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UNIVERSITY OF CALIFORNIA, SAN DIEGO

The Avant-Garde Utilitarian: Musical Considerations of Advances in Technology
and the Increasing Footprint of Popular Culture

A Thesis submitted in partial satisfaction of the requirements
for the degree Master of Arts

in

Music

by

Kyle Adam Blair

Committee in charge:

Professor Aleck Karis, Chair

Professor Mark Dresser

Professor Steven Schick

2013

The Thesis of Kyle Adam Blair is approved and it is acceptable in quality and form for publication on microfilm and electronically:

Chair

University of California, San Diego

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LIST OF SUPPLEMENTAL FILES

1. Musical score for *Microscope* by Kyle Adam Blair.

ABSTRACT OF THE THESIS

The Avant-Garde Utilitarian: Musical Considerations of Advances in Technology
and the Increasing Footprint of Popular Culture

by

Kyle Adam Blair

Master of Arts in Music

University of California, San Diego, 2013

Professor Aleck Karis, Chair

When considering the creation of new musical compositions it occurs to me that there exists a variety of ways of relating to history. Many works call upon forms and harmonic languages spanning back hundreds of years. Some composers seek to eschew the past and present and imagine music of the future. Some composers ignore the issue entirely.

Music explicitly relating to the present time always fascinates me.

Although one might respond to that notion by claiming that any piece of music ever written qualifies as “music of the present” upon its completion, my concern is not with the date of composition.

In this case I am concerned with music that embraces the cultural phenomena and innovations of the time during which it was composed. The *Zeitoper* pieces of Kurt Weill exemplify this concern wholly, as these pieces exploit current events and technological innovations as inspiration for musical content.

In this thesis I aim to highlight three other examples of “music of the present”. Firstly, I will propose manners in which Edgard Varèse’s *Ionisation* for percussion ensemble might be understood as related to the electrochemical process of ionization and the Neils Bohr model of the atom, proposed in 1913. Secondly, I will discuss Internet latency, a parameter inherent in telematic performance practice, as a usable compositional tool. Finally, I will discuss my recent composition, *Microscope*, with regards to its relationship to popular culture

idioms and to the placement of musical and non-musical “hooks” throughout the work.

Part 1: *Ionisation*: The Merger of Music and Quantum Physics?

It is well documented that the titles of many of Edgard Varèse's compositions bear strong references to scientific and mathematical knowledge. His famous *Density 21.5* refers to the density of platinum, the material used to construct the flute upon which the piece was premiered. *Hyperprism* refers to the geometric 3-dimensional figure in which a shape is encapsulated within an identical, larger copy of itself. These references to scientific phenomena are somewhat clear, but what remains unclear is the relationship between the referential titles of the works and their respective musical content. It is uncertain if the titles were given their respective works before or during the compositional process (thus perhaps making the title an intrinsic part of the compositional process and somewhere present in the musical content) or if the titles were given afterwards as a reflection on the yet unnamed piece of music. I argue in the case of *Ionisation* that although there are not "hard and fast" relationships between the musical content and the quantum process of ionization, there are indeed parallels between the musical content and certain sub-atomic processes. In this paper I

will briefly discuss some of the compositional principles and musical happenings present in *Ionisation* that most closely relate to the title's scientific namesake.

Chou Wen-Chung states the following regarding Varèse's music in

Perspectives in New Music:

Sound-masses seem to emerge out of the expansion of an idea.... into the sonic space. The sense of projection of sound-masses obviously depends on the source location of the emission as well as the independent movement of each sound-mass as opposed to the other. When such sound-masses collide, the interaction tends to bring about penetration, during which certain attributes of one sound-mass are transformed to another, thus causing transmutation to take place and changing the attributes of each sound-mass.¹

This description of sound-mass collision, interaction and subsequent transformation is not unlike the mechanics of the scientific process of ionization.

Many of the theories regarding energy transfer at the atomic level were pioneered by Neils Bohr, the creator of the famous Bohr model of the atom in 1913. In this model Bohr depicts the atom as a set of negatively charged electrons orbiting a nucleic cluster of positively charged protons and neutrons that lack charge. The electrons orbit the nucleus at different "energy levels",

¹ Chou Wen-Chung, "Open Rather Than Bounded," Perspectives of New Music, 5/1, 1966.

depicted in the model by a series of increasingly larger rings surrounding the nucleus.

The process of ionization, similar to Chou Wen-Chung's quote, involves the collision of energy and matter and the subsequent effects on the structure of the matter. In negative ionization, a negatively charged electron with more energy and momentum than an atom's ability to repel it collides with the atom and bonds with it. In positive ionization, outside energy strikes an atom. As a result, the electrons in orbit around the nucleus absorb the energy and become "excited," and at times will be ejected out of the orbit of the atom, thus disrupting the balance of charge and creating a positively charged atom.

It is in this metaphorical vein that I will discuss certain happenings in the musical content in *Ionisation* and hope to bridge the gap between the music and its title.

Instrumental Shifts and Electron Jumping

The first and arguably the most noticeable parallel between the ionization process and *Ionisation* is the relationship between the visual transference of

musical material from one instrument or player to another and the visual “jumping” of electrons from one energy level to another as depicted in the Bohr model of the atom. At Rehearsal 1, two germinal rhythmic cells of the second distinguished texture (Texture 2) are introduced: an alternating rhythm of sixteenth notes and eighth notes in the bongos and a syncopated, faster-moving rhythmic cell in the snare drum. These rhythmic cells remain within the music of their respective instruments until Rehearsal 4 when the bongos’ rhythmic pattern moves to the bass drums. This instrumentation change, however, occurs within the instrumental array of a single performer. This change occurs immediately following the introduction of the third distinguished musical texture (Texture 3) at Rehearsal 3. I theorize that the introduction of Texture 3’s new “energy” into the musical matter has caused the rhythmic cell to jump from one staff to another, just as the introduction of energy into an atomic structure causes electrons to jump from one energy level or orbit to another.

