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Electronic String Quartet #1

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Electronic String Quartet #1

A Composition
Presented to the Graduate Division of the
Mary Pappert School of Music
of Duquesne University

As a partial fulfillment for the degree
of Master of Music Technology

By
Ted Smoker
May, 2005

NAME: Ted Smoker

TITLE: Electronic String Quartet #1

DEGREE: Master of Music Technology

DATE: May, 2005

APPROVED: _____

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Assistant Professor of Music Technology and Project Director
Duquesne University

APPROVED: _____

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Professor and Chair of Guitar and Music Technology
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APPROVED: _____

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Dr Robert Shankovich, D. A.
Professor and Director of Graduate Studies, Chair of Musicianship
Duquesne University

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Abstract

Electronic String Quartet #1 by Ted Smoker incorporates the expressiveness of live string performance with the sonic capabilities of music technology through the use of effects processing. This piece incorporates pitch set theory, polytonality, Lydian and Phrygian church modes, microtonal pitch sweeps, and percussive effects. The effects used in the Electronic String Quartet #1 are reverb, delay with tempo control, tube-amplifier distortion, and flanger or filter sweep generator. It is intended to be played by five performers, string instrumentalists and sound engineer. A notation for the effects was invented to provide a clear, simple, and precise system for manipulating the effects in real-time.

Performance Notes

Instrumentation

Violin 1
Violin 2
Viola
Cello

Technological Considerations

Electronic String Quartet #1 is written for strings with electronic processed effects. It was written with the intention that a sound engineer would perform the effects from a mixer console while the instrumentalists perform with pickup microphones. This situation is ideal, but it is possible to perform this without an engineer by choosing moderate settings as appropriate. For more adventurous ensembles, it is possible to perform with "stomp–boxes" usually associated with electric guitarists.

The effects are notated on a scale of 0 to 5, where 0 is off, and 5 is the maximum. As for the delay effect, 5 would indicate unending feedback. The effects are indicated using the following shapes:

Reverb amount

Delay feedback amount

Distortion gain

Other effects

The delay should approximate the tempo of the movement. In the first movement it should be set to the eighth note triplet, around 260 milliseconds. In the second movement it should approximate the quarter–note, around 800 milliseconds. In the third movement the time should be set to the eighth note, around 210 milliseconds.

The distortion should resemble a basic tube amp distortion effect. It is possible to expand on this with a flange or phase effect in order to produce a distinctive sound. This is especially true in the first movement in which the closing phrase should remind the listener of the distinctive opening motif.

The "other effects" indication refers to the first and third movements. In the first movement, any type of automated filter sweep effect should be used. The modulation source should be a sine wave with a period of one measure in length, around (approximately 3 seconds). In the third movement a flanging effect should be used.

