AESTHETIC AND TECHNICAL ANALYSIS ON SOAR!

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Soar! is a musical composition written for wind ensemble and computer music. The total duration of the work is approximately 10 minutes. Flocking behavior of migratory birds serves as the most prominent influence on the imagery and local structure of the composition. The cyclical nature of the birds' journey inspires palindromic designs in the temporal domain.

Aesthetically, Soar! portrays the fluid shapes of the flocks with numerous grains in the sounds. This effect is achieved by giving individual parts high degree of independence, especially in regards to rhythm. Technically, Soar! explores various interactions among instrumental lines in a wind ensemble, constructs overarching symmetrical structures, and integrates a large ensemble with computer music.

The conductor acts as the leader at several improvisational moments in Soar! The use of conductor-initiated musical events in the piece can be traced back through the historic lineage of aleatoric compositions since the middle of the twentieth century.
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# TABLE OF CONTENTS

Page

LIST OF TABLES AND FIGURES........................................................................................................ iv

PART I: AESTHETIC AND TECHNICAL ANALYSIS ON SOAR! ..............................................

   Chapter 1. Introduction: Migratory Birds and Their Formation .............................................. 2

   Chapter 2. The Birth of the Composition *Soar!* ................................................................. 6

   Chapter 3. Structural Elements .......................................................................................... 14

   Chapter 4. Special Performance Techniques and Notation ............................................... 25

   Chapter 5. Writing for Wind Ensemble and Electronics ..................................................... 32

   Chapter 6. The Conductor, the Leader ............................................................................... 41

   Chapter 7. After Thoughts ................................................................................................. 44

   Bibliography ....................................................................................................................... 46

PART II: *SOAR!* FOR WIND ENSEMBLE AND COMPUTER MUSIC

   Instrumentation .................................................................................................................... 51

   Performance Notes .............................................................................................................. 52

   Program Notes .................................................................................................................... 53

   Musical Score ....................................................................................................................... 54
LIST OF TABLES AND FIGURES

Tables

3.1 Palindromic structure in Soar! ................................................................. 14

Figures

1.1 Dan Dzurisin, Blackbird Swarm Near Starved Rock State Park .................. 3
2.1 Illustration of heterophony from Shuang Hsin Hen .................................. 9
3.1 Micro-entrances among woodwinds, Soar! m. 131-132 .......................... 18
3.2 Evolving sound masses, Soar! mm. 16-19 .................................................. 19
3.3 Intervalic preference for small intervals, Soar! mm. 80-82 ......................... 21
3.4 Embellishments of notes, Soar! mm. 79-81 ............................................. 21
4.1 Use of whispering breaths in brass, Soar! mm. 30-33 ............................. 26
4.2 Use of spatial time signature 4/X, Soar! m. 110 ......................................... 27
4.3 Use of spatial time signature X/X, Soar! m. 133 ....................................... 28
4.4 Boxed notation, Soar! mm. 162-165 ......................................................... 30
5.1 Military band during the civil war era, c. 1864 ........................................ 33
PART I

AESTHETIC AND TECHNICAL ANALYSIS ON *SOAR!*
Chapter 1

Introduction: Migrating Birds and Their Formations

Massive flocks of migratory birds travel through the North American continent and other parts of the world each year. Driven by a genetic memory so powerful and fundamental to their being, these birds travel through different terrains and across borders that stretch between their breeding habitat and wintering grounds. During the years I lived in the north Texas area, the coming and passing of these flocks marked the change of seasons for me. Their arrival can hardly be missed. Suddenly, entire trees can turn black with thousands of birds resting on the branches. The sounds of their chirps can be thunderous if you get close enough to them. Up in the sky, their formations converge and diverge, with countless variations in the shape and density. For bird watchers, the area offers a wealth of opportunities to observe hundreds of species that visit throughout different seasons each year.

One of the most intriguing aspects of these migrating birds is their formations during flight. The complexity in their group flight behavior has been the subject of study for many scientists. The discoveries about bird behavior can be and has been applied to other social creatures from ants to human, as well as patterns of traffic flow and job allocation. How do the simple actions of individuals add up to the complex behavior of a group? How can each seemingly insignificant individual affect and contribute to the large-scale survival and prosperity of the whole?

It has been found that each bird is primarily guided by its own inclination due to biological default and is only concerned with those interactions between birds that are closest to itself in a flight formation. Based on its feather structure and how it reacts to air currents, each bird will find the optimal location to fit within a flock to minimize the energy spent flying. Air deflected by neighboring birds can be an aid to the flight efficiency if aligned correctly. In other words, simple interactions between individual birds manifest into the looming formations that we perceive from the ground. From an

\footnotetext{2 Blackbird Swarm Near Starved Rock State Park IL DDZ_0104. Dan Dzurisin, Uploaded on January 6, 2008 via Flickr, Creative Commons License.}
aerodynamic standpoint, flying in a flock is the most efficient way to travel for these migrating birds.

The ever-changing current in mid-air throws variables into the mix. In order to find the most efficient path against the wind, the birds have to constantly adjust themselves. They do this collectively. In doing research about migrating birds, I came to realize that the seemingly miraculous ability of these birds to navigate in large swarms of their own kind is not as mysterious as it looks. Each individual behaves in a way that will benefit itself the most. This system is described as self-organizing. As a result, their collective behavior benefits the entire group. Minor variations in the way birds in a flock align themselves have ripple effects on the local arrangement as well as the overall formation. It can be said that each bird takes an insignificant role in the resultant formation but at the same time every one of them holds a vital piece in place.

The local configuration frequently has irregularities that keep adjusting themselves. The formations also vary greatly depending on the individual's minute interactions as well as the flying condition of that given day. But if you look at the largest scale of their journey – the destinations – we notice their path is very precise, year after year. Sometimes the landing spot of their destination can be the exact pond or cliff where their ancestors had arrived millions ago.

Aside from the scientific findings of aerial migration, the hovering formations of these birds in the north Texas area have inspired composers such as Christopher Deane

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for his composition *Vespertine Formations*. He captured the imagery through dispersing chords among the four marimba parts that chase one another. The four marimbas are situated as a square, with all players facing toward the center of the square. This configuration not only facilitates the practical coordination required to play the work as a quartet, it also provides spatial effects for notes to bounce from one side of the stage to the opposite side, or to pass around in a circular manner. Constant sixteenth notes that often cascade spatially mimic the motions of the birds' flight. Riding on the perpetual pulse, these notes swell and fade from one phrase to the next. *Vespertine Formations* was written when I was formulating ideas for *Soar!* and I was intrigued by his composition in many ways. To be sure, Deane's harmonic language and phrasing tendencies are drastically different from my personal composition style. However, the work's fluid texture and shimmering sonority gave me many ideas to ponder when I first started approaching the materials for *Soar!*

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Chapter 2
The Birth of the Composition *Soar!*

Having observed the migrating birds' pattern of behavior when I first arrived in the north Texas area in Fall 2002, as a composer, I immediately realized that my observation could be very useful in constructing a piece that potentially has numerous entities within a larger scheme. This is how *Soar!* began.

