Echo Music
Exploration and Composition in the Wesleyan University CFA

by

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INTRODUCTION

I dropped a snare drum and heard something like thunder. Strangely enough, the thunder had sounded like it was in quantized musical time. I looked at Jon Myers and smiled. The echo we had just stumbled upon was unlike anything I had ever heard. It was the grittiest, 360-degree dance beat echo in the world. I picked up the drum and played. There were at least 12 countable echoes, and they did seem like they were organized in measures. We moved around, and wherever we were on the field, the different set of echoes would create a pattern that was both complex enough and clear enough to be experienced as a metric beat. I stayed there for hours, playing single snare drum hits, listening to the structural echo-grooves of the field.

In this way, I was inspired to investigate what was occurring, and the ways in which echoes can be used in music and installation. I worked primarily in the Wesleyan University Center for the Arts, spending much of my time in the open space on Jackson Field and in the CFA courtyard. The experiments would include studies of various notational techniques, focusing on the use of maps for scores. I worked with many instruments and spaces over the course of the 2010-11 academic year, observing how the quality of reverberation changes due to physical and sonic differences in instrumentation and location.

I have written music for both the exploration of the echo-scape of a space and the direct use of echoes within “strict composition.” I use the word strict to mean un-improvised, in which use of certain echoes is expected and executed in
predictable and repeatable manner. The exploratory musics do not have specific aesthetic goals as they are investigative in nature. The strict compositions, for the most part, attempt to recontextualize conventional musical forms into reverberant spaces in which texture is dispersed over large areas and surfaces act as performers. Both types of music highlight the effects of large spaces and multiple reflective surfaces on the spatial, temporal and timbral qualities of sound, and how manipulating both the production and experience of these effects is a musical act. Both types of music attempt to display physical phenomena as music, with or without the use of conventional formal structures.

There are many methods one can use to activate and investigate the acoustics of a space. While the poles of this investigative spectrum can be considered production and experience, or performance and listening, every method will be some composite of the two. I have attempted to write pieces that interact with the CFA using many different points on this spectrum. Some use particular performative devices to illustrate (or, more correctly, color-in) the local quality of a set of echoes. Others address the act of listening and how changes in distance and orientation relative to a sound source define what is heard.

Some methods allow the isolation or accentuation of specific acoustical qualities of a space. I consider the qualities of local meter and the metric mode as two of the most important aspects of my work. Local meter is the musical time inherent to any given position in a large reverberant space, caused by the temporal positioning of echoes at different metric points, or beats, in a perceived
measure. Along with local meter, I found that large spaces with at least two parallel surfaces support a metric mode: a single fundamental tempo at all points between those surfaces. This tempo is based on the length between the two surfaces and can be measured in beats-per-minute (BPM.) I address both local meter and the metric mode in the chapter Mapping.

Experiments in local meter led me to develop methods of producing musical harmony using one or more reflected sounds. Echoes can blend with instruments or be activated in such a way that multiple distinct echoes are experienced simultaneously, creating chords. Echo harmony is the other element of my work that I found most compelling and which I address in the chapter 4.
1. MAPPING

The echo-mapping of the CFA was both a scientific and artistic exercise. I took measurements of lengths between surfaces and calculated local tonal and metric modes. I attempted to notate positions of particular metric familiarity—where echo sets can be easily understood as beats in common time signatures—as “landmarks” to an average listener. Identifying landmarks is arbitrary, of course, when we are speaking of possibilities of echoes. The only available way of notating echoes over time is musical notation, and any music can be transcribed in various ways. So an actual map of echoes will always be a particular impression. In that way, any map of echoes can be considered a notated piece of music in itself.

To develop a raw structural template, I measured the dimensions of various spaces and lines in the CFA. Since I was not able to find blueprints of the layout of the entire CFA, I did this with a surveyor’s wheel. Due to the unevenness of the ground and imperfections in the walked path, I believe I achieved distance measurements to within 10% of actual distances.

I use a map of the space from a 1972 CFA pamphlet. Drawn to scale, the map includes dotted lines for the positions of trees. Since 1972, a large portion of these trees have died or otherwise been removed.
From this data we can derive important information. The length to a surface, and the length between surfaces, will determine when each echo will occur. Surfaces parallel to one another create modes of vibration that can be considered both tonally and metrically. In general, the mode between two
surfaces, such as the walls of a room, is thought of as the fundamental frequency that will be supported by the distance between those walls.\(^1\) This is due to the distance being half as long as the wavelength of a particular frequency soundwave, which allows the soundwave to travel between the surfaces without interfering with itself. The average distance between two parallel surfaces is short enough that it will support a frequency within the range of human hearing. For example, a room with a 20-foot width will support a wavelength of 40 ft, and thus a frequency of 28.5 hz (or full waves/sec, with the speed of sound 1126 ft/sec) or a sharp A0. For a space to have a mode below the spectrum of human hearing, at roughly 16 hz (C0,) the distance between the walls would have to be greater than 35 ft. 16 hz is the threshold at which human experience of rhythm becomes experience of tone; where our experience of a distinct number of sonic events per second becomes an experience of pitch.

In the CFA, there are a number of sets of parallel surfaces with distances greater than 35 ft. This does not mean that these spaces do not support tones within the spectrum of human hearing. It only means that the fundamental frequency supported by the space will be a discernible rhythm, or echo. For example, the distance that became the most elemental to my work was the distance between Crowell Concert Hall and the Art Workshops building, 320 ft. At 1126 ft/sec, sound will take .27 seconds to travel that distance, supporting a frequency of 1.7 hz. The secondary echoes of any sound will always occur off both surfaces .54 seconds later, the result of the soundwave travelling across the

full distance twice. Wherever you are on the field between Crowell and the Art Workshops, you will hear echoes every .54 seconds after an original sound. (.54, 1.08, 1.63, etc., until the echoes become inaudible.) I call this discernible rhythm the metric mode. Since the unit of time between echoes occurs repeatedly, it establishes a rhythmic tempo for the field. Various positions can appear to describe different meters (4/4, 3/4, 6/8, etc) and will share the same tempo, because of the metric mode. Likewise, distinct positions can describe the same meter, at this tempo, by stressing a different set of beats.

Instead of a frequency in hz, which we use to measure pitch (and can, of course, be used to measure pitches outside of human hearing) I have decided to measure the metric modes of various spaces in beats-per-minute, or BPM, which is commonly used to describe tempo. For Jackson Field, our 3.7 hz fundamental becomes approximately 110 BPM. I calculated both tonal and metric modes for various spaces in the CFA.
Map of CFA modes.
From there, mapping became abstract. I named metrically familiar positions, or landmarks, and began working on both notating location and notating the echoes at these specific spots. These notations are all for one snare hit. I use the names from the 1972 map.

A. Anywhere between Crowell and Rehearsal Hall, other than by the door. Upward glissando of echoes, one noticeable return from WMH.

B. Between Rehearsal Hall and WMH, 50 ft west of WMH, 220 ft S of ASN. Listen for slap off ASS.

C. **The Dub.** Anywhere between Music Studios and WMH on either side of the stairwell. Ascending glissando, incredible sustain. Echoes 16\textsuperscript{th} notes at 196 bpm.

