

Fall 2019

Solo Trombone with Electronic Accompaniment: An Analysis and Performance Guide for Three Recent Compositions

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SOLO TROMBONE WITH ELECTRONIC ACCOMPANIMENT: AN ANALYSIS
AND PERFORMANCE GUIDE FOR THREE RECENT COMPOSITIONS

by

Joshua Mize

A Dissertation
Submitted to the Graduate School,
the College of Arts and Sciences
and the School of Music
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Musical Arts

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December 2019

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2019

Published by the Graduate School



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ABSTRACT

This dissertation examines three solo trombone works, each with a different electronic accompaniment—fixed media, live electronics with a computer, and live electronics with a loop station. A historical and cultural background establishes a context for each accompaniment type, followed by a brief introduction of the selected composition and its composer. Then, an analysis of the piece explores how the electronic accompaniment functions within the context of the solo. Finally, a performance guide addresses rehearsal techniques and important aspects of performing with the different electronic accompaniments. The final product is a pedagogical resource representing current literature for the trombone and electronics genre, to encourage others to perform these works.

ACKNOWLEDGMENTS

I would especially like to thank Dr. Ben McIlwain and Dr. Douglas Rust for their help guiding me through this process. By reading each section and providing comments, he helped tremendously as I worked toward completing this study.

I would also like to thank my committee members— Dr. Ed Hafer, Dr. Richard Perry, Dr. Douglas Rust, and Dr. Timothy Tesh—for their support and guidance.

I want to thank the composers and performers interviewed for this document for taking the time to speak to me about their involvement in the respective works.

DEDICATION

First, to my wife, who provided tremendous support throughout this journey.

To my kids, for letting me take the time to do this even though they were too young to realize it.

To all of my friends and family who spent time encouraging me to always keep going.

To Dr. Ben McIlwain for being a mentor to me and always helping me to become better at what I do.

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GLOSSARY

Amplitude Envelope Follower– an effect that controls the volume of the fixed-media playback according to the dynamic level of the trombonist.

Audio Signal- the path the audio takes to get from its input to its destination.

Digital Audio Tape (DAT)- a type of music recording tape that was used for storing digital music on analog tape.

Digital Audio Workstation (DAW) –a computer program that recreates the concept of a live studio digitally. Accomplishes recording, replaying, mixing, and processing real or virtual audio signals. Example DAW's include: Logic Pro X, Studio One, Ableton Live, and Pro Tools.

Delay Effect– the audio signal is repeated one or more times creating an echo of the original sound.

Fixed Rate Delay– the delay effect is concrete and remains the same throughout the composition

FX pedal – a foot control pedal that controls the turning off/on of live-process manipulation. In *Slipstream*, it is also called the octaver pedal, as it is set to transpose the incoming audio down 12 semitones (one octave).

Hardware- physical electronic device rather than computer software.

Input- first part of the order of recording sound that can be from the microphone, USB cable, or MIDI.

Live-processing – the manipulation of audio signals accomplished during a performance.

Loop – a repeating phrase of recorded music.

Loop channel—independent tracks that audio can be recorded to; referred to as Loop 1, Loop 2, and Loop 3. Each channel has a Play/Overdub pedal and a Stop pedal that control the function of the track.

MIDI- (Musical Instrument Digital Interface) standard connection language for operating and manipulating electronic instruments.

Overdub – recording additional material to an existing loop by recording.

Real-time fft contrapuntal harmonizer— effect that takes incoming audio from the real-time pitch tracker and manipulates the pitch, creating a harmony effect with live-performer's sound.

Real-Time Pitch Tracker— the tracker analyzes the pitch throughout the composition in order.

Sample— a pre-recorded sound of a digital or acoustic instrument that is used in creating sample instruments and in both hardware and software samplers.

Software— computer program that either emulates physical devices or runs specific tasks it has been assigned by a user.

Stop (Pedal) – stops the specified loop channel as defined in the settings of the device. It can be set to stop immediately or stop at the end of the loop. Suggestion is to have it set to stop at the end of the loop.

Track—a layer of music that contains recorded sounds. Could be in reference to an audio track for playback (as in a performance track), one of many tracks in a DAW that are combined to create a final mix, or a track that will have recorded material added to it (as in the loop channels on the Boss RC- 300 used in Maier's *Slipstream*).

Variable Rate Delay— the delay effect happens randomly through a defined section.

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CHAPTER I – Introduction

Purpose

In the twenty-first century there are a growing number of solo trombone works where the accompaniment is not a pianist, nor an instrumental ensemble, but rather some sort of electronic accompaniment such as a tape recording, a computer program or an effects pedal. These types of accompaniments are appearing increasingly in faculty and student recitals, festivals, and workshops such as the American Trombone Workshop and International Trombone Festival. With the rise of these types of works, students and teachers may venture into programming electronic pieces in a recital. These pieces bring additional pedagogical challenges in both preparation and performance.

This paper will provide a pedagogical resource by defining different types of electronic accompaniments (tape, digital, computer, effects pedal), provide a historical and cultural background for each accompaniment innovation, and present sample works in each category for analysis and a performance guide. Brian Sadler's *Soundtrack*, Steven Snowden's *Ground Round*, and Florian Magnus Maier's *Slipstream* were chosen because they are recent additions to the trombone repertoire, and reveal the current state of the literature.¹

Related Literature

The literature for solo trombone and electronic accompaniment is catalogued primarily in three dissertations. Douglas Farewell's *A Catalog of Works for Trombone*

1. Each composition was performed in one my doctoral recitals.

and *Electroacoustic Music* (1990) catalogs over three hundred works for trombone and electroacoustic accompaniment, including solos, duets, trios, and mixed ensembles. Farewell labels the works into three broad categories under electroacoustic accompaniment: works for trombone and tape, works that use live processing, and works that use multimedia such as video, lighting, and other theatrical effects. In Thomas Cox's *Two Analyses and an Annotated List of Works for Solo Trombone with Electroacoustic Accompaniment for Use in The Collegiate Studio* (2011), a survey was sent to college professors to find the most performed trombone and electronic accompaniment works. The results of the survey revealed that Mark Phillips *T-Rex* (1996) was the most performed work, and was followed by Jacob Druckman's *Animus I* (1966/67). None of the twenty-five most performed works were selected for this study because the focus is on recent, lesser-known compositions. In addition to the works Farewell and Cox listed, William Chu's *A Comparative Analysis of Two Seminal Works for Solo Bass Trombone with Electronic Accompaniment* (2016) identified an additional twenty-nine trombone solo works with electronic accompaniment. All but one of the works from Wu's list were composed after the writing of Farewell's dissertation. They were not present in Cox's dissertation because some works were composed after Cox finished his dissertation or they were lesser known works which his survey did not reveal.

There have been some individual trombone and electronic accompaniment works closely examined in four dissertations. Thomas Cox provides an analysis of Larry Austin's *Changes: Open Style* (1966) and Jacob TV's *I Was Like Wow* (2006). William Chu explores Diamante's *Hosanna II* (1972) and Walter Ross's *Prelude, Fugue and Big Apple* (1972), both of which are for bass trombone. Joseph Muñoz provides an analysis

and performance guide for Barry Anderson's *Sound the Tucket Sonance and the Note to Mount* (1984). Finally, Craig Ivany's dissertation (2017) provides an analysis and performance guide for two avant-garde trombone solos, one of which has an electronic accompaniment, Jacob TV's *I Was Like Wow* (2006). The examination of three pieces examined in this document add to current literature by providing a state of trombone and electronic accompaniment and providing examples of different accompaniment options within the genre.

Definitions

There are two main types of electronic accompaniments discussed in this paper, one where the accompaniment is already created and presented in its final form during performance, and one where the accompaniment in some form is created during the live performance. The first, and oldest, is called fixed media which is where a pre-recorded accompaniment receives no external influence from the performer. It was first called tape accompaniment, due to the fixed media being presented on tape for performance. Even though digital has replaced tape, tape accompaniment is still sometimes used as a designation for fixed media accompaniments. The second type is live electronics, which means there is digital sound manipulation of the live sound that becomes the accompaniment.

CHAPTER II – Fixed Media: Brian Sadler’s *Soundtrack*

Fixed Media: Creating the accompaniment

Music studios

Initially, dedicated music studios provided the expensive technology needed to create fixed media accompaniments. These studios provided places to learn about, create, and share different forms of electronic music. When Pierre Schaffer first introduced electronic music in the mid-twentieth century, studios were fundamental for the development of the genre. During this time, and until almost the 21st century, equipment that was needed to produce electronic music was costly. To see how Brian Sadler’s *Soundtrack* demonstrates the current state of fixed media in the trombone repertoire we must see the role of the studio in the recent past.

From the inception of electronic music, the places for learning and experimenting with different types of electronic music were electronic music studios. The two types of electronic music, *musique concrète* and *elektronische Musik*, were developed and further explored in electronic music studios. Those studios continued to be foundational for composers learning their respective styles. Stockhausen, a pioneer electronic music composer learned both styles of electronic music in their respective studios. While working at Pierre Schaffer’s studio in Paris, he explored the *musique concrète* style and composed *Konkrete Etüde* (1952). Then, in 1953 while working at the Cologne studio, he practiced *elektronische Musik* where he composed *Elektronische Studien* in that style. Soon, studios like the ones Stockhausen worked in began appearing in more and more places around the world.

In 1959, the Columbia-Princeton computer music studio was founded by Otto Luening and Vladimir Ussachevsky from Columbia University and Milton Babbitt from Princeton University. They founded the studio with funds from a Rockefeller Foundation Grant which allowed them to purchase an RCA synthesizer, one of their most important pieces of equipment for realizing electronic music. Babbitt used the RCA synthesizer to compose *Vision and Prayer* (1961). Composer Charles Wuorinen used the synthesizer to realize his 1970 Pulitzer prize winning work, *Time's Encomium* (1969). One of the earliest electroacoustic trombone solos, *Animus I* (1966/67), was composed by Jacob Druckman there.²

On the other side of the country, another important studio for electronic music founded in 1961—the San Francisco Tape Music Center (SFTMC). Pauline Oliveros and Ramon Sender created the SFTMC which became a place to experiment with, write, and showcase all kinds of tape-based music, and later avant-garde. Some well-known important electronic pieces were a part of the SFTMC's heritage. Terry Riley's *In C* was first performed here in 1964. A year later, Steve Reich premiered *It's Gonna Rain*, an electronic composition that was created by two tape recorders playing the same recording which phase in and out with each other.

On the trombone side of things, there were some trombonists and composers that were associated with the SFTMC. The first tenor trombone and electroacoustic solo *Changes*:

2. Douglas George Farewell, "A Catalog of Works for Trombone and Electroacoustic Music" (DMA diss., University of Illinois at Urbana-Champaign, 1998), 12.

Open Style (1966) by Larry Austin was composed at this studio.³ Trombonist Stuart Dempster was heavily involved performing at the studio. He premiered Oliveros' *Theatre Piece* in 1965. It featured candles, hose, funnels, and other props, for which the studio also had telephone lines installed at the studio so the performance could be broadcast over the radio. Although much different from the Columbia-Princeton studio, the SFTMC provided unique opportunities and influence for electronic music.

The turning point away from mainly studio composing began in the early 1980s, beginning with equipment becoming less expensive. This change started with Yamaha's introduction of the DX-7 in 1983 which "permanently changed the world of electronic music and democratized access to sound synthesis equipment."⁴ The DX-7 was a synthesizer that could be purchased for a fraction of the cost of other synthesizers and could easily fit in a home. It may not have been for everyone, just as the first computer would not have been, but it started the journey to more affordable equipment. A few decades after the DX-7, those things that once required the use of an electronic music studio now could be accomplished on a personal computer.

Sadler's *Soundtrack* demonstrates just how far the process came from needing a studio for equipment and location to composing the entire work on a personal computer. He used the music notation program Finale in conjunction with GarageBand, a digital

3. Thomas Burns Cox, "Two Analyses and an Annotated List of Works for Solo Trombone with Electroacoustic Accompaniment for Use in the Collegiate Studio" (DMA diss., The University of Georgia, 2011), 13.

4. Margaret Schedel, "Electronic Music and the Studio," in *The Cambridge Companion to Electronic Music* (Cambridge: Cambridge University Press, 2007), 29.

audio workstation (DAW), to notate and record the music.⁵ The finalized audio file is an mp3 that can be played back on any audio player to accompany the trombone solo.

Studios still exist, researching and promoting electronic music, but fixed-media accompaniments can now be created solely at home instead of the studio.

Sounds of the accompaniment

There are a limitless amount of sound possibilities in any fixed-media accompaniment. These sounds can come from real-world recordings or electronically created sounds from synthesizers. One notable thing about the use of sounds is how it is linked to musical style. A seemingly uninteresting sound, like the buzzing of a mouthpiece, can be used as a backdrop to an atonal work just as easy as it can be to a modern, popular music style. A chronological exploration of the sounds and styles from the fixed-media trombone repertoire exhibits how the sounds and style in Sadler's *Soundtrack*, although unique, fit into the genre.

Many of the early electroacoustic trombone pieces were in the ambient and abstract styles.⁶ They used sounds in a way that helped convey those styles. Works like Austin's *Changes: Open Style* (1966) and Druckman's *Animus I* (1966/67) used mainly trombone and electronic sounds. The trombone sounds were manipulated to be almost, or completely, unrecognizable. The same trend continued in the next decade with pieces like Donald Erb's "...and then, toward the end..." (1971) that used a combination of modified

5. Sadler, interview.

6. Cox, 78.

trombone and electronic sounds. Each of these pieces used the sounds in a way that enhanced their ambient and abstract styles.

One way to push the boundaries of sound and style was to use only one sound source and manipulate it many ways while still conveying the correct style. James Mobberley's *Beams!* (1986) entire accompaniment is created with sounds from the trombone. He included mouthpiece sounds, breathing sounds, striking-the-instrument sounds, and traditional pitched sounds.⁷ The composer says about the piece that, "It is a "kind of concerto with the live performer accompanied by a multitude of other trombones."⁸ All of which are combined to help the abstract and atonal nature of the composition.

Closer to the turn of the century, the influence of popular musical styles made their way into fixed-media compositions. Mark Phillips *T-Rex* (1996), one of the more well-known trombone and tape pieces features a heavy funk influence in two of the four movements. Phillips used recorded trombone sounds from six trombonists to create the accompaniment. Jacob TV's *I Was Like Wow* (2006) takes influence from hip-hop.⁹ He uses spoken interview, song excerpt, and electronic sounds to create the accompaniment and the trombone part is often synchronized with the spoken word to emphasize the text.

As with any fixed-media accompaniment, in Sadler's *Soundtrack* the sounds and the style are linked together. With his piece, instead of the sounds being recorded and

7. James Mobberley, "beams! Pages 1-6," jamesmobberleymusic.com, accessed Feb. 19, 2018, <https://jamesmobberleymusic.com/list-of-works-score-samples/beams-pages-1-6/>

8. Ibid.

9. Cox, 42.

manipulated, the sounds are sampled instruments. What makes the use of sampled instruments different from many of the other fixed-media works is that the sounds are recognizable as instruments. Many typical and atypical orchestral instruments are used, including; strings, brass, woodwinds, guitars, taiko drums, and a choir, all of which help portray the desired musical style—the epic orchestral sound heard in film scores of the day.¹⁰

Brian Sadler and *Soundtrack*

Brian Sadler has composed music for film, band, orchestra, chamber, and solo instruments. His numerous band compositions have been played by the Navy bands he is a part of. His tuba concerto was commissioned by the Harrisburg Symphony Orchestra and additionally can be performed as a fixed media soundtrack. *Soundtrack for Trombone and Orchestra* (2017) was a commissioned piece to premiere in a doctoral recital. It has also been performed at the American Trombone Workshop and on various faculty recitals since its publishing.