This composition germinated from the images of massive flocks of migrating birds that can be seen throughout the world, but particularly in Texas. The shape formed by the birds provides the main inspiration for local musical gestures while the overall structure of the work resembles a palindrome, signifying the returning pattern in the journey of the migrating birds. The musical gestures represent organic shapes and forces that can be found in nature, such as those created by wind and rain. The piece not only reflects the elements of nature, but also provides a commentary that represents my poetic interpretation of natural events.

Some have described my instrumental music as lacking melodies and rhythms. The reason for this trait originates from my preference to minimize the importance of individual notes in preference for texture, timbre, and dynamics as primary shapers of gesture and local structure. This is an especially important device that I utilize frequently in my larger ensemble works as well as tape works.

The motion in the birds' spectacular swarms has vivid musical implications to me especially as a computer music composer. With the power of the latest computer, I can
emulate numerous sound strands with relative ease and assemble them in precise arrangements to project the imagery of the swarms. Granular synthesis lends itself perfectly to creating the type of sound mass I am seeking. In particular, granulation of sampled sounds can provide a rich foundation for such treatment. With random processes added to small grains derived from the sample, the resulting cloud of sound grains can compare to the birds' flocking behavior. I am particularly interested in these birds' seemingly unpredictable sudden motions. For reasons the human eyes cannot detect, the flock sometimes shoots through the sky with surprising force and determination, and in the next moment it makes a slow turn to gently unite with another flock. These imageries can equate to gestures in music. In my earlier tape works, gesture is arguably the most important aspect of the compositional focus. For example, in *Green Potato I* for tape alone (2001), the opening segment was primarily concerned with sound fragments that zoom from right to left, from far to near, with varying degrees and assortments of digital signal processing techniques. These fragments all came from the same original audio sample, thus creating a unifying sonic character for the entire first half of the piece. As I trace back to my inclination for fractal-like structures in music, it is revealing to note the two major factors that have affected my fundamental understanding of musical texture. My experience in Chinese heterophonic music and in gamelan music has led to my fascination with self-mimicking cells.

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5 The term “tape works” here refers to the genre of computer music where manipulation and assembling of digital audio culminates in two or more channels of fixed audio as the resulting outcome. These works are designed to be performed through loudspeakers only. At the time when my earlier “tape works” were composed, they were stored on compact discs. However, the genre is commonly referred to as “tape music.”
At age nine, I started playing the yangchin, the Chinese dulcimer, in an orchestra consisting of mostly Chinese instruments. Occasionally we would also play traditional southern Chinese chamber music, *jiang-nan-si-chu* (江南絲竹). Prior to that point, I was only studying western music on the piano and violin. The way traditional Chinese chamber music was organized puzzled me at first. We often read from the same melody but were taught to each add our own ornamentations and variations from that melody. This technique is called *jia hua* (加花). Often times, the embellishment would be fully notated for beginners to help them learn the traditional way of *jia hua*. As a youngster, I enjoyed the sense of security of playing in unison with others, and I learned to appreciate the freedom I was given to deviate from the ruling melody by way of either notation or improvised embellishment. That was my first experience in learning about heterophonic music. When I entered the National Taipei University of the Arts, I studied *jiang-nan-si-chu* with Professor Chen Chong-Shen. He explained that though all instruments in the group play off the same melody, each should contribute to the liveliness of the performance using the traditionally acceptable ways to develop and improvise. Another essential point is to listen carefully and complement one another to create a cohesive entity among players.

Figure 2.1 is an example of heterophony based on a melody taken from *Shuang Hsin Hen* (雙星恨). The melody is stated on the top staff and can be played by various

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6 *Jiang-nan-si-chu* (江南絲竹) is the general term for chamber music that is common among the southeastern provinces of China.

7 Taipei National University of the Arts is the current name for the university, formerly known as the National Institute of the Arts.
instruments beyond what is notated in this particular example. The principle is that each player ornaments the melody in a way that is largely dependent on the instrument's capability. On the woodwind instrument hsiao (蕭), it is easy to play trills. Thus players commonly embellish by adding trills or turns to the melody. On yangchin (揚琴), it is easy to play repeated notes as well as add octaves to the melody with the two hammers, thus we see both types of ornamentation used several times in the example. On the low lute instrument ruan (阮), to allow the tone to resonate fully, longer notes are played on a simplified version of the melody. All three instruments play based on the same melody, and at the same time. Each of them retains its characteristic way of embellishment as demonstrated in Figure 2.1.

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8 徐英輝. 廣東音樂及江南絲竹, 香港特別行政區政府教育局. 2009.
During my time at the National Taipei University of the Arts, I also studied gamelan music, the influential ensemble music from Indonesia. Each set of gamelan instruments as an ensemble is distinct in its tuning. This practice makes instruments from different gamelan ensembles mutually exclusive. An instrument from an outside group cannot successfully be integrated due to the discrepancy in tuning. Each of the instruments in an ensemble is constructed to be very slightly off in pitch so they resonate with one another to create the shimmering effect that is so characteristic of gamelan music.\(^9\) Instruments are often constructed in pairs. Interlocking rhythmic patterns in pairs are a staple of gamelan figuration. Besides heterophony such as in Chinese music, gamelan uses self-derived structure within itself to form the basis of composition.

Traditional gamelan music often has a melody that loops for long stretches of time. In between loops, there are bridges that connect looping sections. In the loops, the melody is placed on several layers that move at different speeds, with the speed increasing as the instruments diminish in size and rise in pitch\(^10\). The basic construction of gamelan music can be reduced to two or three layers and thus it assures flexibility for each performance situation. Most of these ensembles consist of villagers that may or may not be able to participate each time. This tradition brings to gamelan its reputation of being a flexible ensemble that welcomes variation on size and orchestration. Texturally, the smallest instruments play the fast figuration which enhances the richness of the overall sound, but they can be left out or switch to play slower moving melodies. Gongs are the lowest

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\(^9\) This phenomenon is called 'beating' in acoustics.

instruments in gamelan, and they mark large structural points with sparing hits at the foot of each phrase or section. The idea of one melodic line zooming in on itself to form a multi-layered musical texture is consistent with the heterophonic aesthetic of Chinese chamber music. The endless loops in gamelan music remind me of the cycles of natural events such as tides, seasons, and birds' migrations. Loop-based music has the power to transcend the passing of time and send the performers into a meditative state of mind. In Indonesia, it is not uncommon to play the same piece of music for hours on end during religious ceremonies. The music forms a stasis or a constant that transports both the performers and the audience from the material existence into a timeless plane.