D. **The Waltz.** Northwest corner of east Music Studios building. Echoes off Theatre and Theatre Studios (now Dance Studios) seem in three:

D*. **The March.** Directional instruments or listening aimed at upper stories of ASS create a faster 4:

E. **The Jig.** 55 ft. N of DAC, 130 ft E of ASN. 6/8 that ends with low-filtered off Theatre Studios.
F. Anywhere between the Gallery and the Cinema (Now CFA Hall.)

G. Drum Fill. 50 ft. S of Art Workshops, 15 ft W of Cinema. Descending glissando that may remind a listener of a typical drum fill. Listen for echoes trapped near Crowell and WMH.

H. The center of the field, 160 ft from both Crowell and Art Workshops, 120 ft W of ASN.

I. The Tango. 124 ft N of Crowell, 96 ft W of ASS. First 16th is off ASS, rest of measure between Crowell and Art Workshops. Can be felt in three, as well.

J. The Herald. From platform of second window of Crowell facing north. Most obvious position to distinguish between echoes of Art Workshops and Goldsmith Cinema (not pictured.)

The map is, in a way, a notated piece of music in which the listener can move from position to position and hear the echoes. One use of this in composition was to write guided “tours” of the various landmarks. Since the measurements are in feet from surfaces, listeners/performers would technically need either a surveyor’s wheel, a very accurate positioning system, or a laser measuring device unless the positions were marked. In practice, I mostly ended up using markers or visual triangulation for positioning. Since most of the positions have a substantial radius, very exact measurements were never necessary.
2. INSTRUMENTATION

The primary instruments I used throughout my research and composition were drums, the trumpet, and the human voice. Every instrument interacts with the space it inhabits in a different way. The quality of the sound of the instrument (its timbre, range and dynamics) as well as the spatial characteristics of the sound it emits (direction, focus, and quality of dissipation) combine to create a particular spatial signature for every instrument. The signature of each instrument will highlight certain properties of the space.

Acoustics Fundamentals:

The effects of spaces and surfaces on the quality of sound are numerous and immense. One of the spatial qualities I often observed in the CFA was the timbral spectrum of returning soundwaves. For instance, the spectral quality of a snare echo could be all “highs,” and sound like a rim click. Conversely, the high frequencies could be filtered out, leaving a sound that seemed lower than the initial slap. The change in quality of many echoes, while still obvious, cannot be explained in terms of pitch. In general, the ratios of various frequencies present in a waveform produce the timbre of the sound.2 Angle(s) of reflection, quantity of reflections, distance, surface material, interfering objects, and weather are among the variables that affect the ratios within the waveform of an echo.3

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2 Hall, pg. 107.
3 Hall, 69.
Among these variables, distance is the most obvious and most predictable. In general, longer and shorter distances produce lower- and higher- pitched echoes. High frequencies decay more rapidly than low frequencies.\(^4\) Over every long distance travelled by a soundwave, many of the higher frequencies disappear; if that distance is travelled again, this process repeats. In a large field with opposing surfaces, the long distance between the surfaces will be travelled by each soundwave multiple times, causing a constant descent of pitch in the echoes. When an echo filtered in this way then enters a space with small distances between surfaces, the naturally low-pass-filtered sound creates a new, rich and very distorted version of itself.

Shorter distances, and especially distances shorter than a wavelength present in an original sound, do not support the propagation of long wavelengths and cause destructive interference.\(^5\) Again, every distance supports modes whose wavelengths are twice the distance, the same distance, or a factor of the distance. When speaking of an impulsive soundwave, that contains many frequencies, this quality is particularly important. An ideal impulse wave has a flat frequency spectrum that contains all frequencies. From amongst the frequencies emitted in the wave, each distance and surface will filter a select set.

\(^5\) Hall, pg. 65.
The Snare Drum:

The impulse-like nature and the volume of the snare drum sound offer the clearest way of exploring the full, 360° echo-scape of a specific location. The instrument has a huge dynamic range, allowing performers and listeners to observe how the perceived loudness of an “original” sound changes the echoes it produces and the ways in which the sound itself interacts with those echoes.

While the sound is in some ways impulsive, the snare also has a tonal center and overtone series, though noticeable tones of drums are very difficult to pick out in echoes. The amplitude of the initial slap overwhelms and masks the tones of the drum. As that immediately decays, the listener can hear the original tones of the skin or head. These tones are not loud or directional enough to produce echoes that could compete with the slap. The echoes of a doumbek and a snare drum with the snare turned off—both highly tonal percussion instruments—were atonal. Even taiko drums, which initially seemed ideal for the space for their sheer volume, proved unsatisfactory: the slap on the skin is not loud enough to function like a snare head, and the tonal quality of the echoes, while more distinguishable than that of other drums, was inaudible to a performer close to the drum.

The Tambourine

Tambourine cause exceptionally interesting echoes. During a rehearsal, on Jackson Field, a curious listener named Natali Plaza came to join the fun, carrying a tambourine. As she approached from the west, all of the performers
present looked east, hearing the clearest and loudest version of the sound off the west wall of the Art Studios. Of all the instruments that I have tested, the tambourine creates the echo that is most similar to the original sound. This is slightly counterintuitive, if we consider that high frequencies decay fast, and the waveform of a tambourine is distinctly high-frequency. It may be that the initial sound is soft enough, compared to the other instruments we were using, that the ratio of the perceived loudness of the original to the perceived loudness of the echo is smaller than that of the other echoes. This would be due to the logarithmic nature of hearing volume, by which changes in perceived volume are observed relatively, not absolutely. Also, the distance that at which the tambourine is played—which at times was larger than the distance from the listener to the nearest echo—can change things substantially.

The Trumpet:

Trumpets, like drums, have an exceptional dynamic range. They can reach amplitude levels of over 120 db (measured at one foot,) or be used to whisper. The sustained volume of the sound is loud enough to produce many distinct tonal echoes, in which the pitch of the original sound can be clearly identified. Since their sound is composed of a single fundamental frequency and its overtone series, one could calculate the modes of a specific distance and choose to play or interact with those pitches. One of the reasons this is possible is the extreme directionality of the instrument, which allows for specific surfaces or areas to be isolated or musically stressed. An echo that is isolated in this
manner, intentionally or unintentionally, will be considered a primary echo. Changes in bell direction and dynamics can be used to explore the possibilities of a sound emitted in a primary direction and observe the echo structure of a given location in a more focused way. Single repeated tones, fast scales or arpeggios, growls, and half-valves all caused beautiful effects in the space. Because of the strength of its echoes, the trumpet allowed me to explore harmony, in which an original sound and/or one or more echoes play simultaneously to create a cluster or chord.

The trumpet can also be used as a megaphone of sorts to focus the direction of various vocal sounds such as hums and whispers. Sweeps of the bell would become a favorite musical technique of one performer, Myles Potters, causing a spatial cascade of a single or multiple tones returning from various reflective surfaces. While certain arrangements and orientations of multiple surfaces can and do create a cascade from a sound emitted in a single direction, sweeps create a cascade of sounds that are all stressed by the directionality of the instrument. Each of the returning echoes will have the timbre of a primary echo, creating the aural impression of a trumpeter painting all the surfaces around him with sound.

