that, given half an excuse, Ruggles would rip them to pieces and rewrite almost every measure--still, in the hearing, especially of *Angels*, *Lilacs*, and *Portals*, one knows that one has heard a complete work of art, the effect and the memory of which lies over and above the recognized and admitted imperfections. In spite of the reams of theoretical explanations, bizarre and, from a scholarly point of view, preposterous, that Ruggles is accustomed to regale his listeners with--here is pure intuition. The pool

⁴ This phrase refers to Whitman's two-line poem *Portals*, from *Songs of Parting* (*Leaves of Grass*, 1881 edition), quoted by Ruggles as an epigram on the title page of his own *Portals*:

What are those of the known but to ascend and enter the Unknown?
And what are those of life but for Death?

is muddied, the banks cluttered up and the surface ruffled, but one knows, after one leaves it, that one has had an unforgettable intimation of the clear, unsullied crystal. "What are those of the known but to ascend and enter the Unknown?" What, indeed?...But here again, we come face to face with the same enigma (or else it is not an enigma, but the most obvious sort of experience): *the beauty is there or is near*. What is lacking in balance is there in conviction--sheer arrogant assertion--of value. You cannot put your finger on it. You cannot point out any melody, passage or detail that even represents it or can be characterized as such. But you know, just as surely, that in hearing the work you have been in touch with or have had intimations of the sublime. The known enters the unknown (or vice versa)! The critic who attempts in language to be logical can only go so far. He can point out that the means-by-which have certain virtues and faults, but it is very hard, when there is so little attempt at organization, to relate these to the experience which has so evanescent yet so real a temporal relation with them (Seeger 1932:589-90).

On the one hand Seeger admits that Ruggles's works evoke "an unforgettable intimation of the clear, unsullied crystal," "intimations of the sublime," and a beauty that "is there or is near." On the other hand, he cannot reconcile this experience to the works' imperfections--the muddied pool, the cluttered banks, the ruffled surface.⁵ Seeger is basically saying that Ruggles achieves this result by grace, not by works. There is nothing in the music that would account for it, yet it is there.⁶

⁵ Virgil Thomson seems to have either been unaware of or disregarded Seeger's opinion, since he writes that Ruggles's works "have been tested microscopically by the toughest of analysts without any examiner finding anywhere a flaw" (Thomson 1970:31). I suspect the latter, since Seeger's essay was included in Cowell 1933a (*American Composers on American Music: A Symposium*), one of the main sources of information on ultra-modern American composers, and Thomson certainly must have been aware of it.

⁶ Seeger's evaluation of Ruggles is discussed at length in Greer 1998:107-11. I disagree with Greer's statement that Seeger felt that Ruggles's music "falls short of greatness" because "listeners are 'in touch with' or have an intimation of what Seeger calls 'the Sublime' but they never truly reach it....The point is that, despite Seeger's sympathy for Ruggles's spiritual cast of mind, the music never quite attains the mystical transformation that, according to Seeger, its author intends" (Ibid 110). Seeger never reproaches Ruggles for approaching but failing to fully reach the Sublime. Seeger's dilemma is that, while he disapproves of the music on technical grounds, he acknowledges its spiritual power, and he cannot reconcile these two aspects.

One reason for Seeger's dilemma is that the only "organizing principle" he sees in Ruggles's music is pitch-class nonrepetition, and even that (he feels) is applied in a slipshod and inconsistent manner. Everything else is "pure intuition." I, on the other hand, see far more evidences of organization, even if they are not systematically applied to Seeger's satisfaction (see the foregoing list of eleven compositional procedures or traits).⁷ Therefore, I feel that Ruggles's "unforgettable intimation of the clear, unsullied crystal" is the result of grace *and* works. Ruggles's compositional techniques as such are directly related to his quest to transcend the known and enter the unknown.

Negatively put, Ruggles avoids "the known". For instance:

(1) He avoids tonality by writing in an atonal chromatic idiom with occasional whole-tone associations. Consonant intervals or triads are either dissonated or placed in a dissonant environment.

(2) He avoids metrical accent and regular phrasing. In a talk entitled "The Present Situation in American Music" (given to the Whitney Studio Club on 31 March 1922) he attacks Edward MacDowell on this point:

"All one has to do is examine his melodic line. There is no rhythmic variety, no breaking up of phrases--I mean by that phrases of three measures followed by

⁷ Lou Harrison (Harrison 1955:16-18) strongly disagrees with Seeger's statement that pitch-class nonrepetition is the only organizing principle in Ruggles's music, as does Tucker Robison, who writes:

But, when considering Ruggles's music from the standpoint of this conflict, which might also be referred to as the conflict of intuition vs. organization, one finds, nevertheless, a high degree of organization. The spontaneous, rhapsodic, unquestionably personal forms that this music assumes are composed of melodies, harmonies, and rhythms which proceed and interact with a remarkable degree of consistency (Robison 1991:16-17).

seven, or two followed by five, ect., or four followed by nine, etc. It is generally four followed by four. the block system--bookshelf, like Grieg and Frank (Carl Ruggles Papers, in Archabal 1979:93).

(3) He avoids exact repetition--something is always changed.⁸ His music is full of shifting shapes, skewed patterns, altered procedures, modified imitations, and approximate similarities.

Positively put, Ruggles strives towards the unknown:

(1) He writes extremely long-breathed extended soaring lines. In a letter to Ruggles, Ruth Crawford Seeger wrote: "*Organum* was fine. In thinking back, I have the queer feeling that its line just kept on going in space" (letter to Ruggles dated 27 January 1928, in Archabal 1979:121).

(2) He constructs large jagged wave shapes that convey the sense of fighting or giving in to gravity--rising and falling back through a series of subsidiary climaxes to a main climax on the ascending side of the wave, and then reversing the process on the descending side. His cadences are characterized by unrelenting ascending lines that push ever higher towards a rarified registral peak, sometimes counterpointed by contrary motion to the deepest register in the bass. These cadences are not points of relaxation or resolution, but rather of maximum tension, often reinforced by added dissonances and thicker textures.

(3) His customary texture of extreme dissonance with fleeting glimpses of less dissonant or consonant intervals and sonorities conveys a sense of restlessness,

⁸ The main exception to this is in Ruggles's typical AA' or ABA' formal plans. The A' sections always begin with a certain amount of exact repetition, but then veer off on their own, rather like Ruggles's motives.

preventing the listener from settling down or finding a comfortable resting place anywhere.

(4) This sense of restlessness is also conveyed by Ruggles's fluid irregular rhythm and shifting meters. Robison writes:

The basic temporal characteristics of Ruggles's music are ametrical construction with non-periodic phrase structure, ties and rests on the beat to vary accent patterns, frequent changes in subdivision of the beat, use of polyrhythms, frequent changes in tempo and expressive character, and liberal use of *ritardandos* and *accelerandos*. These devices...serve to support Ruggles's rhythmic ideal of *tempo rubato* (Robison 1991:55).

(5) The quest towards transcendence is evoked through Ruggles's work titles and epigraphs, many taken from the poetry of Whitman, Blake, and Browning. The titles of *Angels*, *Evocations*, and *Exaltation* have no links to poetry and, I think, require no commentary. *Men and Mountains* takes its name from Blake's *Gnomic Verses*: "Great things are done when Men and Mountains meet; This is not done by Jostling in the Street."⁹ Its second movement, *Lilacs*, took its title from Whitman's *When lilacs last in the dooryard bloom'd* (Ziffrin 1994:93). *Sun-Treader* refers to

⁹ In a review of the premiere of *Men and Mountains*, Lawrence Gilman comments on Ruggles and Blake:

Mr. Ruggles is well fitted to set Blake to music. He is a natural mystic, a rhapsodist, a composer who sees visions and dreams fantastic dreams. The wild, gigantic, tortured symbols of Blake's imagination, his riotous and untrammelled excursions in the world behind the heavens, are all of a piece with Mr. Ruggles's thinking. There is a touch of the apocalyptic, the fabulous, about his fantasies. He is the first unicorn to enter American music. He is the master of a strange, torrential, and perturbing discourse....This New Englander with a touch of Blake--of Blake's rhapsodic fantasy, Blake's piercing and swift simplicity--may not write music that we should call "beautiful." Yet tomorrow, or the day after, we may call it that (*New York Herald-Tribune*, 8 December 1924).

the opening line of Browning's paean to Shelley, *Pauline*; "Sun-treader, light and life be thine forever." Ruggles's *Sun-Treader*, however, is not about Shelley, but takes its inspiration from the feeling and image of that initial line.¹⁰ The manner in which Ruggles used these lines of poetry is suggested in an account of the inception of *Portals*, given by the composer to Dorothy Canfield Fisher:

"I can't tell you," he said, "how *Portals* was written. One can never say, really, how a work of art is written because it takes form gradually in one's unconscious mind until something, perhaps something apparently quite unrelated, comes along and happens to crystallize it and bring it to consciousness. In this case the re-agent was Walt Whitman's lines

What are they of the Known
But to ascend and enter the Unknown?

There is no literal correspondence between these and the composition but the one movement in which it is written is broken from time to time by the recurrence in various forms of the main theme, like a series of portals opening on new vistas. A mystical concept--as indeed Whitman was mystical (Fisher 1929:1-2).

In sum: Seeger deplores Ruggles's unsystematic application and paucity of "organizing principles." I feel that, on the contrary, Ruggles has more organizing principles than Seeger recognizes, many of them (ironically) influenced by Seeger himself; and that Ruggles's lack of system is an integral part of his compositional method. But Seeger also admits that Ruggles's music conveys an intimation of the sublime--more or less by grace, since that intimation cannot be reconciled with what Seeger views as Ruggles's technical

¹⁰ Ruggles noticed the line underscored in a copy of Browning's poems owned by his wife Charlotte, who said that it was one of her favorites lines. I take this to imply that Ruggles was impressed by the movement and imagery of the line, not of the entire poem (Interview with Ruggles by James Tenney and Carolee Schneemann, Arlington, Vermont, 25 December, 1965; in Archabal 1979:209-210).

deficiencies. My position is that the sense of the transcendent conveyed by Ruggles's music is not only directly related to his compositional procedures, but that if he were to use those principles systematically he would never leave the realm of "the Known." The fact that they are so malleable allows him to use them to intimate what lies beyond their borders. Thus not only Ruggles's compositional procedures, but also his flexible application of them, comprise the means by which he strives to leave the realm of the Known to "ascend and enter the Unknown."

Appendix: Publication Chronology of Carl Ruggles's Compositions (including miscellaneous notes)

The chronology (composition, publication, and revision) of Ruggles's works is tangled and not entirely clear. This chronology is not intended to be definitive, but is more complete than other chronologies I have seen, and may be useful. The Theodore Presser Company currently holds all Ruggles copyrights.

Toys

- 1919 Completed (Kirkpatrick 1968:152). Soprano and piano. Verse by Ruggles.
 1920 H.W. Gray Co. (New York). Voice and piano. Treble piano notes in m.1 are D5/E5.
 1983 Theodore Presser Co. (Bryn Mawr). Revised, ed. Walter Eckard. Transposed down a whole step from the 1920 edition--treble piano notes in m.1 are C5/D5.

Men and Angels

- 1921 Composed (Kirkpatrick 1968:153). Three movements: *Men*, *Angels*, and *Suntreader*. Subsequently broken up and recycled, as follows:
- Men*. "Now rejected....a very brief, almost symmetrical balancing of a few episodes linked by melodic variation: a pair of fanfares, a melodious lento, a fantastic canon á 5 (prototype of the canon in the later *Suntreader*) which ends adagio, and a final fanfare--hardly more than two minutes in all" (Kirkpatrick 1968:153). "Discarded" in 1924 (Kirkpatrick 1980).
- Angels* Became a separate work of the same name.
- Sun-Treader* Revised as *Men* in *Men and Mountains* (not as the later *Sun-Treader*).

Angels

- 1921 Completed (note on 1943 edition). Originally conceived as the slow middle movement of *Men and Angels* (Ziffrin 1968:184).
 1925 J. Curwen and Sons (London). In Philadelphia, Curwen, Inc. For six muted trumpets; where possible, the sixth should be a bass trumpet. Includes organ transcription by Lynnwood Farnam. Principle treble voice (Trumpet III) begins on Ab.

Note on p.3 (Ziffrin 1968:185):

This composition was conceived for 6 muted trumpets (5 trumpets and bass trumpet), but it may be played by any 6 instruments of equal timbre:

Woodwind---

6 clarinets:

5 clarinets and bass clarinet

Strings---

2 violins, 2 violas, 2 cellos

5 violins and 1 cello

4 violins and 2 cellos

If transposed down a major 3rd 6 cellos may be used

No mutes when played with strings.

1938 Revised (note in 1943 edition).

1943 *New Music* XVI/3 (April). Publication of 1938 revision. Rescored for 4 muted trumpets and 2 muted trombones, or 4 violins and 2 cellos. Transposed down ip <-3>--principle treble voice (tpt.2) begins on G. Principle voices are marked with arrows. Numerous small changes; descending sequence greatly extended. Detailed comparison with first version in Ziffirin 1968.

1960 American Music Edition (New York). Slight revision of 1943 edition. Scored for 4 muted trumpets and 2 muted trombones (no string option). Triplet rhythms simplified, no arrows.

1960, 1994 Piano arrangement by John Kirkpatrick. Theodore Presser (Bryn Mawr).

Vox Clamans in Deserto

Soprano and small orchestra. Three songs: *Parting at Morning* (verse by Browning), *Son of Mine* (Charles Henry Meltzer), *A Clear Midnight* (Whitman).

1919 First setting of *A Clear Midnight* (Kirkpatrick 1968:152).

1924 First performance of all three songs (January) (Kirkpatrick 1968:154).

1977, 1984 Published by Theodore Presser (Bryn Mawr).

The concert program from the premiere (13 January 1924) lists four other projected songs, which were evidently never completed: *Premonitions* (Ruggles), *As if a Phantom Caress'd Me* (Whitman), *Lyric* (Shelley), *Sonnet* (Kirkpatrick:154). The score and parts for *Vox Clamans in Deserto* were available for rental from New Music Editions (New Music edition catalogue appended to the 1943 score of *Sun-Treader*), but not published until 1977. The following is Hale Smith's editorial note from the Presser score: "The major problem in preparing the score of *Vox Clamans in Deserto* was that of discovering, so far as such was possible, Ruggles's actual intentions. The score and parts (most of which were in his beautiful calligraphy) contradicted each other and, worse, changes were written beside and over Ruggles' notation in handwriting other than his. Rhythms, notes, dynamics, articulations, and instrumentation were all affected by the alterations and I found it necessary to clarify each of the above-mentioned elements both separately and in relation to the whole."

Men and Mountains

Three movements: *Men*, *Lilacs*, *Marching Mountains*.

1927 *New Music* I/1 (October) (Mead 1981:585). Small orchestra.

1936 Rescored for larger orchestra (Kirkpatrick 1968:161).

1942 Further revised (Kirkpatrick 1968:161). New ending for *Marching Mountains*.

1970 American Music Edition (New York). Revised edition.

Men originated as the third movement of *Men and Angels*, which was originally called *Sun-treader*.

Portals

String orchestra.

1926 Completed (Kirkpatrick 1968:156).

1930 *New Music* III/3 (April) (Mead 1981:585).

1957 American Music Edition (New York). Revised edition.

Sun-Treader

1931 Completed (Kirkpatrick 1968:157-58).

1934 New Music Orchestra Series 14 (Mead 1981:594).

1981 Theodore Presser (Bryn Mawr).

Title from Brownings' epithet for Shelley in *Pauline* (Kirkpatrick 1968:153). Ruggles's revisions written on the 1934 score are listed in Robison 1991:212-31, Appendices A and B. Robison also notes which corrections have been incorporated into the Presser edition. Errata in the the Presser edition are listed in Robison 1991:232-33, Appendix C.

Evocations: Four Chants for Piano

1935-43

1943 *New Music* XVI/3 (April). *Evocations: Three Chants for Piano* (Mead 1981:589).

1945 *New Music* XVIII/2 (January). *Evocations No. 4*. (Mead 1981:58).

1956 American Music Edition (New York). 1954 revision, ed. John Kirkpatrick. Reverses order of former numbers 3 and 4 (Gilbert 1970). The cover gives the following composition dates: I. Largo (1937); II. Andante con Fantasia (1941); III. Moderato Appassionato (1943); IV. Adagio Sostenuto (1940).

Organum

1947 Completed (Kirkpatrick 1968:163).

1947 New Music special editions (Mead 1981:594).

1947 *New Music* XXI/1 (October). Piano arrangement by John Kirkpatrick (Mead 1981:590).

1970 American Music Edition (New York).

1989 Theodore Presser (Bryn Mawr). Ruggles's 1947 arrangement for two pianos, ed. John Kirkpatrick.

Exaltation

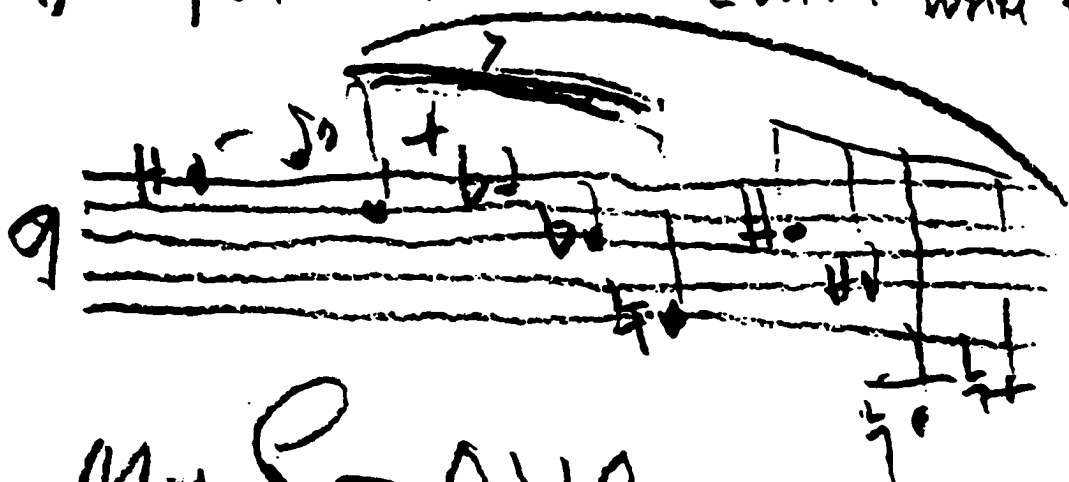
1958 Completed (note by Ray Green in Presser score).

1977, 1983 Theodore Presser (Bryn Mawr). Ray Green, ed.

The subtitle reads "a hymn tune for congregation and organ." The Presser score notes that "it was the composer's intention that this tune be hummed and that no text be used."

to call me up,
 and I loved every
 second of our talk.

Now Jim, how
 about the Woodpecker?
 Do you think he could write this?



My LOVE, as Always.

Example 2-1. Letter from Ruggles to James Tenney (excerpt): The Woodpecker melody

Ex. 2-2a: Adjacent ordered pitch-class intervals

pci: (1 7 7 6 7 6 9 7 3 1)

Ex. 2-2b. Registral disposition Ex. 2-2c: Registral frame
Ex. 2-2d. near-symmetrical CSEGS parsing

<1 2> <1 2>
<1 3 2 0> <1 3 2 0>

Ex. 2-2e: <021> CSEG class

<1 2 0> (<2 1 0>) <2 0 1>
<0 2 1> <0 2 1>

Ex. 2-2f: Descending line CSEGS

<3 2 1 0> <2 1 0>
<4 3 2 1 0>

Ex. 2-2l. SC (016) saturation

Bb-E-----B
 Eb-Bb-E
 A-Eb-Bb
 D-A-Eb

F#-----G
 F#-----B-C

Ex. 2-2m. SC (015) instances

F#-----G-----D
 E-----B-C
 C#-G#-----C

F#-----D-----C#

Ex. 2-2n. I0-related dyads
Ex. 2-2o. (016) framed by (015)

Bb-E-----B
 Eb-Bb-E
 A-Eb-Bb
 D-A-Eb E-----C#-G# (037)!