Performance Techniques

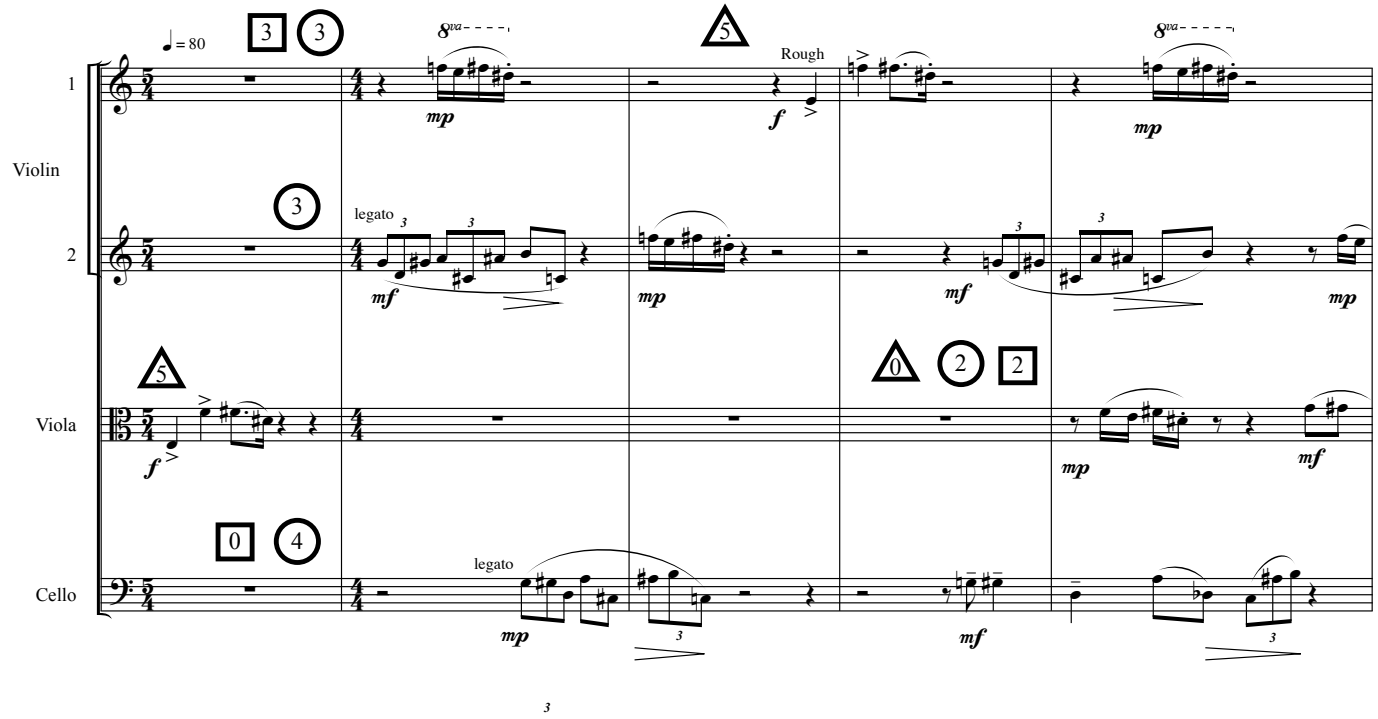
In the second movement the x–note shapes indicate a percussive effect. The instrumentalist should hit the strings sharply with the hair of the bow, so as to produce an un–pitched, short noise.

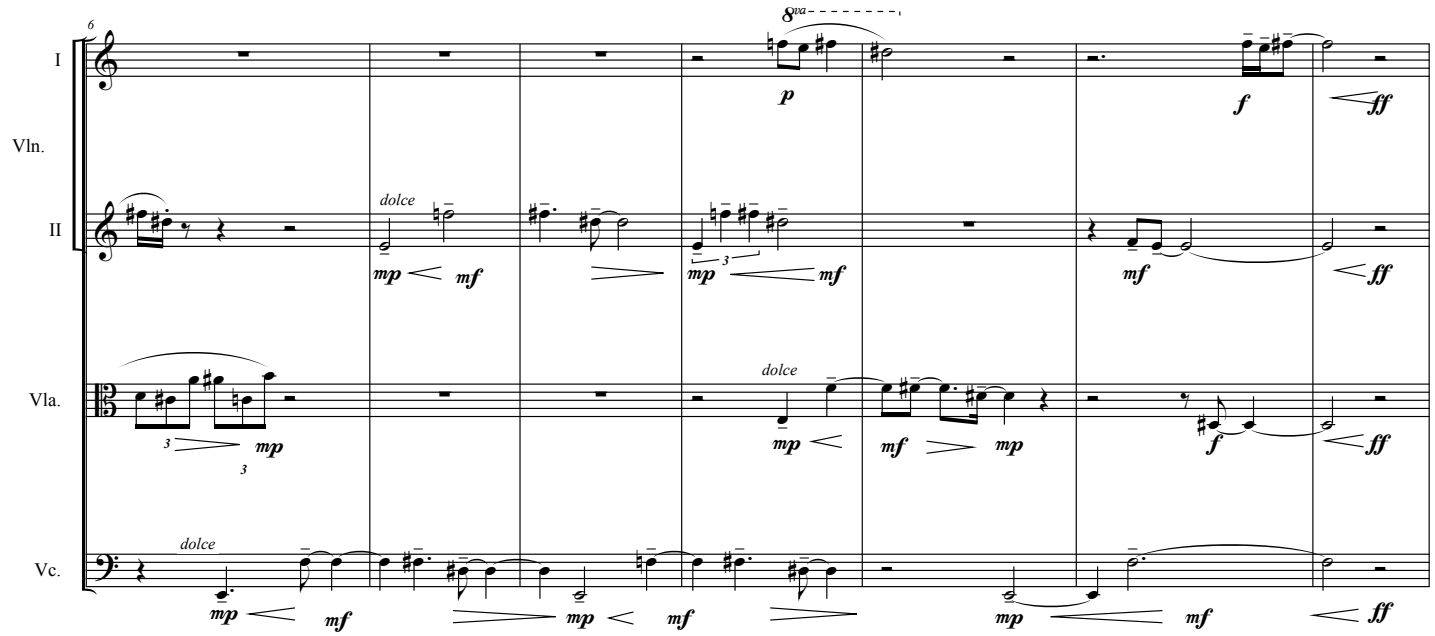
The violin 1 part in the second movement includes a pitch sweep. The violinist should attempt to approximate the curve, within the range of about an octave.