**The Human Voice:**

The human voice was used mostly for timbral exploration. Of special interest were the use of consonants and vowels and the degree of tonality possible in the echoes. The human voice can generate enough amplitude to
produce clear, tonal echoes and can operate inversely to the drum: echoes sometimes decay to un-syllabic, tonal phrases. Still, overall, the consonant is a more forceful tool for exploration as its sharpness and noise-like waveform (which, like an impulse wave, is composed of many frequencies) propagate very efficiently. By efficiency, I mean that unlike a low-volume tonal human vocalization, a low-volume consonant will produce coherent echoes. A favorite line was “shhhhhhou.” In one specific location, the richness of human singing was a major point of comparison to trumpet timbre.

**Other Instruments:**

I also used flute, clarinet, melodica, and tenor saxophone. The flute is a very compelling tool for spatial composition. While its set of echoes was not as large or clear as those of other instruments, its sound outside is crisp and apparent. The instrument is actually quite directional, and spins of the performer would cause changes in the sound. The flute is especially effective as a tool when either it or the audience is moving around surfaces and through various spaces. The sound remains clear, but its perceived location and orientation change in an engaging way. Since the volume of the flute is similar to that of some trumpet and tenor sax echoes, it can be used to harmonize with those echoes very smoothly.

The clarinet, which is more directional than the flute (though normally pointed downwards) has a range of function between those of the trumpet and flute. Notes played in its upper register can be surprisingly loud. Directional and
clear, the instrument can be used to isolate surfaces and “scout.” It can also be
used effectively at low volume to interact with other instruments and their
echoes or explore melodic lines through space.

I would have loved to experience a Sousaphone on Jackson Field, but I
used tenor saxophone for the low register, instead. Its volume and
directionality allow it to remain clear in a mix of both original and reflected
sounds that includes trumpet and drums. Considering its dynamic, pitch and
timbral possibilities, it is an ideal instrument for exploration. The tenor
saxophonist, Owen Callahan, played with growls, squeals, and various sounds he
described as “metallic” while changing his position, orientation, rotation, etc.

For its ability to play many notes at once, in a single direction, the
melodica proved very able to activate a space. Clustered chords played by Sam
Friedman as he spun around caused a very complex cascade.
3. EXPLORATORY MUSIC

After that first session on Jackson Field with Jon Myers, I began conceptualizing the possibilities for music composed for specific spaces and their echoes. At first, I thought mostly about the relocation of conventional musics--with conventional meters--into large reflective spaces. I felt that doing this effectively would require the location of positions at which specific acoustical phenomena were very apparent. Basically every location in the CFA has a compelling set of echoes. The difficulty was to find locations and compose pieces that made a specific echo or a local meter obvious. Insights from Professor Daniel St. Clair led me to understand this very exploration as music, as well, and as a generative template for music. From there, I began to describe and experience the act of exploring the CFA as a continuous musical piece and compose method-pieces of exploration for single and multiple performers at single and multiple positions. To notate the pieces, I used the 1972 CFA map, and either described methods to line up location visually or simply used a marked position on the map.

Most of the pieces are for solo performer/explorer, with or (preferably, sometimes) without an audience. While they do notate music for specific locations, their primary purpose is to notate the music of travel: the sound of entrance to and exit from these positions and every position in between.
I also began to work on pieces for multiple performers who travel freely, approach a position, or disperse from a location. These would use specific echoes as tempo for both music and travel. Using an echo as a requirement for the pace of travel proved an effective way of focusing and isolating a primary echo.
A performance group of Jon Myers (snare,) Kelly Morgan (flute,) Sam Friedman (melodica,) Myles Potters (trumpet,) Cora Lautze (words,) Jack Glenn (words) and myself (trumpet) realized some of these pieces in a performance on November 20, 2010. I feel that an effective way of illustrating the musical possibilities of echoes is to simply describe what was performed.

#1 is a site-specific piece for solo snare drum. Alvin Lucier’s Vespers informed this piece to a large degree. The introduction to Vespers reads:
VESPERTS for any number of players who would like to pay their respects to all living creatures who inhabit dark places and who, over the years, have developed acuity in the art of echo-location, id est, sounds used as messengers, which, when sent out into the environment, return as echoes carrying information as to the shape, size, and substance of that environment and the objects in it (1968)

The instructions for #1 read:

The drummer is instructed to consider the dropping of stones in water and the fluid nature of air, to visualize the properties of motion for liquids and gases, to play freely, and to explore any or all of these techniques:

1) *Echo-scape.* Use the impulse-like quality of the snare drum as a fluid messenger, and acknowledge as much information as possible about the environment.

2) *Meter.* Find a local meter, with the use of initial, loud snare hits. Try to hear the echoes in either simple or compound time. Play snare on first beat of measure. Explore lengths of measures, including 3, 4, 5, 6, and 7 beats per measure. Establish meter, and embellish with snare hits, rim shots, or clicks on beats other than the first. Face drum head at Crowell, Art Studios, and Art Workshops buildings. Explore meters by experiencing the first beat of the measure as one of the primary echoes. Develop meters that include focused experience on multiple surfaces, and use both the original sound and echoes as the first beat of the measure.

3) *Timbre/dynamics.* Crescendo and descrescendo at any constant tempo from tiny clicks to rim shots to full snare hits. Allow echo to completely decay. Face each of the walls. Spin one direction. Spin freely. Include muted snare shots, snare rattles, scraping the drum head, or anything else. Change tempo and tempo of spin.

4) *Tempo.* Begin with any sound at a very slow tempo. Allow echo to completely decay. Slowly speed up to a roll, and slow back down to single hits. Change tempo freely: as you increase and decrease the tempo, face and/or focus on specific surfaces. Explore when the echo is reaching you halfway between hits. Speed up until the hits match the echo: it will disappear (to you.) Explore the appearance and
disappearance of the echo. Try to experience the appearance and disappearance of
the echo according to two surfaces, and possibly three.

#1 represents a collage a many of my more focused exploratory pieces,
and these techniques are generally my instructions for a thorough investigation
of echoes in any space. During this piece, other performers enter focusing on the
audible patterns of the drummer. I say audible to differentiate cues in sound
from those in light. They are instructed to explore the space using their
instruments non-tonally: by hitting them or blowing air through them or using
their voices to feel out the space while proceeding toward the location of the
drummer.

Once all of the performers are in the same place, the drummer is
instructed to begin playing a consistent pattern that outlines a natural meter. In
#2, the performers are given a set of chord tones to explore rhythmically against
any of the surfaces. This piece allows performers to choose what time they
hear, as the drummer is instructed to do in the first technique of #1. This
technique is inspired by experiences with Western African drumming
ensembles, in which a performer or audience member can “flip” the groove
around—intentionally or not—by aligning with a different first beat. The “feel”
of the groove is instantaneously altered, as the body’s expectations of the focal
temporal point—beat one—and its relations to other stressed parts of the
groove change.
Both the audience and the performer can choose what time they hear. Many times, I would hear something in 4 that others heard in 6, or hear the first beat of the measure somewhere completely different than others. Through alignment, the performer changes his experience of the music and will probably change what he is playing. Again, realignment can be achieved by choosing the first beat of the measure, by listening to a specific echo that will then be stressed in the form of the measure, or by feeling a generally different time signature.

As follows, in this music and all music, audience is active. Our expectations, of course, change the music. Audience is particularly active in this music because its structure is based on location. The movement of the audience is a musically creative act. Also, audience members, unlike performers, have an extra variable that they can play: distance from any sound source. This will automatically create different feels that can then be played with, or simply played.