(016)

(015) F#-----G-----D
 E-----B-C
 C#-G#-----C

Ex. 2-2p. SC (0156) instances

Eb-Bb-E-----B
 A-Eb-Bb-E
 D-A-Eb-Bb

F#-----G-----B-C
 F#-----G-----C#-----B-C
 D-A-----C#-G#

Example 2-3. *Portals* (1930), mm.1-10: String lengths without pc duplication

1 2 3 4 5 6 7 8 9 10 11 12 10 9 8 9 10 11 9 11

5 12 10 10 12 10 10 12 10 10 12 10 10 12 10 10 12

10 3 3 3

TABLE 2-1a: *Portals* (1930), mm. 1-10: LSDP (lengths of strings of different pitch classes)

LSDP	1	2	3	4	5	6	7	8	9	10	11	12
Occurrences:	1	1	4	1	1	6	6	8	8	5	3	2
Percentages:	2.1	2.1	8.7	2.1	2.1	13	13	17.4	17.4	10.9	6.5	4.3
ALSD=7.5												

TABLE 2-1b. *Portals* (1930), mm. 1-10: Pitch-class distribution

Pitch class	<u>C</u>	<u>C^b</u>	<u>D</u>	<u>D^b</u>	<u>E</u>	<u>F</u>	<u>F^b</u>	<u>G</u>	<u>G^b</u>	<u>A</u>	<u>A^b</u>	<u>B</u>
	3	4	4	6	5	4	4	3	2	4	4	3
percentages:	6.5	8.7	8.7	13	10.9	8.7	8.7	6.5	4.3	8.7	8.7	6.5

Example 2-4. Lilacs: String lengths without pc duplication

1 2 3 4 5 6 7 8 5 5 6 5 5 5 6 7 8

A

9 10 11 12 2 3 4 5 5 5 6 7 3 4 5 6 7 5 6 7

6

9 8 9 5 6 7 8 8 8 9 8 7 7 8 9 10 11 12 8 8 8 8 9 8 8 9 10

B

14 11 8 9 10 11 12 5 4 5 6 7 8 9 8 9 10 11 12 9 10 11 6

20 1 2 3 4 5 6 7 8 5 5 6 5 5 6 5 6 7 8 9 10 7

A'

7 7 6 7 5 6 6 6 7 8 9 10 5 6 7 6 7 8 9 9 5 6 7 3 4 5

25

29 6 7 5 6 7 6

TABLE 2-2: *Lilacs* LSDP (lengths of strings of different pitch classes) by section and in entirety.

Section A

<u>LSDP</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
Occurrences:	1	2	3	3	11	6	5	2	1	1	1	1
Percentages:	2.7	5.4	8.1	8.1	29.7	16.2	13.5	5.4	2.7	2.7	2.7	2.7
ALSD=5.7												

Section B

<u>LSDP</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
Occurrences:	0	0	0	1	3	3	4	14	9	5	6	3
Percentages:	0	0	0	2.1	6.2	6.2	8.3	29.1	18.7	10.4	12.5	6.2
ALSD=8.5												

Section A'

<u>LSDP</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
Occurrences:	1	1	2	2	11	13	12	4	4	2	0	0
Percentages:	1.9	1.9	3.8	3.8	21.2	25	23	7.7	7.7	3.8	0	0
ALSD=6.2												

Complete

<u>LSDP</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
Occurrences:	2	3	5	6	25	22	21	20	14	8	7	4
Percentages:	1.5	2.2	3.6	4.4	18.2	16.1	15.3	14.6	10.2	5.9	5.1	2.9
ALSD=6.9												

Example 2-5. *Portals* (1930), mm. 1-10: Ordered PC intervals and LSDI (length of strings of different intervals)

LSDI 1 2 2 1 2 3 2 2 3 4 5 2 1 2 3 4 1 2 3 4
 pci 11 6 11 11 5 6 5 3 8 7 3 4 5 8 10 11 2 8 10 4 1

LSDI 3 4 5 6 5 6 4 2 2 3 2 3 2 3 3 4 2 3 4 5 6 2
 pci 10 8 11 2 1 3 11 3 11 9 11 3 11 4 3 1 3 4 2 11 10 11

LSDI 3 3 3 3
 pci 3 10 11

TABLE 2-3a. *Portals* (1930), mm. 1-10: LSDI (length of strings of different intervals)

<u>LSDI</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	4	13	13	8	4	3	0	0	0	0	0
Percentages:	8.9	28.9	28.9	17.8	8.9	6.7	0	0	0	0	0

ALSDI=3.1

TABLE 2-3b. *Portals* (1930), mm. 1-10: Pitch-class intervals

<u>Ordered pci:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	3	3	7	3	2	2	1	6	1	5	12
Percentages:	6.7	6.7	15.6	6.7	4.4	4.4	2.2	13.3	2.2	11.1	26.7

<u>IC:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Occurrences:	15	8	8	9	3	2
Percentages:	33.3	17.8	17.8	20	6.7	4.4

LSDI 1 2 3 4 4 5 6 2 3 4 2 3 4 5 5 3 4
pci 10 4 11 5 10 6 9 6 5 11 5 9 6 3 11 6 2

A

LSDI 4 5 6 7 4 4 4 5 5 2 3 4 2 2 3 4 5 4 2 1
pci 3 10 8 4 3 10 8 11 4 11 3 10 3 10 8 11 4 10 4 4

6

LSDI 2 1 2 3 1 2 2 3 4 5 6 6 2 3 4 5 2 3 1 2 3 4 3 4 5 4
pci 9 9 5 4 4 9 4 6 7 2 5 9 5 8 6 3 6 7 7 6 9 4 6 5 3 4

B

LSDI 5 4 5 6 6 1 2 3 4 5 5 6 6 2 3 4 2 3 1 1 1
pci 9 5 7 8 3 3 10 5 7 8 3 4 10 4 1 3 1 2 2 2 2

14

LSDI 1 2 3 4 4 5 6 2 3 4 2 3 4 5 6 1 1 2 3 4
pci 10 4 11 5 10 6 9 6 5 11 5 9 8 3 10 10 10 1 8 6

A'

LSDI 5 5 4 5 6 2 2 3 4 2 3 4 5 2 3 2 2 3 4 4 5 2 3 4 4 4
pci 3 10 8 11 4 11 4 10 3 10 8 11 4 11 3 11 3 10 8 11 4 11 3 10 4 4 4

25

LSDI 5 4 5 2 3 4
pci 5 10 6 10 1 4

29

TABLE 2-4a. Lilacs: LSDI (length of strings of different intervals)**Section A**

<u>LSDI</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	2	7	6	11	7	2	1	0	0	0	0
Percentages:	5.6	19.4	16.7	30.6	19.4	5.6	2.8	0	0	0	0
ALSDI=3.7											

Section B

<u>LSDI</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	8	10	9	8	7	6	0	0	0	0	0
Percentages:	16.7	20.8	18.8	16.6	14.6	12.5	0	0	0	0	0
ALSDI=3.3											

Section A'

<u>LSDI</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	3	12	10	15	9	3	0	0	0	0	0
Percentages:	5.8	23.1	19.2	28.9	17.3	5.8	0	0	0	0	0
ALSDI=3.5											

Complete

<u>LSDI</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	13	29	25	34	23	11	1	0	0	0	0
Percentages:	9.6	21.3	18.4	25	16.9	8.1	0.7	0	0	0	0
ALSDI=3.5											

TABLE 2-4b. Lilacs: Pitch-class intervals**Section A**

<u>Ordered pci:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	3	3	7	3	2	2	1	6	1	5	12
Percentages:	6.7	6.7	15.6	6.7	4.4	4.4	2.2	13.3	2.2	11.1	26.7

<u>IC:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Occurrences:	15	8	8	9	3	2
Percentages:	33.3	17.8	17.8	20	6.7	4.4

Section B

<u>Ordered pci:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	2	5	6	8	6	5	5	3	6	2	0
Percentages:	4.2	10.4	12.5	16.7	12.5	10.4	10.4	6.2	12.5	4.2	0

<u>IC:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Occurrences:	2	7	12	11	11	5
Percentages:	4.2	14.6	25	22.9	22.9	10.4

Section A'

<u>Ordered pci:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	2	0	6	7	4	4	0	5	2	12	10
Percentages:	3.8	0	11.5	13.5	7.7	7.7	0	9.6	3.8	23.1	19.2

<u>IC:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Occurrences:	12	12	8	12	4	4
Percentages:	23.1	23.1	15.4	23.1	7.7	7.7

Complete

<u>Ordered pci:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
Occurrences:	4	6	17	20	13	13	5	11	10	21	16
Percentages:	2.9	4.4	12.5	14.7	9.6	9.6	3.7	8.1	7.4	15.4	11.8

<u>IC:</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Occurrences:	20	27	27	31	18	13
Percentages:	14.7	19.9	19.9	22.8	13.2	9.6

15

strings/harp

trumpet

strings/harp

pc chromatic zone: G-G#-A-B-B#-C-C#-D-D#-E-F

R

R

The first system of musical notation for 'The Bird Song' is written on a single five-line staff. It begins with a treble clef (a stylized 'C' with a dot) and a key signature of one sharp (F#), indicated by a sharp sign on the first line. The melody consists of a series of eighth and sixteenth notes, with some notes beamed together. The notes are: G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F#4 (quarter), E4 (quarter), D4 (quarter), C4 (half), B3 (half), A3 (half), G3 (half), F#3 (half), E3 (half), D3 (half), C3 (half), B2 (half), A2 (half), G2 (half), F#2 (half), E2 (half), D2 (half), C2 (half), B1 (half), A1 (half), G1 (half), F#1 (half), E1 (half), D1 (half), C1 (half), B0 (half), A0 (half), G0 (half), F#0 (half), E0 (half), D0 (half), C0 (half), B-1 (half), A-1 (half), G-1 (half), F#-1 (half), E-1 (half), D-1 (half), C-1 (half), B-2 (half), A-2 (half), G-2 (half), F#-2 (half), E-2 (half), D-2 (half), C-2 (half), B-3 (half), A-3 (half), G-3 (half), F#-3 (half), E-3 (half), D-3 (half), C-3 (half), B-4 (half), A-4 (half), G-4 (half), F#-4 (half), E-4 (half), D-4 (half), C-4 (half), B-5 (half), A-5 (half), G-5 (half), F#-5 (half), E-5 (half), D-5 (half), C-5 (half), B-6 (half), A-6 (half), G-6 (half), F#-6 (half), E-6 (half), D-6 (half), C-6 (half), B-7 (half), A-7 (half), G-7 (half), F#-7 (half), E-7 (half), D-7 (half), C-7 (half), B-8 (half), A-8 (half), G-8 (half), F#-8 (half), E-8 (half), D-8 (half), C-8 (half), B-9 (half), A-9 (half), G-9 (half), F#-9 (half), E-9 (half), D-9 (half), C-9 (half), B-10 (half), A-10 (half), G-10 (half), F#-10 (half), E-10 (half), D-10 (half), C-10 (half), B-11 (half), A-11 (half), G-11 (half), F#-11 (half), E-11 (half), D-11 (half), C-11 (half), B-12 (half), A-12 (half), G-12 (half), F#-12 (half), E-12 (half), D-12 (half), C-12 (half), B-13 (half), A-13 (half), G-13 (half), F#-13 (half), E-13 (half), D-13 (half), C-13 (half), B-14 (half), A-14 (half), G-14 (half), F#-14 (half), E-14 (half), D-14 (half), C-14 (half), B-15 (half), A-15 (half), G-15 (half), F#-15 (half), E-15 (half), D-15 (half), C-15 (half), B-16 (half), A-16 (half), G-16 (half), F#-16 (half), E-16 (half), D-16 (half), C-16 (half), B-17 (half), A-17 (half), G-17 (half), F#-17 (half), E-17 (half), D-17 (half), C-17 (half), B-18 (half), A-18 (half), G-18 (half), F#-18 (half), E-18 (half), D-18 (half), C-18 (half), B-19 (half), A-19 (half), G-19 (half), F#-19 (half), E-19 (half), D-19 (half), C-19 (half), B-20 (half), A-20 (half), G-20 (half), F#-20 (half), E-20 (half), D-20 (half), C-20 (half), B-21 (half), A-21 (half), G-21 (half), F#-21 (half), E-21 (half), D-21 (half), C-21 (half), B-22 (half), A-22 (half), G-22 (half), F#-22 (half), E-22 (half), D-22 (half), C-22 (half), B-23 (half), A-23 (half), G-23 (half), F#-23 (half), E-23 (half), D-23 (half), C-23 (half), B-24 (half), A-24 (half), G-24 (half), F#-24 (half), E-24 (half), D-24 (half), C-24 (half), B-25 (half), A-25 (half), G-25 (half), F#-25 (half), E-25 (half), D-25 (half), C-25 (half), B-26 (half), A-26 (half), G-26 (half), F#-26 (half), E-26 (half), D-26 (half), C-26 (half), B-27 (half), A-27 (half), G-27 (half), F#-27 (half), E-27 (half), D-27 (half), C-27 (half), B-28 (half), A-28 (half), G-28 (half), F#-28 (half), E-28 (half), D-28 (half), C-28 (half), B-29 (half), A-29 (half), G-29 (half), F#-29 (half), E-29 (half), D-29 (half), C-29 (half), B-30 (half), A-30 (half), G-30 (half), F#-30 (half), E-30 (half), D-30 (half), C-30 (half), B-31 (half), A-31 (half), G-31 (half), F#-31 (half), E-31 (half), D-31 (half), C-31 (half), B-32 (half), A-32 (half), G-32 (half), F#-32 (half), E-32 (half), D-32 (half), C-32 (half), B-33 (half), A-33 (half), G-33 (half), F#-33 (half), E-33 (half), D-33 (half), C-33 (half), B-34 (half), A-34 (half), G-34 (half), F#-34 (half), E-34 (half), D-34 (half), C-34 (half), B-35 (half), A-35 (half), G-35 (half), F#-35 (half), E-35 (half), D-35 (half), C-35 (half), B-36 (half), A-36 (half), G-36 (half), F#-36 (half), E-36 (half), D-36 (half), C-36 (half), B-37 (half), A-37 (half), G-37 (half), F#-37 (half), E-37 (half), D-37 (half), C-37 (half), B-38 (half), A-38 (half), G-38 (half), F#-38 (half), E-38 (half), D-38 (half), C-38 (half), B-39 (half), A-39 (half), G-39 (half), F#-39 (half), E-39 (half), D-39 (half), C-39 (half), B-40 (half), A-40 (half), G-40 (half), F#-40 (half), E-40 (half), D-40 (half), C-40 (half), B-41 (half), A-41 (half), G-41 (half), F#-41 (half), E-41 (half), D-41 (half), C-41 (half), B-42 (half), A-42 (half), G-42 (half), F#-42 (half), E-42 (half), D-42 (half), C-42 (half), B-43 (half), A-43 (half), G-43 (half), F#-43 (half), E-43 (half), D-43 (half), C-43 (half), B-44 (half), A-44 (half), G-44 (half), F#-44 (half), E-44 (half), D-44 (half), C-44 (half), B-45 (half), A-45 (half), G-45 (half), F#-45 (half), E-45 (half), D-45 (half), C-45 (half), B-46 (half), A-46 (half), G-46 (half), F#-46 (half), E-46 (half), D-46 (half), C-46 (half), B-47 (half), A-47 (half), G-47 (half), F#-47 (half), E-47 (half), D-47 (half), C-47 (half), B-48 (half), A-48 (half), G-48 (half), F#-48 (half), E-48 (half), D-48 (half), C-48 (half), B-49 (half), A-49 (half), G-49 (half), F#-49 (half), E-49 (half), D-49 (half), C-49 (half), B-50 (half), A-50 (half), G-50 (half), F#-50 (half), E-50 (half), D-50 (half), C-50 (half), B-51 (half), A-51 (half), G-51 (half), F#-51 (half), E-51 (half), D-51 (half), C-51 (half), B-52 (half), A-52 (half), G-52 (half), F#-52 (half), E-52 (half), D-52 (half), C-52 (half), B-53 (half), A-53 (half), G-53 (half), F#-53 (half), E-53 (half), D-53 (half), C-53 (half), B-54 (half), A-54 (half), G-54 (half), F#-54 (half), E-54 (half), D-54 (half), C-54 (half), B-55 (half), A-55 (half), G-55 (half), F#-55 (half), E-55 (half), D-55 (half), C-55 (half), B-56 (half), A-56 (half), G-56 (half), F#-56 (half), E-56 (half), D-56 (half), C-56 (half), B-57 (half), A-57 (half), G-57 (half), F#-57 (half), E-57 (half), D-57 (half), C-57 (half), B-58 (half), A-58 (half), G-58 (half), F#-58 (half), E-58 (half), D-58 (half), C-58 (half), B-59 (half), A-59 (half), G-59 (half), F#-59 (half), E-59 (half), D-59 (half), C-59 (half), B-60 (half), A-60 (half), G-60 (half), F#-60 (half), E-60 (half), D-60 (half), C-60 (half), B-61 (half), A-61 (half), G-61 (half), F#-61 (half), E-61 (half), D-61 (half), C-61 (half), B-62 (half), A-62 (half), G-62 (half), F#-62 (half), E-62 (half), D-62 (half), C-62 (half), B-63 (half), A-63 (half), G-63 (half), F#-63 (half), E-63 (half), D-63 (half), C-63 (half), B-64 (half), A-64 (half), G-64 (half), F#-64 (half), E-64 (half), D-64 (half), C-64 (half), B-65 (half), A-65 (half), G-65 (half), F#-65 (half), E-65 (half), D-65 (half), C-65 (half), B-66 (half), A-66 (half), G-66 (half), F#-66 (half), E-66 (half), D-66 (half), C-66 (half), B-67 (half), A-67 (half), G-67 (half), F#-67 (half), E-67 (half), D-67 (half), C-67 (half), B-68 (half), A-68 (half), G-68 (half), F#-68 (half), E-68 (half), D-68 (half), C-68 (half), B-69 (half), A-69 (half), G-69 (half), F#-69 (half), E-69 (half), D-69 (half), C-69 (half), B-70 (half), A-70 (half), G-70 (half), F#-70 (half), E-70 (half), D-70 (half), C-70 (half), B-71 (half), A-71 (half), G-71 (half), F#-71 (half), E-71 (half), D-71 (half), C-71 (half), B-72 (half), A-72 (half), G-72 (half), F#-72 (half), E-72 (half), D-72 (half), C-72 (half), B-73 (half), A-73 (half), G-73 (half), F#-73 (half), E-73 (half), D-73 (half), C-73 (half), B-74 (half), A-74 (half), G-74 (half), F#-74 (half), E-74 (half), D-74 (half), C-74 (half), B-75 (half), A-75 (half), G-75 (half), F#-75 (half), E-75 (half), D-75 (half), C-75 (half), B-76 (half), A-76 (half), G-76 (half), F#-76 (half), E-76 (half), D-76 (half), C-76 (half), B-77 (half), A-77 (half), G-77 (half), F#-77 (half), E-77 (half), D-77 (half), C-77 (half), B-78

[C D E E# F F# G A A# B $\flat$ B# -] C#

Example 2-8. *Visions*: Near-aggregates and aggregate completion



Wave 1

C - D E F
F G A A B B

Wave 2

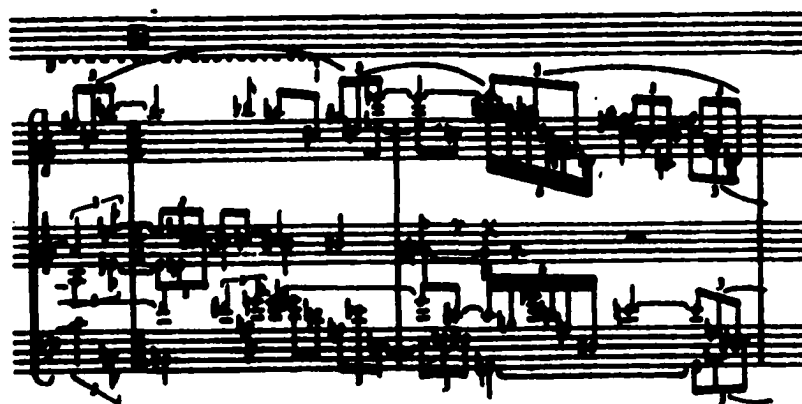
C D D E E F
F G A A B -

D

Wave 3

C D D E E F -
G A A B B

Descent



R

Example 2-9. *Sun-Treader*, opening: Linear aggregate completion

Example 2-10. *Sun-Treader*, mm. 12-19: Linear chromatic zones

E F G G A B - C C D D E
 E F G G A C C D D E F G - A B

Serene - Lento

Winds

14 *up to 15th of previous*

12 14 16 18

Strings, harp

249

[Aggregate] [Near-aggregate]

20 A^b B^b 23

V. I
V. II
Vla.
Vc.
Cb.

24] [Aggregate B 24] [Aggregate 29

V. I
V. II
Vla.
Vc.
Cb.

-gate 30] 31 VI. I 32 33

V. I
V. II
Vla.
Vc.
Cb.

rit. a tempo

mp

Example 2-11. *Sun-Treader*, mm. 20-30: Aggregates and near-aggregates

Marching Mountains, mm. 1-4

Violin I
Violin II
Viola
Cello
Bass

1 2 3 4

Marching Mountains, mm. 5-8

V. I
V. II
Via.
Vc.
Cb.

5 6 7 8

Marching Mountains, mm. 9-13

V. I
V. II
Via.
Vc.
Cb.

9 10 11 12 13

Example 2-12. *Marching Mountains*, mm. 1-12: Linear aggregate completion

8 <0 2 1> <0 2 1> <0 2 1> 8va 1>

Example 2-13a. *Sun-Treader*, mm.6-9: <021> CSEGs

12 <2 0 1> <2 0 1>

Example 2-13b. *Sun-Treader*, mm.12-14: <201> CSEGs

ANGELS

For Brass or Strings

CARL RUGGLES

Serene
♩ = 40

6

Trumpets in C III
with mutes
(actual pitch)

2

or
Violins IV

Trombones with mutes
or
Violoncelli

Example 2-14. *Angels*, opening: <021> contours

II. LILACS

253

The image displays a musical score for the piece "Lilacs". The score is written for five instruments: Violin I, Violin II, Viola, Cello, and Bass. The notation is in a standard musical format with five-line staves. The Violin I staff is at the top, followed by Violin II, Viola, Cello, and Bass at the bottom. The score includes various musical notations such as notes, rests, and dynamic markings. A large, sweeping line is drawn across the Violin I and Violin II staves, indicating a melodic contour. The score is divided into measures by vertical bar lines. The overall layout is clean and professional, typical of a printed musical score.