This theory of musical energy disrupting musical matter is further evidenced in the third measure of Rehearsal 4. It is at this moment that the Chinese cymbal from the initial musical texture of the piece (Texture 1) re-enters

the musical mix. The introduction of the energy of Texture 1 into the musical matter of Texture 2 results in another “jump” of rhythmic cells. The bongos’ original rhythmic cell jumps to the snare drum, while the snare drum’s original syncopated rhythmic cell is performed on the bongos. This section of music depicts a greater absorption of energy, as instead of one jump within a single player in the ensemble, this section of music depicts two jumps across players of the ensemble (Player 3’s material moves to Player 4, and vice-versa). It is in this musical moment that it seems that Texture 1 and Texture 3 have imparted their energy onto Texture 2 and transformed it, moving its rhythmic cells around in a similar fashion to the way an atom’s electrons jump energy levels when subject to outside energy forces.

Proximity of Forces, Magnetism and Stabilizing Energy

Another concept of ionization that one might glean from the musical content of *Ionisation* is a broader one: the incurred instability of an atom when it is exposed to outside energy or forces. Whether it is the escape of an electron from an atom resulting in a positively charged atom or the collision of an electron

with an atom to create a negatively charged mass, both processes create an imbalance and instability within the matter.

One simple example of the destabilizing effects of energies and forces at work in *Ionisation* occurs at the very beginning of the piece. Prior to Rehearsal 1, a piece of musical matter is presented. The resonant sounds of Texture 1, a series of strikes from the bass drums and gongs compounded with the rise and fall of sirens, give a sense of musical spaciousness that is reinforced by large rests between attacks. At Rehearsal 1 a new texture, Texture 2, is introduced. Significantly rhythmic motives in the snare drums and bongos accompanied by whip cracks and maracas create a stark contrast to the long, resonant sounds of Texture 1. At Rehearsal 2, Texture 1 and Texture 2 recur in series once again with slight overlap. However, the relative durations of both textures have been truncated and their contents have been compressed. Texture 1 has been reduced from eight bars in its initial statement to roughly four bars at Rehearsal 2. Texture 2 has been reduced from four bars to roughly five beats.

It is my theory that the horizontal proximity of the initial statements of Textures 1 and 2 has caused them to intermingle and attract to one another.

This attraction has had effects on both textures, as both have compressed in an effort to inhabit the same space of Rehearsal 2. The slight overlap of the sirens into the entrance of the snare drums and bongos depicts to me the beginning of a bond. Two contrasting textures are beginning to attract and come together in a similar fashion to how positive and negative charges are attracted to one another. Perhaps in metaphorical terms since later on in the piece Texture 2 contains the previously discussed material in which electrons jump around in orbit, Texture 2 could be described as negatively charged and Texture 1 as positively charged.

Stabilizing Forces

With all the discussion of destabilizing forces in this piece, I feel it is important to note the presence of stabilizing forces as well. After all, if unbalanced ions are present they only need ions of the opposite charge to collide and interact with them become balanced once again. Metaphorically, one such moment occurs at Rehearsal 7. It is my theory that the stabilizing force that is introduced is a sense of unifying rhythm. Prior to Rehearsal 7, Textures 1, 2, and 3 were all relatively “excited”, intermingling with one another vertically in a

juxtaposition of numerous disjunct rhythmic cells. However, at Rehearsal 7 the ensemble is suddenly divided into fewer parts. Players 1-4, 7, 10, and 12 all perform simultaneously in interlocking triplet rhythms while the tarole, maracas, castanets and snare drum continue rhythmic patterns in the space between the triplet attacks. The overall texture is much simpler than before, and as that initial energy fades, one finds that at rehearsal 8 the maracas, bongos, and snare drum from Texture 2 and the Chinese blocks and tarole from Texture 3 are performing in exact rhythmic and pitch unison with one another. It seems to me that the interjection of the energy at Rehearsal 7 has caused the previously disjunct rhythms and timbres of Textures 2 and 3 to work as a unified tandem. Metaphorically, if Texture 2 and Texture 3 were of opposite electrical charges, they have at least for a moment bonded together in perfect harmony or, in scientific terms, neutrality.

The Finale as a Depiction of Neutrality

I think there is a strong stability and “groundedness” inherent in the end of the piece (from Rehearsal 13 to the end). The source of the stability in my ear

relates to the co-existence of three timbre groups that intermingle throughout the work and finally manage to meld into a single, grounded texture. These timbre groups are: 1) long, resonant sounds, 2) short, dry sounds and 3) medium-length accented, heavy sounds (such as bass drum or tom-toms).

The timbre groups are not completely related to the textures described above, as the instruments that perform the textures shift throughout the work. However, beginning at Rehearsal 13, the roles of each instrument cease to shift, and timbre groups and textures are locked in place for the remainder of the piece.

Based on my previous statements regarding ionization energy and their relationships to the intermingling of textures in *Ionisation*, it would hold true that for a shift in stability to occur (in this case, a positive shift in stability rather than the introduction of entropy or disorder), that energy must be added in order for the shift to occur. In this case, one can hear and see the new addition to the work that causes stability: the entrance of the piano, glockenspiel, and bells. More importantly, perhaps, is the introduction of explicitly pitched instruments into the ensemble.