The importance of audience positioning led to the notation of pieces for moving audience in which the audience is given a specific path to walk and explore the changes that occur to sound being emitted from a stationary sound source. #4 uses this technique by having guides circle a building, leading the audience.

During the November performance, we also explored cues in light and techniques of travel. A conductor at distances of noticeable sound-lag signals musical cues in light in #3. The conductor, in this case Myers, either conducts freely or conducts and also hits a drum. The performers have spread out over
the field to specific positions where they are instructed to play certain chord tones when they see the hand signal for the first beat or see the drumstick hit the drum. Performers across from each other (+/- 150 ft apart) should, at our general tempo (+/- 110 bpm) hear each other a 16th note late. A central performer would theoretically hear every other performer a 32nd note late.

Following light patterns is in part inspired by the practice of tala in Karnatak music. While South Indian performers do not have to deal with the lag of large distances to remain in synch, a visual (instead of aural) pattern is used to describe the meter when the drummer is improvising. For an audience member, or at least for me, this adds another dimension to the music. The patterns of the drum, if experienced alone, might sound completely independent of the tala, but the visual definition of the form allows for a new composite music. To someone with their eyes open, the light cues on Jackson Field might have represented a structure that is then relatable to the other sounds.

To travel, we performed an exercise in playing and listening in which the performers could only move to the next location by aligning their steps to echoes. This was executed by one performer making a sound once to which all performers listen for an echo pattern, followed by every performer moving in synch with the expected echo pattern when the musician makes the sound for a second time. We ended up slightly stuck in some of the tighter spaces.

The last location and #4 emphasizes both reverb and echo. By reverb I mean the continuous suspension, or blended repetition, of a sound. Echo is the distinct repetition of sound. The space between the Music Studios and the
World Music Hall has an amazing quality. A sound of short enough duration will quickly echo upwards of 15 times, and a long sound will reverberate for about 4 seconds. During the decay, the low end of any sound filters out, providing the listener with an ascending tonal arpeggio into distinct and rich overtones. Here, the trumpet and human voice both quickly become strange versions of themselves multiple octaves up.

During the performance of this piece, guides circled the west Music Studios building offering an example of how to listen to the sound while moving and identifying the various borders where the change in sonic quality is particularly striking.

Despite having set locations for each piece, all performers understand that there is never a destination and that the music is complete at every location.
4. STRICT COMPOSITION

During the processes of mapping and exploration, I continuously engaged with my initial aim in the CFA: to write music that uses specific echoes within the composition. This music uses conventional metric systems to predict and interact with echoes and cause echoes to interact with other echoes. The outdoor portion of my thesis recital *Torrents*, performed on on 3/26/2011, was largely composed of a set of these compositions. For these pieces I wrote for tenor saxophone, two trumpets, flute, clarinet, and drums.

The basic drum technique of creating meters from one hit remained elemental to the compositions in this category. I consider the ability of one hit on one drum to sound like a percussion section as possibly the most compelling aspect of echo music. The concept of groove is a major point of compositional interest for me, and the reliance of some musical forms—such as West African drum music, hip hop, funk, and rock—on an engaging, repeated rhythm greatly influences my work.

The first strict composition I wrote was an elaboration on a previous tour for solo snare drum and was realized on 3/26. In this piece, the drummer travels along a path with stops at six specific locations in the CFA. For each of these locations, a groove was composed that included meter and basic embellishments to be further expanded as the performer sees fit. Depending on the length of the piece, audience members are encouraged to experience the piece from the six locations and as travelling listeners.
Using the drum as a consistent groove, I then wrote instrumental parts that work with the drum. Once the local meter is established at any given location, it is possible to notate echoes according to that meter. Using directional instruments, I isolated particular echoes that were identifiably metric and wrote parts that included those echoes in the score. To notate these echoes, I used stem direction; stems up and down describe a note played by the instrument, stems down described an echo. This is a trumpet part written for a piece that was realized at position F from the Strict Snare Tour:
An interesting method for clear identification of a local meter is the dispersion and regrouping of performers. On 3/26, we performed a piece in which the drummer remains at position F and trumpets approach from Crowell. The drummer plays a repetitive rhythm outlining the local meter at F. As the trumpets approach, they play to the meter they perceive according to the original sounds of the drum (not to any of the echoes, technically, although many locations will be completely metric because of the metric mode.) Due to the time it takes the sound to get from the drummer to the trumpeters, added to the time it takes the sound from the trumpets to get back to the drum, the sound and echoes of the trumpets will seem “out” at the location of the drum. When the trumpets arrive at position F, their sounds and echoes synch with those of the drum to clearly identify both the local meter at F and the effects of position, distance, and motion in a large reverberant space.

An interesting note: if a sound originates at a single position between two reflective surfaces, the sets of echoes off each of those surfaces are identical at every location in that space. Only the relative relationship of the sets changes. In practice, if a performer is using one of the surfaces to create a pattern in time, any listener on the opposite side of the performer from the surface will experience that pattern, including the original sound, exactly as the performer
does at the original position. Likewise, a performer approaching this position from opposite the isolated surface can hear and play to the pattern as it is being heard at the original position, although the entire pattern is experienced by the second performer a certain amount of time after it is experienced at the original position. This amount of time is based on distance to the original position. The trumpets in the piece above, for instance, can grasp the feel and meter of the drums but cannot synch to them until they have arrived at position F. This is not possible for a listener at a position between a performer and the isolated surface, because the time between the original sound and the isolated echo at the listener’s position will be shorter than it is experienced at the original position, which changes the pattern.

Isolating a single echo to create meter is a major technique for strict composition. I used this technique in various exploratory pieces. The simplest method is to use the echo as either a quarter note or eighth note, and to play straight rhythms, such as four quarter notes or two half notes, in which the echo returns halfway between notes. This will, of course, make any composition sound like each note is being played twice. It is possible to line up the echo to any beat in the measure. For example, we used an echo in the CFA courtyard as the third (and sixth) triplet in 6/8.
Using this technique, I was then able to begin exploring the simultaneous interaction--harmony--of echoes. After establishing the meter against a single echo, one can predict the timing of the echo and harmonize. Using a trumpet, playing quarter notes and establishing the echo as the upbeats of each beat, a performer then begins to play eighth notes. To clearly hear the echoes, a trumpeter should accent the first eighth note and play the second eighth note softly. This will create an audible dyad using the echo and the trumpet. Two performers can build a seventh chord in the same way.

Softer and generally higher-register instruments can be used very effectively to substitute for the “soft” second eighth note. I primarily used the flute. Its original sound can mix well with the echoes of trumpet, tenor sax and drums. The flute can be used to either harmonize with echoes or play a melody over a rhythm section that includes echoes.

Taking this one step further, it is possible to design music that creates harmony and chords within the echoes themselves. This is achieved by finding
and notating a position with a local meter at which two distinct echoes return at different points in the measure. Then, by playing two notes that mirror the difference in time of the two echoes, the echoes will line up so that they return to the listener/performer simultaneously. For example, we performed a piece written for position D on the landmarks map (called “The Waltz,” \( \begin{array}{c} \text{trans.:} \\
\text{echo 1:} \\
\text{echo 2:} \\
\end{array} \)). By playing two eighth notes instead of a single note, the echo becomes:

\[
\begin{array}{c}
\text{trans.:} \\
\text{echo 1:} \\
\text{echo 2:} \\
\end{array}
\]

Echo harmony.