Example 2-15. *Lilacs*, opening: <1032> and <1320> contours

The musical score is presented in four systems, each with three staves (treble, middle, and bass clef). The notation includes various musical symbols such as notes, rests, and dynamic markings.

- System 1:** Labeled "1 Ascent 1" at the beginning and "5 Ascent 2" at the end. A bracket connects the first and fifth measures.
- System 2:** Labeled "6 Ascent 3" and "9 Descent 1". A bracket connects the sixth and ninth measures.
- System 3:** Labeled "10 Descent 2", "Descents 3", "4", and "5". A bracket connects the tenth and fifteenth measures.
- System 4:** Labeled "12" at the beginning and "15" at the end. A bracket connects the twelfth and fifteenth measures.

The score illustrates a series of ascending and descending melodic lines across the staves, with specific measures highlighted by brackets and labels.

The musical score for Example 2-17, 'Sun-Treader, opening: Overlapping phrases', is presented on three staves. The first staff, in 4/4 time, begins with a melody of eighth and sixteenth notes, featuring triplets and a fermata. The second and third staves illustrate overlapping phrases, with the second staff starting a new phrase while the first staff's phrase continues. The notation includes various musical symbols such as notes, rests, beams, and dynamic markings.

Example 2-17. *Sun-Treader*, opening: Overlapping phrases

⑨

More memo

cars. And a wee down bel - loon that

⑪

WT1

<+9, -2> <+10, -2> <+10, -1>

Mais tranquille

floats, and floats, and floats, way

⑭

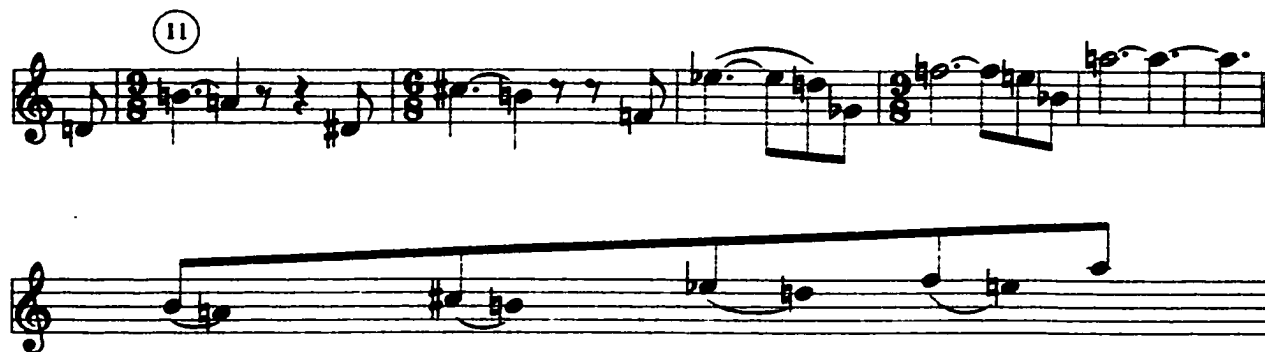
<+11, -1> <+11>

up to the stars.

111-40096

WT0 WT1 WT0 WT1 WT0

Example 2-18: *Toys*, end: Whole-tone passages



Arma

Voice

Piano

The musical score for 'Arma' by Debussy is presented for Voice and Piano. The Voice part is on a single staff, and the Piano part is on two staves. The music is in 3/4 time and features augmented triads. The piano part has a complex, flowing melody with many accidentals and ties. The voice part has a few notes, including a high note with a fermata.

Example 2-21. *Toys*, beginning: Augmented triads

Example 2-21, *Lilacs*, measures 133-138. The score is for five staves: Violin I (V. I.), Violin II (V. II.), Viola (Via.), Violoncello (Vc.), and Contrabasso (Cb.). Measures 133-138 show a complex texture with many beamed sixteenth and thirty-second notes. Measure 138 is marked *dim. e rit.* and *poco di poco*. The key signature has one flat (B-flat).

Example 2-22, *Lilacs*, measures 139-144. The score is for five staves: Violin I (V. I.), Violin II (V. II.), Viola (Via.), Violoncello (Vc.), and Contrabasso (Cb.). Measures 139-144 show a complex texture with many beamed sixteenth and thirty-second notes. Measure 139 is marked *Largo*. Measure 140 is marked *molto rit.*. Measure 141 is marked *mf*. Measure 142 is marked *p*. Measure 143 is marked *f*. Measure 144 is marked *f*. The key signature has one flat (B-flat).

Example 2-22. *Lilacs*: Cadential sequence and ascent

The musical score is presented in two systems. The first system includes measures 12, 15, and 18, while the second system includes measures 13, 16, and 19. The notation is in 3/4 time and features a whole-tone scale. The first system is labeled 'IMPLICIT' and the second system is labeled 'EXPLICIT'.

Example 2-23. *Lilacs*: Whole-tone lines

Example 2-24. *Angels*, opening: Whole-tone descent and voice exchanges

Example 2-25. Angels, opening: Reaching-over and outer-voice counterpoint

The second system of the exercise, measures 11-13, continues the pattern. Measure 11 shows a treble staff with a half note G4 and a bass staff with a half note E3. Measure 12 shows a treble staff with a half note A4 and a bass staff with a half note F3. Measure 13 shows a treble staff with a half note B4 and a bass staff with a half note G3. The notes are connected by a series of lines, including a large 'X' shape, indicating a specific fingering or articulation pattern.

From: To:

To:

12

1 WT0

2 WT0

3

4 WT0

5

6 WT1

Trumpets in C

Detailed description: The image shows a musical score for six trumpets, numbered 1 through 6. The key signature changes from one flat (B-flat) to no flats (C major). The score is divided into two systems. The first system contains measures 1 through 11, and the second system contains measures 12 through 15. A circled measure number '12' is at the beginning of the second system. The score includes various musical notations such as treble and bass clefs, 4/4 time signature, notes, rests, and triplets. Some parts are labeled 'WT0' and 'WT1', likely indicating different trumpet parts or weights. The text 'Trumpets in C' is written vertically on the left side of the score.

Example 2-26. *Angels*, 1921, transposed down a minor 3rd

To:

Example 2-27. *Angels*, 1943 (=1960). Sequential elaboration of whole-tone descent

The image shows a musical score for the piece 'Angels' (1943, revised 1960). The score is written on six staves. Handwritten annotations in black ink highlight specific musical features. The letters 'WTO' and 'WT1' are written in various staves, likely indicating whole-tone or whole-tone interval relationships. Large, hand-drawn loops connect notes across different staves, illustrating a sequential elaboration of a whole-tone descent. The score includes lyrics: 'rel... len... len... do...' and 'rel... len... len... do...'. A '2' and '(molto)' are written in the third staff, and 'III' is written in the bottom left corner.

B $\flat$ (A $\flat$) A $\flat$ B $\flat$ B
 B $\flat$ A $\flat$ F $\sharp$ E

Example 2-28. *Angels*, mm. 23-30, treble: B $\flat$ -A $\flat$ -F $\sharp$ -E linear expansion

40 42 44 267

Picc. *meno mosso* *rit.* *fff*

Fl. *ff* *fff*

Ob. *ff* *fff*

E.H. *ff* *fff*

Cl. *ff* *fff*

Bsn. *piu f* *meno mosso* *fff*

Hr. *ff* *fff*

Trp. *piu f* *meno mosso* *fff*

Trom. *f* *meno mosso* *fff*

Pa. *ff* *meno mosso* *fff*

Cym. *ff* *meno mosso* *fff*

Vla. *ff* *meno mosso* *fff*

Vla. *ff* *meno mosso* *fff*

Vel. *ff* *meno mosso* *fff*

C.B. *piu f* *meno mosso* *fff*

40 42 44

This musical score is for the ending of 'Marching Mountains (1924)'. It features a full orchestral arrangement with parts for Piccolo, Flute, Oboe, English Horn, Clarinet, Bassoon, Horn, Trumpet, Trombone, Percussion (Pauces, Cymbals), Violins, Viola, Violoncello, and Double Bass. The score is divided into measures 40, 42, and 44, with a final measure numbered 267. The tempo is marked 'meno mosso' and the dynamics range from 'piu f' to 'fff'. The music is in 2/4 time and features a variety of rhythmic patterns, including eighth and sixteenth notes, and rests. The Piccolo part has a melodic line with grace notes. The woodwinds and brass parts have more complex, rhythmic patterns. The strings provide a steady accompaniment. The percussion parts are marked with 'ff' and 'meno mosso'.

Example 2-29. *Marching Mountains* (1924): Ending

Example 2-30a displays musical notation for measures 41-42 of *Marching Mountains*, illustrating an unaltered $\langle -6, -1, +11 \rangle$ cycle. The notation is written on a grand staff (treble and bass clefs). The first system shows four measures, each with a treble clef staff and a bass clef staff. The intervals between notes are labeled as $\langle -6, -1, +11 \rangle$ below the first three measures. The second system shows two measures, each with a treble clef staff and a bass clef staff. The intervals between notes are labeled as $\langle -6, -1, +11 \rangle$ below the first measure. The notation includes various accidentals (sharps, flats, naturals) and a large upward-pointing arrow indicating a melodic rise. Labels "ip (12)" and "Bb aug. triad" are present.

Example 2-30b. *Marching Mountains*, mm. 41-42: Skewed $\langle -6, -1, +11 \rangle$ cycle

Example 2-30b displays musical notation for measures 41-42 of *Marching Mountains*, illustrating a skewed $\langle -6, -1, +11 \rangle$ cycle. The notation is written on a grand staff (treble and bass clefs). The first system shows four measures, each with a treble clef staff and a bass clef staff. The intervals between notes are labeled as $\langle -6, -1, +11 \rangle$ below the first three measures. The second system shows two measures, each with a treble clef staff and a bass clef staff. The intervals between notes are labeled as $\langle -6, -1, +11 \rangle$ below the first measure. The notation includes various accidentals (sharps, flats, naturals) and a large upward-pointing arrow indicating a melodic rise. Labels "ip (13)" and "Bb aug. triad" are present.

Handwritten musical score for Example 2-31, *Sun-Treader*, ending. The score is written on five staves, numbered 231, 232, 233, 238, and 241. The notation includes various musical symbols such as notes, rests, accidentals, and dynamic markings like *accal.* and *f*. The score is divided into measures by vertical bar lines. The notation is dense and complex, typical of a musical manuscript.

231

232

233

238

241

accal.

f

Example 2-31. *Sun-Treader*, ending

231 *accal.* $<+1, +6, +7>$ 232

Chromatic line $C^\sharp D E^\flat E^\sharp F F^\sharp G A^\flat A^\sharp A^\sharp B C C^\sharp D D^\sharp$

Octatonic line $C^\sharp C^\sharp E^\flat E^\sharp F^\sharp F^\sharp G G A^\flat A^\sharp A^\sharp B C C^\sharp D D^\sharp$

T3 line $C^\sharp C^\sharp E^\flat E^\sharp F^\sharp G A^\flat A^\sharp A^\sharp B C C^\sharp C^\sharp$

$<-6> <+1, +7, +6> <-11> <+1, +6, +7> <-11> <+1, +6, +7> <-11> <+5, +8, +5, +8> <-23> <+5, +8, +5, +8>$ 233 237

Chromatic line $E^\sharp F F^\sharp G$

Octatonic line $E^\sharp E^\sharp F^\sharp F^\sharp G G G$

T3 line $E^\sharp E^\sharp F^\sharp F^\sharp G G G$

$<-23> <+5, +8, +5, +8> <-23> <+5, +8, +5, +8> <-23> <+5, +8, +5, +8>$ 238 241

Example 2-32. *Sun-Treader*, mm. 232-241, treble sequences: Chromatic, octatonic, and T3 lines

233

T9

T3

T3

T3

T6

T9

T3

Example 2-33. *Sun-Treuder*, mm. 233-235: Voice exchange within set [C#, E, G, Bb]

The image shows two musical staves in treble clef, both starting at measure 238. Above the first staff, the interval sequence is given as $\langle +5, +8, +5, +8 \rangle \langle -23 \rangle$. The notes are: G4 (circled), A4, Bb4, and B#4. The label below is "Unaltered cycle". Above the second staff, the interval sequence is $\langle +5, +8, +5, +8, +5, +8 \rangle$. The notes are: G4 (circled), A4, Bb4, B#4, C5, and D5. The final note, D5, is circled. The label below is "Expanded cycle".

Unaltered cycle G4 (too low) Expanded cycle G7 (high)

Example 2-34. *Sun-Treader*, m. 238: Expansion of cycle to ensure arrival of G in the highest register

233

<+8, +5, +8>

<+5, +8>

II II 13

<-4, -7, -6>

233 234 235 236 237

238

<+8, +5, +8>

II II 13

<-4, -7, -6>

238 239 240 241

Example 2-35. *Sun-Treader*, ending: Dissonant voice exchanges



Example 2-36. Rockwell Kent's drawing of Ruggles as Captain Ahab

Men, mm. 1-2 *Lilacs*, mm. 1-2 *Marching Mountains*, m. 1

Example 3-1a. Men and Mountains: First four notes of each movement

Men *Lilacs* *Marching Mountains*

Set class: (0124)
Set: [Eb, F, F#, G]

T8

Set class: (0124)
Set: [Cb, Db, D#, Eb]

T_{4,4}

Set class: (0124)
Set: [Eb, F, F#, G]

Example 3-1b. Set, set class, and transposition

Men *Lilacs* *Marching Mountains*

CAS: < - + > CAS: < - + - > CAS: < - + - >

CSEG: <3 2 0 1> CSEG: <1 0 3 2> CSEG: <1 0 3 2>

SWAP(3,4)(RET)

Example 3-1c. Contour: CAS and CSEG

Men Lilacs Marching Mountains

CSEG: <3 2 0 1> CSEG: <1 0 3 2> CSEG: <1 0 3 2>

123 <1 1 0>	123 <1 0 2>	123 <1 0 2>
124 <1 1 0>	124 <1 0 2>	124 <1 0 2>
134 <1 1 0>	134 <1 0 2>	134 <1 0 2>
234 <2 0 1>	234 <2 0 1>	234 <2 0 1>

Example 3-1d. Contour: CSEG and trichordal C-subsegs

Men Lilacs Marching Mountains

28 18 18

Example 3-1e: Registral span

Men Lilacs Marching Mountains

G 1 F# 1 F# 2 Eb 1 Eb 1 Eb 2 G 1 F# 1 F# 2 Eb 1 Eb 1 Eb 2

Example 3-1f: <2-1-1> registral layout

Men Lilacs Marching Mountains

T8 T4 T0

Example 3-1g: Pitch-class voice leading

Men Lilacs Marching Mountains

6 3 (1) 1 1 4 2 (.66) 2.33 2 4 2 (2) 2 2

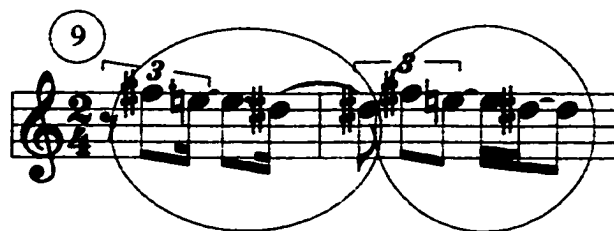
Durational span: 5 Durational span: 2 Durational span: 2

Example 3-1h: Note durations in eighth note equivalents

Men Lilacs Marching Mountains

ip < -1. -27. +2 > ip < -2. +4. -1 > ip < -2. +4. -1 >

Example 3-1i: Succession of pitch intervals



Ex. 3-2. *Portals*, (1930), mm.9-10: Immediate repetition

Trumpets in C

I

II

III

IV

Trombones

I

II

G F C E $\flat$ D $\flat$ G F C E $\flat$ D $\flat$

37 39

Example 3-3. *Angels*, mm.37-40: Immediate repetition with instrumental redistribution

Largo (J. = 60) *poco più mosso (J. = 60)* *più mosso e liberamente (J. = 70)*

G A C B F

A **G A C B F A**

Example 3-4. *Evocations I*, mm. 4-7: Immediate repetition

The musical score illustrates the immediate repetition of a marcato motive across ten statements. The notation is organized into four systems, each containing piano (Piano) and trumpet (Tpts.) staves. The first system shows Statements 1 and 2, with the piano part marked 'marcato marcato'. The second system shows Statements 3 and 4. The third system shows Statements 5, 6, 7, and 8. The fourth system shows Statements 9 and 10, with the piano part marked 'cresc. molto' and 'Molto F.F.'. A final, isolated statement of the motive is shown at the bottom, marked with a forte (f) dynamic.

Statement 1 Statement 2

Statement 3 Statement 4

Statement 5 Statement 6 Statement 7 Statement 8

Statement 9 Statement 10

marcato marcato

cresc. molto *Molto F.F.*

f

**Example 3-5. *Marching Mountains*, mm. 7-8, 33-43, marcato motive:
Immediate repetition**

CAS: < - . - . + > CAS: < - . - . + >

CSEG: <3 1 0 2> CSEG: <3 2 0 1>

<u>123</u>	<2	1	0>	<u>123</u>	<2	1	0>
<u>124</u>	<2	0	1>	<u>124</u>	<2	1	0>
<u>134</u>	<2	0	1>	<u>134</u>	<2	0	1>
<u>234</u>	<1	0	2>	<u>234</u>	<2	0	1>

**Example 3-6. *Marching Mountains*, m. 7: Marcato motive.
Contours--CAS, CSEGs, and trichordal C-subsegs**

7 *mf* *f*

U.S. A very long hand should play this F an octave higher.

with pedal

Example 3-7. *Evocation 3*, mm. 9-10: Immediate repetition

$ip < +1, +6, -5>$
 $CSEG < 0 \ 1 \ 3 \ 2>$
 *quasi tempo primo (1=100)*
 $< +13, +18, -5>$
 $< 0 \ 1 \ 3 \ 2>$
 $< +1, +6, -5>$
 $< 0 \ 1 \ 3 \ 2>$
 $< +1, +2, -1>$
 $< 0 \ 1 \ 3 \ 2>$
tempo primo (1=110)
 u. with almost no pedal

Example 3-8. Evocations 2, mm. 42-44: Immediate repetition

29

31

1

2

3(incomplete)

winds

strings

3 cont.