Prior to the entrance of pitched instruments at Rehearsal 13, a sequence of rapidly shifting timbres occurs:

- First measure of Rehearsal 12: timbre group 3 (accented, heavy sounds) then,
- One measure of timbre group 2 (short, dry sounds)
- One measure of timbre group 3 (accented, heavy sounds)
- Three measures of timbre groups 1 and 2 (long, resonant sounds and short, dry sounds)
- One measure of timbre group 2 alone
- Two measures of timbre group 3 alone

These rapid changes seem very clear and present the image of something that is in flux or unstable, such as an ionized molecule or atom. Following the first, hard entrance of the piano clusters, bells, and glockenspiel, these disjointed and fluctuating timbres immediately begin to co-exist. The gongs and sirens perform their long, resonant sounds (timbre group 1), the snare drum and bongos perform short, dry sounds (timbre group 2), and the bass drum performs heavy, accented sounds (timbre group 3). With this seeming homogenization in mind one can relate the entrance of the piano, glockenspiel, and bells to a ray of energy that strikes a negatively charged ion. When the energy strikes the

negative ion an electron is forcefully ejected from the atom and a neutral charge is restored. It is not a stretch to relate the piano, glockenspiel, and bells to an important addition of energy, since Rehearsal 13 is the very first entrance of these performance forces, and a striking addition to the sound world of the piece.

Conclusion

In conclusion, I do not wish to present *Ionisation* as some sort of sub-atomic story or narrative. However, I do find parallels between the intermingling of textures and instruments in the music and the interaction of energy and atoms in the ionization process. It is difficult to know to what degree, if any, Varèse was familiar with the Bohr model of the atom or other discoveries in the fields of quantum structures or quantum physics when he wrote *Ionisation*. What seems clear to me, however, is that Varèse utilizes different sound-bodies and rhythmic cells as materials in the piece, and that the superimposition or sonic proximity of these structures have an effect on the structures themselves. Such is an example of the organic nature of piece. The structures respond to stimuli, which is a capability of even the smallest building blocks of matter. Even if Varèse was

unaware of the specifics of quantum physics, it seems clear to me that he was aware of the vitality of the natural world, and was able to harness and musically depict these energies through *Ionisation*.

In the future, I wish to take a similar analytical approach other pieces of Varèse. Also, I hope to look at other pieces through the same lens: both tracking the manipulation of energy and matter throughout musical works, and also attempting to discern the degree to which a work's title is manifested its musical contents.

Works Cited

Wen-Chung, Chou. "Open Rather Than Bounded." *Perspectives of New Music* 5.1 (1966):

Part 2: Telematic Latency as a Compositional Device

Wouldn't be amazing if one could collaborate with colleagues in real-time performances across geographic distances using high-speed Internet connections? Through the telematic performance medium and the use of high-quality audio servers such as JackTrip, this dream has been realized. However, along with the benefits of long-distance collaborations utilizing the Internet come drawbacks and special considerations that must be accounted for. The first consideration is the required technological knowledge or personnel with such knowledge to accomplish, maintain, and troubleshoot high-quality Internet audio and video connections. The second drawback is an intrinsic and inescapable characteristic of the Internet medium: latency. Latency can be defined as temporal lag that is naturally caused by Internet signals travelling across a geographic distance. The distance between two locations is directly correlated to the amount of time that elapses when a signal travels to its destination. The amount of latency can also be affected by connection speed and bandwidth availability, as a slow Internet connection can increase the amount of lag

experienced by online communicators and the substantial amount of data sent back and forth during a telematic performance can strain the entire system.

As the telematic medium has only recently developed, the properties of the medium and protocols utilized in dealing with it are still being analyzed and calibrated. Many telematic performers and composers utilize or create means to ignore or work around the latency ever-present in their performances. However, some experts and pioneers in the telematic performance field, such as Dr. Chris Chafe at Stanford University, have experimented with ways of composing pieces that *exploit* latency as a musical device. In this essay, I will highlight the use of latency in the telematic medium as a compositional device through an analysis of latency from a performance standpoint, a discussion of two of Chris Chafe's telematic compositions as precedent for such a compositional device, and a proposition of a performance and compositional technique that utilizes audio and video latency as a tool.

Latency in Performance

Latency in the telematic medium is expressed and perceived in two forms simultaneously: audio lag and video lag. Interestingly enough when one factors latency into audio/video communication, the Internet medium allows audio transmissions to travel more quickly than video transmissions. This quality is unique to the Internet medium alone; it is effectively the reciprocal of the physical mechanics of the real world in which light travels faster than sound.

Although in “real-life” performance certain factors affecting acoustics and sound travel are somewhat variable, in telematic performance the velocity and efficiency of the transmission of data is volatile at best and usually highly inconsistent. This is the other unique factor of the Internet medium; acoustical and physical laws regarding light and sound travel do not apply in the virtual world. In fact, there are no laws that govern or accurately predict the amount of audio or video lag in any moment during a performance. Consistency and reliability are not qualities that can be readily associated with the telematic medium.

Dr. Chris Chafe mentions in “Living with Net Lag” that “Internet latency can be ignored, tolerated, or exploited in making music together at a distance.”² Ignorance or acceptance of latency in composing for the telematic medium is manageable, though the composer, when considering the musical content of a piece, cannot expect the ensembles at various locations to achieve musical synchrony in all locations at the same absolute moment in time. At best, the audience of only one location at a time will perceive musical synchrony between the local performers and the remote performers. Since absolute synchrony is impossible, the level of success of exploiting the temporal values of audio and video latency depends upon the notion of “failed synchrony.”