Electronic String Quartet #1

movement 1

Ted Smoker





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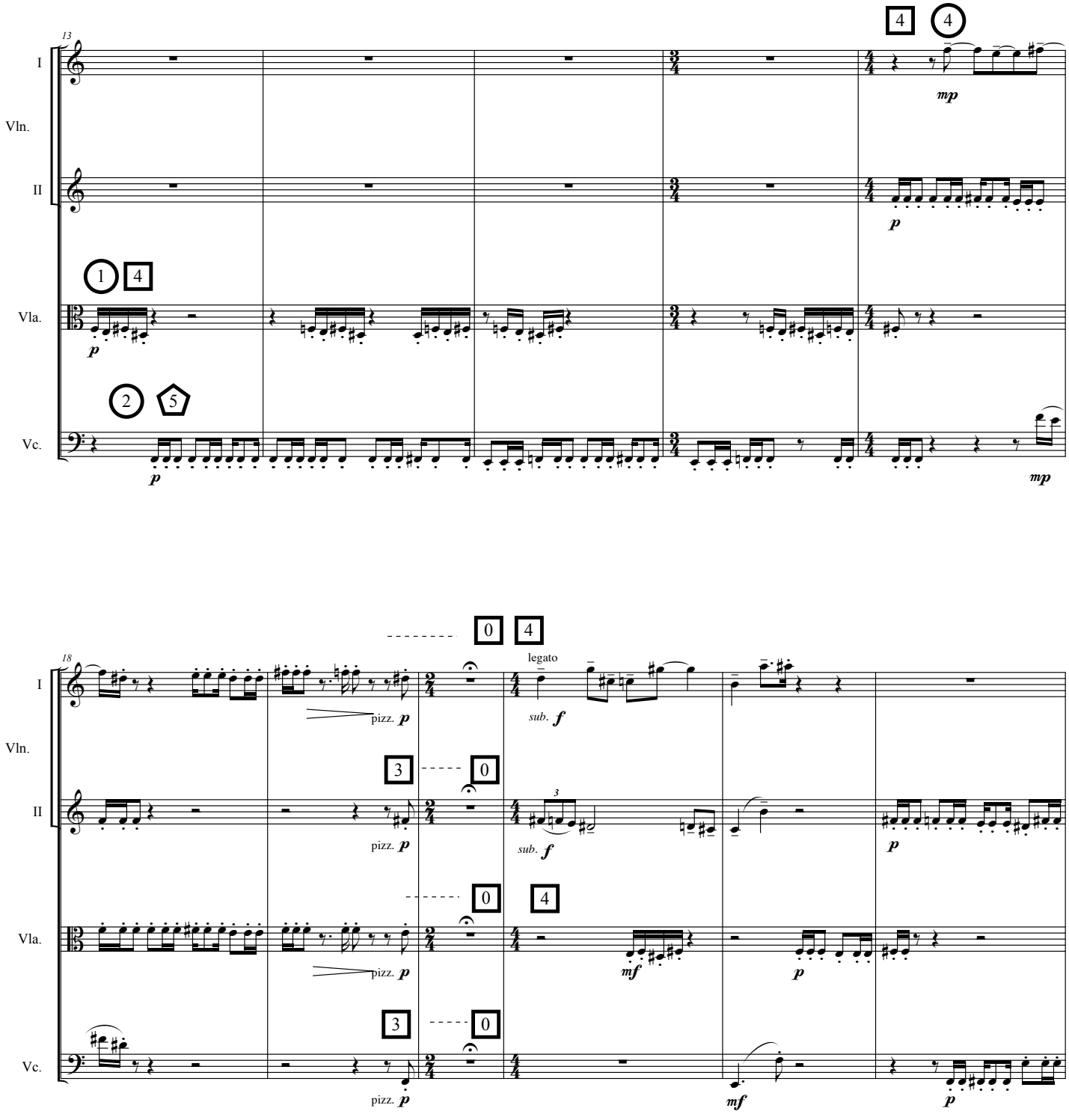
