MIMINALISM IN PERCUSSION: A COMPARATIVE ANALYSIS OF *NAGOYA MARIMBAS* BY STEVE REICH, *OBSERVATIONS* BY TRISTAN PERICH, AND *VELOCITIES* BY JOSEPH SCHWANTNER

A thesis submitted in partial fulfillment of the requirements
For the Master of Music in Performance

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ABSTRACT

MIMINALISM IN PERCUSSION: A COMPARATIVE ANALYSIS OF NAGOYA MARIMBAS BY STEVE REICH, OBSERVATIONS BY TRISTAN PERICH, AND VELOCITIES BY JOSEPH SCHWANTNER

By

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Master of Music in Performance

Minimalism is the last original tonal compositional style to emerge since the early twentieth century. Its constant pulse, short repeated fragments, consonant tonalities, and gradual harmonic progressions are perfectly matched with pitched percussion. Nagoya Marimbas, a marimba duet by Steve Reich, Observations, a piece for two sets of crotales and one-bit electronics by Tristan Perich, and Velocities, a virtuosic marimba solo by Joseph Schwantner provide three different applications of minimalism in solo and chamber works for percussion. After a brief overview and history of minimalism and postminimalism, this thesis analyzes each piece, examining their form with a non-traditional tonal analysis, as well as their textures, timbres, and musical elements. This is a helpful companion to learning, studying or listening to any of these pieces, as it emphasizes the way the compositional processes operate, explores the composers’ motivations, and also offers performance considerations. Finally, it compares each piece to find whether they are “minimalist” or “postminimalist” and reviews the similarities and differences in their form, style and use of tonality.
Introduction

“I am interested in perceptible processes. I want to be able to hear the process happening throughout the sounding music... To facilitate closely detailed listening a musical process should happen extremely gradually.”¹ –Steve Reich

“Human beings find beauty in things that we can understand... In Minimalist art when you can look at something very simple and understand the processes that went into it, you can find beauty in being able to comprehend the entire system.”² –Tristan Perich

The compositional process of music refers to how it is constructed, how the form evolves, and how the textures are built. Minimalist music allows the listener to meditate on its processes, abandoning traditional tonality without the harsh auditory demands of serialism. The term “minimalism” itself is an insufficient way of describing the music. With its origins from the singularly simplistic austerity of minimal art (such as Mark Rothko’s color fields), audiences without prior knowledge will often equate minimal music to “music with practically no substance,” or “music where nothing happens.”³ The unadopted candidates for the movement’s name, “pulse music,” “trance music,” “modular music,” and the “Hypnotic School,”⁴ together frame a more complete picture of its aesthetic. Minimalist music has earned a place as the last original tonal music genre and compositional technique to come out of the twentieth century, and continues to influence all spheres of music, including the percussion repertoire. In the recital fulfilling the requirements for my Master of Music in Percussion Performance, there are three

pieces with varying degrees of minimalist elements: *Nagoya Marimbas* (1994) by Steve Reich, *Observations* (2008) by Tristan Perich, and *Velocities* (1990) by Joseph Schwantner. *Nagoya Marimbas* is a marimba duet in the vein of Reich’s early minimalist pieces, but compressed into an efficient five minutes. *Observations* is a piece for two sets of crotales and six-channels of one-bit electronic tones, playing constant interlocking polyrhythms in a dense diatonic texture. Finally, *Velocities* is a virtuosic four-mallet marimba solo with a continuous sixteenth note rhythm throughout, which has established a spot among the most popular advanced marimba solos. This paper provides an original analysis of each piece within the context of minimalism, a review of the compositional processes that led to their construction, and an exploration of their minimalist and postminimalist elements. This leads to a comparison between their differing styles, as well as a review of their influence on minimalism in percussion repertoire. In order to examine these topics properly, the subsequent material focuses on establishing context for the minimalism and postminimalism that frames the discussion of the pieces.

The main characteristics of Minimalism are repetition (through short repeated cells, or simply repeated single notes or chords), pulse (a constant, persistent beat) and tonality (or modality; often through arpeggiations). Music with any of these traits would have “minimalist elements,” and a piece featuring all of these traits would be called a “minimalist” piece. Traditional minimalism, primarily from 1970 and earlier, also employed the techniques of gradual process, phasing, additive rhythmic or melodic construction, polyrhythms, and simplicity: “drastic simplification of raw materials and an omnipresent pulse in tandem with insistent repetitions that, usually over long stretches of time, served as the vehicle for steady change.”

The seeds of early minimalism grew from the avant-garde philosophy of a string of West Coast composers: Henry Cowell, Harry Partch, Lou Harrison, John Cage, Morton Feldman, and La

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5 Bernard, p. 114.
Monte Young. After Feldman’s glacial treatment of time in his indeterminate music, Young (b. 1935) took Webern influenced serialism and stretched it out over a similarly extended time frame. Young’s pieces often meditated on single long tones for minutes before changing. The intervals of a perfect fourth fifth were particularly revelatory (such as in his Composition 1960 #7, consisting of the interval of a fifth “to be held for a long time”), but he avoided the major third interval. His long tone compositions are the first that can be classified as being minimalist. In his early works, Terry Riley (b. 1935) employed Young’s long tones, but used the major third to obtain a sweeter sound. Riley also worked with tape loops, and through his desire to combine the slow moving harmonies of long tones with the frantic tape, he composed In C (1964). The piece, which is commonly referred to as the starting point of minimalism, is comprised of fifty-three short repeated melodic fragments played in disjointed but coordinated succession, all above a pair of chiming high Cs on the piano.

Steve Reich (b. 1936), who played piano for the premiere of the piece, fittingly introduced the idea of the C pulse. He was the most important propagator of early minimalism, with his main focus on the rhythmic aspect of music. In the process of making his tape piece It’s Gonna Rain (1965), he encountered a fortunate accident while trying to exactly align two recordings of the same loop. Due to the small differences in the samples, the loops ended up slowly moving in and out of sync with each other. This was the precise mechanism Reich was searching for as a means of exploring all rhythmic, melodic, and harmonic possibilities without an obvious change in the material. He used this technique, known as phasing, as a central component in almost all of his early pieces, causing it to become one of the standard elements of early minimalism. In his 1968 essay “Music as a Gradual Process,” Reich explains his ideas of

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7 Ross, p. 538.
8 Ross, p. 536.
10 Reich, “The Phase Shifting Pulse Gate – Four Organs; An end to Electronics,” p. 17.
music with audible processes that occur “extremely gradually,” and invite sustained attention and perception of minute details that are by-products of the process. This is similar to “Indian classical and drug oriented rock and roll,” which “naturally focus on these details rather than on key modulation, counterpoint and other peculiarly Western devices.” The focus on the process also allows one to “participate in a particular liberating and impersonal kind of ritual,” which shifts attention from our social surroundings to a direct focus on the music. After a trip to Ghana to study African polyrhythms, he returned and wrote the influential piece Drumming (1970), which introduced additive rhythmic construction, “substitution of beats for rests,” a new method of gradual change. Starting in 1966 (and continuing to the present) he toured with his ensemble, Steve Reich and Musicians, performing his compositions and increasing the spread of minimalism. Even in his more recent compositions, Reich has always remained the most conservative, process oriented composer of the major minimalists.