Brian Sadler had a practical path to pursuing composition, allowing him to compose music in the style and way that he does. His musical training began in fifth grade and his compositional interest began later in high school. After playing in the United States Naval Forces Europe Band and the United States Naval Band Northwest for a few years, he attended Arizona State University to study composition. Because he

10. Brian Sadler, email interview by author, February 2018.

“didn’t like the atonal world they were introducing,” he rejoined the Navy in 2009 and is currently performing with the Navy Band in Naples, Italy. His practical training in composition has come through the experience of always having an ensemble available to play his music: “I learn what works and what doesn’t, and I move on.”¹¹

The concept for *Soundtrack* is different from many of its fixed-media counterparts, or what may be considered traditional electronic accompaniments. It is tonal and melody driven with real orchestra sounds as the accompaniment which is contrast to the avant-garde and abstract sound accompaniments of its predecessors.¹² The style is drawn from influences from film composers such as Steve Jablonsky (Transformers), John Williams (Star Wars, Indiana Jones), and John Debney (Zaruthstra, Iron Man 2).¹³

Analysis

Brian Sadler’s *Soundtrack* is single-movement work that can be divided into three main sections with a cadenza between the first and second (figure 1). Each section is distinguished by clear tempo changes creating a F-S-F for the overall work. There are easily identifiable melodic, rhythmic, and/or harmonic themes influenced by film music enhanced by the fixed-media accompaniment.

11. Ibid.

12. Cox, 5.

13. Sadler, interview.

Structure diagram for *Soundtrack*

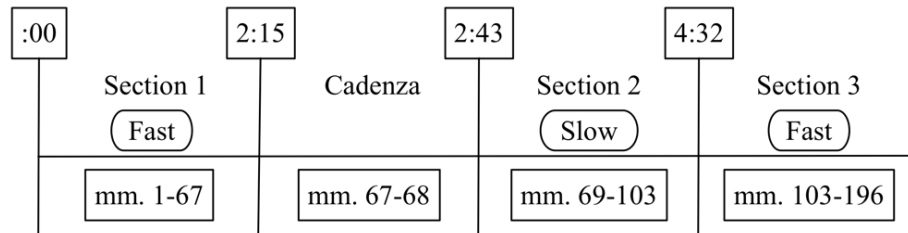


Figure 1 Sadler, *Soundtrack*, formal structure chart

The first section begins with strings and percussion creating the sound of a ticking clock. This rhythmic clock provides a rhythmic motive present throughout the entire first section.

The first introduction of the melodic theme is introduced by the electric guitar at m.11. At last, at m. 20, the solo trombone enters with the previously introduced melody that remains the focus of this section (example 1). This theme features a sixteenth note pattern followed by either an ascending melodic phrase (m.21) or a descending melodic phrase (m.23). That contour continues to play a prominent role in the melodic and harmonic shape for the rest of the section.



Musical Example 1 Sadler, *Soundtrack*: mm.20–23, principal melodic idea

The harmony and melody feature a common film music usage of the Lydian mode (#4). In m. 29, the harmony is G major with the solo melody on a concert C sharp resolving down to a concert B natural. Two measures later, the harmony is an E major with the solo playing B flat resolving down to concert G sharp. In m. 34, it occurs one

more time in this eight-measure phrase with an A major chord. The entire sequence is repeated again harmonically the same the next eight measures, transposed up from Bb minor to Db minor. The jarring use of harmony is a distinct characteristic of film music.¹⁴

One important note about the harmony during mm. 28-44 is the added choir in the following section. As with the addition of the electric guitar, the digital orchestra features untraditional orchestral sounds which sampled instruments make easy to include. The additional instruments help add to the film music style.

The principal melodic idea, from m.20, continues in each subsequent phrase in different variations. For example, at mm. 45–49, the melodic idea is presented in a fragmented form in the solo (example 2) while the orchestra provides the clock sound idea. Section two begins with the cello as the soloist holds out the final note of the cadenza. At a much slower tempo,



Musical Example 2 Sadler, *Soundtrack*: mm.45–49, variation of the theme

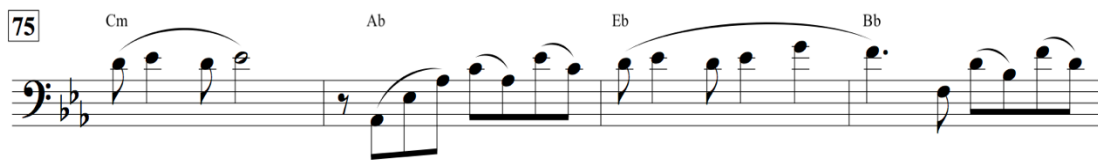
The first section concludes with a sixteenth-note double tonguing passage in the solo which includes the melodic shape, rhythmic motive, and harmonic progression in the single phrase. that ends with a fermata on Bb4. As the soloist sustains the fermata on Bb4, the high register violins fade out, leaving the trombone sounding alone ready to start the cadenza which lasts approximately thirty seconds (example 3).

14. Frank Lehman, *Hollywood Harmony* (New York: Oxford University Press, 2018), 3.



Musical Example 3 Sadler, *Soundtrack*: mm. 67, cadenza

the low string ostinato sets up the thematic chord progression with an eighth-note pattern of Cm-Ab-Eb-Bb/ Cm-Ab-Fm-G (example 4). The soloist enters at m. 74 with the melodic theme of section two as the harmonic pattern continues underneath.



Musical Example 4 Sadler, *Soundtrack*: mm. 75–78, slow theme melody

After a four-measure interlude with taiko drums and full orchestra, the theme occurs a second and final time. This time it is in D minor, with slight embellishments (example 5). Concluding this phrase, the slow section ends in a soft and low tessitura with the trombone and low strings sustaining a d2.



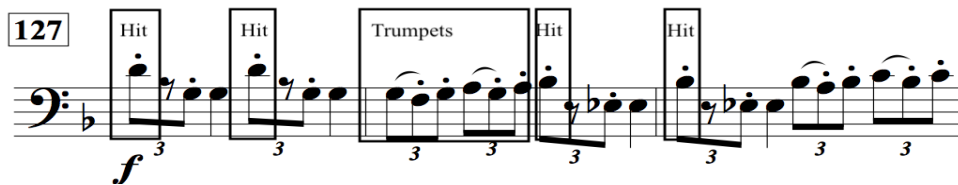
Musical Example 5 Sadler, *Soundtrack*: mm. 91-93, slow theme transposed and embellished

Section three begins with a cello and bass rhythmic ostinato. The low strings are joined by the high strings in m. 109—thickening the texture which allows for the solo to play louder. Over the ostinato pattern, the solo and brass section play together, mixing both live acoustic and digital sounds. (example 6).



Musical Example 6 *Soundtrack*: mm. 102–107; ostinato and brass section

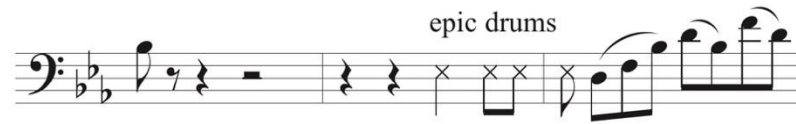
A frantic atonal glissando in the strings from mm.101-102 introduces the faster tempo, quarter equals 140 bpm at m.103. From here until the end, the song is fast and energetic with a triplet thematic idea. The accompaniment provides punctuated full-orchestral hits emphasizing the triplet theme in the solo part. Other instruments join to play brief phrases along with the solo, blending the acoustic and digital sounds (example 7).



Musical Example 7 Sadler, *Soundtrack*: mm. 127–129, orchestral integration

This loud orchestral digital accompaniment is in major contrast to the seven counts of silence that immediately follows. After this silence, epic drums usher in the return of the second theme but in a much quicker tempo (example 8). In this portion, the contrast of silence before the quickened second theme provides a sense of forward

motion that drives the final section. At the end of the second theme's return, the key shifts from C minor to C major.



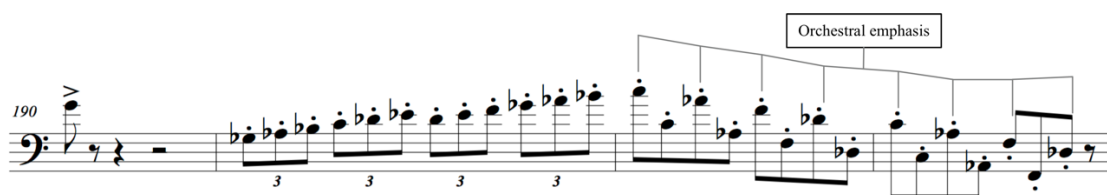
Musical Example 8 Sadler, *Soundtrack*: mm. 158–160, epic drums

The triplet motive of the third section continues at m. 170 to the end with the trombone and various orchestral instruments trading off short phrases (example 9). The triplet motive is presented in both eighth notes and quarter notes providing slight variety in the idea. Throughout this portion, the digital orchestra and trombone solo blend together seamlessly creating a unified sound.



Musical Example 9 Sadler, *Soundtrack*: mm. 170–175, motif exchange

The final phrase includes difficult passages for the trombone as the accompaniment shifts chords every beat from C-D-Gb-C. Following this quick-paced chord shifting, unison orchestral hits on the downbeats of C-Ab-F-Db (example 10) highlight octave jumps in the solo. The orchestra and soloist continue to play in unison in the final measures, reinforcing the triplet idea permeating the third and final section.



Musical Example 10 Sadler, *Soundtrack*: mm. 190–192, orchestral emphasis

Performance Guide

Of the three selected compositions, Sadler’s *Soundtrack* uses the least amount of additional electronic equipment for its performance. The composer provides an mp3 file of the accompaniment which will be played via computer, phone, or any other digital playback device that can send audio to the amplification. Loudspeakers are also needed and should be set up on the stage by the performer if the hall is not already equipped with a speaker system. Many options exist for speakers, but the goal is to have a stereo setup, placing a speaker on both the left and right sides of the stage (figure 2). Additionally, the performer needs a way to monitor the audio which allows hearing the audio directly instead of through the loudspeakers aimed at the audience.

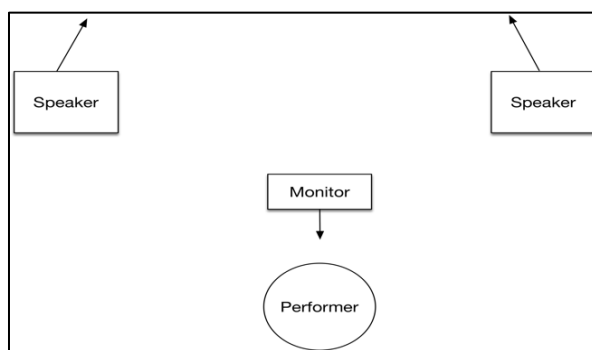


Figure 2 Sadler, *Soundtrack*, stereo speaker setup

One consideration in the set up involves starting the electronic accompaniment. The audio equipment can be run by the performer or by separate audio personnel. However, the sound set up should be tested in a rehearsal prior to performance.

Rehearsal of this piece can be accomplished just as one would rehearse any composition that uses orchestra. The unique advantage with a piece such as Sadler's *Soundtrack* is being able to rehearse with the digital orchestra at any time. The solo part should be reasonably learned before major work with the recording begins. Since the recorded tempo will always be the same, the goal must be to execute the music at written tempos with the recording.

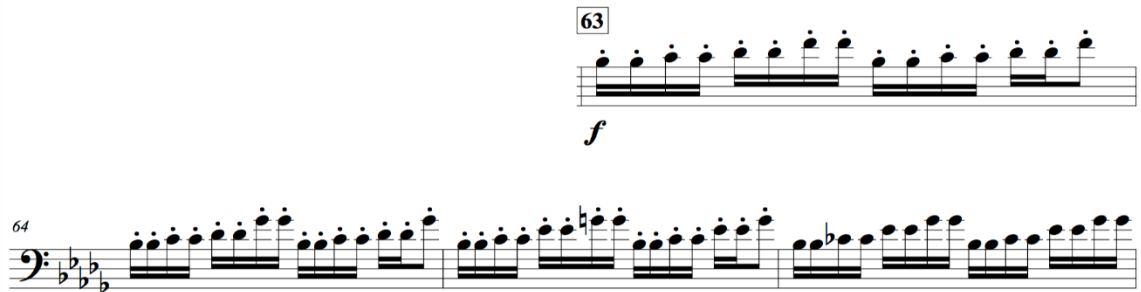
Another important set up consideration is the balance between the performer and the loudspeakers. Elizabeth McNutt says the way loudspeakers are set up “removes the critical links between space, sound source and person that most musicians expect.”¹⁵ Because the speakers often face away from the performer and the monitor is conversely placed facing the performer to hear the track, the balance can sound quite different than the performer may expect. With electronic accompaniment, any adjustment of the sound balance doesn't change once the performance begins. In a typical solo in which other live musicians are involved instead of a recording, the performer and accompanying musicians react and adjust to the sound of the room and each other.¹⁶ A prior run-through with the sound system in the location of the performance is important—not just to have a

15. Elizabeth McNutt, “Performing Electroacoustic Music: A Wider View of Interactivity,” *Organised Sound* 8, no. 03 (December 2003): 298, <https://doi.org/10.1017/S135577180300027X>.

16. *Ibid.*

sense of the acoustics but to check the sound levels and to adjust the performance to balance with the audio.

The next part of the discussion in performance of Sadler's *Soundtrack* involves playing with the accompaniment. One specific area that can be addressed when rehearsing and performing involves tempo alongside the accompaniment. When playing with the accompaniment part, slight variations in tempo that usually happen organically with live players cannot happen. Throughout the work, when the solo and the accompaniment are playing the same rhythms, any tempo variation by the soloist is extremely noticeable. One such spot is the sixteenth-note run before the cadenza in mm. 63-67. When the trombone starts at m.63, there is no accompaniment other than downbeat hits until the trombone is joined with the strings playing the same figure at m. 65 (example 11).



Musical Example 11 Sadler, *Soundtrack*: mm. 63-66, sixteenth notes with orchestra

Another crucial timing spot occurs with the cadenza in m. 67-68. There are thirty seconds of silence in the accompaniment that allow the soloist to take liberties in regard to pacing within the cadenza as he normally would, but the cadenza must be completed within the allotted time.

A second area to address involves lining up the solo and the accompaniment parts. Since the accompaniment may not provide a strong sense of pulse at times, entering accurately can present a challenge. At mm. 121-123, the accompaniment does not provide any sense of beat for two measures, and the trombone begins in a new tempo on the downbeat of m. 123. Rehearsing this section involves knowing the new tempo and keeping accurate count of the beat in the two previous measures. The advantage to learning it in this way is that the recording is the same every time.

Although it requires similar equipment to other performances that use a sound system, Brian Sadler's *Soundtrack for Trombone and Orchestra* is a solid introduction into performing fixed-media accompaniments from trombone repertoire. By identifying difficult areas and specifically working with the given techniques, successful performance with fixed-media accompaniment in this composition can be achieved.

CHAPTER III – Live Electronics with Computer: Steven Snowden’s *Ground Round*

Computers as accompaniments

Steven Snowden’s *Ground Round* (2010) is an entirely different type of electroacoustic solo than Sadler’s *Soundtrack*. Instead of using only a fixed media track, it uses a computer and software during the performance, making it a live electronics accompaniment. New Grove’s defines live electronic music as “sound produced by the performer is modified electronically at the time of production...,” which in this case the trombone sound is modified live on stage by computer software. Before analyzing Snowden’s composition in detail, let’s review the history of this technology.

After the initial exploration of electronic music, the first step towards using computers as accompaniments came through research in digital music synthesis. At Bell Laboratories, Max Matthews developed programs for digital sound synthesis called MUSIC-N (1957-1968).¹⁷ MUSIC-N was a series of computer programs that focused on creating and/or connecting musical devices with the computer; very similar to the electronic studio counterparts. Bell Laboratory also involved other composers and musicians in the program including Milton Babbitt, Vladimir Ussachevsky, James Tenney, Otto Leuning, and Edgard Varèse. Tenney ended up employed at Bell from 1961 to 1964 working on computer music where he composed some important computer music pieces, including *Analog #1: Noise Study* (1961) and *Four Stochastic Studies* (1962). Bell

17. Paul Doornbusch, “Early Hardware and Early Ideas in Computer Music: Their Development and Their Current Forms,” in *The Oxford Handbook of Computer Music* (Oxford: Oxford University Press, 2009), 49

Laboratory was not the only place working on computer audio at that time. Others included CSIRAC in Melbourne, Lejaren Hiller and Leonard Isaacson at the University of Illinois.