These ideas from Chinese chamber music and gamelan music offered me different perspectives on ways to organize materials in my own composition. With these Eastern musical influences as my background, I gradually started thinking more critically about the tension and release paradigm in western music, and it became the main focus of my studies at National Taipei University of the Arts. How can the cyclical music model of the East coexist with the tension and release tradition of the West? Both paradigms hold special interest for me, but each has a very different approach to music regarding perception of time, texture, and form. In trying to discover an answer to my own question about this complex issue, I identified one subject that I felt could point me in the right direction.

The fascination with golden mean in western arts has a long history from antiquity, evidenced by Greek mathematical findings and architecture. Throughout history, western intellectuals have found designs with the golden proportion aesthetically
pleasing. In the first movement of Béla Bartók's *Music for Strings, Percussion, and Celesta*, the timing of fugal entrances is consistent with a sequence of the golden ratio, including the main climax aligning with the phi position. Essentially, the structure of the movement is based on placement of the climax and how each section pushes toward or pulls away from that climax. This example of emphasis on the climax strongly contradicts the cyclical nature and coexistent strands of musical thinking in Chinese heterophonic music and gamelan music. The idea of the golden ratio prompted me to consider the role of climax (and climaxes) in western music. Literally every piece of tonal music in the western tradition values the arrival of one highest point in tension, which often happens at or near the golden mean. This model is extended to operate in similar ways for much post-tonal music as well. Is the perception of ideal beauty in the golden ratio indicative of traditional western music's fixation on climax, especially in the tonal music idiom? This question about climax, viewed from a more personal perspective leads to another interesting finding.

Composer Cindy McTee wrote about this phenomenon of climax driven musical preference:

The traditional, "western" conventions of tonal striving, climax, and closure are at work here. The music bristles with rhythmic energy, and once spent, quickly diminishes to a point of complete cessation.

The example that might be thought to exhibit both "masculine and feminine" characteristics comes from my most performed work, *Circuits*. Even its title, related to the word "circle," suggests integration. "Feminine" techniques might include the frequent use of circular patterns, or ostinatos, offering the possibility

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of suspended time without the need for continuous forward movement and development. Also "Feminine" might be Circuits's tendency, through its steady, quickly-moving pulse, to inspire bodily motion.12

Is it possible that my desire to integrate both the climactic structure and circular tendency in my composition results from my desire to understand my own masculine and feminine qualities? This is a question that warrants further investigation. As I pondered these intricate layers of influences and curiosities, materials for the composition Soar! eventually surfaced.

A. Palindromes

As discussed in the previous chapter, the migratory birds' journey serves as the main inspiration of *Soar!* Thus, symmetrical form is a logical choice to portray that imagery. Musical palindromes have always exhibited interesting aural and psychological effects for me. Studying Alban Berg's use of palindromic structures in his works, such as his opera *Lulu*, the benefits of palindromes in painting a cyclical musical journey have been confirmed. In *Soar!* I have devised a similar overarching palindrome albeit in a more relaxed manner. At the local level, strict palindromes hold the important power of serving as pillars of the composition's structure. Prominent instances of palindromes in my composition are outlined in the following chart.

Table 3.1. Palindromic Structure in *Soar!*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A&lt;sup&gt;1&lt;/sup&gt; 30-41</td>
<td>Brass whispering, with light woodwinds</td>
</tr>
<tr>
<td>B&lt;sup&gt;1&lt;/sup&gt; 89-107</td>
<td>Palindrome by itself, with m. 98 as center</td>
</tr>
<tr>
<td>C</td>
<td>Local palindromic figure in woodwinds - cluster</td>
</tr>
<tr>
<td>D 110-113</td>
<td>Center point of piece. Conductor cues players based on spatial notation.</td>
</tr>
<tr>
<td>E 145-147</td>
<td>Local palindromic figure in bassoon and piano - mirroring contours</td>
</tr>
<tr>
<td>A&lt;sup&gt;2&lt;/sup&gt; 189-204</td>
<td>Brass whispering, with heavier woodwinds</td>
</tr>
<tr>
<td>B&lt;sup&gt;2&lt;/sup&gt; 218-236</td>
<td>Palindrome by itself, with m. 227 as center, plus percussion palindrome</td>
</tr>
<tr>
<td>A&lt;sup&gt;3&lt;/sup&gt; 246</td>
<td>Brass whispering, with very soft ambience</td>
</tr>
</tbody>
</table>
Referring to table 3.1, the entire piece is shown to be constructed based on a palindrome. Material D as designated in the chart stands as the center of the entire piece. From there, corresponding material pairs can be mapped as mirrors: material C and E are both local figures in smaller palindromic shapes; \( B^1 \) and \( B^2 \) are two almost identical sections that are symmetrical in themselves; A material features distinct whispering sounds blown into brass instruments. The symmetrical design has one exception – the appearance of \( A^2 \) starting at measure 189. This one interjection of the A material is accompanied by a block-like woodwind section that takes over the foreground. In other words, this extra occurrence of material A at measure 189 serves as a sub-current of other more prominent material, thus lessening its impact on the overall palindromic form. The irregular appearance of material \( A^2 \) also makes the overall form more complex through the inclusion of this element to the otherwise straightforward structure.

The center of the composition, material D at measures 110-113, plays a significant role in the temporal sphere: it is the one point where the conductor has total control over the timing of each event. It is a highly focused moment where the conductor and players need to be completely in tune with one another to create a musical moment that has the potential to be quite different during each performance. It is the concentration and communal feeling required for this central point that brings a sense of focus, more than the fact that it sits at the mid-point in terms of measure count.

B. Texture

The single most important method for forming harmony in *Soar!* is the use of
sound mass. A sound mass is a combination of many musical lines assembled in such a way that none of the parts can be named as the main melody. There can be some lines that are slightly more prominent than others. This differentiation is primarily achieved by orchestration. Each instrument's sonic characteristics as well as registral strength can be used to accentuate certain aspects of a given sound mass. Careful adjustment of dynamics is also an indispensable tool used to shape these clouds of sounds. It is rare in Soar! to hear a note that is played for any stretch of time without adding swells and fades or other kinds of dynamic manipulation. I prefer to give the texture of each sound mass its unique signature. To do that, orchestration and dynamics are indispensable tools for achieving the goal. Wind ensemble is a great medium for producing sound masses because of its abundance in timbres, number of players, and its large dynamic range.