After attending a performance of Reich’s ensemble and later playing with Reich, Philip Glass (b. 1937) began composing in a minimalist style. Glass and Reich were colleagues at Julliard and Glass was also influenced by Indian music. Though Reich is usually credited as the first minimalist composer, Glass would later dispute Reich’s influence on his own repetitious music. In his work in the late 1960s, Glass employed a similar gradual process through long form works that explored a consonant tonal pattern altered through the additive process. Rather than the rhythmic focus of Reich, the core of his work is melodic motives and consonant harmonies repeated in short phrases and fragments with many thirds and arpeggiations. Glass subsequently toured with his own ensemble (the Philip Glass Ensemble) and composed the gargantuan opera Einstein on the Beach (1976). He achieved great popularity through his more popular style with relatively traditional emotional and pleasing harmonic progressions. Though Young and Riley

12 Reich, “Notes on Compositions,” p. 66.
were instrumental in its formation, Reich and Glass are considered the fathers and cultivators of minimalism. However, an alternate view places the aforementioned names as just some of a larger group of experimental minimalists in 1960s downtown New York. This scene was not “audience accessible and “classical” (as it would be from 1973 on) but often gritty, demanding, writhing, rebellious, austere.” The Theatre of Eternal Music, led by Young and Tony Conrad (b. 1940), exhibited amplified drone-filled performances lasting hours at bursting decibel levels, and other composers such as Charlemagne Palestine (b. 1945), who “strummed” on a piano for hours causing some keys to detune, had equally bombastic performances. The movement was full of tension and eccentric personalities, leading to its virtual collapse and allowing “Glass and Reich to pick up the remnants of the movement and walk away with it”—a contrast to their identities being perceived as sole visionaries of an original genre.

Starting in the mid-1970s, minimalism began to diversify and differentiate from the rules it had established in the previous decade, as composers started applying new techniques and methods that made their compositions less minimal. The given name for this development is “postminimalism.” It can be broken down into four chronological stages: (1) complication, (2) “a greater concern with sonority in itself,” (3) pieces with a “more explicitly ‘harmonic’” and “chordally oriented” sound, and (4) tonal (or neotonal or quasi-tonal) harmony assuming “primary control.” These stages refer to a move within the minimalist movement toward postminimalism, so pieces exhibiting these stages would probably still be considered “minimalist” pieces. Next, the original early minimalist elements of repetition, pulse and the absence of harmonic progressions were “pushed into the background, where they became stylistic objects,” a device used for a certain mood or character. These pieces would no longer be

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15 Gann.
16 Gann.
17 Bernard, p. 114.
18 Bernard, p. 114.
considered “minimalist” but either “postminimalist” or simply a modern piece using some minimalist elements. Reich moved into the third stage with his pieces *Four Organs* (1970) and *Music for Eighteen Musicians* (1976), both framed by a chordal structure instead of the counterpoint of the phasing in his earlier works. Glass also inhabited stage three by the late 1960s. John Adams (b. 1947), who saw Reich’s ensemble at a California performance of *Drumming*, and subsequently employed minimalist techniques, entered the scene in the late 1970s, already occupying the third and fourth stages in his first minimalist works with more directionally oriented harmonic structures and a greater focus on changing emotions. In his recent works, he employs minimalism as a style mixed with various other romantic or serial styles. Similarly, after hearing *In C*, Dutch composer Louis Andriessen (b. 1939) adopted the minimalist style in combination with jazz, serialism and a Stravinskian influenced European style.

Other composers who also employ a postminimalist style or use minimalist elements as a device are Michael Torke (b. 1961; who studied under Joseph Schwantner), and Frank Ticheli (b. 1958), who has many compositions that have become part of the standard concert band repertoire.

In order to clarify the use of postminimalism, it is important to narrow down its definition. For the rest of this thesis I will classify a piece whose foundation is not composed of the most basic minimalist elements as a modern piece that employs some aspects of minimalism. Such a piece instead uses the minimalism aesthetic only occasionally as a style. However, I will label a piece “postminimalist” if it was built primarily upon repetition and short repeated fragments, while also venturing into a neoromantic harmonic framework.

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19 Bernard, p. 115.
Nagoya Marimbas

Moving into the late 1970s and 1980s, Reich continued to develop his style. Through his 1976-77 study of cantillation, the singing and reciting of Hebrew writings (reflecting his Jewish heritage), he implemented “longer and more traditionally-oriented melodies” in the long form pieces Music for a Large Ensemble (1979), Octet (1979) and Tehillim (1981; the Hebrew word for “Psalms”). These pieces continue to advance the harmonically driven complexity originated in Music for Eighteen Musicians, with Tehillim even drawing from some traditional Western harmonic devices. In his application of cantillation (as well as his study of African rhythms), he focused on “its structure and not its sound,” because imitating only the sound is simply a form of exoticism, while using the structure of cantillation (and African rhythms) allowed him combine it with his own style to create something new. With Music for a Large Ensemble and Desert Music (1983), he ventured into large scale orchestrations on a grand scale. In Different Trains (1988), based on the contrast between the trains he rode as a Jewish child in America and the trains that Jews in Europe rode during the Holocaust of World War II, he reintroduced the use of tape recorded speech in combination with a string quartet. He then combined the use of recorded vocal samples and the cantillation of Tehillim in his video opera The Cave (1993).

Nagoya Marimbas contrasts with its contemporary compositions as a stylistic return to Reich’s pieces from the late 1960s and early 1970s. The piece’s name comes from its commissioning by the Conservatory in Nagoya, Japan to commemorate the opening of a new hall. Reich states that the similarity to his older work is in “repeating patterns played on both marimbas, one or more beats out of phase, creating a series of two-part unison canons.” But there

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are also similarities to his then recent work as the patterns are “more melodically developed, change frequently and each is usually repeated no more than three times.” It also contrasts with his early work as it is “considerably more difficult to play… and requires two virtuosic performers.”

I have been unable to locate any analysis of the piece, likely due to its relative simplicity compared to Reich’s later and more large scale works, but my analysis reveals that there is enough complexity in the melodic and harmonic material to warrant its examination. The main finding is in the use of Japanese and other non-Western scales and modes as pitch sets which organize the form and shape the piece’s different moods.