Perhaps one of the most influential places in computer music still in existence today is the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris. IRCAM was initially created as a music research institute in 1970 and its focus turned to computer music production and computer music research. Tools for composing computer music were developed at IRCAM, like the 4x digital audio processor, built for Boulez's work *Répons* (1984). Later it became a place that developed software tools for modern computers. One such development was a software program created by Miller S. Puckette called Max/MSP.

Max/MSP is a graphical computer program for routing and manipulating sound. It was first implemented by Puckette at IRCAM in the mid-1980s and was continually developed to include features for manipulating MIDI, audio, and eventually video.¹⁸ Max/MSP has virtual *objects* which can be programmed within the software to interact with each other. A *patch*, or developing environment, holds all of the *objects* together.¹⁹ This means a finalized *patch* could act as the interface for the performer to see and interact with much like any other computer program. Because Max/MSP operates like this way, a composer can create just about any type of interface “leading to a greater

18. Ge Wang, “A History of Programming and Music,” in *The Cambridge Companion to Electronic Music* (Cambridge: Cambridge University Press, 2007), 63.

19. Ibid., 64.

artistic freedom.”²⁰ From its development to its current state, Max/MSP has grown to utilize the power of modern personal computers, continuing to provide fertile ground for exploration into live electronics.

Max/MSP functions as the interpreter between the soloist and the computer. The interpreter has been given a set of instructions for what to tell the computer to do when it hears certain things from the performer. As an example, Max/MSP could be programmed to play a sound based on the temperature outside. As long as there is a way to get information into the Max/MSP program it can do something with it. In the context of *Ground Round*, there are many sets of instructions that were meticulously created to follow along with the performer. One example is, when the trombone plays a certain pitch the software takes that pitch, changes it to another pitch and plays it back simultaneously (an example that will be explored further in context).

The initial information that Max/MSP used was MIDI. Musical Instruments Digital Interface (MIDI) was developed during the 1980s as an extremely important protocol for music and computers. The basic premise of MIDI is to send virtual computer messages that trigger events in a host application.²¹ It was a way for devices to talk to one another without sending actual audio sounds. Since audio data took much longer to send over cables, MIDI provided a fast way to communicate between devices like synthesizers

20. Ivica Ico Bukvic, “RTMix towards a Standardised Interactive Electroacoustic Art Performance Interface,” *Organised Sound* 7, no. 3 (December 2002): 277, <https://doi.org/10.1017/S1355771802003072>.

21. Julio D’Escriván, *Cambridge Introductions to Music Technology* (Cambridge: Cambridge University Press, 2012), 64.

and computers. MIDI remains an important part of computer audio to this day and continues to be used to transmit information on modern equipment.

One of the earliest works in trombone repertoire that uses Max/MSP is Alexandra Gardner's *Snapdragon* (2002). There was at least one prior trombone and computer work by Neil Rolnick, *Wondrous Love* (1979), but many of the earlier works that were live electronics were not necessarily interactive, only to the extent that the electronics didn't change but the performer could make it seem to change.²² Two other available works for trombone and computer are Karlheinz Essl's *Sequitur X* (2010) and Guy Barash *Talkback VI* (2016). As computers continue to become faster and more powerful, the potential for their use as an accompaniment expands.

Steven Snowden and *Ground Round*

Steven Snowden's concept for this composition developed toward the latter part of his academic studies. A few years after Snowden learned to read music, he began studies at Arizona State University in music education, but later changed his major to composition. During his time at ASU, he wrote his first composition for horn and piano. He continued his graduate work at the University of Texas at Austin, receiving both his master's and doctoral degree in composition. While at the University of Texas, Snowden composed *Ground Round for Trombone and Electronics* for trombonist Steve Parker.²³

22. William Chu, "A Comparative Analysis of Two Seminal Works for Solo Bass Trombone with Electronic Accompaniment" (DMA diss., University of Kansas, 2016) 5.

23. Steven Snowden, phone interview by author, February 2018.

The narrative for this piece provides the listener with an imaginative story to follow. The program notes of the score explain that the piece represents a cattle auction from a cow's perspective which creates a scenario for Snowden's *Ground Round* to be a funny, yet serious, composition that is well-suited for the trombone.²⁴ The electronic accompaniment includes sounds of a cow, an auctioneer, and other various sounds heard during an auction. Steven Snowden explains about the background of his composition, "I couldn't help but think of how strange the auction process must be for the cows themselves. Ultimately, this dictated the form of the piece."²⁵

The computer acts as the accompaniment with both fixed-media and live-processing aspects. The fixed-media portion uses manipulated electronic sounds, sound effects, and a cattle auctioneer voice. All of these sounds were mixed into one audio file and incorporated into the live-processing. For the live-processing portion, Snowden programed a patch in Max/MSP, which controls all of the electronic aspects of the piece.²⁶ Max/MSP interprets incoming audio signals and uses them to control the live-instrument processing.²⁷ For example, in this composition the trombone audio signal is sent to Max/MSP which manipulates the sound by adding reverb, delay, pitch shifting, or any other number of audio adjustments. The Max/MSP patch Snowden created for

24. Ibid.

25. Steven Snowden, *Ground Round for Trombone and Electronics* (Talking Rocks Press, 2010).

26. Snowden, interview.

27. Ibid.

Ground Round also has controls for each effect that is used and referenced during live performance.

The live-processing approach to technology in Snowden's *Ground Round* allows for more interactivity with the electronic accompaniment part. According to Simon Emmerson, interactivity in music means people and computers are acting as "both sources and causes of actions by the other."²⁸ The Max/MSP patch in *Ground Round* listens and adjusts the audio of the trombonist, who then reacts to the sounds of the accompaniment. It is only with modern computer technology that the live processing through software becomes possible.

Analysis

Live-processing techniques can be used to divide Snowden's *Ground Round* into three sections (fig. 3). The main effects that define the form of the piece are the variable rate delay, fixed-rate delay, and the harmonizer. Additionally, other techniques are utilized throughout the piece which includes reverb, amplitude envelope follower, and a real-time pitch tracker. While the performer needs to be aware of each of these effects, the most important knowledge is how they influence the piece.²⁹

28. Simon Emmerson, "Combining the Acoustic and the Digital," in *The Oxford Handbook of Computer Music* (Oxford: Oxford University Press, 2009), 179.

29. McNutt, 298.

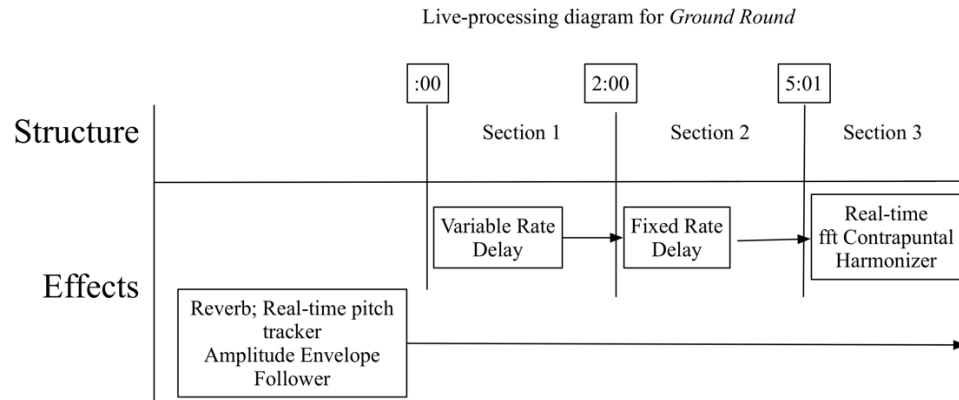
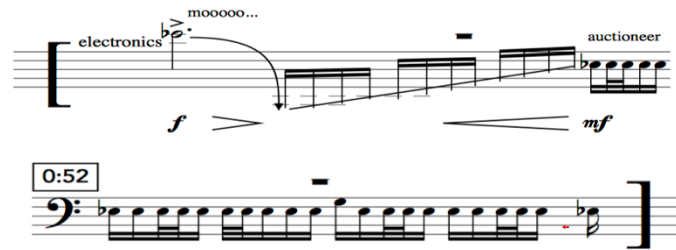


Figure 3 Snowden, *Ground Round*, formal structure with live-processing effects

The first section is highly improvisational with the fixed-media portion driven by the cattle auctioneer. The solo part in section one was derived from improvised performances and leaves the interpretation open to the trombonist.³⁰ Using a plunger mute during a glissando and slightly changing the pitch creates a cow-like sound that goes along with the narrative. As it continues through the first two minutes, the soloist becomes more agitated, even performing “exaggerated tonguing sounds.”³¹ The notation of the computer part gives only a slight indication about what is sounding in the fixed media, highlighting the improvisational nature (example 12). Other sound effects in the fixed-media audio that can be heard are cows mooing, cow bells, and a truck door opening.

30. Snowden, interview.

31. Snowden, *Ground Round*.



Musical Example 12 Snowden, *Ground Round*: 0:52, computer line cue

The live-processing portion in section one features mainly the variable-rate delay which provides randomly repeating pitches and sounds of the trombone. By randomly repeating these sounds and notes the delay helps add to the improvisational nature of the section. The other effect that helps highlight the delay is the envelope follower which follows the dynamics of the trombonist and adjusts the fixed-media audio to be the same dynamic as the soloist. This allows the sound of the auctioneer to mimic the dynamics of the trombone during the performance (example 13).



Musical Example 13 Snowden, *Ground Round*: 0:58, envelope follower effect

The second section features a fixed-rate delay and begins at 1:58 with the sound of a gavel on beat three of m. 60. The gavel's two eighth notes contribute to the narrative and establish the tempo for the performer (example 14). Beginning at m. 61, the trombone solo has sixteenth notes that are processed with the fixed-rate delay. This delay effect creates an echo in the solo line with each note of the trombone being repeated three times, each a little softer than the previous. The delay is not easily discernable to the ear

because the effect blends with the live trombone, creating the sound of numerous trombones not just one.

Musical Example 14 is a musical score snippet. It begins with a tempo marking of $\text{♩} = 120$. The score is written on a single staff in bass clef. It starts with a measure containing a whole note G2, marked with a *p* dynamic. This is followed by a measure with a whole note A2, marked with a *mp* dynamic. A bracket connects these two measures. The next measure contains a whole note B2, marked with a *pp* dynamic. This is followed by a measure with a whole note C3, marked with a *f* dynamic. A bracket connects these two measures. The next measure contains a whole note D3, marked with a *mf* dynamic. This is followed by a measure with a whole note E3, marked with a *pp* dynamic. A bracket connects these two measures. The next measure contains a whole note F3, marked with a *mf* dynamic. This is followed by a measure with a whole note G3, marked with a *f* dynamic. A bracket connects these two measures. The next measure contains a whole note A3, marked with a *mf* dynamic. This is followed by a measure with a whole note B3, marked with a *pp* dynamic. A bracket connects these two measures. The score ends with a measure containing a whole note C4, marked with a *pp* dynamic. Above the staff, there is a 'Gavel' sound icon. The text 'strictly in tempo' is written above the staff. The measure numbers 59 and 60 are indicated at the beginning of the first and second measures, respectively.

Musical Example 14 Snowden, *Ground Round*: mm. 60–61, fixed rate delay

The fixed-delay also adds a large number of textural sounds and dissonances to the trombone part. Many long glissandi within the trombone part create an audible dissonance with the live trombone when heard with the delay (example 15). In this section, the computer part is displayed on the score starting in m. 74. The computer audio is the bass line of the re-pitched auctioneer audio from section one notated below the solo part, which provides a listening cue for the performer throughout this particularly texturally dense section.

Musical Example 15 is a musical score snippet. It consists of two staves. The top staff is in bass clef and contains a series of notes: G2, A2, B2, C3, D3, E3, F3, G3, A3, B3, C4. The notes are connected by a long horizontal line, indicating a glissando. The dynamics are marked as *f* and *ff*. The bottom staff is labeled 'Elec.' and contains a series of notes: G2, A2, B2, C3, D3, E3, F3, G3, A3, B3, C4. The notes are connected by a long horizontal line, indicating a glissando. The dynamics are marked as *ppp* and *mf*. The measure numbers 74 and 75 are indicated at the beginning of the first and second measures, respectively.

Musical Example 15 Snowden, *Ground Round*: mm. 74–77, bass line and glissandos

Rounding out the work is the cattle auctioneer chorale of the final section using the harmonizer effect. The harmonizer effect is automatically initiated by the Max/MSP patch around 5:00. This effect takes the pitch of the trombone and plays it back instantaneously into three other pitches, creating a four-part chorale. Each of the three

pitches are notated below the solo line along with a number that is displayed in the Max/MSP patch (example 16).³²

The image shows a musical score for two parts. The top part is a bass line in bass clef, with notes numbered 25 through 37. The notes are: 25 (F2), 26 (F2), 27 (G2), 28 (A2), 29 (B2), 30 (C3), 31 (D3), 32 (E3), 33 (F3), 34 (G3), 35 (A3), 36 (B3), 37 (C4). The notes are grouped into two phrases, each marked with a dynamic: *mf* for the first phrase (measures 25-31) and *mp* for the second phrase (measures 32-37). The bottom part is an electric guitar line, labeled 'Elec.', in treble clef, starting at measure 140. It consists of a series of chords and single notes, primarily in the lower register.

Musical Example 16 Snowden, *Ground Round*: mm. 140–145, fft contrapuntal harmonizer

Many effects are utilized throughout the composition and help define the overall form of the piece. Although the performer is not responsible for activating any of the live-processing effects, an understanding of them helps to interpret the music. Knowing the narrative and how it defines each section with all of the live-processing effects can also help the performer have a deeper understanding of this composition.

Performance Guide

Ground Round requires equipment beyond standard amplification and speakers because of its computer requirement to run the Max/MSP patch. The performer will need a computer, Max/MSP software, a microphone, and the necessary cables to connect them. The composer provides a detailed list of materials in the score to help ensure the performer has everything needed. If an analog microphone is being used, an audio interface may be needed. An audio interface converts analog signals to digital signals

32. Snowden, interview.

without overloading the computer. However, a USB microphone can connect directly into the computer, bypassing the need for the audio interface. The equipment set up is as follows: input from the microphone to the computer, mixing and storage via live-processing achieved through Max/MSP, and output through amplification (figure 4).

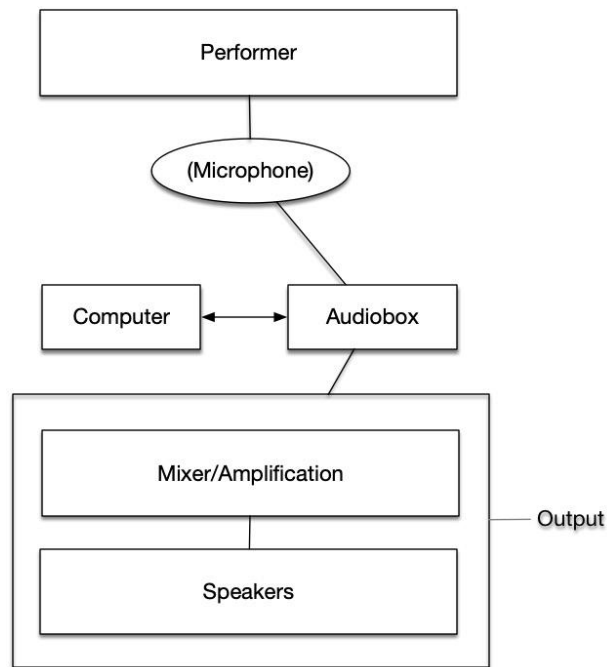


Figure 4 Snowden, Ground Round, equipment setup for the performer

When setting up the audio equipment, the microphone must be placed carefully in relation to the speakers. By making sure the speakers do not send the sound directly to the microphone, feedback of the audio can be better avoided. Avoiding feedback is extremely crucial in the chorale, which depends on accurate pitch recognition. If the speakers are behind the performer, there is a good chance that audio will hinder recognition of the correct pitch through the microphone. The same problem could happen if the speakers are too close to the microphone. The performer can move the microphone closer to the trombone bell and play a little softer to balance the speaker and live sound

better.³³ Exploring the prime placement and different optional placements can help make the performance run smoother.