The successful exploitation of latency also depends upon a perceptible amount of lag-time between telematically-linked sites. If the sites are close together geographically then it is possible, due to the decreased distance that the signal travels, that the time it takes for the signal to travel between sites is not long enough to be perceived by the ears. Also, it is quite possible that in the future bandwidth availability and software advances will decrease the numerical

² Chafe, Chris. “Living with Net Lag.” *AES 43rd International Conference*. 29 Sep 2011-1 Oct 2011, Pohang, Korea.

temporal value of Internet latency to that below the threshold of human perception. Lag as a compositional device depends on the system of telematic musical communication being imperfect.

Precedent for the Use of Latency as a Compositional Tool

In the process of searching for inspiration regarding the utilizing of latency as a compositional tool I had a conversation with Dr. Chris Chafe from Stanford University. We spoke about his previous experiences using and dealing with latency in his compositions and performances. He specifically discussed two telematic pieces he composed which exploited telematic latency as a musical tool: “Chopper”, and “Rock, Paper, Scissors.”

Chopper was performed during 2011 at the CNMAT/CCRMA Exchange Concerts.³ The piece was conceived for a group of saxophonists. In Chopper, a fixed-media electronic track directs a local soloist at one site. As Chafe mentioned to me in conversation, the soloist would periodically play a short staccato “burst” and the other saxophonists would “hit as soon as

³ “Living with Net Lag.”

possible...that's their job."⁴ The piece effectively compounded telematic audio latency with human reaction time. Chafe relates this exploitation of latency as a compositional process to "kind of if you were in a Driver Ed class, and they stick you in a booth, and a brake light comes on and you have to hit the brake pedal."⁵ In this case, the local soloist acted as the stimulus for the reaction of the remote players. In thinking about Chopper, the audio latency in the system seems to enhance this feeling of cause and effect by inserting additional time between the stimulus and the response. The piece surely would have sounded far different if the players were all in the same room instead of inhabiting distant geographic locations.

Rock, Paper, Scissors was performed during the "ResoNations" concert in 2009, produced in part by the World Association of Former United Nations Interns and Fellows.⁶ In *Rock, Paper, Scissors*, Chafe used video lag as a compositional tool in a type of "game piece." Chafe set up various groups and sub-groups of remote and local participants to play the familiar hand game "Rock,

⁴ Chafe, Chris. Personal Interview. 19 Nov 2011.

⁵ Personal Interview.

⁶ "Living with Net Lag."

Paper, Scissors” with one another. When playing the game with someone standing directly in front of you the aspect of timing as critical, as both players “shoot” their respective choice of rock, paper, or scissors in synchronous fashion. However, when some degree of visual and temporal distortion is introduced into the game (i.e. video latency) the mechanics and play of the game become more difficult. On relating this phenomenon to the musical content of the piece, Chafe says there were “performers who were in the same room as the game player, watching. That game player is their conductor.”⁷ It seems to me that the video latency would have affected the rhythm of each location’s game players, and in turn those game players’ motions would affect the music played by local performers. This little bit of chaos must have been compounded by the audio latency transmitting the sound from local to remote locations. Through this compositional tool video latency played a role in the musical output of the entire group (the term “group” referring to both local and remote performers in each location).

⁷ Personal Interview.

“Phasing” as a Telematic Compositional Technique

In thinking about the telematic medium, the unique quality of latency can only be realized by the perception of intended synchrony that has been foiled by the geographic distance traveled by audio and/or video signals. Also, the perception of synchrony at one location means that all other locations will NOT experience synchrony. I thought about this “synchrony/non-synchrony” issue in terms of a visual metaphor of a multi-player game of “tug o’ war” in which one site experienced latency and the others did not. My objective was to conceive of how to musically depict that game of back-and-forth pushing and pulling.

The idea that came to mind was one that I nicknamed “telematic phasing” due to the perception and experience of unison music moving into and out-of-sync with one another. The concept requires two groups of performers, hereafter referred to as Group A and Group B. Group A would perform a repeated melodic figure in a regular rhythmic pattern. The reasoning behind utilizing a regular rhythmic pattern is to assist Group B in internalizing a steady tempo from Group A’s performance. The purpose of a repeated melodic figure is

to make it more obvious to the listener when something within the figure (or the composite figure of both groups) has changed.

Once Group B had internalized the tempo and rhythm of Group A's melodic figure, they would begin to perform the same figure in synchrony with Group A. The relative success of this would require Group B to have successfully internalized the tempo of Group A's initial figure, and would require that Group A would continue its repeated figure at a metronomic level of consistency without wavering. Group A's steady performance of the figure without wavering undoubtedly would become more difficult after Group B's entrance.

When hypothetically visualizing the process being performed and factoring in the value of Internet latency between sites, the audience's musical perception of the composite sound of both groups at site B will be that of synchrony. However, at site A, group B's remote music will sound as though it is occurring slightly after group A's live music. This "rhythmic disconnect" will musically quantify the latency value in the Internet connection between site A and site B.

The next step in the process would be for that perceived “rhythmic disconnect” at site A to be corrected. For this to occur, group B would need to continue to perform the figure at the same steady tempo while group A would gradually accelerate from a perceived local “hocketing” at site A to local synchrony. In so doing site A would then perceive synchrony while site B would have experienced a gradual move from local synchrony to “hocketing” caused by the audio latency value of the Internet connection.

In exercising a “back-and-forth” execution of this technique, I theorize that each site would experience a continually shifting motion between synchrony and disconnectedness resulting in a type of “phasing” not unlike the “phase music” of Steve Reich and other composers.