Figure 1. Form and Scales in Nagoya Marimbas

<table>
<thead>
<tr>
<th>Measures</th>
<th>Pitches</th>
<th>Intervals (semi-tones)</th>
<th>Scale or Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 22</td>
<td>E, G, A, B, D</td>
<td>3, 2, 2, 3, 2</td>
<td>E Minor Pentatonic or Yo Scale</td>
</tr>
<tr>
<td>23 – 27</td>
<td>E, F, G, A, B, D</td>
<td>1, 2, 2, 3, 2</td>
<td>E Minor Pentatonic/In Scale</td>
</tr>
<tr>
<td>28 – 38</td>
<td>E, F, A, B, D</td>
<td>1, 4, 2, 3, 2</td>
<td>E In Scale</td>
</tr>
<tr>
<td>39 – 46</td>
<td>E, F, G#, A, B, D</td>
<td>1, 3, 1, 2, 3, 2</td>
<td>E Phrygian Dominant</td>
</tr>
<tr>
<td>47 – 52</td>
<td>E, F, A, B, D</td>
<td>1, 4, 2, 3, 2</td>
<td>E In Scale</td>
</tr>
<tr>
<td>53 – 65</td>
<td>E, G, A, B, C, D</td>
<td>3, 2, 2, 1, 2, 2</td>
<td>E Phrygian or Aeolian</td>
</tr>
<tr>
<td>66 – 72</td>
<td>B, C, D, F#, A</td>
<td>1, 2, 4, 3, 2</td>
<td>B Phrygian</td>
</tr>
<tr>
<td>73 – 75</td>
<td>E, F#, G, A, B, D</td>
<td>2, 1, 2, 2, 3, 2</td>
<td>E Aeolian</td>
</tr>
<tr>
<td>76 – 77</td>
<td>E, F#, A, B, D</td>
<td>2, 3, 2, 3, 2</td>
<td>E Pentatonic (2nd mode/Egyptian/Suspended)</td>
</tr>
<tr>
<td>78 – 84</td>
<td>E, G, A, B, D</td>
<td>3, 2, 2, 3, 2</td>
<td>E Minor Pentatonic or Yo Scale</td>
</tr>
</tbody>
</table>

Besides a short departure into ‘B’, the tonal center of Nagoya Marimbas is ‘E’. It begins and ends using the ‘E’ Minor Pentatonic, moving through other types of scales in between. This is equivalent to a derivation of the Japanese Yo scale which also contains no half steps, the only difference being that the latter has a different starting point, organizing the intervals as (2, 3, 2, 2, 3). The first scale it moves to by adding ‘F’ and taking away ‘G’ is equivalent to the Japanese In

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scale which is characterized by the intervals (organized by the number of semi-tones apart) (1, 4, 2, 3, 2). The In scale contains half steps, making it exhibit a darker, distinctly Japanese character, compared to the lightness of the Yo scale. In measure 39, after a four measure crescendo (the measure numbers do not correspond to the actual number of measures, since most of them are repeated two to four times), the ‘G#’ is prominently introduced, causing the piece to move to the Phrygian Dominant mode. The -half step-augmented second-half step- beginning of the mode creates a characteristically exotic sound and is commonly used in Western compositions to evoke a non-western atmosphere. The mode is used in Middle Eastern music (as in the magam nahawand of Arabic music theory), which led to its use in Hebrew and Klezmer, Eastern European, and Spanish music. Measure 53 then introduces the lowest notes of the piece and enters into the Phrygian or Aeolian mode (the two are equivalent without their second scale degree). This produces a dramatic textural change, evoking a grand, expansive atmosphere. Measure 66 offers another change, as the key of the piece suddenly shifts to ‘B’ Phrygian. This intensity is soon released as the lower range is taken out and the piece gradually moves back into the original ‘E’ Minor Pentatonic by reintroducing the ‘E’ and ‘G,’ and removing the ‘C’ and the ‘F#.’ This return of the original mode allows the mood to be calm as the register and dynamics also move back to the middle, followed by a final rise of intensity to the end of the piece caused by a raise in the register and dynamics.

In many cases these modal changes act as a bridge between two sections by adding a transitory note (such as measures 23 to 27 and 73 to 77), but several others (such as measures 39, 53, and 66) go to the new material unprepared, except by a crescendo build up in some cases. The latter changes are not a part of Reich’s old music, where he desired extremely gradual changes, but are more reminiscent of the harmonic changes of Music for Eighteen Musicians or even Adams’s “gates” from Phrygian Gates (1977) and China Gates (1977).

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27 Apel.
Along with the tonal framework, *Nagoya Marimbas* uses several processes that add to the character of each section and to the piece as a whole. The beginning of the piece features a statement of the initial melodic pattern by player one, followed by an additive rhythmic construction (substitution of rests for notes) of the same pattern by player two, but offset by three eighth notes. Once player two has completed the pattern he decrescendos from *f* to *mf* to match player one, revealing to the listener that the pattern player two has been building is in fact the same pattern as player one. This is a clear application of Reich’s ideal “audible processes,” being able to hear what the composer is doing, which leads to an enhanced listening experience.

Throughout the piece, another audible process is *phase shifting*, which is implemented by player one playing one pattern, and player two shifting the same pattern to different beats. This first occurs in measure 19 (Example 1), as player two shifts from playing the pattern offset by three eighth notes to playing it offset by three sixteenth notes. This also occurs in measures 30 (shifting from one eighth note off to two and a half eighth notes off), 55 (one eighth note off to three eighth notes off), 62 (one eighth note off to five eighth notes off), 71 (one eighth note off to two eighth notes off), and 81 and 82 (one eighth note off to two eighth notes off to three eighth notes off). The last of those, which shifts three consecutive times, adds to the drama at the end of the piece.
piece, allowing the listener the clearest view of the process. Reich also uses dynamics very simply and gradually, with the body of the piece only containing \textit{mf} and \textit{f}, with \textit{ff} only appearing at the very end. The dynamics are very purposeful, assisting in the other processes that are occurring such as bringing out the entrance of player two as the pattern is constructed, building towards changes in mode (such as the measures leading to 39 and 53), and building at the end to allow for a dramatic ending.

Though the piece may appear to be somewhat simple, it creates a number of technical challenges that require the talents of skilled marimba players. Despite being a short piece, it still must be completely memorized and very well-rehearsed, as it is very problematic if one of the players gets out of sync with the other. If this happens that player must keep the original meter in mind and avoid the temptation to hear the other person’s pattern as their own (as they are often playing the same notes, only displaced), as it is hard to return to the pattern on the correct beat once hearing it the wrong way. This could potentially result in a collapse of the performance — either a large stretch of the piece with only one player until the other finds his place, or having to completely stop and restart the piece at a certain measure number. Another performance issue is dealing with mental fatigue, which manifests itself in a heightened way in this piece due to the similarity of many of the patterns, potentially causing the notes to blend together. Due to its contrapuntal nature, it calls for very tight rhythmic precision between the two players in order for them to lock into the constant eighth note pulse. It is also important for the two players to match each other dynamically, in order to produce the blended effect that is sought after. The choice of mallets can have a positive effect on this ambiance. Reich recommends the use of rubber mallets for the marimba parts of all of his pieces, which bring out the attack and the fundamental compared to the yarn mallets used for most marimba playing, leading to an easier listening experience. There is also the question of how many mallets to use; two, three or four. The piece can be played with any of those, though I chose to use two for my recital performance as it enables me to play with a more relaxed feel and tone. Three mallets is also a common choice, as
it deals with the wide range of measures 53 to 69, and allows the repeated low ‘A’ to ‘E’ intervals starting at measure 53 to be played with the two mallets of the left hand, causing better note accuracy. The players should use the same type and number of mallets, and if possible, the same type of marimba. The marimbas are usually set up facing one other to allow the players to see each other’s mallets and to visualize the other player’s pulse. Since player two’s part has more changes on the high end of the instrument, that marimba should be set up to the audience’s left, so that the marimba’s higher end is closer to the audience.
Observations

Over the last fifty years, electronic music has experienced a massive growth and development in popular and classical music. Yet in 1970 Steve Reich proclaimed in his short essay, “Some Optimistic Predictions about the Future of Music,” that electronic music “will gradually die and be absorbed into the ongoing music of people singing and playing instruments.”