2

3

33

winds

strings

winds and strings

Example 3-9. *Sun-Treader*, mm. 29-35: Nested repetitions

Example 3-10. *Sun-Treader*, mm. 12-19, treble line: Transposition

The image displays a musical score for the piece *Sun-Treader*, measures 12-19, specifically the treble line. The score is presented in two systems, each with a grand staff (two staves). The first system shows the original notation with lyrics 'GIA FLEIGH' and 'DIE C' C' C' D'. The second system shows the transposed notation with lyrics 'A B G R'. The transposition is indicated by a bracket labeled T7 and T6. The notation includes various musical symbols such as notes, rests, and dynamic markings.

Men **Lilacs** **Marching Mountains**

The image shows three musical staves. The first staff, labeled 'Men', is in 5/4 time and contains a sequence of notes: a whole note G4, a half note A4, a quarter note B4, a quarter note C5, a quarter note D5, and a quarter note E5. The second staff, labeled 'Lilacs', is in 3/4 time and contains a sequence of notes: a whole note G4, a half note A4, a quarter note B4, a quarter note C5, a quarter note D5, and a quarter note E5. The third staff, labeled 'Marching Mountains', is in 6/4 time and contains a sequence of notes: a whole note G4, a half note A4, a quarter note B4, a quarter note C5, a quarter note D5, and a quarter note E5. Brackets indicate transpositions: a bracket labeled 'T8' spans the Lilacs staff, and a bracket labeled 'T4' spans the Marching Mountains staff.

Example 3-11. *Men and Mountains*, first four notes of each movement: Transposition

31

(01267) (01267)

II

D C# G# A E B E F C B

11 7 1 6 7 6 1 7 11

Example 3-12. *Sun-Treader*, 30-31: II mappings and retrograde intervallic ordering

288

Example 3-13a. Split transposition

Example 3-13b. Split inversion

Example 3-14a. Split transposition between sets of different cardinalities

Example 3-14b. Split inversion between sets of different cardinalities

6

Example 3-15. Portals, 6-8. Transposition and split transposition (T numbers differ by 1)

33

B
E
D
C
A
G

B
Q
B
D
C
A

T0/T11

Example 3-16. *Sun-Treader*, 33-35: Linear T0/T11

31

T0/T1

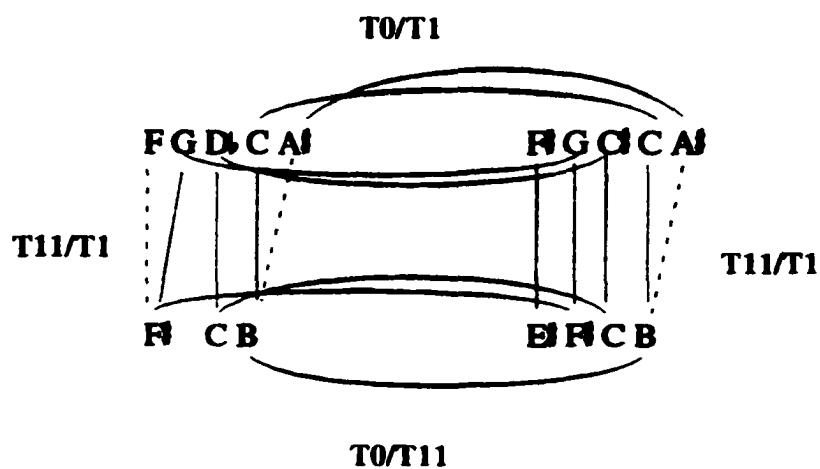
T0/T1

Example 3-17. *Sun-Treader*, 30-31: Vertical instances of T0/T1

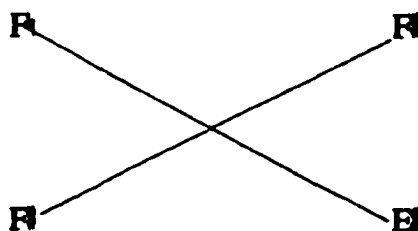
3

Violoncello II

Contrabass (actual pitch)



Example 3-18a. *A Clear Midnight*, mm. 3-4: Split-T formation



Example 3-18b. *A Clear Midnight*, mm. 3-4: F/F voice exchange

Piano

Example 3-19. *A Clear Midnight*, mm. 35-36: T11/T1 between treble and bass

T6/T5

Example 3-20. *A Clear Midnight*, mm. 3, 35: T6/T5 between motive forms

I5/I4

Example 3-21. *A Clear Midnight*, mm. 1-3: I5/I4 between motive forms

flute

cello II

CSEGs: <3 2 0 1> SWAP(1,2 and 3,4) <2 3 1 0>

pitch intervals: <-2, -6, +1> <+2, -6, -1>

Example 3-22. *A Clear Midnight*, mm. 1,3: SWAP

II. LILACS

With deep feeling

This musical score system includes staves for Violin I, Violin II, Viola, Cello, and Bass. The Violin I staff begins with a tempo/mood instruction 'With deep feeling' and contains measures 3, 4, 5, and 6, marked with dynamics *mp* and *mf*. The Violin II staff also contains measures 3 through 6 with *mf* dynamics. The Viola, Cello, and Bass staves contain measures 3 through 6, with the Cello and Bass parts marked with *p* and *mf* dynamics. The music is written in treble and bass clefs with various accidentals and phrasing slurs.

This musical score system continues from the first, covering measures 7 through 10. It includes staves for Violin I, Violin II, Viola, Cello, and Bass. The Violin I staff contains measures 7 through 10 with dynamics *p* and *mf*. The Violin II staff contains measures 7 through 10 with dynamics *p* and *mf*. The Viola, Cello, and Bass staves contain measures 7 through 10, with the Cello and Bass parts marked with *p* and *mf* dynamics. The music continues with complex phrasing and various accidentals.

Example 3-23: *Lilacs*, mm. 1-10

(0124) (0236) (0125) (0236) (0236)
 4

(0236) (0236) (0136)
 7

T6/T8 T0/T1 T9/T8 I5 T1
 T11 T1 T11/T10 T4/T5
 T0/T1

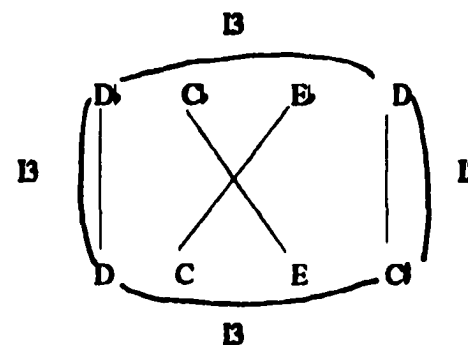
Ex. 3-24. *Lilacs*, mm.1-9: I, T, and split-T



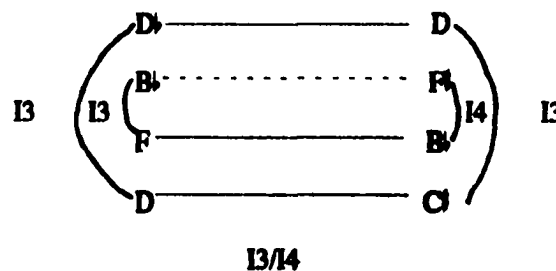
Example 3-25a. *Lilacs*, mm. 1-2: Chords I-IV

	I	II	III	IV
S	D	C	B	D
A	B	A	F	F
T	F	F	G	B
B	D	C	E	C

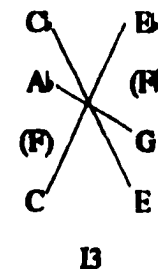
Example 3-25b. Magic square



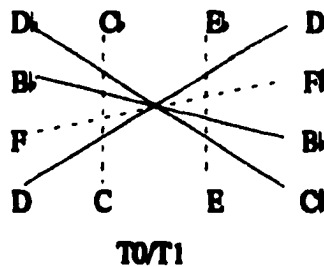
Example 3-25c. I3 between soprano and bass voices and between corners



Example 3-25d. I3/I4 within and between chords I and IV



Example 3-25e. I3 between chords II and III



Example 3-25f. Alternate T0/T1 reading between chords I and IV and between soprano and bass voices

3

B
A $\flat$
G
F $\sharp$ ----- B
A $\flat$
G
F $\sharp$

Example 3-26a. *Lilacs*, mm.3-5: F-F $\sharp$

D $\flat$ D
B $\flat$ F $\sharp$
F ----- B $\flat$
D C $\sharp$

Example 3-26b. *Lilacs*, chords I, IV: F-F $\sharp$

3

FGD, CA; FGD, CA;
F, CB; E, FCB

Example 3-26c. *A Clear Midnight*, mm.3-4: F-F#

3

T0/T1

(0236)

(0125)

T1

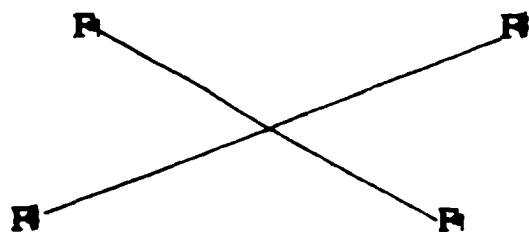
T1/T2

(0236)

(0136)

T0/T11

Example 3-27a. *Lilacs*, mm. 3-6. T and split-T configuration



Example 3-27b. *A Clear Midnight*, 3-4: F/F $\sharp$ voice exchange

Example 73 consists of three staves of musical notation. The first staff contains two phrases: (a) and (b). Phrase (a) is followed by the word "extension". The second staff contains two phrases: (c) and (d). Phrase (c) is followed by "extension", and phrase (d) is followed by "Tonal intension, with tonal opposition and probably modification of (b) and (a)". The third staff contains two phrases: (e) and (f). Phrase (e) is followed by "extension", and phrase (f) is followed by "opposition of (d)".

Example 73. Phrase construction: extension: Wagner, *Tristan*, Vorspiel

Example 3-29. Seeger's example 73 (extension/intension)

Example 74 consists of two staves of musical notation. The first staff contains a single phrase, and the second staff contains a single phrase. The two phrases are connected by a dashed line, indicating a relationship between them.

Example 74. Phrase construction: intension: Beethoven, *Symphony no. 5*

Example 3-30. Seeger's example 74 (intension)

G# A E D# / G# A E E D / G# A E E D C# / G# A E E D C# B

63 64 65 66

mf dim. dim. dim. pp

Example 3-31. *Sun-Treader*, mm. 63-66: End extension (in three voices)

B C C D E $\flat$ E $\sharp$ A G $\sharp$ / C $\sharp$ D D E $\sharp$ A G $\sharp$ / D E $\flat$ E $\sharp$ A G $\sharp$ / D E $\flat$ A G $\sharp$

Lento

119

Example 3-32. *Sun-Treader*, mm. 119-120: Beginning intension in treble line

The musical score is written on a single staff in treble clef, 2/4 time. It begins with a key signature of one flat (B-flat). The melody consists of eighth and sixteenth notes. There are five end extensions marked with brackets and numbers below the staff: a bracket of 4 notes, another bracket of 4 notes, a bracket of 5 notes, a bracket of 7 notes, and a final bracket of 8 notes. Some of the notes are grouped with a bracket and a '3', indicating a triplet. The score ends with a double bar line and a repeat sign.

Example 3-33. *Angels*, mm. 23-30, treble: End extensions

Statement 1

$\langle +1, +4, -1 \rangle$
Molto Moderato (♩ about 58) (each note has its mp or p)

Statement 2

$\langle +1, +4, -1, +4, -1 \rangle$ Extension

Statement 3

$\langle +1, +4, -1, +6, -1 \rangle$ Extension
 (♩ about 40) *poco accel.*

Statement 4?

Fragment: $\langle +3, +2, +6, -2 \rangle$
 Fragment: $\langle +7, -6 \rangle$
 Fragment: $\langle +10, -6 \rangle$ (♩ about 50)
 Expanded fragment: $\langle +11, -6, -1 \rangle$ *poco ten.*

Expanded fragment?

$\langle +11, -5, -8 \rangle$
a tempo (♩ about 50)

più ardente (♩ about 54)

Example 3-34. *Organum*, mm. 1-10: Modified repetitions

The image shows a musical score for the first three measures of 'Evocations 1'. The tempo is marked 'Largo (J. = 60)'. The piano part is in the left hand, and the violin part is in the right hand. The piano part has a 'poco più mosso (J. = 65)' marking. The violin part has a 'più mosso e allargamento (J. = 70)' marking. The score includes interval extensions: <+7, +6, +2> for the first measure, <-11> <+7, +6, +5, +2> <-11> for the second measure, and <+6, +2, +5, +1, +2> <-11> for the third measure.

Example 3-35. *Evocations 1*, mm. 1-3: Middle extensions

Example 3-36. *Angels*, mm. 18-22: Elaborated repetition

Example 3-37. *Angels*, mm. 18-22: X-Y pairs

(A) X-Tpt. I Y-Tpt. I

(B) X-Tpt. II Y-Tpt. III

(C) X-Tpt. III Y-Tpt. IV

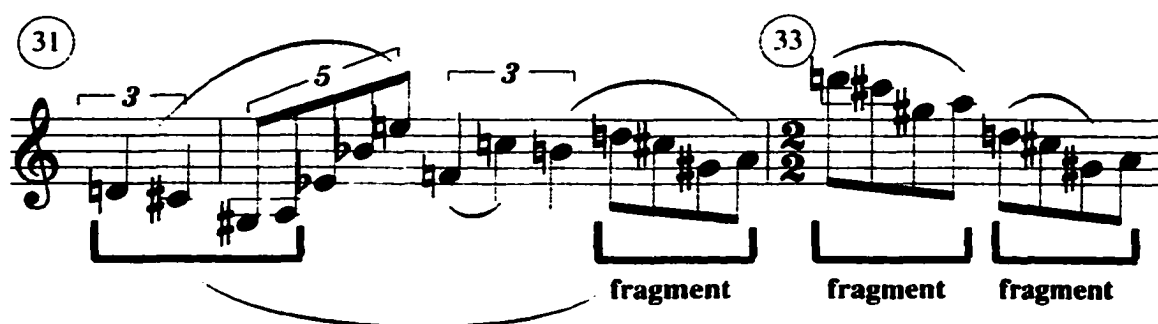
(D) X-Tpt. IV Y-Tpt. II

(E) X-Tb. I Y-Tb. I

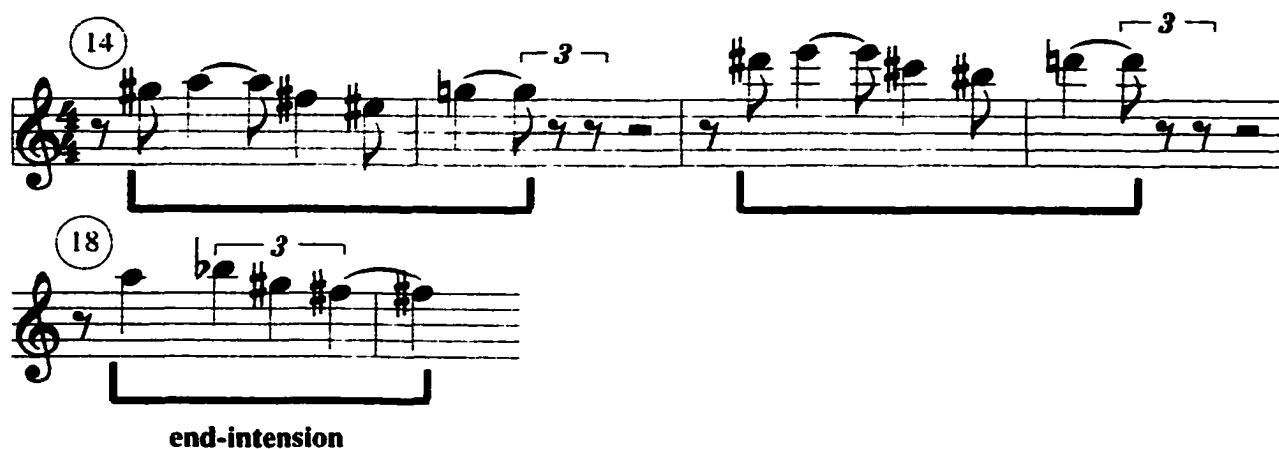
(F) X-Tb. II Y-Tb. II

The image displays two musical staves, X and Y, illustrating a split transposition. Staff X is in 8/8 time and contains a circled triplet of eighth notes. Staff Y is in 7/8 time and contains a circled triplet of eighth notes. Dashed lines connect the notes of the triplets between the two staves, illustrating a split transposition. The label "T0/T1" is placed to the right of the staves.

Example 3-38. *Toys*, mm. 8, 7-8. Middle intension and split transposition



Example 3-39. *Sun-Treader*, mm. 31-33: Fragmentation



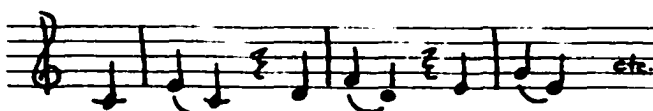
Example 3-40. *Sun-Treader*, mm. 14-19: End-intension



Example 3-41a. Retrograde or cancrizans



Example 3-41b. Change of sequence: increase



Example 3-41c. Change of sequence: increase



Example 3-41d. Change of sequence: decrease

Examples 3-41a-d (Seeger's Examples 76-79): Increase and decrease in the feeling of sequence



Example 3-42a. Exact sequence of a dissonant neume



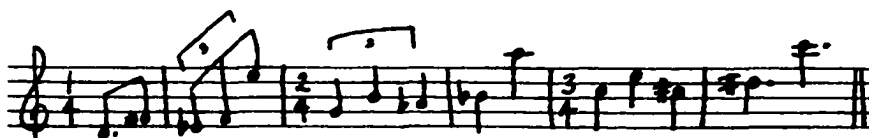
Example 3-42b. Modified sequence of a dissonant neume: tonally diminished



Example 3-42c. Modified sequence of a dissonant neume: tonally augmented



Example 3-42d. Modified sequence of a dissonant neume: rhythmically diminished



Example 3-42e. Modified sequence of a dissonant neume: rhythmically augmented

**Example 3-42a-e (Seeger's examples 111-115). Sequences:
intervallic and rhythmic modification**

T4 (incomplete)

The musical score consists of four staves. The first staff (treble clef) contains measures 33, 34, and 35. Measures 33 and 34 each contain two circled groups of notes, each labeled 'T8' and 'T4'. Measure 35 contains one circled group of notes labeled 'T8'. The second staff (treble clef) contains measures 33, 34, and 35. Measures 33 and 34 each contain two circled groups of notes, each labeled 'T8' and 'T4'. Measure 35 contains one circled group of notes labeled 'T8'. The third staff (treble clef) contains measures 33, 34, and 35. Measures 33 and 34 each contain two circled groups of notes, each labeled 'T4'. Measure 35 contains one circled group of notes labeled 'T4'. The fourth staff (bass clef) contains measures 33, 34, and 35. Measures 33 and 34 each contain two circled groups of notes, each labeled 'T4'. Measure 35 contains one circled group of notes labeled 'T4'. A large bracket labeled 'T4 (incomplete)' spans the first three staves. A large bracket labeled 'T4' spans the fourth staff.

Example 3-43. *Men*, mm. 33-35: Sequence and IC4 permeation

Example 3-44. *Men*, mm. 33-35. Sequence and whole-tone segmentation

Example 3-45. *Men*, mm. 33-35. Implied whole-tone lines

Section II-----

Section I-----

Statement 1 Statement 2 Statement 3 Statement 4 Statement 5

(25) (28)

Statement 1 Statement 2 Statement 3 Statement 4 Statement 5 (incomplete)

New motive

(30)

Example 3-46. *Sun-Treader* mm. 25-30. Sequence

The musical score is presented in two systems. The first system includes measures 25 through 29, and the second system includes measures 30 through 34. The notation features various interval successions (e.g., $\langle 11, 9 \rangle$, $\langle 9, 11 \rangle$) and T/I operations (e.g., T10, T7, II). The score is annotated with circled numbers 25, 28, and 29, and various interval successions and T/I operations are indicated above the notes.