Substituting video latency for audio latency in the same process would theoretically also result in a phasing effect. In this case, some type of visual cue would accompany the repeated melodic figure. Rather than the process depicting a sonically “back-and-forth” interplay between the two groups, the interplay would occur visually with the visual cues being synchronous in one site while the visual cues would appear to be displaced at the other site. An apparent

difference between this “video phasing” technique and the “telematic audio phasing” technique is that since the latency values are intrinsically greater in online video communication than in pure online audio communication, musical audio synchrony would not occur at the same time as video synchrony.

However, theoretically, in gradually moving from video latency to video synchrony, the composite sound will express a single moment of perceived audio synchrony at one site. The musical consequences of this would be interesting and chaotic as synchrony would occur rarely, but the perception of “failed synchrony” would be very strong, aided by the clarity of a repeated melodic figure.

Conclusion

In conclusion, it has been interesting to me considering latency in the telematic medium as a unique quality to, in the process of composing with the medium in mind, be worked *with* rather than *around*. It has also been interesting and inspiring talking with Dr. Chafe about his experiences with exploitation of lag in his pieces. Researching the precedent for compositional use of latency and its

intended musical effects has led me to the idea for “telematic phasing.”

However, through experimentation and implementation of this and future ideas I hope to take advantage of the unique quality of temporal latency in the telematic medium as a compositional tool used in the crafting of performance pieces in years to come.

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Chafe, Chris. Personal Interview. 19 Nov 2011.

Part 3: *Microscope*, and the Challenges of New Music Programming for General Audiences

As a graduate music student at UCSD I am well aware of our department's new music pigeonhole. I understand that the concerts we (collectively) curate do not often feature the "classics" of the art music repertory that audiences are most familiar with. I also understand that the experimental works performed during many UCSD concerts do not always include familiar melodic, harmonic, or formal structures.

There is one phenomenon at UCSD, though, that I do not understand. More times than I would like to admit I have witnessed audience members, especially younger undergraduate students, walk out of our concerts. Not only have they walked out of these concerts; occasionally they have walked out in the middle of pieces.

I am hopeful, perhaps naively, that there is some valid practical reason for their exit. I like to entertain thoughts such as "Maybe they have somewhere they need to be" or "Maybe they have a phone call they need to take."

Despite my hope for non-musical justifications I have the sneaking suspicion that their reasons for leaving these concerts were musical in origin. I

have the feeling that they find what they hear to be unattractive, strange, or averse to their musical expectations.

Throughout the numerous attempts at deciphering the thoughts behind the listeners' displeasure I always come to one particular conclusion: the music is somehow not living up to a set of standards that they've either consciously or subconsciously put in place to help them decide whether or not they find what they hear to be beautiful. If that is the case, what exactly has incurred these standards?

Lately I've operated under the assumption (right or wrong) that the answer to that question lies in many new music performances lacking a sense of melodic, harmonic, or formal "catchiness" that listeners might associate with music they often listen to for leisure (i.e. traditional Classical-era art music, Romantic-era art music, or popular music). In short, perhaps these pieces lack a "hook".

The term "hook" as it exists in the world of popular music describes a part of the music that is immediately digestible and/or memorable. It is the part or parts of the piece that audiences leave concert venues humming or whistling at

the end of a show. Taken a step further, the ability of a hook to stick in the ears and minds of listeners might be what offers composers and performers the opportunity for the piece containing the hook to be performed again. The hook could be the thing that makes audience members buy a CD or research the other repertoire of the performer(s) or composer.

If the lack of a melodic, harmonic, or structural hook is the reason for the listeners “turn-off”, then I would argue that the listeners are disregarding an exhaustive list of other musical attributes that many people, and likely they themselves, find attractive. Have they never enjoyed a piece because its timbre, its dynamic subtleties, its programmatic intent, its title, its scope, its character, its instrumentation, its rhythmic nature, or its sense of gesture? Have they never been pulled in by a well-written set of program or liner notes?

As a new music enthusiast and performer, when I consider all the possible attractive qualities in a piece of music and compare them to the relatively short list of qualities that some others find attractive I can’t help but feel that those people are being somewhat shallow in their musical judgments. However, one cannot blame someone else for his or her firmly held opinions. After all, those

same people are the ones that I, as a performer, hope will buy a ticket to my performances.

Thus, to some degree I am drawn to the desire to please “the crowd”. However, as a member of the “new music crowd” I do not want to “bench” the avant-garde works that I enjoy performing and composing in order to keep audience members in their seats.

In an attempt to bridge the gap between the “high art” and “low art” camps I composed *Microscope*. The goal of this set of piano pieces is to, in each piece, include some type of easily digested “hook” for those without a strong taste for experimental or avant-garde music while maintaining some aspect or aspects of the avant-garde music that my colleagues and I find interesting and attractive. In this essay, I’ll discuss *Microscope* through the different types of “hooks” I include throughout the entire work.

Harmonic Language and Tonality

Given that a huge portion of the Western musical repertoire expresses or implies tonality, it is no surprise that works utilizing a more traditional harmonic

language tend to be processed more quickly and easily by general audiences.

There is tremendous amount of precedent for this in the 20th century – especially given the popularity of the “minimal” and “post-minimal” works of composers like Philip Glass, Steve Reich, and John Adams.

In composing movement 5 of *Microscope* I considered a strong sense of tonal center. Thinking about jazz piano techniques while listening to numerous hardcore punk and metal albums led me to the idea of creating a technique I nicknamed “rock stride piano”. To accomplish this I placed a strong harmonic foundation in the bass, a melody in the treble, and enough rhythmic vitality between the two to emulate a punk rock band performing very aggressively. The result of this experiment was a piece in three parts.