In regard to the location of the computer, the screen needs to be visible to the performer throughout the piece. Setting the computer on a table allows for plenty of room to hold additional cables and the audio interface. Always double-check all connections especially when using more equipment and cables. Once all of the equipment is connected, the performer should open the Max/MSP patch on the computer. Doing so during set-up makes sure both the program and the computer recognize the audio equipment and prevents any problems that may occur with those connections. Once the program is opened, the levels can be adjusted as needed and monitored within the patch itself by the performer. After this set up, the equipment is ready for rehearsal. In addition to the physical set-up, the Max/MSP patch labels must be clearly understood (figure 5).

33. Steve Parker, phone interview by author, June 2018.

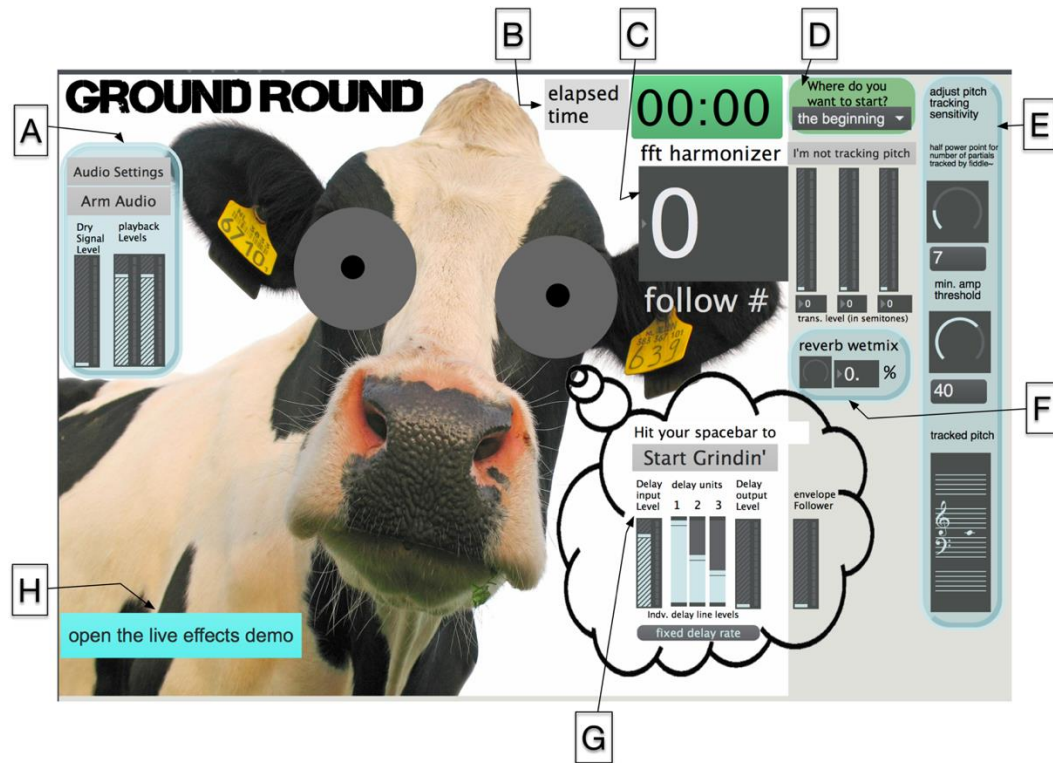


Figure 5 Snowden, *Ground Round*, performer's perspective of the Max/MSP patch

The first part of the patch to become familiar with is the settings (A). These settings direct the audio signal path within the Max patch. The “Dry Signal Level” slider allows the input microphone level (volume) to be adjusted to the correct volume before beginning. If the slider is all of the way down, the microphone signal will not be available for the patch to process. “Playback Levels” should be set to allow the volume to be heard clearly. If no sound can be heard during rehearsal, the sliders should be checked and adjusted.

The second part of the patch provides the time (B). This element is especially helpful in the first two pages which have timing suggestions provided on the score. The third element (C) displays the pitch numbers. These numbers will be shown in the chorale section. Once a note is played, the computer interprets and tracks the pitch with the

corresponding number from the score showing up in this location. The next section (D) allows the performer to quickly choose certain places to rehearse (figure 6). This menu allows for easy access to most of the piece, rather than having to start rehearsal from the beginning every time.

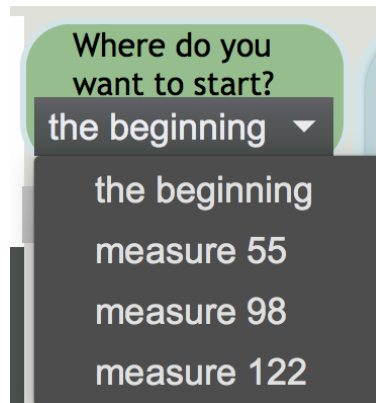


Figure 6 Snowden, Ground Round, Max patch drop down menu

The next section provides more granular control of pitch sensitivity (E). The knobs allow adjustment in how many trombone partials the computer listens for. If the computer does not consistently recognize pitches, these knobs can be adjusted up or down until pitch recognition is consistent and accurate. The music staff below the knobs provides visual representation of the pitch the patch is hearing. The reverb control (F) allows adjustment for the amount of reverb applied to the output of the sound. Below the reverb control, sliders (G) adjust the sound levels of the individual fixed-rate delays. More than likely, the performer does not need to adjust these, but they are available if desired. The envelope follower (G) is automated and is in use during playback of the fixed-media portion during the first two pages of the score. This section also includes the button to start the entire accompaniment. It can be enabled by clicking or pressing the space bar once the trombonist is ready to begin. The live effects demo (H) displays on/off

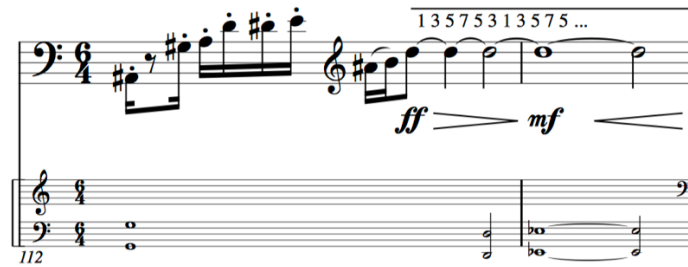
buttons for the various effects within the patch (see performance analysis). These effects can then be tested out by the performer to check levels and hear each sound effect.

Rehearsing the music away from the computer will help one become comfortable when the patch is added. One particularly difficult place that combines live-processing and the fixed-media accompaniment is in the second section in mm. 98–99 that features a phrase which covers multiple octaves very quickly (example 17). The phrase is also being processed with the fixed-rate delay effect repeating each note multiple times. The electronic part's cue is notated below and is roughly emphasizing the sixteenth-note pattern, although in context it is not as easily heard.

Musical Example 17 Snowden, *Ground Round*: mm. 98–99, fixed-rate delay

Another similar place to carefully rehearse occurs right before the transition to the chorale. This spot features an extended technique called a timbral trill (example 18). The performance notes state to “rapidly move slide from 1st to 7th position while playing (ref. Berio Sequenza V).”³⁴

34. Snowden, *Ground Round*.



Musical Example 18 Snowden, *Ground Round*: mm. 112–113, timbral trill

This extended notation is one of just a few throughout the piece. Each is clearly explained in the key (figure 7). Some of the notated techniques include air tongue, pitch approximation, rapid wiggle of the slide, and doodle tonguing.

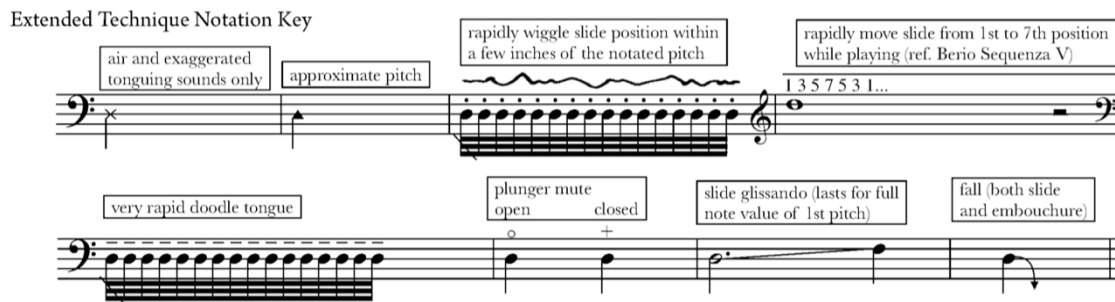


Figure 7 Snowden, *Ground Round*, notation key.

After spending time with each facet of this composition—the computer software and the actual solo—the rehearsal and performance of the piece becomes more manageable. Even practicing the equipment set up is helpful. Snowden's *Ground Round for Trombone and Electronics* is a good introduction to performing with technology through live-processing with computer software.

CHAPTER IV –Live Electronics with looping: Maier’s *Slipstream*

From Tape to Stage

Florian Magnus Maier’s *Slipstream for Trombone and Loop station* is a live electronics solo with a slightly different angle than the previous piece. Maier’s *Slipstream* uses an effects pedal (loop station) for live audio processing and looping techniques. Looping is defined, at its basic level, as a short section of music that is recorded and then plays back repeatedly.³⁵ Maier’s *Slipstream* is a live looping solo because the looping process occurs during performance by the performer using a loop station (loop pedal). It is typically on the floor and controlled by the performer’s foot, allowing for easy control while playing. Live looping is a performance style whose development started back with analog tape and electronic music and made its way into mainstream popular music before entering the concert music repertoire with *Slipstream*.

As an extension of tape music, composers at the San Francisco Tape Music Center began to experiment with tape delay techniques. In late 1961, Terry Riley had the idea to create a piece of tape music different from what had been done before. With the help of Ramon, Riley used an “Echoplex, a primitive electronic contraption allowing a sound to be repeated in an ever-accumulating counterpoint against itself,” to create *Mescaline Mix*.³⁶ Riley expanded tape music to something new and quite different. By using the

35. Michael Peters, “The Birth of a Loop,” livelooing.org, last modified 2015, accessed March 28, 2018, http://www.livelooing.org/history_concepts/theory/the-birth-of-loop/

36. Keith Potter, *Four Musical Minimalists: La Monte Young, Terry Riley, Steve Reich, Philip Glass*, 1st pub. ed. with minor revisions, Music in the Twentieth Century (Cambridge: Cambridge University Press, 2002) 99.

Echoplex in that manner, he could change the frequencies and distort the sound of the tape by changing the speed.³⁷

A few years later, when Riley was in Paris in 1963, he took the concept of the echoplex even further. Riley described the technique he used for *Mescaline Mix* to a French technician who then set up a similar system with an Ampex tape machine, with Riley calling it his “Time-Lag-Accumulator.”³⁸ Riley was still using the device to create tape music by looping sounds and used it to compose *She Moves She* in 1962-63 which was part of the music he used in *The Gift*.³⁹ Riley first used his set up for live performing with improvisation in 1964, calling it “Solo Time-Lag Music.”⁴⁰

The work that Riley did influenced other composers and they began to use and experiment with his techniques. Pauline Oliveros devoted most of her time after 1960 to tape-delay composition.⁴¹ Steve Reich was a friend of Riley’s and began writing music based on the tape delay system, even premiering his first piece using tape phasing at the S.F. Tape music Center, *It’s Gonna Rain*. Riley’s work with the time-lag accumulator directly influenced Reich’s composition.⁴² Though these composers did not take Riley’s

37. Ibid.

38. Ibid., 105

39. Ibid.

40. Ibid., 12.

41. Ibid., 16.

42. Ibid., 165

technique of using “looping” further, their work was part of the lasting influence on the genre.

One musician who took Riley’s concept of looping live even further was guitarist Robert Fripp, who set up his own system for performing. He used the tape delay like Riley, but he added other guitar effects and called it “Frippertronics.”⁴³ It was Robert Fripp’s “concert appearances [that] increased the public’s awareness of the use of tape delay as a performance and compositional device.”⁴⁴ Fripp’s purposeful use of live looping would help the genre continue to develop, inspiring continued innovations for its continued use.

After the concept of looping became more and more popular, manufacturers created dedicated tools for performers. At first the tools were analog but in 1992 the first digital looping tool became available, ushering in a new way for musicians to utilize looping.⁴⁵ Digital music affected looping tools, just as it did in other areas of electronic music. Companies like Boss, DigiTech, and Pigtronix continually developed new looping tools. All of these tools now allow for the same delay manipulation to happen much faster, with more control, and with emulation of the original tape loops. Michael Peters suggests that with looping “there are now many additional kinds of musical aesthetics and styles that can be produced by live looping, and more keep getting invented.”⁴⁶ Thanks to tools

43. Geoff Smith, “The music of Brian Eno and Robert Fripp” liveloooping.org, accessed June 1, 2019, <http://liveloooping.org/researchpapers/geoffsmith/index.htm>, 28.

44. Ibid.

45. Peters, the birth of a loop.

46. Ibid.

continually being developed, live looping continues to be explored by composers and performers.

Looping eventually made its way into the trombone repertoire. One trombonist who brought looping into forefront is Christopher Bill. Bill uses looping techniques to improvise, cover popular songs, and compose original music. His cover of Pharrell William's song *Happy* went viral and at the time of writing had 4.7 million views on YouTube. After that success, Bill continued to present live looping demonstrations, produce looping videos, and even use looping on his own album.

Looping in the trombone repertoire is a fairly new adventure. *Slipstream* is the first published, or perhaps the first well-known published piece, for trombone and loop station. Since its publishing, there have been a few others live looping pieces that followed. Jeremy Wilson began to perform *Slipstream* in concerts and recitals. He really wanted to continue to explore the possibilities of the loop station by being a major promoter of the work.⁴⁷ Wilson has commissioned a new work for trombone and loop station, *Loop-D-Loop* (2018), by James Stephenson for his first album. John Sipher, principal trombonist of the Colorado Symphony has composed and performed works for trombone and loop station. His *Changes for Trombone and Loop pedal* (2017) and *Recollections for Trombone and Loop pedal* (2019) are two additional works that can be added to the growing list of repertoire. Live looping is a new frontier being explored in trombone repertoire and *Slipstream* is at the forefront.

47. Jeremy Wilson, phone interview by author, June 2018.

Florian Magnus Maier and *Slipstream*

Danish composer Florian Magnus Maier's involvement in numerous genres of music contributes to the uniqueness of *Slipstream for Trombone and Loop Station*. Maier originally planned to study flamenco guitar at the Conservatory of Rotterdam but ended up switching focus and graduating in 2001 with a degree in music composition. In addition to composing, he performs in numerous rock bands and various chamber ensembles. His view of composing is that "the best way to learn is always doing something a lot."⁴⁸ But the idea to introduce live looping into the trombone repertoire came from another source. Jörgen Van Rijen, Principal Trombone of the Royal Concertgebouw, had the idea to use a loop station with trombone and commissioned Maier to compose a piece for that combination.⁴⁹

Analysis

An analysis of Maier's *Slipstream* is different because, with live-looping, the composition is not presented in a harmonically completed form. The harmonic texture is created from the playing of monophonic phrases. When the loop plays back a recorded phrase as another is performed, the basis of the harmonic texture is created. Because of this unique situation, the analysis of Maier's composition will progress from the player's perspective, beginning to end, highlighting how live looping creates the accompaniment.

