Time's Shadow for Clarinet and Ensemble
and
Object and Shadow as Visual/Spatial Schemata
in the Composition of Time's Shadow

by

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The composition *Time's Shadow for Clarinet and Ensemble* is scored for solo clarinet with an ensemble of flute, alto flute, french horn, bass clarinet, piano, celesta, orchestra bells/tubular bells, vibraphone, violin, viola, and two cellos. An accompanying document discusses the use of the visual/spatial relationship of object and shadow as a basis for the composition of this work. Drawing on music analysis, cognitive psychology as it relates to music perception, and the *Phenomenology of Perception* by Maurice Merleau-Ponty, a case is made for the role of visual/spatial schemata in the understanding of relationships heard within non-tonal pieces. An example is given of the perception of object and shadow using *Derive I* by Pierre Boulez. The composition, *Time's Shadow for Clarinet and Ensemble*, is presented in detail demonstrating the use of object and shadow relationships in the compositional process of this work.
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A sensation would be no sensation at all if it were not the sensation of something, and 'things' in the most general sense of the word, for example specific qualities, stand out from the amorphous mass of impressions only if the latter is put into perspective and co-ordinated by space. Thus all senses are spatial if they are to give us access to some form or other of being, if, that is, they are senses at all. And, by the same necessity, they must all open on the same space, otherwise the sensory beings with which they bring us into communication would exist only for the relevant sense--like ghosts which appear only at night--they would lack fullness of being and we could not be truly conscious of them, that is to say, posit them as true beings.

—Merleau-Ponty, *Phenomenology of Perception*
CHAPTER I
INTRODUCTION

This paper outlines not so much an analysis as a description of a way of thinking, an approach to composition that has its roots in the experience of listening, and proposes a means for developing relationships between perceived objects independent of the medium of perception. For the past seventeen years I have created a body of work which, although founded solidly in the art of music, has often drawn on relationships more commonly associated with the visual/spatial arts. My compositions, based initially in the traditional performance activities of musicians, have evolved to become pieces which find their foundation in more inclusively experiential relationships. This includes both works which are entirely aural and those which employ materials from theatre, dance, or the visual arts. Over time I have progressed toward an integration of visual/spatial concerns within my musical grammar and have applied these concerns directly in my more conventionally musical compositions.

In my sound installations and permanent sound works I integrate aural relationships with visual/spatial experience. Placing sounding objects in the urban environment, I use their sounds to articulate space and time and their physical/spatial presence to define local space and to trigger memory. The visual/spatial and aural are inseparable and result in a unity of perceived experience. The relationships between object and
object, object and surroundings, object and sound, sound and surroundings, sound and sound, object and person, sound and person, and person and memory are separately present and experientially inseparable. Working from the spatial towards the aural to integrate both has given me reason to consider more carefully the interpretation of perceived experience by the listener/viewer, both within the environment and in the concert hall.

My recent compositions continue to seek a more direct link between the aural and the visual/spatial. In this paper I describe my current thinking along these lines. Although my fundamental thinking draws on recent readings in philosophy, cognitive psychology, analytical music theory, and psychoacoustics, it is technically neither analysis nor psychology. In the end it is simply musical composition and as such stands or falls on the experience of sounds and silences as they elucidate relationships in time to create a coherent space in which the experience is nested.
CHAPTER II

FOUNDATION

At this point in the late twentieth century a diverse group of composers, music theorists, computer scientists, and psychologists increasingly find themselves converging on research aimed at probing the mysteries of musical structure, perception, and understanding, asking the question, "How do we understand what we hear?" New fields of investigation have arisen from this convergence including, among others, psychoacoustics and music cognition.

In his concise and insightful article "Music: A Science of Mind?" Stephen McAdams briefly traces the development of the psychology of music from physical thought (Greeks), to sensation, perception, and cognition. He identifies cognitive science as having

... emerged from the cross-fertilization of a number of disciplines including psychology, linguistics, neurophysiology, philosophy, and computer science. Its main concern is to characterize the mental capacities of human beings (and other organisms in some cases). Its most important goals include the attempts to understand the nature of mental representation and memory, the processes of organization of perception and thought, and the ability to reason and solve problems.1

Given these concerns, music offers an ideal medium for the experimental investigations of cognitive science. This was clearly demonstrated in the collaborative research of music theorist and composer Fred Lerdahl and linguist Ray Jackendoff who, in 1983, posited a generative grammar of music which relates the heard surface of a composition to the musical structure unconsciously inferred by the listener. Subsequently, this theory has served as the basis for several experimental studies in music cognition.

McAdams initially proposes three products of musical activity which need to be explained from a psychological perspective:

1) a notation or text resulting from composition and from which the generation of sound can proceed by a third party
2) a series of motor patterns (or patterns of muscle activity) generated by a performer in order to control a musical instrument or voice
3) the perception and accumulation of musical images and musical form in memory and in the conscious mind.

It is this third area which most concerns McAdams as a psychologist and myself as a composer. McAdams puts forth "a beginning approach to a theory of the processes underlying music listening," for although music cognition breaks down the act of hearing into its component parts for the sake of experimentation and study, the process involved in understanding music is a unified one with its basis in the experience of listening. This "approach" includes the following areas:

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2 Ibid., 14.
3 Ibid., 35.
Fundamental to this process of listening is the internal representation of musical elements from which the development of structural relationships leads to a full understanding of the work. These mental representations can include "the structures assumed by the memories of things we have experienced and the models we have about how the world works." This results in the development of schemata which combine symbols for concepts and relations between these concepts. This internal representation and understanding is active in all five of the areas stated above. According to McAdams, "One of the major contentions of the cognitive approach to psychology is that all mental activity is mediated by internal (or mental) representations." McAdams goes on to identify three important assumptions in viewing the perceptual process as a building up of representational schemata.

One is that percepts are pre-fabricated building blocks that are derived from experience. Another is that a schemata is a pattern for assembling perceptual units or other schemata into larger structures.

4 Ibid., 36.
5 Ibid., 21.
6 Ibid.
7 Ibid., 18.
or unitary wholes. And, finally, these schemata can operate on various levels to discern structures in the sensory information . . . 8

From this description, the use of schemata would seem to fit well into our sense of the processes involved in the perception and understanding of music. Since these schemata are derived from experience it is obvious that the trained musician would listen with a different set of schemata than the untrained music lover. This has been demonstrated experimentally using music within a tonal context.

The derivation of schemata from musical experience also points to the importance of cultural influences. This is true particularly in the realm of rhythm. Studies have shown that the ways we define schemata for rhythmic interpretation are, as one would expect, "constrained by the norms of our culture." 9

In western music the role of pitch and the relationships of the tonal system impose an even stronger influence on musical perception. In his discussion of building structural relations, McAdams identifies six criteria related to the identification of form-bearing elements. Several of these criteria address themselves directly to the strength of relationships within a tonal system. It is clear that the relationships between heard elements within a tonal system provide a coherent pitch space through which music can be experienced. In turn, tonality provides a shared context for the listener's understanding of musical experience in western art music and for the development of musical schemata. Because of the shared

8 Ibid., 23.

9 Ibid., 30.
experience of and clear relationships in tonal music, many music psychologists have limited their experimentation to materials drawn from tonal systems. If, as McAdams says, "it is with schemata that we pay attention to things in the world," and, in music, many of our schemata are derived from long-standing experience with tonal music, it is not surprising that many listeners feel as if they have fallen into an unknown and unfriendly world when they venture into the realm of non-tonal music.

In an article titled "Cognitive Constraints on Compositional Systems," Fred Lerdahl expands on his theory of generative grammars in tonal music to apply hierarchical representation to non-tonal music. In this article he postulates a set of compositional constraints necessary if a composer's work is to be understood by an active listener. His pursuit of constraints based on his own theory, originally applied only to tonal music, leads him to state that

... my argument has led from pitch hierarchies, to an approximation of pure intervals, to diatonic scales and the circle of fifths, and to a pitch space that prominently includes triads.11

Lerdahl has come full circle to conclude that compositional constraints evolved from a generative grammar originally extrapolated from tonal systems require a vocabulary of tonally based music to be cognitively clear.

10 Ibid., 24.
Non-tonal music, particularly serialism, is "cognitively opaque" to Lerdahl and does not meet the constraints of a coherent pitch space which can be understood through the construction of a hierarchical mental representation of the music heard.

Where then does that leave us as composers or listeners? Must we return to the materials of tonality to create music which is cognitively clear? Is the non-tonal music of the twentieth century destined to be ignored and classified as unlistenable? Why do many non-tonal pieces communicate directly through the heard experience without employing Lerdahl's compositional constraints and tonal language?

"All senses are spatial if they are to give us access to some form or other of being . . . ." This clear and, in some ways, simple statement opens up an entire vista of possibilities for the perception of experience. Merleau-Ponty posits a philosophy of perception where "all (senses) open on the same space," a space experienced as spatiality. Each sense provides its own window on this space and its own particular embodiment of spatiality.

Sensation as it is brought to use by experience is no longer some inert substance or abstract moment, but one of our surfaces of contact with being, a structure of consciousness, and in place of one single space, as the universal condition of all qualities, we have with each one of the latter, a particular manner of being in space and, in a sense, of making space.

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12 Ibid., 231.