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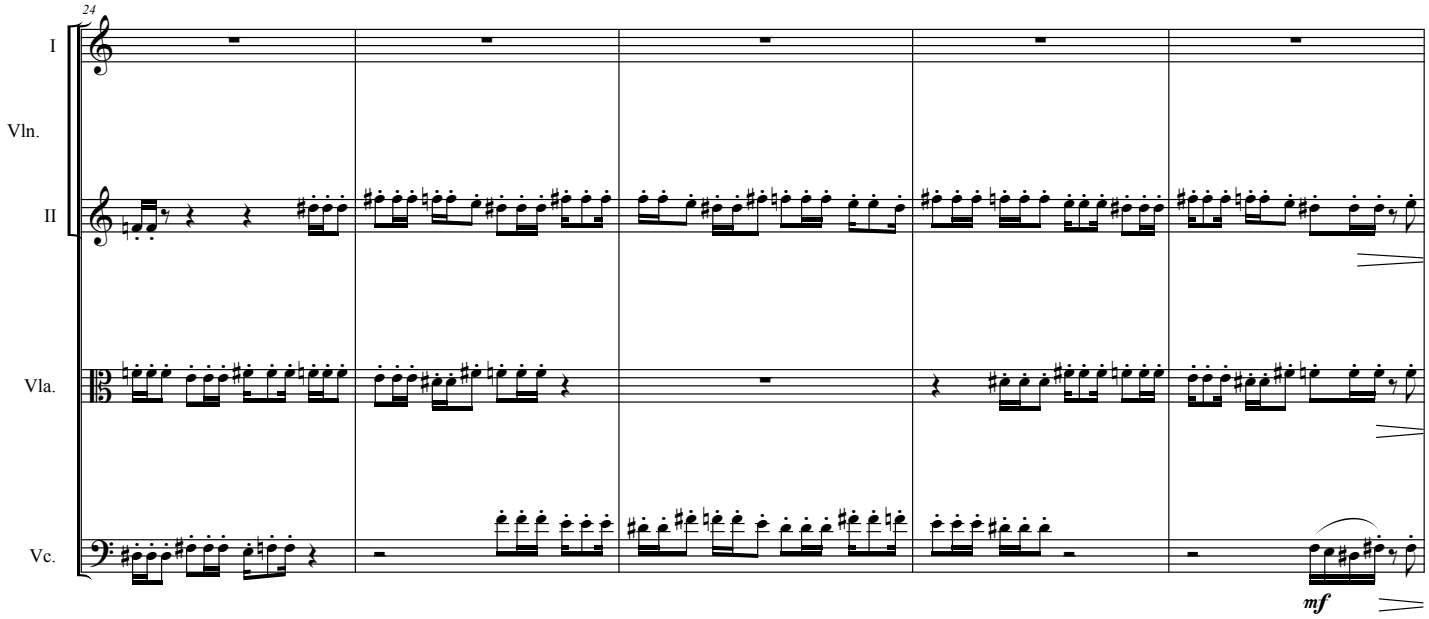
I
Vln.
II
Vla.
Vc.
4
4
mp
p
1
4
2
5
18
0
4
legato
pizz. p
sub. f
3
0
mf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