48. Florian Magnus Maier, email interview by author.

49. Ibid.

Maier's *Slipstream* can be divided into three different sections each featuring the trombone building the rhythm, harmony, and bass lines as the accompaniment to the solos. Each of the three sections do not have distinct starting or stopping points, but they can be defined with different timbre, texture, and looping techniques (figure 8). *Slipstream* sustains the audience's interest with the slightly different texture/timbre highlighted in both the looping and solo material.⁵⁰

Structure diagram for *Slipstream*

Section 1	Section 2	Section 3
mm. 1-177	mm. 178-330	mm. 331-450
Strict Time	Loose Time	Strict Time
Rhythm and Bass Line	Ambient Texture	Melodic & Textural Rhythms

Figure 8 Maier, *Slipstream*, formal structure.

To understand how looping plays a crucial role, a visual representation of the texture created through each loop track is shown in the following diagram (figure 9). In this diagram, grayed areas represent material that is sounding, with either an *R* (record loop), *O* (overdub loop), or *play* (playing the already recording material without recording). Any white areas indicate that music is not playing on that specific loop track.

50. Wilson, interview.

Slipstream Loop Pedal Analysis

Slipstream Section 1

Measure	2-21		22-33		34-41		42-65		66-73		74-81		82-89		90-104		105		106-129		130		134-137		138-141		142-149		150-153		154-177		177				
Free Play																		Solo 1						Solo 2										Solo 3			
Loop 1 (8 Measures)			R- Harmony		O- Harmony		Play		O- Harmony		Play										O- Harmony (3X)		Stop														
Loop 2 (4 Measures)	R- Rhythm & Bass		Play																				R- "Clave" Rhythm								Stop						
Loop 3 (Free)									R- Rhythmic Harmony		O- Rhythmic Harmony		Play		Sop								Play		O-Bass Line Fx		Play										

Slipstream Section 2

Measure	178		182-186		187		191		193-207		208-216		217-225		226-234		235-238		239-242		243-...		(251)		...-265		266-269		271		275-...		(277)		...-300		301-304		305-308		309-312		313-316		317-...		(329)		...-330	
Free Play								Interlude														Solo 4										Interlude								Interlude										
Loop 1 (8 Measures)	Play																																																	
Loop 2 (4 Measures)							Erase								R- Rhythmic Harmony (Quartet- Triplets)		O- Rhythmic Harmony		Play										Erase				R- Textural Harmony		O- Textural Harmony		O- Textural Harmony		O- Textural Harmony		Play									
Loop 3 (Free)	... Continued		Stop		Erase				R- Texture		O- Texture		O- Texture		Play						Erase		R-Single Measure Harmoni c Texture (X4)		Play														Erase											

Slipstream Section 3

Measure	331-332		333-334		335-...		(348)		...-354		355-358		359-362		363-366		363		367-370		371-378		379-386		387-389		390		391		392-394		395-...		(410)		...-402		403-410		411-415		416		417		418		419-431		432		433		436-447		448-449		450	
Free Play					Solo 5												Transition																																Solo 6				Ending Run							
Loop 1 (8 Measures)																			R- Harmonic Rhythm (Wah-Wah Mute)		O- Harmonic Rhythm (Wah-Wah Mute)		Play										O-Bass Line (Fx)				O-Bass Line (No Fx)		Play								Stop													
Loop 2 (4 Measures)	...Continued				Erase				R- Harmony		O- Harmony		O- Harmony		Play																																Stop													
Loop 3 (Free)	R- Melodic Rhythm		O- Melodic Rhythm		Play								Erase						R-Single Measure Harmonic Rhythm		O-Single Measure Harmonic Rhythm		Play				Erase								R-Single Measure Harmoni c Rhythm		O-Single Measure Harmoni c Rhythm		Play						O-Single Bar Dub (X12)		Play		Stop Exactly With Solo											

Figure 9 Maier, Slipstream, analysis chart.

Section one begins with the initial creation of a rhythm and bass line on **Loop 2** (figure 10). The process begins with the recording of a rhythm line with the player blowing air through an inverted mouthpiece on the trombone. A single four-measure phrase is recorded and then overdubbed with another four-measure phrase. Immediately, the mouthpiece is changed to its correct placement and a rhythmic tongue-slap is added to the previous two recordings. A four-measure rest in the solo, which is one play-through of the loop, allows the performer to activate the Loop FX pedal to record the bass line during the next loop pass. All five recordings are recorded on **Loop 2**.

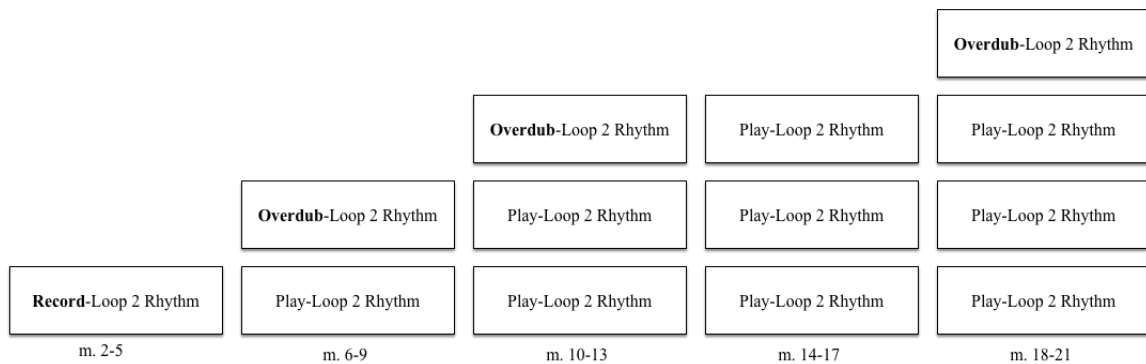


Figure 10 Maier, Slipstream, four measure loop process.

After the first solo in mm. 42-65, a new phrase is recorded on **Loop 3** which adds to the rhythmic feel of section one. This track is set to *free*, because the loop does not contain a predefined number of measures. The number of looped measures is defined when the first initial recording stops, which is eight measures at this point. **Loop 3** also introduces a harmony to the phrase by overdubbing a second layer in harmony with itself (example 19).



Musical Example 19 Maier, *Slipstream*: mm. 74–86, combined Loop 3

At the end of Solo 2 in m.106, the first section slowly moves away from the strict rhythmic feel when Loop 3 stops, and the recording of Loop 1 begins. When the sustained notes change every one-and-a-half measures (six beats) instead of every measure (four beats), the strict sense of pulse gradually fades. To enhance the texture, Loop 1 is overdubbed two more times creating additional harmonies out of the same rhythm and giving the listener more time to lose the sense of strict pulse from the previous section.

Even though the texture begins to change, the rhythmic pattern does not suddenly move away from the first section’s overall style. The percussive rhythm continues by overdubbing a clave sound on Loop 2 in mm. 134-137, which is indicated by the composer instructing the performer to, “Tap a ring against instrument bell.”⁵¹ The third solo enters at m. 154 and is rhythmically slower than the previous two solos. The final eight measures of the solo are in harmony with Loop 3. At the end of m. 177, Loop 2 stops at the same time the solo finishes, marking the end of the first section.

51. Florian Magnus Maier, *Slipstream for Trombone and Loop Station* (Florian Magnus Maier, 2012), 7.

A more ambient and atmospheric texture permeates the second section. A loose sense of time is gradually introduced by recording sixteen measures on **Loop 1** while also erasing the other two loops. Once the two loops are erased, the texture is much more atmospheric, and the sense of time is all but gone. Erasing two loops while the soloist continues playing allows for fresh material to be recorded later without entirely stopping the music.

The first recording of the second section is on **Loop 3** and since the track was just erased, it will be nine measures rather than eight. The ambient and atmospheric texture is further established by adding high register glissandos (example 20). Playing the nine-measure phrase against the eight-measure phrase of **Loop 1** adds to the loose time feel through metrical ambiguity. In keeping with this ambiguity, the first solo featured during this section (solo 4) avoids the strict beat by having quarter-note triplets that are often tied over the bar lines.

The musical notation shows a single staff with a treble clef and a key signature of one sharp (F#). The melody consists of a series of quarter notes and eighth notes, with some notes tied across bar lines. The dynamics are marked as *p* (piano) and *mp* (mezzo-piano). The measure numbers 210 and 211 are indicated at the beginning and end of the phrase.

Musical Example 20 Maier, *Slipstream*: mm. 210, **Loop 2** high register glissando

In the second section, a sense of timelessness is created by creating a looping chord with no definite beginning or end. At the conclusion of Solo 4 at m. 265, **Loop 3** records a single-measure phrase and overdubs three additional measures with different notes, creating a continuously sustained chord, E-F-A-E. With this single-measure loop,

the trombone plays sustained melodic material over this newly-created chord in mm. 275-300. While **Loop 3** and the melody play, the soloist erases the other two loops. A similar chord building technique happens with **Loop 2** at mm. 301-316, but with an additional textural element (example 21). The chordal texture created through this process includes the notes A-Bb-D-A.

The image shows a musical score for a section starting at measure 301. The top staff is a bass clef with a sustained melodic line. Above the staff, there is a large, dark, textured area representing a sustained sound, with a large arrow pointing right. Below the staff, there is a section labeled 'p ~ mp' (piano to mezzo-piano) and '(gentle internal texture ad lib. within a sustained legato note)'. This section is marked '2 L rec' (2-measure loop recorded) and '301'. The bottom staff shows a '2 L dub' (2-measure loop dub) section, also marked '301'. The notation includes various musical symbols like notes, rests, and dynamic markings.

Musical Example 21 Maier, *Slipstream*: mm. 301–305, texture building

As **Loop 2** and **Loop 3** play together, a sustained textural sound continually loops with the pitches E-F-A-Bb-D. Even though one loop is only a single measure and the other is four measures, they sound like one continuously held note. One final melodic line is played to close out section two. As the soloist holds out the last note of the phrase, **Loop 3** is erased.

The third and final section has a texture that is a combination of both the rhythmic first section and ambient second section. This texture begins with a two-measure loop recorded on **Loop 3** one measure after it was erased. The recorded loop is a melodically driven, rhythmic line that defines the section's sound. One aspect that is different from the first section is the absence of the driving percussive rhythm created at the beginning of the piece. Other differences include variations in texture/timbre combinations, a

section with a Harmon mute on **Loop 1**, and more use of the FX pedal to record an extended bass line melody.

As a culmination for the last section and the entire composition, Solo 6 continually builds in texture and volume until the end. At the end of the solo, the trombonist plays a sixteenth-note pattern that alternates between two half steps. **Loop 3** begins with overdubbing the solo pattern by recording every measure which continually adds to the loop. With the texture and sound building in intensity, the constant recording culminates in a two octave E-E5, flutter-tongued run upward. The ending of **Loop 3** and the last note on the high E5 in the solo are meant to occur at the exact same time by accurately pressing the loop stop pedal (example 22). This dramatic stop concludes the piece.

The image shows a musical score for Solo 6, measures 447-450. The top staff is a bass line with a flutter-tongued run upward, culminating in a two-octave E-E5. The score includes dynamic markings (f, ff) and performance instructions (3 L play, 3 R stop (Loop stops here)).

Musical Example 22 Maier, *Slipstream*: mm. 448–450, flutter tongue to loop stop

An analysis of Maier's *Slipstream* highlights the use of electronic technology through live-processing with external hardware. Live-looping and a demanding trombone part provide for an accompaniment that is created entirely in the moment on stage with a single performer. Electronic technology builds harmonies through continual recording or overdubbing, allowing the soloist to create a unique performance.

Performance Guide

The accompaniment is completely controlled by the performer. The equipment set up is as follows: input from the microphone, mixing and storage on external hardware, and output to the loud speakers (figure 11). A loop station, specifically the Boss RC-300, functions as the external hardware equipment. The trombone audio signal is recorded, looped, played back, and manipulated with audio effects. All signals can be stored in the loop station for looping or can be manipulated and played without storing the sound. The final output comes from the loop station to the amplification and monitor.

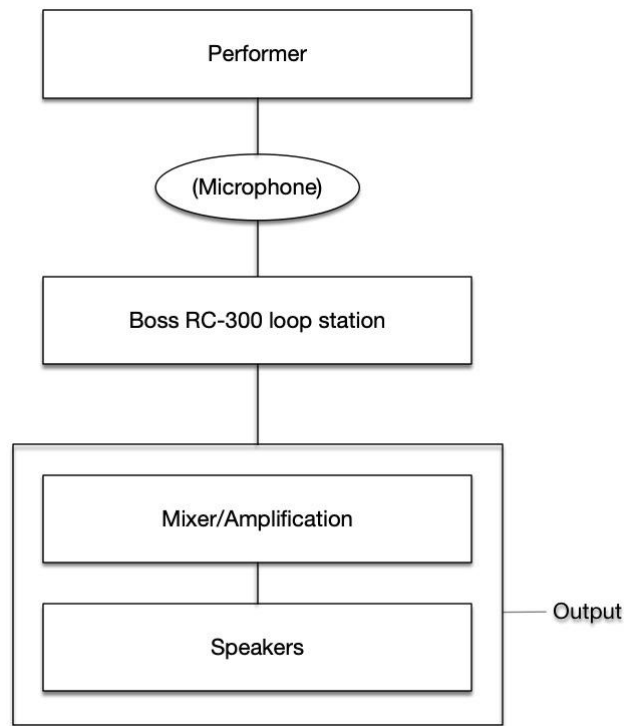


Figure 11 Maier, Slipstream, equipment use for the performer.

As discussed previously, the equipment needed for *Slipstream* is very specific. In addition to the Boss RC-300 loop station, a microphone and cables will be needed. The microphone plugs directly into the back of the Boss RC-300. Although headphones are

not listed as a requirement to perform the piece, they are highly recommended in order to accurately monitor the audio and the click track.

The loop station is placed on the floor directly in front of the performer with all connections running in and out of the device. The headphones connect into back of the loop station. The audio cables connect from the Sub-Output left and right slots to the sound system. Because there are many options for sound output on the loop station, there are also many opportunities for mistakes if not careful. The metronome click track should be switched to Main instead of Sub-Output to ensure that click is only heard through the headphones and not reproduced for the audience.

Once the machine setup is understood, it is important to know how it functions in the playing environment. Confirming that the loop station machine is the least familiar component for most players, trombonist Jeremy Wilson states that the “steepest learning curve was just learning how the machine worked.”⁵² The best way to approach a piece like Maier’s *Slipstream* that uses a hardware device controlled by the performer is to treat the equipment as a second instrument. The performer must become very familiar with how it works in order to have a great performance. Jeremy Wilson stated that time should be given to learning the ins and outs of the device.⁵³ Besides reading the manual, one way to learn the device is by using it in warm-up routines. A basic warm-up with this loop station can be playing scales in a round (example 23). During this process, one can become familiar with setting up a two-measure loop and looping an easy pattern.

52. Wilson, interview.

53. Ibid.

The image shows a musical score for a Trombone (Tbn.) and a Loop station. The Tbn. part is written in bass clef with a key signature of one flat (Bb). The Loop part shows three pedal functions: '2L rec', '2L dub', and '2L play', each with a corresponding foot pedal symbol.

Musical Example 23 Mize, *Scale warm-up with loop station*

A second helpful way to learn the equipment is to study the score of the solo and then create exercises that mimic the solo passages. In learning the piece, Jeremy Wilson said he would include it as part of his warm-up routine and overdub things like Bach chorales by recording each part himself.⁵⁴ Another part of learning the machine is the performer practicing using his feet to control the pedal functions while he is also playing the instrument. The key to a strong performance is not to spend too much time learning the music and neglecting the device or vice versa.

Learning both elements—the trombone and the loop station—will help with the precision necessary to perform the piece. In fact, Florian Magnus Maier states the most challenging aspect of this piece, in addition to virtuosity and musicality, is precision.⁵⁵ There are many fast, technical passages that are being recorded and will continue playing throughout the performance. Being precise with every previous recorded loop is important. The fast, technical passages are not the only ones that get tricky. Any part that is recorded will be remembered since it will be played back many times. The program notes state, “Any mistake or imprecision while recording will haunt the player till the end

54. Ibid.

55. Maier, interview.

of the passage or piece.”⁵⁶ Rather than jumping into recording a new loop and risking a mistake, it is better to wait one phrase before overdubbing. Between mm. 65–66, the soloist is supposed to put in a mute and begin overdubbing Loop 1 three beats after finishing the first solo (example 24). Although this adjustment may be possible that quickly, waiting at least one full loop (eight measures) to overdub is better. The audience will not notice the pause and will potentially allow them to better digest the music that just played.⁵⁷



Musical Example 24 Maier, *Slipstream*: mm.65–66, mute change

In many ways, learning the music of this piece is no different from learning any other solo. Performers should work on the difficult passages, slowing them down to make them precise. The tempo on the loop station can be set much slower, and the performer can record only a small section in order to work on a specific passage, especially if it involves using the foot pedals in precise time between notes (example 25).

