PHYSICAL GESTURE, SPATIALIZATION, FORM AND TRANSFORMATION IN

WATERSHED I/IV, FOR SOLO PERCUSSION AND REAL-TIME COMPUTER

SPATIALIZATION, BY ROGER REYNOLDS

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*Watershed I/IV, for Solo Percussion and Real-time Computer Spatialization* was composed in 1995 by Pulitzer prize-winning composer Roger Reynolds. This work is a 25-minute choreographed music drama for one multiple-percussionist, in which Reynolds synchronizes the musical transformation of percussion instrument families, the physical gestures of the performer, and the spatialization of processed sounds around the audience.

This dissertation addresses several aspects of *Watershed*, which include: the expressive intent and extra-musical concepts; the formal organization, and several non-musical tools that Reynolds utilized in designing the piece (e.g. logarithmically derived sequences); the primary musical motives; the instrument setup and how the resulting physical gestures contribute to the musical intent; and the real-time computer spatialization. Throughout the document, specific musical passages are demonstrated with notated musical examples and embedded video/audio clips. In addition, transcripts of my interviews with composer Roger Reynolds, percussionist Steven Schick (premiere performer of *Watershed*) and engineer/technician Greg Dixon (engineer for my performances of *Watershed IV*) are also included.
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*All video examples are taken from a performance by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas. If you are using Adobe Reader to view this document, be sure that you have the latest version. In order to play the video examples within the document, you will need to enable the file – you should be prompted to do this when you first click on the video to play. If you are viewing the document with Adobe Professional, you will not have to enable the file. (Higher quality video/audio of these video examples and the complete performance are available upon request.)
CHAPTER I

INTRODUCTION

Background and Significance

Multiple-percussion is a collection of two or more percussion instruments written for as a single unit and played by a single performer.¹ In Teaching Percussion, Gary Cook defines multiple-percussion performance as “the playing of several percussion instruments at one time by a single performer”.² Steven Schick recently wrote one of the first volumes specifically dedicated to the evolution of percussion in the 20th century, The Percussionist’s Art: Same Bed, Different Dreams (2002). In this book, he offers several insightful interpretations of the term multiple-percussion:

A multiple-percussion instrument consists of several individual instruments arranged so that one percussionist might play them as a single poly-instrumental unit…multiple-percussion music is collective – the unified result of the accumulated sounds of single instruments…often this includes instruments of similar sound, material and/or mode of performance being treated as a unit, allowing for the development of a strong sense of internal coherence among an otherwise disparate set of objects.³

Preparing works for solo multiple-percussion requires performers to learn new notational systems and new instrument setups for each piece. The variability

¹ Although works for solo multiple-percussion have existed since the 1950s, standard library reference tools have not yet defined the term multiple-percussion. Neither Grove Online, nor the Oxford Dictionary of Music Online defines the term.
³ Steven Schick, A Percussionist’s Art: Same Bed, Different Dreams (Rochester, NY: University of Rochester Press, 2006), 16-17. Steven Schick, one of today’s premier performers of virtuoso multiple-percussion works, premiered Watershed I/IV. He currently teaches percussion at University of California in San Diego.
of instrumentation, setup and notation is precisely why many percussionists, composers and audiences are drawn to the genre of solo multiple-percussion. As a result, multiple-percussion solos have become standard educational repertoire for university and conservatory percussion programs, as well as solo repertoire for professional musicians over the past three decades.

One of the first significant examples of multiple-percussion can be attributed to Igor Stravinsky’s *Histoire du Soldat* (1918), which was written for one percussionist playing several instruments in a chamber ensemble setting. Little more than a decade later, Darius Milhaud composed *Concerto for Solo Percussion and Orchestra* (1929-30), which calls for numerous percussion instruments to be played by one percussionist: four timpani, pedal bass drum, concert toms, snare drum, tam tam, suspended and crash cymbals, slap stick, triangle, woodblock, ratchet, tambourine and castanets. These pieces were pivotal to the birth of solo multiple-percussion, as well as the development of the percussion ensemble. Beginning in the 1930s, a large number of works written for percussion ensemble employed one or more multiple-percussion parts. One example is Edgard Varese’s *Ionisation* (1929-31), which requires 13 percussionists to play more than 30 instruments. More than twenty years passed before John Cage composed the first work for solo multiple-percussion, *27’ 10.554”* (1956). Since 1956, works for solo

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multiple-percussion have steadily evolved with regard to notation, instrumentation and recently, integration with multi-media.\textsuperscript{5}

Throughout its brief history, many composers writing for solo multiple-percussion have successfully overcome the challenges of writing for unspecified pitched instruments. Composers have gravitated to the genre of solo multiple-percussion for experimentation in most of the 20\textsuperscript{th} century musical trends such as minimalism, indeterminacy, electronic accompaniment, computer processing, and the use of mathematical processes in composition. Although styles of composition for multiple-percussion have varied immensely over the last fifty years, two key elements have remained prevalent. First, the use of instrument families to create aesthetic or musical coherence (families within percussion are defined either by how an instrument is constructed, or how it is played); and second, the inherent need for choreographing physical gestures around the various instrument setups.

\textsuperscript{5} John Cage’s 27’ 10.554” (1956) is an indeterminate work (for unspecified instrumentation and performer’s interpretation of non-standard notation) written for four groups of instruments: woods, metals, skins and others. Karlheinz Stockhausen’s Zyklus (1959), written in graphic notation, was the first multiple-percussion work written for a specific set of percussion instruments. For Zyklus, Stockhausen requires families of instruments that create a scale from tone to noise. William Kraft, in 1962, composed the French Suite, a multiple-percussion solo written with style and instrumentation similar to Stravinsky’s Histoire du Soldat (1918). The King of Denmark (1964), by Morton Feldman, written in a graphic notation, was written as a reaction against the preceding multiple-percussion solos, which were large setups played with a large sound. The King of Denmark is also a large setup of percussion instruments; however, Feldman requires the player to play with the fingers throughout the piece, creating a very subdued, delicate sound that is not often associated with percussion. In 1966, Charles Wuorinen composed Janissary Music, a 12-tone composition for pitched and non-pitched percussion, with serialized pitch and rhythm. During the next ten to twenty years there was a flux of pieces written in either graphic or modified staff notation, that had open-ended directions for instrument choice. Major works in this time period include: Psappha (1975) and Rebonds a and b (1989), by Iannis Xenakis; Anvil Chorus (1991), by David Lang; and, Bone Alphabet, (1991), by Brian Ferneyhough. As early as the 1950s composers were writing for percussion and electronics, with tape and CD accompaniment. By the late 1990s composers such as Roger Reynolds and Cort Lippe began integrating percussion and real-time computer processing with works like Watershed IV (Reynolds, 1995) and Music for Hi-Hat and Computer (Lippe, 1998).
John Cage required four instrument families in the very first piece for solo multiple-percussion, 27’ 10.554” (1956): skins, metals, woods and others. Since then, similar groupings of instrument families have appeared in numerous multiple-percussion solos, including Roger Reynolds’ *Watershed*. Many authors discuss the use of instrument families in analysis of solo multiple-percussion works. However, physical choreography is not often discussed, even though it has played a significant role in the performance of works for solo multiple-percussion from the time of their inception.

At the time of its composition, Milhaud’s *Concerto for Solo Percussion and Orchestra* was considered to require extreme percussive virtuosity. This piece includes a variety of percussive sound effects, distinct melodic contours created on the toms and timpani, and the resulting visual choreography of one percussionist playing multiple instruments. Its virtuosic elements lie in the physical maneuvering between several percussion instruments (e.g. choreographing hand and foot movement efficiently from tambourine to timpani to slap stick to bass drum). Although choreographed movement is inherent in any performance of the concerto, Milhaud did not explicitly address it in any capacity; it was merely the inevitable result. Even so, contemporary performers of Milhaud’s *Concerto for Solo Percussion and Orchestra* and other works for solo

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6 Other examples: Iannis Xenakis’ *Rebonds* and *Psappha*, and Karlheinz Stockhausen’s *Zyklus*.

7 See bibliography entries: Beyer, Greg; Bill Sallak; Daryl Pratt; John Welsh; and William Ranta.

8 All acoustic musical sounds are created with some kind of choreography. However, physical gesture is especially important when learning compositions for multiple-percussion because each piece is written for a different instrument configuration.

9 The piece was considered virtuosic because one performer playing multiple-percussion instruments was, to that date, an unexplored and undeveloped skill. Today, the piece is not considered as technically challenging when compared to newer multiple-percussion works. Most college-aged students studying percussion are exposed to the challenges of multiple-percussion at an early stage in their musical development.
multiple-percussion often highlight the visual elements of their performance regardless of the composer’s intent. Similar to Milhaud, not all composers address the issue of choreography. Some composers provide a diagram of their suggested instrument setup (which affects the choreography). But, these configurations usually allow for maximum efficiency of movement between the instruments and are not meant to enhance the musical interest or intent.

For *Watershed*, Reynolds requires four distinct percussion instrument families very similar to those used in Cage’s 27’ 10.554” : skins, metals, woods and oddities. Reynolds collaborated with percussionist Steven Schick to purposefully design a configuration of these four instrument families in *Watershed* that would *not* adhere to the most physically efficient movement. The intent of the not-so-optimized setup was to enhance sonic characteristics of the instrument families and their motives through the physical motions required to strike them. While the actual choreography of *Watershed* is not unprecedented, Reynolds is among one of the first composers to explicitly address the choreographed motion of a multiple-percussion solo in the creation of his composition.

*Watershed* currently exists in three versions: 1) *Watershed I* for solo percussion, 2) *Watershed III* for solo percussion, chamber orchestra and real-time computer spatialization and 3) *Watershed IV* for solo percussion and real-time computer spatialization.\(^{10}\) In *Watershed I*, the concept of gesture is limited to the physical choreography of the performer. However, in both *Watershed III* and *Watershed IV*,

\(^{10}\) The numbering of the different versions is reminiscent of Luciano Berio’s *Sequenza* and *Chemins* numberings. Currently, there is no *Watershed II*. If composed in the future, it will be for solo percussion, full orchestra and real-time computer spatialization. Roger Reynolds, Personal interview, 5/30/2009. Telephone.
Reynolds utilizes real-time computer spatialization that explores four paradigms: projection, rotation, permutation and trajectories of sound around the audience.\textsuperscript{11} The computer spatialization maps the processed sounds of acoustic instruments to six loudspeakers surrounding the audience. This includes instrument to speaker mappings that mimic the performer’s physical relationship to the acoustic instruments for the audience. The four paradigms of spatialization are utilized to create sonic motion in the performance space that enhances both the physical choreography of the performer and the sonic characteristics of the instrument families, as well as the overall musical intent.

Purpose

The purpose of this dissertation is to provide a discussion and an in-depth analysis of Watershed I/IV. My analysis will serve as a reference for musical interpretation for both the percussionist and engineer/technician. Transcripts of my interviews with composer Roger Reynolds, percussionist Steven Schick and engineer/technician Greg Dixon (the engineer with whom I collaborated in numerous performances of Watershed IV) are included as appendices.

\textsuperscript{11} In the field of computer music, \textit{real-time} is defined as a compositional technique in which data is processed at the same rate as it is taken in or used. Charles Dodge, \textit{Computer Music: Synthesis, Composition, and Performance} (New York, NY: Schirmer, 1997), 436. For Watershed IV, a computer is used as the sound processor. An audio signal is received from the individual instrument microphones, modified in a computer program and output instantaneously, or in real-time, to six loudspeakers surrounding the audience. \textit{Computer spatialization} refers to the way (direction, speed, etc.) in which the sound is projected after it is processed.
Method

My analytical approach is influenced by Roger Reynolds’ Rothschild Essays published in his book, *Form and Method: Composing Music*. In this collection of essays, Reynolds begins by describing components of his compositional process as follows: 1) identifying the expressive intent, 2) formulating the overall shape, 3) determining the appropriate musical materials, and 4) defining the procedures that will best serve to elaborate the chosen materials over the large-scale form. The chapters in this dissertation are organized to reflect these stages of Reynolds’ compositional process: Chapter II addresses the expressive intent and extra-musical concepts of *Watershed*; Chapter III addresses several elements of the formal organization of *Watershed*, as well as specific tools Reynolds used to create these aspects; Chapter IV identifies the primary musical materials, or motives; Chapter V addresses the instrument setup and how the resulting physical gestures contribute to the musical intent; and, Chapter VI includes discussion of the real-time computer spatialization. The spatialization is purposefully set as the last chapter because the piece can also be performed without this aspect. All other elements are applicable to both *Watershed I* and *IV*.

Throughout the document, specific musical examples are shown with notated musical examples and embedded video/audio clips. This is especially important in Chapter V, which deals specifically with the physical gestures created in performance of *Watershed*. All video examples are taken from my DMA recital performance of *Watershed IV*.

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Current State of Research

Watershed IV is written for solo percussion and real-time computer spatialization, therefore, there are two areas of research in which the piece can be contextualized: 1) analysis of electronic music (e.g. electroacoustic, interactive, or computer music); 2) analysis of percussion music (particularly with emphasis on physical gesture, solo multiple-percussion pieces and percussion with electronics). In addition, there are numerous publications by and about Reynolds that are significant resources for any discussion of his works.

Current relevant analytical research of electroacoustic works includes two collections of essays by composers and theorists, edited by Thomas Licata and Mary Simoni.¹³ Most analyses of electroacoustic pieces (including those found in Licata and Simoni’s collections) focus on compositional processes or tools and are written from the composers’ or theorists’ perspective. Only a few articles that provide analysis of electroacoustic music from the performer’s perspective exist at this time.¹⁴

Most analyses of solo multiple-percussion pieces address instrument choices, performance problems and structural analysis. This type of analyses exist for pieces such as Iannis Xenakis’ Rebonds and Psappha, Karlheinz Stockhausen’s Zyklus and John Cage’s 27’ 10.554”, among many others.¹⁵ Physical choreography in relation to solo percussion performance is rarely discussed in research literature.¹⁶ In his dissertation entitled Interpreting the Relationship Between Movement and Music in Selected

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¹³ See bibliography entries: Licata, Thomas and Mary Simoni.
¹⁴ See bibliography entries: Kimura, Mari and Elizabeth McNutt.
¹⁵ See bibliography entries: Beyer, Greg; Daryl Pratt; William Ranta; Bill Sallak; and John Welsh.
¹⁶ See bibliography entry: McClaren, Cort.
Twentieth Century Percussion Music, Francis Kumor discusses significant physical gestures found within one multiple-percussion solo, one marimba solo, two percussion trios and one percussion ensemble piece. Kumor’s methodology identifies the various notational styles used to communicate physical gesture in each piece. He also discusses how the specific physical gestures contribute to the form and development of each piece.

Aside from Steven Schick’s The Percussionist’s Art: Same Bed, Different Dreams, which includes a brief discussion of Watershed, there appears to be no other publication that addresses solo multiple-percussion works with real-time computer processing. Richard Dean Cheadle’s 1983 dissertation, A bibliography of multimedia solo percussion works with an analysis of performance problems, is an annotated bibliography of solo percussion works with dance, graphics, narrator, tape, and theatrical elements. Cheadle did not include any solo multiple-percussion works with computer processing.

Steven Schick’s book is the most comprehensive publication on solo multiple-percussion. It is the only discussion of the musical content of Watershed other than this study. Percussionist Steven Schick, a collaborator in the creation of Watershed and

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the premier performer, offers significant insight into the meaning and intent of the piece in *A Percussionist’s Art: Same Bed, Different Dreams*. Schick dedicates about nine pages (of an almost 250 page book) to the creation of the piece, his specific instrument choices and his interpretation of Reynolds’ compositional intent. He also mentions the importance of the physical gestures created by the performer’s movement around the instrument setup, the computer spatialization and the musical goal of transformation of the instrument families throughout *Watershed*. Due to the nature and scope of his book, Schick is limited to a generalized overview of the piece. However, he embodies the musical transformation in a beautifully personified description of how the instrument families grow, interact and affect each other from the beginning to the end of this lengthy solo percussion piece. With his description of *Watershed*, Schick gives the reader insight into the emotional tensions created between the instrument families.

Although Schick provides significant material for performers to consider, he does not give clear examples of how Reynolds creates musical distinctions and communication between these instrument families. Nor does he discuss Reynolds’ use of spatialization and how significantly the techniques of spatialization contribute to the musical intent. This may be due to that fact that Schick first (and most often) performed the piece in its solo version without the spatialization.21

Roger Reynolds has published three books: *A Searcher’s Path: A Composer’s Ways* (1987); *Form and Method: Composing Music* (2002); and *Mind Models: New*

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21 Steven Schick, Personal interview, 06/03/2009. Telephone.
Reynolds does not discuss *Watershed* in either of the books published after its composition. In addition to these books, Reynolds has published numerous articles that contain technical information regarding his use of sound processing and computer spatialization.

Publications about Reynolds’ life and his works are plentiful. In 1982, C.F. Peters published *Roger Reynolds: Profile of a Composer*, the first in a series of portraits of American composers. This pamphlet includes a biography of the composer, as well as several essays on specific works by Reynolds and an interview with Reynolds conducted by Harvey Sollberger. Other relevant publications include two lengthy interviews: 1) “An Interview with Roger Reynolds,” conducted by Stephen Soderberg that delves into many areas of Reynolds’ life as a composer and educator, with much of the discussion centered around his work, *Transfigured Wind*; and 2) “Image, Engagement, Technical Resource: An Interview with Roger Reynolds,” conducted by David Bithell that discusses various aspects of Reynolds’ work with multi-media. In his interview with Bithell, Reynolds briefly mentions the creation of *Watershed*, the *Watershed* DVD and his technical score concept.

Until now, the only publication devoted to *Watershed* was Richard Zvonar’s “Surround’s Watershed Event”, published in 1999 in the *Surround Professional*

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22 See all bibliography entries: Reynolds, Roger.
25 The technical score is an expansion of the performer’s score that includes descriptions of the desired outcome of the technical processes involved in executing the piece. The score is intended for the performing technician. The technical score was completed several years after the completion of the performer’s score.
In this three-page article, Zvonar discusses the production and release of the Watershed DVD, the first 5.1 surround sound DVD of a multiple-percussion piece. This DVD includes a performance of Watershed IV and two other works by Reynolds, along with interviews of Reynolds, Schick and engineer Peter Otto that focus on the creation of Watershed.

Biography of Roger Reynolds

Roger Reynolds, born in 1934 in Detroit, Michigan holds degrees in both engineering physics and composition from the University of Michigan. In 1961, he cofounded the ONCE group (an association of avant-garde composers and artists) in Ann Arbor, Michigan. During the 1960s, Reynolds lived in several locations in Europe as the recipient of various research grants: in 1962, as a Fulbright scholar, Reynolds lived in Cologne while studying electronic music; in 1964-65, he lived in Italy under a Guggenheim; and, in 1966, he received a fellowship from the Institute of Current World Affairs in Japan. In 1969, Reynolds returned to the United States to join the music faculty at the University of California, San Diego where he still teaches today. Two years after joining the UCSD faculty, he founded the Center for Music Experiment and Related Research at USCD. Reynolds has held residencies at Stanford’s Center for Computer Research in Music and Acoustics (CCRMA), Institut de Recherché et

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Roger Reynolds’ academic and research credentials position him as one of the most influential composers of the second half of the 20th century, specifically in the development of combining music and technology and the promotion of new compositions. Reynolds has composed in most electronic media explored, including live analog electronics, fixed analog and digital media, and live processing of acoustic sound. His compositional output also spans the gamut of solo instruments, as well as varied chamber groups and large ensembles. In 1989, Reynolds was awarded the Pulitzer Prize for his composition *Whispers Out of Time* for string orchestra. Reynolds continues to expand the repertoire and research of electronic music.

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CHAPTER II

WATERSHED CONCEPTS

Technical Goals

In *Form and Method*, Roger Reynolds defines one of the first stages in his compositional process as identifying the expressive intent.\(^3\) Some of the initial extra-musical and expressive goals for *Watershed* emerged in 1991, during conversations with percussionist Steven Schick. The intentional use of the percussionist’s physical gestures to enhance, or mimic, the musical affect was one of the first ideas they explored. It led to the selection of four instrument families: skins, metals, oddities and woods. Reynolds and Schick meticulously arranged the four instrument families in a manner that would require distinct gestures from the performer’s execution of the musical materials. The final configuration requires the performer to create spiraling gestures when playing three of the four instrument families (skins, metals and woods). The oddities are purposefully confined to a small table, forcing the performer to make quirky, awkward motions in performance.

In addition to defining the physical gestures of the performer, Reynolds and Schick also discussed the development of a then new technology that could “recreate the internal space of a percussion setup” by processing the acoustic percussion sounds and

sending them through multiple loudspeakers surrounding the audience. Reynolds collaborated with Peter Otto, Miller Puckette and Tim Labor at the University of California, San Diego in developing TRAnSiT, a program that enabled the real-time spatialization of the percussion sound sources. According to Schick, the utilization of both the computer spatialization and the physical gestures was intended to “unite the eye and the ear by creating a strongly visual piece where the gestures of performance both support the acoustical music and serve to cue the movements of sound in space…”

The Title: _Watershed_

After the instrument configurations and the basic concepts of spatialization were determined, Reynolds began exploring ideas for the musical materials of _Watershed_. The title of the piece came about early on in this process and served as an impetus for much of the musical content. During my interview with him, Reynolds spoke at length about the significance of choosing the title _Watershed_:

Generally, though not always reliably, I come up with a title during the preparatory phases of the work on a piece. …

Once I settle on the title, it is likely either to be or to be close to being the idea of the impetus that I am working with. In this case, I think I was reading dictionaries, which I like to do when preparing a title, and working on understanding what it might mean, and there are, of course, often alternative choices. …

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33 Steven Schick, _A Percussionist’s Art: Same Bed, Different Dreams_ (Rochester, NY: University of Rochester Press, 2006), 220.
34 Ibid., 221. These three people collaborated with Reynolds primarily on the technical aspects of _Watershed_. Peter Otto is a leading figure in the first generation of cross-over digital media technologists (http://music.ucsd.edu/bio.php?fn=Peter+Otto). Miller Puckette is one of the original creators of both Max/MSP and Pure Data (two of the most frequent programs used in real-time computer music). Tim Labor is a professional sound designer specializing in music composition and sound design for theater and film (http://mediaandculturalstudies.ucr.edu/people/faculty/index.html).
35 Ibid.
It is often the case that the settling upon a title and the probing of what a title implies is an important aspect of trying to focus my creative energies in a particular way that is suited to that project. …

For me, [the title] *Watershed* came about because it was the first time that I decided to make a project that would involve real-time computer processing. In a sense, it was a watershed moment for me. (I had used analog electronics in real-time fairly extensively, decades before that, but hadn’t actually gotten into using computers for real-time performance.) …

It seemed clear to me that if I were going to do something that I was going to invest a lot of thought, time and energy into, a lot of human capital – of time and relationships, as well as creative capital – it needed to be something that really brought me into a new kind of relationship to ideas and materials. So there were a lot of ways in which the notion of watershed, which is to say moving over some kind of decisive boundary, became interesting and appropriate. I think that it operates within the project on a number of levels. …

As Reynolds intimates, the term watershed is polysemous, meaning 1) a region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water, or a ridge of land that separates two adjacent river systems, and 2) a crucial dividing point, line or factor. The title initially came about as a philosophical application of the second definition listed above. The crucial dividing point in *Watershed* occurs about thirteen minutes into the piece, a place called the Watershed Divide.

Metaphorically, this musical moment is a critical turning point in the motivic material of the skins, the primary instrument family in *Watershed*. In his “Note to the Performer”, Steven Schick describes the overall musical goal of the piece as a personified transformation of the skins:

A primary goal of interpretation is to construe a physical, gestural and emotional amalgam for each instrumental group, which is sufficiently potent to establish parity for itself and ultimately to act as a force of transformation upon the other

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36 Roger Reynolds, Personal interview, 05/30/2009. Telephone.
groups. In this regard, the skins are central. Their relative arid personality at the outset is softened over the course of the piece by the critical carping of the wooden boxes and the volatile metals. The drums begin as analytical and rational elements and finish as supple and lyrical music. Transformation is the ultimate goal here.\(^{38}\)

According to Schick, Reynolds created an evolving character for the skin family that transforms like a character in a movie. The dynamic skins converse with the other more static characters in the story (metals, oddities and woods). At the end of the piece, the skin family is transformed by the persistence of the other three imposing personalities.