Reich spent the year of 1968 and half of 1969 working primarily on the Phase Shifting Pulse Gate, an electronic device with twelve channels programmed to execute the phasing of a pulsing chord, with minute alterations changing by one 120th of a measure. After only two performances with the device, he abandoned it to work on music to be performed by people. He felt that “in any music which depends on a steady pulse, as [his] music does, it is actually tiny micro-variations of that pulse created by human beings, playing instruments or singing, that gives life to the music.”

Though rhythmic precision is an essential aspect of musicianship, a computer cannot duplicate the feel and groove of a human, and it is likewise impossible for a human to duplicate the exact metronomic rhythm (or pitch) of a computer. On one hand, the result of Reich’s prediction about electronic music was overwhelmingly falsified by its staggering growth that has continued to the present. But he was absolutely correct if his prediction is taken in the context of the cultural importance and persistence of people singing and playing instruments, and the organic quality that can only be achieved by that music.

So it is fitting that the use of electronic music by Tristan Perich (b. 1982) contains a combination of the physical manifestation of code and real instruments that give the music life. He dwells on the processes involved in the creation of his music and art. The characteristic timbre that he employs stems from the use of one-bit electronics “meaning at any moment in time the

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30 Reich, “The Phase Shifting Pulse Gate – Four Organs; An end to Electronics,” in Writings about Music, p. 25.
music is represented by only one bit of information.” He utilizes microchips that are “like a computer, but much simpler, much more bare bones,” with no interactive display, keyboard, or mouse; “it’s just a chip that runs code, and it has input and output pins,” which can be directed to perform a basic task written in binary code (1’s and 0’s). It is “raw computation” that can be harnessed and plugged in; so “to create sound you connect it to a speaker,” and “to control a motor you connect it to a motor.” His works interact directly with computation physically in the world, instead of a translation of the code through a display (the way we interact with most computer devices today). His “machine drawings,” which consist of a pen attached by string to two motors controlled by microchips, exemplify the ultimate interaction between the physical world and the abstract world of computation and electronics. The grains on the wall, drying and degrading of the pen, gravity, and time, work together to produce the realization of the initial programmed code.

The opening quote of this paper summarizes Perich’s ideas behind the importance of the processes that form a work; finding beauty in understanding exactly how something works. He compares it to understanding the biology of how a tree makes leaves, and finding beauty in being able to see that whole model and comprehend it. Finding beauty in understanding is similar to Reich’s view of the processes that a composer uses to form a work. The difference is that Perich is more focused on working with the process of turning physical and tangible objects into art and music, whereas Reich is more focused on the listener being able to perceive and comprehend the musical process. Though his art and music are also compatible with Reich’s audible processes, Perich’s processes are meant to be seen and apparent when viewing or watching a performance. This is another similarity between these two types of processes, as Reich’s statement can be

33 Perich, “Artist talk.”
34 Perich, “Mind the Machine.”
applied to both types: “once the process is set up and loaded it runs by itself.” An exhibit of Perich’s machine drawings consists of setting up the pen, turning on the microchips connected to the motors, and letting it run by itself for several weeks while the process of the machine working is plainly on display.

Perich’s music operates with a similar philosophy, as he places great importance in physically making the connection to allow electricity to move from the microchip to the speakers. The microchip takes in the electricity and uses the raw 1’s and 0’s of the code to apply the presence or lack of voltage (a “1” creates an electrical connection with the speakers and a “0” turns it off). This means that the information of the code is the power and energy that makes the computer work. In his music, Perich uses “the most basic digital representation of sound:” one-bit sound waves. This is the absolute lowest possible quality for digital audio; a binary representation of sound. With sixteen-bit audio (the standard for high quality sound, such as an audio CD), the waveform of a sound is smoothly shaped to closely duplicate the analog wave, allowing a recording of an acoustic instrument to sound virtually the same as it did when the sound was originally produced. With lower quality eight-bit audio, such as in the music commonly found in old video games, there are only 256 (2^8) possible values (compared to 65,536 (2^16) for sixteen-bit), making the wave jagged, and causing the audio to sound more digital and less like a natural instrument. One-bit audio only has the possibility of “on” or “off,” with no curve in the waveform, only flat, instantaneous transitions from “sound” to “no sound.” Perich chose to work with one-bit audio in his music due to its “primitive, raw, [and] electronic” sound that offered a stark contrast to high quality electronic music where any type of sound is possible.

Perich did his undergraduate work in math, music and computer science at Columbia University, and received his master’s degree in art, music, and electronics from New York

36 Perich, “Artist talk.”
37 Perich, “Artist talk.”
University. With his father Anton Perich (b. 1945) being a visual artist who created machine paintings, Tristan grew up with the idea that “machine made art was just as valid as any other kind of art,” further leading him to focus on the process of making art. This led him to think that a focus on process in turn has more to do with computation than the actual music or art itself. Clearly this had an influence on his visual art, as well as his 1-Bit Video and his Interval Studies and Microtonal Wall, which use hundreds of small speakers each emitting a slightly different frequency along a continuum that spans a musical interval (the Microtonal Wall uses 1,500 speakers and spans four octaves and 25 feet). He also listened to the classical minimalist composers growing up, but struggled to find a means to combine his love of computation and music until he discovered the simple microchips that allowed him to use one-bit code. His first work with these was 1-Bit Music (2004), an album of one-bit electronic music comprised of a microchip leading to a headphone jack in a CD jewel case; “the first album ever released as a microchip.” Prior to this he had composed for traditional instruments, but following 1-Bit Music he has composed almost entirely for combinations of traditional instruments and one-bit electronics. He has written many commissions including works for So Percussion and the Calder string quartet, Mantra Percussion, the Meehan/Perkins Duo, and an upcoming commission from the Los Angeles Philharmonic to be performed on December 8th, 2015 as part of their Green Umbrella series. He composed Observations in 2008 and it has remained among his selected works as his most performed piece to date.