This technique, as well, can be performed by two instruments to produce full tetrads in echoes.

If a surface is far enough away, a performer can also use echoes to elaborate a melody. At position D, some amazing effects occurred when a more involved melodic line was played. Depending on the accents/dynamics of the original line, the echoes could construct a new melody upon return, one that didn’t seem like the composite of two separate echoes, or a more developed variation of the original line.

\[
\begin{array}{c}
\text{instrument:} \\
\text{perceived echo} \\
\end{array}
\]

New echo melody.
Performers can be positioned to function like echoes. We can establish meter off surfaces, using the amount of time it takes to travel from a primary performer (performer A) to the surface and back as a metric unit. The echoes return at a predictable point in the measure. For example, an echo returns a quarter note later. Positioning a performer (performer B) at the same distance will yield an identically predictable result. If performer B is playing to the rhythm they hear from performer A, any note that they play will be heard at position A a quarter note later than it is experienced at position B.

Likewise, a secondary performer can be placed at many positions relative to a primary position so that whatever they play will be in time at both the primary and secondary positions. As long as the time it takes sound to travel to the secondary performer is equal to a metric unit at the tempo being played at the primary position, any notes played by the secondary performer on clean divisions of the beat will arrive back at the primary performer on clean divisions of the beat. When the notes arrive back at the primary performer, they will strike at a different point in the measure, creating a different, predictable, metrically clean music for each performer.

There are many ways to position performers and listeners relative to a primary performer so that the composite of the original sound and the echoes is metrically clean. By metrically clean, I mean that a local meter can be heard and that the pattern of the primary performer can be predicted based on the echoes and the local meter. This is achieved by positioning performers and listeners at distances from the primary position and from surfaces that create metric units.
based on the speed of sound. Often, positioning a listener halfway between a performer and a surface will create a metrically clean version of the music.
5. **THE TORRENTS RECITAL**

My senior thesis recital, *Torrents*, was the culmination of my strict-compositional work throughout the year. Because of the number of people present, interesting new variables arose. The variables include the absorptive quality, movement systems, and threshold noise of large groups of humans.

The recital took place at 9 p.m. on 3/26, and we moved outdoors at approximately 9:45. The temperature was cold (about 30°.) I had found that cold nights are the ideal environmental setting for the propagation of echoes. Lower temperatures, especially those below freezing, make the ground more reflective by freezing it. Lower temperatures also remove various sound sources, like animals and people, by forcing them indoors. Night does this as well. The general hum of traffic, equipment, and people decreases substantially. Interestingly, it is very difficult to experience the change in threshold noise level (the volume of “silence”) without a control. For us, the control is the echoes.

The first half of the recital took place in the World Music Hall. The indoor music of *Torrents* is written for drum set, two percussionists, bass, guitar, vibes, trumpet, flute, two guitarists with E-bows, four vocalists, and multiple poets. The music is composed for performers surrounding an audience. Using a setup of eight speakers and four amps, I was able to isolate each sound at its source.

Inspired largely by the outdoor acoustics of the CFA, the indoor music deals heavily with the dispersion of shapes, ideas, and textures in space. Hocketing, a process through which a musical phrase is dispersed timbrally and
spatially by dividing it between performers, plays a large role. I developed a style of lyrical hocketing (in *mantra 1*, *mantra 2*, and *for three poets*) that overlays various complete statements such that they create a new statement.

The indoor music also uses overlaid time signatures, drones, solkattu-based music and solkattu-based poetry, and percussion with West African-style rhythms and *taiko* drums. General influences include hip-hop, Navajo chant and ritual dance music, Georgian choral music, karnatak music, blues, and rock. At the end of the indoor music, a poet tells the audience that “the only way to stand under a flux of another order is to go outside.” The audience then transitions outdoors, where singers have begun to perform the first outdoor piece.

The outdoor portion of *Torrents* is one semi-strict composition with eight movements. The score is in the Appendix, and I outline each movement here:

*Sah Pasyati:*

Choral piece in four parts for position between WMH and Music Studios, for as many singers as possible. The initial movement of the audience outside from the highly reverberant World Music Hall should highlight obvious environmental changes in the quality of the acoustics. The chant uses clusters and pedal tones to display the reverb of the space. Meter is established so the reverb can decay completely before next phrase begins. The audience needs to be positioned between the surfaces of the buildings to experience the effects. Orchestrating the positioning of the audience proved difficult (and generally failed.)


**Trumpets to Courtyard:**

Two trumpets begin at position of *Sah Pasyati*, highlighting the same effects and creating chords in the reverb. Move underneath archway of Music Studios into the CFA Courtyard, displaying another sonic emersion from tightly enclosed spaces to a more open field. Identifies echoes off CFA Theatre and uses them both melodically and harmonically. Flute enters at end of piece.

**Flute and Clarinet Dialogue**

This piece is has a free form, in which the clarinet and flute approach our next position trading D major notes and phrases. The audience reacted strongly to the sound of the flute outdoors, immediately moving towards it. The two instruments, as well as the two trumpets and a snare drum, converge at position called “The Jig.”

**Off the Wall**

Reorienting towards the CFA Theatre, the four instruments perform a hocket, in which all the returning echoes of the instruments harmonize with the original sounds. Due to the crowd, this was difficult to hear.

**The Strict Snare Tour**

As described on page 29. If the audience hadn’t quite put together what was happening, the strict snare tour makes it obvious. Other performers
disperse towards Jackson Field through the Art Studios. Most of the audience follows the drummer. It ends by adding tambourine and *doumbek* at position F, displaying a complex version of local meter.

**Trumpet Duet for Crowell**

A semi-improvised trumpet herald duet in F minor, contrapuntal style, from the second window ledge of Crowell. Identifies time using Art Workshops and Goldsmith Family Cinema. Trumpets transitions towards position F. Upon arrival, synch to local meter is hopefully apparent.

**The Tango at The Tango**

Introduces tenor saxophone at position F, called "The Tango." Three percussionists, two trumpets, and tenor sax play to local meter. A travelling flute player plays melody, providing an example of possible audience motion and the effects of movement. Instrumentalists alternate identifying time off Art Studios and Art Workshops, displaying the change in feel due to the isolation of different surfaces. Instruments other than the tenor sax and drums then disperse to locations approximately an eighth note away. As drums continue to play local meter at The Tango, tenor sax also disperses, before all instruments reconvene at position of the drummer, coalescing in space and sound. The flute continues to play melody as the performers and audience travel back through Art Studios to CFA courtyard, exploring with consonant vocalizations.
Off the Wall Again

A second piece performed at The Jig, this time accompanied by drums. The drummer is situated about 20 feet away, not causing noticeable lag, but interacting with a different set of echoes. The tenor sax and trumpets play off the CFA theatre, while flute plays harmony to the echoes.