In our interview, Reynolds described how he used the geographic definition of watershed in the piece:

…when you look at the term watershed you see geographic or geological aspects to it. So, I thought that there was nothing wrong with seeing whether, in some way, it could be a part of this adventure. I think the idea of an ostinatic patterns probably preceded their designation as Rain. Once one had the idea of rain and climax or apogees, geographically or elevation-wise, it would be obvious that having a storm here and there would make sense. …\(^{39}\)

Reynolds imposed the geographic definition of watershed in a conspicuous manner by structuring the piece around a Watershed Divide and labeling several passages as Rain and Storm. Within these sections, he created musical atmospheres reminiscent of the particular climates.

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\(^{39}\) Roger Reynolds, Personal interview, 05/30/2009. Telephone.
The Spiral Concept

As discussed at the beginning of this chapter, *Watershed* was written with intentional physical gestures and spatialized sound. Spiraling gestures result from both the instrument configuration and the placement of the speakers surrounding the audience. Three of the instrument families are set in spiral configurations around the performer and the speakers circle the audience. Considering the performer’s spiraling gestures and the computer spatialization, *Watershed* is saturated with the both visible and aural spirals. However, the spiral concept is not limited to the physical gesture and spatialization applied in *Watershed*. Reynolds also based the musical foundation of *Watershed* upon progressive events that spiral upward throughout the entire piece. After the Watershed Divide, Reynolds begins a second series of events that spiral downward to the end of the piece.

Most interestingly, though, is that Reynolds chooses to embed the metaphoric transforming life of the skins within the more overt visual, sonic and musical spirals. Many philosophers have postulated the relationship between the progress of life and the spiral. The German poet, philosopher and scientist, Johann Wolfgang von Goethe stated that, “progress has not followed a straight ascending line, but a spiral with rhythms of progress and retrogression, of evolution and dissolution”. It is certainly not surprising then that *Watershed*, a work that intentionally embodies some form or transformation of human existence, is saturated with visible, audible and metaphoric spirals.
CHAPTER III

WATERSHED: FORM AND METHODS

Form and organization have been central to Reynolds’ compositional approach for several decades. In his revealing book, Form and Method: Composing Music, he discusses several key aspects of his organizational decisions, which are fundamental to the formal design of most of his music.\(^{40}\) Many of his considerations extend beyond typical compositional devices into the study of perception, memory, psychology and cognition. Reynolds makes reference to perceptual threshold, the perceptual present (7-10 seconds), the placement of surprise, plausibility of succession, frequency and degree of contrast, the balance of transformation and invariance, the degree of tolerable transformation and landmarks, and their memorability.\(^{41}\) Instead of relying merely on his intuition to apply these concepts, Reynolds often utilizes non-musical tools to determine the placement of events and sections within a composition. In this chapter, I discuss the two primary non-musical tools Reynolds used in composing Watershed: 1) an architectural diagram created in the early stages of composition, and 2) logarithmically derived sequences. After identifying the tools, I will describe several musical elements Reynolds determined using these tools, including: the boxed events, tempos, durations and initiation points of major sections and subsections.

\(^{40}\) Roger Reynolds, Form and Method: Composing Music. (New York, NY: Routledge, 2002). Although he does not mention Watershed in Form and Method, many of the techniques described in the book were used in composing Watershed.

\(^{41}\) Ibid., 15.
Identifying the Tools: The Architectural Diagram

As with many of his works, Reynolds first realized the formal design of *Watershed* in a detailed architectural diagram that includes individual sections and musical events within a unit-based timeline (see figure 3.1). During our interview, Reynolds discussed how he typically uses these architectural diagrams:

There are with all my pieces architectural plans that give the proportions and spacing of events. Those are what I would call orderly provocations. They don’t explicitly and finally determine the way time will actually occur in a performance. So the proportions that I lay out are for me opportunities or prospects; they are not proscriptions.

Figure 3.1 is Reynolds’ architectural diagram for *Watershed*. One of the logarithmically derived sequences Reynolds utilized in composing *Watershed* can be found in the upper right corner of the diagram. Specific musical materials are placed in the diagram in the following order, from top to bottom: boxed events (written as actual notes), oddities, metals, skins and woods (graphically represented in a horizontal timeline). Additionally, there are several rulers at the bottom of the diagram that Reynolds used to determine the placement of most of the significant musical events.

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42 I received Reynolds’ architectural diagram several months after the diagram in Figure 3.2 was completed.

43 Roger Reynolds, Personal interview, 05/30/2009. Telephone.
Figure 3.1 Roger Reynolds' architectural diagram for Watershed.
Reynolds also included two sets of numbers at the top of the diagram: one set spans from 1-16; the other includes subdivisions of 50 that span from 0 to 960. The use of both numberings suggests that the piece was originally conceived as 16 minutes in length (960 units/16 = 60 seconds). However, because of the indicated tempo markings, performance times can range from 20-30 minutes in length. As Reynolds stated, the architectural plans do not necessarily determine the way time actually occurs in performance. Because of this discrepancy, the placement and proportions of each section or event in Reynolds’ unit-based diagram are not equal to the proportions of an actual performance. Figure 3.2 illustrates the proportions of *Watershed* relative to a timed performance. The times shown on the graph are an average of the timed proportions taken from five different performances (four personal performances and one performance by Steven Schick, recorded on the *Watershed* DVD). Compare Figure 3.1 (a unit-based diagram) to Figure 3.2 (a time-based diagram) to see the difference in the proportional relationships.

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44 During our phone interview, Reynolds confirmed that, regardless of the variability due to tempo changes, he does usually view the diagrammatic units as seconds, at least in the earlier stages of the compositional process. Roger Reynolds, Personal interview, 05/30/2009. Telephone.
Applying the Tools: The Formal Design

Reynolds identifies three major sections of *Watershed*: before, during and after the Watershed Divide. The middle section (the Watershed Divide) is significantly shorter than the other two and serves as a metaphoric *dividing line* in the music. The Watershed Divide does not include characteristic motives of the primary instrument family (the skins). The transforming motives of the skins can only be found in the lengthy sections before and after the Watershed Divide, which I identify as the A-section and the B-section. In addition to the three sections identified above, there is a brief introduction and a short coda.

The top line of the time-based diagram in Figure 3.2 marks the AB structure, including the introduction, the Watershed Divide and the coda. The second line of demarcations in Figure 3.2 shows the placement of the three major sections that Reynolds identifies. The AB structure corresponds to Reynolds’ architectural diagram at the following unit indications: the introduction ends right before unit 50; the A-section ends at unit 558; the Watershed Divide section spans units 559-653; the B-section ends at unit 912; the remainder of the piece is the coda, spanning from 913-960 (refer back to figure 3.1).


46 There is an interesting inconsistency between Reynolds’ original diagram and the performer’s score. In the diagram, Reynolds labels a “Watershed Area” spanning measures 157-299 whereas in the performer’s score, he only marks the Watershed Divide at measure 276. Without knowledge of Reynolds’ architectural diagrams, one might perceive a “Watershed Divide Area” consisting of measures 276-299. The musical materials in measures 276-299 are distinctly different from the surrounding materials, containing no transforming motives of the skin family. Adding measures 157-275 to the Watershed Area would include the transforming motives of the skins. This seems inconsistent with the conceptual intentions of the Watershed Divide (as dividing materials) and may be the reason that Reynolds did not mark the Watershed Area in the score.
Applying the Tools: The Golden Ratio

Throughout history, Western philosophers and scientists have searched for occurrences of the Golden Ratio in nature, as well as the arts. The Golden Ratio is an irrational number commonly written as $\Phi$ (Phi). If the ratio between two numbers is the same as the ratio between one of those numbers and the sum of the two, then the ratio between the larger number and the smaller number is $\Phi$. Algebraically, this relationship can be expressed as: $\Phi = (\Phi + 1) / \Phi$, which produces the result $\Phi = (1 + \sqrt{5}) / 2$, approximately 1.618039887. This can be represented geometrically in a variety of ways, including that shown in Figure 3.3.

![Figure 3.3 The Golden Ratio.](image)

By the 20th century, most trained composers were well aware of theories explaining the numerous occurrences of the Golden Ratio found in compositions of Wolfgang Amadeus Mozart, and the supposedly purposeful inclusion of the Fibonacci series in Bela Bartok’s *Music for Strings, Percussion and Celeste*. Reynolds appears to

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47 Mike May, “Did Mozart Use the Golden Section?” *American Scientist* 84 no. 118 (1996). The Fibonacci series, Phi and the Golden Section are all related concepts. In the Fibonacci series, beginning with 1, each subsequent number is the sum of the two numbers preceding it: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, etc; Phi is an irrational number, equal to the limit of the ratio of two successive Fibonacci numbers as these get larger and larger: 13 divided by 8 = 1.625, 21 divided by 13 = 1.6154, 89 divided by 55 = 1.618182, the 100th number in the sequence divided by the 99th = 1.61803398874989484820458683436563810086656318951287239968.
have purposefully applied the Golden Ratio, to a high degree of precision, is designing the proportions of *Watershed*. The total number of units in Reynolds’ architectural diagram (960) divided by the Golden Ratio $\Phi$ is approximately 593.3. Unit 593 is the exact point at which Reynolds starts the downward spiraling boxed events at the beginning of the B-section, after the Watershed Divide.

Identifying the Tools: Logarithmic Sequences

Other non-musical elements utilized in *Watershed* are logarithmically derived sequences. In *Form and Method: Composing Music*, Reynolds writes, “many of the formal schemes that I have used [in devising the macro and micro-level form of pieces] have arisen out of some external model or influence”. 48 Reynolds composed a work with multiple levels of proportional coherence by using derived sequences to determine tempos, durations and initiation points of major sections and subsections, the placement of the *boxed events* and the Golden Ratio. Reynolds describes how he typically creates and utilizes logarithmic sequences (a process he has been using for over twenty years):

A series of numbers is established by laying a straight line across a sheet of semi-log graph paper. Such sheets are logarithmic along their vertical axis and linear along the horizontal one, thus it is possible to obtain a logarithmic series of numbers by reading the vertical Y-values at equidistant steps along the X-axis. A logarithmic series grows (or diminishes) in a non-linear way, thereby approximating, metaphorically, the effect of a musical *ritardando* or acceleration.

The series, once determined, is used sequentially. The successive repetition of values is minimized since repetition suggests a static condition. As indicated above, I have come, rather, to feel that trended change is a more natural and engaging address to the perceptual system than constancy.

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No permutation of order is allowed (that is to say, non-contiguous successions are avoided) for this could create the impression of arbitrariness, rather than necessary, coherent trends of growth or diminution.⁴⁹

In determining the primary sequence for *Watershed*, Reynolds drew a straight line on 3-cycle semi-log graph paper that spans from 0 to 960. The sequence of numbers that results from his process is: 2, 3, 5, 7, 11, 17, 25, 37, 55, 85, 128, 187, 286, 428, 632, 960. This is not a known mathematical sequence, but it is closely related to the sequence derived from powers of the fourth root of five.⁵⁰ The following graph shows a straight line that connects the sequence of numbers Reynolds used in composing *Watershed*. Beginning halfway up the line, two numbers are indicated – the second number shows the deviation of the sequence derived from the powers of the fourth root of five (see figure 3.4).

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⁴⁹ Ibid., 17.
⁵⁰ Powers of the fourth root of five, rounded to the nearest integer: 2, 3, 5, 7, 11, 17, 25, 37, 56, 84, 125, 187, 280, 418, 625, 935. The numbers in Reynolds’ sequence seem to be the best-fit line through this sequence.
Figure 3.4 A straight line on 3-cycle semi-log graph paper connecting the sequence of numbers used in Watershed.

Applying the Tools: Placing the *Boxed Events*

Even without studying Reynolds’ architectural diagram and determining the coincidental beginning of the downward spiral at the Golden Ratio, it is evident that the placement of the boxed events is purposeful and significant. Reynolds intentionally differentiates the boxed events with a unique notation and states in the score that they should “always be treated with notable weight”.\(^5\) These events, always played on

instruments in the metal family, are depicted in the score as notes surrounded by a double-lined box (see figure 3.5).

According to Reynolds, the placement of the boxed events was controlled by a logarithmic set of proportions.\textsuperscript{52} Using the process described above, Reynolds derived a unique logarithmic sequence for each of the five metal instruments.\textsuperscript{53} By overlapping these sequences, Reynolds created a “stabilizing, global clockwork manifested in two retarding cycles: one begins the whole piece, stretches out over its entire length and is marked by single strokes which rise from low (tam tam) to high (crotale). The other begins after the Watershed Divide and involves tremolos falling from high to low”.\textsuperscript{54} In the first cycle, the events are set in an expansive rhythmic \textit{ritardando}, from the beginning to the end of the piece. During the B-section, Reynolds inverts and condenses this same sequence of boxed events, creating a rhythmic \textit{accelerando} (see figures 3.6a-b).

\textsuperscript{52} Roger Reynolds, Personal communication, 04-10/2009. Email.
\textsuperscript{53} Ibid.
Figure 3.6a All boxed events before the Watershed Divide, as seen in Reynolds' architectural diagram.
Figure 3.6b All boxed events after the Watershed Divide, as seen in Reynolds' architectural diagram.
The progression of boxed events in Figure 3.6a (notated as either simple note heads or note heads with stems) rises from the lowest to the highest pitched metal instrument; the progression in Figure 3.6b falls from the highest to the lowest pitched metal. The upward progression continues to the end of Watershed, ritarded to the extent that only three rising boxed events occur after the Watershed Divide, at units 670, 798 and 960 on Reynolds’ diagram (see figure 3.6b). It is evident that these events are part of the upward progression because they are played as single strokes on the individual metal instruments. All of the events in the downward progression are played as tremolos.

Most of the events in the upward progression spanning from unit 0-798 and the downward progression from 593-844 have a palindromic relationship over the Watershed Divide. The first boxed event in the upward progression maps onto the last boxed event of the downward progression. Likewise, the last event of the upward progression maps onto the first event of the downward progression (see figure 3.7). The events with palindromic relationship are connected with a blue line in figure 3.7. Because the upward progression extends to the end of the piece, there are three events that do not map onto each other with axes over the Watershed Divide. These three events are connected with a red line in figure 3.7.
Watershed, by Roger Reynolds - Time-Based Diagram

++ vertical line shows that boxed events disrupt the flow of developing thematic materials of the instrument families
** minute markings come from an approximate average of four of my performances and Steven Schicks DVD performance
*** deliniations made in Reynolds architectural plans
**** score indications

boxed events
upward arrow indicates inclusion in upward sequence of boxed events
indicates boxed events that have a palindromic relationship over the Watershed Divide
downward arrow indicates inclusion in downward sequence of boxed events
indicates boxed events that do NOT have a palindromic relationship over the Watershed Divide

AB Structure
Introduction
A-Section
Dividing Section
B-Section
Coda

Reynolds' Diagram
SECTION 1
SECTION 2 - WATERSHED "AREA" *
SECTION 3

Deliniations
RAIN 1
RAIN 2
RAIN 3
WATERSHED DIVIDE
STORM 1
CLIMAX
STORM 2
CLIMAX

MINUTES
0
*
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

SKINS
Cadenza
 METALS
Cadenza
Cadenza
ODDITIES
Cadenza
Cadenza
WOODS

BOXED EVENTS
M5
M4
M3
M2
M1

Figure 17 Time-diagram indicating the palindromic relationship of the boxed events in Watershed
Reynolds discussed how he placed the boxed events and their intended function:

The idea of these boxed events was to have landmark moments that shaped the experience, for the performer and/or the listener, of the large-scale shape of the piece. There are, as you know, five metals – there are logarithmic series that place strokes on each of these five metals throughout the duration of the entire piece. Whether one actually hears that is certainly open to question, but the idea of a series of events, which accelerate, or ritard is fairly clear after the Watershed Divide. Just after half-way through the piece, there is a reversal, so that, instead of going from low to high, the series of strikes on the five metallic instruments goes from high to low.

As I was working on the design of the piece and the placement of these events, the idea of boxing just came about as a notational convenience to set them apart from other events, so that the performer would understand that these had some kind of privileged status. But then, when I looked at the design of the whole, the placement of these logarithmic iterations on the tam tam, on the wind gong, or whatever, also gave me ideas about how to arrange proportions within the whole piece and where there could be points of initiation or conclusion that began to suggest other formal possibilities.55

Reynolds’ comment indicates that the placement of the boxed events could suggest other formal possibilities within the piece. In Watershed, the subsections (Rains, Storms, Cadenzas, etc.) are most often preceded or followed by a boxed event. In Figures 3.7 the boxed events are notated as boxes with a vertical line drawn up through the musical materials of the skins, metals, oddities and woods showing their placement within the larger musical context (see figure 3.7). The first oddity cadenza is preceded by a boxed event, played on M1 and M3; Rain One is preceded and followed by a boxed event; Rain Two is followed by a boxed event; the first metal cadenza is preceded by a boxed event, etc. However, there are also numerous boxed events within the subsections that, to the listener, may sound like random diversions from the surrounding musical

55 Roger Reynolds, Personal interview, 05/30/2009. Telephone.
materials. In *Form and Method*, Reynolds describes the possibility of such an imposition of algorithmic procedures on the melodic or thematic materials in his music:

The algorithmic procedures that I use often disturb temporal proportion and succession radically. …If a transformational algorithm shuffles segments of an original thematic element such that proportions of the end are mapped onto portions of the beginning, one must have foreseen whether the resulting composite needs to be homogeneous or heterogeneous in character in order to best serve the purposes of the larger form. There may, then, be a second order as well as primary functions for any core thematic element. Anticipatory decisions are made in preparation for the later application of optimal transformational strategies.\(^5^6\)

As Reynolds described, the result of the algorithms applied to the placement of the boxed events can potentially be quite disruptive to the thematic materials. Reynolds shows the boxed events in the architectural diagram as an overarching musical idea that spans the entire piece. However, the diagram does not reflect the disruptive nature of the events (refer back to figure 3.1). In Figure 3.7 the boxed events are portrayed appropriately as stopping the flow of the thematic materials, with a break in the graphic representation of the thematic material of the skins. Though Reynolds conceived the primary musical themes and the boxed events separately, the listener will most likely hear the two opposing ideas as they relate to one another within the perceptual moment, rather than over the course of the entire piece. The graphic depiction of the boxed events in Figure 3.7 is a more accurate representation of the listener’s experience of *Watershed*.

Applying the Tools: Setting Tempos

In both the score and Reynolds’ architectural diagram, the most conspicuous use of the logarithmically derived sequence is the relationship of the various tempos. Reynolds marks three tempos before the Watershed Area in the architectural diagram: 60 bpm (at m. 1), 90 bpm (at m. 49) and 150 bpm (at m. 157) (see figure 3.8).
Figure 3.8 Tempo markings, as seen in Reynolds' architectural diagram.
The ratio of these three tempos (60:90:150) can be simplified to 2:3:5, which corresponds to the first three numbers of the sequence. There are a few discrepancies between the score and the architectural diagram, but the overall tempo scheme is the same. In the score, Reynolds marks two additional tempos between measures 1-275: 33.6 bpm (mm. 42-49) and 90 bpm (mm. 240-275). 33.6, 60, 90 and 150 bpm are the only tempos set throughout the entire piece.\footnote{The tempo marking of 33.6 bpm is only set on one occasion (at m. 42). The specificity of 33.6 bpm suggests a potential proportional relationship to the other set tempos. However, I have been unable to find a simple relationship to the sequence or the 2:3:5.} After the Watershed Area, Reynolds again utilizes 60 bpm, 90 bpm and 150 bpm, but the tempo changes are more frequent and more unpredictable than before the Watershed Divide.\footnote{The tempos marked in the score after the Watershed Divide include: 60 bpm (mm. 276-299), 90 bpm (mm. 300-318), 60 bpm (mm. 319-358), 90 bpm (mm. 359-384), 60 bpm (mm. 385-388), 90 bpm (mm. 389-393), 150 bpm (mm. 394), 90 bpm (mm. 395-396), 60 bpm (mm. 397-399), 90 bpm (mm. 400-401) and 60 bpm (mm. 402-406). There are no tempo markings in the architectural diagram after the Watershed Divide. The actual performance time after the Watershed Divide is much more variable than before, as there are many accelerando, ritards, ad libitum and rubato sections within each tempo. This could be the reason for not including the tempo markings in the diagram.}

Applying the Tools: Determining Durations\footnote{The selected examples in this chapter are purposely not exhaustive. They are meant only to demonstrate Reynolds’ use of the tools and to give the reader a basis for interpreting Reynolds’ architectural diagram.}

Reynolds also utilizes the numbers from the sequence to determine the durations (in units) of the major sections and subsections in \textit{Watershed} (Rains, Storms, Cadenzas, etc.). In Reynolds’ architectural diagram, the three Rain Sections are 25, 37 and 55 units in length, making each Rain Section proportionally longer (see figure 3.9). 25, 37 and 55 are three successive numbers in the initial derived sequence. Reynolds slowly introduces thematic materials before each Rain Section, which is represented in the diagram by an upward slope. Adding the unit value of the upward slope to the durations of each Rain
Section results in total lengths of 37, 55 and 85 units, respectively (also three successive numbers in the original sequence). Similarly, the length of every subsection in

Watershed corresponds to a number in the original sequence (2, 3, 5, 7, 11, 17, 25, 37, 55, 85, 128, 187, 286, 428, 632, 960): the first oddity cadenza is 25 units, the first metal cadenza is 37 units, the skin cadenza is 37 units, the second metal cadenza is 17 units, the second oddity cadenza is 11 units, Storm One is 85 units; Storm Two is 128 units, etc.
Figure 3.9 Three Rain Sections, as seen in Reynolds' architectural diagram.
Applying the Tools: Defining Initiation Points

Not only did Reynolds choose durations based on numbers from the logarithmically derived sequence, he also used the sequence to determine initiation points of major sections and subsections (Rains, Storms, Cadenzas, etc.). Reynolds created three contrasting rulers by dividing the total number of units (960) by 11, 17 and 37 (three numbers from the original sequence). He used these rulers to assist in placing the significant initiation, and ending, points in Watershed. These rulers can be found at the bottom of his architectural diagram above the tempo markings (see figure 3.10). As seen in Figure 3.10, none of the ruled subdivisions is continued throughout the entire length of the diagram.
Figure 3.10 Ruled subdivisions, as seen in Reynolds' architectural diagram.
In Figure 3.10, unit 187 marks a dividing point of 11 groups of 17, as well as 17 groups of 11. Not coincidentally, several significant musical events occur at unit 187: 1) a boxed event, 2) the end of Rain One, 3) the end of a short logarithmic sequence of strikes played on the metal instruments, 4) a change in tempo and, 5) the beginning of a lengthy silence from the metal instruments. As with the durations of each subsection within Watershed, most significant initiation points correspond with one or more of the specific ruled subdivisions (to see how these ruled subdivisions line up with the musical events, refer back to figure 3.1).
CHAPTER IV

MUSICAL MATERIALS

The Skin Family

After identifying the technical goals, the expressive intent and the overall form of *Watershed*, Reynolds composed the musical materials for the four chosen instrument families: skins, metals, oddities and woods. The skins are the central musical figure in *Watershed* for several reasons. First, the skin family is played more than any other instrument family in *Watershed*: 669 of 960 units, or 18 of 25 minutes (refer back to figures 3.1 and 3.7). The skins are also the only instrument family to be played with the performer facing the audience at all times. Most importantly, Reynolds only develops recognizable motives for the skin family. Steven Schick describes the other three instrument families in *Watershed* with musical characteristics that remain consistent throughout the piece: the metals are mercurial and volatile; the oddities are eccentric; and, the woods are critical.60 However, for the skins, both Schick and Reynolds suggest an evolving musical character.