Observations is based around a series of twelve dense diatonic chords that are formed from the homophonic relationship between the eight individual monophonic parts. The composer writes in the notes to the score, “Observations revolves around simultaneous changes of pitch across all parts, while leaving the rhythm entirely constant. The pointed polyrhythms of the 1-bit

39 Perich, “Mind the Machine.”
Figure 2. Chords in *Observations*

<table>
<thead>
<tr>
<th>No.</th>
<th>First Appearance</th>
<th>Chord Pitches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Crotales 1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>m. 1</td>
<td>F, F</td>
</tr>
<tr>
<td>2</td>
<td>m. 9</td>
<td>F, F</td>
</tr>
<tr>
<td>3</td>
<td>m. 23</td>
<td>G, Ab</td>
</tr>
<tr>
<td>4</td>
<td>m. 29</td>
<td>Db, Eb</td>
</tr>
<tr>
<td>5</td>
<td>m. 44</td>
<td>C, Ab</td>
</tr>
<tr>
<td>6</td>
<td>m. 59</td>
<td>G, Eb</td>
</tr>
<tr>
<td>7</td>
<td>m. 63</td>
<td>Eb, C</td>
</tr>
<tr>
<td>8</td>
<td>m. 91</td>
<td>Eb, Ab</td>
</tr>
<tr>
<td>9</td>
<td>m. 101</td>
<td>C, Ab</td>
</tr>
<tr>
<td>10</td>
<td>m. 113</td>
<td>G, Bb</td>
</tr>
<tr>
<td>11</td>
<td>m. 139</td>
<td>G, Bb</td>
</tr>
<tr>
<td>12</td>
<td>m. 165</td>
<td>C, F</td>
</tr>
</tbody>
</table>

Figure 3. Chords in *Observations*, Notated

Tones exist in lockstep with the steady, ringing sixteenths of the crotales.”

Due to these constant rhythms, Perich uses shorthand in the music and score, noting for the crotales to “continue sixteenth pulse throughout,” and “rhythm continues” for the electronics in the score. For every measure after the first measure the rhythms refer only to changes in the individual parts or the other parts (acting as a cue when there are multiple notes and rhythms on the same pitch).

The piece is in the key of Ab Major, with all the notes of the piece part of the Ab Major

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42 Perich, *Observations*. 
scale. All of the chords are variations of Ab Major (I), C Minor (iii), Eb Major (V), and F Minor (vi), but with dense suspensions that make the tonal progressions more smooth and less directional. These progressions are led more by the distinct timbres of each chord than by the progressions or melodies that they form. Each pair of instruments (as shown in Figure 2) plays the same rhythm throughout the entire piece, which is restarted with every new pitch (or occasionally on the same pitch). The crotales and first and second electronics play sixteenth notes, the third and fourth electronics play triplets, and the fifth and sixth electronics play dotted eighth notes. This creates a chaotic, sparkling polyrhythmic texture that runs through the whole piece. The most distinct timbral differences between the chords are created by the difference in pitches between the first and second, and third and fourth electronics parts. For example, the first chord contains contrasting notes between those parts (Eb, Bb and C, Ab), causing the triplet-over-sixteenth note polyrhythm to stand out, and creating a miniature repeated progression between Eb Major and Ab Major. But other chords contain similar notes between those parts (such as C, Bb and C, G in No. 5), so they have a softer, calmer texture. Another difference in the timbre comes from the chord voicings, as some are more open between the crotales and electronics (No. 5) while others are closed (No. 7), and some have more doubled notes in the electronics parts (No. 5) while others have more contrasting notes (No. 1).

The form of the piece consists of the general process of establishing one chord or a progression between two chords as the harmonic center, gradually and increasingly embellishing upon it, then passing through a “gate” that moves to a different chordal center. The embellishments begin as single eighth note departures and develop to the point where the original chord is met with a relief like that of arriving back at the tonic in traditional tonality. The main device that is apparent in the whole piece is the establishment of chord No. 1 (measures 1 through 100), followed by its departure and return at the end of the piece (measures 246 to 265). Figure 4 outlines the overall form of the piece, displaying the chords that act as the chord center in each section. The introductions of each new chord, listed as their “First Appearance” in Figure
Along with the major sections in Figure 4, the first section contains some smaller developments. Section A(a) contains mostly the first chord with some short eighth note or quarter note departures, and sections A(b) and A(c) use progressions and departures from chord No. 1 to build the tension until its return. The long exposition of Section A comes to its dramatic conclusion with a two beat rest where the crotales are “let ring,” followed by the beginning of Section B, which introduces a new chord. Section B features the electronics playing what amounts to a rhythmic solo on the same chord for the first twelve measures. It continues these rhythms as new chords are introduced, creating a build to Section C. Instead of gradually increasing in complexity, Section C establishes a short progression with one chord per bar leading to chord No. 11, and then proportionally augments this progression, until it stretches out to encompass four measures with two chords per bar, transitioning to Section D. Here the chord center is a progression between two chords, No. 7 and No. 10, another device to keep interest as
the piece begins to stretch beyond eight minutes. All the chords have been introduced, but the texture still builds up to the densest point from measures 230 to 245, where there are eight different chords used in the same passage. The Coda of the piece repeats what can be perceived as a V-I cadence in the repetitions of chord No. 1 and No. 7 every two measures. The contrasting characters of these two chords corresponds to a tension and resolution, as chord No. 1 is jagged and restless, while chord No. 7 is more smooth yet brilliant, as it is higher in pitch.

Though the timbre of each chord is unique, the piece has an even atmosphere throughout, especially following Perich’s direction that “dynamic sound [should] be relatively constant throughout, though accenting the outlying notes is allowed.” This creates an ethereal soundscape that appeals to the original aesthetic of minimalism. It requires a long term, introspective approach that focuses on the quality of the sound instead of the need for traditional progressions, since the musical process unfolds very gradually. As the listener or performer gets to the simpler points, such as three fourths of the way through the piece, when it dwells on the two chords that switch every four measures, it becomes meditative. The listener starts noticing different sounds besides just the musical notes, such as the contact noise of the mallets against the crotalas, and the “tick” sound of the speakers turning on and off. As a performer, though most of this piece is not difficult or virtuosic in a traditional way, the challenge lies in playing the same note for an extended period (up to three minutes) then having to hit the new accents that start building up. The piece does become challenging in a traditional sense when it arrives at the three most complex spots: measures 54 to 75, 121 to 145, and 230 to 245. There is also a challenge in playing the constant sixteenth notes, as any derivation from the pulse will easily stand out. To assist with this, the setup includes an LED display with a visual metronome that shows the beat and the current measure, also making it particularly helpful when there are several measures that do not change. Ultimately the most challenging aspect of the piece is maintaining focus for twelve minutes, in order to be able to perfectly execute the offbeat, syncopated rhythms.