56. Maier, *Slipstream* score.

57. Wilson, interview.



Musical Example 25 Maier, *Slipstream*: mm. 432–434, pedal precision

Since Maier’s *Slipstream for Trombone and Loop Station* involves looping techniques, the entire piece is not an already finished product; instead, the performance is the experience of producing an accompaniment alongside a solo at the same time. Therefore, as Jeremy Wilson states, it is important to, “remember how the audience experiences it.”⁵⁸ The performer must pay attention to the textures of the piece and remember that the entire composition has a flow of building, layering, texturing, and evolving throughout.

58. Ibid.

CHAPTER V – Conclusion

The aim of this paper was to define different types of electronic accompaniments, provide a historical and cultural background for each accompaniment innovation, and present sample works in each category for analysis and performance guidance. The three compositions featured some form of either fixed media or live electronics, as well as provided an example of the current repertoire for trombone and electronic accompaniment. A resource for preparing and performing Sadler's *Soundtrack*, Snowden's *Ground Round*, and Maier's *Slipstream* was made available through an analysis and performance guide of each work.

As this literature continues to grow, performers and teachers can be better prepared. Trombonist Steve Parker says about preparing a work that uses any type of electronics involves “doing research, understanding the framework, and knowing the gear.”⁵⁹ As each work presented in this paper highlighted various types of interaction between performer and electronic accompaniment, the hope is that a trombonist could choose one that resonates with him based on interest as an introduction to performing this literature. As composer Florian Magnus Maier said, “If you have something to say, there are more possibilities than ever to do so. So, nobody has an excuse anymore to not do something refreshing and inspiring!”⁶⁰ Take one of these pieces and be inspired to try something new.

59. Parker, interview.

60. Maier, interview.

APPENDIX A – Transcript of Email Interviews

Taken from email interview with Brian Sadler, March 2018

1) What was your musical training like?

I've been playing trombone since 5th grade, so for about 25 years. I got my start composing in high school and arranging trombone quartets. After high school, so I enlisted in the US Navy as a musician and my experience in performing as well as arranging and composing grew. I got out, went to Arizona State for composition, didn't like the atonal world they were introducing me to, and decided to go back in the Navy in 2009. I'm mainly taught by experience thanks to always having a concert band at my disposal. I learn what works and what doesn't, and I move on.

2) What instruments and combinations do you enjoy writing for?

My favorite is brass ensemble because of the power that you can get with only a few players. I love writing for concert band as well because there are so many instrumentations you can use to achieve different sounds.

3) Have you written other music that incorporates technology?

I've written a lot of music for internet-based videos and games and all of those use orchestral sample libraries. Other than Soundtrack for Trombone, I've written a tuba concerto and a brass quintet both with digital accompaniment.

4) Can you talk about the inspiration/background for Soundtrack for trombone and orchestra?

Josh [Mize] pretty much gave me free reign to compose whatever I want, knowing that I would compose something bombastic and movie-score sounding.⁶¹ I did remember back to my college days of listening to a lot of trombone concertos and recitals to help me get on the right track though. The orchestral backgrounds have influences from Steve Jablonsky's *Transformers* soundtrack as well as other greats such as John Williams and John Debney.

5) What would you say is different about writing a piece that has a digital accompaniment?

A piano player can speed up, slow down, and interact with the performer whereas a digital accompaniment cannot. I had to keep that in mind while writing this piece. The performer doesn't have as much liberty with the melody as he would with a pianist.

6) Did you have to learn any new technology in order to compose this piece?

I didn't have to learn any new technology as I just used my normal setup: my MacBook Pro, Finale 25, and various sample libraries by EastWest including Hollywood Strings, Symphonic Orchestra Gold, and StormDrum 3. To record everything, I used GarageBand.

7) What was your process of composition for writing this piece?

61. The author of this dissertation commissioned Brian Sadler to compose *Soundtrack*.

First, I try to come up with a basic melody. I don't sit at the piano or noodle around on my trombone or anything like that though. I mainly go throughout my normal day, listen to a lot of music that I know I will try to emulate, and try to think of something good. Once I get an idea, I'll put it into Finale and see how it sounds. If I don't like it, then I'll start over.

8) What do you feel is the most challenging aspect for the performer?

The most challenging aspect is probably staying on tempo with the backing track. This piece has a few fast runs and some double tonguing and if you get behind, too bad, the accompaniment is going to keep chugging on, with or without you.

9) What was the most challenging part of composing this piece?

Writing a melody that sounds good not only on its own but also sounds good played by a trombone. There are some lines that can sound quite awkward on trombone, so I tried to avoid that.

10) Would you ever consider writing a piece that utilizes this type of technology again?

Absolutely, it's right up my alley and every time I do it, I get better at it.

11) How do you see the growth of technology affecting music, for example; as seen in how your piece uses the sounds of a real orchestra and choir but, are actually sampled instruments?

The quality of samples and the power of computers gets better and better every year. Even now there are a lot of movies, some of them blockbusters, that

are using samples instead of real orchestra. This is solely because it can save money for the studio. I don't think samples will ever totally replace a live orchestra though. No matter how good the quality gets, samples will either sound not good enough or sound too good compared to a live orchestra with real people.

Taken from email interview with Florian Magnus Maier, February 2018

1) What was your musical training like?

I followed classical guitar lessons between age 12 and 17, at the same time teaching myself electric guitar and starting my first metal band. Then I switched focus to flamenco guitar, first teaching myself as well as possible at that time in my area, then, with help from flamenco dancer Annette Hüftle for a year in Regensburg, learning my chops to accompany flamenco dance. At 21, I joined Paco Peña's flamenco guitar class at the Conservatory of Rotterdam, where I eventually graduated in classical composition with Klaas de Vries. In between, I followed courses and workshops; mainly some flamenco courses in Spain with amongst others Manolo Sanlúcar, and my two Tanglewood Fellowships in Massachusetts have left quite an impression back in the days. But I always also learn a lot from the people I work with. And, in general, I'd say the best way to learn is always doing something a lot.

2) What instruments and combinations do you enjoy writing for?

Honestly, I enjoy every new instrument or combination I write for. I decided during my studies that, if I'm gonna call myself a professional composer,

I should be able to write for anything they put in front of me, especially if it's good players - and it's what I've always done ever since. I'm a guitarist myself, so writing for strings always came easy to me. But I've always been very happy to discover what can be done with instruments I knew nothing about before - trombone, accordion, clarinet, marimba, sarangi, organ and many others - which I got to know because I was surrounded by these incredible players from all over the world here in the Netherlands. It's easy to like an instrument if this is the way you hear or notice it for the first time.

3) Have you written much music that incorporates technology?

As an electric guitarist, technology is an integral part of my instrument, so I do have some interest in electronics, sound design and new techniques. It's an exciting time to live in, and for a composer, the electronic arsenal is just as much part of the big pool of possible ways to make those sounds in your head heard as are the instrumental techniques. But also, different disciplines come with technological doors to open; one of the most interesting collaborations I had was about operating a flight simulator with a piano, but luckily, we had a guy for the technical part. However, as a composer, my core business is for the biggest part writing for acoustic instruments.

4) Can you talk about how the idea for composing a piece for trombone and loop station came about?

It was actually Jörgen van Rijen who proposed it when he asked me to write the piece. He has done amazing work for the promotion of solo trombone

music, of which there's not incredibly much. The loop station naturally extends the musical options while taking nothing away from the solo performer experience, so it had to find its way sooner or later into the classical world as well.

5) What would you say is different about writing a piece like *Slipstream*?

It's quite a logistical puzzle to plan such a piece, since every mistake is going to haunt the player for a long time. Also, to create a fluent, interesting, changing accompaniment for the solo part that doesn't limit itself to the most obvious loop station clichés requires a lot of precision and finding solutions for letting one player do the work of an ensemble. I'd say performing *Slipstream* without mistakes should be double hard because of operating the loop station at the same time.

6) Did you have to learn any new technology in order to write it?

Yes, the particular loop station we used, but it wasn't hard at all... it's just an effects board, after all. I also looked specifically for the loop station with the longest loop times, and the possibility to set the different loop tracks to different lengths; this led me to the Boss RC-300.

7) What do you feel is the most challenging aspect for the performer?

As I mentioned before, the precision required in addition to the virtuosity and musicality. There's just no room for error, and nowhere to hide.

8) What was the most challenging part of composing this piece?

Making sure both solo part and looped accompaniment are seamless; things like tempo changes for example are hard work here, you have to trick the machine a bit. And controlling the dramaturgy is also more challenging, because all parts of the structure are always presented alone first. Surprises and sudden changes in the music, other than stopping everything at once, are hard to achieve like that.

9) What was your process of composition for this piece?

I convinced myself that I could get away with a sort of standard beginning - set up a beat, a bass lick, and then soloing over that - because the trombone makes the situation weird and interesting enough. Everyone has heard musicians use those simple looper tricks, but maybe not on trombone yet. A few minutes into the piece, I felt the need to go into a bit more atmospheric textures and explore different sides. Of course, every note always had to be exactly composed. Then a friend of mine, Wolfgang Besl, died, which had an impact on the piece in the quieter stuff in the middle. In the end, I had to tie it all up and bring it to a climax, or at least an ending that feels natural.

10) Would you ever consider writing a piece that utilizes this combination again?

I have, actually, but for bass trombone and in a trio with harp and a dancer (“Aeon of Horus” for Brandt Attema, Astrid Haring and dancer Rodrigo Alves). I’m not excluding working again for this combination, but only if it’s something

different to Slipstream. I don't want to do the same thing twice, and I'd have to have an idea that requires it specifically. But never say never.

11) Do you see the mix of technology, such as the loop station, and typically classical instruments growing today?

Yes, definitely! The internet allows ideas to spread a lot faster now than they used to, and in that sense, the genres and disciplines have been opening a lot in our cultural epoch. A generation ago, every style in itself had come to a bit of a dead end, so the logical way forward was to mix things up. Nowadays, a musician's a musician, and we're starting to understand that there's absolutely no reason not to try new stuff hitherto considered inappropriate or impossible on your particular instrument or in your home genre. If you have something to say, there are more possibilities than ever to do so. So nobody has an excuse anymore to not do something refreshing and inspiring!

APPENDIX B – Transcript of Phone Interviews

Taken from a phone conversation with Steven Snowden, March 2018

What was your musical training?

I don't have a lot of early music training or like classical music training. I didn't learn to read music until I was 16. We got a new band director between my freshman and sophomore year. I was playing sports and stuff before that and I was getting kind of tired of it. I was in a rock band and I really wanted to learn more about music and when we got a new band director the policy was you had to start in 5th or 6th grade but since we got a new band director I, uh, sort of snuck in and then from there I got pretty standard kind of musical training in college. I did my undergraduate in Arizona State University it started as a music education and eventually made its way to composition while I was there, I had my first piece for horn and piano. From there I got my master's in composition and my doctorate in composition from UT Austin.

What instruments and combinations do you enjoy writing for?

I really love writing for percussion just because that encompasses so many things, um, especially like things that are not normally considered instruments. So I really like writing for junk percussion like metal mixing bowls, I would say my favorite musical instrument is metal mixing bowls like you find in the kitchen I use it in all kinds of percussion pieces, I think they sound awesome. And uh, so that's a really fun aspect of that. I have actually written a lot more percussion music than anything else. I think just because I wrote a couple of pieces that became really well known and a lot of my

commissions have come out of the reputation that I have in the percussion world. I am glad that it happened that way, but it wasn't really a conscious decision to write a lot of percussion music it just sort of worked out that way. I like writing for a lot of instruments, I have written for strings. I have written a lot for woodwinds. I have written the least amount music for brass which is a little silly because I am a brass player. You know, aside from like doing something you know like arranging Erlking brass quintet or a couple of brass trios and things when I was in my undergrad. Once I got into graduate school, I was mostly writing for strings and percussion just because that was sort of the people that I hung around with, you know, my colleagues and uh, just started really getting into that. I would love to write more for brass. I would say if I were to pick an instrument to play instead of horn it would be jazz trombone. Actually, I love Frank Rosalina and I also like Robin Eubanks. I love the Dave Hollins quintet. So, I ended up writing mostly for percussion. Percussion is the most prominent thing I write for.

You also wrote a piece for cactus, correct?

The cactus piece is more like performance art than concert performance. It is pretty heavily manipulated. It gets a variety of sounds. You can process the sounds.

Have you written other music that incorporates technology?

I would say about half the pieces I have written incorporate technology in some way rather it's interactive, like *Ground Round*, or just "tape" part. I often times prefer to write the tape pieces because it's simpler for performers to set up and work with. It's usually like a click track and then electronics. And I'll build a little Max patch to run that.

If even with something that is purely tape, it's really inconvenient to have to just search through an audio file and find a place to start. If you have a ten-minute piece and you have a place you want to start 50 bars in, you have to find it and all that. Kind of like what I did with *Ground Round* and all my patches before trying to make it easy for the players. When it comes to interactive stuff, that can be pretty daunting for a lot of people. I think there are probably a lot of people who look at *Ground Round* and like "oh this sounds really cool, but I don't know anything about computers, and it seems complicated." And they don't pick it up and play it. But I try to make it as simple as I can like the interface and everything. And also, with *Ground Round* in particular though I started to get kind of silly because it is a fun piece. You know have a little fun with it, have a sense of humor with it too.

Did you have to learn this technology (Max/MSP)?

I have taken a few classes in Max/MSP. It is a pretty complex language for composer to learn and a lot of people who do installations or anything to do with audio and MIDI. MSP is actually, Max signal processing, so that's the audio side of it. And then Max deals with MIDI and also just data. You can basically transform anything into anything else you just have to know what objects to use and how to connect them together. So you could take the barometric pressure and use that to control the pitch shifter as long as you can get the data from the barometer into your computer. So that's the really cool thing about it. It easily translates things into MIDI which is really great for composers because it is a very familiar language. And it is pretty comprehensive when it comes to represent musical ideas. I know people have kind of a negative opinion about

MIDI because they assume it means bad sounds, like poorly done sampled sounds. It is just a means of communication, just a digital way of representing musical gestures and things like that. Max is really great at doing that. And it's really fun too. I'm not really a computer programmer, I've done a couple of semesters of C-sound, a scripting language for music. And then Super Collider which is also a scripting base and super powerful. But Max/MSP is a little more approachable because you have objects that you connect wires to. So it's like this data is coming into this object and then it passes through and transforms it in some way like say multiplies it by two or scales it between 0 and 1 and then passes that data to something else. So you can basically take data in and do something useful with it like by filtering it out and transforming it in some way. So it's a really great tool for that. It doesn't do as well with like time-based things. It's a little tricky when it comes to a piece like *Ground Round*. It's basically like a tape part, like a fixed track, and then there is live signal processing on the top of that with the performer. I have to kind of build in a rigid structure for everything to fit within and then I have to tell when to switch things on and off and when to turn on the harmonizer or when to turn off or on the delay and things like that. It can be a little tricky with things like that but it's pretty straight forward though, I mean I just had to go through piece by piece.

And this piece was actually the final project for one of my classes when I was at UT Austin. For like the second semester of Max. In the choral section I was converting MIDI note numbers from audio.

What was the inspiration/ background for the piece?