From the beginning of the piece through the Watershed Divide, Reynolds writes motives for the skins that are metronomic, dry and abrupt. As the piece progresses, he transforms the skins’ personified character by giving them more *rubato* and lyrical

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motives. In this chapter, I will identify three significant stages in the transformation of the skins and discuss the motives Reynolds uses to portray their evolving character.

The Musical Transformation

The transformation of the skins occurs in three stages. The first stage includes the materials before the Watershed Divide; the second stage spans mm. 300-358; and, the third stage begins at measure 359. Figure 4.1 is a graphic representation of this transformation. In the graph, the three stages are marked by a change in color from red (Stage One) to purple (Stage Two) to blue (Stage Three). During the first stage, Reynolds creates an “analytical and rational” identity for the skins with abrupt, staccato motives. In the second stage, Reynolds begins to soften the skins’ abrupt character. Though softened, the motives in the second stage are reminiscent of those introduced prior to the Watershed Divide, which demonstrates a gradual change. In the final stage, Reynolds writes lyrical, rubato motives for the skins that are in stark contrast to the motives in the first two stages of their transformation.

61 The graph also shows the presence of the four instrument families throughout Watershed. The instruments are presented in score order from top to bottom: skins, metals, oddities and woods. The Rain and Storm Sections, as well as the cadenzas are boxed and labeled as such. The Rain Sections, where the skins are portrayed as passive, are represented by a lighter shade of red because, while they are being played, the music does not contain their distinct musical motives. After the Watershed Divide, the moments of subdued character from the skins are shown without any color because the skins are actually silent.

Stage One: Motives

Stage One is the longest of the three stages, spanning from the beginning of Watershed to the Watershed Divide at measure 275. There are four significant passages in this stage that demonstrate the skins initial musical character: measures 1-41 (excluding the oddity cadenza), measures 49-94, measures 110-139 and measures 240-275. Within these four passages Reynolds sets forth three distinct motives to portray the dry, metronomic and abrupt character of the skins. The remaining musical materials before the Watershed Divide, labeled as Rain Sections, do not include distinguishable motives for the skins. Nonetheless, they are quite significant to the skins’ musical growth. The dominance of the other instrument families in the Rain Sections serves as an impetus for the skins to respond by loudly asserting their recognizable motivic materials.

The first motive in Stage One is heard only in the first passage of Watershed (mm. 1-41). Though the motive is hinted at several times in short fragments over the first few measures, the first complete motive is not heard until measure 15 (see figure 4.2). The motive is a 5:3 polyrhythm with the quintuple grouping played on the low bongo and the triple grouping played on the high bongo. Most occurrences of this motive contain conflicting crescendos and decrescendos on the two opposing sides of the polyrhythm. As seen in Figure 4.2, there are short decrescendos (mf to p) on the high bongo, and on the low bongo there are relatively longer crescendos (pp to mf). Although there is significant complexity in this motive, the simple triple grouping of the polyrhythm is more discernable because the tone of the drum is higher and both the rhythm and the
dynamic pattern are constant. In comparison, the rhythm of the quintuple grouping is not steady, often with omissions or embellishments (refer to video example 5.1).

While Motive One is only heard in the initial passage of Watershed, the second and third motives of the skin family are present in several variations throughout the rest of Stage One. The second skin motive is introduced at measure 49. The motive begins with three fortissimo quarter notes leading into an 8:6 polyrhythm with awkwardly placed accents, followed by a quintuplet that leads into three eighth notes (see figure 4.3). This motive occurs a second time in Figure 4.3 beginning at measure 57. Reynolds fragments this motive numerous times throughout this section as the oddities become increasingly interruptive.
In the same passage, Reynolds also introduces the skins’ third recognizable motive. In Figure 4.3, measures 54-55 and measures 60-61 show the first two occurrences of the third motive. Although embedded within a rhythmically active passage, this motive includes only an accented bongo note followed by an accented bass drum note. Between measures 49-94, Reynolds uses the second and third motives in several settings, often in alternation, almost forming a call and response (see video example 4.1).
In the next passage, measures 110 to 139, Reynolds uses the third motive as the primary thematic material (see video example 4.2). He begins by setting the motive in its most straightforward form – a single bongo note followed by an accented bass drum note (see figure 4.4). The two-note motive is shifted from strong beats to weak beats and is often preceded by a partial quintuplet rhythm. As the passage continues, Reynolds places the simple motive within more complicated rhythmic textures similar to those between measures 49-94.
Figure 4.4 Motive Three set as the primary thematic material (mm. 110-112) from *Watershed I/IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 4.2 Mm. 110-138 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
During the final passage in Stage One of the skins’ transformation (mm. 240-275), Reynolds again combines the second and third motives (see video example 4.3). The second motive is seen first at measure 240, in a musical setting similar to its first occurrence in measure 49 (refer back to figure 4.3). In this passage, however, Reynolds expands the middle 8:6 polyrhythmic idea over six measures before ending with the quintuple rhythm and three eighth notes (see figure 4.5). At measure 249, Reynolds presents another expanded version of this motive, ending with a variation of the quintuple rhythm at measure 257.

Figure 4.5 Expansion of Motive Two (mm. 240-252) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
Reynolds also includes the high bongo/bass drum motive in this last section of Stage One (see figure 4.6). Although embedded within an 8:6 polyrhythm from measures 258-269, the accents placed on the high bongo and bass drum notes mark them as significant musical material. The recurring motive serves as a constant anacrusis and downbeat in the midst of embellishments that consistently grow more chaotic (see video example 4.4).
Figure 4.6 Embellishment of Motive Three (mm. 259-264) from *Watershed I/IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 4.4 Mm. 257-269 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
Stage One: Other Musical Materials

As mentioned at the beginning of this chapter, there are lengthy sections in *Watershed* that do not include motivic development of the skins. Before the Watershed Divide, this includes the Rain Sections and the cadenzas of the other instrument families. After the Watershed Divide, the sections with no motivic development include the other instrument family cadenzas and extended periods of silence during the Storm Sections.

There are no distinct motives related to the skins’ transformation in the three Rain Sections. But, the music contained within the Rain Sections is metaphorically significant to their development. Reynolds creates a musical texture in the three Rain Sections in which the skins are relatively passive and subdued as they play in duet with one other instrument family: the metals, the oddities and the woods, respectively. (The passivity of the skins is shown in Figure 4.1 as light red.) The two instrument families usually begin as equal partners, but the second instrument family in each of the duets slowly challenges the skins either by increasingly active rhythms, increasing dynamics, or by more persistent spatialization.

Reynolds writes ostinatos for the skins in each of the Rain Sections, usually with an unchanging soft dynamic. In Rain One, the skin ostinato (on the top stave) is juxtaposed with increasingly disruptive notes played on the metals (on the second stave) (see figure 4.7). Both the metals and skins maintain a steady dynamic level: the skins at *piano* and the metals at *mezzo forte*. The metal interruptions begin in a slow rhythm with only one note per measure for the first four measures. As Rain One continues, the interruptive metal notes occur more frequently with a resonance that finally overwhelms
the skin ostinato (see video example 4.5). The spatialization applied to the metals in this section also enhances the quickening pace of the metals as Rain One progresses.

Figure 4.7 Rain One (mm. 41-48) from *Watershed I/IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video example 4.5 Mm. 41-48 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
When comparing the three Rain Sections, it is evident that each progressively allows more strength and presence from the skins. In Rain One, the metals completely overwhelm the skins; in Rain Two, the skins and oddities end with almost equal partnership; and, in Rain Three, the skins gain confidence and volume, and finally rise to the top of the musical texture in the last few measures. The skins’ growing persistence in each of the Rain Sections is the only evidence of transformation before the Watershed Divide. The challenges presented to the skins during the Rain Sections ultimately serve as an impetus for the skins to react. Their momentary passivity during the Rain Sections provokes abrupt and assertive $ff$ or $fff$ responses afterwards. After each Rain Section, these responses introduce the primary motives of the skins discussed above.

Stage Two: Motives

After the Watershed Divide, the significant points of change occur following lengthy periods of silence that are conceptually similar to the Rain Sections in the first part of Watershed. However, in comparison to the abrupt and assertive responses following each Rain Section, the motives following the Watershed Divide are smooth and lyrical, and the entrances are gradually less assertive. After the metal cadenza, the final entrance of the skins in measure 389 is, in fact, the most passive of all these entrances.

There are three significant passages in the transformation of the skins after the Watershed Divide: one in Stage Two and two in Stage Three. In each passage, Reynolds writes motives for the skins that are progressively more smooth and lyrical. This shows that the change occurs gradually, not abruptly. At measure 300, the skins’ only entrance
(the skin cadenza) in Stage Two, Reynolds makes the motivic transformation obvious (see figure 4.8).

![Figure 4.8 Beginning of the Skin Cadenza (mm. 300-308) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image)

Although the materials in this passage are more expressive and dynamic, they are thematically similar to the first motive described in Stage One. The contrasting crescendos and decrescendos and the orchestration of the polyrhythm is reminiscent of the 5:3 motive found in the introduction (refer back to figure 4.2). The first 5:3 motive in Figure 4.2 is played on the high and low bongo (the two highest instruments in the skin family). In measures 300-303, the beginning of the skin cadenza, a similar polyrhythm is set with both parts of the polyrhythm on the high bongo. The third motive that occurs in Stage One (bongo/bass drum motive) also reemerges several times at the end of the skin cadenza between measures 306-308 (refer back to figure 4.4) (see video example 4.6).
Video Example 4.6 Mm. 300-308 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.

**Stage Three: Motives**

The third stage of the skins’ transformation includes two significant passages: after the climax of Storm Two (measures 359-384) and the passage immediately following the second metal cadenza (measures 389-402). Even in the first passage of Stage Three, the character of the skin family has been significantly transformed. Reynolds writes new melodic motives for the skins that are expressive and lyrical, containing for the first time *accelerandos* and *ritardandos*, as well as long rolls. In both Stage One and Stage Two of the transformation, the rhythms of the skins’ motives were...
strictly notated and metronomic. In Stage Three, Reynolds includes *rubato* sections and a style of rhythmic notation that allows for variable outcomes (see figure 4.9). At measure 362, Reynolds notates a rolled passage that rises from the low bass drum to the high bongo and back down to the low bass drum. The notation allows for flexibility in the number of notes that are struck on each drum. Throughout measures 359-384, Reynolds utilizes this type of notation, giving the performer great freedom in expressing the lyrical nature of the transformed musical materials (refer to video example 5.2).

Figure 4.9 Stage Three of the skins’ transformation (mm. 359-370) from *Watershed I/IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
The final entrance of the skin family occurs after the metal cadenza, at measure 389 (see figure 4.10). Unlike the *fortissimo* entrances of the each of the skins’ motives during Stage One, this entrance is weak and subdued. At *mezzo piano*, the beginning of this final skin passage is barely heard in the sustaining resonance of the metal cadenza (see video example 4.7). Reynolds writes in the score that the skins should sound as if they are emerging from resonance. The motive that begins this section (measure 389) is reminiscent of the first 5:3 motive and the motive within the skin cadenza (refer back to figures 4.2 and 4.8). In the materials that follow the initial entrance, Reynolds continues with expressive and lyrical materials usually containing soft rolled notes.

Figure 4.10 Final skin entrance after the Metal Cadenza (mm. 389-393) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
Video Example 4.7 Mm. 389-393 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.

The last musical gesture of the skins is marked as *molto espressivo* (see figure 4.11). For this gesture, Reynolds writes a smoothly rising, rolled passage in which the skins gradually fade into *niente*, finalizing their transformation from dry and abrupt to smooth and lyrical (see video example 4.8). Or, as Schick would say, from “analytical and rational to supple and lyrical”.  

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Figure 4.11 Final musical gesture of the skins (m. 402) from *Watershed IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 4.8 M. 402 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
CHAPTER V

INSTRUMENT CONFIGURATIONS AND RESULTING PHYSICAL GESTURES

The Instruments and Their Configurations

Most composers and percussionists configure instruments for maximum efficiency of movement when composing or playing works that include a multiple-percussion setup. Reynolds, on the other hand, saw the potential for exerting expressive control over the physical gestures of a percussionist by specifying the instrument configuration. After considering this element of percussion performance, Reynolds determined that one of his primary goals in the creation of Watershed was to exploit the emotional and musical potential of the physical gestures of the percussionist.64

The setup for Watershed is a configuration of instruments “purposely not optimized for physical efficiency”.65 This configuration requires the performer’s physical gestures to mimic, and ultimately enhance, the sonic and musical characteristics of the instruments. In our interview, Schick discussed how the instrument configuration designed for Watershed creates unique gestures that enhance Reynolds’ musical intent:

The original point of departure was to make geometrically overlaid arrangements with different instruments – so a spiral of drums, a spiral of metals, the oddities setup, and the wooden constellations. Each of those has an organic and self-contained geometry and each is just imposed one on top of another.

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64 Roger Reynolds, Personal interview, 05/30/2009. Telephone.
65 Steven Schick, A Percussionist’s Art: Same Bed, Different Dreams (Rochester, NY: University of Rochester Press, 2006), 221.
… If you take a more optimized set of instruments and if the prevailing impulse is always to make the piece as efficient as possible then you are going to get, over the long term, a very limited and repetitive set of motions. I think that has really been the gist of percussion playing. Harry Partch, in *The Genesis of Music*, talked about making instruments that were less optimized precisely so that the playing motions would be more unique. So, this point of departure in *Watershed* was to ask, “What happens to the physical part of the player when you no longer put things as close as possible to make it easy to play”? If you had a bank of four wooden boxes, one right after another or maybe even organized in a big square – well, that would totally be a different piece.66

The diagram in Figure 5.1, taken from the *Watershed* score, shows an overhead view of the relative placement of the 26 instruments used in *Watershed*.67 The instruments are divided into four groups with sonic similarities: skins, metals, oddities and woods. In this diagram, the metals are shown as thin rectangles and circles, depending on the nature of their mounting hardware [M1-M5]; the circles represent the skins [S1-S6]; the squares represent the woods [W1-W4]; and, on the rectangular table are the oddities.68 The specific placement of the oddities on the table is left up to the performer, with the exception of the four corners. Reynolds intended the corner instruments to be extensions of the metal and wood families; therefore, they are labeled as such.69 One instrument is absent from this diagram: S5, a pedal bass drum, set beneath the oddity table. The plus sign in the middle of the diagram represents the performer and the unspecified square is a stick tray.

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66 Steven Schick, Personal interview, 06/03/2009. Telephone.
67 I say *relative* placement because the final configuration will vary depending on individual performer’s body types – height, arm length, stance, etc.
68 I added the instrument names to the diagram. M1-M5 represent the metals 1-5, low to high; S1-S6 represent the skins, high to low; W1-W4 represent the woods, low to high. The inconsistency in whether the instruments are labeled low to high or high to low reflects the composer’s choice in ordering and notating the different instrument families.
69 Although the specific instruments set in the four corners of the table are technically part of the oddity family, they are meant to bridge the sonic gap between the oddities and the metals, and between the oddities and the woods.
Each instrument family depicted in the diagram has a unique geometry, and therefore a unique resulting gesture. The placement of the skins, metals and woods creates three overlapping spirals of various sizes and the oddities are confined to a small rectangular table. The performer’s gestures when playing the oddities are awkward due to the compact positioning of the oddities and their physical relationship to the other instrument families. Though the configurations of the skin, metal and wood families all create spiraling gestures, the varied proximities of each instrument family to the performer require different gestures. Schick describes the various gestures of the three spiraling instrument families in his “Note to the Performer”:

The skins: are arranged in a tight spiral [all in front of the performer] …they should be played with a short and rather fast stroke [in the beginning].

The metals: because they are larger and suspended in space [around the performer] they might well be played with freely swinging arms.
The woods: comprise an uneven constellation around the player…just far enough from the player that a *forte* stroke threatens to pull him or her off balance.\(^{70}\)

The following graphs show the horizontal, vertical and directional variation of the resulting spiral gestures (see figures 5.2a-c). The blue spiral represents the gesture of the skins; the spiral beginning on the x-axis shows the wood gesture; and, the spiral beginning on the y-axis outlines the gesture of the metals. In all three graphs, the axes represent the location of the performer. Figure 5.2a shows an overhead view of the gestures. Figure 5.2b shows the spirals from the front view, or the audience perspective. From this perspective, the x-axis shows the player’s natural playing position and the y-axis reflects the player’s standing position.\(^{71}\) So, from this view, the skin spiral is a flat line, the metal spiral begins behind the player directly on the y-axis and the wood spiral begins to the right of the performer (the audience left). Figure 5.2c shows the spirals from about 60 degrees above the ground.


\(^{71}\) Natural playing position is generalized as the plane on which the performer would normally strike an instrument, at waist-level.
Figures 5.2a-c The performer’s overlapping spiral gestures created by the instrument setup; a. 90° overhead view; b. 0°, front view/audience perspective; c. 60° in between view of Watershed I/IV, by Roger Reynolds (1998).

In Figure 5.2a, the overhead view, the small blue spiral in front of the performer represents the gesture created when playing the skins in ascending or descending pitch order. The color of the skins’ spiral does not change because the entire family of instruments is located on one horizontal plane.72 Viewing the overhead graph, the metal spiral begins behind the performer and follows a path to the back/right, the front/right, the front/left and ends at the back/left of the performer (see figure 5.2a). The spiral path begins with the lowest pitched metal instrument and ends with the highest pitched [M1-M5]. Each metal instrument on this path is placed on a progressively higher horizontal plane. This is represented by the changing color of the line. The four woods are set in

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72 This is with one exception: the pedal bass drum. Footwork used on the pedal bass drum is not clearly visible to the audience. The graphs show the significant arm motions seen by the audience, therefore, the motion created when playing the pedal bass drum was not taken in account.
the four corners of the instrument setup. In the overhead diagram, the wood spiral begins at the front/right of the performer and follows a path to the back/right, the back/left and ends at the front/left (see figure 5.2a). As with the metal spiral, the changing color represents the placement of the wood instruments rising through various horizontal planes, from low to high (see figure 5.2b). Similarly, the lowest horizontal plane corresponds to the lowest pitched wood and the instrument at the highest horizontal plane is the highest pitched [W1-W4].

Musical Examples that Demonstrate the Physical Gestures

It is significant that Reynolds had this particular instrument configuration in mind prior to writing the musical materials of Watershed. Reynolds created a choreographed drama that occurs simultaneously with each musical phrase. With each instrument family’s gestures in mind, Reynolds specifically composed music for each group of instruments that enhances or mimics those gestures. For example, in our interview Reynolds stated, “the proximities of the oddities to one another or the proximities of the skins to one another was an important aspect of the way in which I could ask him to play them”. Although three of the four instrument families create spiral gestures, Reynolds exploits the different characteristics of each with their specific musical materials. The skins’ spiral is not visible from the typical audience perspective, therefore Reynolds focused on the tightness of their configuration. The metals are the only family for which Reynolds writes music that shows the spiral gesture on both the horizontal and vertical planes. For the woods, Reynolds composes music that challenges the players’ balance,

73 Roger Reynolds, Personal interview, 05/30/2009. Telephone.
emphasizing the horizontal distance from the instruments. The gestures of the oddities, of course, reflect the close proximity of the individual instruments and their varying sizes and heights. The musical examples in this chapter demonstrate how Reynolds composed the music and the choreographed gestures of the four instrument families to enhance each other and the sonic characteristics of each instrument family.

The Skin Family

In his discussion of the skin family Schick points out that, 1) the skins are positioned in a typical fashion at equal heights, and 2) the performer faces the audience directly at all times when playing the skins. Both characteristics are unique to the skin family. The positioning of the skins allows them (or, the performer), metaphorically, to speak directly to the audience. Additionally, the tightness of the skins’ spiral allows the performer to more easily change the gestural character in order to accommodate the evolving music of the skins. As discussed in Chapter IV, the musical materials written for the skin family range from dry, abrupt and staccato to smooth and lyrical, with each musical and emotional extreme requiring specific physical gestures. The performer must show this change because, as the musical materials evolve, the setup remains static. Staccato notes are generally approached with short, fast strokes whereas legato notes are usually approached with a slower, more graceful gesture. It is easier for the performer to make these conflicting gestures with the instruments set in a spiral, rather than more common configurations like a semi-circle or a straight line.

The motives of the skins prior to the Watershed Divide require both complex (for the polyphonic passages) and simple (for the monophonic passages) physical gestures. The complex gestures used in executing the more polyphonic motives of the skins are more visually interesting from the audience perspective, but they do not clearly reflect the spiral nature of the skins’ configuration. The monophonic passages written for the skins, on the other hand, do outline their spiral configuration. But, because all of the skins are located on a single horizontal plane, the spiral gesture the performer creates when playing them can only be seen from an overhead view.\textsuperscript{75}

Motive One, introduced in measures 15-17, requires a series of complex physical gestures that is typical of the skins’ musical materials before the Watershed Divide (see figure 5.3). The motive is played on the two bongo drums, with the left hand playing the low bongo and the right hand playing the high bongo.\textsuperscript{76} There are two primary musical and physical considerations when playing Motive One: 1) the 5:3 polyrhythm that occurs between the two hands on different drums, and 2) the conflicting crescendo and decrescendo patterns between the two hands. In order to execute the rhythms in the left hand (low bongo) at the tempo indicated (1/4 note = 60 bpm) the performer must use fast, relatively low strokes. The rhythms played in the right hand (high bongo) will be played with slower, and potentially higher strokes that reflect the longer duration of the notes. Complicating the gesture further, the short decrescendos on the triplet grouping of the

\textsuperscript{75} Did Reynolds intend the skin spiral to be seen? Or, did he initially intend to have the audience looking over the percussionist?

\textsuperscript{76} The performer may choose to use the right hand to assist in playing the sixteenth notes in the quintuple grouping of the polyrhythm. This would complicate the gesture further.
polyrhythm (the right hand) and the longer crescendos on the quintuple grouping of the polyrhythm require contrasting rising and falling gestures from the two hands.

![Figure 5.3 Motive One of the skin family that requires a complex staccato physical gesture (mm. 15-17) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image)

At the end of this passage that introduces Motive One, Reynolds writes ascending and descending scales for the skins, which when played, create several cycles around the tight spiral (see figure 5.4). The passage starts with S2, descends down to S5, and then rises back up to S2. The pattern of descending and ascending from S2-S5 happens twice in quick succession, with a final strike on S1. The resulting physical gesture, though not necessarily visible to the audience, is a series of tightly wound spirals. Video Example 5.1 shows both the complex gesture in Figure 5.3 and the simple gesture seen in Figure 5.4.
Figure 5.4 Musical materials of the skin family that create a spiraling gesture (mm. 23-24) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 5.1 Mm. 15-29 from Watershed IV, by Roger Reynolds, performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
After the Watershed Divide, Reynolds incorporates both *staccato* and *legato* passages for the skins, but with more frequent occurrences of *legato* phrases. During measures 359-361, the performer’s motions should be smooth and connected in order to reflect the lyrical nature of the passage (see figure 5.5). Video Example 5.2 shows my gestural approach to the more *legato* passages seen after the Watershed Divide.

![Figure 5.5 Musical materials of the skin family that require *legato* gestures (mm. 359-362) from *Watershed I/IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image)

Video Example 5.2 Mm. 359-388 from *Watershed IV*, by Roger Reynolds, performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
The Metal Family

In contrast to the skin family, the physical gesture of the metals is more obvious to the audience because of their expansive horizontal and vertical configuration. The physical gesture created when playing the metals is influenced by the distance of the individual instruments from each other and from the performer. When playing the metals from the lowest to highest pitch, the performer creates a spiral from low/back/right to high/back/left. As a result, when the metals are played, the audience will see all sides of the performer. The metals are placed around the performer with M1 directly behind the performer, M2 on the back/right, M3 on the front/right, M4 on the front/left and M5 on the back/left. Each instrument is on a slightly higher horizontal plane arranged by pitch: M1 is lowest – the performer has to bend down slightly to strike appropriately; and, M5 is highest – the performer has to fully extend the striking arm and almost stand on tiptoe (refer back to figures 5.1 and 5.2a-c).