43 Perich, Observations.
Velocities

With a traditional academic compositional background, Joseph Schwantner’s (b. 1943) writing comes from a setting and viewpoint that contrast with those of Reich and Perich. He received degrees in composition including a Bachelor of Music from the American Conservatory of Music in Chicago, and a Master of Music and doctorate from Northwestern University. He began teaching composition immediately afterwards, and has continued teaching through the present. He has witnessed an evolving compositional style throughout his successful compositional career, as his earliest works were jazz compositions, his works in the 1970s employed serialism, and starting in the late 1970s he moved to a style based on the tone colors of Impressionism and Neotonal tone centers. He received the Pulitzer Prize in 1979 for his orchestral composition, Aftertones of Infinity (1978). From that point on his pieces establish tonal centers through use of pitch sets instead of traditional scales or tonic dominant relationships. Virtuosity is also a common thread through many of his pieces, as seen in his Concerto for Percussion and Orchestra (1995) and several solo and chamber works. Velocities was commissioned as part of the groundbreaking 1986 National Endowment for the Arts Solo Marimba Commission, along with Reflections on the Nature of Water (1986) by Jacob Druckman, both of which greatly helped advance the level of solo marimba compositions. Schwantner was paired with renowned marimbist Leigh Howard Stevens to compose a new virtuosic marimba work. Stevens was closely involved with Schwantner in the formation of the piece, and particularly influenced the technical aspects, helping to determine what was possible or impossible to play.

There is a generous amount of previous research and analysis on Velocities (in particular the 2005 dissertation by I-Jen Fang on this piece, Reflections on the Nature of Water, and the NEA Commission), and a full analysis would require its own entire paper. Therefore, this section

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will focus on certain analytical elements such as thematic and motivic development, the emotions and characters present in different sections throughout the piece, and the minimalist elements present in the work. *Velocities* is characterized by a constant sixteenth note rhythm throughout the piece (except for a short section with thirty-second notes), while all the other musical elements such as dynamics, expression, and extended techniques, are exercised to their full extent. The aforementioned dissertation focuses on the pitch sets and intervals that Schwantner uses, showing a great level of connectivity and organicism. It emphasizes the importance of the intervals of the perfect fourth, perfect fifth, and major seventh, the intervals of the double stops that open the piece, which are present in most of the transitional arpeggios that border each section of the piece. The pitch class set \([0, 2, 7]\) (in semitones; or the intervals: tonic, major second up, perfect fifth up), which appears in the first cascading passage of perfect fourths and minor seconds, also appears in the tonal centers of both the first and second main thematic motives.

Figure 5 provides a thorough picture of the motivic and thematic development of the main melodic material throughout the piece. The general arc form is seen on the left of the table; Introduction, A, B, A', Coda. The level of development of the themes or motives corresponds to the letters in the next column. Sections of the piece that only appear once and are not related to other passages were not included in the table. Letters with different numbers refer to material that is related but introduces significant differences, while letters with primes are directly similar to the original but altered in some way. The column on the right of the table provides a very brief
Figure 5. Form, Themes and Motives in *Velocities*

<table>
<thead>
<tr>
<th>Form</th>
<th>Themes or Motives</th>
<th>Measure Numbers</th>
<th>Comments and Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro</td>
<td>A0</td>
<td>1</td>
<td>Opening double stops; “con bravura,” “relentlessly with energy and intensity”</td>
</tr>
<tr>
<td></td>
<td>A1</td>
<td>3, 15, 20</td>
<td>Repeated double stops; “prorompendo,” “tempesto,” “brutale”</td>
</tr>
<tr>
<td></td>
<td>B1</td>
<td>7, 25, 32 (ff), 44</td>
<td>Two independent lines combined into one melody</td>
</tr>
<tr>
<td></td>
<td>B1’</td>
<td>10, 13, 43, 38 (fff)</td>
<td>Similar to B1 but stretto</td>
</tr>
<tr>
<td></td>
<td>A0’</td>
<td>17, 19, 23</td>
<td>Double stop chords with major 7ths</td>
</tr>
<tr>
<td></td>
<td>B1''</td>
<td>28</td>
<td>B1 + B1’</td>
</tr>
<tr>
<td></td>
<td>C0</td>
<td>48</td>
<td>First theme; “legatiss.”</td>
</tr>
<tr>
<td></td>
<td>C1</td>
<td>58, 70, 97, 99, 101, 103</td>
<td>First theme in its fully realized form; “wave-like”</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>62, 72</td>
<td>Octave instead of major 7th; “brightly”</td>
</tr>
<tr>
<td></td>
<td>B1</td>
<td>66, 95, 98, 100, 102, 104</td>
<td>66: “con gusto ed estatico”</td>
</tr>
<tr>
<td></td>
<td>C1’</td>
<td>68</td>
<td>Perfect 5th instead of minor 6th</td>
</tr>
<tr>
<td></td>
<td>D1</td>
<td>83</td>
<td>Swelling triplet arpeggiations; “(resonant)”</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>87</td>
<td>Subito <em>pp</em>; “(subdued)”</td>
</tr>
<tr>
<td></td>
<td>B3’</td>
<td>89</td>
<td>Added accents on new notes</td>
</tr>
<tr>
<td></td>
<td>B3”</td>
<td>91</td>
<td>Continued development</td>
</tr>
<tr>
<td></td>
<td>B3’’</td>
<td>93</td>
<td>Continued development</td>
</tr>
<tr>
<td></td>
<td>B2</td>
<td>106</td>
<td>Duple and triple arpeggiations</td>
</tr>
<tr>
<td></td>
<td>D2</td>
<td>114</td>
<td>Triplet arpeggiations; “resonant”</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>147</td>
<td>f with dim.</td>
</tr>
<tr>
<td></td>
<td>E1</td>
<td>119</td>
<td>Lower note accent</td>
</tr>
<tr>
<td></td>
<td>G1</td>
<td>125, 192, 200</td>
<td>Subito <em>mf</em>; upper note accents</td>
</tr>
<tr>
<td></td>
<td>G1’</td>
<td>129, 137, 196, 204</td>
<td>Cresc. to <em>ff</em>; transitions to next section</td>
</tr>
<tr>
<td></td>
<td>F1’</td>
<td>130, 154, 197</td>
<td>Melody up an octave; countermelody doubled</td>
</tr>
<tr>
<td></td>
<td>D3</td>
<td>142</td>
<td>Up a minor 3rd</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E1’</td>
<td>150, 152</td>
<td>Same melodic pattern with all notes doubled; accent on upper note</td>
</tr>
<tr>
<td></td>
<td>G1”</td>
<td>157, 161</td>
<td>Jumps down for another ascension</td>
</tr>
<tr>
<td></td>
<td>E1</td>
<td>166, 168</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td>173</td>
<td>Altered melody, <em>pp</em> to <em>p</em>; phrase line over whole measure; “legato (flowing)”</td>
</tr>
<tr>
<td></td>
<td>F2’</td>
<td>178</td>
<td><em>mp</em> to <em>f</em>; big left hand jump</td>
</tr>
<tr>
<td></td>
<td>D3’</td>
<td>184</td>
<td>Arpeggiations with 32nd notes</td>
</tr>
</tbody>
</table>