The audience caused a substantial dampening of the echoes, sometimes making it difficult to perform and difficult to identify the acoustic phenomena that I had intended to identify. Positioning instruments above the crowd, such as the trumpets at Crowell, adjusted for this well. The snare drum was the most resilient of the instruments in these conditions, able to cut through and generate distinct echoes and meters.
CONCLUSION

There is something about being surrounded by echoes that can make a listener feel both disoriented and centered. Friends have said that to them, the echoes describe this locality: that our lives will always be experienced from the origin, coordinates 0,0. A musical relativism informs us that when we’re over here, we can never experience what’s going on over there. There’s something comforting and terrifying about that.

If my work in the CFA and the exhibition of *Torrents* achieved anything, I hope that more people clap when they walk, make noises just to see what will happen, stop and consider that every space is an instrument. Stop and consider that no *space* is empty: it is filled with an ocean of air in a flux far more complex than we can imagine. We can’t imagine it, but we can swim in it, play with it: send waves out into the medium, to return or not.
ACKNOWLEDGEMENTS

I would first like to thank Professor Dan St. Clair. You got me excited about experimental music, the act of listening, and acoustical phenomena in a way no one else could, and this is Wesleyan University. You dig on sound more than anyone I’ve ever met. Thank you for your insights and humor. If one day I hear a hybrid semi drive by sounding like an Australian frog, I’ll blame you.

To my other music professors, thank you. I feel blessed as a student, listener, performer, and composer to have been surrounded by so many amazing musicians and minds. David, studying with you has been one of my most rewarding experiences at Wesleyan, and thank you for letting me use your compositions as a template for new music. To Sandy, Deb, and the CFA staff, thank you for putting up with me.

Performers, you made this project possible. Thank you for your trust, your curiosity, and your hard work. I have learned so much from all of you. Jon, you get deep in it and hot on it.

Family and friends, I hope that I can show you as much love as you’ve shown me throughout this whole year. Go make noise.
Appendix/Scores
CFA Metric modes map.
CFA Echo Map.
CFA Echo Map Key:

A. Anywhere between Crowell and Rehearsal Hall, other than by the door. Upward glissando of echoes, one noticeable return from WMH.

B. Between Rehearsal Hall and WMH, 50 ft west of WMH, 220 ft. S of ASN. Listen for slap off ASS.

C. The Dub. Anywhere between Music Studios and WMH on either side of the stairwell. Ascending glissando, incredible sustain. Echoes 16th notes at 196 bpm.

D. The Waltz. Northwest corner of east Music Studios building. Echoes off Theatre and Theatre Studios (now Dance Studios) seem in three:

D*. The March. Directional instruments or listening aimed at upper stories of ASS create a faster 4:

E. The Jig. 55 ft. N of DAC, 130 ft E of ASN. 6/8 that ends with low-filtered off Theatre Studios.

F. Anywhere between the Gallery and the Cinema (Now CFA Hall.)

G. Drum Fill. 50 ft. S of Art Workshops, 15 ft W of Cinema. Descending glissando that may remind a listener of a typical drum fill. Listen for echoes trapped near Crowell and WMH.

H. The center of the field, 160 ft from both Crowell and Art Workshops, 120 ft W of ASN.

I. The Tango. 124 ft N of Crowell, 96 ft W of ASS. First 16th is off ASS, rest of measure between Crowell and Art Workshops. Can be felt in three, as well.

J. The Herald. From platform of second window of Crowell facing north. Most obvious position to distinguish between echoes of Art Workshops and Goldsmith Cinema (not pictured.)
FOR SOLO PERCUSSIONIST.
BEGIN AT POSITION 1.
BETWEEN HANDRAILS. BEGIN SLOW, 1 STRIKE ON HANDRAIL.
ART STUDIO NORTH
BUILD TO A ROLL ON HANDRAILS. OBSERVE ECHOES & PITCH EFFECTS.
PROCEED CLICKING STICKS TO 8. SCOWL. HITS A ROLL ON LAMP POST AT B.
CLICK STICKS & STRIKE WALLS TO C.
AT C SCREAM. CROWELL CONCERT HALL
WYLLYS AVENUE
PERFORMER: BEGIN AT A. CHOOSE A REPETITIVE MUSICAL PATTERN. TRAVEL TO B, C, AND D ELABORATING ON ART STUDIO NORTH THAT PATTERN. TAKE YOUR TIME.

AUDIENCE: TRAVEL IN CIRCLES AROUND BUILDINGS, LISTENING FOR THE LOCATION OF THE PERFORMER.
BEGIN AT ANY POINT BETWEEN GALLERY & THEATRE.
USING VOICE, TRUMPET, OR ANOTHER DIRECTIONAL INSTRUMENT, PROCEED TO B & C. ART STUDIO NORTH AS YOU MOVE, CONTINUOUSLY SPIN. VARY SPEED.

PLAY LONG TONES, ACCENTS, ARPEGGIOS, SCALES. GROWL & SQUEAL.
Approach one another and tune positions. Find meter off.

Attempt to find a predictable echo for the two. Slowly find time off, then tune again.

Foust for Two Trumpets

Swing
FOR TWO DRUMMERS:
CLOSE YOUR EYES.
USE ANY DYNAMICS AND
PATTERNS TO EXPLORE
THE FIELD.

Art Studio North

ATTEMPT TO LOCATE
A POSITION AT WHICH
BOTH ECHOES ARE METRICALLY CLEAN
AND BOTH DRUMMERS CAN PREDICT & INTERACT
WITH THE COMPOSITE LOCAL METER.

Crowell Concert Hall

World Music Hall

Rehearsal Hall

Music Studios

Davison Art Center

High Street

Wyllys Avenue
A: Choose rhythm. Establish local meter. Use snare.
To change to a different rhythm, scream number.

B: Play to A. Use rimshots or muted sounds.
Follow number calls.

Audience: Begin near A & B. Travel between
them. Make your way to C, D, & E, travelling
freely.
Score, torrents, 11/20/2010.

#1

For solo snare drum at position A, 100 ft from Crowell, 75 ft from wall south of ASS.

The drummer is instructed to consider the dropping of stones in water and the fluid nature of air, to visualize the properties of motion for liquids and gases, to play freely, and to explore any or all of these techniques:

1) *Echo-scape.* Use the impulse-like quality of the snare drum as a fluid messenger, and acknowledge as much information as possible about the environment.

2) *Meter.* Find a “natural” meter, with the use of initial, loud snare hits. Try to hear the echoes in either simple or compound time. Play snare on first of measure. Explore lengths of measures, including 3, 4, 5, 6, and 7 beats per measure. Establish meter, and embellish with snare hits, rim shots, or clicks on beats other than the first. Face drum head at Crowell, Art Studios, and Art Workshops buildings. Explore meters by experiencing the first beat of the measure as one of the primary echoes. Develop meters that include focused experience on multiple surfaces, and use both the original sound and echoes as the first beat of the measure.

3) *Timbre/dynamics.* Crescendo and descrescendo at any constant tempo from tiny clicks to rim shots to full snare hits. Allow echo to completely decay. Face each of the walls. Spin one direction. Spin freely. Include muted snare shots, snare rattles, scraping the drum head, or anything else. Change tempo and tempo of spin.