As discussed in Chapter III, the metals have two major musical roles in Watershed: 1) they are one of the four personified instrument families, and 2) they serve as an organizational tool in the form of the boxed events. When executing music for these varied roles, two distinct physical gestures are required. As one of the personified instrument families in Watershed, Reynolds creates for the metals a musical character that is “mercurial and volatile”. The musical materials Reynolds most often writes for the metals in this role exploit the spiral configuration of the instruments. The boxed events, on the other hand, are significantly distanced from one another (in time) and the

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spiraling gesture of the performer cannot be seen. Nonetheless, the gesture of the individual boxed events is pivotal in demonstrating their importance. The physical gestures of both roles of the metals are seen in the opening excerpt (see figure 5.6).

![Figure 5.6 Musical materials that demonstrate the metal family gestures (mm. 1-2) from Watershed I/IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image)

Figure 5.6 begins with a boxed event (notated within a double-lined box) that includes a *fortissimo* strike of M1. M1 resonates alone through one full 4/4 measure (1/4 note = 60bpm). This event has significantly more time to resonate alone than most other boxed events, allowing the performer to accurately, and dramatically, introduce the significance of the event with a memorable physical gesture. It is up to the performer to decide the exact gesture, but the boxed events should “always be treated with notable

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*At first glance, the musical notation for the metals is counter-intuitive – the highest note on the metal stave is actually the lowest pitched metal. This was done in order to align more accurately with the physical position of the instruments, with the lowest pitched instrument to the right and the highest pitched instrument to the left of the performer. According to the Reynolds, it is also meant to connect the notation of the oddities, which have metal elements at one end and wooden ones at the other. Roger Reynolds, Personal communication, 04-10/2009. Email.*
weight".79 This gives the audience a chance to recognize the boxed events as separate from the thematic musical materials throughout the piece.

The placement of M1 (tam tam) is behind the performer and low to the ground. Additionally, M1 is played with a different mallet than all other metals, requiring the performer to always choreograph a mallet change immediately before and after each tam tam [M1] note. When emphasizing importance and weight, a performer would generally not move quickly away from the note. However, the immediate mallet change needs to be executed quickly, without deemphasizing the importance of the previous event or visually disrupting the lengthy sustain of M1.

Figure 5.6 also shows characteristic music of the metals in their role as a personified instrument family. The physical gesture resulting from this music is much less variable than that of the boxed events, as the performer is limited by the expansive configuration of the entire instrument family. Measure 2 presents overlapping polyrhythmic figures that progressively increase in rate of speed from 16\textsuperscript{th} notes to 32\textsuperscript{nd} notes (see figure 5.6). Metals M2 through M5 are played in this passage. The gesture of the performer that results from the music in measure 2 is a visible spiral that quickly rises up from below the performer’s waist to the highest reach of the mallet. Throughout the piece, the resonant sound of the metals is enhanced with this flowing, spiral gesture. Within just the first page of the score, this spiral occurs four times. Video Example 5.3 demonstrates the resulting spiral gestures of the metals, as well as the boxed events.

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Video Example 5.3 Mm. 1-8 from Watershed IV, by Roger Reynolds, performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.

The Wood Family

The woods are configured in a spiral from low/front/right to high/front/left (refer back to figures 5.1 and 5.2a-c). Just as when the metals are played, the audience will see all sides of the performer. The height of the woods is less varied than that of the metal family. The element of the wood configuration that significantly impacts its musical character is the distance of the boxes from the center of the setup where the performer generally stands. The lowest pitched wood is closest to the performer, but still more than an arm’s length away; the highest pitched wood is most out of reach. Schick writes that
the wooden boxes are to be “positioned in a spiral rising from right to left at the extreme periphery of the setup...the lowest is located to the right of the player at about the level of the drums [skins]; the treble drum [skin] is positioned just within reach as high as possible and to the left”\textsuperscript{80}. Because of the extreme distance, the resulting gesture of the wood family requires extremely quick motions from the performer.

Although the woods are configured in a spiral, the music Reynolds writes for them does not exploit a spiraling gesture. The music for the woods usually consists of jarring interruptions in the midst of smooth, lyrical passages of the other instrument families. The quick, sharp nature of the gesture necessary to execute the wood passages enhances their “critical carping” character and the short, dry sound of the instruments.\textsuperscript{81} The best example of the woods’ gesture is in Rain Three, where Reynolds writes a subdued ostinato for the skins that is progressively more interrupted by gestures from the woods (see figure 5.7). As Rain Three progresses, it becomes an aural struggle between these two opposing musical ideas (the subdued ostinato of the skins and the jarring interruptions of the woods).

\textsuperscript{80} Steven Schick, \textit{A Percussionist's Art: Same Bed, Different Dreams} (Rochester, NY: University of Rochester Press, 2006), 223.

As Reynolds intended, the choreography of this passage reflects visually the musical conflict between the skins and the woods. The performer struggles to maintain balance and center of gravity around the skins, while throwing themselves quickly in all directions to reach the wooden boxes. Because the wood family’s musical materials are interspersed between the lyrical skin ostinato, the performer’s gestures are complicated. In Rain Three, the gesture of the skins must remain low and smooth, while the gestures of the woods must be quick in attack and release. Beyond the obvious difficulty of simply reaching the wooden boxes, the performer is also required to place the strokes in specific locations on the instrument, creating muted and open tones. The performer has to maneuver much of the upper body to reach the instrument, as well as make eye contact.
with the wooden box in order to strike it in the appropriate place. The following video demonstrates gestures of the woods and skins in Rain Three (see video example 5.4).

Video Example 5.4 Mm. 194-239 from Watershed IV, by Roger Reynolds, performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
The Oddity Family

In *Watershed*, the oddity family has the most unusual configuration and resulting physical gestures: eleven instruments of various heights, lengths and widths are confined to a small table, creating an extremely awkward playing area. The physical gestures created when playing the oddities undoubtedly mimic the unpredictable and eccentric sounds of this instrument family. Additionally, while playing the oddities in solo passages, the performer's back (or side) is facing most of the audience, creating a unique relationship between the performer and the audience.

Because of the endless possibilities of instrument choice, the oddities best demonstrate Schick’s statement that “the medium determines the message…the voice of the instrument develops in response to its sound”. Every performer will choose different instruments for the oddity family, thereby creating unique challenges and choices for performance. The percussionist may choose to position instruments with a variety of playing techniques, such as scrapes, scratches, finger flicks, etc., in any configuration on the table. Although the general aesthetic of the oddity gestures is quirky and awkward, specific motions will be unique to each performer. The following discussion of the oddity gestures reflects my personal choice of instruments and their positioning on the oddity table (see figure 5.8). Each choice is meant to enhance the musical characteristics of the oddities. For example, Reynolds does not request or even suggest a mallet change; I chose to add to the eccentric character of the oddities by

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playing the oddity cadenzas with chopsticks that are inherently awkwardly balanced, thin and light.\(^{83}\)

![Image](image.png)

Figure 5.8 My oddity configuration for *Watershed IV*, by Roger Reynolds (1998).

For the oddity cadenza, labeled *eccentrically*, Reynolds composed quirky melodic and rhythmic materials that reflect the unexpected sonic differences between the individual oddities. These materials include numerous abrupt partial polyrhythms, with dead strokes interspersed periodically (see figure 5.9).\(^{84}\)

\(^{83}\) Steven Schick used his fingers and fingernails to play the oddity cadenzas. Roger Reynolds, *Watershed IV, for Solo Percussion and Real-Time Computer Spatialization*, performed by Steven Schick and TRAnSIT. Mode Records, mode 70, 1998. Digital videodisc.

\(^{84}\) In this example, the dead strokes are notated with a square note head.
Because many of the instruments I used could be scraped as well as struck, I had several options in shaping the contour of the rhythms and the longer notes. I played the rolled note in the fourth measure of the cadenza on a metal plate with clock springs mounted on top [O8]. On this instrument, I could execute a single stroke, double or multiple bounce roll. I chose a single stroke roll because it most effectively activated the springs and added to the eccentric character of the passage. Another element in the cadenza that is affected by the performer’s choice of instruments is the execution of the dead strokes. In measures 30-35, dead strokes are always on the lower pitched specified metal oddity [O2/M7]. For this instrument, I chose an opera gong, which when played with a dead stroke actually made the pitch rise quickly and stop short. To add to the quirkiness of the dead strokes, I used a back stick flip, striking the center of the gong

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85 Dead strokes are executed by striking and momentarily leaving the stick or other implement on the instrument in order to deaden the natural sustain.
with the butt end of the chopsticks, perpendicular to the instrument. One final example of the quirky motions of the oddities is the last note of the cadenza (the roll), played on the highest unspecified oddity [O3]. For this instrument, I chose a tin can on which I could again execute a single stroke, double or multiple bounce. However, the tin can also has ridges around the center that I could scrape with increasing speed and pressure to create the thickening texture similar to a crescendo roll. The following video shows my interpretation of the oddity cadenza (see video example 5.5).

Video Example 5.5 Mm. 30-35 from Watershed IV, by Roger Reynolds, performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
CHAPTER VI

REAL-TIME COMPUTER SPATIALIZATION\textsuperscript{86}

In the field of computer music, \textit{real-time} refers to systems that process data at the same rate as it is taken in or used.\textsuperscript{87} For \textit{Watershed IV}, the sound processing was originally performed by a computer-controlled network of bespoke spatialization hardware. More recent implementations need only a computer with a multi-channel audio interface. Audio signals are received from the individual instrument microphones, converted to digital data streams, processed by real-time software and output in real-time to six loudspeakers surrounding the audience.\textsuperscript{88} \textit{Spatialization} refers to the way in which sound is projected through the loudspeakers after it is processed. This type of projection creates illusions of spatial position and movement through control of levels and simulated reverberation. Reynolds identifies four specific paradigms of spatialization that he utilizes throughout \textit{Watershed IV}: projection, rotation, permutation and trajectories. Each of these paradigms distributes the sound through the six loudspeakers surrounding the audience in specific ways.

\textsuperscript{86} Real-time computer spatialization is used in \textit{Watershed III} and \textit{IV}; this analysis only refers to \textit{Watershed IV}, as I was unable to obtain a technical score for \textit{Watershed III} from the publisher, C. F. Peters.\textsuperscript{87} Charles Dodge, \textit{Computer Music: Synthesis, Composition, and Performance} (New York, NY: Schirmer, 1997), 436. \textsuperscript{88} The current version (2009) of the spatialization is implemented in the software environment Max/MSP.
Reynolds does not correlate the four paradigms of spatialization specifically to the musical characters of the four instrument families. However, as a result of different microphone specifications for each instrument family, the application of any spatialization paradigm is necessarily unique to each family. In this chapter, I address microphone and speaker placement and the four paradigms of spatialization used in *Watershed IV*. The last section includes discussion of Reynolds’ application of the spatialization in each instrument family’s cadenza, as well as the Rain Sections that occur before the Watershed Divide. Although these examples do not demonstrate all occurrences of the spatialization, they show how Reynolds uses real-time computer spatialization to significantly enhance the musical intent, the performer’s physical gestures and the musical character of each instrument family.

In discussing the spatialization, I make numerous references to the technical score. The technical score for *Watershed IV* includes all the materials found in the performer’s score, with an additional nine pages of notes specifically for the technician/engineer. The notated music is minimized slightly to make room for Reynolds’ cue notation, which is set around the individual staves on each relevant page of the score. The technical cue notation lays out the following fields for each cue throughout *Watershed IV*: the sound source; the geometry, or speaker path; the

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89 Reynolds only applies trajectories to the skin family, but he uses projection, rotation and permutation on all miked instrument families at various times throughout the piece.

90 I recommend that anyone planning to perform *Watershed IV* buy and perform from the technical score. The cue notation does not hinder reading of the music notation. Additionally, it is extremely beneficial (and interesting) to understand how and when the spatialization is utilized. The technician/engineer will require the technical score in any case. Refer to Appendix D, an interview with Greg Dixon, for discussion of the technical score from the technician’s point of view. Greg Dixon is the technician with whom I collaborated in numerous performances of *Watershed IV*. 

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reverberation/filtration level; the time span during which the cue is active; the speaker origination and width of the image as it rotates; and the speed of rotation (see figures 6.1a-b) (see Appendix A for a complete list of the technical cues, organized by instrument family).

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>acoustic sound source</td>
<td>time span in which cue is active</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GEOMETRY</th>
<th>UTILIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>speaker location, path or process</td>
<td>originating speaker; width of image</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REVERBERATION/FILTRATION</th>
<th>SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0-R4</td>
<td>SS (slow) to FS (fast)</td>
</tr>
</tbody>
</table>

Figure 6.1a General technical cue notation from *Watershed IV*, by Roger Reynolds (1998).
Reynolds’ concept of the technical score is unique. Although many composers of electroacoustic works include cue placement in the performer’s score, few actually define what occurs within each cue so that a skilled engineer could recreate the specifications in any program or by any technical method they choose. Reynolds views the application

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91 In most cases, the composer supplies the performer and/or technician with the computer software for performance. While the electronic component is prefigured in works of Karlheinz Stockhausen using analog electronic systems for signal processing, this may be unique in the world of
of spatialization as similar to the variable specification of percussion instruments, which
gives the technician/engineer freedom to accommodate to specific performance
circumstances.92

Microphone and Speaker Setup for Watershed IV

Reynolds’ general intent for the microphone and speaker setup for Watershed IV
was to “maximize the listener’s sense of engagement and investment from an empathetic
perspective”.93 As mentioned in Chapter V, the performer is surrounded by 26
percussion instruments. By requiring different microphone specifications for each
instrument family and mapping the various spatialization paradigms to the six
loudspeakers, Reynolds recreated the internal space of the percussion setup. He also felt
that the spatialization could enhance the performer’s physical actions by giving them
“greater than expected consequences”.94

Each instrument family in Watershed IV has unique microphone specifications.
The entire skin family (six instruments) is miked with two microphones, with the
intention of simulating a stereo field that smoothly spans the highest (left) to the lowest
(right) pitched drum.95 Each instrument in the metal family (five instruments) has its

92 For more discussion about the technical score concept, see Appendix B, C and D: interviews
with Roger Reynolds, Steven Schick and Greg Dixon.
93 Roger Reynolds, “Performance Notes.” for Watershed I/IV, for Solo Percussion and Real-Time
94 Roger Reynolds, “Performance Notes.” for Watershed I/IV, for Solo Percussion and Real-Time
95 The sub-mixing of more than two microphones will improve the impression of a smooth left-
right/high-low correspondence. Roger Reynolds, “Performance Notes.” for Watershed I/IV, for Solo
own contact microphone.\textsuperscript{96} The eleven oddities have just one microphone that captures the disparate sound sources as one aggregate image. Although the wood instruments may be picked up by microphones intended for another instrument family, they are not directly miked at all (see figure 6.2).

![Microphone setup for Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image.png)

The six loudspeakers are set around the audience as seen in Figure 6.3. A notation in the score indicates that it is possible to use only five speakers by collapsing speakers two and three.\textsuperscript{97} There are no specifications in the score regarding the height of

\textsuperscript{5} Also, the pedal bass drum (below the oddity table and to the right of the performer) is picked up by the left channel microphone. The concert bass drum is picked up in the right-channel microphone.

\textsuperscript{96} Reynolds’ diagram shows that the metals are to be miked with contact microphones. However, for my performances the metals were miked with SM-81 and DPA 4060 microphones, closely mounted with gooseneck arms. For more on the technical specifications of my performance, see Appendix D, which includes an interview with Greg Dixon.

\textsuperscript{97} If you choose to perform Watershed IV with only five speakers, you must rethink the cues from this more limited perspective. Roger Reynolds, “Performance Notes” for Watershed I/IV, for Solo
the speakers. The placement of the speakers in most of my performances was about sixteen feet from the ground. Though, for several performances the speakers were placed only slightly above the audience at eight feet from the ground.

![Audience setup diagram](image)

Figure 6.3 Speaker setup for *Watershed IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Paradigm of Spatialization: Projection

The projection paradigm can be defined as a specific spatial arrangement or distribution of microphone sound sources to loudspeakers. In the *Watershed IV* technical score, Reynolds describes projection as:

…the most straightforward strategy. The sonic geometry that the soloist inhabits, surrounded by a ring of instruments, is simulated for the audience by assigning each of the miked metal instruments to a specific position around the performance space (this pattern of assignments is called the *standard mapping*, and it is illustrated in Diagram C [in the technical score]).

The intent here is to surround the listening audience with a stable sound field that acts as a reference (against which more dynamic spatialization is gauged) and also

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nourishes an empathic relationship between the listener’s and the performer’s circumstances.

The impression of stability with respect to angular position in the horizontal plane (front, right, rear, left, etc.), however, still allows for the impression of differing distances: proximate (dry) to distant (a high percentage of reverberant signal and a substantial decay time; the signal is also filtered so as to simulate the frequency dependency of distance).  

In this passage, Reynolds mentions one specific type of projection that is applied only to the metal family, called the standard mapping. Because each metal instrument is miked individually, this family is best suited to spatially immerse the audience in a sonic environment similar to the performer’s perspective. According to Reynolds, the mapping of the metals “establishes not only a stable impression of embrace or immersion for the audience, but also a normative placement: gong here, crotale there”. The standard mapping projects the five metals onto the six loudspeakers results in a configuration that mimics, though not exactly, the placement of the instruments around the performer (see figure 6.4). There are slight alterations that project the larger, louder instruments [M1-M3] in front of the audience and the smaller, softer instruments [M4-M5] behind the audience.

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99 Ibid., 11.
Within any single cue, the projection paradigm can only create a static placement – meaning that once mapped onto a speaker or a set of speakers, the sound will not move to another speaker. This gives the listener what Reynolds refers to as stability. Figure 6.5 is a diagram of the projection paradigm applied to a six-loudspeaker setup. The arrows indicate the potential for creating the illusion of variable distance relationships created by changing the reverberation and filtration levels.
Reynolds does not always utilize the projection paradigm to create stability as with the standard mapping. In several instances, he creates a sense of motion by setting numerous projection cues with different speaker mappings in relatively quick succession. At cue 14 (mm. 118-134), Reynolds applies the projection paradigm to the skins and oddities with changes in reverberation and filtration levels, progressing from R1 to R4.\textsuperscript{100} Cue 14 includes several parts; 14A and 14C are set on the skins, while 14E, 14G, 14I, 14K and 14M are utilized on the oddities (see figure 6.6).\textsuperscript{101} Reynolds creates a sense of dynamic motion in these cues by changing the instrument to speaker mapping in each technical cue. In cue 14E, the oddities are mapped onto speakers 1 and 2; in 14G they are mapped onto speakers 4 and 1; in 14I they are mapped onto speakers 2 and 5; in 14K they

\textsuperscript{100} The full range of reverberation levels is: R0 – R4, from low to high.
\textsuperscript{101} The absent cues (14B, 14D, 14F, etc.) represent the end of the cue space, as the technician must open and close the technical cue.
are mapped onto speakers 6 and 3; and in 14M they are mapped onto speakers 4 and 1 (refer back to video example 4.2).¹⁰²

The choice of speaker mapping and sonic movement is consistent with the erratic and unpredictable nature of the oddities – there is no predictable pattern of the motion from one cue to the next. At times, Reynolds also opens the oddity microphone when

¹⁰² The video examples taken from my performances can only be heard in stereo, not 5.1 surround sound, and is limited by the reader’s choice of speakers. Because of this, the motion of the spatialization cannot be heard as effectively as it would in a live performance, but the general application and growth can be heard. Listen to Steven Schick’s DVD performance of Watershed IV in a 5.1 surround sound environment for the fully spatialized experience.
other instruments are being played and the oddities are silent. This happens at cue 14I, while the skins and one metal instrument [M3] are being played and at cue 14M when the skins are being played (see figure 6.6).\textsuperscript{103}

Paradigm of Spatialization: Rotation

Rotation is simply either a clockwise or a counter-clockwise path around the six speakers. Reynolds defines the rotation paradigm as:

Smooth angular displacement in the horizontal plane (right to left, left to right) where speed can vary and also width of image (in effect, the number of loudspeakers which simultaneously contribute to the sound pressure level with which a sound source is projected).

In general, higher pitched, less complex sounds do well with a relatively narrow focus, whereas low frequency, massive sounds (such as the tam tam’s) are more visceral when carried by four or more speakers simultaneously.

Of course, the ideal image width (and dynamic contour: more level in the middle speakers, less in those on the skirts) is also a function of reverberation and speed of rotation: wetter and slower images prefer image width and the dryer, more rapid ones benefit from focus.

While rotating, a sound image may also seem to recede or draw near, depending on the nature of the reverberation and spectral processing associated with it.\textsuperscript{104}

The rotation does not necessarily have to span the full circle and Reynolds differentiates between \textit{circular} and \textit{non-circular} paths within the clockwise or counter-clockwise rotation. Circular refers to a rotating path in which all speakers along the path are sounded; non-circular refers to a path in which various speakers may be skipped. The speed of the rotation can change the sonic \textit{appearance}. And, as with the projection, the

\textsuperscript{103} This could either indicate an error in the technical score, or that Reynolds intended to momentarily treat the other instrument families as oddities.

distance can be altered by changing the reverberation and filtration levels. In the third paragraph of Reynolds’ description, he mentions the ideal image width as a result of changes in the reverberation and speed of rotation. The reference to dynamic contour as being “more level in the middle speakers and less in those on the skirts” refers to the fact that the original source could potentially be more than one speaker in width and that the center of the source (the middle speaker of the sonic image) is louder than those on the periphery. This creates an interesting dynamic contour in the sonic space.

The following figure shows the clockwise rotation of an image that is three speakers wide (see figure 6.7). The image starts in speakers 6, 1 and 2 (with speaker 1 as the center and most dynamically present) and is rotated in a clockwise path until the center of the image reaches speaker 4. As the image is rotated, it is pushed into the distance by changes in reverberation and filtration levels. This creates a sonic spiral, rather than a simple circular rotation.

![Figure 6.7 Rotation paradigm for Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image-url)
One musical idea on which Reynolds applies the rotation paradigm is the *scream* (see figure 6.8). A scream is created when the performer scrapes a stick around the front perimeter of the tam tam. Alone, this technique is a jarring, ear piercing and very uncomfortable for the listener. Reynolds enhances the screechy nature of this effect by utilizing a fast counter-clockwise circular path (CCW.CP) on the tam tam [M1], with a reverberation level of R3 (see video example 6.1).

Figure 6.8 Scream Two, with rotation paradigm applied to the metals (mm. 339-342, CUE 27A-B) from *Watershed IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 6.1 Mm. 339-342 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
Paradigm of Spatialization: Permutation

Permutation is any combination of the projection and rotation paradigms.

Reynolds defines the permutation paradigm as follows:

Permutation challenges these norms [the normative projection of instruments or rotation of motion]. The position of one of the metals may begin to rotate against the fixity of the others, permuting the standard map’s orderings; several metals may rotate at differing rates and in different directions simultaneously while others remain fixed at their standard mapping’s locations; the left-right/high-low skin images are affectively convoluted when the two channels of the stereo field move independently, without the expected linkage of a stereo pair.

Further choreographic richness can be evoked by linking these various processes with dynamically changing distance cues: one sound image spirals inwards, clockwise, while another spirals outwards, counterclockwise, and at a faster rate.105

Permutation can include two or more simultaneous rotation cues, two or more projection cues or any combination of rotation and projection cues applied to any instrument family or families. The combinations can include more than two cues, though Reynolds rarely uses more than two at one time. Figure 6.9 shows the two channels of the skin family, right and left, acting independently. The right-channel moves in a non-circular clockwise path (CW.NCP) that spirals outward. The left-channel moves in an erratic counter-clockwise non-circular path (CCW.NCP), followed by a clockwise circular path (CW.CP) that also spirals outward (see figure 6.9).

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The example in Figure 6.10 shows the first musical instance where Reynolds divides the right- and left-channels of the skins. The path of the two channels is similar to the permutation diagram in Figure 6.9 (see video example 6.2). Interestingly, Reynolds only splits the skins’ right- and left-channels in this passage leading up to the Watershed Divide, and then on every occasion the skins are spatialized following the Watershed Divide. This is the only aspect of the spatialization that evolves as the skins transform throughout the piece.
Figure 6.10 Musical materials with permutation paradigm applied to the skins (mm. 270-274, CUE 19A-B) from *Watershed IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

Video Example 6.2 Mm. 270-274 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.
Paradigm of Spatialization: Trajectories

The trajectory paradigm is an abrupt passage of sound from one speaker to another – as if the sound is being thrown across the room. In the technical score, Reynolds compares the smooth and continuous flow of the preceding paradigms to the trajectory paradigm:

A very abrupt transfer of energy, elegantly calibrated, can convey a persuasive impression of rapid motion, of a trajectory wherein a sound appears to be propelled across the performance space like a projectile.