14 Ibid., 217.

15 Ibid., 221.
And in regard to music Merleau-Ponty says,

When, in the concert hall, I open my eyes, visible space seems to me cramped compared to that other space through which, a moment ago, the music was being unfolded, and even if I keep my eyes open while the piece is being played, I have the impression that the music is not really contained within this circumscribed and unimpressive space. It brings a new dimension stealing through visible space, and in this it surges forward, just as, in victims of hallucinations, the clear space of things perceived is mysteriously duplicated by a 'dark space' in which other presences are possible.16

Merleau-Ponty clearly sees music experience, and all sense experience, as spatial. "Music is not in visible space, but it besieges, undermines, and displaces that space . . . ."17 He sees the interaction of experience within the visual domain as a "primary organization."18 "The senses translate each other without any need for organization . . . ."19 "My body is the seat or rather the very actuality of the phenomenon of expression (Ausdruck) and there the visual and auditory experiences, for example, are pregnant with one another . . . ."20

The role played by the body is fundamental in Merleau-Ponty's philosophy. The body "uses its own parts as a general system of symbols for the world, and through which we can consequently 'be at home in'

16 Ibid., 222.
17 Ibid., 225.
18 Ibid., (notes) 234.
19 Ibid., 235.
20 Ibid.
that world, 'understand' it, and find significance in it."21

In perception we do not think the object and we do not think ourselves thinking it, we are given over to the object and we merge into this body which is better informed than we are about the world, and about the motives we have and the means at our disposal for synthesizing it.22

Merleau-Ponty's act of the body in perception parallels closely the role schemata play in our understanding of sensory percepts. To "be at home", "understand", and "find significance" parallel the actions researchers hope to elucidate through cognitive science.

The view of spatial relationships as a fundamental basis for sensory perception offers an interesting concept for understanding the perception of non-tonal music. It has been clearly demonstrated by music theorists and cognitive psychologists that the tonal system provides a context in which hierarchical relationships are perceived as a means of developing an understanding of a composition through time. It has also been demonstrated that the lack of relationships in non-tonal systems leads to an unfamiliar and "opaque" listening experience when viewed in comparison to tonal systems. It is interesting to consider the potential for organizing and understanding relationships based on mental representations if music were sensed and perceived spatially. Non-tonal music offers an ideal opportunity for the use of spatial schemata, in the absence of tonal relationships, to provide the listener with a coherent space in which to develop relationships and to structure understanding.

21 Ibid., 237.

22 Ibid., 238.
Some research has already drawn a relationship between spatial representation and music perception. Most recently, research in education has shown a relationship between tonal music training and visual/spatial problem solving in children. Some research has shown that contour of line (shape through time) plays an important role in the recognition of melodic patterns where there is no scale schema, as in atonal music.\textsuperscript{23} It has also been shown that musical experience plays little role in the "discrimination of imitations and transpositions of atonal sequences."\textsuperscript{24}

Essential to the act of composition is the responsibility of the composer to create a coherent experiential space in which relationships can be perceived. In tonal music composers have relied on the use of underlying hierarchical relationships inherent in tonal structures and on the perception of those relationships through the listening experience. In non-tonal music, the creation of a coherent, perceivable space cannot rely on pre-existing aural relationships or perceptible aural schemata. The composer often works with either a compositional grammar divorced from aural experience or a personally invented grammar totally unknown to the listener. The listener is left with no familiar aural representation with which to understand this music. How then is the non-tonal music of the twentieth century understood? What do we hear and respond to in this music? Clearly it is not entirely unintelligible.

In his analysis of \textit{Messagesquisse} by Pierre Boulez, Antoine Bonnet draws a line between "écriture (i.e. the totality of the symbols in the score)
and perception (i.e. the resulting sound as it presents itself to the listener)."\(^{25}\) He recognizes the "divorce of compositional procedures and perception due to the loss of the principle of identification upon which tonal music was based."\(^{26}\) In searching for an aural relationship upon which perception can rely he turns to timbre, ignoring the rich relationships of shape and implied spatiality between the solo instrument and the ensemble. At times he describes a section of the work as "a presence of the inaudible"\(^{27}\) because of his inability to see a perceivable relationship between its heard components. In conclusion, Bonnet states that "there is in the 'written' something that cannot be heard; in the 'heard,' something that cannot be written."\(^{28}\) The missing link he seeks could be found in the perception of spatial relationships in sound.

In his brief discussion of electroacoustic music, Francois Bayle presents a description of "the criteria of the listenability of organized sounds projected into a listening space by electroacoustic means."\(^{29}\) Although, in his description of both materials and process in the three levels of metaform, he utilizes the language of spatial/physical experience (disappearing, clashing, scraping, bursting; colliding, compressing,


\(^{26}\) Ibid. (abstract).

\(^{27}\) Ibid., 206.

\(^{28}\) Ibid., 208.

twisting; echo or rebound, colors, brilliance\textsuperscript{30}), he is unable to offer more than a conceptual framework for understanding this music based in the organization of sound. He quotes Merleau-Ponty but does not consider the organizational power of perceived spatiality.

I propose that much non-tonal music can be understood through the application of visual schemata active in the shared sensory space of spatial perception posited by Merleau-Ponty. In the absence of tonal relationships, non-tonal music is perceived through the more fundamental sensory relationship of spatiality which underlies all perception. Music is heard as shape and gesture; color, brightness, and darkness; texture and density. Relationships at a variety of levels are built from these spatially based materials and understood through schemata inherent in spatial systems. This allows for the depth of experience perceived in many non-tonal works whose compositional grammars are in some way unapproachable through the listening process. The presence of spatial relationships experienced aurally supplants the compositional grammar and makes the work accessible and meaningful to the listener.

In the compositions \textit{Shadowbox for Clarinet} and \textit{Time's Shadow for Clarinet and Ensemble}, I have attempted to develop a compositional approach based on a single spatial relationship: object and shadow. I selected the relationship of object and shadow because of its prevalence in all visual experience (visual/spatial schemata), its rich potential when applied temporally in music, and its perceived presence in the non-tonal works of other twentieth century composers.

\textsuperscript{30} Ibid., (notes) 168.
CHAPTER III
OBJECT AND SHADOW

Objects are visible only in the presence of light. They are seen when light, reflected from the surface of an object, registers on the eye's retina. The difference between the surfaces of two objects is perceived as the difference between the luminance and the color of the reflected light. In the absence of light, nothing can be seen. Consequently shadows, as the result of an obscuring of light, accompany light as a constant presence in the visual landscape.

Shadows have been classified into two types: the attached shadow, and the cast shadow. The attached shadow is visible on the same object, thus causing shading. The cast shadow is visible on another object or surface. In three-dimensional space, attached shadows provide information about the shape of a single object, while cast shadows show relationships between an object and other surfaces. Cast shadows help in the perception of shape and size as well as placement in space. Research has shown that visual information about our surroundings, gained through the presence of shadows, is distinguishable in children as young as three to five years of age.\(^1\)

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Historically, the relationship of light and shade was identified as one of the primary visual cues used in the perception of visual space. Among other things, these visual cues serve in the processes of differentiation, identification, and location of visual objects. Shadows play an important role in each process. The presence of shadows along with light in all visual landscapes, and the role they play in the spatial perception of objects, give them a primary function as schemata in visual perception.

As a metaphor for relationships in sound, shadows correlate directly with certain musical relationships. The proximity and shape characteristics seen in cast shadows play an important visual role in likeness of shape. In sound, likeness of shape can provide the link for aural recognition in the absence of other clear relationships. Music is often described in visual/spatial terms. Shape, gesture, high and low pitch, brightness, darkness, active, dense, clear: all these "musical" terms find their origin in visual/spatial relationships. The visual relationship of shadow to object lends itself well to an aural equivalent which relates the shape, gesture, etc., of one sound to another. In the absence of a tonal system, these relationships can communicate more coherency to a listener than the presence of composer-defined non-tonal pitch systems.

Certain historical musical relationships reveal object/shadow relationships. The technique of imitation and the relationships within canonic writing can clearly be seen as aural equivalents to object and shadow. It is interesting to observe these musical techniques in this

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manner, for in the aural/temporal medium of music the shadow is always cast into the future and heard later, thus emphasizing the commanding presence of time over depth in the musical world. When heard after the object however, this temporal shadowing does not cause a problem but gives the listener a sense of dimensionality, depth, and relationship in the sound as it proceeds through time. The listener responds with a visual/spatial response to an aural/temporal relationship. Anton Webern is just one example of a twentieth century composer who used canonic writing, which creates the relationship of object and shadow, to its best advantage in creating a coherent, musical experience in the absence of tonal relationships.³

The object and shadow relationship can find an equivalent in all aspects of musical material and at all levels of a composition. Once the physical/spatial aspects of gesture and shape take on a more heard, recognizable importance for the listener than the small to large scale structuring of pitch systems, the aural experience becomes shaped by the relationships of objects in time. The return of recognizable material becomes a spatial event marking the temporal flow of the piece with a returned, although at times somewhat modified, object. This related object, in its returned form, can be heard as a shadow of the previously heard object, giving the listener a point of orientation in the temporal landscape. Related objects as corresponding heard shadows can exist in close proximity as linked temporal imitation or at great temporal distances.

³ This can be seen/heard in many of his twelve-tone compositions, including the Symphony, Opus 21; the Quartet for violin, clarinet, saxophone, and piano, Opus 22; and the String Quartet, Opus 28.
as formal structure. Traditional compositional techniques, such as presenting musical material in an inverted or retrograde form, serve only as aspects of physical manipulation before the sounding object is heard in its altered form as shadow. The extent of the manipulation between objects and related shadows determines the extent of complexity in the heard experience as the listener perceives and correlates relationships between sounding objects.
CHAPTER IV

DERIVE I - PIERRE BOULEZ

The differences between écriture (the totality of symbols in the score)\(^1\) and perception, identified by Antoine Bonnet in his article about Boulez's *Messagesquisse*, can be easily demonstrated in the works of many of the twentieth century's most honored composers. The list would include composers as diverse as Anton Webern, Arnold Schoenberg, John Cage (who would celebrate this difference), Karlheinz Stockhausen, Luigi Nono, Iannis Xenakis, Earle Brown, Jonathan Harvey, Gyorgy Ligeti, Elliot Carter, Milton Babbitt, and many more. The correspondence between compositional language and perceived experience in music in the twentieth century is no longer guaranteed, given the absence of an accepted and shared set of common relationships like those existent in tonality. Most theoretical studies of music focus on the level of écriture and assume that analysis will reveal the heard experience. The theorist is interested in the organization of compositional materials and not in the less easily defined perceived outcome. He/she often assumes the stance that if it is in the score, it is heard and perceived experientially. This has not always proven to be the case. Some of the most highly structured music creates the most difficult listening experiences. In the absence of

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tonal relationships, composers have offered other lines of connection between the score and the heard structure, including density and timbre. These sometimes offer more potential than individualized pitch systems, but often fail in a similar manner to create a coherent experiential space for the listener because they still require unfamiliar modes of listening.