Continued on next page…
**Figure 5. Form, Themes and Motives in *Velocities*, Continued**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B3</td>
<td>210</td>
<td>With shaft clicks</td>
</tr>
<tr>
<td>C1'</td>
<td>211, 217, 265, 267</td>
<td></td>
</tr>
<tr>
<td>B3'</td>
<td>213</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>214, 220, 226, 231, 233, 283</td>
<td></td>
</tr>
<tr>
<td>B3'''</td>
<td>216</td>
<td></td>
</tr>
<tr>
<td>B3''''</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>B2''</td>
<td>222</td>
<td>Restarts rhythm every bar (four quarter notes)</td>
</tr>
<tr>
<td>B2'</td>
<td>230, 232</td>
<td>All notes accented; “con forza”</td>
</tr>
<tr>
<td>D4</td>
<td>235</td>
<td><em>pp</em> with hairpin cresc.; “fluente”</td>
</tr>
<tr>
<td>H1</td>
<td>243, 250 (extended)</td>
<td>Ascending arpeggio, alternating major 3rds and minor 3rds; “sonoro”</td>
</tr>
<tr>
<td>I1</td>
<td>244, 252 (extended)</td>
<td>Repeated notes moving to shaft clicks; “delicato”</td>
</tr>
<tr>
<td>B1''</td>
<td>246, 255</td>
<td>With shaft clicks</td>
</tr>
<tr>
<td>B1''''</td>
<td>259</td>
<td>Same as B1” but in major key</td>
</tr>
<tr>
<td>C2'</td>
<td>266, 284</td>
<td>C2 + C1</td>
</tr>
<tr>
<td>B1'''''</td>
<td>268, 275, 280 (<em>pp</em>)</td>
<td>Natural (white key) notes start first; <em>ff</em> with accents</td>
</tr>
<tr>
<td>B1''''''</td>
<td>272, 277</td>
<td><em>pp</em> and “legato”</td>
</tr>
<tr>
<td>B1'</td>
<td>289, 304, 313</td>
<td>313: adding shaft clicks, moves to all shaft clicks</td>
</tr>
<tr>
<td>B1''''</td>
<td>295 (<em>fff</em>), 300, 310</td>
<td>300: moves through series of keys (Bb, E, G, Db); 310: with shaft clicks in left hand</td>
</tr>
<tr>
<td><strong>Coda</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1'</td>
<td>316, 319, 322, 325, 328, 331, 334, 337, 342</td>
<td>Inverted from A1; marcato markings on single notes, accents on repeated notes; “con abbandono,” “marcatiss.”</td>
</tr>
<tr>
<td>A0'</td>
<td>318, 321, 324, 327, 330, 333, 336, 339</td>
<td>Marcato markings on every note; “con abbandono,” “marcatiss.”</td>
</tr>
<tr>
<td>A1''</td>
<td>342</td>
<td>A1'' + A0'; “brutale”</td>
</tr>
</tbody>
</table>

description of the material, any expression markings from the score, or how that letter is different from previous letters. These letters are in the order of their first appearance, with later appearances listed after the first in the “Measures” column. Letters A0 and A1 (Examples 2 and 3) refer to the emphatic double stops that only appear in the opening and closing of the piece (A1 is the more fully realized form of A0). There is a similar character between the Introduction and the Coda, as seen from the analogous expressions (“con bravura,” “tempestoso,” and “brutale” in the Introduction and “con abbandono,” “marcatiss.” and “brutale” in the Coda) and the same *fff* dynamic marking. B1 (Example 4) is the other thematic material stated at the outset of the piece.
Along with its derivations (B2 and B3), it refers to two interlocking lines that together combine to form one melody, with one hand playing each line. This motive continues to appear throughout the A and A' section. Section A begins with the statement of the first main theme of the piece, represented in its various forms by C0, C1, and C2 (Example 5). It is shaped by a “wave-like” phrasing structure of dynamics and accents, and offers some apparent rhythmic diversity since the third eight note is in effect not part of the melody. The varying forms of this theme offer a challenge since the phrasing and dynamics change while playing similar material. The next repeated material is the swelling arpeggiation of D1, D2, D3, and D4. Though the figures are similar and should be given a different quality from the rest of the piece, they must also be distinguished from one another, as their context and the directions from the score have subtle changes. All of the material up to D1 has been introduced within the first 83 measures, or about the first two and a half minutes of the nine minute piece. This material returns in the A' section, while the B section contains entirely new material which does not appear anywhere else in the piece. The beginning of the B section introduces the second main theme of the piece, F1

Example 6. Velocities, measure 122, F1
(Example 6). It features two lines that simultaneously work in counterpoint against each other in different meters. The main melodic line, played mostly by the right hand, is in triple meter, while the left hand plays in duple meter. This presents the challenge of phrasing the right hand melody properly without letting the feel of the left hand influence which notes are emphasized.

The minimalist elements of Velocities include the constant rhythmic pulse, repeating the melodic material, and tonal harmony throughout most of the piece. The sixteenth note pulse throughout the entire piece brings about a similar mood to that of Nagoya Marimbas and Observations; the continuous sound which leads to an introspective listening experience through its repetition. However this piece does so with great variations and expressiveness, compared to the even dynamic sound of the other two. The main thematic material often repeats itself four times (such as in C0, C1, and C2, and B3). And certain passages (B2 and B3) evoke a chaotic tonal counterpoint containing two melodies in different meters, causing them to phase with each other. This allows the listener to hear new melodies even though nothing is changing (a result of phasing that Reich greatly appreciated). Additionally, the piece contains a tonal harmony based on tonal centers. Though it uses less consonant intervals than most minimalist pieces, it does remain in a tonal setting throughout. The main material of the piece (A, B, A’, without the introduction and coda) is relatively consonant and graceful in general, and much of it (B3 at measure 87, and the repeated notes at I1 in particular) is overtly minimalist, acting as a respite from the dramatic, energetic material directly prior.