Achieving such impressions involves the following considerations: 1) an interval of time during which the sound is established at an initial location (I); 2) a very brief transit time during which the transfer of energy from the initial to a final (F) location is accomplished; and, 3) a sufficient time, image breadth, and reverberance at F so that the impression of arrival (a new, stable location) is well established.

Evidently, to work well as a trajectory, the sound moved needs to have a pronounced spectral density and to have an economical, but not too abbreviated dynamic envelope in relation to its duration.106

The sound originates in one speaker and is sent quickly to another. Similar to how throwing a stone in water creates rippling circles, the sound of the trajectory spreads in width to the speakers surrounding the initial point of impact. The following diagram shows a simple trajectory that originates in speaker 6. After the initial impact, the sound is thrown to speaker 3 and gradually spreads to speakers 2 and 4 (see figure 6.11).

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Figure 6.11 Trajectory paradigm for Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.

The trajectory paradigm is applied only four times in Watershed IV. Two of these occurrences are at measures 158 and 166 (see figure 6.12). The abrupt nature of the spatialization enhances the dry, fff figures of the skins in this passage (see video example 6.3). In the technical score, Reynolds defines these two cues (cue 16A and 16C) as TRAJ A and TRAJ B, but he does not identify the specific trajectory paths.

Figure 6.12 Musical materials with trajectory paradigm applied to the skins (mm. 157-158, CUE 16A-B) from Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
Significant Musical Examples With Spatialization

One of the most successful aspects of Reynolds’ use of spatialization in Watershed IV is that he does not use it constantly. Instead of specifying one type of spatialization to each instrument family and maintaining that position throughout the piece, Reynolds employs the various types of spatialization at appropriate musical
moments.\(^\text{107}\) In addition to the examples above, Reynolds utilizes spatialization to enhance several of the subsections of *Watershed IV*, including the instrument family cadenzas and the three Rain Sections.\(^\text{108}\) In the rest of this chapter, I will discuss how Reynolds uses the spatialization to enhance the characterization of the oddities, metals and skins in their individual cadenzas and how he utilizes the spatialization within the three Rain Sections.\(^\text{109}\)

Oddity Cadenzas

In both oddity cadenzas, measures 30-35 and measures 403-406, Reynolds uses simple rotational cues. For the first cadenza, he uses a counter-clockwise, circular rotational path (CCW.CP) that originates in speakers 2, 3 and 4, and progresses at a slow rotational speed (SS) with a width of three speakers wide and a reverberation level of R2. In the second cadenza, Reynolds uses a clockwise, circular rotational path (CW.CP) that begins in speakers 3 and 4, and continues at a slow rotational speed (SS) with a width of two speakers wide and the highest reverberation level (R4).

\(^{107}\) Initially, I thought there might be a pattern to Reynolds’ use of spatialization on the different instrument families; or that there may be an audible pattern of transformation of one or more aspects of the spatialization as applied to any instrument family. After tracing the spatialization applied to each instrument family, I realized this was not the case. Though Reynolds does apply specific types of spatialization more often to specific instrument families, he does not do so consistently. There is no recognizable pattern of growth in any spatialized aspect (e.g. a pattern of growing reverberation levels or pattern of slowly morphing mapping around the audience). The only significant difference in the spatialization paradigms before and after the Watershed Divide happens with the skins. Reynolds begins utilizing the right- and left-channel permutation on the skins immediately before the Watershed Divide, and continues to use similar permutation exclusively on the skins after the Watershed Divide. It seems to be a part of the skins transformation.

\(^{108}\) This does not demonstrate all occurrences of spatialization, but does include most of the lengthy applications.

\(^{109}\) There is no wood family cadenza.
The oddities have been defined as eccentric and unpredictable. The physical
gestures that result from the configuration of the instruments are also awkward. The
slowly rotating spatialization, whether clockwise or counter-clockwise, enhances the
musical character of the oddities by placing the audience in the middle of unpredictable
swirling sounds. With the slow rotating speed applied during the both oddity cadenzas,
the initial impact of individual notes will be displaced in random speakers throughout the
passage. In his architectural diagram for *Watershed IV*, Reynolds made a note by the first
oddity cadenza to “spatialize with Hénon distribution of gated pickup that separates the
stream of activity into attacks or even pseudo attacks” (refer back to figure 3.1). For the
second oddity cadenza he writes that the spatialization “involves matching of attack
speed with the pre-set rate of location resets, so that the effect is of stunningly direct
correlation, as though each oddity attack were individually spatialized” (refer back to
figure 3.1). These directions imply that the rate of the circular motion is meant to line up
with the attacks and rhythms of the notated music. However, this is not exactly the case,
as the pace of the written music is actually much faster than the rotational speed (see
figure 6.13). Nonetheless, the spatialization does enhance the eccentricity of the oddities.
The slow speed of the spatialization and the quickness of the performer’s gestures in
executing the rhythms create a contradiction between what the listener sees and hears
(refer back to video example 5.5).
Metal Cadenzas

The two metal cadenzas include projection of the standard map in addition to clockwise and counter-clockwise rotational paths. In the first metal cadenza (mm. 139-155), Reynolds projects M2-M5 in the standard map (see figure 6.14). While some metals maintain their position in the standard mapping throughout the cadenza, others are rotated. Setting M2-M5 in the standard mapping gives the listener a sense of stability, against which they feel the rotation of M1, and later M3. M1 is rotated in a counter-clockwise circular path (CCW.CP) through measure 147 at a fast speed (FS). And, at measure 152, M3 is rotated in a clockwise circular path (CW.CP) at a slow speed (SS) until the end of the cadenza. Placement of the fast and slow rotational speeds enhances the quickening or slowing of the rhythmic motion in the notated music.
As discussed in Chapter V, the physical gestures of the performer playing the metals create the most clear and visible spirals. The spatialization applied to the metals is also easily discernable and mimics both the quick spiraling gestures of the performer and the resonant sustaining quality of the metal family. Interestingly, the rotating spatialization in this first metal cadenza often occurs when the notated music does not require the performer to physically create full spirals. Likewise, when the performer is making complete spirals, the rotational spatialization is not applied. For example, the performer will spiral quickly four times between measures 147-150, but Reynolds applies the standard map projection without a rotating path (see video example 6.4).

Figure 6.14 First Metal Cadenza (mm. 139-150, CUE 15A-B) from Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
Video Example 6.4 Mm. 139-155 from Watershed IV, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.

Another unique relationship between the music and the spatialization of the metals is that they both serve two roles in Watershed IV. As discussed in the preceding chapters, the metals function as a personified instrument family and as a pivotal marker in the large-scale structure of the piece (the boxed events). The simultaneous use of the two paradigms of spatialization onto the metals reflects these two roles. As the boxed events provide a sense of stability throughout the piece, the standard mapping (only
applied to the metals) provides a stable and consistent perspective for the audience.\textsuperscript{110} The rotation paradigm, on the other hand, mimics the mercurial and volatile character of the metals and enhances the performer’s physical gestures.

Skin Cadenza

The skin cadenza is significant in that it is the only instrument family cadenza not to have spatialization. Although it may seem contradictory to include a musical example without spatialization in a discussion dedicated to the spatialization of Watershed IV, it is crucial. As stated earlier, one of the greatest aspects of Reynolds’ use of this technology is that he does not use it constantly. For this reason, it is important to consider why he chooses to not use spatialization in certain places. The absence of spatialization in the skin cadenza is as telling about the character of the skins as the use of spatialization in the other instrument family cadenzas.

In Chapter IV, the skin family was identified as the primary instrument family in Watershed, while the three other families play secondary roles in the piece. The oddity and metal families have two cadenzas, in which Reynolds uses spatialization to enhance their physical gestures and sonic characteristics, as well as their role in the piece. It seems consistent that the skin cadenza would also have spatialization that enhances its character. Reynolds’ choice to not use spatialization here sets the skins in their most pure, straightforward, unaffected state. The skin cadenza occurs immediately after the Watershed Divide and shows the skins at their most compromised moment – the first

\textsuperscript{110} Reynolds uses the standard mapping eight times throughout the piece: at cues 5, 6, 15A, 20A, 26A, 26C, 32A and 35. In addition to the two metal cadenzas, the standard mapping occurs during the opening and closing passages in Watershed, as well as the Watershed Divide.
identifiable occurrence of significant change in their musical character.\textsuperscript{111} The straightforward purity of not utilizing the spatialization reflects the typical face-forward position of the performer to the audience, as well as the skins’ vulnerability in this passage. It also reflects the minimal physical gestures that the performer makes when playing the skins; there is no spatialized motion (refer back to video example 4.6).

Rain Sections

The three Rain Sections are conceptually and musically very similar. In each Rain Section, the skins play in duet with one other instrument family: the metals, the oddities and the woods, respectively. The spatialization in each Rain Section either enhances or controls the relationship between the two instrument families and helps to demonstrate the transforming nature of the skins.

Rain One (mm. 42-48; cues 8B, 8C and 8D) contains a duet between the skins and metals in which the metals overwhelm the skins with dynamics, rhythmic persistence and their spatialization (see figure 6.15). While the skins are more rhythmically active in this passage, Reynolds uses rotational spatialization to enhance the presence of the metals throughout the seven-measure section. The skin ostinato maintains a soft dynamic level throughout Rain One and is set with a static projection mapping called \textit{pattern one}.\textsuperscript{112} As the skins remain constant, the music of the metals rises from M2 to M5 over the course of the seven measures, with increasing dynamic levels and rhythmic pace. As the performer moves from one metal to another, the spatialization progresses from a CCW.CP rotation

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\textsuperscript{111} Refer back to Chapter IV at Stage Two of the skins’ transformation.
\textsuperscript{112} Specific preset patterns are labeled, but not defined in the technical score.
on M2 (mm. 42-46), to CW.CP on M3 (mm. 46-48), and ending with a CCW.CP on M4 (m. 48). The rate of the rotational speed increases from slow (SS) to fast (FS) and the reverberation level increases from R1 to R2 (refer back to video example 4.5). All of these elements contribute to the metals’ overwhelming presence.

![Figure 6.15 Rain One (mm. 42-48, CUE 8A-E) from Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image)

The oddities and the skins in Rain Two (mm. 95-109, cue 13) are spatialized using similar preset projected geometries; the skins in pattern two and the oddities in pattern three. The musical materials of the skins and the oddities in this section are also similar – both families play unchanging, subdued ostinatos (see figure 6.16). In fact, the only element that changes in Rain Two is the reverberation level of the spatialization. The reverberation level of the skins grows from R0 to R3, while the reverberation level of the oddities diminishes from R4 to R0 (see video example 6.5). Because of the static
nature of most elements of this section, it may seem in stark contrast to the goals of the Rain Sections identified above. With the growing reverberation level of the skins, it seems likely that they would uncharacteristically rise to the forefront of the musical texture. However, while the audience may perceive a change in the skins, the sonic nature of the oddities (dry, *staccato* and eccentric) is much more present than the warm, rounded tone of the skins in this passage. As a result, the skin family is a more equal duet partner in Rain Two than it was in Rain One. The growing persistence of the skin family continues in Rain Three.

![Figure 6.16 Rain Two (mm. 97-101, CUE 13A) from Watershed IV, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.](image-url)
Video Example 6.5 Mm. 95-109 from *Watershed IV*, by Roger Reynolds performed by Julie Licata, January 28, 2008 at the Merrill Ellis Intermedia Theater (MEIT), part of the Center for Experimental Music and Intermedia (CEMI) at the University of North Texas.

In Rain Three (technical cues 18A-18I), the skins play in duet with the wood family (see figure 6.17). While no spatialization is applied the woods, they overwhelm the skins with increasing dynamics and more frequent interruptions. Reynolds utilizes spatialization that sets the skins in *pattern four*, with the reverberation level increasing from R0 to R3 through cue 18D, and decreasing back to R0 through cue 18H. The notated music for the skins requires a long, slow crescendo from the beginning to the end of Rain Three, with the majority of the crescendo occurring after 18H (*mezzo piano* to
fortissimo). The woods, on the other hand, increase in dynamic presence and frequency of interruptions up to 18H. At 18H, the presence of the woods diminishes in frequency, though not in dynamic level (refer back to video example 5.4). Not coincidentally, there is also a significant change in the spatialization at cue 18H (the last three repetitions of the skins’ ostinato). For the first time in the piece, Reynolds uses the permutation paradigm on the skins, with the left- and right-channels acting in different manners. This is significant because from this point on, Reynolds incorporates a left- and right-channel separation on the skins (aside from the skin cadenza, which has no spatialization).

Figure 6.17 Rain Three (mm. 211-224, CUE 18D-G) from *Watershed IV*, by Roger Reynolds. Copyright © 1998 by C. F. Peters Corporation. All Rights Reserved. Used by permission.
CHAPTER VII

CONCLUSION

The initial impetus for this analysis was a question posited by Steven Schick in his book, *A Percussionist’s Art: Same Bed, Different Dreams*. He asks, “What would it take in the world of [solo multiple-] percussion to construct a longer, more formally complex piece”? Most multiple-percussion solos do not extend beyond ten minutes. Considering the lack of specified pitch or normal concepts of melody in multiple-percussion, this is not surprising. However, *Watershed* can be up to 30-minutes in length.

Schick writes that, with *Watershed*, Reynolds has composed a lengthy, complex solo for percussion that “quotes neither tonality nor world music”. He further postulates that Reynolds avoids [unspecified] models of tonality and world music by utilizing a sophisticated strategy of organization in *Watershed*, which he describes in his book as follows:

[Reynolds] offers an interlocking two-part global strategy. One part is musical: Reynolds maps an interleaved formal plan that evolves by means of the statement and contraposition of the four instrument groups. The other is metaphorical: each group is laced with emotional inclinations that are revealed to the listener through sound and related physical gestures.

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114 In this instance, Schick refers to the use of tonality as pieces that function by channeling an unpredictable flow of information along a known pathway – the inherited and mutually understood grammar of tonal harmony. Steven Schick, *A Percussionist’s Art: Same Bed, Different Dreams* (Rochester, NY: University of Rochester Press, 2006), 224.

115 Ibid., 224-225
The analysis in this document expands and clarifies Schick’s stance; that *Watershed* is one of few solo multiple-percussion pieces of significant length, with organizational depth and complexity. However, the intent has not been to exaggerate or overemphasize Reynolds’ particular ability to write lengthy percussion solos (his output for percussion is limited to only a few works). Instead, this analysis shows that Reynolds’ longstanding compositional methods create cohesive, palpable and intelligent music of both musical and emotional depth, that easily overcome the potential barriers of composing for percussion. His ideas extend far beyond the realm of solo multiple-percussion.

In *Form and Method*, Reynolds writes that “a true composition is not only a remark or stance or display, but a dimensional experience that either leads the listener [and the performer] along a path or proposes a landscape for exploration in such a way that an arc, a trajectory of proposal, engagement, and response has been traversed by its end”. The compositional tools, the form and the musical transformation of *Watershed* provide ample opportunities for such an experience. The additional elements of physical gesture and computer spatialization create a uniquely immersive and dimensional perspective of sound that relates to physical motion and musical transformation, reaffirming the truth and force of Reynolds’ composition.

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APPENDIX A

CHRONOLOGICAL LIST OF TECHNICAL CUES, BY INSTRUMENT FAMILY
### Skin Cues

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### Metal Cues

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### Playing

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APPENDIX B

INTERVIEW WITH ROGER REYNOLDS

(Conducted via phone, by Julie M. Licata on May 30, 2009)
RR: I think that the questions you emailed me are exhaustive, if not exhausting. There is plenty to talk about and I think that everything that you have identified is potentially relevant. I would certainly say at the beginning that I appreciate the seriousness with which you have prepared for this and the substantially of the approach in general. I think that this is one of the larger issues that really beleaguers the contemporary music scene in this country. There is such an emphasis on music that it is safe to discuss because the composers are long gone.

JL: I have had a great experience over the past year and a half preparing, performing and now, doing extensive analysis of *Watershed*. Even in the later stages of my research, I am discovering new aspects of the piece that I didn’t recognize when I was performing *Watershed*. It has been very exciting, and the piece has been crucial to my musical growth over the past two years. To say the least, I am very excited to be able to talk to you about this. So, let’s get right to the questions …

JL: How and when in the compositional process did the title *Watershed* come about? And, can you discuss the significance of its dual meaning?

RR: This process came about some time ago –17 years in fact. The precise chronology of it is unlikely to be discoverable. But generally, though not always reliably, I come up with a title during the preparatory phases of the work on a piece. I’m a believer – which you probably know from the reading that you have already done – in the idea that there is no such thing as precomposition; that everything one does in the investment, everything that one does on the way to a realization is an essential part of the process. It is often the case that the settling upon a title and the probing of what a title implies is an important aspect of trying to focus my creative energies in a particular way that is suited to that project, as opposed to let’s say a generic interest. So I think that there is always that sort of duality in whatever it is that one has done and knows how to do on one hand versus the particular way in which those capacities are being engaged in the context of an individual
composition. For me, I think *Watershed* came about because it was the first time that I decided to make a project that would involve real-time computer processing. In a sense, it was a watershed moment for me. (I had used analog electronics in real-time fairly extensively, decades before that, but hadn’t actually gotten into using computers for real-time performance.)

The titles of the pieces are an essential way of focusing my attention on that particular moment. Of course that means that other things that are happening in the environment, or in my life at the same time are often engaged. In this case I had two new colleagues, one was Miller Puckette, who created Max/MSP and was then at work on the beginning stages of Pure Data, and Peter Otto who directed Berio’s *Tempo Reale* in Florence. With Steven Schick as such a valued performing colleague and these other two very strong new additions to our community, I thought it would be an ideal place to start working with real-time electronics. I decided that this was going to be a collaborative undertaking on a lot of different levels. It seemed clear to me that if I were going to do something that I was going to invest a lot of thought, time, energy and human capital – of time and relationships, as well as creative capital – it needed to be something that really brought me into a new kind of relationship to ideas and materials. So there were a lot of ways in which the notion of watershed, which is to say moving over some kind of decisive boundary, became interesting and appropriate. I think that it operates within the project on a number of levels. So, whether the word itself provoked some of these thoughts or these thoughts provoked the word, I’m not clear on at this point. I know that it was a synthesis of factors that were of interest to me at that time and also, in a certain sense, it was a demand that I placed on myself.

JL: Would you say that the geographic meaning of watershed – the one that plays out as a large-scale organizational tool in *Watershed* in sections titled “Rain,” “Watershed Divide” and “Storm” – came about as a secondary, but crucial, implication of the term?
RR: Yes, I think so. There is a process of exploring a possible title, and of course the title may be a single word if it is resonant enough, or it may be a phrase or something a little longer. But once I decide on it, I think of it in terms of … I don’t know whether you have looked at my book *Form and Method*? … If so, you know that I use the idea of the impulse or *impetus*. Once I settle on the title, the title is likely either to be, or to be close to being, the idea of the impetus that I am working with. In this case, I think I was reading dictionaries, which I like to do when preparing a title, and working on understanding what it might mean, and there are, of course, often alternative choices. In any case, when you look at the term watershed you see geographic or geological aspects to it. So, I thought that there was nothing wrong with seeing whether, in some way, it could be a part of this adventure. I think the idea of an ostinatic patterns probably preceded their designation as Rain. Once one had the idea of rain and climax or apogees, geographically or elevation-wise, it would be obvious that having a storm here and there would make sense – so that this is just a part of living in the space of opportunity.

JL: You had mentioned after reading my initial proposal that the placement of the boxed events were controlled by a logarithmic set of proportions. Are there any other organizational or formal aspects of *Watershed* that were created or controlled by mathematical calculations?

RR: From what you are saying you probably don’t have a copy of the diagrammatic overall play of that piece. I could send you that.

JL: That would be helpful.

RR: Of course. There are with all my pieces architectural plans that give the proportions and spacing of events. Those are what I would call orderly provocations. They don’t explicitly and finally determine the way time will actually occur in a performance. So the proportions that I lay out are for me *opportunities* or prospects; they are not proscriptions.
The idea of these boxed events was to have landmark moments that shaped the experience, for the performer and/or the listener, of the large-scale shape of the piece. There are, as you know, five metals – there are logarithmic series that place strokes on each of these five metals throughout the duration of the entire piece. Whether one actually hears that is certainly open to question, but the idea of a series of events, which accelerate, or *ritard* I think is fairly clear after the Watershed Divide. Just after half-way through the piece, there is a reversal, so that, instead of going from low to high, the series of strikes on the five metallic instruments goes from high to low.

As I was working on the design of the piece, the placement of these events, the idea of *boxing* just came about as a notational convenience that sets them apart from other events, so that the performer would understand that these had some kind of privileged status. But then, when I look at the design of the whole, the placement of these logarithmic iterations on the tam tam, on the wind gong, or whatever, also gave me ideas about how to arrange proportions within the whole piece and where there could be points of initiation or conclusion that began to suggest other formal possibilities.

**JL:** Did you consciously insert shorter variations of this large-scale time-line within the body of the piece? For example, measure two has a musical figure that spans the metals from the lowest to the highest pitch; also, over the course of the first Rain section, the music of the metals spans from the lowest to the highest pitch in slowly accelerating occurrences – both these passages mimic, in different ways, the large-scale boxed event structure that spans the entire piece. These are just two examples; there are many more occurrences of similar musical ideas.

**RR:** This is not specifically thematic, but it does echo the boxed events. Whether that echo was consciously intended or spontaneously happened in the making of the piece, I couldn’t say at this point. But it is certainly going to be the case that anything that I consider as essential or fundamental to the materials, or the processes of the piece, is going to appear many times in many different circumstances and at many different scales.
and so on and so on. That idea of immersing oneself and being in a space of relationships and potential is the whole point of the exercise for me. The fact that you observe that something is there doesn’t mean that I planned it, but it is certainly evidence of the fact that I try to get very immersed in what I am doing.

JL: I’m going to take you in another direction. The configuration of the instrument families was developed early on in the process of *Watershed*. What other positions did you consider for the performer in relation to the audience?

RR: None. I think that probably in the interactive evolution of all the aspects of the piece, it became clear quite early that the computer’s role was going to be exclusively spatialization. So, at that point I had no intention to do any signal processing and that meant that issues of location and space, and so on, were even more important than usual in my thinking about things. Steve and I actually worked on arriving at an ideal setup, probably for most of the year – that is there were probably 8 or 9 months of playing around with different positions and different ideas and the whole notion of spiraling up and down and so on. I think that probably the selection of the instrumental families preceded the making of the final performance setup. But, the idea that the instruments surrounded the performer and the speakers surrounded the audience came very early.

JL: When I was considering the room that I first performed *Watershed* in – a tall black box room – I thought it would be interesting to place the performer in the middle of the room with the audience surrounding the performer and the speakers surrounding the audience. But after listening to your interview on the *Watershed* DVD and heard you talk about giving the entire audience a similar spatial orientation to the spatialized sound as the performer has to all of their instruments, I realized that putting the performer in the middle of the audience wouldn’t necessarily reflect your intentions.
RR: There is another element that comes into the picture, (that was certainly more strong in *Sanctuary*) that is one of the most regrettable things about most of the utilization of computer processing of any kind in a real-time context (or actually earlier than that, when there are situations involving prearranged or prerecorded materials which are played back during a performance). A very problematic aspect of this is that the performer doesn’t really live within the same space that the audience member does, so in fact, it might be highly desirable to try the idea of playing it in the round. I think that the fact that we didn’t specify that in the beginning shouldn’t being taken as indicating that it is not okay, but rather that we were dealing with the situation that we had, and the idea of putting the audience around the player given the performance space that we had in 1995 … it just wouldn’t have worked. But, of course, there is also the issue that if you don’t have the performance setup orientated in some way then it is difficult to be ideally economic in terms of positioning geometries – you know… the performer being able to reach the instruments. Just think of *Zyklus* – it’s a nice idea, but it constrains potential as well as focusing potential … the bitter and the sweet. So I think that we decided, for example, that the proximities of the oddities to one another or the proximities of the skins to one another was an important aspect of the way in which I could ask him to play them. So if you are going to have focal centers, then it is natural to think of putting the audience in the position where they are most optimally located to see the performer performing. Nonetheless, I wouldn’t necessarily be opposed to the idea of it being done in the round.