Pierre Boulez is an ideal example of a highly respected composer, conductor, and musician who writes very complex and at times difficult music. He has composed some of the most "abstract" music in the twentieth century including his Structures, Book I (1952) and Structures, Book II (1961) for two pianos, and Le Marteau sans Maître (1954-56). Beginning with his use of pure serialism, he has continued to create music derived from constructed pitch sets using modified serialist compositional techniques. Fred Lerdahl refers to the "cognitive opacity" of this music; more specifically he comments on the "huge gap here between compositional system and cognized result" in Le Marteau sans Maître. It is this gap and possible ways of bridging it that I will attempt to explore in my observations of Derive I by Pierre Boulez.

In compositional complexity, Derive I is by no means the equivalent to Le Marteau sans Maître. By the time Boulez has reached Derive I in his compositional development, he has reduced, and in some works simplified, his pitch material significantly. Derive I (1984) shares a basic set of six pitches with Messagesquise (1976). This set is derived from

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3 Ibid., 230.
the letters in the last name of Paul Sacher (Eb, A, C, B, E, D), and underlies both works, with an emphasis placed on Eb as a pivotal pitch. One year after writing *Dérite I*, Boulez composed *memoriam* (...) *explosante-fixe* (...) *Oriinel*), which uses a limited pitch set of seven pitches and also centers on Eb.

The six-pitch set of *Dérite I* is used in six different transpositions, each selected so that it contains the ever-present Eb. The six forms of the set are shown in figure 1.

<table>
<thead>
<tr>
<th>Six-note Set and Transpositions</th>
<th>Minor Hexachord</th>
</tr>
</thead>
<tbody>
<tr>
<td>T⁰</td>
<td>T⁶</td>
</tr>
<tr>
<td>T⁰</td>
<td>Eb</td>
</tr>
<tr>
<td>T⁶</td>
<td>A</td>
</tr>
<tr>
<td>T³</td>
<td>F#</td>
</tr>
<tr>
<td>T⁴</td>
<td>G</td>
</tr>
<tr>
<td>T¹¹</td>
<td>D</td>
</tr>
<tr>
<td>T¹</td>
<td>E</td>
</tr>
</tbody>
</table>

Figure 1. The original set and five transpositions with their hexachordal content

The chosen transpositions rotate the Eb across the pitch set, moving it into the next position to the right with each subsequent transposition, and producing inverted forms of the set. The one exception to this process is the use of the second pitch (A) in the $T^{11}$ transposition, where the actual
transposition calls for Ab. Along with the ever-present Eb, Boulez has chosen to maintain silently depressed octave A's on the piano as a resonant pedal. This might explain his choice of A in place of Ab for $T^{11}$. Also, when placed in normal form, each of the six-note groups produces a hexachord which outlines the first five notes of the minor scale, with the sixth note supplying the lowered fifth scale degree (enharmonic leading tone to the fifth scale degree). The six-note group of $T^{11}$ produces a hexachord which outlines Ab minor. The A may have been used in place of Ab to distort this Ab hexachord and to avoid the presence of the implied Ab/Eb perfect fifth. This helps in maintaining the tritone axis, A-Eb, emphasized by the presence of Eb and the silent octave A's throughout the piece.

The piece is constructed from two types of pitch material. The primary pitch material of the piece is clearly drawn from the six transpositions of the six-note set, and is used in both vertical and horizontal statements. Accompanying this material throughout is an intensity of grace notes and trills which expand on the fundamental material, embellishing the surface texture and skewing the squareness of the consistent quadruple meter by always appearing on the beat. In fact, the meter hardly seems to exist for any reason other than time keeping. The grace notes constantly blur the beat, which progresses at a tempo so slow ($J = 40$) as to have little sense of forward momentum. The one dramatic contribution is to slow by steps from $J = 40$ to $J = 30$, and then to return by steps to $J = 40$. The sounds float in this time field, awash in the constant embellishment of grace notes.
In his analysis of *Messagesquisse*, Antoine Bonnet demonstrates some systematic origin for the grace notes in certain sections of that piece by comparing the accumulation of grace note pitches with the vertical collection of pitch groups across the six transpositions. In regard to the grace notes in *Dévide I*, no such compositional structure is clear. The grace notes complement the primary tones and draw on many of the pitches of the currently active set, but seem to elude further categorization since they also include pitches not present in or easily traced to the current six-note set.

What is clear in *Dévide I* is that the piece divides neatly into two easily heard equal halves: section I, measures 1-27; and section II, measures 27-54. Each contains its own clearly heard texture and internal structure. This fundamental physical/spatial/temporal partition provides the basic starting point for experiencing the work.

Section I is made up of a series of six-note chords articulated in the piano with single tones sustained, often as trills, in the other instruments. The six-note chords of the piano are vertical statements of the transpositions of the six-note pitch set occurring first in the order given in fig. 1 ($T^0$, $T^6$, $T^3$, $T^4$, $T^{11}$, $T^1$) so as to rotate Eb through the matrix, then in the following order: $T^3$, $T^{11}$, $T^0$, $T^4$, $T^1$, $T^6$, $T^0$, $T^6$. In this second statement of chords, alternating sets from the matrix are used: $T^3$, $T^{11}$, $T^0$, and $T^4$, $T^1$, $T^6$, ending with adjacent sets $T^0$ and $T^6$, which are the final sets from each of the previous three set series and the first two sets in the original matrix. Embellishing this texture is a proliferation of grace notes,

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always preceding a note or chord and always to be played on the beat. Although the grace notes and trills give this first section a certain level of activity, the perceived sense is one of static block verticality. All of the primary pitches in the flute, clarinet, violin, cello, and vibraphone sustain or anticipate the pitches of the block chords of the piano. These pitches always occur in the same register dictated by the piano voicing, which in turn always places each pitch for each transposed set in the same register. Thus section I is made up of one six-note pitch set and its five transpositions, each with its own unique but repeated voicing. It is as if the piano freezes the pitches of each set in space, creating a static pitch space which the other instruments can join but not alter. Variation in both time and pitch is accomplished by the freer grace notes.

Whereas section I is static and vertical, section II is linear and horizontal. Here again the piano takes the lead, but now the emphasis is on line rather than chord. The piano makes a series of linear statements, each comprised of pitches from a different transposition of the six-note set, and each limited to notes of a specific rhythmic value. The sets and their assigned rhythmic values are shown in figure 2.
<table>
<thead>
<tr>
<th>Set Transposition</th>
<th>Basic Rhythmic Units</th>
<th>Beginning Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T^{11}$</td>
<td>quarter notes</td>
<td>(beat 2, measure 27)</td>
</tr>
<tr>
<td>$T^4$</td>
<td>eighths/triplet eighths</td>
<td>(beat 3, measure 30)</td>
</tr>
<tr>
<td>$T^1$</td>
<td>triplet eighths</td>
<td>(beat 3, measure 33)</td>
</tr>
<tr>
<td>$T^4$ (a brief statement)</td>
<td>triplet eighths</td>
<td>(beat 3, measure 35)</td>
</tr>
<tr>
<td>$T^3$</td>
<td>quintuplet sixteenths</td>
<td>(beat 2, measure 36)</td>
</tr>
<tr>
<td>$T^{11}$</td>
<td>thirty-seconds</td>
<td>(beat 4, measure 38)</td>
</tr>
<tr>
<td>$T^0$</td>
<td>triplet thirty-seconds</td>
<td>(beat 1, measure 41)</td>
</tr>
<tr>
<td>$T^4$</td>
<td>septuplet sixteenths</td>
<td>(beat 4, measure 42)</td>
</tr>
<tr>
<td>$T^6$</td>
<td>sextuplet sixteenths</td>
<td>(beat 1, measure 44)</td>
</tr>
<tr>
<td>$T^3$</td>
<td>sixteenths</td>
<td>(beat 1, measure 45)</td>
</tr>
<tr>
<td>$T^1$</td>
<td>eighths</td>
<td>(beat 4, measure 45)</td>
</tr>
<tr>
<td>$T^0$</td>
<td>miscellaneous</td>
<td>(beat 2, measure 46)</td>
</tr>
</tbody>
</table>

Figure 2. Order of sets and their rhythmic units from section II

From the second beat of measure 46 to the end, $T^0$ is sustained in the flute, clarinet, violin, cello, and vibraphone, while the piano scatters notes from $T^0$, combined with fragments from several other sets, across the frozen musical landscape of the sustained instruments.

As in section I, the other instruments follow the piano. In each successive piano statement, a new instrument joins in canon with the pitches from the piano but always begins with quarter note values. Before joining the canon, instruments are occupied in echoing piano notes or sustaining trills to decorate the surface. The instruments join the canon at each consecutive new set statement as shown in figure 3.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Set</th>
<th>Instrument Entrances</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>T11</td>
<td>piano</td>
</tr>
<tr>
<td>30</td>
<td>T4</td>
<td>piano clarinet</td>
</tr>
<tr>
<td>33</td>
<td>T1</td>
<td>piano clarinet cello</td>
</tr>
<tr>
<td>36</td>
<td>T3</td>
<td>piano clarinet cello vibraphone</td>
</tr>
<tr>
<td>38</td>
<td>T11</td>
<td>piano clarinet cello vibraphone (no new addition)</td>
</tr>
<tr>
<td>41</td>
<td>T0</td>
<td>piano clarinet cello vibraphone flute and violin</td>
</tr>
</tbody>
</table>

Figure 3. Order of canonic entrances in section II

At each successive entrance of a new instrument, all previous instruments continue to play and, like the piano, to change to an appropriate shorter rhythmic value of their own. This "canon" quickly becomes indistinguishable as the note values get shorter, and each instrument plays more and more pitches from the given set (which are not part of the "canon") to fill in between the shorter note values. Grace notes also continue through this section, adding to the surface embellishment and the confusion. After the entrance of the final instrument at the occurrence of $T^0$, all instruments continue to play, increasing their durational values at each new set statement until they reach the sustained $T^0$ in measure 46.