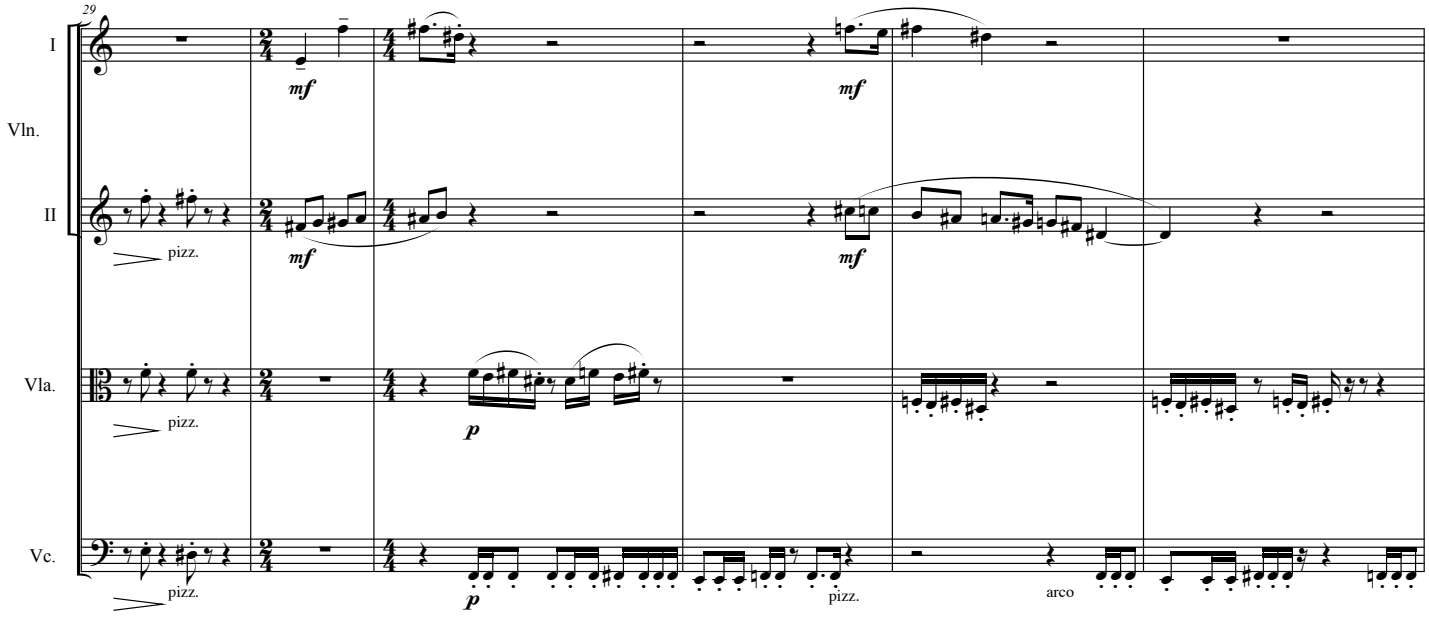
I
Vln.
II
Vla.
Vc.
mf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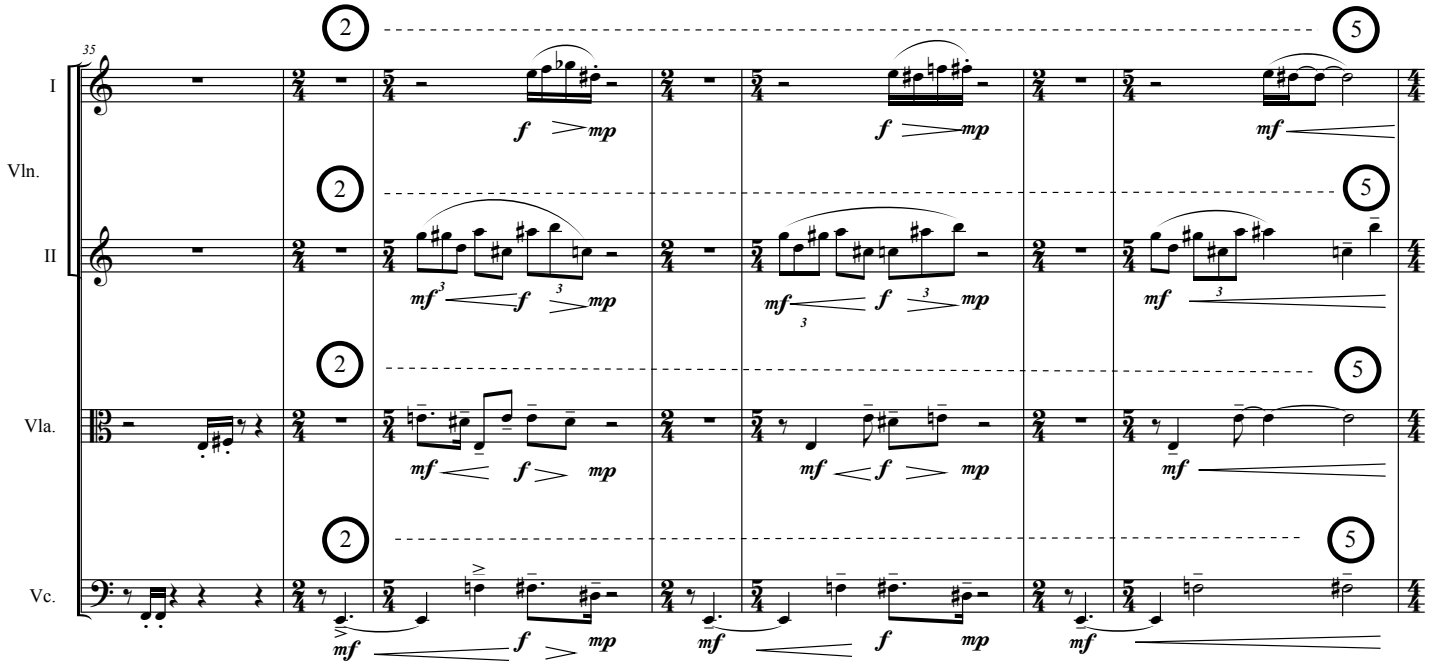