Example 3-47. *Sun-Treadernum*. 25-29: Sequence, section I. (014) sets, interval successions, and T/I operations

Example 3-48. *Sun-Treader*, mm. 28-30: (014) sets

C — G — A B — F — G F — G — B
 C — B — G A — B — F G — E — B
 G — E — B
 F — F — D
 F — D — C
 D — C — B — C — D

Example 3-48. *Sun-Treader*, mm. 28-30: (014) sets

Example 3-49. *Sun-Treader*, mm. 28-30: Treble-tenor interaction and treble CSEG transition to new motive

<3 2 0 1> <3 1 2 0> <3 1 2 0>
 <-1, -3, +1> end ext.
 beg. ext. <+1, -3, -1>
 <2 3 1 0>

Example 3-49. *Sun-Treader*, mm. 28-30: Treble-tenor interaction and treble CSEG transition to new motive

9 Statement 1 11 Statement 2 13 Statement 3: 1st half-statement echo

15 echo 17 jagged descent straight-line ascent

Example 3-50. *Marching Mountains*mm. 9-17: Sequence I

23 Statement 1 25 Statement 2 27 Statement 3: 1st half-statement echo

29 modified echo 31 jagged descent echo

Example 3-51. *Marching Mountains*mm. 23-32: Sequence II

Statement 1 **Statement 2** **Statement 3: 1st half-statement** **echo**

CSEG: <0 1 2> <3 2 0 1> <0 1 2> <3 2 0 1> <0 1 2> <0 1 2>
 CAS: < +, +, -, -, +> <-1, -3, +2> < +, +, -, -, +> <-1, -3, +2> < +, +, -, -, +> <-1, -3, +2>
 IP: <-2> <-2> <-2> <-2> <-2> <-2>

Statement 1 **Statement 2** **Statement 3: 1st half-statement** **echo**

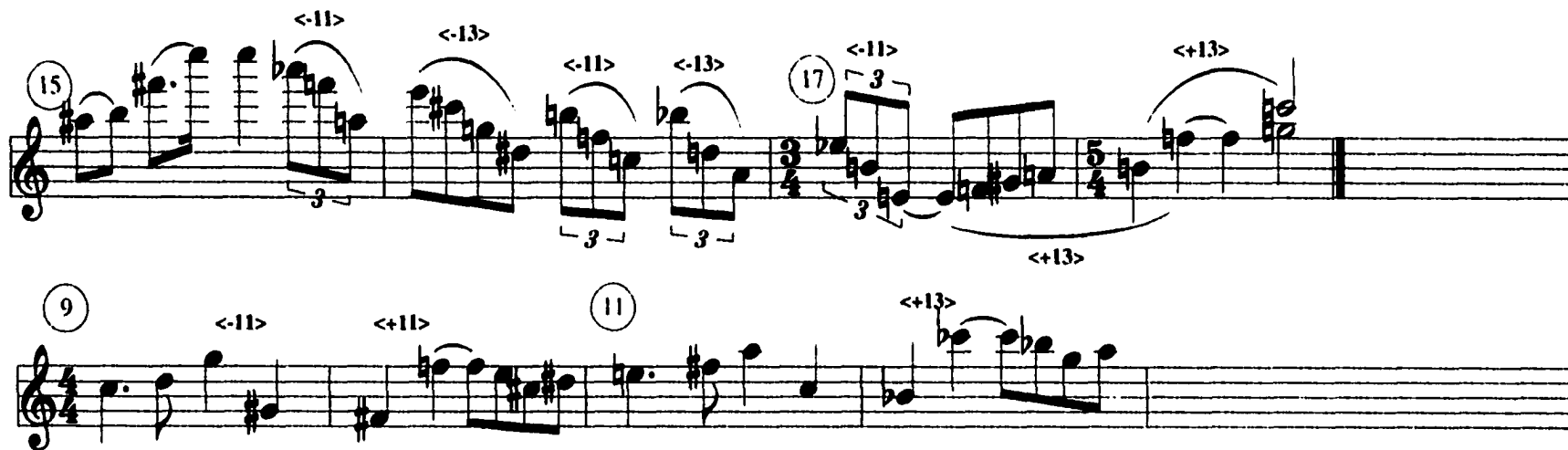
CSEG: <0 1 2> <3 2 0 1> <3 2 0 1> <0 1 2> <3 2 0 1> <3 2 0 1> <0 1 2> <3 2 0 1> <0 1 2> <3 2 0 1>
 CAS: < +, +, -, -, +> <-1, -3, +2> <-1, -3, +2> < +, +, -, -, +> <-1, -3, +2> <-1, -3, +2> < +, +, -, -, +> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2>
 IP: <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2> <-1, -3, +2>

Example 3-52. *Marching Mountains*: Sequences I and II. Contour and interval similarities

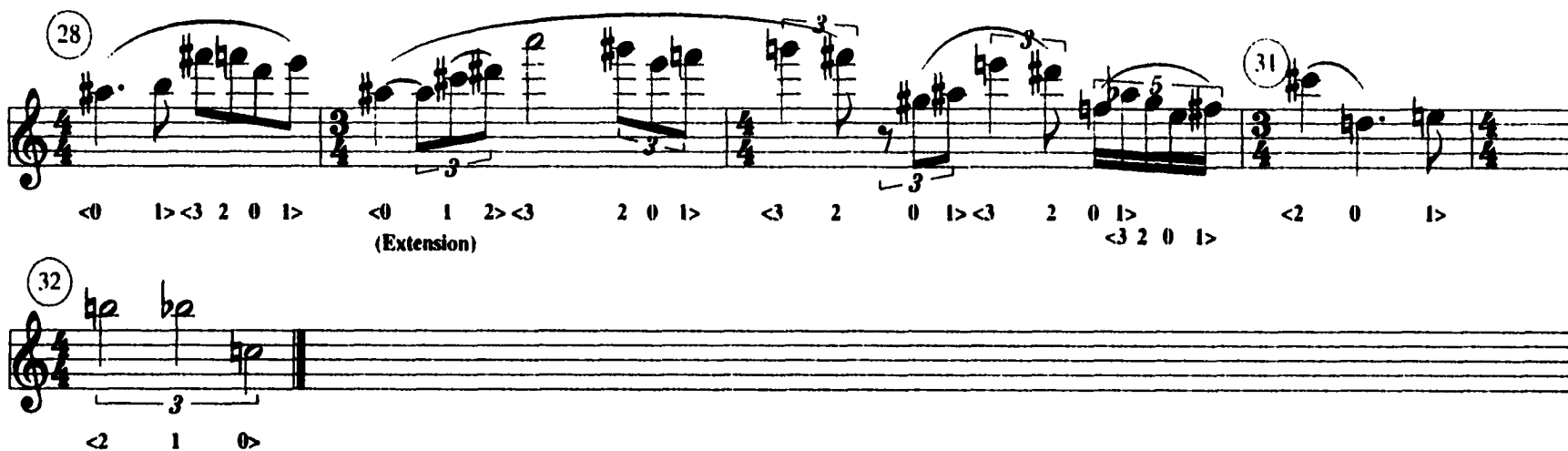
T4 T8 T8 T4 T8 T8

T4 T4

Example 3-53. *Marching Mountains*: Sequence II. T4 and T8 parallelism



Example 3-54. *Marching Mountainsym.* 15-18 and 9-12: ip (11) and (13)



Example 3-55. *Marching Mountainsym.* 28-32. CSEG organization

[MODEL]

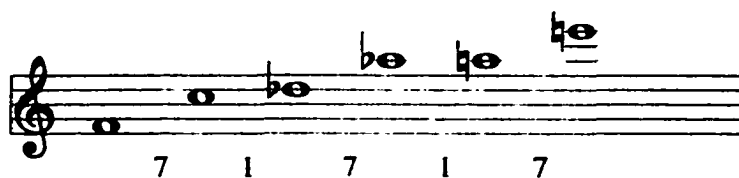
*I've been waiting on:² And out of it
has come this unfolding:*

[UNFOLDING 1]

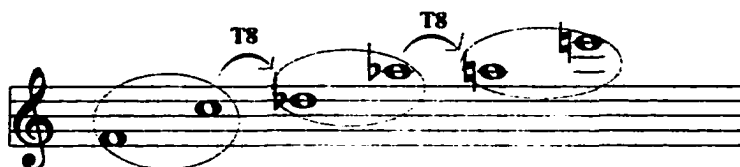
[UNFOLDING 2]

Also this: This. Lovely, what?

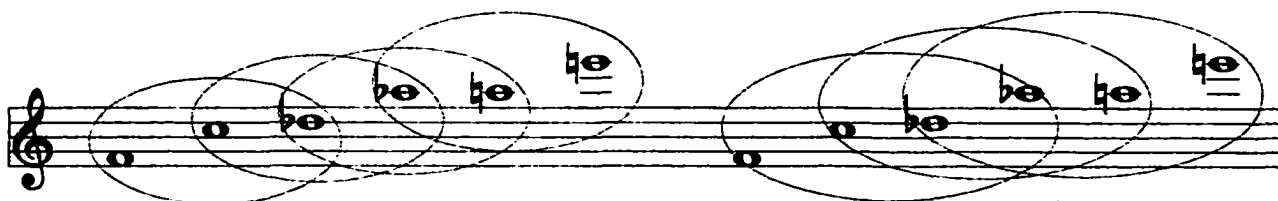
Example 3-56. Excerpt from Ruggles letter to Kirkpatrick, 25 November 1940



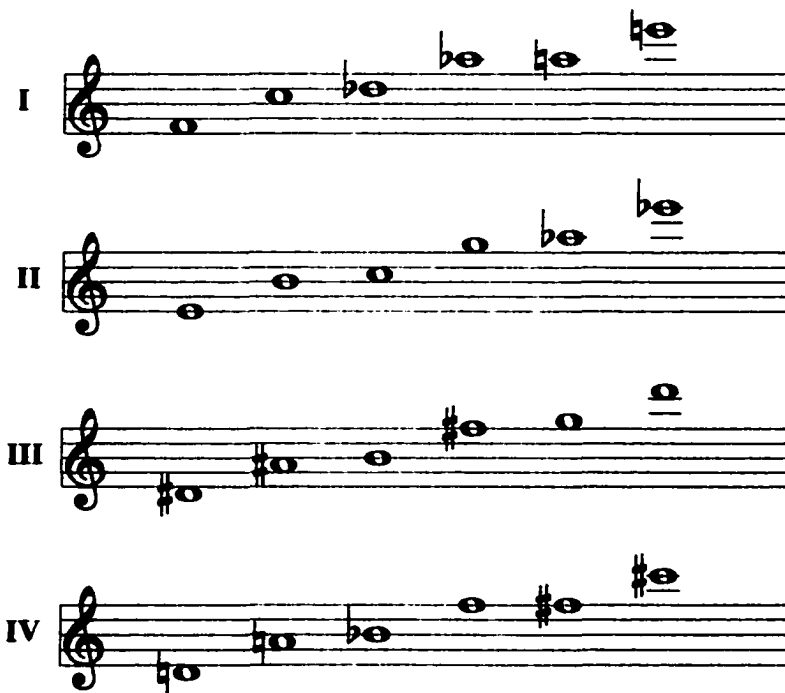
Example 3-57a: 7/1 combination cycle



Example 3-57b: 5ths at T8



Example 3-57c: (015) trichords and (0158) tetrachords



Example 3-57d: The four 7/1 subcycles

Example 3-58a. Unfolding 2: 7/1 subcycles

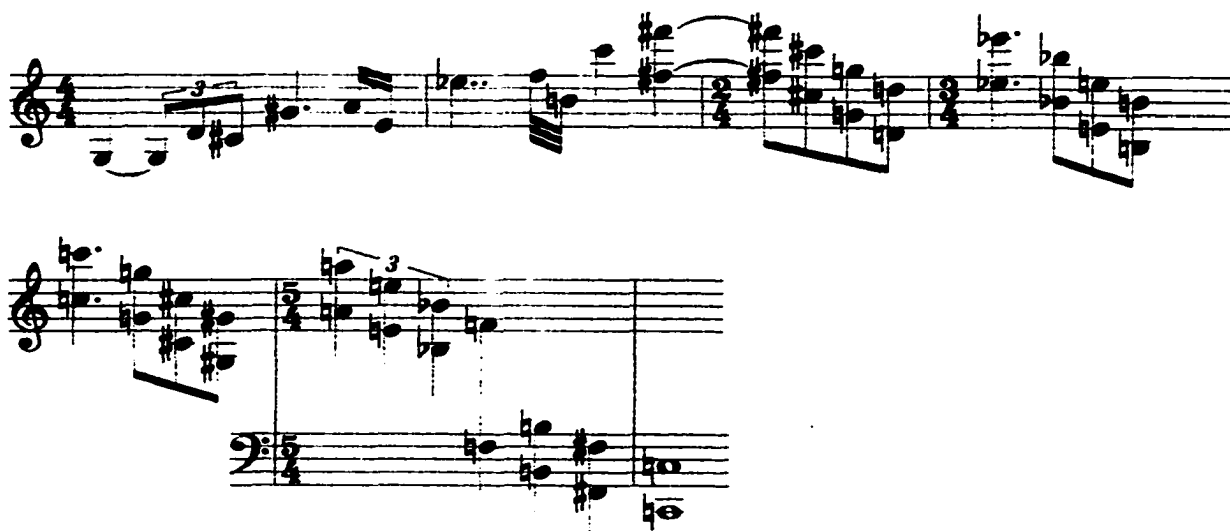
The musical notation consists of two staves, treble and bass. The treble staff contains several measures of music with triplets and various accidentals. Labels above the treble staff identify 'subcycle III', 'subcycle I?', 'subcycle III', and 'subcycle I'. A label 'subcycle II?' is placed below the treble staff. The bass staff contains fewer notes, with a label 'subcycle II' and 'aug 4th!' below it. Brackets and arrows indicate the unfolding of these subcycles.

Example 3-58a. Unfolding 2: 7/1 subcycles

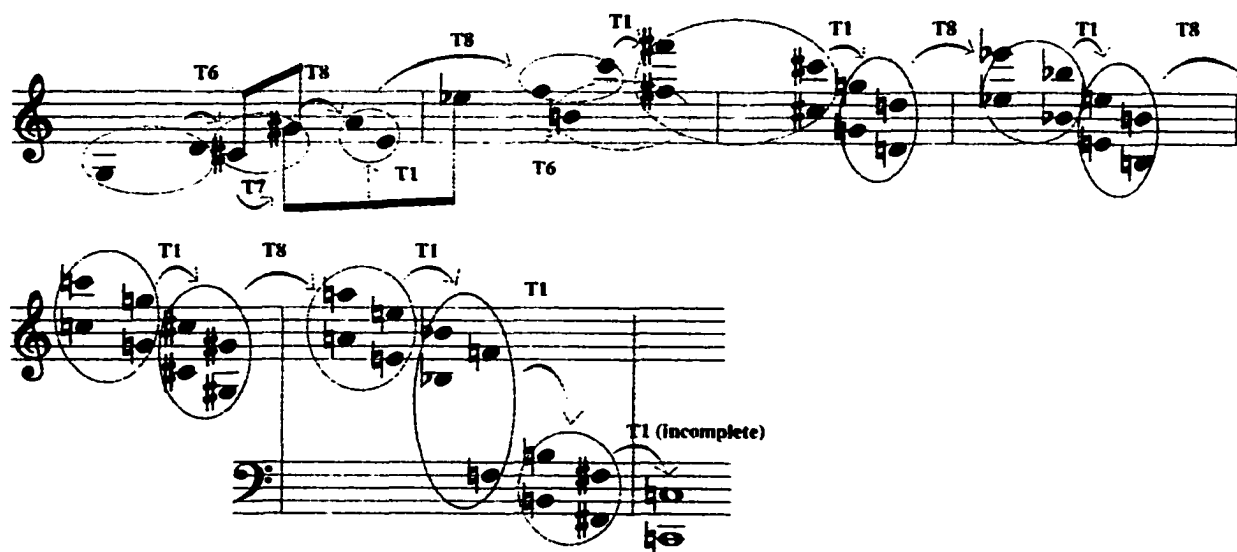
Example 3-58b. Unfolding 2: T-levels between 7s (mostly)

The musical notation consists of two staves, treble and bass. The treble staff shows notes with circles around them, labeled with T-levels: T8, T8, T6 (incomplete), T11, and T9. The bass staff also shows notes with circles, labeled T9, T11, T11/T10, and T8/T7. A note in the bass staff is labeled 'Bb instead of B#'. Arrows and brackets indicate the relationships and unfolding of these T-levels.

Example 3-58b. Unfolding 2: T-levels between 7s (mostly)



Example 3-59a. Unfolding 1



Example 3-59b. Unfolding 1: T-levels between 7s

Cycle cardinality: 6 24 4 24 6

Comb. cycle: 7/1 7/4 7/11 7/6 7/9

Set class: (0158) (0156) (0167) (0156) (0158)

T-levels: T8 T11 T6 T1 T4

7/11 or 7/4 7/4 or 7/9 7/11 or 7/4 7/6 or 7/11

(015) (015) (016) (016) (016)

T8 or T1 T11 or T4 T6 or T11 T1 or T6

Example 3-60a. Semitone-related 5ths

Example 3-60b. Semitone-dissonated 5ths

(0156) (0156) (0156) (0156) (0156)

T9 T9 T9 T9 T9

Example 3-61. Unfolding I: T9 chain

13 Apr. 41
3

The image shows a handwritten musical score on two systems of staves. The first system is labeled 'Canon at T0' and 'Dux'. It features multiple staves with complex notation, including notes, rests, and dynamic markings like 'ff' and 'cresc.'. There are also some annotations like 'Doubling at T11' and 'cresc. ff'. The second system continues the notation with similar complexity. The handwriting is dense and expressive, with many slurs and ties.

Canon at T0
Dux
ff
cresc.
Doubling at T11
cresc. ff

Example 3-62: Unfolding 1'

The musical score consists of five measures, each circled and labeled with a T9 interval and a (0156) chord symbol. The notes are as follows:

- Measure 1: Bb4, C5, D5, Eb5 (half notes), F5 (quarter note).
- Measure 2: Bb4, C5, D5, Eb5 (half notes), F5 (quarter note).
- Measure 3: Bb4, C5, D5, Eb5 (half notes), F5 (quarter note).
- Measure 4: Bb4, C5, D5, Eb5 (half notes), F5 (quarter note).
- Measure 5: Bb4, C5, D5, Eb5 (half notes), F5 (quarter note).

Example 3-63. Unfolding I': T9 chain

To Christa E. von
IV

Adagio sostenuto (J. 66)

The musical score is written for piano and consists of five systems. The first system begins with a forte (f) dynamic and a ritardando (rit) marking. The second system includes a poco ritardando (poco rit) and a tempo marking. The third system features a poco ritardando (poco rit) and a piu sostenuto (L. 66) marking. The fourth system is marked piu forte (piu f). The fifth system includes markings for U. 66 and A. (U. 66). The music is characterized by dense piano textures and long, flowing melodic lines in the right hand.

Example 3-64. *Evocations* 4, page 1

poco a poco ritenuto e crescendo - - - - - (1/2 00)

poco a poco ritenuto - - - - -

(1/2 00) *tempo primo (1/2 00)*

allargando *poco rit.* *a tempo*

poco rit. *molto adagio e tenuissimo* *ritardando*

Example 3-64. *Evocations* 4, page 2

The musical score is written for piano and consists of two systems. The first system (measures 11-12) is marked with a piano (p) and forte (f) dynamic. It features a 7/1 liquidation marking. The second system (measures 13-14) is also marked with a piano (p) and forte (f) dynamic, with a 7/1 liquidation marking. The score includes various musical notations such as notes, rests, and slurs.