Throughout section II what remains clear is the accumulation of density and complexity, and the acceleration of motion to the $T^0$ statement in measure 41, followed by a relaxation of tension and a slowing of motion to the sustained $T^0$ in measure 46. This is heightened by the avoidance of
the addition of a new instrument at the $T^{11}$ statement, and the subsequent addition of the two remaining instruments at the following $T^0$ entrance. Measure 41 provides the same type of landmark for section II as measure 27 does for the entire piece. Beat 2 of measure 41, the highest point of tension and activity, is the exact center point of the second half. Boulez provides the listener with a clear secondary physical/spatial/temporal partition within the second half.

It is interesting to note that even in the more active linear second half, Boulez maintains the frozen position of the pitches from the first half. Within each set statement, each pitch is always heard in the same register, and that register corresponds to the same position in which that pitch was placed in the vertical statement of the set in the first half. Boulez's treatment of pitch in *Dérive I* takes on a very physical/spatial sense through the creation of a fixed pitch space for each transposition of the set.

The underlying six-note set and its five transpositions provide a fundamental pitch structure which serves as a foundation for the piece itself. The use of $T^0$ as a kind of "tonic key" is emphasized by its placement at significant points in the work. The repetition of transposed sets lends the work a consistency of pitch content, but does not provide the kind of clear heard relationships which become fundamental to the experience of a tonal composition. The revoicing of the vertical position of each pitch within the chordal statements obscures the transpositional relationship between the pitch sets. The rhythmic manipulation and surface embellishment of the "canon" in the second half completely mask
the relationships between lines. At best, a highly experienced listener might hear the return of each transposition because of its particular voicing. What is then left to provide a coherent heard experience for the listener?

The key to this lies in the physical sense created by the frozen pitch space which Boulez employs in this work. The static qualities of *Derive I* encourage a listener to approach the work not from a sense of temporal progression, but from a physical/spatial sense.

All of section I is linked to the underlying piano statements of the six-note set. The piano places its chords like physical objects in a three-dimensional space, and the other instruments create shadows of these objects by sustaining individual pitches. In the opening measures, the chords as objects take on a growing weight by increasing in length with each statement: $T^0$ two beats, $T^6$ three beats, $T^3$ four beats, $T^4$ five beats, $T^{11}$ six beats, $T^7$ seven beats. The ponderously slow tempo adds to the sense of accumulation. At times, the piano even shadows its own chords with repeated statements, as in measures 6 and 7. Here the $T^1$ chord is restated several times, with the subtraction of a single note in each successive restatement, to conclude the opening section. An attempt is made to reduce the weight of the chord by removing chord tones over time. Grace notes foreshadow the statement of a new chord and link chord tones to the single sustained notes of the melody instruments, creating a physical presence (shadow) of the chord around single tones. Trills and grace notes add surface embellishment but do not create forward motion. The first half serves to establish the pitch space, and to focus the
listener on the chords as physical objects and on all related pitches as echoes or shadows of those objects. Instead of experiencing section I in terms of abstract musical relationships, the listener relies on the more familiar mental schemata of spatial relationships, and finds these relationships present within the aural/temporal medium of this nontonal piece.

Section II unfolds the same physical objects established in section I, but now in a linear manner through the obscured "canon" between the piano and other instruments. On a larger scale, the primary heard structure grows out of the accumulation of density and motion to the center of section II, and the subsequent return to a sustained stasis at measure 46. On a smaller scale, the "canon," though obscured by rhythmic layering and grace notes, creates an effective sense of relationship between the separate parts—not the usual relationship of recognized musical line, but the occurrence of repeated and often simultaneous pitches in their frozen registers, which shadow each other in a physical elaboration of their shared three-dimensional pitch space. Again, aural/temporal material becomes clear when interpreted through the schemata of spatial/physical relationships.

There is a wide gap between écriture and experience in the works of Pierre Boulez. Compositional structure and musical language are nestled within highly developed aural textures. Learned tonal relationships provide little assistance in understanding and experiencing this work. But the key to understanding is not necessarily buried within the complexities of musical structure. Boulez, through the act of composition, provides the
listener with an experience united by aural/temporal relationships and perceived and understood through physical/spatial schemata.
CHAPTER V
SHADOWBOX FOR CLARINET

In writing a musical composition which reflects the visual/spatial metaphor of object and shadow as its fundamental relationship, it is first necessary to determine what the object or objects which are shadowed are to be and how they will be treated compositionally. In Time's Shadow for Clarinet and Ensemble, the solo clarinet part serves as the primary object, and the ensemble writing provides shadows for it. Given this as a basic concept, Shadowbox for Clarinet was written first and exists as a separate musical entity. The composition for solo clarinet then became the solo part for the larger work, thus guaranteeing a level of structural and musical independence for the object.

During the composition of Shadowbox for Clarinet, consideration was given to the opportunities it could provide for shadowing in the ensemble piece, as well as to the integration of object and shadow connections within the solo piece itself. At its largest structure, Shadowbox can be heard as a type of rondo or even a highly modified sonata-rondo form. Its structural form is illustrated in figure 4.
<table>
<thead>
<tr>
<th>Description</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Running sixteenth note motion.</td>
</tr>
<tr>
<td>a</td>
<td>Bb-F 1-8</td>
</tr>
<tr>
<td>b</td>
<td>Slow melodic contour.</td>
</tr>
<tr>
<td>a'</td>
<td>Running sixteenth note return.</td>
</tr>
<tr>
<td>B</td>
<td>Quick scalar octatonic patterns.</td>
</tr>
<tr>
<td>c</td>
<td>b' Slow melodic contour.</td>
</tr>
<tr>
<td>b'</td>
<td>c' Disjunct octatonic gestures.</td>
</tr>
<tr>
<td>A'</td>
<td>Running sixteenth note motion.</td>
</tr>
<tr>
<td>a''</td>
<td>Slow melodic contour (multiphonics only).</td>
</tr>
<tr>
<td>C</td>
<td>Twelve-note set as three-dimensional object.</td>
</tr>
<tr>
<td>(B')</td>
<td>Quick scalar octatonic descent (brief).</td>
</tr>
<tr>
<td>c''</td>
<td>A'</td>
</tr>
<tr>
<td>b'''</td>
<td>Slow melodic contour.</td>
</tr>
<tr>
<td>a'''</td>
<td>Running sixteenth note motion.</td>
</tr>
</tbody>
</table>

Figure 4. The formal structure of Shadowbox for Clarinet

A musical structure is expected to create a coherent listening space and to contain perceivable relationships at a variety of levels from surface to background. When object and shadow are used in a musical context, returning sections contribute to the accumulation of larger structure, while being heard as shadows of their respective previously stated objects. This is enhanced by the return of the initial musical object in an altered form. The process of shadowing has not reproduced a like object but has caused the object to undergo change. This is evident in the return of the
larger sections, A and B, and the returns of the smaller internal sections, a, b, and c. The shadowing connection is weakened considerably by the intervening time, but the return of the object is definitely heard.

**Shadowbox** utilizes four basic types of musical material which range from semi-tonal to atonal. The most prominent type consists of fast, murmuring sixteenth notes which occur throughout the work. These note patterns evolve through repetition and expansion from a single note to a note series and finally to a line with contour and shape. This material initially seems like a directed random walk but coalesces into something with a definite prescribed shape and direction. On the smallest level it begins as a minute series of notes shadowing notes as pitches repeat, move away to neighbors, repeat again, and return or continue to digress. This material offers a flexible and expanding opportunity for a whole series of surface shadows to exist within the solo part which can easily be shadowed themselves, either individually or as patterns by the larger ensemble.

Slow sinuous melodic material forms the center of both the A and B sections, and in many ways provides the primary focus of the work. It has within itself two types of material: the slow melody which serves as a balance and counterpoint to the fast sixteenth note passages, and the multiphonic dyads and triads which, when heard coming from a solo-line instrument, seem to freeze mysterious tones out of time. Each returning slow section shadows the initial slow object with similar material in which intervalic relationships are altered. Within these returning slow sections, melodies are built up out of repeated melodic patterns which expand and change in a way not dissimilar to the expansion of the fast
sixteenth note motion. On a surface level the small slow melodic patterns can be heard as cast shadows of their previous contiguous patterns, replicating themselves and evolving.

The unambiguous octatonic material of the internal section c serves as a balance to the more ambiguous material of both a and b. The scalar patterns in section c are directed and evolving, ascending as the material descends, and descending when it ascends. It is rhythmic and metric where the material of a and b was not, being tripped only occasionally by intervening grace notes. The various symmetrical pitch relationships within the octatonic scale offer much opportunity for a variety of approaches to shadowing, both harmonically and melodically. Although seemingly disjunct from the previous material, the octatonic scale in section c exploits interval relationships which are well established in both a and b.

The material most distant from all that comes before it is also the most abstract. Section C is constructed initially from a twelve-note row derived from the initial sixteenth note material of section Aa. In its wanderings, the sixteenth note material of Aa traverses all twelve tones of the chromatic scale. These tones are collected in order of appearance, Bb A B C Db Eb D Ab G Gb F E, to make up a twelve-note series which provides the first pitch statement for section C, measures 95-101. This resembles a reduced contour of the unfolding line of Aa without repetition, a kind of stripped-down shadow of the previous material. This series is then used to construct a three-dimensional pitch object, comprised of all twelve pitches, which is shadowed in time by a related shadow object.
In addition to the row generated from Aa (fast sixteenth notes), related but distinct twelve-note series are constructed in a similar manner from Ab (slow melody), Bc (octatonic scale), Bb' (slow melody), A'a" (fast sixteenth notes), and A'b" (slow melody). It is interesting to note that the slow melodic section, A'b", was reduced in a later editing to include only the clarinet multiphonics. The melody which was the origin for the twelve-note set for a portion of letter C no longer exists in the piece, while its reduction and use as a twelve-note set does. Figure 5 represents the six twelve-note rows generated from previous material in Shadowbox for Clarinet and used in section C.