The essence of Velocities is in the virtuosity required of the soloist. When asked about the difficulty of his works, Schwantner stated that “there is something to be said for just being on the verge of losing it… and really good players… embrace that sometimes, and really go for the jugular!” During its composition, Schwantner kept in mind the dichotomy between the physical

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challenge of the “constant motion, range and velocity,” balanced with “its slow harmonic
development [that stretches] the musicality and phrasing” of the performer. The aspects of this
difficulty include the extreme range, extreme dynamics, and extended techniques, such as using
the shafts of the mallets, playing full chords as double stops that change every sixteenth note,
sudden dynamic shifts, and sudden expressive shifts. Yet the hardest aspect is keeping up one’s
stamina throughout the piece and avoiding the mental and physical fatigue that comes from a
piece of this length with no breaks. Using proper, relaxed technique helps to relieve the potential
muscle exhaustion that can occur from overplaying. Another major challenge of the piece is how
to keep it musically interesting through its repetitious length. Schwantner asks for the tempo to be
constant and unwavering throughout the piece, but many performers choose to add some tempo
fluctuations for dramatic effect, to help with the feel of certain sections, or to ease in the
performance of more difficult sections. Another way to further differentiate the contrasting
sections of the piece is to use different types of strokes, such as a “push” stroke (pushing the
mallet into the bar with tension) for the biggest accents of the Introduction and Coda for a dark,
strong tone, moving the beating spot to the middle of the bar to get a legato tone and closer to the
node for a brighter tone, or using the top of the mallet heads to get the lightest, calmest possible
stroke. The extended techniques, range, and different strokes add to the important visual aspects
of the piece, as do some of Schwantner’s notes in the score to play certain sections (B1, B2, B3,
C0, C1, and C2) using the inner mallets to emphasize the melody and the interdependence of the
two lines. The mallets the performer chooses must have good tone across the entire range, usually
a medium hard mallet, and can be either graduated (four of the same type) or non-graduated
(softer mallets on the low end and harder mallets on the high end) with the two inner using the
same type.

46 “Vic Firth Feature: Joseph Schwantner,” Vic Firth, accessed March 17, 2015,
Conclusion

The three pieces in this paper contain several similarities and differences. They all have shared minimalist elements such as a constant pulse, repetition of short melodic fragments, gradual process, and a meditative or introspective quality to some extent. *Nagoya Marimbas* and *Observations* are clearly “minimalist” pieces, while *Velocities* would better be referred to as a “postminimalist” piece, as it is too varied and frenzied in its harmonic and structural processes to be a “minimalist” piece. However, *Nagoya Marimbas* and *Observations* still contain some aspects of postminimalism, which differentiate them from the original minimalist pieces of the late 1960s and early 1970s. The short length and condensed tonal and contrapuntal motion of *Nagoya Marimbas* are reminiscent of the brevity and dramatic nature of *Short Ride on a Fast Machine* (1986) by Adams. Following the four basic stages of postminimalism referenced in the Introduction to this paper, *Nagoya Marimbas* would definitely encompass stage one and two (complication and a greater concern with sonority), and probably stage three (a more harmonic sound oriented toward chord progressions) due to its focus on the changing scales which evoke different moods. *Observations* similarly uses stage one, two, and three, but its harmonies are still too simple and more based on the process than a means in themselves, so it does not move into stage four (tonal or neotonal harmony assuming primary control). *Velocities* easily encompasses all four stages, as it is very complicated and very tonally oriented (based on the motivic development within tonal centers). It also briefly uses elements of minimalism as stylistic objects, though the structure of the piece is framed by enough minimalist elements to still be labeled as “postminimalist.” Many of the themes are repeated three or four times, and some aspects are purely repetitious, such as I1 which is simply one note repeated for one to three measures.

Something that is common to both “minimalist” and “postminimalist” pieces, which all three pieces exhibit, is slow harmonic movement and the use of tonal centers or pitch sets to establish a tonality instead of traditional western scales and progressions.
The main differences between the pieces are in the styles of their soundscapes, their contrasting compositional processes, and the motivation behind each composition. *Observations* clearly contrasts with the marimba pieces due to its instrumentation, as the electronics and crotales create a bustling, ethereal setting. Though *Nagoya Marimbas* and *Velocities* are both marimba pieces, they still have a very distinct sound from one another. *Nagoya Marimba*’s use of rubber mallets and its flat, constantly phase shifted parts contrast with *Velocities*’s yarn mallets and great textural diversity. As for the compositional processes, *Observations* is a very long form minimalist piece with slowly developing landmarks, *Nagoya Marimbas* is of the same style but with everything more condensed, and *Velocities*’s form is more like that of a Romantic piece, as it is framed around two main themes and has a great deal of organic thematic development. All the pieces do happen to have a type of arc form, or at least some elements of one. *Observations* brings back its initially established chord (No. 1) for the final 12 measures, *Nagoya Marimbas* returns to its original E Pentatonic or Yo Scale in its final thirty seconds after having departed, and *Velocities* is entirely framed around an A, B, A’ arc form with the Coda also bringing back material from the Introduction. As for the thought or motivation behind the compositions, *Nagoya Marimbas* and *Velocities* both display elements from the origins of their commissions (the use of Japanese scales and the close work with Leigh Howard Stevens to create an artful virtuosic work, respectively), whereas *Observations* was not a commission and has a more philosophical approach in its visually and audibly clear use of the process of one-bit electronics. This surely is a major influence in causing *Observations* to be the piece that is most similar with traditional early minimalism, and Reich’s ideal gradual processes, as it is not focused on technical prowess or musicality, but on the experience of listening to the sound that it creates.

Just as *Velocities* and *Nagoya Marimbas* have already made a significant impact on marimba literature, *Observations* could potentially influence the course of chamber percussion literature. With the marimba as a solo instrument still in its infancy, a work like *Velocities* by a major composer has had a significant role in its establishment. Since its composition, it has been a
staple for solo marimba competitions, and is one out of a very short list of works commonly asked for in graduate auditions to conservatories.\textsuperscript{47} \textit{Nagoya Marimbas} is also unique as a minimalist work of a short length (and manageable length, compared to Reich’s other works) that exhibits ample difficulty to be suitable for a percussion recital or university percussion ensemble concert. Both of these works exemplify the fitting juxtaposition of minimalism played on the marimba, as it is perfect for capturing the percussiveness of the constant pulse while still offering a kind sound with pleasing sonorities. \textit{Observations} is on the cutting edge of the current compositional trend, as it offers a way to integrate electronic music with classical percussion while using the minimalist aesthetic, which has infused itself into much of today’s music. Possibly influenced by its emergent success in popular music, electronic music has recently been increasing its position in the classical world. This is seen in the music of Mason Bates (b. 1977), who employs electronics as a new instrument in an orchestral setting, and with pieces such as Los Angeles Philharmonic commission, \textit{Awaken the Machine Electric} (2014) by Mark Grey, which uses heavy electronic sampling to create an industrial soundscape. Electronic music also has a place in the percussion repertoire through pieces for percussion and recording. However, the music of Tristan Perich is unique among the realm of electronic classical music due to the ultimate simplicity of the one-bit electronics, which transform the expansive use of electronic music into a closely defined instrument, intimately connected with the process of computation.

As the last original tonal style to come out of the twentieth century, minimalism has influenced the realms of classical music, popular music, and the mass media. It is continuing to evolve as a genre and style, and its idiomatic compatibility with percussion, and the marimba in particular, is mutually beneficial to both. They easily capture interest and attention; pulse and repetition have an innate connection with the human psyche, and percussion activates certain frequencies with unique timbres and textures that strike at the heart of our primal instincts.

\textsuperscript{47} Fang, p. 58.
References