Each sound mass in the piece has a different configuration within: some are dense and narrow in register as in a cluster, while others are more spread out and span a larger range; some are created using chance operation, while others are arranged through careful consideration. A strong characteristic of these sound masses is that they are formed by instruments in the same family or similar relatives. This preference originates from my interest in self-mimicking structures as discussed in chapter 2. Sonically, it makes sense to call for instruments with similar sonic impressions when what I aim to evoke is a sound mass that resembles birds of the same species in a flock.

To depict the sudden shift of shapes of these birds' formations, I use micro-entrances for a group of instruments, where each of them enters at a slightly different time. This treatment makes the cluster sound more fluid and organic, creating a sound
mass that has mutating colors. György Ligeti remains an important influence on me for utilizing this technique of micro-entrances. In his composition *Atmosphères* (1961), he created sound masses by giving each instrumental line a slightly different time to enter the chords. The resulting effect is a texture that grows organically, and is always changing. One technique that Ligeti developed was micro-polyphony where each line in a cluster moves rather than remaining static. Though this technique is not used extensively in *Soar!* it informs the way I see musical textures and my decision to employ micro-entrances for sound masses.

For example, in figure 3.1, each instrument has a different timing regarding its entrance. The composite rhythm is a straightforward series of sixteenth notes strung together. However, the sonority grows and transforms as each line enters the sound mass.

Another interesting aspect of this arrangement is the spatialization of sounds on stage. Since each instrumentalist is located at a different spot in space, the string of notes that they play is dispersed throughout the space in time. Spatialization has become an indispensable element in music making, especially since the rise to prominence of electronic music. As a computer music composer, I am particularly attuned to the power spatialization holds. In the study of aural perception – psychoacoustics –, it has been discovered that the human brain is able to detect minute discrepancies of the time when a sound reaches each of our ears. The brain calculates the time difference and translates that difference as the location of the sound source. Spatialization creates another dimension for a music performance to include “choreography” of sounds.
Since there are numerous sound grains in a sound mass, I saw this as an opportunity to grow one sound mass out of another by dividing it into subsets. This idea came from the birds' performance of diverging formations. Below is an example of converging and diverging bodies of sound mass.
In figure 3.2, a frenzy of staccato notes start on the flutes and clarinets. When it reaches the third beat of measure 17, the sudden dynamic change to $p$ is intended to create the effect of a contraction. Immediately, many more lines join in and bring the music to a broadening crescendo. At the start of measure 19, most instruments stop playing, except the oboes. They keep ascending like they are the birds that shoot out of the flock. This is the point where one sound mass divides into two sound masses. The
bass clarinet fades to a lower dynamic level at measure 19 to provide a grounding ambiance with its low pitch. This note on the bass clarinet contrasts against the oboes' high notes, thus framing a wide spectrum that has no middle frequencies present. From a poetic point of view, the bass clarinet note represents earth, and the oboes' notes represent the birds soaring high. The absence of any other notes in between portrays the vast space between the earth and the sky. Coupled with the careful control of dynamics and orchestration, these various sound masses evolve and reproduce, akin to the birds' ever-changing formations. The close association between my work and nature is demonstrated here using instrumental lines to correspond to birds' graceful convergence and divergence in their flight formations.

C. Preferences for Small Intervals and Ornamentations

It is worth noting that certain small intervals are emphasized in *Soar!* Reflecting my personal preference, small intervals such as minor and major seconds are used frequently. This characteristic is most recognizable in sound masses, especially when a cluster is called for. The preference for small intervals is a result of using sound masses as the basic structures of harmony. When there is a prominent melody, the pitch organization for the melody often favors minor and major seconds as well as minor thirds. In figure 3.3, these intervals are given important roles.

If we add up a minor second, a major second, and a minor third, a tritone is outlined – an interval that I use frequently. In the following example, all three intervals are used. One important feature worth pointing out is that the tritone is the result of
compositing smaller intervals and not used as a primary interval on its own.

Figure 3.3. Intervalic preference for small intervals, *Soar!* mm. 80-82.

In both figure 3.3 and figure 3.4, quasi grace notes ornament the entrances of important lines in the music. This technique is borrowed from the traditional Chinese embellishment technique called *jia hua* (加花). In Chinese music, a note has a head, a body, and a tail. The musician shapes the note throughout the entire duration by ornamenting the entrance, sustaining and shaping the body, and eventually ending the note with a punctuation. This notion of carrying the note throughout and not letting go of the energy is similar to the discipline of Chinese calligraphy where the tension of each
stroke should be retained throughout. I put special emphasis on the head, or entrance, of the notes. An ornamented note adds brilliance to the sound, and it animates the texture without profoundly affecting the musical structure. In figure 3.4, every sustained note has a group of ornaments to accentuate the long notes that follow. After the ornamentation, the note stabilizes and yields a contrasting sonority from the activity that precedes it. When the note comes to an end, I pay special attention to end it at an appropriate time where closure can be sought. Often, this is achieved by ending the note on a beat or eliding it with another phrase that is just beginning.

Small intervals and ornamentations are abundant in Soar! They serve the function of giving delicate and lively sonic impressions to the sound world. These are the smallest cells yet they give the piece its defining characteristics.

D. Juxtaposition of Musical Fragments

Multiplicity has been a prominent concept in music since the beginning of the twentieth century. Multiple strands of musical entities coexist without the need to bridge the difference between them. They can occupy different corners of the music simultaneously, or they shuffle through contrasting fragments temporally. In either case, it poses a challenge for the listener to make linear connection between each fragment, thus this technique decreases music's directionality. This has been a significant discovery to me in searching for ways to write music that is not driven by one climactic point. Through repeated listening to music that exhibits a high level of multiplicity, it is evident to me that such an aesthetic can yield meaningful results in writing non-climax-driven
music. To be sure, multiplicity in music does not necessarily prevent the occurrence of climax. However, it provides a possible way to write music that is non-climactic, anti-climatic, or multi-climactic.

One great example of vertical (simultaneous) multiplicity in music is Edgard Varèse's *Intégrales* (1925) for 11 winds and 4 percussionists, in which musical materials are presented as separate static strands. These strands are stated simultaneously as blocks that can be swapped with one another. The way these materials are combined is carefully planned so the total effect still conveys a sense of unity. Varèse's persistently used this approach to construct many of his compositions. What he was most concerned with was timbre and musical fabric. Temporal progression in his music operates in a more subtle way: though his music often sounds colorful and rhythmic, it can also sound static. The blocks he uses to build the piece tend not to develop. They may be extended, but rarely develop in motivic ways.