Figure 5. Six twelve-note rows used in the composition of section C in Shadowbox for Clarinet
Music is commonly thought of as unfolding in two dimensions; time serves as the horizontal dimension and pitch as the vertical. Music passes by as a two-dimensional scroll. The third dimension, depth, is less easily identified; through listening, however, this dimension is often experienced in complex relationships between sound objects. In the process of creating a three-dimensional sound object for clarinet in Shadowbox, the vertical and horizontal were allocated as previously stated, with the parameters of duration and amplitude assigned to convey depth. One view of the sound object consists of one statement of a twelve-note series, each pitch voiced in a register to isolate the vertical dimension, and sounded in row order to express the horizontal placement of each element. Single pitches are located front-to-back by duration and amplitude: louder/shorter tones closer, softer/longer tones farther away. Time scans the object from left to right much as a viewer might if the scene were gradually unfolded from left to right.

Section C is made up of six views of a sound object, each except the last followed by its own shadow object in time. Each view is a complete twelve-note row distributed in three-dimensional space. Eleven twelve-note rows (six objects and five shadow objects) are stated. Each sound object, along with its shadow, is oriented to the location of the pitch C and is rotated in space by the choice of row inversion. As C moves across the row, the entire object pivots.\(^1\) Pitches, frozen in their given register, always maintain their vertical placement and occur sequentially according

---

\(^1\) The use of a similar form of row manipulation in the Boulez score discussed earlier was not apparent to me until after Shadowbox was completed.
to row order. As the sound object is restated, it evolves in the three-
dimensional sound space in several ways. Each statement takes a different
row as its basis, following the chromatic order of the original material
from the piece. Each row is transposed so as to rotate the pitch C (and
consequently the entire sound object) through the sound space, changing
the left-to-right relationship of single pitches. Each sound object, except
the last, is followed by its own shadow object. Shadow objects are linked
statements of the same row in inverted form, transposed to keep C in the
same location in the row. Durations and amplitudes for the pitches of
each sound object are drawn from a set of five values, and linked to pitch
order in a later row. Each durational value is a multiple of a basic unit
which can change according to the sound object and shadow. Durations
within shadow objects are based on a smaller rhythmic value, and use an
inverted amplitude order: short duration/soft amplitude, long
duration/loud amplitude. Rests occur between notes which are more
than one duration value apart.

Figure 6 shows the occurrences of sound objects in section C of
Shadowbox for Clarinet; it identifies the row origin, the transposition and
subsequent location of the pitch C, the basic duration for each object and
shadow, and their locations in the piece.

---

Twelve values were used originally but I reduced the number when it became
apparent that it was too difficult for a listener to differentiate between them.
Row Origin | Transposition | C Location | Basic Duration | Measures
--- | --- | --- | --- | ---
Aa Shadow | T11 | pitch 5 | eighth | 95-101
Aa | T5 | pitch 5 | sixteenth | 101-105
Ab | T11 | pitch 7 | eighth | 105-112
Ab | T5 | pitch 7 | sixteenth | 112-116
Bc | T1 | pitch 9 | triplet eighth | 117-122
Bc | T3 | pitch 9 | sixteenth (no rests) | 123-126
Bb' | T3 | pitch 11 | eighth (no rests) | 126-133
Bb' | T3 | pitch 11 | sixteenth | 133-138
A'a'' | T7 | pitch 1 | eighth | 138-145
A'a'' | T7 | pitch 1 | sixteenth | 146-149
A'b'' | T9 | pitch 3 | eighth (no rests) | 149-152
A'b'' | | | sixteenth (no rests) | 152-153

Figure 6. Description and order of sound object occurrences in section C

The performance of three-dimensional sound objects and their shadows on a linear instrument creates an interesting juxtaposition of opposites. Hearing unified objects constructed from multiple pitches in time is challenging, and requires perhaps impossible memory resources. However, as experienced by a listener, this section of Shadowbox for Clarinet is less a set of three-dimensional objects and more a spinning out of complex relationships through time, which coalesce into melodic shapes and gestures based on material reminiscent of previous sections of the piece. The three-dimensional sound objects and their shadows truly take form only when shadowed simultaneously by the larger ensemble in Time’s Shadow for Clarinet and Ensemble.
CHAPTER VI

TIME'S SHADOW FOR CLARINET AND ENSEMBLE

Taking Shadowbox for Clarinet as a departure point, Time's Shadow for Clarinet and Ensemble is composed as a system of interlinking and overlapping shadows, all of which lead back to the solo clarinet part as the fundamental source-object. Extensive use is made of imitative writing, and the three-dimensional sound objects heard in section C of Shadowbox are shadowed by the ensemble with objects of its own. Within the ensemble itself, musical material is shadowed between instruments and sometimes within a single instrument.

Choice of instrumentation reflects the use of shadowing techniques in the work. The ensemble is divided equally into three groups of four instruments each. The instrumental groups are winds (flute, alto flute, French horn, bass clarinet), strings (violin, viola, two cellos), and attack-point instruments (piano, celesta, vibraphone, orchestra bells/tubular bells). The strings and winds both have the capability of sustaining tones as shadows. The attack-point group is so titled because of the acoustic sound envelope of each instrument. Each instrument creates a sound with a specific point of attack and a natural decay to silence. The length of the decay is dependent upon the range and the resonance of the instrument. This natural sound envelope has the acoustical
characteristics of an object (the attack) and a shadow (the decay). Strings can join in this attack-point orchestration through the use of pizzicato.

On the largest scale, Time's Shadow closely follows the overall structure of Shadowbox. The solo clarinet part is composed primarily of the piece for solo clarinet with section Bb' distributed amongst the ensemble. A few additions were made as needed to facilitate transitions. The only major change is the addition of an extended opening, which allows the ensemble an opportunity to establish itself, and gives the piece a means for developing a sense of momentum not so necessary in the solo instrument work. Much more than the solo instrument texture of Shadowbox, the larger mass of the twelve-member ensemble necessitates a means for building the energy which will sustain it across the entire work. This accumulation of momentum provides yet another physical link to processes within the act of composition. The entire work is outlined structurally in figure 7.

<table>
<thead>
<tr>
<th>Description</th>
<th>Measures</th>
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</thead>
<tbody>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Part 1</td>
<td>E (C#/C)</td>
</tr>
<tr>
<td>Part 2</td>
<td>1-20</td>
</tr>
<tr>
<td>A</td>
<td>12-note</td>
</tr>
<tr>
<td>a</td>
<td>Bb-F</td>
</tr>
<tr>
<td>b</td>
<td>56-70</td>
</tr>
<tr>
<td>b'</td>
<td>70-86</td>
</tr>
<tr>
<td>a'</td>
<td>Bb</td>
</tr>
<tr>
<td>c</td>
<td>86-93</td>
</tr>
<tr>
<td>B</td>
<td>93-114</td>
</tr>
<tr>
<td>c'</td>
<td>114-137</td>
</tr>
<tr>
<td>b'</td>
<td>137-149</td>
</tr>
<tr>
<td>c'</td>
<td></td>
</tr>
</tbody>
</table>
Figure 7. Formal structure of Time's Shadow for Clarinet and Ensemble

Written after the entire solo part was completed, the Introduction serves, in the process of composition, to shadow much of the material of Time's Shadow. In performance, the Introduction serves as a foreshadowing of much of the music that follows. The focus on the pitch E in Part 1 anticipates the importance of E in section A"a" at the end of the piece. The octaves of the opening provide a frame for the beginning of the piece and recur at different points throughout the composition, like boundaries between or around scenes. This is particularly evident when material from Part 1 of the Introduction returns during the two surrounding bridges, measures 156-160 and measures 219-221. These two returns of octave material stand like walls around the pitch space of three-dimensional objects and shadows, measures 160-219. They mark off the musical space of the composition and set off the three-dimensional space.
of section C. A similar event occurs at the end of the Introduction, Part 2, measures 52-54, where the ensemble gets stuck on octave E trills, which provide a barrier that must be overcome before the solo material from Shadowbox (the running 16th notes of Aa) can begin.

The solo clarinet part in the Introduction, Part 2, is a slow elongated statement of the fast sixteenth note passage of the final section A"a"'. The sixteenth notes of A"a"' are reduced through the elimination of repetition and the simplification of melodic patterns. This material is then broken into basic gestures, which are shaped by rhythm and register, to create the clarinet melody of Part 2. The melody provides a clear foreshadowing of the fast sixteenth note motion which ends the piece.

The ensemble material of the Introduction, Part 2, is drawn from two sources. Throughout Part 2, the piano, sometimes joined by the celesta, articulates chords which mark the progression of the music and provide impetus for the on-going accumulation of energy. These chords are statements of the twelve-note sets from the three-dimensional pitch space of section C. Each chord is articulated once in the piano, followed by piano shadows of the chord--rearticulations of the chord which slowly disperse over time through the reduction of pitch content. The primary piano chords occur in measures 20, 23, 31, 36, 45, and 51. Secondary piano chord articulations occur in measures 27, 33, and 43. These secondary chords are reduced restatements (shadows) of the immediately preceding primary chords.

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1 Compositionally it was written later, and therefore acts as a shadow of the material from the end of the piece; in performance, however, it serves to foreshadow the final section.
The strings and winds shadow the piano chords in their own manner. Joining at the attack-point of each chord, string and wind instruments sustain single chord tones forward in time, like cast shadows, from the articulated chords of the piano. The strings continue these sustained tones as chords which slowly simplify and dissolve across time until the next attack-point. The wind instruments sustain single tones which decay to silence, or merge with melodic material not long after their attack.

The winds participate in yet another layer of shadowing throughout the Introduction, Part 2. After the sustained chord tones are released, selected wind instruments shadow the solo melodic line of the clarinet with melodies of their own, which are generated from the clarinet melody. This occurs in various combinations as detailed in figure 8.