I had become pretty good friends with a guy named Steve Parker. He is a trombone player who still lives in Austin and does all kinds of interesting things he's a really great guy, a really great musician and we had been talking about me writing something for him for a while. He is very adventurous when it comes to electronics, improvisation, all kinds of things. I thought this was a good chance, you know I'm still in school right now so if I write something that is a complete flop or does not work at all it's not a huge deal. It's not like it's a huge commission from Joe Alessi or something like that. So why not just take a chance on it. I am always on the lookout for sounds that are typically considered to be non-musical that can be put into a musical context. So I do a lot of field recordings and things so when I travel, I always take a field recorder with me. Like this gate has a really interesting squeak to it or these birds you know have a really interesting call. I have a library of 40-50 gigs of sounds that I have recorded just random things. I came across a video of a cattle auctioneer something, I think I was researching something else at the time and I wrote it down thinking it was such a musical sound and such an interesting technique-there has got to be something cool I could do with that. And then I just put it to the side for a while. Steve and I started talking and you know the pitch range is so similar to the trombone to like a tenor trombone and the trombone is so voice-like that it can really imitate these sorts of things well, better than any other instrument. So I was just thinking, how it would sound to just transcribe this cattle auctioneer and just went from there. A lot of this actually comes from improvisation that Steve did as well as the opening section with all the plunger stuff. We just, I just played through the tape and he would improvise a bit and would say let's just try this and try this...and I ended up

with all these recordings. I just put it together in Cubase, the main software DAW that I use, to create that opening section. To find the sort of gestures and things that I would find particularly cool and then went through and notated it with the understanding that if anyone else played it, it was going to sound different, but be approximately in the same realm. The notation is kind of specific, but I know that when it comes to glissing back and forth and with the mute and everything else, it's always going to be a little different from player to player and I like that sort of thing, I like leaving some room for the performer.

So with the notation you were talking about did you already have in mind that you were going to use pretty much traditional notation rather than a more graphical approach?

Yeah, I guess I wanted to be more specific because I did have a certain style in mind. So I guess it just depends on where I wanted to draw the line because I could have just written in a description and done some like squiggly lines and that probably would have been just fine too. But, I also kind of like too, I mean this is not typical for me necessarily, usually my pieces are pretty straight forward and not like really really difficult. I also kind of like the idea of being a bit of a struggle too, like there is something, sort of a fluster feeling or just like a struggle in like playing all of these notes and doing all, and there is so much movement happening, and especially when it gets to the breath sounds and it's just like this really wild visual element of moving around that's really one of the awesome things about trombone, it's such a visual instrument. And yet there is like hardly any sound coming out, I really like the idea of that too and uh yea, I

just felt like I needed to be more specific with the notation to kind of get the form right of the opening section so that things kind of progress in the way I was looking for as opposed to graphic notation. I figured it would be better to be a little more specific with that.

What was the process like of composing the piece?

I did some sketches and stuff for form on this and I had some ideas about specific moments in the piece. So one of the things, and it's kind of a silly thing, like around 50 seconds in where there is that "moo" and I pitch shifted down gradually and sort of morphs into the cattle auctioneer. I had done that earlier but then it's such a cool sound I have to use that and it's going to be so cool to put it right in that section when things start to change. And then also with the chorale, I knew that I wanted to have this really big section where all these voices, it's all multiples of the same voice, it's the same auctioneer, but have them all pitch shifted so that they are just babbling really quickly like incoherently. And forming a chorale. And then I wanted to actually have the trombone take over that chorale like in a gradual phase. Then when I was playing around with it, I was thinking it would be really cool, I think it's possible to do like real-time contrapuntal harmonizer with this, as long as the pitch tracking works ok, if you just count pitches. You know, listen for a B and then when it hears a B after this other note that came just before it then it knows to shift all of the other voices to certain notes every time. And then with the chorale too it makes a lot of sense with this sort of thing because it's not, like the voices are contrapuntal in that they are moving in different directions but rhythmically they are all the same. It would be a whole other ball game if I were trying to

do something where the rhythms were different in each voice, like real Bach style counterpoint as opposed to just a chorale. So it was a simpler choice. I also just thought it was just funny to have a chorale at the end of a piece about a cow and a cattle auctioneer.

Was there any sort of Ground Bass designed for the piece?

Harmonically speaking it just works in cycles. It's not exactly the ground bass all of the time there is this very slow-moving harmonic structure to it. I mean it doesn't get, all that adventurous harmonically speaking, there isn't a ton of harmony in there until the end. It's mostly just these melodic lines and delay lines. And I also really love the idea of the trombone being able to gliss very smoothly and having delay lines because you end up with this sort of smear and cluster with that.

What do you feel like was the most challenging part of composing this piece?

The patch took me actually longer than composing the piece. So the fun part to me was working with the tape part, the fixed audio because I love doing sort of doing audio manipulation and creating textures and I love that style of electro-acoustic music as well. There's a French-Canadian composer who is doing really amazing stuff with that. So it was a chance for me to combine that with live performance and interactive electronics. The interactive part was definitely the most time consuming. The harmonizer did take some time because it was a lot of trial and error, I don't even remember how many times I tried to make it work and it just wouldn't, so I had to fine tune everything. And even then, I do have kind of a funny story about this that you might kind of appreciate.

To answer the question, the patch itself, probably the harmonizer was the most difficult part of the patch. But it was organizing the timed events because every time it passes a certain point it passes a certain minute and second part it will switch something off and something else on, or I'll trigger a line, basically like a fade so like let's say the delay lines fade out or the harmonizer fades in, that sort of thing. So there is a lot of detail. And luckily, it's been, I don't want to say bulletproof, but I've had very few issues from, or the performers have had very few issues with this piece even though it is quite interactive. I have a piece called shovel head for bass clarinet and electronics that's kind of the same level of interactivity, I guess, as this one and its similar to level of things, I have built things in such a way that they seem to be pretty stable. Which was not the case when I first made it. I had to do a lot of work to get any little bugs out of there because sometimes is like oh, if you are in one certain situation, if you do things in a certain order, then it starts to fall apart, or you know it, there are just so many moving parts to everything that can be a little tough. But I did run into strange issue back in 2013 I think at world music days in Belgium, it was in Antwerp. There was a trombonist, I can't remember his name right now, but he plays with a group in Antwerp called Champ D'Action. He was having a lot of trouble getting the patch to work, the harmonizer wasn't following correctly. He was just like, "I don't know what the issue is", and I spent all of this time building in extra little dials and things, so you could fine tune it to be able to locate your pitch better, like which partial is it looking for or what weight is it giving to each partial, or amplitude. He could figure out what the issue was. He realized it was because he plays at A=442 not 440, that's why it wasn't following. So he just had to tune his trombone down a little bit and it was fine.

What do you feel is the most challenging part for the performer?

Probably, just keeping up with the pulse throughout the middle section and just endurance. I mean, that's my guess. Once it gets to all that sort of stuff, it's a lot, you don't get a lot of breaks. Some of it goes very, very high, and it seems like it would be kind of a tough piece in terms of endurance. It's not all that long necessarily, but it is a solo piece and you're playing pretty much the whole time. So, it seems like that would be kind of challenging.

Would you ever consider writing a piece for trombone and electronics again?

Oh yes, definitely. The trombone is a really versatile instrument and I have always had good experiences with trombone players too. It could be because I am a fellow brass player and I feel like I can kind of relate. Trombone players often don't tend to take themselves too seriously. I think they are not quite as uptight as others, I mean I am just generalizing it. But they seem to be pretty fun people and pretty laid back and like aware of the fact that they play these kind-of-silly instruments. I mean, that's Steve's attitude with this too. Steve Parker, he is an excellent trombone player, but he's like, yea I play trombone, I can put this like tube in here and its funny sound", He always has fun with it. And I don't see that as much with like a cellist, or you know uh, or a pianist or something. I think trombone players, like percussionists, are willing to experiment a bit more. They don't mind doing something a little silly. Like the Berio *Sequenza* for trombone is one of the silliest pieces that has ever been written but serious at the same time, it's such a weird piece. But you know, that's kind of the personality that people ascribe to the trombone and I think most players just like play along with it. Like, yes, I

play a silly instrument and can do cool stuff and will try anything once and just have fun with it.

How do you see the growth of technology affecting the music?

Well, to go in sort of a different direction I think something that has already made big changes in the world of chamber music in particular is iPads and Bluetooth pedals. I know that is a simple thing but even as a composer, if someone commissions me to write a piece I'll ask them beforehand what kind of setup are they going to have when they play it because as mundane as it is, page turns are a big part of a composer's life, and a performer's too. That's a really important thing you have to consider, so if you have a setup like that... and also if your using an iPad your lighting can be different, you can have a darkened stage, you can write things that go on longer than a page and you don't have to build in some kind of complicated, three pages here, two pages here and a little snippet over here and turn the page really quickly at this spot. That's something that has changed a lot. My fiancée is a violist and she plays in a quartet that she bought an iPad to play in this quartet and they only play 20th century music. A lot of it they just read from the score because it can get so complicated and it's way more difficult to just read from your part and know how things fit together so they will just read from the score all the time and they will just use Bluetooth pedals and iPad and it just works out really well. But as far as interactive technology goes, I think something like Max and Ableton Live. Ableton is just interesting because it works in a different way than other DAW's and I really like that about it. It works really well in live performance. It compliments Max/MSP well in that Max has all these crazy things it can do with data and audio and

it's like a sandbox. You can tinker around, you can make your own patches to do whatever you want. Now that they have Max to Live, that has been around for a while, I'll make patches in Max and use them in Ableton because Ableton works with time really well and Max is not very good at working with time. So it's kind of a perfect marriage in a way. It also makes it a lot easier for composers and people who are doing it for a hobby or just kind of dabbling in it. It's easier to learn Ableton than it would be just to dive into Max. And the fact that it sort of has this sort of almost infinite possibilities now that Max-to-Live exist I think you're probably going to see a lot more people, like a lot more performers kind of taking on the role of composer and doing live improvisation with electronics. I mean that already happens quite a bit but it's becoming easier and easier. A good example would be Todd Reynolds, a violinist. He has been playing solo violin and electronic sets for decades. He has a really great setup with Ableton and he works with Max for Live as well. Uses some foot pedals to trigger things and trigger stuff. I think maybe he is a good example of earlier pioneer of this sort of thing where you can have a one-man band. You can use technology as a way to fill things out, to experiment in real time, to improvise and make something really fluid. I think we are going to see a lot more of that as the technology becomes more and more approachable and as performers get more tech savvy. 10 years ago it wouldn't have been all that common for performers to even have a laptop, more like 15 years ago. You had a desktop computer probably and wouldn't take it on stage with you. Now days you can do everything you need to do with a laptop and it doesn't even have to be that powerful. I have a 2015 MacBook Pro and its more than enough for me and I do pretty complicated stuff. Luckily, I don't do a lot of video editing or else I would need a more powerful

computer. I mean really its sort of professional grade I guess, but it's a pretty normal laptop that does everything I need it to. We are at a point with technology that processing speed and all that have gotten fast enough that we are able to do all kinds of interesting things live and most people have these tools laying around already. Most people have a laptop laying around as they are typing up papers or just surfing the web. It's also powerful enough to build patches in Max/MSP and build things like a piece like *Ground Round*.

The chorale at the end, it blows my mind that computer is able to do this. It's using a (fft) which is basically a way to take in an incoming audio signal and transform it into data. But it can break it up in such a way that it can alter and shift the data around. There is so much processing that has to go on in order to make that happen. It just blows my mind that a 2010 MacBook can do that with three independent voices in real time while it is tracking pitch and playing an audio file. I think technology can wind up being less and less visible but more prominent. It's going to be something that can help facilitate or add to things but as people get more and more familiar with it and as technology progresses, it will be the sort of thing that is in the background. You are not going to be aware of what it's doing or what role it's playing, but it is helping to enhance music in its own way. I guess we kind of see that in like general technology around. The better it becomes, the less visible it becomes is kind of the goal. That's kind of happening with music as well.

Is there anything else you would like to share about the piece or technology?

Musically speaking, it is an interesting process to try to use humor. That felt like a very safe place for me to do it because trombone players tend to have a sense of humor. The interface itself for Max, I wanted to do something silly and fun to just try and write a serious piece of music. It is a musically serious and substantial piece and it's a difficult part to play and took a lot of time to write it. But the end result that is supposed to be kind of funny. I hope that people kind of chuckle when they hear this piece or even laugh out loud, I think that is really great. And it's really difficult to do, I think that is one of the hardest things to do as a composer is to use humor. It's this delicate balance you have with the audience to try and time things just right. With this kind of piece, it is just generally kind of silly, but I took a lot of care in making it funny but keeping it as like a serious substantial piece of music.

Taken from phone conversation with Steven Parker, June 2018

Have you performed much music that uses technology?

I have. I performed a bunch of stuff. I am moving more towards gallery work, but for a while I was performing with technology for quite a bit using things like Max, Ableton, and sometimes Super Collider combined with trombone.

Were you playing compositions or doing some improvisation?

A little of both. Doing commissioned work, writing my own stuff, and improv stuff.

What was your involvement with *Ground Round*?

Steven and I were classmates and friends, and still are, at UT Austin. We just talked about doing something together. I went to school for performance, but I spent most of my time with composers and taking electronic music courses. It was sort of inevitable, I ended up working with them a bunch. Out of that grew a small body of work and one of those pieces was *Ground Round* and I don't really know what the genesis of the piece was. It was possible we were talking about it over beer in Texas and thinking about how trombone is good at imitating the human voice and sort of the melody of cattle auctioneers or I don't know, he probably knows more than I do about the genesis of the piece.

He would bring me kind of like different fragments and I would play through them and we would talk about them and build on that. The first section of it, I mean its

notated but it's just improvised in the way that I had realized it the first few times I played it. I think Steve just kind of transcribed some of that and arranged it a bit.

Did you have to learn any new technology?

No. I was working with Max already. I just used the existing setup that I had been using.

So you already knew what to do when performing works like it?

Yeah. I mean each work is different to some degree. The idea of using Max in live performance was something I had done a few times before he wrote that piece.

Did you find any one part of that, the music with the technology, difficult to get together?

There is a bit of latency sometimes you can hear in most recordings. Sometimes the fundamental of the pitch has moved along in that progression. I think being in tune with the computer, I mean whenever I play with technology, it is like playing with another person to some degree, a pretty inflexible person. I just have to be aware of that. It's another entity but it's not going to follow me, so I just have to be in tune with what the computer is doing and what it is perceiving.

Like during the chorale section?

I had to work to get the computer to hear only me and not the extra sounds during that part. What I would do was stuff the mic more inside the bell. Often turn up the

microphone and play softer. Or maybe I turned it down and stuffed it in there, so it wasn't picking up other sounds.

What was your most challenging part in performing a piece that incorporates technology, like *Ground Round*?

It jumps around quite a bit. It's been so long since I learned it. It's just a bunch of jumps around and I think being coordinated with the pulse of the track was a bit of a challenge. I think it is a well-crafted piece. There is not a lot about it that breaks. I have had a lot of pieces that really do not work well in execution, but I don't think Steve's piece is that way, I think it plays itself pretty well.

When preparing a piece that uses technology what do you find challenging?

At this point it feels pretty natural to me, it's like playing another instrument. The challenge is acknowledging it is another instrument and not just like a mute that you stuff into your horn and it works or something else that is automatic. You need to understand how these things work in order for them to function properly. So I think that is the challenge, being willing to commit to that, rather than it being a new toy that you plug in and play.

How do you feel the audience enjoyment was with this piece?

It's always been a well-received piece and I think it's largely because of that narrative and the humor of the piece. People kind of get what the story is because it is programmatic, and I think the cattle auctioneer sample is pretty captivating and a good

point of entry for audiences. It's really been a crowd pleaser. If I am playing something with electronics, I usually throw this on the program.

Do you think the story behind it really helps the audience listen to it?

Definitely. I always talk about it before I play it and people love it. It is a really compelling piece I think.

How do you see the growth of technology affecting the music?

I don't really know how it affects trombone music. I think more people have access to it and it is more accessible. It's just another sort of functional thing that you can add to your bag of tricks as an artist or musician.

So you don't see it going away?