In Witold Lutosławski's *Venetian Games* (1961), the composer experimented with the way a conductor can synchronize various instrumental subgroups of the orchestra by cuing them at will. Each subgroup has suggested pitches and rhythms to play, but the timing of their entrances is under the control of the conductor. These subgroups of the orchestra act as separate strands that can be combined with one another differently each time through temporal adjustments. The multiplicity coupled with aleatoric technique becomes notable traits in Lutosławski’s music.

Those are but two examples of musical multiplicity that have influenced my thinking toward the formal design in *Soar!* Charles Ives, Olivier Messiaen, Earle Brown,
and John Zorn have also offered me inspiration with their works using juxtaposition of musical fragments. Although each of them has a different approach to organizing these disparate musical materials, the unifying attraction for me is the ideal of inclusiveness in music without suppression or sacrifice of the integrity of each element. In other words, what I find intriguing about their ways of organizing multiple strands of materials is the liberation from a history of progressional expectation in music.

My admiration for the aforementioned composers has inspired the way I juxtapose multiple musical entities in *Soar!* In a wind ensemble, where an abundance of instruments are available, it is logical to separate them into subgroups. These subgroups are assigned self-fulfilled musical elements. When the subgroups present their individual elements simultaneously, the result is a stasis that is complex and rich. This mode of organization can be compared to montage technique in filmmaking. Montage is an editing technique in film where a series of short shots are edited into a sequence to condense space, time, and information. It is interesting to consider the effects that montage film editing creates by manipulating our perception of time and space. In my composition, the combination of multiple sound fragments in the instrumental writing is an attempt to achieve musical effects similar to those of film montage.
Chapter 4
Special Performance Techniques and Notation

*Soar!* features a continuous strand of sounds that draws upon various instrumental timbres within and outside of traditional techniques – players are required to produce tones that are sometimes uncharacteristic of the instruments, as well as even less conventional playing methods that will be discussed below.

A. Whispering Breaths

One special performance technique used in *Soar!* is whispering into the brass instruments. This performance technique's inspiration came from Phil Winsor's *Asleep in the Deep* (1970), version for five tubas, where performers are asked to produce breath sounds into their instruments with consonants such as 's--' or 'sh--' that are often followed by a vowel glide from 'i--' to 'oo--' or vice versa. The initial consonants give the noise-based breath sounds more defined entrances. In *Soar!*, I incorporated this technique in the brass section and asked every brass player in the ensemble to whisper into their instruments. This creates a sea of non-pitched sounds that permeates the entire space. Each player is instructed to change breaths as needed and to stagger their breathing changes with one another. This is to insure that variables are introduced into the sounds that appear random or organic. The performers should not try to align their breath changes with the beat.
B. Time Signature Considerations

In the example shown in figure 4.1, I use the time signature 4/M. The M stands for metronome, and it means the players should recognize where the beats are and know the passing of exact amount of time according to beats but not trying to align musical events to the beats. This idea came from Cindy McTee's approach to meter in the case of
conducted spatial music as in her *Einstein's Dream* (2004). She indicated the usage of 2/M, 3/M, 4/M, etc, for music that has periodic beats as in traditional meters, and players simply “fit in” their music between the bar lines. For the purpose of my composition, the breath sounds are not traditional musical notes but they can operate in the same fashion and simply fit in their sounds as the conductor beats regular meter. This time signature 4/M also affords the possibility for multiple musical components to play at the same time – some of them use meter while others do not. Since the beat pattern of 4/4 is the same as 4/M in a conductor's beating pattern, the conductor can coordinate everyone in the ensemble using one beating pattern.

Figure 4.2. Use of spatial time signature 4/X, *Soar!* m. 110.
Similarly, I have used 4/X and X/X in the score when I would like the conductor to have total control over timing of each sound event. This idea also comes from McTee's approach to meter. The X refers to variable time between beats. For example, when the
time signature is 4/X, the conductor beats four beats, but each beat can happen at any given time according to the conductor's direction. This allows each beat to have variable duration for each conductor and each performance. The beats are indicated with a circled number.

When X/X is used, it is intended that there can be any number of cues from the conductor and each cue can last variable amount of time within the range of duration allowed. In McTee's music, she indicates duration for each beat in seconds, but I am taking a more liberal approach by allowing the conductor even more freedom regarding timing. I have only indicated the approximate duration for the entire measure. In Soar!, the meter X/X is used when the conductor improvises with the orchestra.

C. Boxed Notation

Boxed notation has been used commonly by contemporary composers to designate repetition of notes placed in the box. I have used boxed notation in Soar! as well as in my other works to indicate a continued musical content that is to be repeated or sustained until the end of a line and arrow that are attached to the box as shown in figure 4.4. The performer plays the notes in the box and reiterate them a few more times as the conductor marks the passing of time. When the intended duration is reached, shown by the line that extends out of the box, the player stops playing the boxed material. The note events in the box are not to be synchronized with the metronome beat, as is indicated by the time signature 4/M. While this use of boxed notation is not a standardized way to indicate such musical activity, it comes from the modernist tradition of graphic notation.
A large number of modern composers have used graphic scores in various manners. The idea is to convey information that is otherwise difficult to convey with traditional notation. In this work, the aleatoric mechanism is built into the boxed notation as the number of times the material is repeated depends on the tempo and rest duration that the performers choose for that given performance.

Finally, after examining the special performance techniques and notation, it becomes clear that the challenge of event coordination in sections with aleatoric operation requires some interesting solutions in the notation. I have used non-traditional time signatures such as 4/M, 4/X, and X/X to allow the conductor to manage timing issues in an efficient way. My experience in conducting contemporary works with graphic notation has validated the effectiveness of using this type of conducted event coordination.

Boxed notation offers an easy way to instruct the performers to improvise based on prescribed material in the box. It induces spontaneity in the way players interact with one another. To encourage and facilitate such interaction between voices, I always place...
boxed notation on multiple instruments that are in the same family. The proximity of these players assures their ability to hear one another, and to recognize the collective web they are forming through controlled improvisation.