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>flute/bass clarinet</td>
<td>21-23</td>
</tr>
<tr>
<td>flute/alto flute/horn/bass clarinet</td>
<td>24-27</td>
</tr>
<tr>
<td>flute/alto flute/horn/bass clarinet</td>
<td>28-30</td>
</tr>
<tr>
<td>flute</td>
<td>31-33</td>
</tr>
<tr>
<td>flute/alto flute</td>
<td>34-36</td>
</tr>
<tr>
<td>bass clarinet</td>
<td>37-43</td>
</tr>
<tr>
<td>horn/bass clarinet</td>
<td>43-45</td>
</tr>
</tbody>
</table>

Figure 8. Wind instrument lines shadowing the solo clarinet melody in the Introduction, Part 2
The melodic lines of the wind instruments, shadowing the clarinet part, are created through manipulation of the clarinet line, which shares the same set of measures. A group of melodic lines is generated through transposition and/or inversion of the clarinet part, each beginning on a pitch sustained by a wind instrument from the most recent attack chord. New melodic lines are constructed from these manipulated clarinet lines by linking different transposed and/or inverted versions of the clarinet part at points where they share common tones. These new melodic lines are then distributed amongst the instruments chosen to shadow the current clarinet phrase. The melodic lines played by the accompanying winds are shadows of the clarinet melody which, when taken in their entirety, contain most of the set of transposed and inverted forms originally generated. Figure 9 illustrates this technique as used to create the melodic material for the flute, alto flute, French horn, and bass clarinet in measures 24-27.
By far the most obvious form of shadowing in music, tonal or non-tonal, is that of imitation in its wide variety of forms. Studies have shown that both interval information and contour information play important roles in the recognition of melodic material. Context, however, has a great influence on the listener's ability to utilize these two methods of defining and recognizing melodies. In Judy Edworthy's studies of contour and interval information, she found that interval information is encoded by a listener quickly and precisely when key is immediately available. When the key is weak, poorly established, or non-existent (as in atonal music),
interval information is imprecise or absent to the listener. This was reinforced by the research of Jay Dowling, who found that contour plays a more important role than interval information when tonal context is weak. Contour is easier to extract because it does not rely on the establishment of key. These studies demonstrate the importance of melodic shape over the specifics of interval content information in a semi-tonal or atonal context.

Throughout all sections of *Time's Shadow*, imitation as a form of shadowing is used in a variety of ways. Simple canonic shadowing occurs in section Aa, measures 56-70, between the solo clarinet and the string lines. Each clarinet phrase is shadowed by lines in the violin and viola. The cello 1 pizzicato line shadows with a simplified excerpt from the clarinet part. At the same time, the piano articulates a series of attack-points featuring chords created as collections of pitches from the solo clarinet part. In measures 64-65, a rhythmically simplified line shadows the clarinet melody in the bass clarinet and alto flute. This line duplicates pitches from the clarinet, but creates its own shape by doubling clarinet pitches at longer values and eliminating intervening pitches. In measures 66-67, the celesta joins the canonic shadow; however, by dropping pitches from the melodic line, it catches up with the clarinet to provide a sparkling unison shadow at the peak of the clarinet line.

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3 Ibid., 184.
Canonic shadowing of lines is treated differently in the final section A"a"', measures 241-254. Here again the instruments of the ensemble shadow the clarinet line with canonic statements of the same material; however, this time the shadows precede the primary line. The viola, flute/violin, alto flute/vibrphone, piano/cello 1, and piano/cello 2 enter prior to the solo clarinet. To prevent these instruments from exhausting the melodic material while not extending their lines freely or shortening the clarinet line, loop points are identified for each line, where a pitch in common with a previously sounded pitch facilitates looping back to previously stated material. The repeated musical material takes on a fresh new quality because of its new position within the line and its new relationship to the implied strong/weak points of the melody.

A third more abstract type of imitation occurs in section Bc', measures 137-142. Here the solo clarinet shadows the scalar octatonic line of Bc, measures 93-114, with a repetition of pitch material presented in a disjunct gestural manner. The clarinet line is shadowed by the ensemble in a way that reflects the disjunct presentation of the material.

Throughout section Bc and Bc', octatonic scales provide the musical material for the solo clarinet. The octatonic scale is a sequence of alternating whole steps and half steps. Beginning on any given pitch, there are only two possible unique octatonic scales, one which begins with a half step and one which begins with a whole step. In section Bc', ensemble instruments always shadow the octatonic gestures of the clarinet with the opposite scale beginning on the same pitch. Figure 10 shows the two scales used for measure 137.
Clarinet Octatonic Scale

Ensemble Octatonic Scale

Figure 10. The octatonic scale of the clarinet and the octatonic scale of the ensemble parts in measure 137

To create the ensemble parts, the clarinet part is inverted and projected into the new octatonic scale. Scale-degree pitch replacement serves to translate the inverted form of the clarinet line into the new line for the ensemble instruments. The inverted form in the opposite scale is combined with the original form of the clarinet line, also projected into the opposite scale, to create the complete pitch material for the ensemble parts.

Further fragmentation occurs in section Be', measures 137-142, because of the timbral organization of the ensemble parts. Once the pitch material has been generated from the clarinet part, it is distributed to a specified set of instruments. A timbral progression occurs from measures 137 to 142. The three separate timbral groups used to accompany the clarinet are shown in figure 11.
These groups are used sequentially with transitional overlaps. Group 1 occupies measures 137-139; Group 2, measures 139-141; and Group 3, measures 141-142. Each timbral group progresses toward a lower darker timbre, with the exception of the orchestra bells in Group 3. The pitch material generated from the clarinet part is distributed to each instrument as a set of two or three pitches, which are rhythmically positioned throughout the corresponding measure. Pitches maintain sequential order within each instrument, but are positioned without concern for their original sequential order between instruments. This creates overlaid fragmented layers across the ensemble. The ensemble instruments shadow the clarinet with similar gestures, generated from the line of the solo clarinet, and scattered across the timbral group of the moment.

The octatonic material from the center section of Shadowbox for Clarinet takes on a larger role in Time’s Shadow. The ensemble uses a progression of major chords, each a minor third apart, to accompany the solo melodic portions of the clarinet line in section Ab and the ensemble
melody in section Bb\'. This accompanying harmony is derived from the octatonic scale, and demonstrates a less obvious but equally significant relationship to the shadowing process.

Certainly the harmonic accompaniment of section Ab serves to foreshadow the direct octatonic scalar material of Bc, creating a link to the octatonic scale which was implied but less clear in Shadowbox for Clarinet. This harmonic progression also shares between adjacent chords a shadow relationship which is significant but not obvious. Each contiguous chord shares a pitch in common with its neighbor on either side. This single pitch creates a thread of pitch material which binds these chords together linearly. This single point of shared contact resembles the earlier description of a cast shadow, with one slight qualification. A cast shadow always appears to share a point in common with its object, if the object is in contact with the surface on which the shadow occurs. A less direct illusion of connectedness occurs when the shadow is cast on a surface directly behind the object, so that it appears to be connected at a point blocked from view. Adjacent ensemble chords which accompany the slow melodic sections share a single tone, and suggest an object/shadow relationship through this point of contact.

Yet another form of shadowing occurs several times throughout the work. This shadowing involves various situations where single tones from the clarinet part are caught and sustained by another instrument. This has already been demonstrated in the Introduction, Part 2, where solo-line instruments in the ensemble sustain pitches from the attack chords of the piano. A further example of this technique occurs in
measures 112-113, where clarinet pitches are caught and sustained by the ensemble, to shadow the solo line and create a verticalization of the horizontal statement.

A further application of this technique occurs in section A'a", measures 149-152. Here, while the clarinet solo is imitated in various ways throughout the ensemble, the flute and celesta create a sustained line over the running sixteenth notes of the solo instrument by catching and augmenting the duration of selected clarinet pitches. In this way, these instruments shadow the solo line while creating a prominent line of their own. A final shadowing of this melody occurs at the end of each measure where the alto flute, joined by the piano and later by the vibraphone, repeats a greatly compressed version of this melody.

As in Shadowbox, the most complex and abstract application of shadow relationships in Time's Shadow occurs in the presentation of the three-dimensional pitch space in section C, measures 160-219. As described in the earlier discussion of Shadowbox, the solo clarinet unfolds a series of three-dimensional sound objects, each except the last followed by a shadow of itself, and each consisting of a single statement of a twelve-note set. In Time's Shadow, these sound objects are in turn shadowed simultaneously by one or more shadow objects in the ensemble. Limited by the linearity of the solo work, the shadows in Shadowbox had to be cast forward in time and could only appear sequentially. The addition of an ensemble in Time's Shadow allows for the simultaneous presentation of a sound object and its shadow or shadows.
At its greatest density, four levels of ensemble shadowing occur in section C. At the ensemble level most closely related to the currently sounding objects of the clarinet part, ensemble shadows are cast for every object and share the same twelve-note set. These shadows alternate between uninverted and inverted forms, and utilize the same basic durational unit as do their corresponding clarinet objects. However, the relationship of durational object to three-dimensional depth is reversed in the shadow objects. In the clarinet’s sound object, a pitch identified as the first row position for duration corresponds to the shortest duration group, and a pitch identified as the twelfth row position for duration corresponds to the longest duration group. In the ensemble’s shadow object, a pitch identified as the first row position for duration corresponds to the longest duration group, and a pitch identified as the twelfth row position for duration corresponds to the shortest. This relates to an attribute of three-dimensional space. Pitches of the clarinet object which are closer to the rear of the space cast sharper shadows than those further forward in the space. The shadow objects at this first ensemble level are rotated in relation to their currently sounding clarinet objects, utilizing a different transposition of the set, to cast C in a new location in the three-dimensional space. (For an example of Level I shadowing see measures 160-167.)