I don't know how popular it's going to be, but I mean live electronics is a part of what most people do. Guitar pedals and vocoders or using something a little bit more elaborate like Max. I don't know if Max is necessarily the best choice at this point unless you just really want to get under the hood and do certain things and do it a certain way every time. Because Ableton, in my opinion, you can do most of the stuff you want to do on Max much easier and most kids these days, they know how to mess around with Ableton. There is enough tutorials online that people can teach themselves how to do this kind of stuff.

Without all of the coding involved in Max?

Yes. I teach electronic music, but I don't usually teach Max just because you need to invest quite a bit of time into it to get some results and you can most likely just do that in Ableton already.

What kind of advice would you give to a performer for a piece like this?

Like with any other piece you want to do some research on your own and understand the framework of the piece. I don't know if it is any different than another piece you would work on. You're going to have some gear too. Or maybe a friend who is an electronic music composer that can help you out with that hurdle. Or just watch some tutorials online that will kind of guide you on what you want to do.

Where do you teach?

UT San Antonio.

Anything else you would like to say about technology and music?

Technology is just a continuation of the general advancement and expansion of thinking about what performance is. Or what a performance is on a brass instrument or how a performance can be experienced.

Transcript from phone conversation with Jeremy Wilson, June 2018

Recently you have commissioned works that use the loop station.

That's right. I commissioned a piece from our director of Jazz studies here at Blair. I'll actually be performing it next week at the Pokorny Seminar and then I just received a piece from Jim Stephenson. It's called Loop D' Loop because he loves puns. It turned out really great. I'm going to be recording it on my CD in August and then premiering it in October.

Have you performed much music that uses technology?

About the only one that I had done was "I was like Wow" the Jacob TV piece. Before that, really I can't think of any. I mean I had played along with recordings before from time to time. Nothing that I would qualify as making art with technology. So "Slipstream" was a pretty big chunk for me to bite off because I had never really been involved in that kind of music but was always intrigued by it and a bit intimidated.

Did you have to learn any new technology?

I had to learn a lot not only about operating the loop station but also like speaker cables, mic cables, audio interfaces, just stuff I didn't really know much about. I'm pretty good with technology in terms of computer technology, video editing, imaging, graphic design, but for some reason I had never entered the world of audio technology recording, mics, and speakers, pedals, and all that kind of thing. I had never really been around it enough to learn anything about it, so I definitely had to learn this machine inside and out.

But also how does it connect to a PA system, how to connect to a house system, what is a DI box, and all that kind of thing.

You never have the same exact setup as you perform it, so you really have to know what everything is.

I have used many different, I have now performed it probably a couple dozen times in almost as many different spaces. I've had to do some interesting finagling to make it work sometimes.

When was the first performance for you?

I heard the piece for the second time in the summer of 2015. Jörgen performed it, or part of it at the ITF in Valencia. I contacted the composer that summer and he said the piece was about to be published by the New Trombone Collective. I had a recital scheduled for October. I bought the Boss RC 300 and waited for the music to come in. I started to dig into it and thought there is no way this is going to be ready by October. I ended up doing *I was Like Wow* instead of it and delayed *Slipstream* until February of 2016, the first performance.

What would you say is different about performing and learning a piece like this that uses technology?

For me the steepest learning curve was just learning how the machine itself worked. I spent a lot of time with the manual and then I spent a lot of time just dinking around on stuff that wasn't even *Slipstream*. I started to use the machine just as part of

my warm-up routine and I would record hymns like Bach chorales with me recording each part. Just learning how to loop. It was really intimidating at first. I ended up finagling a couple of different things that are maybe even a little different for what Florian asked for in the piece to make it work for me. The main way it's different from other recital prep is just the time commitment that it took me. I made sure to pair it on my faculty recital with stuff that did not take so much time to prepare. I put it with the Šulek sonata, some Schumann romances, the Susan Mucher piece called "Ages", pieces that I had either played a lot or did not require a whole lot of rehearsal time because *Slipstream* just ended up becoming 70 percent of my prep time. Just to get all the pedal pushes, and besides that it's just a hard piece to play. The licks are somewhat difficult in places. Also, just figuring out the stamina not only chop wise but mentally. I really agonized where to put in a program. I normally don't have to think that much about where a piece goes in a program, but I had to think, I ended up putting it as the last piece on the first half of my program because it's really hard to follow that piece so you really need either something that contrasts completely, or you need a little break and so putting right before an intermission was really helpful. I agonized over that decision. In subsequent recitals now I almost always use it as a closer again for the same reason. It's just hard to put anything after it. But the challenge of doing it as a closer is that it's hard and you are supposed to end on a high "E" and all that. I've had to work a lot on my stamina and my high range, I've made some equipment changes and things. Whenever there is *Slipstream* on the program I have to make sure I can last the distance. Back in the fall of this last academic year I did a residency at Western Michigan University where they asked me to perform at 1 in the afternoon for their school convocation and then do an artist series that night and

they specifically requested that I do *Slipstream* on both programs. So I did an hour long recital and then an hour and 20 minute recital that night, both of which ended with *Slipstream*. I wasn't sure it was going to happen. It ended up being ok, but I have also played the piece a lot by this point. But for that first performance it was a lot of learning the technology so that I could then put my effort and mental focus toward the piece itself.

Did you just go for the specific loop station suggested or look for anything else?

I just went straight for the RC-300. Only because, since I am new to this kind of technology, instead of trying to build my own pedalboard, I am just going to buy this machine. I like the fact since I bought the machine, I like the fact it has all of these sound effects and things built in which has made it really nice for subsequent pieces that I have asked people to write. You know I can have them come in, or like I went to Jim Stephenson's house with the loop machine and showed him the different sound effects that are available and things like that, that if you had just built a pedal board for *Slipstream* you might not have. I really appreciate the loop sync and the tempo sync and all that kind of stuff which has been really helpful for me. So I just went straight for the recommended machine.

Is there any concern that as technology grows, something like the specific loop station will become less common, or something will replace it?

I thought about is this machine going to hold up, is it going to be obsolete at some point? I feel like the concept of looping is popular enough that people are going to keep making machines, but I think even if the machines aren't made anymore there will

always be software to do looping either through a tablet or a laptop or something like that which would be obviously difficult to do since this is based on foot operation. I feel like there will always be a way to make it work but I am definitely aware of the fact that 10 years from now I may have to, if I want to keep playing these pieces, I may have to adapt what I do. I think it is fresh on my mind because Andrew Glendenning was just here, his son is in my studio, he came for Liam's junior recital and then stayed over and did a recital for trombone and tape music. Some of the music he did from the 1960's were in danger of not existing anymore because the first tape, or all the copies of the tape were destroyed, or lost, or worn out. There was one piece in particular that he went to great lengths to find it and digitize it and rescue it so that the piece can live into perpetuity. I happen to think, I wonder if I may have to do something like that, or somebody may have to do something like that with some of these looping pieces if the technology becomes obsolete or the companies stop making them. I feel like the concept of looping, because of how things work with software, will always be possible we may just have to change our machinery.

So that thought should not scare anyone away from approaching a piece or investing into it?

I don't think so because I also think that temporary art is worth doing. Now it's a big financial investment. I am hoping that in 3 or 4 years there will not be only *Slipstream* but maybe half a dozen or maybe even 10 pieces written for this combination. I also realize there is a significant financial investment and significant time investment and people may not want to do that if they think the technology is going to be obsolete. I

may be woefully naive, and I have been before, but I don't think it's going to be like two years I think if it's going to be obsolete it's going to be like 15 years and I think that is enough time. But I also think that more people doing these things makes it less likely that it's going to become a thing of the past.

I had seen Jim Stephenson's upcoming works list that included a piece for trombone and loop station commissioned by yourself. You are really trying to bring out more pieces with this combination.

I had even contacted Florian about another piece as he clearly understands how the technology works. That's the big challenge is finding composers that are willing to jump into a piece of technology they don't understand. I've talked to probably a dozen composers about writing for trombone and loop station and most of the time when I talk to them you can just see in their eyes are just the limitations and the challenges. When I talked to Jim about it, you could just see the wheels turning and he could see the possibilities. Now once he started writing the piece we had many emails a day for a couple of weeks where he was just saying is this possible, is this possible, is this possible? Even though I had spent an hour and a half doing a show and tell and trying to tell him how it works, you can't really understand how the machine works unless you've used it. I think Florian through his rock band has actually used a loop station and understood how it worked. I had contacted him about doing another piece. He basically said that "I had a lot of projects lined up and if I did a piece I would want it to be something completely different from *Slipstream*. I would not want to do a *Slipstream* part 2." And that is what I was hoping for was to get him to do was a companion piece that I

could that would be totally different in ways. I just keep asking composers to write for loop station and both Jim and Ryan Middaugh say this is fun, don't ever ask me to do it again. They enjoy it but it's not something they want to do more of because I think it is frustrating as a composer. For me, it's like I put the time investment to learn the machine and I put the time investment to do *Slipstream* and so I am doing it everywhere that I can, but I would love to have more things to play besides that. Now more people are doing it also, for a while I was the *Slipstream* guy. Now a lot of students are doing it and Tim Higgins is doing it. You're getting more people doing it, so I want to try and have something new and fresh to play.

Do you find yourself adventuring into composing with the loop station?

It's on my five-year plan. I have really considered it. Now that I know the technology and have some ideas to play around with. This actually puts a lot of power in my hands that I can actually come up with sounds that are my own invention. I think it is only a matter of time before Tim does because Tim is a composer anyways, but he has only done unaccompanied works. I think it is only a matter of time before he started dinking around with the loop station and create his own piece. It's in the plan for me. I just have too many other projects right now to dig into it. Actually, kind of like next summer I would love to set aside a month to just work on my own stuff.

What were the audience receptions of the piece?

Overall it's been really well received. It's been pretty much universally well received. I was a little nervous about how older audiences might like it just because it is

different. Younger audiences have always responded well to it, but I have been surprised that older perhaps more traditional audiences have also really responded well to it. If it is on the program, it is almost always one of the pieces people talk to me about in the lobby afterwards no matter what else is on the program. People just find it fascinating, new, and novel in just the sounds that you can make. I think people just really enjoy it.

I think Florian just did a really good job composing the piece. It has all of the interesting air sounds and all of that at the beginning. Just about the time the audience would get tired of that he moves into this ethereal, free everything. He is able to help it sort of palette cleanse and then obviously the thing just builds up to that amazing ending which if you can pull it off is just stunning. I remember the reaction that I had both times that I heard Jorgen play it live. I mean it is what made me want to play the piece. I think people really respond because it is new and novel and also because Florian just wrote a good piece.

It is good music.

And that's the thing, I had a few composition students give it a go and one of them turned out ok. Most of them it was like "yeah, this is loop music." What I am so jazzed about with Jim's piece is that it is a Jim Stephenson piece. It's an awesome piece that happens to use a loop station.

With this idea of technology, do you see beyond that, this growing within the trombone community?

I feel like there will always be people pushing the limits. Whether or not that breaks into the mainstream of the trombone community. I don't know? I think it depends on people championing it, if we keep having good pieces written for it, and if people will keep using it well. I think once you buy this machine and start working on *Slipstream* you kind of come into this community where it's like everybody that has prepared this piece goes, "yeah you are part of the club now." There is so much that goes into it. I think that what will cause it to regress or crash and burn is if the threshold for entry becomes so low that people start doing it and doing it badly. I think there needs to be a sweet spot. I want the threshold to be low enough that a lot of people can experiment and can do things but if the threshold gets so low that just anybody can pick it up and can try it we are going to have a lot of people doing it badly which I think is not great for the technology. That would then cause people to again marginalize this whole type of music to the point that we won't have further exploration, further boundary pushing, other technologies that could either spring out of this or branch from this that are completely different. I think you have to build on what you have and build it healthily so that people want to continue and find the next step.

The way technology is progressing generally, I am certain there are kinds of technologies and ways to use them in a musical and artistic way that we haven't even thought of yet. I am certain that it exists, but we have to keep cultivating the desire for it to exist by doing what we currently do really well and keeping the envelope, keeping on pushing on that.

What advice would you give to someone wanting to tackle this piece?

First thing is learning the technology and play around with it way before you start trying to play *Slipstream* with it. Learn how the thing works. I mean like I was, and I still do as encores, I was dinking around with Coldplay tunes and just pop tunes just to learn the technology. I think that has to happen over here separately first, or concurrently. Then work on the licks in the piece that are difficult. It's so easy to get caught up in the looping patterns that you forget all the solos. Obviously, the way Florian wrote the piece you loop and then you don't loop. It would be very easy to get caught up in the looping part that you forget the solo parts, which are actually the most difficult to play. Learn the technology, concurrent with learn those really difficult licks and slow it down just the way you would if it were a really difficult piece with orchestra. Work on the tough licks so that when you start to put it with the machine it is automatic. When it comes to actually preparing with the machine, and trying to actually prepare *Slipstream*, I would say remember that even though you know, for example if you are coming up on the end of a loop and you miss a pedal, the audience doesn't know that. The great thing is that if you miss a pedal you will get another chance in 8 bars or 4 bars or whatever the section of the piece is. There were a couple of times that I was like really rushing to do mute changes because I knew Florian wanted that to happen immediately. It was causing me to stress and to not do well. Whenever I played it for a couple of colleagues they said if you miss something, if you miss a mute change or miss a pedal, just wait. That is the beauty of a loop station is that it's going to come back around. Because for the audience, the audience's experience of the piece is very different from the performer's. So like at the end of the first solo where you are supposed to go right into another loop and Harmon

mute, my student Josiah at my dress rehearsal said, “that feels really rushed.” “When you finish playing that solo, it’s so impressive and so many notes and whatever, it might be nice from an audience perspective to have 8 bars to absorb what happened before you start layering more things on top of it for me.”

That would be my advice for anyone preparing it. Remember how the audience experiences it. It might be very different from you as a performer and to realize the piece can be really overwhelming for an audience member. There are times where I think Florian wants it to be very overwhelming, for instance the last twenty seconds. There are times when you just need to take your time and not try to get everything correctly. On the flip side, that’s one of the reasons you have to practice all of the hard licks because obviously, if you make a mistake while you are looping then you get to hear that mistake every four bars.

Did that ever happen when you were rehearsing?

I did that when I was performing. It was maybe the second or third time I played the thing. There is that section where you keep going up to a high “D” and have all of those glasses down. I missed the first one badly. It was painful every time it came around. It was for a trombone studio somewhere; a relatively small audience and it was a friendly trombone audience. I tried to kind of play it off comedically and like every time it came around I winced. I normally would not do that in a proper concert. That made me go and practice that part. I am not going to miss that ever again. Or if I do, I am just going to erase and do it again. It is more distracting to the music. That would be my other thing. I have never played the piece the same way twice. There is almost always something I

have to change or something I have to adjust to on the fly and I think it's one of the reasons you have to know the technology and know the piece really well. You are going to have to adjust or compromise something during the course of a performance of this piece. There is going to be pedal push that you miss or you're going to forget the loop effect or you're going to miss a note, or something is going to happen. You have got to be able to adjust on the fly. Like I said, I have performed it a couple dozen times and its only gone sort of "perfectly" maybe five or six of those times. Yet, most people in the audience wouldn't know that it hadn't gone perfectly. It's about being flexible and about being able to adjust.

APPENDIX C – IRB Approval Letter



INSTITUTIONAL REVIEW BOARD

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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- ☐ The risks to subjects are minimized.
- ☐ The risks to subjects are reasonable in relation to the anticipated benefits.
- ☐ The selection of subjects is equitable.
- ☐ Informed consent is adequate and appropriately documented.
- ☐ Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- ☐ Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- ☐ Appropriate additional safeguards have been included to protect vulnerable subjects.
- ☐ Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- ☐ If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 18020705

PROJECT TITLE: A Brief Analysis and Performance Guide of Selected Trombone Literature Which Incorporates the Use of Technology

PROJECT TYPE: Doctoral Dissertation

RESEARCHER(S): Joshua Mize

COLLEGE/DIVISION: College of Arts and Letters

DEPARTMENT: Music

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 02/14/2018 to 02/13/2019

Lawrence A. Hosman, Ph.D.

Institutional Review Board

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