Soar! has instrumental parts that blend with the computer music part to invent a “mega instrument” as a whole. This “mega instrument” can produce sounds that neither wind ensemble nor electronics can produce on its own. To connect the two sound worlds, noises are utilized in the instrumental parts to mimic some of the complex sounds in the computer music. These noises are considered extended techniques, such as breathing and whispering consonants into brass instruments. With these sounds as the bridge to the computer music part, the connection between the two sound worlds can be easily achieved. Pitch materials in the wind ensemble also have an impact on the digital music. These interactions between the wind ensemble and computer music part demonstrate my desire to combine the two into one powerful entity. The interactions between the wind ensemble and the computer part will be discussed in more detail in the next chapter.
Chapter 5
Writing for Wind Ensemble and Electronics

A. Historic Background of the Wind Ensemble

Early predecessors of today's wind ensemble, or 'band' as a more general term, came from a much different origin than that of the orchestra. Thanks to the high volume and bright timbres of the wind and percussion instruments, wind band traditionally played outdoors and served the function of signaling in battles or social functions as well as entertainment. The immediate predecessor of the modern band is the military band, dominant up until the middle of the twentieth century. Grove Music Online has the following entry about the different traditions between the band and orchestra:

In Europe the wind and percussion band is descended from the ‘high’ or ‘loud’ groups of the medieval period and from the civic waits or the *Stadtpfeifer*, who generally performed outdoors and therefore used predominantly loud brass and percussion instruments. Bands were often mobile, had a vernacular appeal (they usually performed lighter forms of music, often to a non-paying audience; as such they have also served as useful propaganda tools, or at least assisted in promoting nationalistic or patriotic fervour), and were often associated with specific military or civic duties and were thus uniformed. The orchestra, on the other hand, is descended from the medieval ‘low’ or ‘soft’ instruments (strings and softer wind instruments), and usually plays indoors. It was originally associated with the church or the nobility, and later with formal concerts of more ‘serious’ and sophisticated music for which audiences paid.¹³

The band's traditional association with state and social functions has given the literature of band music a vernacular connotation. In the tradition of the band world, music is something that supports, inspires, and rouses. The band music of today still has many of the traits of its early day military band incarnation.

The modern concept of a symphonic band or concert band emerged in the middle of the twentieth century when the popularity of the medium rose with the return of veterans from World War II. The development of the band reached an important stage when conservatories and schools started forming bands across the United States in the 1950s. Many new works for band were commissioned in response to the lack of repertoire and to combat the practice of playing merely transcribed music from choral or

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orchestral classics. Wind ensemble emerged out of that period of band development and originally differentiated itself from other types of wind bands in that there was only one player per part. The traditional configuration of a band is multiple players on each part. This distinction in instrumentation refinement undoubtedly helped transform the wind ensemble as an art form.

B. My Approach to Writing for Wind Ensemble with Electronics

Despite the effort to sophisticate the music for wind band, the prevalent trend in band literature boasts chorale-like texture, strong rhythmic emphasis (partially because of the expanded percussion section), and less adventurous harmonic language compared to its orchestral counterpart. These traits are evident in the medium's history. What prompts me to write for the wind ensemble is the potential to write a different kind of music for the band world. The opportunities in the wind ensemble world are appealing. Wind ensembles are more receptive to new music than orchestras and generally allow more flexibility regarding artistic approach and practical issues since the medium does not have the heavy burden of a long tradition. I am also attracted to the medium because of its rich timbral content as well as its powerful acoustic force. While wind ensemble represents a relatively new sound world, computer music is even more so with less than a few decades of development. The lack of musical literature for the combination of wind ensemble and computer music prompted me to compose Soar! My intention has been to create a work that brings out the best qualities in both media and integrates them in a way that surpasses the notion of “wind ensemble music” with “computer music”. The combination of the
two forces should be perceived as a whole new instrument that is capable of producing a wide variety of sounds. In my mind, the wind ensemble has a bright future and much room for future contributions.

Coming from an orchestral background, I have relied heavily on strings for my instrumental compositions. The homogeneous quality of the strings has always served as the foundation for my large ensemble works. The first challenge I had when writing Soar! was the lack of strings and the assortment of string techniques that I had become accustomed to using. Instead of searching for a substitute in the wind ensemble, I realized that the lack of strings needed to be a fundamental character of the piece. I decided to abandon the orchestral sound in my head and start from scratch, building another sound world that is uniquely for this medium – wind ensemble and computer music.

My interest in sound mass technique and integration of multiple musical fabrics has guided my recent compositions. Stylistic elegance and the contemplation of time are the two most carefully considered subjects in Soar!

C. Technology as Enhancement

The use of pre-recorded computer music in conjunction with a large ensemble is getting increasing attention. In an ensemble environment, where an abundance of timbres is available, the use of pre-recorded sounds poses an interesting challenge for the composer. Either using sound synthesis or musique concrète, the electronic part provides an added layer of musical texture and meaning to the composition. Previous works in this
genre have exhibited very different approaches and aesthetics in the inclusion of pre-recorded sounds. The following are two drastically different examples:

In Varèse’s *Déserts* (1954) for two-channel tape and large ensemble, the composer's approach to the tape is unique: it is played as a series of interludes between each instrumental movement. In other words, the tape and the ensemble never play together. The contrast between the instruments and the electronic sounds is shown through juxtaposition, and this character reaches into the psychological realm of the abandoned city that Varèse intended to depict. With the factory sounds and percussive hits captured on the tape, he successfully created a dream-like illusion of an urban desert.

In Kaija Saariaho’s *Verblendungen* (1984) for orchestra and tape, the ensemble and the electronics work as two rivaling components. “The orchestra and the tape are moving in opposite directions with respect to the tone-noise axis. The piece starts with a thick orchestral tutti, which is first hidden then shaded by the noise on the tape. Throughout this piece the orchestral coloring is transformed into instrumental noises, which, before withering away, shade the quasi-string orchestra on the tape. The orchestra is built to have a heterogeneous nature to contrast with the even colors on the tape.”

In other words, the two components transform and exchange roles gradually throughout the work.

Psychology also plays an important role in electroacoustic music. The simple fact that certain sounds have certain associations in the ears of the listener is a powerful tool. This can be utilized in order to evoke extra-musical meanings through the integration of

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15 From the program notes of *Verblendungen* by Kaija Saariaho, (1984).
concrète sounds with the instruments. Throughout the composition *Soar!*, images of migrating birds have inspired and guided me in shaping the piece. I have also included other psychological details imbedded in the tape part that will enrich the work through a web of sonic associations.