The first part, measures 1-4, acts an introduction to the piece. This introduction was conceived in a polytonal idiom; I thought that the treble might emphasize the Ionian mode while the bass implied the Dorian mode. In measures 3 and 4, as a tip of the hat to a frequently used popular music device, I transposed the first two measures up a whole step.

The second part, measures 5-12, is an experiment in “rock counterpoint”.

The treble staff and the bass staff were composed entirely independently of one another but both with the pre-compositional caveat that the lines would reside within key centers containing four or five sharps at any given moment. Although the harmonic implications of the two simultaneous lines are usually functional I found that the rhythmic implications of the two melodies were not so easily compatible. However, it seems to me now that the cross-accents between the two lines evoke the illusion of an active drummer performing a composite rhythm based on the two lines performed by the guitar and bass.

The final part, measures 13-28, is my attempt at imitating the hardcore punk phenomenon known colloquially as the “breakdown”. Traditionally the breakdown consists of a low harmonic pedal performed by the guitarist and bassist using intricate rhythms and aggressive attacks. Rather than the usual single harmonic pedal, my version of the breakdown includes three pedal points in a progression largely implying the key C# minor: C# for four bars, A for two bars, and B for two bars. The first eight bars of this section emulate a bassist and a single guitarist performing a breakdown together. The second eight bars

are the apex of “rock stride piano” technique as the left hand “single-handedly” assumes the responsibility of covering material usually performed by a bassist and a rhythm guitarist while the right hand performs a line similar to that which a lead guitarist might play.

In movement 8 of *Microscope* I aimed to once again evoke a strong sense of harmonic center. In this composing this particular piece the desire for including a strong sense of harmonic center was spurred by two concepts: 1) The pre-compositional challenge to only use 18 piano keys throughout a cohesive and “large-sounding” work and 2) The pre-compositional notion of attempting to create a “lazy” version of a Reichian melodic and rhythmic structure. In this piece the key of C# (natural) minor dominates the entire sonic landscape. In order to utilize the 18 notes most effectively across the instrument I relegated 6 notes to the bass register, 7 notes to the baritone register, and 5 notes to the alto/tenor register. The pitches are not entirely exclusive to each register, however.

I used three pitch classes to form the foundation of a harmonic progression: C#, G#, and A. The intended implications of those pitches were three chords in the key of C# minor: i, v, and VI respectively. Although all three

of these chords are incredibly common in popular music and somewhat common in modally centered art music, the common use of “minor v” or “modal v” in atmospheric black metal music and similar metal-based genres specifically stimulated my use of the chord in this piece.

It is my hypothesis that the tonally oriented harmonic structure of these two movements allows them to be easily processed by general audiences in comparison to pieces using more complex harmonic systems.

Ostinato and Gradual Development

Repetition is the driving force of any traditional classical musical form. In sonata-allegro form the recapitulation not only recalls material from the exposition but also, in so doing, retroactively establishes the temporal boundaries of the development. In the traditional rondo form the A section returns numerous times, not only acting as a refrain but also acting as a consistent backdrop against which the episodes are able to display their contrasting musical qualities.

It is my hypothesis that, to the untrained audience member or even the trained audience member without access to a score, the large-scale musical

structure of a piece is only realized through the repeated performance of a section or sections of music. Given the ability of repeated material to stick in the mind of the listener I utilized two treatments of repeated music in *Microscope*. The first such treatment is the use of ostinatos in movements 1 and 10. The second treatment is a gradual development and variation of a short bit of musical material. I consider this process to be philosophically similar to the principles outlined in Steve Reich's essay *Music as a Gradual Process*. In that essay Reich describes his desire for compositional processes to be heard easily by audience members rather than sonically hidden or difficult to discern (i.e. serial processes). I agree with his sentiments to some degree, so I attempted to include audible compositional processes in movements 3 and 7.

In movement 1 I composed an ostinato of four pitches performed on the keyboard at the top of the treble staff to act as a sort of backdrop. Onto that canvas I introduced contrasting musical material: indeterminate low pitches performed by striking the strings with a yarn mallet. These pitches are first performed in a middle, high, low disposition. Although the pattern of relationships between indeterminate pitches is consistent the duration of each note and the

temporal placement of the set with regard to the ostinato is in constant flux. In all, the neutral treble ostinato allows the low pitches to be highlighted as a result of their contrasting timbral, registral, and rhythmic attributes.

The ostinato in movement 10 doesn't present itself until the end of the piece, beginning in the tenth measure. Movement 10 was initially intended as a sort of "drunken ballade". While thinking about this concept I was struck by a fantastical image of a drunken me attempting to be romantic, sultry, and suave. Humorously this image evolved until I imagined a drunken me trying my hardest to dance a tango.

As a transcription of this image the left-hand ostinato, starting in measure 10, consists of three elements set over a duration of four beats in a classic but very broad tango rhythm (dotted-quarter, dotted-quarter, quarter in 4/4 time). The first element is a pedal D1 that acts as a firm harmonic foundation. However, that foundation is invariably muddied by the second element: a 9-note rolled cluster beginning at D2, ending at Eb3, and including every in-between white note. The final element is a white-note glissando from a quarter note A2 back down to the D1 that starts the next installment of the ostinato. This ostinato

helped me to create the distinctly sloppy version of an otherwise tactful statement that I was trying to attain. As a bit of a twist on this ostinato I replaced two of the copies with variations in measures 20 and 21. These two variations, rather than being centered on D, are centered around pitches G and F. Within the context of the repeated ostinato on D, these variations are intended as a vague, sloppy nod to a “12-bar blues” harmonic structure.