4) *Tempo.* Begin with any sound at a very slow tempo. Allow echo to completely decay. Slowly speed up to a roll, and slow back down to single hits. Change tempo freely: as you increase and decrease the tempo, face and/or focus on specific surfaces. Explore when the echo is reaching you halfway between hits. Speed up until the hits match the echo: it will disappear (to you.) Explore the appearance and disappearance of the echo. Try to experience the appearance and disappearance of the echo according to two surfaces, and possibly three.
#2

All performers approach A from Art Studios courtyards. Use instruments atonally or scout the space using voice. Move in time to the audible patterns of the drum. At position A, develop a metric pattern based on the drum and the local meter. Begin together, and use any notes from these chords including 7ths and 9ths at one chord/bar. Key of C minor.

\[ c/Db/c/bdim/c/Db/D7/G7 \]

Use single or multiple surfaces to create a repetitive metric pattern. Perform to any time signature you feel.

Begin to disperse toward * positions. Continue to play to the drummer, off any surface. Drummer to B, melodica to 1, T1 to 2, flute to 3, T2 to 4.

Stop when drummer at B hits snare.

#3

Conductor at B, conduct any time signature. If you change, change slowly. At some point, begin to play the first beat of each measure on the snare drum. Listen and try to adjust the tempo of your conducting to the local meter at B.

Play to your vision. Follow the conductor. On the first beat of the measure, play a quarter note, two 8th notes, or four 16th notes. Use these chords: Bbmin7/Cb7. Use any chord extensions and any dynamics.

As you see fit, discard the instructions above and begin to spin. Use any sound to explore every surface around you. When any performer begins to spin, all other performers follow. Piece ends when central performer spins until he/she falls down. At ending, briefly use the phrase “well done” to explore.
#4

Beginning at * positions from #3, we begin to move towards C.

To move, we will play acoustical red-light-green-light:

Everyone stands still. A performer makes a sound. All other performers attempt to remember the pattern of echoes that they heard. Performer repeats the sound. This time, all performers step to the pattern of the echoes that they expect. One performer leads each time. If you get stuck, listen for and move fluidly during any decay. Take any path toward C.

At C, stack 4ths: play C,F,B and D,G,C. Let each chord decay completely before beginning the next. Use any dynamics, swell, sforzando, blare, descrescendo. At any point, begin to play any number of stacked 4ths beginning on C or D. Proceed to play any arpeggio, listening for chords. Play clusters. Locate the spatial position and motion of the decay.

Guides circle west Music Studios building. Find landmarks of interest and display them. If a long silence is held, say “well done.”

When ready, use a repetitive pattern to move through the Music Studios archway to position D. Before, during, and after passing through, listen for the echo off the theatre studios. Repeat the pattern at D. Spin. Aim at space between second story rooms of ASS. Aim at Theatre Studios. Aim at Theatre, Art Library, Music Studios, and the ground.

#5

Piece for three poets at * positions 5, 6, and 7. Explores lyrical hocketing, quality of human voice in space. The score is lost. At end of piece, say “well done” to signal end of exhibition.
move: position will describe the structure
move: you will always be in the center of space
move: each set of positions will be a music: the music will exist at the center of space

always feel free to dance

mantra 1: all will be raised to the one verb: will to light
mantra 2: light fire light and know in to fire you will be lifted

callahan- clarinet/tenor sax
cecilia lynn-jacobs-- vox
natali plaza- percussion

adam gunther- e-bow
hannah overton- e-bow

jisard- words
mattito perry- words
josh smith- words
marina reza- words

feature:
benjamin block- electric bass
ash friedman- vibes
jon "five" myers- drums
kelly morgan- flute/words
myles potters- trumpet

em trambert- vox
evan schnoll- percussion/words
donovan arthen - percussion/vox

whoa

samples

misra koraipu and misra jati rhythmic compositions by david nelson.

tryambakam yajamahe sugandhim pushtivardhanam
urvarkamiva bandhanan mrityor mukshiya maamritat
--mahamrityunjaya mantra

samam sarvesu bhutesu tishthantam paramesvaram vinasyatsv
avinasvantam yah pasyati sa pasyati
- bhagavad gita 13.28

thank you: performers/collaborators, DSC, DN, AP, cfa architects, AG, listeners
Performers enter from stairwell opposite their position during the performance, crossing the space either around or through the audience.

3 Ebow players enter first, turn up volume. Ebow 1 holds A. Ebows 2 and 3 begin to move away from A, 2 ascends and 3 descends. Within the first half-step, attempt to locate a clear beating pattern.

Drummers enter. Attempt to begin at the tempo of the beating pattern. Play BEAT 1. After drums begin, ebows are free to move as they please.

Poets enter, travelling and repeating their first phrase. Final drum cycle is signalled by exit of bell player. When drums stop, poem begins. During poem, Ebows turn down volume and be sure to be holding a note in Am9 by the end.

All other performers enter. The cue for the flute to begin is "light multiplying light multiplying light."
BEGIN W/ 4x BELL PATTERN

X3, cue is triplet in bass drum
on beat 4 of third time.

BELL
SNARE
BASS
TAKO RIM

X4, cue is change in bell pattern
on beat 1 of last time.

X4, transition back to A, cue
on beat 1 of last time.

When bell stops or moves away,
Finish through C.

63
KALEID THE DELTA
for 3 poets

R) Her shape kaleids the forms
Josh) The delta changes her
Jeremy) Changes disperse liquid
Mattito Pito)

R) Volcano birthing of the present tense infinite acceleration
Josh) The present tense towards the future
Je) Tense with momentum tense
M) tense with whiplash

R) point towards Oz
Josh) Towards the more central point
Je) like we reach toward the light
M) like west to the new world

R) the light being the punctualization
Josh) being changes the system
Jer) the punctuation being changes in the drop of the systematic sedative
M)

R) as collisions will come
Josh) so be to beauty
Jer) being changes
M) clear the monument hour

R) collisions will come
Josh) be to beauty
Jer)
M) clear the monument hour
the fire being the present moment in time
changes consumed back into the verb: dance toward the fire
yet still being changes
Back into the reverb

in Time like in freefall
or in motion
monuments for fuel
fueling the present moment in time

to describe a flux
or motions in order
or the gravity of this
or the gravity of this
or the gravity of this

or motion like toward iron
motion like to ward off iron with

by necessity
by flight
and desire of earths
into dimensionality

to be described
I broke in to myself

the scribe drawing signals in sand
eat signals, digest
KALEID THE DELTA
for 3 poets

R) I broke in to myself
Josh)
Jer) eat signals digest
M) and you’re here again

R) call mother
Josh)
Jer) please her
M) you’re here again

R) but will electricity and silk burst?
Josh)
Jer)
M) materials rise towards balancing

R) which touch the womb of the
Josh) will electricity and silk burst
Jer)
M) materials rise towards balancing

R) observe the ellipse
Josh)
Jer) observe the ellipse clips in the input, as this is not a sophisticated enough
M) lips around the eyes of the yin

R) instrument to understand what the fuck is going on
Josh)
Jer) eclipses ellipsing
M) observe the ellipse
KALEID THE DELTA
for 3 poets

R) ellipses
Josh) the eclipse ellipses the ellipse is all orbits signing the
Jer) eclipsing ellipsing in elliptical orbit
M) the ellipse

R) ellipses revolutions ellipsing towards the center of space
Josh) ellipsis eclipsing the chemistry of our evolution
Jer) ellipses
M) spiraling toward

R) multiplying towards light multiplying light multiplying light light multiplying multiplying light
Josh) multiplying light light multiplying multiplying light
Jer) light multiplying multiplying light light multiplying
M) illumination
torrents
torrents
torrents
Over videos, come in after one full round.

\[ \sqrt{1} = 1 \]

Beat 3

Beat 1

Beat 2
openings

Flute

Trumpet in B♭

Trumpet in B♭

Vibraphone

Drum Set

Guitar

Electric Bass

Soprano

Alto

Tenor 1

Tenor 2

begin with ebow section and mantras
SOLOS: Build solos slowly. Between solos DS to mm. 13.
Light; embellish freely
cresc. poco a poco

cresc. poco a poco
beat a and b trans it to manta beat
TRANSITION TO MANTRA 1

A: Snare Bass
   Djembe
   Congas
   Shaker
   Bell

B: 

C: 

Shaker becomes Bell, cues transition, play BABABB (4 beats each)

Cue: [ ] [ ] [ ] x 4

After going around a few times, Bell drops out during B. Mantra 1 beat begins.