D. Challenges of Combining Wind Ensemble and Computer Music

Along with the new possibilities of these combined media, there are also potential problems. The difficulty in adding sounds that work with wind ensemble, a very timbre-rich ensemble, lies in delicately balancing the instruments and the computer sounds. As I started working on the computer music part, the integration of the live instrumental sounds and the pre-recorded and pre-processed sounds became an element that required special attention. Due to aleatoric technique used in the instrumental parts, as well as the wish to avoid traditional wind ensemble sonority, it has been proven challenging for me to 'hear' the exact sounds of the music I am writing, an ability that I confidently possess in orchestral writing. When working on the computer music part, every sound is produced clearly and definitely. I know one hundred percent of the sounds I produce on the computer, but have a less level of assurance in regards to the sound I am trying to create in the wind ensemble.

Studying wind literature had helped tremendously for me to gain mastery in the live instrumental parts. Even though it is not as natural a process to me compared to writing orchestral music or computer music, the entire process of composing *Soar!* has been one of the greatest learning experiences in my career as a composer.
E. Techniques and Digital Signal Processing Used in the Computer Music Part

Going back to the original inspiration for composing this piece, it was the birds' vivid formations that suggested the imagery for me. Each bird is unique just as each leaf on a tree is unique – that is if we look at them in microscopic detail. Biologically, all the birds in a flock are very similar. Looking from a far, they seem to be replicas of one another. When they gather in large numbers, the viewer starts to ignore the individual birds' existence. Rather, one focuses on the combined image, or the big picture. This phenomenon can be simulated in computer music with granular synthesis.

Granular synthesis is a method by which sounds are broken into short fragments and redistributed to create the resulting sound. In the granular synthesis technique, the fundamental units that are used to weave the sound are called grains. These small fragments of sounds can have unified or varied sizes. The temporal distribution of grains can be regular to produce a pitch or randomized to form a cloud of sound.\textsuperscript{16} With powerful computers today, the task of creating granular synthesis can be done with relative ease. Programs such as Max/MSP can readily assist the composer in creating sounds easily, for what was once an extremely time-consuming endeavor. I decided to use recorded samples as the sound source for granulation. Next, I had a few basic parameters to define: grain size, grain density, frequency range, and amount of randomness allowed in these parameters. Given the similarity between the principles of birds' formations and granular synthesis, utilizing granular synthesis for the computer music part became a natural choice. I have used this technique extensively in creating

computer music for *Soar!*. By adjusting the randomness level, the sound can transform from pitched to noise-like, or vice versa. That fluidity matches perfectly the imagery I want to portray. Granular synthesis's ability to transform the quality of the sound has been one of the most powerful tools I have in creating my electroacoustic works.

Another technique that is central to the computer generated music for the piece is convolution. I strictly use the computer music software Bias Peak to run this type of digital signal processing. Convolution is taking two audio signals and modifying one of them with characteristics of the other. As a result, the spectral quality of one sound can be applied to the other sound. With the complexity of audio samples, it is sometimes a trial and error process to find the right sound for what I am looking for. Nonetheless, convolution has been a staple of my digital signal processing vocabulary.

I strongly believe in technological enhancement and assistance to augment traditional music making. The endless possibilities in computer technology today make it possible for composers to add another dimension to instrumental playing. It has also been my belief that computers and electronics help us achieve dreams that were not attainable before by extending our capabilities beyond what is physically difficult or impossible to produce. Loudspeakers play the pre-processed computer music on stage along with live musicians, in the absence of any visual evidence of the act of sound making. This disconnect between what the audience sees (the wind ensemble players) and what they do not see (the computer music playing through loudspeakers) can blur the sense of reality. The magic power of electronics often resides in our inability to see the act of sound production, thus creating an illusion that sounds very real, yet always lures us into the
unknown. Hopefully this layer of computer music played with wind ensemble adds an interesting aspect to the overall listening experience.
Chapter 6
The Conductor, the Leader

Being a conductor myself, I have always paid special attention to the execution of my compositions from a conductor's point of view. The leader of a large group of musicians is naturally given ample authority in order to shape the music played. This authority to lead had been expected by both the conductor and the players in the ensemble.

Non-traditional time signatures are a necessity for Soar! to be successfully conducted. Using meters such as 4/M, 4/X, and X/X\textsuperscript{17}, the conductor is given control over the timing of events. In essence, the conductor determines the larger structures by defining temporal elements and the players realize controlled improvisation under the conductor's direction. This type of composition gives conductors a new sense of ownership over the performance. The conductor is actively creating the piece as it unfolds in front of both the players and the audience. I have used this mechanism in some of my earlier compositions, such as Rugged Edges for string orchestra (2003).

From my exploration of new types of conducting models, I discovered that I would like to see more freedom of creativity for the conductor in compositions for large ensembles. This is definitely not a new idea. Aleatoric works rely heavily on the conductor to coordinate improvisatory operations. As mentioned earlier, Venetian Games (1960) by Witold Lutosławski gives the conductor (often the composer himself) a large

\textsuperscript{17} For detailed explanation of these time signatures, see p. 26-29.
amount of freedom to determine the order and timing of each musical segment, with multiple strands of musical activities happening simultaneously.

My inclination for conductor-centered music also stems from John Zorn's game pieces such as *Cobra* (1984). Zorn designed a system of strict rules on how musicians should interact in their improvisations, but with no pre-defined event order. The conductor prompts ensemble players with note cards for event changes. The result is a highly engaging improvisation among the players and the prompter. Another musician, Butch Morris, also takes a similar approach to music making using 'conduction' to guide improvisations. He does not use note cards, but instead uses only hand gestures and baton as a traditional conductor would. Both Zorn and Morris see the conductor as the true leader of the ensemble. As such they give the conductor the power to dictate not only the timing of events but also the way the improvisation should be done.

My musical background of playing strictly from written music has given me the advantage of sight-reading at a competent speed. Orchestral score reading for traditional repertoire has never been an excessively difficult task for me. As I venture into more experimental type of compositions where improvisation is required, it is both challenging and liberating at the same time. I have increasingly been interested in conducted improvisation in recent years. The Electric Monster Laptop Ensemble that I founded at Montana State University in 2009 is a group that plays mostly improvised music on laptops. Although some laptop orchestras or ensembles have relied solely on free improvisation, the large number of players in Electric Monster, as well as the different musical backgrounds of the members, makes it difficult to practice free improvisation.
Instead, I, as the conductor, have consistently used hand gestures to direct the timing and especially the change of musical events. It is a system of cultivated proficiency, and it requires a group of players that have become accustomed to these gestures.