Example 3-65. *Evocations* 4, mm. 11-12: 7/1 liquidation

Example 3-66.
Evocations 4, mm. 1-6

perfect 5th

D ————— G

D ————— B ————— A^b

T₇

T₆

T₃ ————— T₃ ————— T₁

a)

Adagio sostenuto (♩ = 60)

tailored

simile

Essential voice leading

D — C[♯] — C[♯] — B — A[♯] — A[♯] — A[♯] — G

G — F[♯] — F[♯] — E — D[♯] — D[♯] — D[♯] — C

Registral voice leading

D — F[♯] — F[♯] — B — D[♯] — D[♯] — A[♯] — C — G — F

G — C[♯] — C[♯] — E — A[♯] — A[♯] — D[♯] — G

per tu

mp

tempo

4

A[♯] — C — G — F — E — E — D

D[♯] — G — G — G

Repeat of m.3

b)

c)

7/4

1 3+4 1 5

111

dissonating semitone
in wrong position for 7/4

large T9

Example 3-67. Evocations 4, mm. 25-29

a) 23

Essential voice leading

B — A¹ — A¹
E — D¹ — D¹

Registral voice leading

B — D¹ — D¹
E — A¹ — A¹

minor 6th

A^b T₈ E
T₇
T₁ T₁

26

Essential — A^b — G — WT — F — E — D¹
— D^b — C — B — WT — A — G¹

Registral — A^b — C — B — ⁴/₇ — E — G¹ — D¹ — C¹ — E — G¹ — D¹ — C¹
— D^b — G — WT — F — A — D¹ — D¹ — C¹ — A — D¹ — D¹ — C¹

Repeat of m. 27

29

C — C — B^b
E

Example 3-67. *Evocations 4*, mm. 25-29, continued

b)

c)

7/4

T11

dissonating semitone
in right position for 7/4

large T11

TABLE 4-1: Chordal consonant and dissonant intervals**Perfect Consonances**

perfect 1
perfect 8
perfect 5
perfect 4

Imperfect Consonances

major 3
major 6
minor 3
minor 6

Tritone : more consonant chordally than melodically

Imperfect Dissonances

major 2
minor 7
major 9

Perfect Dissonances

minor 2
major 7
minor 9

Cellos
 Contrabass and
 bassoon

1 5 8

13 $\times$ 11 10 13 13 13 $\times$ 11 11 13 13

Example 4-1: *Parting at Morning*, mm. 1, 8. Vertical dissonances

16

tempo primo ($\text{♩}=50$) *mp*

poco meno largu ($\text{♩}=50$) *mp*

1-14-6-8
tense poised relaxed

13-14-6-8
tense poised relaxed

1-3-6-8
tense relaxed poised relaxed

f

p

Example 4-2. *Evocations I*, mm. 16-19: Vertical intervals

11-13 11 11-10 11 13-10 11 13-7-8 11 13

Example 4-4. *Evocations* 3, mm. 3-4. Outer-voice intervals

Maestoso, con Moto

①

13-11 1341 13-11 13 11-9 11 13-11 11——9 11 11 1313

Example 4-5. *Marching Mountains*, mm. 1-6: Outer-voice intervals

Handwritten musical score for 'The Rose Tree'. The score is written on ten staves, with the first five staves for the vocal melody and the last five for the piano accompaniment. The key signature has one flat (B-flat), and the time signature is 3/4. The melody is in G major (one sharp). The piano part features a rhythmic accompaniment with many beamed sixteenth and thirty-second notes. The score includes various musical notations such as slurs, ties, and dynamic markings. The piece concludes with a double bar line and a repeat sign. The handwritten number '82' is visible at the bottom right of the page.

Example 4-6. *Sun-Treader*, mm. 77-82: Outer-voice IC1 frame

7

p with a little pedal

poco accel. . . . *a tempo*

11 13 13 13 13 11 11 11 11

Section 1

13

allargando (♩=84)

tempo moderato (♩=72, ♩=69)

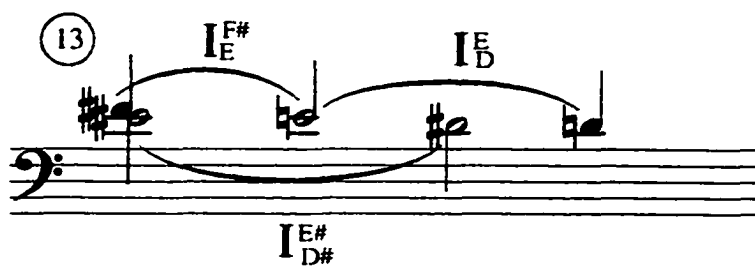
accel. . . . *poco rit.* . . .

1 1 1 1 1 13 13 13 13

Section 2

Section 3

Example 4-7a. *Evocations 2*, mm. 10-16: Left-hand IC1 vertical intervals

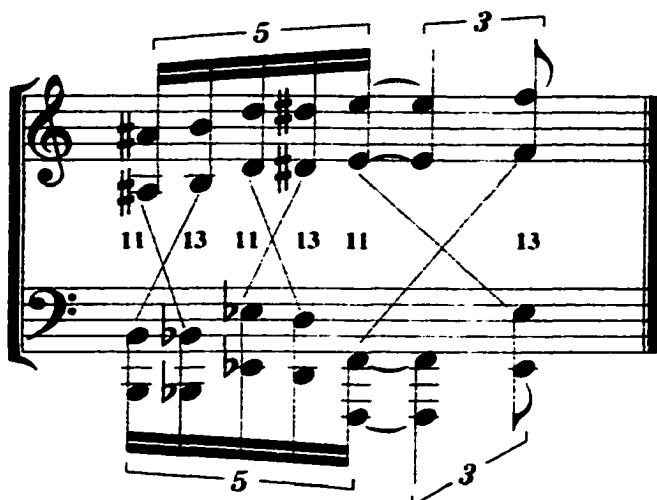


Example 4-7b. *Evocations 2*, mm.13-14: Chain ip (1-1) suspensions

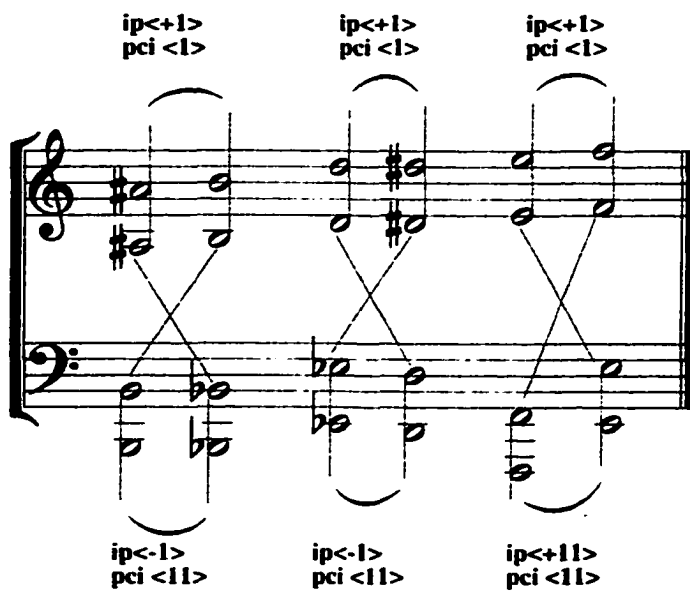


Example 146. Tone alternation

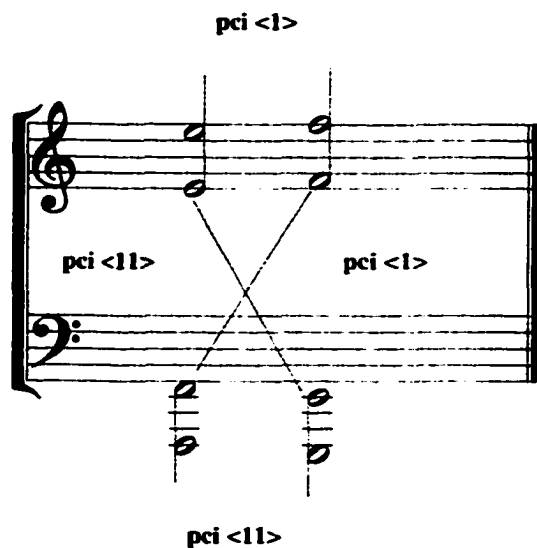
Example 4-8 (Seeger's Example 146): Tone alternation (voice exchange)



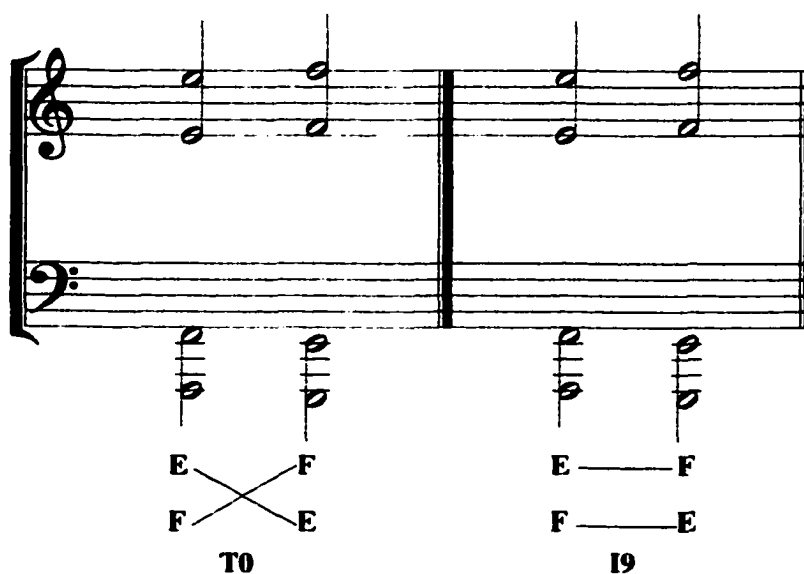
Example 4-9a. *Sun-Treader*, m. 77: IC1 voice exchanges in contrary and parallel motion



Example 4-9b. *Sun-Treader*, m. 77: IC1 voice exchanges--linear pitch and pitch-class intervals



Example 4-9c. Voice-exchange: Linear and vertical pitch-class intervals



Example 4-9d. Voice-exchange: Transpositional vs. inversive interpretations

40

The musical score is for four parts: Vla. (Violoncello), Vla. (Violoncello), Vel. (Violoncello), and G.B. (Guitar/Bass). The score is for measures 40-42 of 'Marching Mountains' (1924). The score includes dynamic markings like 'pizz', 'molto', 'pizz', and 'pizz'. The bottom part of the score has circled notes with numbers 11, 13, and 11, indicating specific voice exchanges.

Example 4-10. *Marching Mountains* (1924), mm.40-42: ICI voice exchanges

(J = 80)

34

13×11 11×13 13×11
 outer 1 outer and outer
 voices 1 inner voices
 voice

Example 4-11. *Evocations 2*, mm. 34-36: IC1 voice exchanges between different voices

poco rallentando

39

13×11 11×13 8-11×13 13×11 9-7 11×13 7

Example 4-12. *Evocations 2*, mm. 39-40: IC1 voice exchanges (and other outer-voice intervals)

The musical score is for Example 4-13, titled "Angels, mm. 1-2: IC1 voice exchange with incomplete upper neighbor". It is written in 2/4 time and features six staves: four for Trumpets in C (I, II, III, IV) and two for Trombones (I, II). The key signature has one flat (B-flat). The score shows a voice exchange between the Trumpets and Trombones. The first staff (Trumpet I) has a circled '1' above it. The second staff (Trumpet II) has an 'IN' above it. The third staff (Trumpet III) has a slur over it. The fourth staff (Trumpet IV) has a slur over it. The fifth staff (Trombone I) has a slur over it. The sixth staff (Trombone II) has a slur over it. The score is divided into two measures. The first measure shows the initial notes, and the second measure shows the voice exchange. The exchange is indicated by lines connecting the notes of the Trumpets to the notes of the Trombones. Specifically, the notes of Trumpet I and II are connected to the notes of Trombone I and II, and the notes of Trumpet III and IV are connected to the notes of Trombone I and II. The exchange is incomplete, as the upper neighbor is not fully realized. At the bottom of the score, there is a diagram showing two lines crossing, labeled '11' and '13'.

Example 4-13. *Angels*, mm. 1-2: IC1 voice exchange with incomplete upper neighbor



Example 4-14. *Sun-Treader*, m. 81 ICI nonadjacent voice exchange



Example 4-15. *Lilacs*, mm. 1-2: IC1 outer-voice exchanges

The musical score is written for two voices, labeled "Upper stratum" and "Lower stratum", in 3/4 time. The key signature has one flat (B-flat). The score consists of three systems. The first system shows the initial vocal entries with melodic fragments: "G F B AB" for the upper stratum and "G Ff B AB" for the lower stratum. The second system continues the development of these themes, featuring complex rhythmic patterns and triplets. The third system concludes the piece with a final melodic flourish. The notation includes various musical symbols such as notes, rests, beams, and slurs, indicating the flow and timing of the vocal lines.

Example 4-16. Lilacs, mm. 3-6: IC1 voice exchanges in two strata

Serene
♩ = 40

Trumpets in C with mutes (actual pitch)

Trombones with mutes

IC2 voice exchanges

B **D_b** **D_b**

C₂ **B**

mp *pp* *pp* *foco* *rit.* *rit.* *rit.* *rit.*

The musical score is for a piece titled 'Serene' with a tempo of ♩ = 40. It features two staves: the upper staff for Trumpets in C with mutes (actual pitch) and the lower staff for Trombones with mutes. The score is divided into two systems, each with four parts (I, II, III, IV). The first system shows a melodic line in the trumpets and a harmonic line in the trombones. The second system shows a voice exchange between the two sections, with the trumpets playing a melodic line and the trombones playing a harmonic line. The score includes various musical notations such as notes, rests, and dynamic markings (mp, pp, foco, rit.). Above the score, the notes B, D_b, and D_b are written, and below the score, the notes C₂ and B are written. The text 'IC2 voice exchanges' is written below the score.

Example 4-17, *Angels*, mm. 4-18: IC2 voice exchanges

(5)

10 10 10 3 14

Example 4-18a. *Angels*, mm. 5-7. Hypothetical aligned outer voices: Vertical intervals

(5)

9 13 8 13 13 8

Example 4-18b. *Angels*, mm. 4-7. Actual staggered outer voices: Vertical intervals

The musical score for Example 4-19, 'Angels', mm. 43-44, illustrates voice exchanges on two levels. It features six staves with complex melodic lines and numerous diagonal lines connecting notes across staves, indicating intricate voice exchanges. Performance markings include 'rit.', 'tempo', 'molto rit.', 'mf', and 'f'. Measure numbers 43 and 44 are indicated at the top. Below the staves, there are two horizontal lines with rhythmic markings: the top one has '8' and '4' with diamond shapes, and the bottom one has '8' and '4'.

Example 4-19, *Angels*, mm. 43-44: Voice exchanges on two levels

The image displays a musical score for two staves, measures 233 through 236. The key signature is one flat (B-flat), and the time signature is 2/4. The score is characterized by complex voice exchange and arpeggiated diminished 7th chords. Above the staves, four chords are labeled: C# (C# major), E (E major), G (G major), and A# (A# major). Below the staves, three chords are labeled: Bb (B-flat major), E (E major), and C# (C# major). The notation includes various note values, rests, and dynamic markings, with some notes connected by slurs and others by ties. The measure numbers 233, 234, 235, and 236 are indicated at the beginning of each measure.

Example 4-20. *Sun-Treader*, mm. 233-236: ICI voice exchange and diminished 7th chord arpeggiation

The image displays four musical examples, labeled a, b, c, and d, illustrating voice exchange between two voices (treble and bass clef) across two measures. Each example shows the notes in each measure, the connections between them, and the resulting voice exchange (VE) skew calculation.

- Example 4-21a: Normal voice exchange**
 - Measure 1: Treble has notes 1 and 0; Bass has notes 0 and 11. Connections: 1 to 0, 0 to 11.
 - Measure 2: Treble has notes 0 and 1; Bass has notes 1 and 10. Connections: 0 to 1, 1 to 10.
 - VE skew: $1+1=2$
- Example 4-21b: Voice exchange with a skew of 2 (1+1)**
 - Measure 1: Treble has notes 1 and 1; Bass has notes 1 and 10. Connections: 1 to 1, 1 to 10.
 - Measure 2: Treble has notes 1 and 1; Bass has notes 1 and 10. Connections: 1 to 1, 1 to 10.
 - VE skew: $1+1=2$
- Example 4-21c: Voice exchange with a skew of 11 (11+0=11)**
 - Measure 1: Treble has notes 11 and 0; Bass has notes 11 and 3. Connections: 11 to 0, 0 to 3.
 - Measure 2: Treble has notes 11 and 0; Bass has notes 11 and 3. Connections: 11 to 0, 0 to 3.
 - VE skew: $11+0=11$
- Example 4-21d: Voice exchange with a skew of 0 (11+1=0)**
 - Measure 1: Treble has notes 11 and 1; Bass has notes 11 and 3. Connections: 11 to 1, 1 to 3.
 - Measure 2: Treble has notes 11 and 1; Bass has notes 11 and 3. Connections: 11 to 1, 1 to 3.
 - VE skew: $11+1=0$

Example 4-21a: Normal voice exchange

Example 4-21b: Voice exchange with a skew of 2 (1+1)

Example 4-21c: Voice exchange with a skew of 11 (11+0)

Example 4-21d: Voice exchange with a skew of 0 (11+1)

The musical score for Example 4-22, 'Angels, mm. 18-22', is written for Trumpets in C (I, II, III, IV) and Trombones (I, II). The score includes dynamic markings such as *poco accel.*, *poco rit.*, *poco più mosso*, *mf*, *f*, and *p*. It also features articulation marks (accents) and phrasing slurs. Measure numbers 18, 20, and 22 are indicated. To the right of the score are three diagrams illustrating voice exchanges and IC1-skewed voice exchanges.

The diagrams show the following voice exchanges:

- Diagram 1: $B \xrightarrow{C} C \xrightarrow{B} B$ (labeled $=2$)
- Diagram 2: $C \xrightarrow{B} B \xrightarrow{C} C$ (labeled $=0$)
- Diagram 3: $D \xrightarrow{E} E \xrightarrow{D} D$ (labeled $=0$)

Example 4-22. *Angels*, mm. 18-22: Voice exchanges and IC1-skewed voice exchanges

poco a poco allargando

($d = 80$)

($d = 70$)

ap. crescendo

ap. = mf

45

Diagram illustrating voice exchange and IC1-skewed voice exchange:

0 0 11 1

$G^{\sharp} A B^{\flat} G$

$A G^{\sharp} F^{\sharp} B$

$F F^{\sharp} F$

$F^{\sharp} F$

Arrows indicate voice exchange and IC1-skewed voice exchange between the notes.

Example 4-23. *Evocations* 2, m. 46: Voice exchange and IC1-skewed voice exchange

14

Clarinet (actual pitch)

13

11 1 1

A-way from books. A-way from art. The day e-

11

Cello

Piano

17

Bassoon

11

13

-rased The les-son done

11

Piano

3

13

Cellos

Example 4-24. *A Clear Midnight*, mm. 14-18: Vertical (& two linear) IC1s

72

Winds & Strings

Tpts & Tbns

Hns

Winds, Strings, & Tubas

Outer voices: 11 11-13 13 11-13 13 13 11 13 13

Set classes: 0121..... 0134 0126..... 0125 0136..... 0123 012367 01245 01234..... 01267..... 01234 01345 01456 01267 01235 01234.... 01236 01234

Example 4-25: Sun-Treader, mm. 72-76. IC1-related voices

[illegible]

Example 4-25, continued: Sun-Treader, mm. 72-76. IC1-related voices

Set class: (0158) (0158) (0156) (0156) (0167) (015) (015) (016) (016) (016)

T-levels: T8 T4 T11 T1 T6 T11 T1 T11 T11 T1

Example 4-26a. Semitone-related 5ths

Example 4-26b. Semitone-dissonated 5ths

(0158) (0158) (0156) (0156) (0167) (0156) (0156) (015) (015) (016) (016)

T-levels: T8 T4 T11 T1 T6 T11 T1 T11 T11 T1

Example 4-27a. IC1-related 5ths

Example 4-27b. IC1-dissonated 5ths

The musical score consists of two systems. The first system contains measures 1 through 5, and the second system contains measure 6. The notation includes a treble clef with a first finger (1) and a bass clef with a first finger (1). The guitar part is indicated by 'II Vla' and 'Vla Vcl'. Fingering numbers (1-3) are placed above notes, and fret numbers (6, 11, 13) are placed below notes. Measure 1 has a fret number of 13-11. Measure 2 has a fret number of 13-11. Measure 3 has fret numbers 13, 6, and 13. Measure 4 has a fret number of 6-13-11. Measure 5 has fret numbers 6, 11, and 11. Measure 6 has fret numbers 13, 11, 13, and 6. The fret numbers are connected by lines, indicating a sequence of frets.

m. 1. 2. 3. 4. 5.