At the second level of ensemble shadowing, shadow objects occur less frequently. With a total of eleven sound objects in the clarinet solo, eight shadow objects occur at this second level. The shadow objects at Level II use a transposition which casts C in the same position as the
currently sounding shadow object of Level I; however, they use the
twelve-note series from the sound object to follow, alternating it with the
series from the previous sound object. This projects C into the position of
the currently sounding object and Level I shadow, but creates an
alternation between the foreshadowing of the sound object to follow and
the shadowing of a previous sound object in time.

At the third level of ensemble shadowing, only three shadow
objects occur. These shadows use a transposition which projects C one
position forward from its position in the series of the currently sounding
Level II shadow object, while continuing forward temporal shadowing by
using the twelve-note series of the previous Level II shadow object. One
exception to this occurs in the last shadow object of Level III. This shadow
object sounds simultaneously with the final sound object in the clarinet
part. At this point all levels share the same twelve-note series in different
transpositions or inversion.

At the fourth level of ensemble shadowing, all shadow objects are
presented in augmentation. These are the most distant shadows which
have also become the longest and most diffuse. Augmentation is
accomplished by multiplying the basic durational unit by 1.5 or 2,
depending upon the desired extension in time. At this level, shadow
objects exhibit a wider variety of relationships to the other levels, since
they usually extend over two or three clarinet sound objects.

Timbrally, each level maintains a specific orchestration which
changes over the presentation of shadow objects. Timbre groups are used
to identify different levels and shadows. Level I and Level II evolve
through different timbre groups. Level III is timbrally represented by higher frequency ringing sounds (celesta, orchestra bells). Level IV is represented by lower frequency instruments (bass clarinet, French horn, cello). The progression of timbre groups within the four shadow levels is given in figure 12.
### Clarinet Objects

<table>
<thead>
<tr>
<th>Clarinet Objects</th>
<th>Timbre Groups in Ensemble Shadow Levels</th>
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<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Object 1</td>
<td>Violin</td>
</tr>
<tr>
<td>Object 2 (cont.)</td>
<td></td>
</tr>
<tr>
<td>Object 3 (cont.)</td>
<td>Flute</td>
</tr>
<tr>
<td>Object 4 (cont.)</td>
<td></td>
</tr>
<tr>
<td>Object 5</td>
<td>Violin</td>
</tr>
<tr>
<td></td>
<td>Vibraphone</td>
</tr>
<tr>
<td></td>
<td>Cello 1</td>
</tr>
<tr>
<td>Object 6 (cont.)</td>
<td></td>
</tr>
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<td>Object 7 (cont.)</td>
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<td></td>
</tr>
<tr>
<td>Object 8 (cont.)</td>
<td></td>
</tr>
<tr>
<td>Object 9</td>
<td>Violin</td>
</tr>
<tr>
<td></td>
<td>Viola</td>
</tr>
<tr>
<td></td>
<td>Bass Clarinet</td>
</tr>
<tr>
<td></td>
<td>Tubular Bells</td>
</tr>
<tr>
<td>Object 10 (cont.)</td>
<td></td>
</tr>
<tr>
<td>Object 11 (cont.)</td>
<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Figure 12.** Timbre groups in section C of *Time's Shadow for Clarinet and Ensemble*
Figure 13. The relationships between shadow levels in section C, measures 160-219

Figure 13 summarizes the relationships between the sound objects of the clarinet and the shadow objects at various levels in the ensemble. The "C numbers" correspond to the position of the pitch C in the current twelve-note series. An "i" after a C number means that an inverted form of the row is used. The lower case letters refer to each of the eleven forms of the twelve-note series, making it possible to track shadows of particular row forms across the ensemble levels. Any shadow whose durations are augmented is identified by the multiplier for the basic durational unit. The notation "(partial)" means that the shadow object ends before the
corresponding sound object is completed in the clarinet. The notation 
"(delayed)" refers to a shadow object which begins halfway through the 
currently sounding solo clarinet object. The notation "(half)" refers to a 
shadow object which ends halfway through the currently sounding 
clarinet object.

The examples given here do not by any means exhaust the 
profusion of object and shadow relationships in *Time’s Shadow for 
Clarinet and Ensemble*. They do, however, serve to describe the major 
compositional approaches I have employed in creating an aural/temporal 
work with an underlying spatial/physical relationship. Most are quite 
normal extensions in the world of compositional technique. Perhaps that 
alone witnesses to the depth of interrelationship between the seen and the 
heard, and provides reason enough to consider the role of visual schemata 
in the listening experience.
CHAPTER VII
CONCLUSION

The interaction of aural and visual schemata in the experience of music is a rich but little understood phenomenon. Interdisciplinary research in the cognitive psychology of music is just beginning to provide composers with an introduction to an entirely new way to think about listening experiences, and in turn, the processes involved in creating them. Along with an increased understanding of listening experiences come new ways to think about existing compositional techniques and processes.

Mental schemata play a significant role in our understanding of the world around us. In the twentieth century, when so many systems of music composition abound, research into the underlying perceptual processes involved in all the senses offers promise for a better understanding of any single experience. In the absence of the shared musical language of tonality, understanding the interaction of schemata from different sensory inputs can help us to better understand the ways we experience music. Analysis may still focus on écriture, but experience draws on many other associations.

In the exploration of a single facet of visual/spatial perception as both a metaphor and a technical basis for music composition, I have approached the act of composing and the use of traditional tools in a new
way. Few techniques I used in the process of composing Shadowbox for Clarinet or Time's Shadow for Clarinet and Ensemble were compositionally "new;" however, by employing the relationship of object and shadow both in the assemblage of materials and as the focus of the perceived heard outcome, I have attempted to create a work which is cognitively and experientially clear. Is it possible for the listener to hear four levels of ensemble shadowing as the interaction of three-dimensional sound objects in temporal space? Perhaps not; nonetheless, a heard experience for the listener does grow from this most abstract and intricate application of the shadowing process, both through the perception of single tones as they echo from instrument to instrument, and through the perception of collections of tones as they coalesce into recognizable gestures in the definition of a new aural space. The distance between écriture and perception is still wide, but the listening experience is coherent and meaningful. Composers would do well to observe that we understand our world with more than our ears alone, and that, in the shared space of understanding, hearing may not be the only relevant sense for music.
SELECTED BIBLIOGRAPHY


Michon, John A. "Events are Perceivable but Time is Not." In The Study of Time II, ed. J. T. Fraser, 295-301. New York: Springer Verlag, 1975.


Stockhausen, Karlheinz. "... how time passes...." Die Reihe 3 (1957): 10-40.


MUSIC COMPOSITIONS


APPENDIX 1

SHADOWBOX FOR CLARINET
Shadowbox for Clarinet

Robert Coburn
Slowly and Freely

poco rit

to silence

Quickly, smoothly, and somewhat raucous
[Music notation image]
Please play the entire sixteenth note run, from the Very Fast indication to the end, without breaking for a breath (if possible).
Shadowbox for Clarinet

Performance instructions: multiphonics

Other performance notations:

▲ Finger note to sharpen micro-tonally. Maintain fingering to end of dotted line if one is present. Return to normal pitch at next unmarked note or at end of dotted line. If followed by another similar marking, finger note to sharpen even further.

▼ Finger note to flatten micro-tonally. Maintain fingering to end of dotted line if one is present. Return to normal pitch at next unmarked note or at end of dotted line. If followed by another similar marking, finger note to flatten even further.
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at Berkeley.  1974

Bachelor of Music in music theory and composition, Cum Laude,
University of the Pacific Conservatory of Music.  1972

TEACHING POSITIONS

University of the Pacific Conservatory of Music.
Assistant Professor of Music Theory and Composition.
1993 - present

University of Victoria, British Columbia (graduate T.A.).
1990 - 1993

Marylhurst College Department of Music, Portland, Oregon.
Chair and faculty member, responsible for all administrative
duties pertaining to the operation of the college department
including curriculum, budget, recruitment, fund raising, etc.
Also responsible for direction of the Center for Computers
and Music and the administration of the Marylhurst
Preparatory Music Division (see courses taught).
1984 - 1990

Lewis and Clark College School of Music, Portland, Oregon.
Faculty member and Director of the Center for Electronic
Music at Lewis and Clark College.
1978 - 1984
COURSES TAUGHT

University of the Pacific Conservatory of Music:
1993 - present

Music Theory and Aural Perception I
Music Theory II
Music Theory II Drill
Music Theory III
Music Theory III Drill
Music Theory IV: Scoring
Pedagogy of Music Theory (graduate)
20th Century Devices
Advanced Analysis
Composition (undergraduate and graduate)

University of Victoria:
1990 - 1993

Language of Music II (200 level music theory)
Basic Musicianship I (100 level aural skills)
Listening to Music
The Composer in the Late Twentieth Century (300 level)
The Sonic Lab Ensemble (co-director)

Marylhurst College (Portland):
1984 - 1990 (also Chairman of the Department)

Musicianship and Ear Training (100 level)
Intermediate Music Composition
Advanced Music Composition
Introduction to Computer Music
Advanced Computer Music
World Music
New Music - 1950 to the Present
Musician's Survival Skills (the business of music)
Music, Old and New - Early Music and Computer Music (ElderHostel)
Workshops for Computer Music Studio Use

Lewis and Clark College (Portland):
1978 - 1984 (also Director of the Center for Electronic Music)

Tonal Theory (200 level)
Form and Analysis (200 level)
Musicianship and Ear Training (200 level)
Twentieth Century Music Theory
Music Theory Review for Graduate Students
Undergraduate Music Composition
Graduate Music Composition
Electronic Music
Electronic Music for Graduate Music Educators
Contemporary Music Ensemble
Twentieth Century Music
New Music: 1950 to Present
Workshops for Analog Studio Use

Catlin Gabel School - Private, K - 12 (Portland):
1977 - 1978

Music Exploration (Middle and Upper School Music)
School Jazz Ensemble
School Madrigal Singers

Portland Community Music Center:
1975 - 1980

Music Theory (junior and senior high school)
Music History (senior high school)
Conducted the Chamber Orchestra (junior and senior high school)