JL: Although, it would be an interesting perspective sitting behind the tam tam! In my first performance we ended up, since we had the speakers above the level of the instruments and didn’t have many issues with feedback, setting the audience in a semi-circle almost all the way to the tam tam. That setup seemed to give every audience member a unique perspective on the sound and the visual … it may or may not have been the intention.

RR: It sounds like it’s certainly a worthy experiment.
JL: In each of my performances I had a different perspective to the spatialization than the audience. As you mentioned, the performer doesn’t live in the same spatialized world as the audience does. In one of my later performances, all of the speakers (and the audience members) were in front of my setup so I didn’t hear the spatialization at all, or very minimally. But for my performances at North Texas, two of the speakers were beside (and above) my setup and I could actually feel myself inside of the sound a little bit more and it was very interesting.

RR: I think that there is no doubt that the immersion of the performer in the field of the sound that is emanating both from the performer, but also from the computer, greatly changes and informs the nature of the experience. There is no question about that.

JL: Definitely. For the performer and the audience. Also, I studied the technical score so I could actually understand what was supposed to be happening, even if I couldn’t hear it clearly. It was immensely beneficial to me in interpreting how to play the notated music. Also, it was an interesting experience to see the piece grow with the addition of the spatialization. I spent about six months working on the piece without the spatialization.

JL: On another note … is there a recording of *Watershed III*?

RR: Yes, there is. I can send you that too. It was done a couple of times in the east in New York and Baltimore, and it was done in Europe a few times. The recording that I have is from the International Computer Music Conference in Thessaloniki in Greece. Steve Schick performed it, with Jim Avery and the Ensemble Surplus from Freiburg, Germany.

JL: Can you discuss the numbering of the three different versions? Were they numbered in the order they were composed?
RR: The numberings came about in a somewhat capricious manner I’m afraid. The first *Transfigured Wind* (a work for flute and computer processed sound in several versions) was basically the material that formed the solo passages in the piece; the second one to be composed was for the solo material for the flute and full orchestra with computer sound; the chamber version came third; and the version for solo instrument and technology came fourth. Obviously, I would have ordered them differently, but the problem was that my publisher had already named and put in the catalog the first Roman numeral, so I was following the luck of the draw. There is no significance in the numbers. It just happened because of the opportunities I had that they were composed in that order. So four does not mean a culmination, and there is no *Watershed II* at this point because I have not had the opportunity to think about doing it for a full orchestra.

JL: So do you view these as three distinct works?

RR: It is certainly the case that there is a lot of material in *Watershed III* that is not in *Watershed I/IV*. And I’m not 100% happy with *Watershed III* at this point. I have talked to Steve several times as to whether at some point we would have the opportunity to do it again. I would like to do some revisions. I think that at the time that I originally did it – because there was already over 25 minutes of solo materials – I didn’t want to drop a lot of that material and at the same time I didn’t want to obscure it. So it was a very complicated process trying to figure out how to add an ensemble without diminishing the importance of the material that I had already composed.

JL: These next few questions concern audience responses to the different versions of *Watershed*. I spoke to several people after my performances that said that they couldn’t imagine *Watershed* without the spatialization. I have not performed *Watershed* without the spatialization. I practiced it without spatialization, but I have never performed it that way. I was just wondering if you have had any reactions that are memorable to you or that might define how *Watershed*, in its multiple versions, is received?
RR: Well, that is one of the regrettable aspects of where our musical culture is right now … or actually our culture from a larger perspective. Decades ago there were a lot of published reviews that gave composers at least one perspective on what people who were presumably listening seriously in different places were hearing. But that’s not the case any more and I suppose one is reduced to reading blogs, which to put it mildly are unreliable. As I mentioned in the beginning – about the seriousness with which you are undertaking this study – this subject has a lot of importance and negative sequelae, to use a medical term, if there is no record of response. In a way, response becomes tragically ephemeral. And that is very bad for a performer or composer who doesn’t already have a profile, or a particular place, so as to achieve a level of specificity or iconicity that allows a rich discussion or understanding of exactly the question you asked.

I think that the issue of how audiences or listeners in general respond to music is important. How to go about actually restoring that to the larger societal musical discourse is a really tough question. But Steve and a number of his students here have also played Watershed, and I get letters from Doctoral students and Master students around the world, about the fact that they are playing it … I think that it has actually been played quite a few times without any electronics.

One occasion that I remember as being particularly remarkable and rewarding was that Steve (a number of years ago) did a series of programs called “Three Evenings of Percussion”. It was an extraordinary thing because he put into three programs what he thought was the most significant repertoire for percussion. He played these concerts in New York, Los Angeles, Geneva and a variety of other places. In New York his performances were in a small chapel, I think it was in Midtown. It was a very reverberant space and it was absolutely marvelous. In a certain sense the building took care of the issue of magnifying or repositioning or putting halos, metaphorically, around the sound. So it wasn’t variable, but it was very much alive. And there was something very nice about the fact that it was a relatively small space in floor area so that everybody was relatively close to Steve – but it also had high ceilings so you didn’t feel completely inundated by the dynamic level. I think it can certainly be played without electronics but
not ideally in a space that is too vast or a space that is too dry. I guess the basic metaphor is that the space needs to be responding to what the player is doing; if the space is larger, then that comes about through the intermediate stage or assistance of the computer and the dissemination structure.

There are also some reviews of the DVD. There was quite an extensive one in the *Computer Music Journal* and there were a couple of others. There hasn’t been a lot of press that I have seen. I guess one of the ways that it might be explored would be to contact other people who have played the piece, but that in itself wouldn’t be straightforward.

JL: I think it would be very interesting to document the kind of responses that different audience members have, also taking in consideration whether or not the audience was informed about the musical form, content or intentions of the piece before hearing it. In my case, I presented my first performance as my final DMA recital at University of North Texas. I gave a 60-minute lecture before the recital to the composition students in the department, talking about *Watershed*, as well as the other two pieces I performed, *Altered in Transmission*, by Andrew May, and *Imprints*, by Greg Dixon. Greg and Andrew were there as well. Together we talked about the technicalities of the spatialization as well some of the large-scale organizational elements and conceptual ideas of *Watershed* – for example, the physical gestures of the performer, the voices of the instrument families and the significance of following the metal time-line. My hope was that they would be more actively engaged in how they were listening, so hopefully they would feel the growth and transformation through the end of the piece. At another performance Greg and I gave a quick 10-minute presentation. That audience was full of composers and musicians, but they much less informed about electronic music, especially real-time computer processing, so Greg talked to them about the spatialization and the processing in the other pieces. In hindsight, I wish that I had given one or two performances without introducing the piece to see what their reactions would have been and how they would have been different. Maybe this is something I can try in the future?
RR: Well, I think that a lot of young composers believe that there is a high value in the notion of listeners being unprepared, in fact even performers being unprepared, with the idealistic notion that they will discover more, or that their responses won’t be preshaped and so on. But, except for the egregiously manipulative efforts in one way or another, I think that is really nonsense. I actually participated in a very elaborate decade-long study of a piece that I wrote collaboratively with perceptual psychologists in France, called *The Angel of Death*. There is a special issue of the *Journal of Music Perception* that is devoted to the piece. The basic idea for the project was, of course, for the psychologists, different than it was for me. What interested me was the question of whether the elements that I specified in my plans, such as, with *Watershed*, the instruments as families, the metaphor of watershed, the logarithmic series, and so on...whether people were actually hearing these things or whether they were just fantasies in my own mind. And what came out of this experiment was the piece called *The Angel of Death*, a chamber piano concerto. It became very clear that the audience, listeners, whether in France or in the US, absolutely were experiencing the shape of the piece as I intended it. What was also clear was that in a sense they were not comprehending or dissecting the details of the experience in the way one would hope that they would. So there was a strange combination of results, on the one hand – yes, the kinds of things that I think are important in shaping a musical experience are indeed important; but the level of the discourse, the level of the communication between the composer and the performer and the performer and the audience member is probably much less explicit in detail than one would hope.

So, to go back to your question, the thing that I found in the performances in Paris that we did through IRCAM in the early 1990s, is that a lot of scientists that did not usually go to concerts were at the event. They were uniformly complimentary and excited about how rewarding the experience had been and how wonderful the music was. All this was very gratifying, except that it emerged, as one thought about it afterwards, that the reason that these people were excited or so moved or engaged was not necessarily because the music was better that what they usually heard but rather because
there was a task assigned to them. In other words, they were expected to listen and to register reactions as they listened. The fundamental thing that occurred was that these people were engaged in a way that they weren’t usually engaged. Therefore, they had a better experience. It seems almost laughably trivial, but it isn’t. If you set up an agenda for your listeners that isn’t coercive and that is amenable to them in one way or another, then it is certainly probable that you are going to get a much more engaged reaction. And, in a sense that is the whole purpose of concert decorum – the idea that we sit in darkened rooms and everybody is well behaved and sitting facing forward and comfortable, having just eaten dinner and all of that.

JL: In my experience, the audience that typically attends a concert of this type of music is relatively small and that most of the people that are going to hear this music are likely to be more open to a positive experience. I don’t usually see audiences coming to performances like this ready to protest the music or to be upset about it.

RR: Well, I think that I would put it another way … I would say that people who are strongly predisposed that music is a certain thing may well be hostile, but people that are either predisposed to like it or have no presupposition … under the right circumstances they have good and sometimes quite remarkable experiences. The things that people say to one another after a concert or write in a note are quite amazing. So I think that it is the other way around. In other words, I think that the barrier to understanding or responding, assuming that there is something to respond to, is a predisposition to believe that music is and can only be one sort of thing. And, obviously, this is almost unbearably, unbelievably, unjustifiable given the variety of musical cultures in the world – and yet that is how a lot of people see or hear things.

JL: And strangely, even a lot of educated people.

RR: Education doesn’t always open the mind.
JL: My next few questions are a little more personal. You mentioned in your DVD interview that *Watershed* marks a change in your focus from objective to subjective. You also stated that the metaphor of watershed represents a kind of change in your compositional life and the people that you were working with. Could you clarify for me what you meant when you said that your focus has, or had, changed form objective to subjective?

RR: Well, actually that was an interesting question to read [in a previously sent email], because I don’t remember having said that. I haven’t looked at that interview for a very long time. I don’t know why I would have identified that particular piece and that particular project as having this effect. I guess I would just say in a more general way that this is, of course, another aspect of the discussion we were just having about presupposition. For a lot of people, music is properly about itself and about the relationships that can be defined between musical events and so on. There is certainly some truth to that, but it is obvious that the relationships that we have relied on in the West are not completely mappable on to other great musical traditions that involve a larger number of people than were present in early 19th century Europe. I think there is a tendency on the part of certain sectors of our music profession, especially in music education, music history and musicology, to think of music as some kind of absolute thing, an objectifiable thing, and I don’t think that is true. I certainly never thought it was true. But the question of exactly what status so-called subjective elements have in relationship to objective criteria is another matter.

For example, in talks that I give to lay audiences, or audiences that are not primarily made up of music listeners, I sometimes play a synthesized version of a Bach two-part invention. It is a literal realization of the relationships that Bach sets out with no inflection whatsoever. Then I ask the people “Is this music”? Many of them will say, “Of course, it is”. And, I will say, “No, I don’t think that it is really music, it is musical or music-like, but it isn’t *music*”. Then I play the same passage as performed by Peter Serkin, and it is almost impossible not to move when he is playing, because the music is
so animated. Then I say, “What is the statistical difference between these two performances”? They are almost identical in sound relationships, but they are certainly not identical in experience.

Perhaps I was thinking about getting access to, or utilizing better aspects of my own emotional, intellectual or mental life that may not have been fully harnessed before. It could be that there was something I was thinking about a lot then, although I don’t think it was an issue only at that time or with that piece… but it is always there. There is always the basic question that Karen, my wife, frequently asks me when I’m working on a new piece, “What does it mean?” or “What is it about?” For a lot of musicians, this aboutness concerns pre-established patterns of relationships and so on. And, I don’t think that at all… I think the specification of relationships is part of the process that but it is actually the manifestation of those relationships in a very nuanced way that fulfills the entire requirements of music in it’s fullest sense.

JL: After listening to your DVD interview and reading both Steven Soderberg and David Bithell’s interviews several times, as well as Schick’s discussion of Watershed, I started to wonder if Watershed might be intentionally, or unintentionally, a little autobiographical. I see the skins as the primary instrument family in Watershed, and the other instrument families playing significant roles in altering the life of the skins (though they are also being altered by the skins) in many different ways. I don’t remember which interview, but at one point you identify the transformation of the skins as moving from didactic to expansive and again at another point referring to them as moving form objective to subjective …

RR: As I look at the printout that you sent me, I can see where this is going. That is certainly relative to the question that you asked a moment ago about an objective to subjective direction. In a certain sense, if you believe as I do that composing, the making of any art, is a completely immersive activity – that it requires and consumes everything that an individual has at his or her disposal – then it follows that every piece is
autobiographical in some sense, because it is a response to life, it is a response to living. So, as far as a particular time in my life … let’s say around the birth of my daughter, her marriage or the birth of my granddaughter or something like that… In fact, I wrote a piece when our daughter was born called *Threshold*, which was very much a response to that moment. Whether that means it is autobiographical or not is another matter, but I think that any human being, or any artist, is engaged in the process of living and responding to the world. So what is going on in any moment is certainly going to be at some level, whether blatant or subtle, instantiated in the music. It is an interesting surmise I suppose … that passage in *Watershed* from didacticism to a taming of the angularity and the over-explicitness of the rhythmic materials of the skins in the beginning – becoming as Steve referred to them as *singing drums* in the end. You know…that’s there, absolutely. But exactly *why* it is there is something that I wouldn’t be able at this point to illuminate more than I just did.

JL: I would like to share a personal anecdote of my own experience within *Watershed*. As a performer – I don’t compose at all …

RR: … you are blessed and so are we for that. I don’t perform either.

JL: I often remember pieces that I learn and perform and relate them to my life, and *Watershed* had a huge impact on my life. It my last college performance, my last performance as a student (certainly a watershed moment), and I remember having numerous musical epiphanies in the midst of learning this piece. I would spend hours and hours inside the cage of instruments, feeling like I was living with these instrument families. I actually spent a lot of time just lying on the floor in the middle of the setup, relating to the characters in *Watershed*, as I was to my roommates, feeling like I actually lived with these people too because they were transforming me as much as I was transforming and manipulating them. It was a wonderful experience that I want to share.
RR: It looks from your proposal that, and I don’t mean to over emphasize this in a patronizing way – it seems to be a very serious undertaking and that’s a really good thing – but, the question that comes up in that regard, because I’m reading a lot of papers by students here right now at the end of the year, is this: What is the place in documents of this sort [dissertation] for personal reflections and the kinds of things that you just said? What I’m saying to the students whom I have interaction with is that it is important that these perspectives be in the documents but that they don’t dominate the presentation. If they dominate the presentation, then in a way it is off putting for people who don’t share the author’s particular perspective.

On the other hand, for a performer or a scholar for that matter, to write very serious prose about an experience that has been central to their life for some period of time for whatever reason and not to say anything about their personal dimensions of it seems ridiculous and of course it deprives us of exactly the kind of information that you were talking about earlier – how the audiences responded and so on. How an audience responds in my experience has a great deal to do with how the performer is responding. So I would just say, as a side bar here in the discussion, that it would be a very nice thing if your advisors allowed you to put in an appendix like what you just said – a personal reflection, because it is information.

You mentioned going through the Transfigured Wind interview in the Library of Congress site. This was another watershed moment for me because I decided that, if I were going to utilize musical material as a source of the sounds for the computer processing aspect of the piece, it was important to have that material recorded as performed and that the performative information that the player put into it became then, in fact, a part of the material of the piece. So, in the case of Transfigured Wind, Harvey Sollberger’s performance provided that. Or, in the case of The Palace, which was the first piece I did with Phillip Larson’s voice, his way with the words was a part of the material of the piece. So I think that the issue of an individual’s inflection of or response to relationships is part of content. On the other hand it can become really irritating if it in a sense coerces the listener like a used car salesman.
JL: That makes sense – I plan on including those types of materials, personal reflection, and personal instrument choices, etc. in the appendix.

You mentioned [in a previous email] that your percussion quartet, Sanctuary expands on some of the techniques you used in Watershed. Could you discuss how?

RR: Steve Schick and I were having lunch at some point in 2002, and he said he was thinking a lot (because he was preparing his book at that time) about the issue of how limited the discussion of percussion and the understanding within the percussion community was in relation to the realities of performance. You have all these conditions where you create a multiple percussion setup, where you have to move very rapidly and economically between instruments. Patterns that you learn in one context, you have to be able to apply in a quite different way in another. It would be like a pianist facing the prospect of playing on a piano every day where the size and the length of the keys would be different … one can not imagine that possibility … or a flutist playing a different length flute every day. So, he was just talking in a general way about the fact that he would like to have a piece in which setup, geometries, dramaturgy, movement, all of this, were an essential part of the material of the piece. And from that – it is written about somewhere, maybe on the Sanctuary website – we started drawing on the tablecloth and came up with some basic ideas. In the end, I certainly saw this as an extrapolation of the issues that existed in Watershed in quite a number of ways. First, there is the idea of families that exist in Watershed including the idea of “oddities”.

Sanctuary really began with the second movement, not the first. The idea again was to have families, but families considered in a different way. There are two identical families of skins, which are certainly related to the skin family in Watershed and there are two sets of noisemakers or oddities. The oddities are chosen by the player in response to two factors: 1) designations that I give such as “dry and fixed” to “resonant and malleable” and, 2) the group or quartet is asked to meet and elect one of the members as the most irritating, and one of the members as the most seductive, and the other two are considered by default to be diplomats. So, the diplomats play the skins and the irritating
and seductive players choose instruments, in line with my ground rules, that are meant to manifest that aspect of their character. The music is strongly affected by the choices that the players make. They also have to choose, in addition to six noisemaker oddities, a central seventh one, which is called the oracle. The oracle has to be very wide ranging in the sounding opportunities that it provides and it is placed in the middle of the space.

In a certain sense, the four families form a circle, similar to the circle around the player in *Watershed*. But instead of the performer being in the middle, there is a source of authority, called the oracle, which is put there. The four players then move between their primary circular positions along the axes of an X. They can go to the oracle and take the role of being the respondent with higher authority when they react to things other members of the ensemble play. In the last movement there are two remote stations.

The idea of the whole piece is that the first movement, “Chatter/Clatter,” is a basic repertoire of utterances or gestures, which haven’t been woven into a language yet. The second movement deals with the idea of the oracle, where an individual player posits something and the oracle responds to it. Little by little the players get more confidence, metaphorically speaking, and start to interact with each other, bypassing the oracle. Towards the end of the piece they are all playing together, constantly. So, what was linear and ornamental and independent becomes the textural basis of the energy of the whole group. The last movement is called “Song”. In that movement, the tuned almglocken are suddenly utilized and the contours that have been noise-orientated before become pitched. So, the whole thing, in a certain way, parallels *Watershed*, except that in the case of *Watershed* there were more didactic rhythmic behaviors in the skins, which are smoothed later. In this case the initially primal gestures or behaviors of the “Chatter/Clatter” soloist, eventually become pitched melodies. So, it is parallel in a lot of ways and it certainly carries things much further in both the sonic and dramaturgical aspects of music. It also has a much more elaborate computer role that involves real-time digital signal processing, as well as spatialization. So there are a number of advances, in some sense, over what is going on in *Watershed*. 
JL: After reading my initial proposal, you mentioned that my collaborators (technical musician/engineer) realized your aims in their own way. You continued on to say that you think this will be the way things are handled in the future. Could you clarify what you mean by that statement? From what I understand, in their realization they changed several elements – the reverberation levels, the cuing systems and several other things that related specifically to our performance space(s)?

RR: Okay, so the issue here is also an issue for percussion in general. In the early 1980s, I heard Boulez do a program on indeterminacy at IRCAM. He had two sets of percussion instruments on the same stage, right and left. He had the same group of percussionists perform Varese’s *Ionisation* on two separate groups of instruments. He said that these sets are identical, but completely different. It was a very illuminating and interesting demonstration. I think that the relationship between percussionists and composers is always a little bit imprecise. When you write bass drum or tom or gong or whatever, you really don’t know what is actually going to make that sound. You have an idea in your mind, but you don’t have a certainty. Whereas with a piano, flute or violin you are pretty certain as to what is going to come out.

One thing that has been a terrible detriment and a barrier in the case of collaboration in computer music has been the fact that the machines and the software and the dissemination strategies constantly change. They are different in each environment, different each year and different in each environment in each year. So the question that the composer faces is, “How do you specify the technological aspect of the piece of music”? What many people, European figures especially, (such as Jonathan Harvey or Phillip Manoury) have found is that they have to be at every performance in order to make it right. Nobody else knows what the computer processing is supposed to sound like and a traditional score doesn’t (perhaps can not) explain it.

With *Watershed* in particular, our technical apparatus was literally half the size of a Volkswagen. It was a gigantic set of packing cases that had to be air-lifted to Europe and Japan and so on. It was just unbelievable. At a certain point, I thought there was no
way the piece was going to have a future if it requires 400 (or 4,000) pounds of equipment. So, I wrote to Andrew Gerzo, who was the technical assistant to Boulez in his first computer piece, Répons. I knew that Andrew was supposed to be preparing a score publication for Edition Universal. So, I asked him how that was going and his answer was in short, “I haven’t made it happen yet”. This was perhaps 15 years after the premiere. So I thought that a way to address this was to make what I call a technical score. What the technical score does is lay out the ideals and indicate where the processes are to be applied and over what periods of time and so on. But it doesn’t tell you anything about how to do it. I thought that was a rather quixotian thing to do. I had no idea that it would require such a huge amount of effort. And, I didn’t know whether it would solve anything.

But in fact, a year or so after I had done this, I had an inquiry from a percussionist in Belgium who said he wanted to play the piece. He had technological people to work with, so he asked if I could I send him all the specifications. I said, “No, I won’t. But I will send you the technical score”. So, he got Michael Clark, who is at the University of Huddersfield in England, and they performed it together a number of times. Everybody told me it was fine and it worked beautifully. I think that this is the way things have to go in the future, because there is no alternative. There is no other way. In England right now there is an organization at the University of Birmingham called Integra. The purpose of this group has been to re-engineer pieces from the 1950s & 1960s and early 1970s, that involved electronics. But, they do it with contemporary technology. They can only do very few pieces. The question is then, in what form do they leave them and will that software or hardware be available five years from now? It really is unmanageable and a deeply problematic situation. I think that this idea of specifying technological goals and the relationship of these to the aesthetic goals of a piece is at least a viable way of going about it.

JL: I definitely agree. I’ve recently spent some time discussing this very topic with Andrew May and Greg Dixon. Prior to that I hadn’t really thought much about the
preservation of electronic music. I’m a performer rather new to the field of electronic music in any aspect, and my knowledge of the technology is limited. But, I’m starting to get an idea of the impossibilities of preserving and archiving this kind of music. I asked Greg why this piece needed to be revised only 10-15 years after it was written? It seemed strange to me, and I wondered what could be done to avoid that hindrance. We basically came to the point that you just made. I think the inclusion of a technical score really does provide for longevity of the piece better than anything else that has been proposed to this point. Do you see other composers creating technical scores?

RR: No. Not at this point. This is something that I am talking about with some of my own students who are doing very interesting work. But, in the part of my life that is devoted to teaching, technology is not the main point. The main point is the composing of the music. It is possible to think of the score and the future life of the piece as being relatively incidental in terms of the early development of the composer. But in a larger sense it is not incidental at all. And it will have decisive market impact over the long run. It may well be that there are other people doing this kind of thing – making technical scores – but I don’t think so.