Movements 3 and 7 were born from a concept similar to that from which movements 1 and 10 arose. However, movements 3 and 7 express that “concept-seed” in a different way. The entirety of the musical content in Movement 3 gradually evolves from measure 1: the “seed”. Referencing my pre-compositional plan to create a form that audibly evolves over time, I decided that measure 2 would be an exact repetition of the first in order to reinforce the sound of the original seed to be subsequently altered. I altered the seed in measure 3 by 1) replacing the eighth note chordal octave A in the right hand with a two-sixteenth-notes melodic octave and 2) placing another two-sixteenth-notes melodic octave on A in the left hand before the Eb chordal octave and removing the following chordal octave on G. In measure 4 I composed a slight alteration of

Measure 3 by replacing the eighth-note chordal Eb octave with a two-sixteenth-notes melodic Eb octave and by adding a “tag ending” of three sixteenth notes and an eighth note. Upon completing the measure 4 evolution of the “seed” I began to think that, since the first four measures are isolated images of evolution, a continuous portion of music could be palatable. I repeated measure 4 in measure 5. Then, I composed measure 6 as a response to measure 5. I repeated measures 5 and 6 in measures 7 and 8. Finally, in order to complete the evolution, I wanted to compose at least 4 measures that would stand on their own, largely independent of previous musical material. The purpose of these measures was twofold: 1) to depict the evolution out of the musical dependence of measures 2-8 on the seed to the relative musical independence of measures 9-12 from the seed and 2) to imply that, given the rate of change of the music in measures 2-8, that the evolution could feasibly continue beyond the double bar-line. Rather than ending at the double bar-line, in order to reinforce the evolutionary distance that the music had travelled over the course of the piece I included a D.C. al Fine that resulted in a re-hearing of the seed and its first two variations.

Movement 7 at its core consists of two types of chords planed in a melodic fashion. The left hand always performs a second-inversion minor-seventh chord with a doubled fifth and the right hand always performs an augmented triad with an added tritone and major-seventh above the root. During composition the chords were planed with melodic contours in mind. In the right hand, the four-pitch set of Bb, C, D, and Eb made up the roots of the chords to be planed while in the left hand the roots of the chords were the pitches C, C#, D#, and E. If I labeled the right hand's Bb-C-D-Eb root set as 1-2-3-4 respectively and the left hand's C-C#-D#-E root set as 5-6-7-8 respectively, then the evolution of the melodic contours would be enumerated thusly:

Measures	M. 1	M.3	M. 5-6	M. 8-9	M. 11-12
Right Hand	3-2-1	3-4-2	3-4-2-1	3-4-2-1-3-2	3-4-2-1-3-2-1-2
Left Hand	5-6-7	5-6-7	5-6-7-8	5-6-7-8-5-6	5-6-7-8-5-6-8-7

Though the dense harmonic structure might inhibit one's ability to discern aurally the evolution of these two melodic ideas, when the lines are depicted in this visual format one can more easily discern that the two lines are evolving at

roughly the same rate but with slightly different contours and permutations. This was my pre-compositional goal for movement 7: to create a movement which evoked a sense of evolving counterpoint between two simple melodic lines which had been expanded into planed complex chords.

It was my hope through the persistence of repetition and the procedure of gradually developing a small idea that I could imply a formal structures easily discernable and understandable by audience upon hearing them for the first time.

Rhythmic Intensity and “The Groove”

Rhythm, in no small way, contributes to the appeal of popular music of the 20th and 21st centuries. Folk music, jazz music, and the dance music of today all utilize rhythmic patterns that are familiar to audiences. Even when written by different composers, like-titled movements of Baroque dance suites share rhythmic characteristics based on the physical motions of the dances themselves. I decided to include moments of rhythmic groove in *Microscope* to experiment with using rhythm itself as a “hook”.

Movement 11 is the most likely to be remembered for its rhythmic character. There are three distinct grooves in this piece. The first groove is the “refrain” of the movement with statements at the beginning, middle, and end of the work. The intensity of the opening motive does not rely on melody, but rather the repeated hammering of a major second interval in fast sixteenth notes. The well-known opening of Beethoven’s “Waldstein” Sonata inspired the use of a single repeated chord as a thematic motive. In the second measure I composed an augmentation of the first bar by adding one beat in the time signature and by adding two rhythmically accented major seconds a tritone above the first. The third and final measure of the motive is a truncation of the opening measure.

The rhythmic interest within the second and third grooves of movement 11 lies within the grooves’ polyrhythmic characteristics. The second groove, found initially in measures 4 through 6 but also appearing later in the piece, consists of an ostinato in the left hand that implies a strict quadruple subdivision over three beats and melodic fragments in the right hand which adhere to the metric implications of the 3/4 time signature. The third and most complex groove begins in measure 10. Although the time signature shows 5/4 for the ease of the

reader, the ostinato in the right hand, a variation on the second measure of the piece, is most easily felt as repetitions of motive in a 5/8 time signature. In measures 11-13 the odd-metered ostinato in the right hand is placed into counterpoint with a chordal phrase in the left hand that implies three 4-beat phrase and one 3-beat phrase (Once again, the 5/4 time signature was used for the ease of the reader, not necessarily as an accurate depiction of the musical intention or the compositional process). In measures 14 and 15 the steady quarter notes in the left hand strongly imply a 4/4 time signature while the ostinato in the right hand continues performing in what sounds like 5/8 time. This results in the ostinato carrying across the bar-line between measures 14 and 15. Also, the temporal space assumed by two measures of 4/4 do not allow for a simultaneous end of the 5/8 ostinato and the left hand octaves, so the ostinato had to be cut short.