WORKSHOPS AND ARTIST CLASSES

San Francisco Conservatory of Music:
Lecture/discussion on my compositions and sound installations focusing on my work in music and the environment. February 1995

Royal Academy of Music, Stockholm, Sweden and University of Orebro, Orebro, Sweden:
Workshops in 20th century clarinet music with Canadian clarinetist Patricia Kostek. February 1994

Portland State University - Haystack Rock Summer Program:
Composer in Residence teaching computer music. 1986

Portland Mentoring Program:
Music composition (individual instruction) with talented and gifted senior high school students. 1982
Klamath Arts Council, the Oregon Institute of Technology, and Klamath Falls Public Schools, Klamath Falls, Oregon:
Electronic Music Composer-in-Residence presenting in school workshops to 2500 junior and senior high school students, guest lectures at the Oregon Institute of Technology, and a concert of my own compositions. 1978

UNIVERSITY ACTIVITIES (University of the Pacific)

Conservatory Faculty Council 1995 - present

Design proposal for Conservatory Computer Lab for Music Instruction 1994 - 95


University Faculty Research Committee. 1994 - present

Advisor for composition majors. 1994 - present

Symphony Previews for the Stockton - San Francisco Symphony Charter Bus Series. 1993, 1994

Music Theory Committee member. 1993 - present


PROFESSIONAL EXPERIENCE

Finalist for a permanent public art commission for the Avenue of the Arts, Philadelphia, Pennsylvania. Proposed the Philadelphia Carillon Project. (see Commissions) 1993 - 1994

Founding member, World Forum for Acoustic Ecology. 1994

Leonardo Review Committee member, the journal of the International Society for the Arts, Sciences, and Technology, and Leonardo Electronic Reviews, published online. 1993 - present

Selected by a national committee to be one of eight artists to serve on an arts design team for the Oregon Convention Center. Worked collaboratively with artists, architects, and landscape designers in the conceptualization, design, and proposal of artwork to be integrated into the architectural and landscape design of the building. (see Commissions - *Bell Circles II*) 1987

Co-founder of MESOS, a collaborative performance ensemble featuring performances of musical compositions and visual environments created by myself and Portland visual artist Jon Dickinson. 1982

Curator for *Scores, a new music exhibition* at the Northwest Artists Workshop, Portland, Oregon. 1980

Founder of the Center for Electronic Music, a public access studio serving the needs of composers throughout the greater Portland area. 1979 - 1985

Established and directed the Group for New Music of Portland, a professional chamber ensemble dedicated to the performance of music written since 1950. 1975 - 1981

**SELECTED COMMISSIONS** (see complete list of works)

Commissioned by the City of Philadelphia Office of Arts and Culture to design, construct, and compose for the Philadelphia Carillon Project, a sound installation to be installed along the Avenue of the Arts as part of the Public Arts Program. (1994)

*Bell Circles II* (1987-1990), a large, permanent, external sound environment constructed throughout the landscape of the Oregon Convention Center. Primary sound elements include two, six foot tall oriental bells cast for the project in Japan and South Korea.

*Soundings (to take the depth)* (1986) for french horn, string bass, and live computer music, Oregon Coast Music festival.

*Traces (Star Map I)* (1985) for viola and digital keyboard, Stephen Price.
**Environs** (1985) for three digital sampling keyboards, soprano saxophone, tenor voice, digital processing, and visual images, Portland Composers Festival. Performed in a large, open, outside urban environment.

**Strophes II** (1984) for classical guitar and electronic tape, Scott Kritzer.


**Strophes I** (1983-1984) for violin and electronic tape, Jeffrey Cox.

**Ellipsis** (1981) for flute, oboe, violin, viola, cello, and guitar, Metropolitan Arts Commission.

**CANTOS** (1979) for chamber orchestra, the Sunriver Music Festival.

**Ad Vesperum** (1978-1979) for soprano and ten instruments, the San Francisco New Music Ensemble.

**Glasslight Presence** (1978) a sound/space environment created for the exhibition 9 Artists/8 Rooms, the Henry Gallery, University of Washington, Seattle.

**SELECTED PERFORMANCES**

**Time's Shadow**, Victoria International Festival. 1995

**Shadowbox for Clarinet**, Clarinetfest, Conference of the International Clarinet Association, DePaul University, Chicago, Illinois. 1994

**Shadowbox for clarinet**, Open Space Gallery, Victoria, British Columbia, Canada. 1994

**Shadowbox for clarinet** premiered at concerts sponsored by the Society of Contemporary Music in Stockholm and Orebro, Sweden. 1994

**Luminous Shadows**, Victoria International Music Festival. 1993
**Memory** (Likeness of Image) and **Songs of Solitude**, American Music Week, Lewis and Clark College, Portland, Oregon.
1990

**Turnings**, De Ijsbreker, Amsterdam, Holland.
1989

**Soundings (to take the depth)**, Oregon Coast Music Festival.
1986

**Environments**, Portland Composers Festival.
1985

**Descend to the River**, Staursahng, and Faces/Faces, Fall Festival of New Music, Roulette, New York City. 1983

1983

Full concert of my works, Oregon Biennial Exhibition, Portland Art Museum.
1983

**Staursahng**, Forum '82 International Festival of New Music sponsored by Composers Forum, New York City. 1982

**Fog**, for mixed chorus and guitar, Amsterdam, Holland; Gottingen, West Germany; Edinburgh, Scotland; Trinity College, Cambridge.
1982

**Songs of Solitude**, Tufts University, Boston; Colby College, Maine.
1982

**PUBLICATIONS and PAPERS**

Fall 1993

August 1993

"as time goes by . . . " *Portland Review.* 1982

"Solstice, sun standing still" Prologue (Seattle). 1980


HONORS, AWARDS and ORGANIZATIONS

Travel grant from the University of the Pacific School of International Studies, to participate in concerts and workshops in Sweden. 1993 - 1994

University of Victoria Graduate Fellowship. 1991 - 1993

International Who's Who of Music and Musicians. 1990 - present

Oregon Artists Fellowship, Oregon Arts Commission. Provided for travel to Europe for performances and meetings with other composers. 1978

Pi Kappa Lambda Elected 1972

Member - BMI
World Forum on Acoustic Ecology
International Society for Art, Science, and Technology.
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Title of Dissertation:
Time's Shadow for Clarinet and Ensemble and Object and Shadow as Visual/Spatial Schemata in the Composition of Time's Shadow.

Author
Robert James Coburn
September 11, 1995
Robert Coburn

Time's Shadow for Clarinet and Ensemble
(1995)
Ensemble:

Solo Clarinet

Flute
Alto Flute
French Horn
Bass Clarinet

Piano
Celesta
Orchestra Bells/Tubular Bells
Vibraphone

Violin
Viola
Violoncello I
Violoncello II

The score is notated in C.
Celesta sounds one octave higher, orchestra bells sound two octaves higher.
Time's Shadow for Clarinet and Ensemble

Performance Instructions - Clarinet

Multiphonics

\[ \begin{align*}
\text{R} & \quad \text{A} & \quad \text{G}\# \\
\text{F} & \quad \text{F} & \quad \text{SK}\# & \quad \text{G}\#
\end{align*} \]

Other performance notations:

\[ \begin{align*}
\text{\(\triangle\)} & \quad \text{Finger note to sharpen micro-tonally.} \\
\text{\(\downarrow\)} & \quad \text{Finger note to flatten micro-tonally.} \\
\text{Maintain fingering to end of dotted line if one is present. Return to normal pitch at next unmarked note or at end of dotted line. If followed by another similar marking, finger note to sharpen even further.} \\
\text{Maintain fingering to end of dotted line if one is present. Return to normal pitch at next unmarked note or at end of dotted line. If followed by another similar marking, finger note to flatten even further.}
\end{align*} \]
Time's Shadow for Clarinet and Ensemble

Robert Coburn

Clarinet solo

Flute

Alto Flute

French Horn

Bass Clarinet

Piano

Celesta

Orchestra Bells

Tubular Bells

Vibraphone

Violin

Viola

Cello 1

Cello 2

© Robert Coburn, 1995
Cl.

Fl.

Alto Fl.

Horn

B. Cl.

Pno

Csl.

Orch. Bells

T. Bells

Vib.

Vi.

Vla.

Vic. 1

Vic. 2

poco a poco cresc.
poco a poco erase.

mp poco a poco cresc.

mp poco a poco cresc.
Cl.
Fl.
Alto Fl.
Horn
B. Cl.
Pno
Vic. I
Orch. Bells
T. Bells
Vib.
Vl.
Vla.
Vc. 1
Vc. 2
Quickly, smoothly, and somewhat raucous
Slowly and Freely

Cl.

Fl.

Alto Fl.

Horn

B. Cl.

Pno

Vlb

Orch. Bells

T. Bells

Vib.

VI.

Vla.

Vc. 1

Vc. 2
Somewhat faster

1. CL
2. Fl.
3. Alto Fl.
4. Horn
5. B. Cl.
6. Pno
7. Cel.
8. Orch. Bells
9. T. Bells
10. Vib.
11. Vi.
12. Vla.
13. Vic. 1
14. Vic. 2

- mf
- mp
- tr
- arco
- f
Alto Fl., 144
Horn
B. Cl.
Pno
Col.
144
Orch. Bells
144
Vib.
Arco
144
Vic. 2
m p
•
63

Cl.

Fl.

Alto Fl.

Horn

B. Cl.

Pno

Col.

144

Orch. Bells

144

Vib.

Arco

Vic. 2

mp

- 63 -
poco a poco cresc.
Cl.

Fl.

Alto Fl.

Horn

B. Cl.

Pno

Cel.

Orch. Bells

T. Bells

Vib.

Vl.

Vla.

Vlc. 1

Vlc. 2

motor on
poco rit.

Cl.

Fl.

Alto Fl.

Horn

B. Cl.

Pno

Cel.

Orch. Bells

T. Bells

Vib.

Vl.

Vla.

Vlc. f

Vlc. 2