JL: I think that the technical score is useful on another level, beyond longevity. Finally, as a performer, I am able to read and interpret what is actually happening technically, or at least the intent of what is happening. With most other pieces that I have played with electronics… well, it’s just kind of out there and the engineer has complete control and understanding and I, in some ways have to ignore it or just let it happen… or, hassle the engineer to explain things. I guess since most pieces I have performed with electronics have been with the composer, I assumed their musical integrity was in line with their intent, so it isn’t necessary for me to keep them in line.

RR: That’s a good point.
JL: It did a lot for me in my own interpretation of the piece as well.

RR: It also allows you to have a role in monitoring what the technicians are doing.

JL: Exactly.

RR: You might say: “Well, I’m not sure that is in the spirit of what I understand this piece is to be about”.

JL: Yes. While rehearsing the piece together, just as I would with any other chamber musician, I was actually able to talk to him about how he was interpreting the part because I actually knew what he was doing. Likewise, he was able to hold me accountable because he was reading my score. If a cue wasn’t getting turned on or off in time I had to respond or he had to respond to my… interpretive mistakes.

RR: In a new set of pieces called the SEASONS, I’ve gone a lot further than in Sanctuary with having transformative algorithms that are specified in the score, but the computer musician, I mean the technician or the engineer as you are calling him, actually does have to be a performer because, though the relationships are specified, the flexibility in the patches is so great that without the control and subtlety of a real musician running things, its not going to happen. So now my technical assistant, Jaime Oliver, and I are taking about what approach to take to try to notate this. It is very interesting and it wouldn’t be worth doing if the results weren’t different from what you could get in any other way.

JL: Well, I think we have certainly exhausted many topics related to Watershed. Thank you for taking the time to have this conversation.
APPENDIX C

INTERVIEW WITH STEVEN SCHICK

(Conducted via phone, by Julie M. Licata on June 3, 2009)
JL: Could you discuss your role in and the process of creating the instrument setup for *Watershed*?

SS: The original compositional labor was that I was to propose an instrument setup for Roger. I wasn’t necessarily given the sole task of developing it, but essentially the proposal was to come from me. He had other aspects of the project that he was working on independently from me, but the initial point of departure was that this was going to be a highly collaborative process. Roger and I have worked this way for years. That is one of things that I like so much about him; we are involved in the process from the beginning. He is very responsive to performer input, probably more than any other composer that I know. So, it wasn’t a surprise that he suggested that I propose the setup. Now, that is not to say that the setup that came for *Watershed* was only my idea – I merely brought a set of ideas.

The original point of departure was to try to make geometrically overlaid arrangements with different instruments – so a spiral of drums, a spiral of metals, the oddities set-up and the wooden constellations. Each of those has a kind of organic and self-contained geometry and each is just imposed one on top of another. Part of this came from a conversation we had in Chinary Ung’s house – I think that I did write about this in my book – in which we were speculating on how music technology could help people achieve a sense of placement in the space of percussion music. It (the technology) was not just sound generating material or process. I thought that it would be interesting to actually take those geometries inside a multiple-percussion setup, which to a performer are very clear, and transpose them or map them onto the space that the audience inhabited. So those two aspects, the development of a robust system of spatialization and then the sonically interesting geography to the percussion setup itself – those two aspects were part of the original proposition.

Other than ideas for the setup, the only things I brought to the table that weren’t standard or available instruments were: 1) the four wooden instruments, which a friend of mine in New York made (they are just basic wooden boxes with snares, but they really
clatter and I like them a lot) and, 2) the oddities table, which is really designed for every performer, as you know, to choose his or her own arrangement.

JL: How did the idea of the four instrument families come about? Was that conceived before the idea of the spiral configurations?

SS: That’s really a good question. I think that this really came from Roger. He thought Watershed would be modeled on a string quartet so there would be four different instruments that could be separated. They could really have solo moments, but they could also be integrated together as an ensemble. Of course in the world of percussion, a single person can play four instrument families.

JL: When thinking about other pieces for percussion and interactive computer processing, only pieces for single percussion instruments come to mind – marimba, hi-hat, snare drum, etc. Writing for multiple-percussion, with the number of instruments potentially involved, is as complicated and complex as writing for an orchestra – adding the spatialization to this seems to be a huge task as a composer.

SS: Well, but also keep in mind that the use of electronics is equivalent to the idea of spatialization. Those other pieces – I’m not exactly sure which ones you are thinking of, but I think know – they are really about signal processing. Of course that is kind of the last thing that you need in a multiple-percussion piece, but that is the reason to play multiple-percussion. So then real-time electronic treatment equated to, in this particular instance, spatialization.

JL: Can you talk about your preparation and performance of Watershed? (e.g. reading the score, finding/building instruments, how many months of practice, working with the technology, etc.)
SS: Yeah, those are all the moving parts in the preparation of the piece. Well, if I remember correctly, the preparation of the instruments came first, maybe before the score was even finished. I am almost positive that I had those wooden boxes before I had the score. So there was an instrument (the entire setup) basically ready to play on the first day of practice. So that was not being developed at the same time. I think that had to have been the case because the score is very clear about what instruments to use and how they are to be configured, so I’m sure that we had everything pretty much in shape. It is also true that I don’t change very much once I get an installation together. Every once in a while something will change, but it is not very common for me to personally rethink instrumentations after the fact. The way that you learn a piece is so tied to the instruments that you learn them on that it’s often problematic for me to say, all of a sudden, I’m going to need to replace this instrument with something completely different. So that really hasn’t changed, including the oddities. I haven’t played the piece in the last couple of years – the last time was probably 2004 – but in the 9 years of playing it pretty regularly, that was pretty constant.

The learning of the piece was kind of exactly like any other piece. I actually didn’t memorize this piece first – let me think now, your questions are provoking my memory… I usually memorize first, but because the first performance of Watershed was the concerto version I didn’t want to memorize. I just felt more secure having the score and being able to respond to the conductor and things like that. The first time I performed the solo version was also with the music. So, I did those two before I memorized the piece. That was a little bit of a departure from my normal preparations. The day-by-day working in the practice studio was not that different from any other piece, with the exception that Roger was listening in at very early stages of my learning the piece. I don’t think that I have ever had that before. I’m not sure that I have ever played for a composer without really having known the piece – the entire piece. In this case we were sort of working as it came.

JL: So your initial preparations were for Watershed III, the concerto with spatialization?
SS: Yes.

JL: How did you adapt to the different musical settings of the different versions? Did you change anything about the way you played Watershed I, III or IV? And, did you have a different personal aesthetic connection as you were playing in the different version? Is there a version that you prefer?

SS: I think that you know from your performances that when you are performing with electronics you surrender a lot of control to the person that is sitting in the hall mixing the sound. I felt that in the first performance with both electronics and orchestra that I didn’t have as much control over what the audience was hearing as I would in a straightforward solo acoustical piece. I think that is really true. You are also not very aware of the precise spatialization from the stage while you are playing. You are aware that things are happening, but everyone always told me that “the spatialization is really obvious” or “we can really hear this,” but I never knew because I never heard it, except on the multi-channel DVD. You just can’t hear it from the performer’s perspective. The live sound that you are making is so over-powering from that perspective in the hall. So, for me, honestly, the most satisfying musical moments with Watershed were the times that I played it without the ensemble and without the electronics. I have done that quite a bit. All, but a hand full, of my performances have been the solo version. With the solo version, I feel that I can really shape the space. I think it is a beautiful piece – one of the best solo percussion pieces around. For me it really, really works as a solo version – it becomes a more intense and passionate piece that way.

JL: Did you receive different reactions from audiences that heard the different versions?

SS: I don’t know a lot of people that saw all the versions except maybe Roger and some friends of mine. So, I don’t actually remember getting a lot of comparative feedback. And I don’t think that I ever really talked to anyone who saw all the versions to know
what their preferences were. I suspect that Roger likes the version with spatialization, because I think that is how he conceived the piece. But, I don’t know for sure.

JL: How familiar were you with the technical score and translating the spatialization for *Watershed III* and *IV*?

SS: Not very familiar at all. First of all, I have a passive interest in it – it is not a research interest of mine. Also, because I couldn’t really tell what was going on from the stage and, as you know, you really have your hands full with the piece just playing it. I was never really engaged in it – it was really a kind of division of labor that way.

JL: Would you say that there are any elements of the technical score that would be beneficial for the performer to understand, or any aspects of the spatialization that the performer should understand before playing the piece?

SS: When you talk about spatialization you are really taking about reshaping the acoustic space. It is very clear that any time we go into an acoustical space we have to react to it. And I think that this goes without saying – whether you are playing *Kontakte* or *Watershed* or whatever it is. By going into the realm of spatialization you are going into a different acoustical space. So, I think that is extremely important, but I’m not really sure that requires knowledge of the technical score. Well, anyway, I didn’t follow that path. But, the question here was do I know what is going on with the technology? The answer for me was that I used my ears in the same way that you would go into any new space and say that I need to play this faster or slower or whatever in response to the change taking place.

JL: How much time did you spend rehearsing with an engineer?
SS: Quite a bit, especially in the developmental stage. The great thing about Roger and the interesting thing about this piece is – of course it was research and funds all going at the same time – there was research going on for this new percussion instrument and the notation that went along with it and there was research going on for the spatialization. Software was being designed and hardware constructed, so it wasn’t as though we slipped into this pre-existing electronic configuration. It had to be built. In the first performances there was a lot of work. I don’t know that I could give you the number of days, but it certainly wasn’t like we came in and had a dress rehearsal for two days – it was a lengthy interaction.

JL: Did you always use the same engineer when you performed it?

SS: Very often Joe Kucera was a part of my performances. Joe is a recording engineer and a long time collaborator of Roger’s and mine. Peter Otto was often there but, as I recall, we used different people at different times. And then there was a later manifestation of it – I think in 2006. There was another person involved in that who rewrote the software to update it.

JL: I’m going to take you in another direction now…

Preparing a work like *Watershed* is a formidable task, from the music learning to dealing with the logistics of the technology involved. As an educator, sometimes you have to convince students to take on works that at first glance seem like too much work for too little a reward. What might you say to a capable student, or professional musician that is interested, but hesitant to take on *Watershed*? Or, what about the piece makes the difficulties worth working through?

SS: This is an interesting question and I guess the reason that I can’t really answer it is because the situation at the University of California, San Diego is so different from the situation at the University of North Texas and I know Mark Ford … and I don’t think that
I was there when you were there, but I have taken several trips to UNT and I think very highly of the school. I don’t want you to misunderstand me, but there are not that many places in the country or the world where the focus is almost completely on contemporary music. UCSD is and maybe Yale. Even in Europe there are not very many places. So that means that I probably see 90% of the applications from graduate students who are interested in playing just contemporary music, though that may be a small number in relation to all percussionist in the world. If it is a little bit of a lightening rod, then I would always have a class of six people who I would never have to convince to do a project like *Watershed*. So, there is that answer…

But, in a broader sense outside the context of USD where I have always had a graduate class that always did those kinds of things. (In fact *Sanctuary* was a process that was spearheaded by the students … so it wasn’t as though I had asked them to play it. They developed it. But, it is a little bit of an anomaly situation I realize.) My broader answer is that I don’t actually feel like we need to convince people to do these kinds of things. I bet that the kind of reaction you got when you showed your colleges the scores to *Sanctuary* and *Watershed* that there was a mixture of “Life is too short!” and “Why would we want to do that?” and, also “Wow, what is that thing?” So in a way when those things become opportunities that people can follow up on more readily, I think a lot of those would translate into interest in playing it. Now someone like you, who is a relative rarity in the world, would say, “It doesn’t make any difference if there is an opportunity or not, I’m going to do this”. Well, that is the sort of pioneering spirit that a lot of people just don’t have. I never really thought that I needed to be a missionary with respect to contemporary percussion music – I love to play it and I know a lot of people who do also. So, if someone says that I don’t really want to play that then I say “Congratulations! It’s great to know what you want to do and don’t want to do”. I don’t know if that answers your question. And, I don’t mean to be at all facetious with it, because it is really for me an important question as to why and how we pursue the things that we care about. So when someone says that I don’t care about that, I don’t feel very much of an impulse to try to convince him to care.
JL: I think that is a perfect answer.

SS: Great.

JL: Almost fifteen years have passed since Watershed was completed. Has it had the impact on solo percussion performance that you might have speculated fifteen years ago? If so, how? If not, why?

SS: That is really a great question. Even as I just said that I don’t care if any individual plays this piece or not, I do really care whether or not there is impact on the kind of discourse surrounding it… “Has this changed things for us as percussionists”? I think that from that standpoint it is important that other people play it. That is why I was very pleased that you had played the piece and are now writing about Watershed. I also think that it is important for the piece to have an impact on people who have not played it. So from that stand point Watershed has had mixed success. And, maybe one should call it very successful given what it is – but it has some obstacles to overcome. First of all the technology, if you want to play the spatialized versions of the piece, is not readily available to people who don’t have access to a university research facility. Even if you want to play the acoustic version, it takes up a lot of space. It has to be done in the context of a university or an institution of some sort. This is in contrast to pieces like Rebonds or Anvil Chorus that are much easier to do because they have fewer impediments in just getting the piece on stage. I didn’t commission Rebonds, but I did the first American performance of it; I commissioned Bone Alphabet and Anvil Chorus. Those are pieces that I think that have seen many more performances. Even Ferneyhough has had more performance than Watershed has because it’s just easier to manage the practical aspect of it. That having been said, I don’t think that practicality is the main quality of impact, though that is one of them. I think that Watershed poses such fascinating questions, that anyone who picks it up will have much more to think about than a piece which is for a very reduced instrumentation that everyone can play. I think
that this might have been your experience, judging by the conversion that we are having, that this piece prompted a huge number of thoughts for you.

JL: Absolutely. The notation, the large-scale organizational elements, the transformation of the instrument families, the philosophical implications and intentions – there are so many levels that I needed to understand to really get what was happening musically. Even now, as I am doing my research for this project, I am finding it is difficult to keep myself on task, because there are so many things to talk about in Watershed.

SS: I think that the thing that Roger does that many people aren’t capable of doing is that he really connects this to the big musical issues and maybe the big non-musical issues so if you really want to write an article about Watershed for example, that looks like those Percussive Notes articles about different repertoire that talk about just how to play it then you almost have nothing to say. But the instant that you talk about something beyond the facility necessary play the piece than you go into very interesting and sort of deep waters everywhere you look.

JL: Yes, and that is exactly what I am trying to do. I’m not writing this for the purpose of clarifying performance practice. Basically, I want to come at it from a different angle than what most percussion analysis is nowadays.

SS: Performance practice is a very interesting thing because we are developing it as we go and a piece like Watershed is designed to be external to most performance practices. So if you succeed it will expand our notion of performance practice. But, beyond that, I think that the interesting thing about analysis is that it is basically an answer to a question that you pose. The problem in most analysis is that there is a default question. Everybody presumes that question has something to do with form or harmony or something like that and in those Percussive Notes articles people presume that the question is “How do you play the piece”? But, depending on what question you ask, the
analysis will vary. Advice that I give my students when they talk about analysis about anything is to not do your analysis until you have question, then answer that question and you have your analysis.

JL: Two of the elements I am focusing on in my analysis are: 1) the physical gestures created by the performer and, 2) the sonic motion of the spatialization, and how they both reflect and mimic the actual notated music. This leads me to another topic of discussion…

Physical gesture has been a significant element in solo percussion performance dating back to even Milhaud’s *Concerto for Percussion*. Most composers, however, leave the element of choreography (and much of the time, instrument setup, which affects the choreography) to the performer. Usually performers and composers create instrument setups to create the most efficient movements. Reynolds’ *Watershed* is among one of the first works for solo percussion to explicitly call for instrument setup, not for efficiency, but to enhance the musical intent. What are your thoughts on the role of physical gesture in solo percussion in general?

SS: That is a huge question. For one, the choreography of a piece is often a kind of indirectly guided element – I was going to say secondary, but I don’t think that it is less important. I don’t think that I have ever been in a situation that I have made a motion on stage that wasn’t related to the production of sound. In exception, I did a new piece with Paul Dredge recently. It is sort of a theater piece in which – that was a little bit of a different story – even in theatrical musical the motions are normally a part of sound production. So, you are absolutely right that if you take a more optimized set of instruments and if the prevailing impulse is to always make the piece as efficient as possible then what you are going to get over the long term is a very limited and repetitive set of motions. I think that that has really been the gist of percussion playing. Harry Partch, in *The Genesis of Music*, talked about making instruments, which were less optimized precisely so that the playing motions that involved were going to be more
unique. So, this point of departure in Watershed was to ask, “What happens to the physical part of the player when you no longer put things as close as you possible can to make it easy to play”? If you had a bank of four wooden boxes, one right after another or maybe even organize in a big square – well, that would totally be a different piece. So this was really from the outset – you know I think that every piece has its qualities in that way. I’m wondering if I could give you an example of a piece that wasn’t optimized? I learned Interieur the Lachenmann solo only a couple of years ago – after learning Watershed. It was still basically a multiple-percussion setup, but there were things that I did that helped either show or hide the body depending on what the instance was that I wanted… so I think that can bleed into other kinds of pieces – this idea that you create an installation and then you move inside that installation and that creates the choreography.

JL: Does Lachenmann allow for the performer to create a personal instrument configuration?

SS: No, Interieur has a diagram. But, that doesn’t mean that you can’t change it. I made small changes, but for the most part it was the heights and some placements that I changed – but I had an idea of how I wanted it to look also.

JL: Do you think works like Watershed, with intentional choreography, should be considered multi-media works, maybe a choreographed music drama?

SS: I wonder if there is a piece that doesn’t have that aspect? It’s just whether or not it is interesting. I generally think that it is. I think in the case of a piece like Psappha, it is just less consciously a part of most people’s thought process because it wasn’t a part of Xenakis’. But you look at someone playing Psappha and you are seeing a ritual of basically physical theater. I think that was always my injection of the term theater music – I mean, show me music that is not, then I will see the need for distinction.
JL: So do you think that this is simply the nature (and the future) of solo percussion, with Reynolds being one of several contemporary composers to realize their role in creating (or possibly controlling) the choreography?

SS: Yes, that is what I am saying exactly.

JL: Great. Do you have anything else you would like to say about Watershed?

SS: One thing that might be worth thinking about a little bit is the construction of the large-scale form of Watershed. Is there a solo percussion piece that is bigger? Well, John Luther Adams piece is, but it is actually eight, nine-minute movements – it is eight pieces. Watershed is one piece and a single thought. So I think that the ability to find a kind of architectural meaning of the piece is important. This is our biggest problem – that we have a long list of 12-minute pieces for drums and wood blocks, and no real ability to get beyond that and no real interest in moving beyond kind of technical showcases in the mainstream percussion world at least. This is really what it is all about. If you show up at PASIC and play a piece that doesn’t showcase how well you can play, then people wonder why you did it. So one of the goals of Watershed – obviously it is a virtuosic piece, that’s not the issue – was to extend the form and not be simply a kind of talent show, virtuosic showy piece.

JL: Well, yeah. The piece has real musical integrity and that was one of the aspects that drew me in from the start. Even after performing a plethora of marimba solos, percussion ensembles, the other hefty solo multiple-percussion pieces, etc. I feel like Watershed is one of the most complete pieces of music that I have ever played as a percussionist. After performing Watershed, I never felt like I had played for 30 minutes – maybe two minutes. The piece and its direction are so clear and concise.

This sort of relates to some of my questions earlier about audience reactions… Many of my thoughts surrounding my performances centered on whether or not the
audience was able to perceive what I discovered over months of learning *Watershed* – the aspects of the piece that I tried to demonstrate to the audience. Were they able to hear the characteristics of each of the instrument families and hear them develop of the course of the 30-minute solo? Were they able to hear the large-scale organizational elements, such as the boxed events? I heard a lot of reactions from my performances, and generally they were able to perceive motivic development and some of the large-scale organizational elements. I did, though, prepare several of my audiences with short lectures on the pieces, so they had a sense of what the piece was about. In reflection, I plan to experiment with NOT preparing my audience, to see what kind of reactions they have and how much they perceive.

SS: Why not prepare them? You may not need to prepare them with a 60-minute lecture, but I have played it in recitals where I didn’t want to say things. My solo recitals lately have become Spaulding gray in percussion. The kind of standard recital I’m doing these days is about 90-minutes in length, without an intermission, that has seven pieces on it or something like that. I never leave the stage and just talk a little bit. Mostly I don’t talk about the music, but tell some stories or even personal reactions to things. This is just what I’m doing – I’m not suggesting that anybody else would be interested in doing that.

I think the critical thing about *Watershed* is the idea that you have four personality types and they resist each other, as four people might want to hang on to their own identity. The higher you turn up the heat on them, the more they have to occupy the same space, and the more they become like one another or they go through processes of insisting on their own validity and then learning of amalgamation and ionization – it is really very much like the story of *Ionisation*, the Varèse piece. So in a minute you can imagine what it is like to be in a family where four people have very different personalities and you have to decide whether to accept, incorporate or reject aspects of different peoples personalities and that is really what happened in the piece.
JL: While I was preparing *Watershed*, I was living with three roommates. I often found myself drawing parallels between my living situation and the four instrument families.

SS: So which one were you? The skins, metals, oddities, woods? Maybe that’s an unfair question…

JL: No, not unfair…it is an interesting question. I surely see myself as the skins, because I am the central character in my life. My roommates, however, may have a different opinion – they probably would have labeled me the oddities.

SS: Great! Actually that’s what you should do. Find people who really seem like those qualities and invite them for a drink and see what happens.

JL: When talking to Roger, he said that is actually part of the makeup of Sanctuary – to find people who had specific personalities to play specific parts. I think that it is really cool.

SS: Oh yeah. It really is.

JL: So let’s contextualize *Watershed* in a different way. It is obviously significant in length and the development of the instrument families over the course of a 30-minute percussion solo. I’m wondering, are you aware of any other solo multiple percussion pieces with computer processing? Do you know any that are not for just solo percussion instruments?

SS: *Chatter/Clatter* from Reynolds’ *Sanctuary* is, of course, a good example. I am aware of some others, but I can’t think of their names. There are some that have come out of McGill and there is certainly a bunch out of UCSD. But, they are not really standard repertoire, if that is what you are saying. Well, *La coupure* is a good example, the James
Dillon piece, which I am hoping to resurrect next year. So there are some examples and *La coupure* is an interesting piece because it is an hour long and that is single solo percussion piece.

JL: Is it also written for instrument families?

SS: Yes.

JL: Well, those are all the questions I have for you now. Thank you so much for your time.
APPENDIX D

INTERVIEW WITH GREG DIXON

(Conducted face-to-face, by Julie M. Licata in May/June 2009)
JL: In what ways were the technical aspects of *Watershed IV* realized differently than the previous engineers/computer technicians?

GD: I am presently aware of three interpretations of *Watershed IV*, all three of which have different versions of the spatialization. Peter Otto made the first version. In this version, the reverb generation was created using external reverb effects processors controlled with MIDI. The second version was ported to Max/MSP by Grace Leslie and used MSP reverberators that replaced the older and bulkier external reverb units. My version began as Grace Leslie’s and continued on in the Max/MSP environment.

The main changes that I made were the creation of a more intuitive user interface for cueing and fixing some bugs with the software that were still floating around after the second version. Andrew May provided a lot of help on this project and assisted me in creating the new cueing system along with helping pinpoint some bugs in the software of the older version. The first cueing system involved a great amount of hand dexterity, clicking various places – my cueing system doesn’t require use of the mouse and is completely stripped down to keyboard strokes. It also allows the sound technician to start at any of the dedicated cue points found in the technician's score.

So, my version is basically a revision of the second version. I spent a considerable amount of time going through all of the cues written in the score, comparing them to cues on the computer written within the Max/MSP environment and fixing a few errors here and there. I also felt that there were certain things that weren’t aligned between the notations of cues in the technical score and the *Watershed* Max program. So I contacted Grace Leslie, who graciously helped point out some errors and omissions that had occurred in the cue nomenclature in documentation that I hadn’t yet seen. Eventually, those errors were fixed. *Watershed*, like many interactive works of this nature, keeps getting technically reinvented and hopefully improving with time.