Same cue back, play BCBC BBA
All will be raised to light
the one verb

mantra 1

ryan rodger
mantra

light will to light will to light will to

the one verb the one verb the one verb

light all will be raised to light all will be raised to light all will be raised to

mantra

light

the one verb

light all will be raised to light

the one verb
mantra

all will be raised to light
the one verb will to light

all will be raised to light
the one verb will to light

will to light all will be raised to light
the one verb
all will be raised to light
the one verb will to light
will to light all will be raised to light
the one verb

mantra
mantra

E.B.

A 1

A 2

T

will to light
MANTRA 1 BEAT

SNAKE
BASS

SHAKER

CONGAS

BASS & SNAKE FIRST, ADD AUX WHEN SINGERS BEGIN.

MANTRA 2 BEAT

A: SNARE
BASS
BELL

SHAKER

TAIKO!

B: SNARE
BASS
BELL

SHAKER

TAIKO

ETC... x 5 BUILD BACK & FORTH. WHEN SINGERS BEGIN, PLAY A 6 TIMES INSTEAD OF 4.
mantra 2

For three singers.
Each singer begins two bars later, in a round.

Light fire to continue to will to lift
Light and know in to fire You will be lifted

Ryan David Rodger
MISRA KORAIPU

(The prism will not be found) ← marker

sub structural
crystalline design
implies a hid
(den/in) fundamental (in )

(break down)
in fundamental
fundamental
demental
mental
all

variation: in trance around the helix resolute

Chatusram
1) - - - 2) - - - 3) - - - 4) - - -
I am not porous enough to find solution in her

5) - - - 6) - - - 7) - - - 8) - - -
liquid dispersions and will not coalesce into the

delta kaleids the forms refusing a return because

5) - - - 6) - - - 7) - - - 8) - - -
I am not porous enough I am not porous enough

Slow tisram
1) - - 2) - - 3) - - 4) - -
I am not porous enough to find sol

5) - - 6) - - 7) - - 8) - -
solution in her liquid dispersions and will not

1) - - 2) - - 3) - - 4) - -
coalesce into the delta kaleids

5) - - 6) - - 7) - - 8) - -
the forms refusing a return because

1) - - 2) - - 3) - - 4) - -
I am not porous enough I am not por
5) - - - - - - - - - - - - - - - - - - -
6) - - - - - - - - - - - - - - - - - - -
7) - - - - - - - - - - - - - - - - - - -
8) - - - - - - - - - - - - - - - - - - -

Mora

(I PROPHESIZE MY DEATH AND TURN UP THE) [TRACK] in three speeds;[track] is 1 in chatusram and 9 both tisrams
cued by composition in three speeds, "I prophesize my death and turn up the jazz"
flute time

Fl.

D. S.

Gtr.

Bass
Gat her fuel by burning
Monuments to motion into
The one verb: raise to
Light: try to find a rise; try to find the delta that evaporates and melts until you Into the Into you

(Try to find a rise: try to find the delta that evaporates and melts into kaleidoscopic bubbles on the edge) [of a sphere]

the question being one of expansion
and horizontal lines.
expansion away from the umbilical,
though there will be no isolation.
expansion of lungs:
reaction at the interface, intending towards the sun,
and inhalation being a motion upwards:
do not look down: there is vertigo even in growth.
and the question remains one of inhalation,
of finding a flux of another order.
you will be presented with a certain set of possibilities. you will receive one.
travel will determine the music. keep moving, or don’t.
positions described by neon lights will be considered fundamental.
if you find yourself in a small space, make room or pass through.
the question remains one of dispersion
of extending the width,
of breathing freely.
it remains that the only way to stand under a larger structure is to go outside.
1) Singers begin at Exit to WMH, performing Sah Pasyati. Slowly move to A.

2) Trumpets to Courtyard begins at A, proceeds slowly under Music Studios Archway, stops & finishes @ B.

3) Flute & Clarinet dialogue. Flute @ ①, Clarinet @ ②. Flute begins w/ end of TTC. Trade P Major phrases, proceed to C.

4) Perform off The Wall at C, Face CFA Theatre to find time.

5) Strict Snare Tour begins at C, proceeds between Gallery & Cinema to Jackson Field, stopping @ #s. Other performers make their way to Jackson through ART STUDIOS.

6) Trumpet Duet performed at ③. Towards end, Trumpets approach ④ when they arrive, begin:

7) Tango at the Tango. Time off Workshops & Studios. A during B Section, Trumpet ③ to ④, T2 to ⑦, Flute to ⑥, Tenor to ⑤, Last. Reconvene @ ④. Tambourine approach from ⑧. Flute continues melody as ensemble travels through Studios back to C.

8) At C, perform off The Wall again. Snare positioned 20 ft NW at #.
SAH PASYATI

Bhagavad Gita 13.28:
samam sarvesu bhutesu
tisthantam paramesvaram
vinasyatsv avinasyantam
yah pasyati sa pasyati

One who sees the Supersoul
accompanying the individual soul in all bodies,
and who understands that neither the soul nor the Supersoul is ever destroyed,
actually sees.
trumpets toward courtyard
towards center

walk towards B with this:
towards center
towards center
TORRENTS

Fl. 1

B♭ Cl.

T. Sx.

B♭ Tpt. 1

B♭ Tpt. 2

D. S.
Fl. 1

B♭ Cl.

T. Sx.

B♭ Tpt. 1

B♭ Tpt. 2

D. S.
Strict Snare Tour

establish meter at positions using these rhythms. embellish freely; hold rhythm of previous position while moving

\[
\begin{array}{cccccc}
\text{Snare Drum} & \text{position A} & \text{position B} & \text{position C} & \text{position D} & \text{position E} \\
\end{array}
\]

\[
\text{position F}
\]

\# AT EACH POSITION, EXPLORE DYNAMICS AND DIRECTION.

\# FEEL FREE TO DISREGARD INSTRUCTIONS
Tango at the Tango

Fl.

T. Sx.

B♭ Tpt. 1

B♭ Tpt. 2

S.Dr.

workshops:

studies:

34
Tango at the Tango

performers disperse
Tango at the Tango

first time around, trumpets and drums enter here:
Off the Wall Again

First time, echo off theatre is upbeat in common time. Second time, echo is third triplet in 12/8. Flute always plays with echo. After two times, go back to the top.