Conducting is as much a skill as a philosophy. New types of music ensembles emerge, such as laptop orchestras, mobile phone orchestras, and even theremin ensembles. These unorthodox musical groups challenge our very notion of music making. With advancement in technology, more modes of coordination and performance ritual emerge. Therefore, the art of conducting has to adapt to the type of music that is being produced in order to be efficient. To be the true leader of a musical group, the conductor must find the best way to guide and inspire his/her fellow musicians.
Chapter 7
After Thoughts

The word 'soar' brings to mind the idea of hope and a projection of humane imagination. As I composed *Soar!* and probed deeper into my personal way of thinking about music, a few recurring themes have surfaced.

I have taken particular interest in cyclical structure, sound masses, and multiplicity in organizing musical materials and have affirmed my intention to explore them further in my future works. Just as I am fascinated with migratory birds' yearly journey between their wintering grounds and breeding spots, cyclical or symmetrical form such as palindrome holds a special role in my treatment of musical form. Experiencing different sound colors has always been a profound pleasure for me both as a musician and listener. Using sound mass affords me the tool to blend sounds and transform them easily. Placing multiple musical entities simultaneously helps me create a musical texture that is multi-dimensional, both sonically and psychologically. Besides these elements that are central to my musical creation, technology is another element that I view as indispensable. Beyond the immediacy of hearing what I am creating, which is fully satisfying, the capability of being able to affect sounds at a microscopic level makes computer technology an extremely powerful tool for music making.

I have discussed my musical background, my interest in abstract formal relations, as well as certain sonic qualities that are important to me as a composer. What I have not touched on is the issue of identity and its relation to one's musical output. As a composer
who also happens to be a woman, does my gender have any impact on my musical preference? The blood that runs through my body is unmistakably Asian. Does my upbringing cast any predisposition on the way I understand music? Is it possible that as an immigrant in a foreign country, I equate the birds’ migration with my own personal experience of migration? Much exploration and deliberation on these matters will promise to intrigue me in my future work as a composer as well as a conductor.
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PART II

SOAR! FOR WIND ENSEMBLE AND COMPUTER MUSIC
## Instrumentation

<table>
<thead>
<tr>
<th>Flute 1</th>
<th>Piano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flute 2</td>
<td>Timpani (A, D, F, G)</td>
</tr>
<tr>
<td>Flute 3 (double on piccolo)</td>
<td>Percussion 1</td>
</tr>
<tr>
<td>Oboe 1</td>
<td>marimba</td>
</tr>
<tr>
<td>Oboe 2</td>
<td>sleigh bells</td>
</tr>
<tr>
<td>Eb Clarinet</td>
<td>glass wind chimes</td>
</tr>
<tr>
<td>Bb Clarinet 1</td>
<td>lion's roar*</td>
</tr>
<tr>
<td>Bb Clarinet 2</td>
<td>tubular bells*</td>
</tr>
<tr>
<td>Bb Clarinet 3</td>
<td>snare drum</td>
</tr>
<tr>
<td>Bb Bass Clarinet</td>
<td>tom-toms, 3 sizes</td>
</tr>
<tr>
<td>Bassoon 1</td>
<td>bass drum*</td>
</tr>
<tr>
<td>Bassoon 2</td>
<td></td>
</tr>
<tr>
<td>Bb Soprano Saxophone</td>
<td>Percussion 2</td>
</tr>
<tr>
<td>Eb Alto Saxophone</td>
<td>woodblocks 5 sizes</td>
</tr>
<tr>
<td>Bb Tenor Saxophone</td>
<td>large sus. cymbal</td>
</tr>
<tr>
<td>Eb Baritone Saxophone</td>
<td>medium gong</td>
</tr>
<tr>
<td>F Horn 1</td>
<td>crotales (e1, e2, g2)</td>
</tr>
<tr>
<td>F Horn 2</td>
<td>bass drum*</td>
</tr>
<tr>
<td>F Horn 3</td>
<td>lion's roar*</td>
</tr>
<tr>
<td>F Horn 4</td>
<td>Percussion 3</td>
</tr>
<tr>
<td>Bb Trumpet 1</td>
<td>vibraphone</td>
</tr>
<tr>
<td>Bb Trumpet 2</td>
<td>tubular bells*</td>
</tr>
<tr>
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<td>bass drum*</td>
</tr>
<tr>
<td>Trombone 1</td>
<td>medium gong*</td>
</tr>
<tr>
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<td>tam-tam</td>
</tr>
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<td>Bass Trombone</td>
<td>bowed sus. cymbal</td>
</tr>
<tr>
<td>Euphonium</td>
<td>Stereo Digital Audio</td>
</tr>
<tr>
<td>Tuba</td>
<td></td>
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</tbody>
</table>

*shared instrument
Performance Notes

- **Hexagon**: Number in the hexagon indicates track number for audio file playback.

- **Four X**: Denotes 4 conductor’s beats per bar with variable time between beats.

- **Four M**: Denotes 4 conductor’s beats per bar at metronome speed.

- **XX**: Free timing.

- **Ca. 10”**: Play enclosed area for approximately 10 seconds.

- **Circle**: Number in the circle indicates the current beat count within the measure.

- **Repeat**: Repeat notes in the box until end of the extension line.
Program Notes

Soar! is a musical composition written for wind ensemble and pre-recorded stereo audio. The total duration of the work is approximately 10 minutes. Flocking behavior of migratory birds serves as the most prominent influence on the imagery and local structure of the composition. The cyclical nature of the birds’ journey inspires palindromic designs in the temporal domain.

Aesthetically, Soar! portrays the fluid shapes of the flocks with numerous grains in the sounds. This effect is achieved by giving individual parts high degree of independence, especially in regards to rhythm. Technically, Soar! explores various interactions among instrumental lines in a wind ensemble, constructs overarching symmetrical structures, and integrates a large ensemble with pre-recorded electronic music.

The conductor acts as the leader at several improvisational moments in Soar! The use of conductor-initiated musical events in the piece can be traced back through the historic lineage of aleatoric compositions since the middle of the twentieth century.
Soar!

Exhale through the instrument with consonant "s", change breaths as needed, stagger breaths.
Soar!
slightly and slowly bending pitches up and down
change breaths as needed

slightly and slowly bending pitches up and down
change breaths as needed

slightly and slowly bending pitches up and down
change breaths as needed

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slightly and slowly bending pitches up and down
change breaths as needed

slightly and slowly bending pitches up and down
change breaths as needed

slightly and slowly bending pitches up and down
change breaths as needed
Conductor cues instrumental families to mimic sounds on tape.

Conductor dictates texture, dynamics, and timing.

Soar!
Soar!
Soar!

exhale through the instrument with consonant "s", change breaths as needed, stagger breaths.
Soar!
Soar!
Conductor cues woodwind groups sparsely.

ca. 30’