I tried to set up *Watershed*’s mixing as hands-free as I possibly could, because so much of my attention was dedicated to following the score and trying to accurately strike the keyboard for the computer to perform the next cue. The spatialization is all
programmed within the software, so I simply adjusted the input faders for subtle balancing of levels. My final live mix of Watershed was gradually made over time throughout our numerous rehearsals at the Merrill Ellis Intermedia Theatre (MEIT) at University of North Texas – through a process of refining the microphone setup, the gain structure between sound microphone inputs and Max/MSP’s outputs, along with input EQ settings.

Each concert hall that Watershed is performed in demands a different approach from the sound technician as to how the sound will be mixed and projected. At the MEIT, there is a sixteen-channel projection system with a lower and upper ring of eight channels. When I projected the spatialized sound of Watershed, I used six of the upper ring of loudspeakers surrounding the audience in a circular configuration. Projecting the sounds from the upper ring allowed me to amplify the computer’s playback to a greater level before feedback, since the speakers weren’t as focused towards the various microphones’ axes – instead focusing more toward the center of the hall.

JL: Reynolds stated in an email conversation with me that our (your) technical realization of Watershed is the best option for current realization of the piece. How long do you speculate that this will last?117

GD: In the future, I am interested in trying to do another version of Watershed’s software that will be ported into the Pure Data software environment, hopefully with assistance, once again, from Andrew May. Andrew has recently been developing some very interesting spatialization software in Pure Data that is geared towards, but not limited to, thinking of spatialization in circular trajectories. This could make it a very intuitive spatialization interface for Watershed’s sound projection.

JL: Could you describe the technicalities of our performance space?

117 This question was asked before I understood what Reynolds meant by this statement. See Appendix B, an interview with Roger Reynolds for clarification.
GD: I will send you my notes on this:

Computer: Macintosh G5
Interface: MOTU 2408
Mixer: Mackie 24 Channel Mixer
Speakers: Six matched Genelec 1038B in high ring above the audience and performer.
Max/MSP’s six audio outputs routed to each speaker accordingly.
Highpass filter 60-80Hz on Mackie, all channels except tam-tam.

These are the microphones that were used for our UNT performance in January 2008:
Channel 1: tam-tam: SM-81, Preamp Setting: @+ 20dB
Channel 2: right cymbal: DPA 4060, Preamp Setting: @+ 10dB
Channel 3: left cymbal: DPA 4060, Preamp Setting: @+ 10dB
Channel 4: gong: SM-81, Preamp Setting: @+ 20dB
Channel 5: crotale: DPA 4060, Preamp Setting: @+ 15dB
Channel 6: oddities: T.H.E. KP-GM reference microphone, Preamp Setting: @+ 15dB
Channel 7: right skins: AKG Blue Line w/ cardioid capsule, Preamp Setting: @+ 15dB
Channel 8: left skins: AKG Blue Line w/ cardioid capsule, Preamp Setting: @+ 15dB

Note: +48V phantom power on all channels. Channel 7 is *right* skins and not left.
This does not follow the traditional method of routing left channels to odd channel numbers.

Note about DPA 4060: The DPA 4060 were all clipped to music stands or instrument stands to reduce stage clutter.

Output: to MOTU 2408 per channel at unity gain.
Output: Max/MSP output channels from MOTU 2408 to Mackie mixer @ -10dB.
GD: One that might be interesting to talk about is that the way the microphones were set up it was largely out of practical considerations – like the fact that I didn’t have access to a large selection of microphones. I had a limited selection of good quality microphones that I had available to work with, but it wasn’t like I had eight of the same microphones to try to get the most consistent sounds. It was unknowingly kind of beneficial because not only were the source sounds different instruments, but each instrument family was miked differently. I think that it extends the individual character of all the instrument families if you can bring out differences with the microphone also. I think that the sounds themselves have an individual inherent character to them, but as an engineer you can bring out those things by perhaps having a different treatment using the electronics of that specific element so it kind of brings a different color to it. So, I think that even though the microphone considerations were largely practical in a way, I think that if I did it again and I had any microphones that I could possibly choose from, I would probably use different ones for each family of instruments rather than having a much more consistent kind of approach to measuring the sound. We ended up using four high quality omnidirectional microphones and I think that you could probably pull it off with all similar model omnidirectional microphones. But, I think that it is also interesting to have different colors going on for each of the signals. It’s tough to know because I have only had one specific setup that I worked with.

JL: Did we bring all this equipment with us when we traveled?

GD: Mostly. We brought the DPA’s and the SM81’s. I am pretty sure that Chad Loughridge at Capital University had a couple of SM81’s that we used. There were a couple of substitutions, but it was basically apples for apples type of things. For instance, Neumann KM184’s were substituted for the AKG Blue Line microphones with cardioid capsules. Yeah, when we traveled, I kept it as close to our original setup as I could. Because it is just this persistent process of trying to find a setup that will really project the sounds correctly.
JL: Didn’t he call for contact microphones on the metals?

GD: Yes, he did. The reason that … well, the thing is, I got these 2007 notes from Grace Leslie and I looked at the microphone setup. She used SM98’s, which are like goose neck drum microphones. It’s not a contact microphone. So I ended up using DPA4060 microphones instead, clipping them in various ways in essentially the same type of fashion as the SM98’s. So when I saw that in 2007 that they did it without contact microphones, and considering that we didn’t have a really good selection of high quality contact microphones, I said let’s just figure out something that is similar. This is when I started to think that the bleed over from different instruments into different microphones that are getting spatialized actually contributes something to the dimensionality or the spatiality of the work. I feel that whenever you use contact microphones, you are measuring the deformation essentially of a metal that is placed upon something – often you really are trying to reduce feedback. I mean you could probably amplify a lot louder if you use contact microphones because you would be able to reduce a lot of feedback issues that might come up otherwise. But, at the same time because you are just clinging onto the vibrations of whatever surface is being vibrated, you end up having a sound that is kind of almost too dry, like it’s being sucked into a vacuum. In that way, I think that it is not a bad idea to use these types of very close clipped on microphones. I don’t know though … it would be interesting thing to try it with contact microphones sometime.

JL: If I understand correctly, Reynolds’ intention for the spatialization was to give the audience a sonic experience similar to the percussionist’s, so having that bleed over could be part of the experience.

GD: Yeah. I feel like perhaps – you know, we haven’t tried it – if we did try to use contact microphones, the sound would be really clear-cut and you wouldn’t have as much of a confluence of the different sounds that are actually taking place. Again, you can amplify a lot more before feedback, which could lead to some really interesting results.
But I think that it might tend to pull everything into this kind of sonic vacuum that I just spoke about, like in the 80’s, recordings were done in dead, padded rooms, everything was close-miked and everyone was in a separate place – at least with many of the rock n’ roll records. I think this method is helpful because you can process all of those things individually, but it tends to suck things into this sonic vacuum that I find to be kind of ugly. I think that a little bit of space is always a part of the medium in which I work as a recording engineer and sound engineer. It’s like everything has to have a bit of room to breathe in order for us to actually hear the sound in a natural way. I mean we don’t put our ear right next to the cymbal. We don’t necessarily hear them that way. I don’t know. A lot of this comes from my work as classical recording engineer, where I am constantly trying to be aware of the critical distance – which is the point at which reverberant sound is equal to that of direct sound. I often find a microphone placement that blends this direct and reverberant sound in the most effective way. Often I am placing microphones closer to the direct sound than to the critical distance. I am always aware of this relationship between sound and space and I like to let instrumental sounds breathe a little bit, if I can. If you look at the way that I miked Watershed you might find that I have things backed up a little bit more than other people may have in the past. Still, everything is closely miked to try to eliminate feedback problems.

JL: Could you discuss your view of the role of technology to the musical integrity, or the musical intent, of Watershed?

GD: The technology is incredibly important to the performance of this work. There is such a large amount of detail that Reynolds places on the technological aspects of Watershed that it simply cannot be overlooked. Many interactive electroacoustic pieces don’t go to the lengths to include an additional technical score. This inclusion allows the sound technician to understand the abundance of musical details involved with the technology, along with their intent by following the specialized score.

The sound projection augments the work through diffusing the sounds in a way
that directly relates to the materials the performer plays. It also places the audience closer to being within the performer’s unique sound space by projecting the percussionists sound upon the audience with a similar, yet more fantastic spatial realization of the sounds heard and created by the performer in the center of the circle of percussion instruments.

JL: In my view, the percussionist and the engineer are performing in duet. Just as I had to rehearse and interpret my part, so did you. Could you discuss your preparation and performance of Watershed IV?

GD: Learning to read and follow the score, follow the performer, and perform the necessary cues all together took me a considerable amount of time to get comfortable with. Watershed is an extensive piece and as a sound technician or performer it is easy to get lost if you don’t totally immerse yourself in it for an extended period of time. It can only be done with lots of rehearsal time and practice. Keeping really detailed notes about how you setup the microphones, their gain, EQ settings (if needed), etc. is key to finding a consistent rehearsal sound. Just as in performing chamber music, the performer and sound technician in Watershed play in counterpoint with each other.

JL: As the engineer and cue manager (what seems to be a two-person job, especially with the previous cueing system), what was your biggest challenge, in preparation and/or in performance? What was your biggest reward?

GD: I had no idea that it was usually a two-person job! Interactive music composers often have to deal with aspects of engineering along with cueing works, although perhaps not music engineering and cueing on as large of a scale as Watershed. I think that it certainly was hard to juggle all of those tasks at once, but that’s part of what makes it challenging and fun. It was also truly a challenge working towards finding the right sound for the performance. It took a lot of tweaking, reevaluating, and trying many
different configurations until we finally started getting the results we were looking for.

The biggest reward for me was performing at the NOW Festival [new music festival] at Capital University in Columbus, Ohio for a large audience of young musicians, many who had never heard an interactive electroacoustic piece before, and seeing how excited our concert of all interactive works for percussion and computer made them feel.

JL: I am interested in how you perceived the relationship of the four instrument families to the unique methods of spatialization Reynolds applied to each …

GD: I think of them as seven families, each with a different microphone (except for the stereo pair of microphones focused on the skins which make up one family).

JL: Oh, that’s interesting. So, it’s five metals instruments, one skin family and one the oddities? And the boxes aren’t miked at all.

GD: Yeah, it’s nice because the sound of the boxes bleeds into the other microphones and sounds cool.

JL: I hope to show in my analysis how Reynolds writes for the instrument families (specifically the skins) throughout the piece, and how the physical gesture and spatialized sound affect the character and transformation of the instrument families. Are you aware of any patterns of spatialization for the different instrument families?

GD: I think that it is a really good theory and I think that it is probably right. I think with a piece like this there is so much to the formal elements that we can’t use traditional techniques of analysis to start to understand how the music is progressing. I think there may be more categories than this but, generally, I can say that there are two distinctive categories of cues: 1) cues that have a very specific trajectory that just happens and once
it is done it gradually fades out, and 2) cues that start and the trajectories occur and then loop over a given amount of time. I think that that is what you are hearing in those oddities sections, where the cue just starts, it’s open and ends whenever you finish playing. But there is a difference between that and having a cue that I hit the cue and it does a complex trajectory in which I don’t worry about cueing every single detail because it all happens in a quick sequence.

JL: I remember that rehearsing the cues for the oddities was much more important than the other instruments. The oddities were often interjected in the middle of skin passages. And the cue had to be turned off before I started the next note.

GD: That is one of the big things with the timing of the cues, you have to make sure that you don’t start the cue while cymbals are still ringing, because if enough sound is still happening within the space when you start the cue than all of a sudden you end up dovetailing the previous material accidentally into the cue so you have to be right on the mark.

JL: Yes, I made several notes in my score to wait for the cue to open, or to wait for the sound to fade, before starting the next section…

GD: It’s not just the beginnings, but also sometimes the endings that needed to be cut. Sometimes you needed to do something on the oddities and you hit the bass drum really loud and if I didn’t cut it out in time than the pedal bass drum would – well, you know the pedal bass drum carried everywhere and especially into the oddities microphone because it was set up beneath the oddities. It is helpful to have some writing to yourself to say, “Wait for this!” It’s just like the notes that you make when you are playing chamber music with someone – Greg will cue this or Julie will cue that.

JL: We found some cues in the published technical score that are somewhat misleading, right? I recall a few instances where a microphone was opened on an instrument that I
was not actually playing. I couldn’t tell whether that was intentional or not. Might it relate to what we were talking about earlier, regarding the fact that some microphones picked up other sound sources, the wooden boxes for example?

GD: Yeah, I think that is part of the space – even though you are not necessarily playing on that particular instrument, it’s picking something up. You know, the oddities are not specified with contact microphones, they are specified for one microphone. I think that is part of the intention – if it’s not a misprint – to just show or to make a different distance or space between the instruments that are playing there.

You may want to take with you my very worn score because it contains a lot of my performance notes. Actually there is also an email that I forwarded to you that has all the changes that Grace sent me. The thing is that I am not sure completely if they were problems with the technical score or if they just made changes and never updated the technical score afterwards, or if they were simply problems within the program, the Max score … basically the cues within Max you can think of them as a score. Each cue has a set scenario – you know, a cue is hit and then messages are sent out to different parts within the program that define the behavior of how it starts to work. That’s the reason I mentioned it … even with my version there are still some bugs to work out. The impression that I got from Grace is that they had gotten so far, but then simply didn’t have time to fix everything. It’s a very confusing thing … it’s a convoluted experience putting things together. It’s like putting a puzzle together.

JL: I’m going to take you in another direction now. As an engineer, technician and composer yourself, have you seen a technical score like this before? And, what do you think about it? Does it work?

GD: Yes, I think that it does. In my own work I haven’t done it just because I guess intuitively I know that I’m going to be the technician working on the piece, at least at first, and so I know what’s going on. I think a good example is Andrew May’s Altered in
Transmission. The cues in your score of Altered in Transmission are quite similar to mine in Imprints. In Andrew’s case, he chose to just have the technical score and the performer score all in one document. That is probably a more common way to do the technical score.

JL: I have seen other scores that include technical markings. For example, Cort Lippe’s Music for Hi-Hat and Computer has indications in the performer’s score defining when the next event will occur, but he does not describe the event. But, I do find it interesting that none of Reynolds cues are in the performers score.

GD: Would it bother you to have read this score with all the technical markings on the side of the music?

JL: No, not at all. But I suppose I don’t really need all the information provided. While it was interesting for me to study the technical score, it may have been sufficient to just know where the cues were set. Understanding the placement and the type of cues helped me understand the weight of the event. But, I didn’t know where any of the cues were until I purchased the technical score. I am sure the reason for not including the cues is that the piece can also be performed without the spatialization. In all reality, I should have just bought the technical score and performed from that, but when I started working on Watershed IV I had very little knowledge of the technical side of the piece.

GD: When I think about it, just in terms of the things that are going on in my interactive music’s cues, it is very gradual and evolutionary in terms of the processes and so a lot of times if I told you everything that was going on at that cue it would be just too much information. But in Watershed he really has, through this technical score, come up with a score based language for the technician for every single parameter that is taking place. It is actually a rather simple paradigm. However, the way that it is done is not simple.
That’s what is really interesting. He has set up a very simple paradigm that can be notated in a way that makes sense.

JL: Do you think this was done because he knew technology was going to change, and with this technical score you have the parameters and you can impose them into any type of technology? It seems that this can help give the piece a longer life …

GD: Yeah, most likely.

JL: So how much time did you spend with the technical score? I spent eight months learning the piece, building and finding instruments, etc.? We started rehearsing about a month before the first performance. But, you had done a lot of work before we actually got together. The amount of time you put into preparing for this piece was much more than any other electronic piece I have performed. In most cases, I would be lucky to have one or two rehearsals before the performance.

GD: Well, that’s ideally how I want it to be (just walk in). When you are composing an interactive work you want to have software that you can give to people so they can rehearse it on their own.

JL: Is it this piece, or the fact that the technical score and programming was a little convoluted with many hands in the revision process prior to our handling? Did that make it difficult for you as the technician?

GD: I think that Watershed is certainly a much greater task for the percussionist by all means. Learning to physically play this piece asks a lot more from the performer than it does to the experienced sound technician. But through the process of translation, at least me as a sound technician, I didn’t feel comfortable with certain things about the state of the program that was designed to run Watershed, mostly the cueing system. Other than
basically going through all the cues, making sure that they had a logical score in the Max/MSP environment that corresponded to what was going on with the cues, fixing little, little bugs in those scores sometimes you forget a semi-colon and the message doesn’t go to the right place – you know, you have to really be looking at the fine print, finding even patch cables within the Max/MSP environment that hadn’t been connected, just scouring through the whole patch looking for errors.

I’m not sure exactly how the whole piece was translated and how much of Peter Otto’s stuff got transplanted into Grace’s version. I certainly don’t put blame on anyone because these engineers were probably under really tight schedules. I also feel that you don’t really get a sense of how it is going to work out until you are in a rehearsal and you force yourself to go in and set it up and rehearse it again and again. And even if I were to have made an eight-channel recording of all eight microphones and just tried to troubleshoot like that, it would only get me so far. I would still have to rehearse with you in the performance space, because things are going to be different every time. The main change was the updating of the whole cuing system that Andrew May helped me fix up. That was done before our rehearsal. That was something that I saw right away as a problem.

The cuing screen was a whole bunch of different items that are called bangs or buttons that you had to mouse over to and click. It was not intuitive whatsoever, very outdated in my opinion. That may have been something that was just looming and it was just obvious that it needed to be fixed. So my first priority was to get that into a shape that I could actually work on it and luckily Andrew knew some really interesting ways to open up the original Max program as text and very quickly take the send and receive registers and create a whole new cueing system using the Collection object, that he whipped together very quickly. His assistance for the realization of my side of the project was invaluable.

JL: Do you think needing to make these changes is typical for an electronic piece that is only 15 years old…to have to go through this process of updating?
GD: Yes, I think that it is one of the things also that I learned from this experience. As a composer, if there are technical choices I can make that will help keep the piece alive longer then I definitely want to make those. Even the Max environment has gone through so many different changes since its inception that there are old files that I can no longer open. Things that people put a lot of hard work on in the early 1990s in Max have been lost in translation from the many versions of the software since then. If you actually could go back and get the floppy disks and transfer that data over to your computer than there is a small chance that you could even open it in the new Max/MSP/Jitter software. So, yes, it is a big problem because we have to be thinking about this the same way that composers have been thinking about keeping music alive since the first notation that ever existed. That is why they did it. Technology is a constantly evolving beast, the operating systems change, the processors change. Another factor to consider for a composer who is writing interactive music is that the more generalized the objects that they create their programs with, the easier it is to maintain the piece across different software versions and to translate the piece to other software platforms.

JL: Is this a problem that concerns only interactive music? Are all forms of electronic music affected?

GD: It is a problem that specifically haunts interactive music because of the emphasis on the composer writing his or her own software, and that software is often written with other types of esoteric software. Furthermore music technology and hardware are constantly evolving and the interactive works likely make use of those elements. But, I think that you can analyze tape music or fixed media on a deeper level. For instance, if you were able to look back to a classic electroacoustic piece for stereo tape, the original master would be a strange concoction of different things taped together and one could imagine analyzing that piece of tape and discovering new things about the work through looking at that physical object. The master recording is a dub of that cut up and spliced amalgamation of tape. At the same time I can imagine that a new analysis could take
place in the future. Music theorists and historians could open up composer’s data files, seeing the files structures, even seeing the files that were related or included, but not actually used in the work, which I think would actually relate to the work. We are getting closer to a point, thanks to digital back-up systems, where we can really start to dig deeper into the genesis of a work. We should hope that it could be preserved for longer because once it is digital it is … if preserved, it will keep the same exact sound or image of the fixed work intact.

Now, in terms of having old reel-to-reels that’s a whole other issue because maybe the originals got magnetized somehow. The works were destroyed and there is nothing we can do about it. But as a composer, I keep a detailed history of a piece as it progresses and I save older versions. I keep all that stuff around so in the case of one day some poor sap wants to look at all this stuff – I can say, “Here it is!” and in fact you can actually trace through the trajectory of the work and see how it got shaped. It’s a lot like looking at Beethoven’s sketches and seeing all the things that he thought out. I’m not comparing myself to him by any means. The main problem is that you need to have specific kinds of software to open up and begin to study a composer’s work. And how long is that software going to last?

JL: Also, non-composers don’t necessarily have the software. Well, Pure Data is free and Max/MSP has a free runtime version, right?

GD: Yes. I think as a composer you could have a really poor way of putting a frame around it – which is use this software, use this microphone … you know, a much more prescribed approach of describing what you want. It’s kind of like a composer requiring a percussionist to use a 16-inch Zildijan A Custom crash cymbal. Or you can have a kind of approach that is much more vague. I think as a composer it is best to not underestimate the intelligence of the future performer or sound technician and consequently be open and make it possible for different interpretations of your work. I think that it is a turn off to have this score and then see the composer prescribing all these
things for you to do exactly when it really should be a little bit more open to the interpretation of the performer to a certain extent.

JL: Yes. It seems with Watershed that Reynolds is very specific about everything that he wants, but he actually leaves many elements open for the performers to determine.

GD: Exactly. He says to use contact microphones, but he doesn’t say use this specific brand contact microphone or exactly where you should place them on the instruments. Yeah, if you have an idea for a piece and anyone can do it with any type of software or hardware, then I think it is best to leave it open for interpretation.

JL: Looking at the score for Altered in Transmission, I imagine it could be realized in many ways; I can get an effects processor and realize Andrew’s intentions in another program, right?

GD: Absolutely. And, I can definitely learn from this approach because my own compositional approach tends to do things that are very case specific. You absolutely have to run my program because of what is going on inside, for instance there is a lot of pseudo-random or random number generation going on. Unfortunately, a lot of people don’t have my custom-made random number generators sitting around.

JL: This is really interesting. I would like to see this kind of music more accessible, so that it can continue to grow. I mean, the music is accessible, but the technology makes it difficult to get to in many ways.

You know, in the past few years, I have often wished I was around in the early 20th century when the world of percussion was born (at least in the context of academic and art music) – the first percussion concerto, the first percussion ensemble, the first percussion solo... But, now I see that I am involved in the beginning of something else –
electronic music has been around since the 1950s. But interactive music really began in the later 1990s. It really is very interesting to be a part of this.

Back to the interview … as a performer, Watershed was a landmark piece in my musical growth. Was Watershed significant to your musical development? If so, how?

GD: Yes, it was quite a significant landmark experience to me as a computer music composer, technician and sound engineer. Realizing another composer's work, as a sound technician is something that I really enjoy doing and it was a great learning experience.

One of the things that I find especially remarkable about the piece, from a compositional and technical point of view, is that Watershed, while being written for just one performer, is not simply a work for a solo instrument and computer, but a work for many different solo instruments and computer. There are problems that can arise from making interactive music with many different instruments or sound sources all within the same space. These problems often occur from the sound of different instruments bleeding into different microphones. For example, if you are specifically trying to analyze the frequency of a violin and a clarinetist plays simultaneously in the same room, your analysis will probably contain unwanted data from the sound of clarinetist picked up by the violin's microphone. Reynolds' compositional approach evades many of these problems by not attaching any sort of musical intelligence upon the computer systems inputs – there is no analysis, simply spatialization and reverberation performed according to the selected cues’ scenario. In Watershed, I believe that a little bit of instrumental bleed between microphones is not necessarily a negative aspect, but instead, through the source microphone’s spatial representation of combined instrumental sounds, informs our understanding of a given point in space within the setup in relationship to multiple instruments.

Reynolds’ technique is full of clarity, as he doesn’t choose to use all the microphones as source sound inputs at once. The different cues have specific microphones that they are monitoring, or in other words, the cues nullify or gate the input
of certain microphones to highlight others. This creates a clear way of focusing inward on specific sound sources or spatial locations, as opposed to an approach that is all inclusive, of many sound sources, all the time, and might tend towards *sonic mud* and potential for audio feedback. I find this approach to be effective at creating a network of evolving spatial parameters throughout the work.

JL: Great. Well, Greg, I think we have exhausted this topic for now. Thank you so much for your time.
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