II Vla 1
Vla Vcl

13-11 13-11 13 6 13 6-13-11 6 11 11

0156 ————— 0167 0156 0167 0156 — 0167 0156 —

6.

13 11 13 6

0156 ————— 0167

Example 4-28. Sketch from a letter to Kirkpatrick, November, 1952 (Ziffirin 1994:Example 44)

Phrase 1 Phrase 2 Phrase 3 Phrase 4

----- $\text{♩} = \text{♩}$ (about 46) *poco a poco accel.* ----- (♩ about 58) -----

23

Outer voices: 7 7 7 13 7 7 7 7

Phrase 4, cont.

----- (♩ about 64) *calmato* (♩ about 69) *rit.* -----

29

Example 4-29. *Organum*, mm. 23-30

Phrase 1

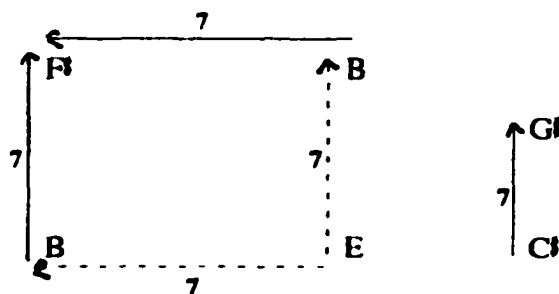
0147

0148 0358 0148 0136

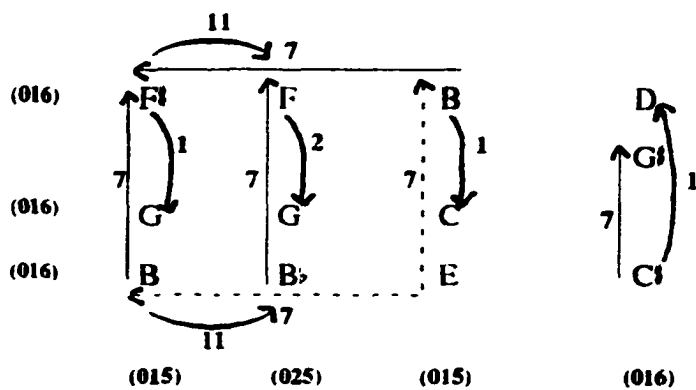
0136

(23)

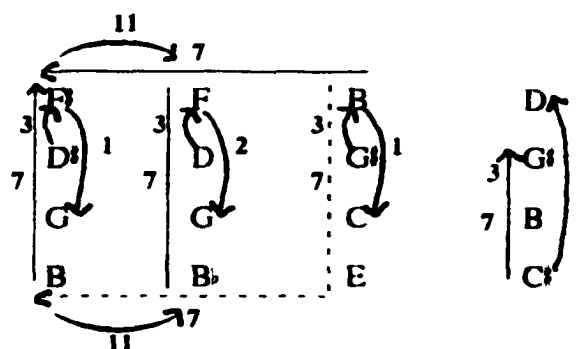
(a)



(b) (016)



(c)



Example 4-30. Organum, mm.23-25. Chord construction: (a) Fifths; (b) Dissonated fifths; (c) Dissonated fifths plus thirds

Phrase 2

Diagram illustrating chord construction for Example 4-31, Organum, mm.24-27. The diagram shows two cycles of fifths and fourths, with notes and fingerings (7, 11, 10) indicating the construction of the chords.

Example 4-31. Organum, mm.24-27. Chord construction

Phrase 3

Phrase 4

28

30

01367

01368

0137

0156

016

015

Vertical chord construction diagrams:

- Measure 27: G⁷, C⁷, A⁷, C, F⁷
- Measure 28: G⁷, C⁷, A⁷, C, F⁷
- Measure 29: G⁷, C⁷, A⁷, C, F⁷
- Measure 30: G⁷, C⁷, A⁷, C, F⁷
- Measure 31: G⁷, C⁷, A⁷, C, F⁷
- Measure 32: G⁷, C⁷, A⁷, C, F⁷

Example 4-32. Organum, 27-30. Vertical chord construction

A musical score for the song "The Rose Tree". The score is written for a piano and voice. It consists of eight staves. The first four staves are for the piano accompaniment, and the last four staves are for the voice. The music is in 3/4 time and G major. The piano part features a melody in the right hand and a bass line in the left hand. The voice part is a single melodic line. The score includes various musical notations such as notes, rests, beams, and slurs. There are also dynamic markings like "mp" and "p". The score is divided into two systems, with the first system containing staves 1-4 and the second system containing staves 5-8. The title "The Rose Tree" is written at the top of the page.

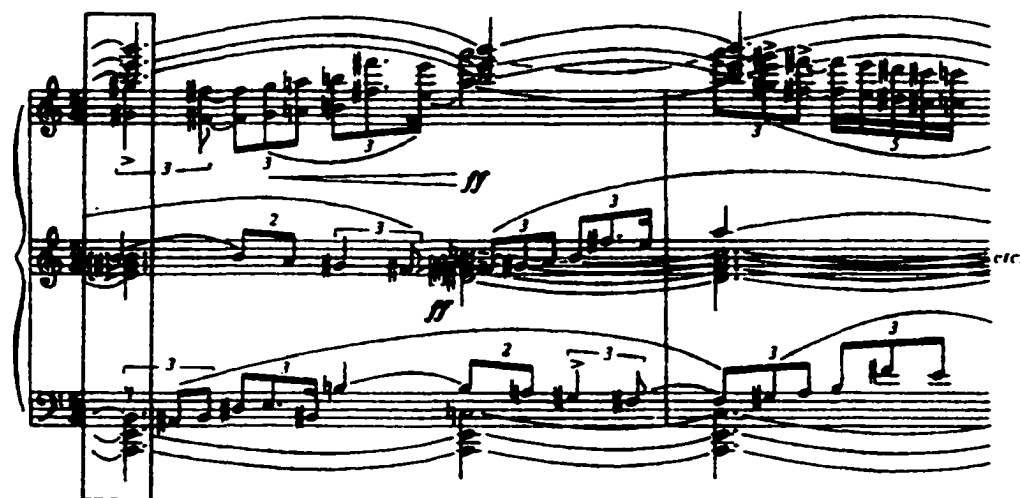
Musical score for "L'Espresso" by Giuseppe Verdi. The score consists of five staves of music. The tempo is marked "tempo". The dynamics are marked "poco accel.", "poco più mosso", "mf", "f", "piu f", "poco rit.", and "poco accel.". The score includes various musical notations such as notes, rests, and slurs. The first staff has a tempo marking of "tempo" and a dynamic of "mf". The second staff has a tempo marking of "tempo" and a dynamic of "mf". The third staff has a tempo marking of "tempo" and a dynamic of "mf". The fourth staff has a tempo marking of "tempo" and a dynamic of "mf". The fifth staff has a tempo marking of "tempo" and a dynamic of "mf".

Example 4-33. Angels, mm. 12-19: Treble parallel thirds with ICI dissonation in lower voices

The musical score consists of six staves. Above the staves, the Ab major triad (A $\flat$, C, E $\flat$) is indicated at measures 1, 5, and 9. The score includes tempo markings (rit., tempo, molto rit.), dynamics (p, mf, f), and articulation (accents). Below the staves, vertical subsets of the triads are shown for measures 1 through 9.

Measure	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	Subset 6	Subset 7	Subset 8	Subset 9
1	A $\flat$								
2		C							
3			A $\flat$						
4				A $\flat$					
5					C				
6						A $\flat$			
7							C		
8								E $\flat$	
9									E $\flat$

Example 4-34. Angels, end. Ab major triads: Vertical subsets, linear arpeggiations, and voice exchanges



Example 4-35. From a sketch for *The Sunken Bell* (McMahan 1993:141, Ex. 2):
E major triad over subdominant note (A)

Tym.
 T. Dr.
 B. Dr.
 V. I.
 V. II
 Vla.
 Vb.
 Cb.

47 48 49 50 51 52

I II I II I II I

**Example 4-36. Marching Mountains, mm. 49-52: "Plagal" cadence:
 Alternation between dissonated D major and G minor triads**

Anima

2

f quasi recit.

P

Come here, — lit - tle son, — and I will play with you.

Piano

f

whole measure: WT0+E₇. sc (012468T)

C[#]₇
0258

6

mf a tempo

B^b₇ plus D₇: WT0+D₇. sc (02368)

Paint - ed ships, And trains of choochoo

poco rit.

mf a tempo

B^b₇
0258

Example 4-37. Toys, mm. 2 & 6: Half-diminished 7th chords and WT0 + collections

23 *slower (♩ = 60) espressivo* *half back a little* *poco a poco accelerando*

(11 - 13) (13 13 13 13)

B—B F—F E—E
 G—G D—D C—C
 C—C B—B A—A
 A—A G—G F—F
 T11 T0 T11 T0 T11

C—E
 A—G
 T6

(♩ = 96) *ff*

A—B—B—C—C—D—D—E
 D—E—F—F—G—G—A—A
 A—B—B—C—C—D—D—E
 T1 T1 T1 T1 T1 T1 T1

A—D—E
 D—A—A
 T6 T1

A—D—E
 D—A—A
 T0 T1

A—D—E
 D—A—A
 T1

Example 4-38. *Evocations* 3, mm. 23-26: T11 and T1 voice leading

373

19 21

FL

Ob

Cl

Set classes 013 014 016 016 013 013 014 014 016 015 015 013 014 013 013 012 013 012

IC1 dyads

diagonal voice leading between IC1 dyads

horizontal voice leading between IC1 dyads

voice leading between trichords

Alternate trichord mapping

Example 4-40a. Marching Mountains, mm. 19-22: Voice leadings (dyadic and trichordal)

The image displays a musical score for three woodwind instruments: Flute (Fl.), Oboe (Ob.), and Clarinet (Cl.). The score is divided into two systems, each containing three staves. The first system is marked with a circled '19' and the second with a circled '21'. The music is written in treble clef with a key signature of one flat (B-flat). The Flute part features a melodic line with slurs and ties. The Oboe and Clarinet parts provide harmonic support with sustained notes and some melodic movement. Below the staves, there are two harmonic analysis diagrams. The first diagram, labeled 'I2/16', shows a vertical stack of notes: F (top), A (middle), and A (bottom). The second diagram, labeled 'I2', shows a vertical stack of notes: F (top), A (middle), and F (bottom). To the right of the staves, there are two more harmonic analysis diagrams. The first, labeled 'I2', shows a vertical stack of notes: F (top), A (middle), and F (bottom). The second, labeled 'I11/12', shows a vertical stack of notes: C (top), G (middle), and B (bottom). The notes are connected by lines, indicating their movement across the staves.

Example 4-40b. Marching Mountains, mm. 19-22: Parallels between local I2s and longer-range split-I2s

Treble line: B C C# D Eb E# A G# / C# D D# E# A G# / D Eb E# A G# / D# E A G#

Lento

Outer voices: 13x11 13-11x13 11x13 11x13 13 13 11x13 11 11 13 13 11x13 11 13 13 11x13 13 13

PC voice leading:

G _b	F ₄	B ₄	B ₄	C ₅	C ₅	D ₅	E _b	E _b	A ₄	G ₄	C ₅	D ₅	D ₅	E _b	A ₄	G ₄	D ₅	E _b	E _b	A ₄	G ₄	D ₅	E _b	A ₄	G ₄
D ₄	D ₄	D ₄	D ₄	E ₄	F ₄	F ₄	G ₄	G ₄	B ₄	B ₄	F ₄	F ₄	G ₄	A ₄	B ₄	B ₄	G ₄	G ₄	B ₄	B ₄	B ₄	G ₄	G ₄	D ₅	C ₅
C ₄	C ₄	C ₄	G ₃	G ₃	G ₃	A ₃	B ₃	B ₃	E ₃	E ₃	G ₃	G ₃	A ₃	B ₃	D ₄	D ₄	A ₃	A ₃	B ₃	E ₃	D ₄	A ₃	A ₃	E ₃	D ₄
F ₃	F ₃	A ₃	C ₄	B ₃	D ₄	C ₄	E ₄	E ₄	A ₃	G ₃	D ₄	C ₄	E ₄	F ₄	A ₃	G ₃	E ₄	D ₄	F ₄	A ₃	G ₃	E ₄	E ₄	A ₃	G ₃
T0	T0/	T1/	T0/	T2/	T1/	T2/	T0/	T5/	T0/		T6/	T0/	T2	T1	T4/	T0/	T7/	T0	T2/	11/	T11/	111/	T0/	T5/	T11
	T5	T6	T1	T0	T11	T3	T11	T4	T11		T4	T1			T0	T11	T11		T1	17	T0	15	T1	T6	

Alternate voice leading:

F—B—B
D—D ? D
C ₅ —C ₅ ? G
F ₄ —A ₄ —C
14/ 110/
12 1?

Example 4-41. *Sun-Treader*, mm. 119-120: Outer-voice intervals and pitch-class voice leading

Example 4-42, *Angels*, mm. 1-9: Voice-leading levels

Serene
♩ = 40

Trumpets in C with mutes (actual pitch)

Trombones with mutes

I II III IV V VI VII VIII

1) $\begin{matrix} G & A & C & B \\ E & E & A & A \\ C & C & G & G \\ B & B & D & D \\ A & G & E & D \end{matrix}$ $\begin{matrix} D & G & D \\ B & B & A \\ F & F & G \\ F & C & F \\ C & B & B \end{matrix}$
T0 I3 T0/T10 I0 T0/T11

1a) $\begin{matrix} G & C & B \\ E & A & A \\ C & G & G \\ B & D & D \\ A & E & D \end{matrix}$ $\begin{matrix} D & G & D \\ B & B & A \\ F & F & G \\ F & C & F \\ C & B & B \end{matrix}$
I3 T0/T10 I0 T0/T11

2) $\begin{matrix} G & B \\ E & A \\ C & G \\ B & D \\ A & D \end{matrix}$ $\begin{matrix} D & D \\ B & A \\ F & G \\ F & F \\ C & B \end{matrix}$
I3/II I0/II1

3) $\begin{matrix} G & D \\ E & A \\ C & G \\ B & F \\ A & B \end{matrix}$
I0/I7

4) $\begin{matrix} G & A \\ E & G \\ C & E \\ B & C \\ A & C \end{matrix}$
T0/T2

Work	Measures	Type	Time between entries	Interval between entries	Sequence & interval of repetition	Retrograde
<i>Lilacs</i>	9-14	3 in 1 (1 strict and 1 free comes)	Half note	Octave (upper) between dux and strict comes	Yes Free	No
<i>Sun-Treader</i>	52-62, 139-49	6 in 2 initially; afterwards 3 in 1 Mixed	Half note	Whole step (lower)	Yes Strict Minor 3rd (lower)	Yes 124-33
<i>Evocations II</i>	19-30	2 in 1 Mixed	Dotted half note	Octave (lower)	No	No
<i>Evocations IV</i>	15-18	2 in 1	Half note	Octave (upper)	Yes Strict Whole step (lower)	Yes 21-24
<i>Organum</i>	5-20 50-62 63-72	2 in 1	Variable	Octave (lower)	No	Yes 37-49 (mixed)

Table 4-1: Canons in Ruggles's works

COMES I

Transition

COMES II

DUX

Cadence

Largo

molto rit.

v. z

v. z

v. a.

v. c.

c. b.

Example 4-43. *Lilacs*, mm. 9-19: Canon

The musical score is presented in three systems, each with a Dux part and a Comes II part. The Dux parts are for Violin 1, Cello 2, and Contrabass. The Comes II parts are for Cello 2 and Contrabass. The score includes pitch-interval successions and measure numbers.

System 1:

- Dux Violin 1:** Measure 9. Pitch intervals: <-3, -3, -7, +4, +4, -3, -8, +6, -4, +2, +3, -3, +5, -4, -7, +4, +6, -5>. Measure 12.
- Comes II Cello 2:** Measure 10. Pitch intervals: <-3, -3, -6, +5, +2, -3, -3, +1, -4, +2, +3, -3, 6, -5, -7, +3, -5>. Measure 13.
- Comes II Contrabass:** Measure 10. Pitch intervals: <-3, -5, -6, +5, +4, -3, -2, +1>. Measure 13.

System 2:

- Dux Violin 1:** Measure 12. Pitch intervals: -3, -8, +6, -4, +2, +3, -3, +5, -4, -7, +4, +6, -5>. Measure 12.
- Comes II Cello 2:** Measure 13. Pitch intervals: -4, +2, +3, -3, 6, -5, -7, +3, -5>. Measure 13.
- Comes II Contrabass:** Measure 13. Pitch intervals: -3, -2, +1>. Measure 13.

System 3:

- Dux Violin 1:** Measure 13. Pitch intervals: -4, +2, +3, -3, +5, -4, -7, +4, +6, -5>. Measure 12.
- Comes II Cello 2:** Measure 13. Pitch intervals: -4, +2, +3, -3, 6, -5, -7, +3, -5>. Measure 13.
- Comes II Contrabass:** Measure 13. Pitch intervals: -3, -2, +1>. Measure 13.

Example 4-44. *Lilacscanon*: Dux and comes II in vertical alignment--Pitch-interval succession

381

Example 4-46. *Sun-Treader*, mm. 52-53. Subjects 1 and 2

Example 4-47. Sun-Treader, mm. 52-62. Canon

S1	D ₄	F	WT1	B	D	WT0	G	B	WT1
S2	F	C	WT0	G	D	WT1	C	A	WT0
	A	B		F	F		G	G	

Comes 2 (57) Ecce terra... (59) (61)

S1 Comes 1 Dux 1 (Comes 5) (Comes 4) (Dux 2)

S2

S1	E C	G C	F A	R A	WT1 A	B D	D R	WT0 R	G C	B D	WT1 D	G B	WT0 C	E A	F A	WT1 B
S2	B A	H D	F A	D A	WT0 A	B B	E E	WT0 C	B G	WT1 B	F D	C H	WT0 A	B F	P A	WT1 D

Example 4-47, continued. Sun-Treader, mm. 52-62. Canon

62

Comes
Comes 1
Dux 1
(Comes 5)
(Comes 4)
(Dux 2)

S1
S2

Al
D wto
H
G
C wti
B

Example 4-47, continued. Sun-Treader, mm. 52-62. Canon

Musical score for Example 4-48, *Sun-Treader*, mm. 124-133. Retrograde canon. The score is written for two staves, S1 and S2, in 2/4 time. The notation includes various musical symbols such as notes, rests, and dynamic markings.

Key markings and annotations include:

- Measures 124, 126, and 128 are circled.
- Staff S1:
 - Measure 124: Comes 2 $\langle +1, +4 \rangle \langle -2 \rangle$
 - Measure 126: Comes 1 $\langle +1, +4 \rangle \langle -2 \rangle$
 - Measure 128: Dux 1 $\langle +1, +4 \rangle \langle -2 \rangle$
- Staff S2:
 - Measure 124: (Comes 4)
 - Measure 126: (Comes 3)
 - Measure 128: (Dux 2)
- Triplet markings (3) are present in measures 125, 127, and 129.
- A crescendo marking (>) is located in measure 124 on staff S1.