It was my hope that the rhythmic intensity within *Microscope*, exemplified in Movement 11, could be as quickly understood and processed by audience members as functional melodic and harmonic structures in classical and popular music.

Extended Techniques and Expanded Sonic Landscape

Through observation I have found that out of all the instruments whose palette of sound possibilities includes extended techniques, audiences tend to be particularly attracted to and fascinated by the timbral possibilities of the piano interior. Although many different instruments have (arguably) more attractive and more varied palettes of extended techniques, I believe that the historic familiarity the general public feels with the piano and its “normal” performance practice causes them to respond more strongly when presented with music utilizing the piano interior.

These strong responses that I have experienced led me to the belief that the sonic possibilities of the piano interior could also be a musical parameter as easily digested as a melodic content. I included extended techniques in movements 1, 2, and 12 of *Microscope*.

Movement 1, as I already mentioned, contains very low, indeterminate pitches that are performed by striking the strings with a yarn mallet. This technique creates a resonant, gong-like sound that I find extremely palatable.

The dark color of these sounds contrasts the brightness of the ostinato performed on the keys in the treble register of the piano.

The end of movement 12 contains the same mallet technique and ostinato as movement 1. However, the strings to be struck are indeterminate in movement 1 while the strings to be struck in Movement 12 are specifically notated. Movement 12 is constructed in a 12-tone style and the pitches struck by the mallets at the end of the piece form a transposition of the initial 12-note row of the piece. It was my intention that a shift from the indistinctness of the mallet-struck pitches in movement 1 to the calculated nature of the mallet-struck pitches in movement 12 would act as an illusionary reference to the metaphor of a microscope focusing in from a vague, messy image to a more detailed, complex image over the elapsed time between the two movements.

I also included the sounds of fingernail scrapes on the wound bass-strings in movement 12. These fingernail scrapes act as punctuation between statements of either one or two 12-note rows.

While one could describe the piano interior sounds of movements 1 and 12 as particular and/or functional, one could describe Movement 2 as a dictionary

of piano interior sounds. It was my goal in movement 2 to create as vivid a timbral landscape as possible using a vocabulary of scrapes, taps, knocks, mallet strikes, plucks, glissandi, muted notes, and harmonics. With the exception of the final four measures of the piece, rarely does one timbre sustain for a long period of time. Instead these timbres are narrowly juxtaposed in an effort to create a sonic landscape that shifts rapidly.

Borrowing and Reference

In listening to the music of Charles Ives it seems he was aware that by including references to popular songs or hymns in his music he could elicit emotional responses from and spark memories in his listeners. In modern musical culture DJs combine two or more pre-recorded songs in “mash-ups”; the quality of which is often judged by the amount of contrast between the two or more songs included. I admire both methods of using previously existing musical material and believe that references to popular music in art music can “grab” audience members by providing them with familiar “hooks” in new musical contexts. I included both musical and non-musical references to popular culture

in *Microscope*; although it is uncertain to what degree a random listener could discern these references.

The first measure of movement 3, the model that undergoes the evolution I described before, is an adaptation of and a reference to the electric bass melody that heralds the bridge section of “F.C.P.S.I.T.S.G.E.P.G.E.P.G.E.P.”, written and performed by The Fall of Troy, a popular rock ensemble.

Movement 6 is my attempt at an acoustic parallel to the “mash-up” that I described earlier. This piece references excerpts from Ceremony’s *Violence*, *Violence* album and Mussorgsky’s *Pictures at an Exhibition*. These references are nearly identical their original sources.

Movement 9 references a non-musical source: Herman Cain’s 9-9-9 tax plan. Rather than containing explicit musical references this piece features the number 9 in as many musical depictions as possible in order to reference Herman Cain’s frequent use of the number during his Republican primary campaign of 2012. The number 9 appears in the tempo (dotted quarter = 99), the time signature (9/8), the interval expressed in each hand (a minor 9th), the interval between the hands (a major 9th), and the implied hemiola (9 instances

over 2 measures). Although this particular reference might not be distinguishable through sound alone, I hope that, assuming familiarity with Herman Cain, once given the title and program notes the reference might become clearer to a random listener.

It was my intention that, in some fashion, the bits of borrowed musical material and musical and political references included in *Microscope* would act as “hooks” which grab the audience through presentations of familiar musical materials or shared cultural knowledge in new contexts.

Conclusion

I imagine that there are some in the new music community who shun the idea of reaching out to a more general audience through composing and performing pieces specifically crafted to “please the crowd”. I have encountered musicians who would deem that goal as a sacrifice of the academic sanctity and craftsmanship of the avant-garde.

I fear, however, that performers and composers who actively try to segregate high art from low art will continue to deter general audiences. It is not

my argument that one should change their compositional style or repertoire choices to appeal to larger numbers of people. Instead, I argue that performers and composers should avoid making compositional and repertoire decisions based on the fear of invalidating their craft by generating mass appeal.

The current status quo feels like an impasse. I do not agree with those that walk out of avant-garde music concerts, but it is impossible to ignore the fact that when someone does it is likely because the music they have heard does not appeal to them. In spite of those that disapprove of avant-garde music we, as new music enthusiasts, firmly believe that our music is incredibly worthwhile and wish that general audiences would listen. Performing solely to suit an audience's needs and ignoring our own desires as composers and performers would be a shame. I do not think we should do that, but I cannot help but think that in some manner there is an opportunity to meet these audiences halfway.