Example 4-48. *Sun-Treader*, mm. 124-133. Retrograde canon

129 Comes 2

131

133

Comes 1

Dux 1

Comes 2

Comes 3

Comes 4

Dux 2

S1

S2

Example 4-48, continued: *Sun-Treader*, mm. 124-133. Retrograde canon

(124) Comes 3: Actual retrograde

(126)

(128)

Comes 3: Hypothetical strict retrograde

The image displays a musical score for two staves, likely piano and violin/viola, in 3/4 time. The score is divided into two systems. The first system, labeled (124) and (126), shows the 'Actual retrograde' of 'Comes 3'. The second system, labeled (128), shows the 'Hypothetical strict retrograde' of 'Comes 3'. The notation includes various musical symbols such as notes, rests, beams, and slurs, with specific markings for retrograde and strict retrograde. The key signature is one sharp (F#), and the time signature is 3/4.

Example 4-49. *Sun-Treader*; Actual versus hypothetical strict retrograde of comes 3 (mm. 124-128)

BIBLIOGRAPHY

- Antokoletz, Elliott
1992 *Twentieth-Century Music*. Englewood Cliffs: Prentice-Hall
- Archabal, Nina Marchetti
1979 "Carl Ruggles: an Ultramodern Composer as Painter." Ph.D. diss.,
University of Minnesota
- Babcock, David
1980 "Carl Ruggles: Two Early Works and *Sun-Treader*." *Tempo* 135:3-12
- Boss, Jack
1992 "Schoenberg's Op. 22 Radio Talk and Developing Variation in Atonal
Music." *Music Theory Spectrum* 14/2 (Fall):125-149
- 1994 "Schoenberg on Ornamentation and Structural Levels." *Journal of Music
Theory* 38/2:187-216
- Brown, Stephen C.
1998 "Dual Interval Space in Twentieth-Century Music." Paper presented at the
Society for Music Theory Annual Meeting, December 6
- 1999 "Dual Interval Space in Twentieth-Century Music." Ph.D. diss., Yale
University.
- Carl, Robert
1995 "'A Fearful Symmetry': Micro/Macro-Structure in Carl Ruggles' *Sun-
Treader*." *Sonus* 15/2 (Spring): 25-53
- Carton, John
1970 "Carl Ruggles: A Treader of the Sun," typescript for Bennington College,
Bennington, VT
- Chapman, Alan
1978 "A Theory of Harmonic Structures for Nontonal Music." Ph.D. diss., Yale
University
- 1981 "Some Intervallic Aspects of Pitch-Class Set Relations." *Journal of Music
Theory* 25/2:275-90
- Chase, Gilbert
1987 *America's Music: From the Pilgrims to the Present*. Urbana: University of
Illinois Press

- Cohn, Arthur
1966 "Now, that Other American Giant--Carl Ruggles." *The American Record Guide* 32 (March): 589-90
- Cohn, Richard
1996 "Maximally Smooth Cycles, Hexatonic Systems, and the Analysis of Late-Romantic Triadic Progressions." *Music Analysis* 15/1 (March): 9-40
- Cowell, Henry
1930 *New Musical Resources*, ed. David Nicholls. New York: Alfred A. Knopf, 1930. Reprinted Cambridge U. P., 1996
- 1933a (ed.) *American Composers on American Music: A Symposium*. Palo Alto: Stanford University Press, 1933; reprint, New York: Frederick Ungar, 1961
- 1933b "Charles Seeger." In Cowell 1933a: 119-27
- Crawford, John C. and Dorothy L.
1993 *Expressionism in Twentieth-Century Music*. Bloomington/Indianapolis: Indiana University Press
- Crocker, Richard L.
1962 "Discant, Counterpoint, and Harmony." *Journal of the American Musicological Society* 15/1 (Spring): 1-21
- Dombek, Stephen
1980 "A Study of Harmonic Interrelationships and Sonority Types in Carl Ruggles' *Angels*." *Indiana Theory Review* 4/1:29-35
- Faulkner, Susan
1973 "Carl Ruggles and his *Evocations* for Piano." Master's thesis, American University, Washington, D.C.
- Ferneyhough, Brian
1982 "Carl Ruggles and 'Dissonant Melody'." Swedish trans. in *Nutida Musik* III. Reprinted in *Brian Ferneyhough: Collected Writings*, ed. James Boros and Richard Toop. Contemporary Music Studies, Vol. 10. Amsterdam: Harwood Academic Publishers, 1995 (197-202)
- Fisher, Dorothy Canfield
1929 Unpublished typescript. Carl Ruggles Papers, Yale University Music Library

- Forte, Allen**
 1973 *The Structure of Atonal Music*. New Haven/London: Yale University Press
- 1988 "New Modes of Linear Analysis." Paper presented at the Oxford University Conference on Music Analysis, September 24
- Friedmann, Michael L.**
 1985 "A Methodology for the Discussion of Contour: Its Application to Schoenberg's Music." *Journal of Music Theory* 29/2:223-48
- Gagne, Cole**
 1993 *Soundpieces 2: Interview with American Composers*. Metuchen, New Jersey/London: Scarecrow Press
- Gilbert, Steven E.**
 1970 "The 'Twelve-Tone System' of Carl Ruggles: A Study of the Evocations for Piano." *Journal of Music Theory* 14:68-91
- 1971 "Carl Ruggles and Total Chromaticism." *Yearbook for Inter-American Musical Research* 7:42-50
- 1972 "Carl Ruggles (1876-1971): An Appreciation." *Perspectives of New Music* 11/1:224-32
- 1973-74 "'The Ultra-Modern Idiom'" A Survey of *New Music*." *Perspectives of New Music* 12/1-2:282-314
- 1974 "An Introduction to Trichordal Analysis." *Journal of Music Theory* 18/2:338-62
- Gingerich, Lora L.**
 1986 "A Technique for Melodic Motivic Analysis in the Music of Charles Ives." *Music Theory Spectrum* 8: 75-93
- Green, Jonathan D.**
 1995 *Carl Ruggles: A Bio-Bibliography*. Westport, Connecticut/London: Greenwood Press
- Greer, Taylor Aitken**
 1994 "Critical Remarks." In Seeger 1994:27-38
- 1998 *A Question of Balance: Charles Seeger's Philosophy of Music*. Berkeley/Los Angeles: University of California Press

- 1999 "The Dynamics of Dissonance in Seeger's Treatise and Crawford's Quartet." In Yung and Rees 1999:13-28
- Griffiths, Paul and Marilyn J. Ziffirin
1980 "Ruggles, Carl." In Stanley Sadie, ed., *The New Grove Dictionary of Music and Musicians*. London: Macmillan, 16:324-26
- Haggh, Raymond
1962 *Hugo Riemann's 'Geschichte der Musiktheorie'...Books I and II*. Lincoln: University of Nebraska Press. Partial trans. of Riemann 1898
- Harmon, David R.
1971 "The Musical Language of Carl Ruggles." *American Music Teacher* 25 (December)
- Harrison, Lou
1945 "Ruggles, Ives, Varèse." *View* (November). Reprinted in *Soundings: Ruggles, Ives, Varèse*, ed. Peter Garland (n.p., Soundings, 1974), 1-4.
- 1955 "Carl Ruggles." *The Score and I.M.A. Magazine* 12:15-26. Originally "About Carl Ruggles: Section Four of a Book on Ruggles, With a Note by Henry Cowell." Yonkers: Author, 1946. Reprinted in *Soundings: Ruggles, Ives, Varèse*, ed. Peter Garland (n.p., Soundings, 1974), 47-60
- Headlam, Dave
1996 *The Music of Alban Berg*. New Haven and London: Yale University Press
- Herlin, Thomas R.
1997a "An Analysis of Carl Ruggles's Exaltation." Web page.
<http://www.students.uiuc.edu/~herlin/ruggles.html>
- 1997b "The Carl Ruggles Page." Web page.
<http://www.students.uiuc.edu/~herlin/exaltation.html>
- 2000 "Carl Ruggles and the Viennese Tradition: A Comparative Analysis." Ph.D. thesis, University of Illinois at Urbana-Champaign
- Hitchcock, H. Wiley
1974 *Music in the United States: A Historical Introduction*. Englewood Cliffs: Prentice-Hall
- Howard, John Tasker
1943 *Our Contemporary Composers: American Music in the Twentieth Century*.

New York: Thomas Y. Crowell

Kenney, Christopher

- 1991 "Experiments in American Dissonance." *Sonneck Society Bulletin* XVII/3 (Fall):107-110

Kirkpatrick, John

- 1968 "The Evolution of Carl Ruggles: A Chronicle Largely in his Own Words." *Perspectives of New Music* 6/2:146-66
- 1980 Liner notes to *The Complete Music of Carl Ruggles*. CBS Masterworks Records M2 34591

Klumpenhouwer, Henry James

- 1991 "A Generalized Model of Voice-leading for Atonal Music." Ph.D. diss., Harvard University

Kramlich, Daniel L.

- 1982 "The Structural Use of Pitch in Selected Works of Carl Ruggles." M.M. thesis, Indiana University

Lambert, J. Philip

- 1989 "Ives's 'Piano-Drum' Chords." *Intégral* 3:1-36
- 1990a "Aggregate Structures in Music of Charles Ives." *Journal of Music Theory* 34/1:29-55
- 1990b "Interval Cycles as Compositional Resources in the Music of Charles Ives." *Music Theory Spectrum* 12/1:43-82
- 1997 *The Music of Charles Ives*. New Haven/London: Yale University Press

Lewin, David

- 1987 *Generalized Musical Intervals and Transformations*. New Haven/London: Yale University Press
- 1990 "Klumpenhouwer Networks and Some Isographies that Involve Them." *Music Theory Spectrum* 12/1:83-120
- 1993 *Musical Form and Transformation: 4 Analytic Essays*. New Haven/London: Yale University Press
- 1998 "Some Ideas about Voice-Leading Between Pcsets." *Journal of Music Theory* 42/1.1:15-72

- Marvin, Elizabeth West, and Paul A. Laprade**
 1987 "Relating Music Contours: Extensions of a Theory for Contour." *Journal of Music Theory* 31:225-267
- McMahan, Robert Young**
 1993 "A Brief History of *The Sunken Bell*, Carl Ruggles's Unfinished Opera." *American Music* 11/2:131-57
- 1990 "*The Sunken Bell*, by Carl Ruggles" (2 volumes). D.M.A. diss., Peabody Institute of John Hopkins University
- Mead, Rita**
 1981 *Henry Cowell's New Music, 1925-1936: The Society, the Music Editions, and the Recordings*. Ann Arbor: UMI Research Press (imprint of University Microfilms International). Revision of 1978 City University of New York Ph.D. thesis
- Mellers, Wilfrid**
 1987 *Music in a New Found Land*, rev. ed. London/New York: Faber and Faber.
- Miller, Bruce Edward**
 1989 "Intervallic and Structural Coherence in the *Sun-Treader* of Carl Ruggles" (Vol. 1 of 2 volumes). Ph.D. diss., University of California Los Angeles
- Morgan, Robert P.**
 1991 *Twentieth-Century Music: A History of Musical Style in Modern Europe and America*. New York: Norton
- Morris, Robert D.**
 1987 *Composition with Pitch Classes: A Theory of Compositional Design*. New Haven: Yale University Press
- 1991 *Class Notes for Atonal Music Theory*. Hanover, N.H.: Frog Peak Music
- 1993 "New Directions in the Theory and Analysis of Musical Contour." *Music Theory Spectrum* 15/2:205-38
- Nesnow, Adrienne and John Kirkpatrick**
 1981 *Carl Ruggles Papers*. Yale University Music Library Archival Collection MSS 26. New Haven
- Newsweek**
 1966 "Carl Ruggles' Season in the Sun." *Newsweek*, February 7: 80-81

- Nicholls, David
1990 *American Experimental Music: 1890-1940*. Cambridge: Cambridge University Press
- Nuss, Steven
1996 "Western Instruments, Japanese Music: Issues of texture and Harmony in Minoru Miki's *Jo no kyoku*." *Theory and Practice* 21:167-87
- O'Donnell, Shaugn J.
1997 "Transformational Voice Leading in Atonal Music." Ph.D. thesis, City University of New York

1998 "Klumpenhower Networks, Isography, and the Molecular Metaphor." *Intégral* 12: 53-80
- Oja, Carol J.
2000 *Making Music Modern: New York in the 1920s*. Oxford/New York: Oxford University Press
- Orkiszewski, Paul Thomas
1988 "An Analytic Overview of the Music of Carl Ruggles." M.M. diss., Rice University
- Ostrander, Arthur E.
1969 "An Analysis of Five Works of Carl Ruggles." MM thesis., Indiana University
- Perle, George
1960 "Atonality and the Twelve-Note System in the United States." *Score* 27 (July), 55-58

1991 *Serial Composition and Atonality*. 6th ed. Berkeley/Los Angeles: University of California Press
- Peterson, Thomas Elliot
1967 "The Music of Carl Ruggles." Ph.D. diss., University of Washington
- Polansky, Larry and Richard S. Bassein
1978 "A Hierarchical Gestalt Analysis of Ruggles' *Portals*." *Proceedings of the International Computer Music Conference*. Northwestern University

1992 "Possible and Impossible Melodies: Some Formal Aspects of Contour." *Journal of Music Theory* 36/2:259-284

- Prout, Ebenezer
1891 *Double Counterpoint and Canon*. London: Augener
- Rao, Nancy Yunhwa
1997 "Partnership in Modern Music: Charles Seeger and Ruth Crawford, 1929-31." *American Music* 15/3 (Fall):352-80
- Randel, Don, ed.
1986 *The New Harvard Dictionary of Music*. Cambridge, Massachusetts and London: Harvard University Press
- Riemann, Hugo
1893 *Geschichte der Musiktheorie im IX.-XIX. Jahrhundert*. Leipzig. 2nd ed. 1921. English trans. of Books I and II in Haggh 1962
- Robison, Robert Tucker
1991 "Carl Ruggle's *Sun-Treader*." D.M.A. thesis, University of Illinois at Urbana-Champaign
- Rothstein, William
1990 "Rhythmic Displacement and Rhythmic Normalization." In *Trends in Schenkerian Research*, ed. Allen Cadwallader, 87-113. New York: Schirmer Books
- Rudhyar, Dane
1922 "Carl Ruggles and the Future of Dissonant Counterpoint." *Christian Science Monitor*, Dec. 23. Reprinted in *Eolian Review* 3/1 (Nov. 1923), 13-16
1924 "A Reply to Charles L. Seeger's 'Reviewing a Review'." *Eolian Review* 3/2 (Feb. 1924): 29-31
1927 "Carl Ruggles, Pioneer: As Seen by a Fellow-Modernist." *Musical America*, August 27: 3, 20
- Ruggles, Carl (see appendix for compositions)
1984 "James Tenney--Carl Ruggles." *Soundings 13: The Music of James Tenney*. Santa Fe: Soundings Press, 15-29.
- Saeker, Jan
1967 "Carl Ruggles in Winona." M.M. thesis, Winona State College
- Salzman, Eric
1966 "Carl Ruggles: A Lifetime is Not Too Long to Search for the Sublime." *Hifi/Stereo Review* 17 (September)

Schachter, Carl

- 1996 "Schoenberg's Hat and Lewis Carroll's Trousers: Upward and Downward Motion in Musical Space." In *Aflame with Music: 100 Years of Music at the University of Melbourne*, ed. Brenton, Broadstock, et al., 237-341. Melbourne: Centre for Studies in Australian Music

Schenker, Heinrich

- 1935 *Neue musikalische Theorien und Phantasien*. Vienna: Universal Edition. Vol. III, *Der freie Satz* (Book I, text; Book 2, musical figures). Second edition, ed. and rev. Oswald Jonas, 1956
- 1979 *Free Composition*, trans. and ed. Ernst Oster. New York: Longman

Schoenberg, Arnold

- 1967 *Fundamentals of Musical Composition*, ed. Gerald Strang and Leonard Stein. London/Boston: Faber and Faber

Seeger, Charles

- 1923 "Reviewing a Review." *Eolian Review* 3/1 (Nov. 1923), 16-23
- 1930 "On Dissonant Counterpoint." *Modern Music* 7 (June-July):25-31
- 1932 "Carl Ruggles." *Musical Quarterly* 18:578-92. Reprinted in Cowell 1933:14-35
- 1939 "Charles Ives and Carl Ruggles." *The Magazine of Art* 32:396-98, 435-37
- 1972 "In Memoriam: Carl Ruggles (1876-1971)." *Perspectives of New Music* 10/2:171-74
- 1976 Interview by Vivian Perlis (March, 1970). *Soundings* 10. No page numbers
- 1994 *Tradition and Experiment in (the New) Music*, in *Studies in Musicology II: 1929-1979*. Ed. Ann M. Pescatello. Berkeley and Los Angeles: University of California Press

Shirlaw, Matthew

- 1917 *The Theory of Harmony*. London: Novello. Facs. Dekalb, Ill: Dr. Birchard Coar, 1955; New York: Da Capo Press, 1969; Sarasota, Fla: Dr. Birchard Coar, 1970 (as *The Theory and Practice of Harmony*, with an appended essay)

Simms, Bryan R.

- 1986 *Music of the Twentieth Century: Style and Structure*. New York: Schirmer

- Sinclair, James B., compiler
 1993 *The John Kirkpatrick Papers*. Yale University Music Library Archival Collection MSS 56. New Haven
- Slonimsky, Nicolas
 1988 *Perfect Pitch: A Life Story*. Oxford/New York: Oxford University Press
- Slottow, Stephen
 1997 "'It's Against Nature': Straight Lines, Sequences, and Whole Tone Collections in the Music of Carl Ruggles." Paper presented at the Society for Music Theory National Convention, Phoenix, Arizona, November 2
- Straus, Joseph N.
 1982 "A Principle of Voice Leading in the Music of Stravinsky." *Music Theory Spectrum* 4: 106-124
- 1990 *Remaking the Past*. Cambridge/London: Harvard University Press
- 1995 *The Music of Ruth Crawford Seeger*. Cambridge: Cambridge University Press
- 1997 "Voice Leading in Atonal Music." In *Music Theory in Concept and Practice*, ed. James Baker, David Beach, and Jonathan Bernard, 237-74. Rochester: University of Rochester Press.
- Tenney, James
 1977 "The Chronological Development of Carl Ruggles' Melodic Style." *Perspectives of New Music* 16/1:36-69
- 1987 *Meta + Hodos*. (written in 1961). Oakland, California: Frog Peak Music
- Tenney, James, with Larry Polansky
 1980 "Temporal Gestalt Perception in Music: A Metric Space Model." *Journal of Music Theory* 24: 205-41
- Thein, Wolfgang
 1988 "'Sun-Treader.'" *Melos: Vierteljahresschrift für zeitgenössische Musik* 4
- Thomson, Virgil
 1970 *American Music Since 1910*. New York: Holt, Rinehart, and Winston
- Tick, Judith
 1997 *Ruth Crawford Seeger: A Composer's Search for American Music*. New York/Oxford: Oxford University Press

- Varèse, Louise
1972 *Varèse: A Looking-Glass Diary: Volume I: 1883-1928*. New York: Norton
- Vishio, Anton
1997 "A Contrapuntal Theory of Roger Sessions' Harmonic Practice." Paper presented at the annual meeting of the Society for Music Theory, November 2
2000 "Towards a Counterpoint of Asymmetry." Paper presented at the annual meeting of the Music Theory Society of New York State, April 9
- Wedgewood, Richard B.
1967 "Melodic and Phrase Structure in the Music of Carl Ruggles," MM thesis, University of Arkansas
- Woo, Wha-Kyoung
1993 "The Music of Carl Ruggles: A Study of Compositional Procedures and Harmonic Organization in his Eight Published Works." Ph.D. thesis, Michigan State University
- Yasser, Joseph
1932 *A Theory of Evolving Tonality*. New York: American Library of Musicology: Contemporary Series, vol. I. Reissued by Da Capo Press, New York, 1975
- Yates, Peter
1967 *Twentieth Century Music: Its Evolution from the End of the Harmonic Era to the Present Era of Sound*. N.P.: Minerva Press
- Yung, Bell, and Helen Rces (eds.)
1999 *Understanding Charles Seeger, Pioneer in American Musicology*. Urbana/Chicago: University of Illinois Press
- Ziffrin, Marilyn J.
1968 "Angels--Two Views." *Music Review* 29/3:184-96
1994 *Carl Ruggles: Composer, Painter, and Storyteller*. Urbana/Chicago: University of Illinois Press
1979 "Interesting Lies and Curious Truths about Carl Ruggles." *College Music Symposium* 19/2:7-18