I
Vln.
II
Vla.
Vc.
mf
mf
mf
pizz.
pizz.
pizz.
p
p
pizz.
arco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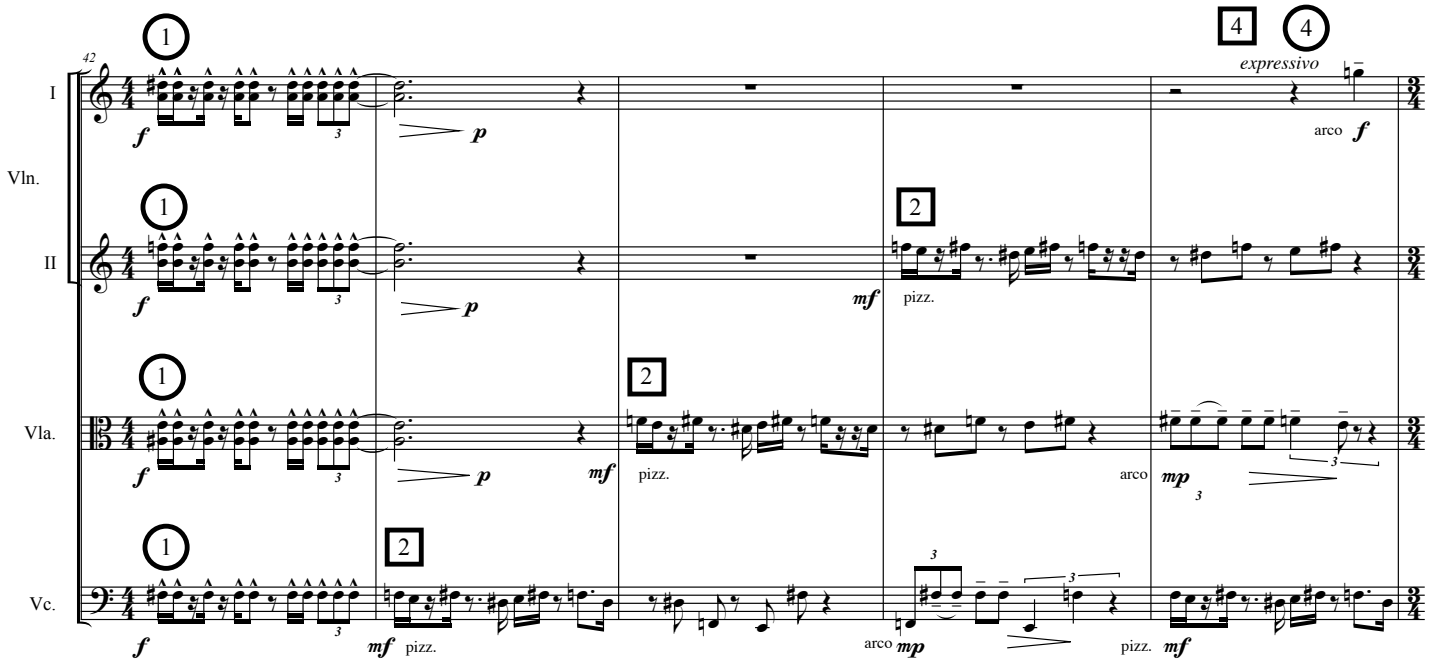
II
Vla.
Vc.
2
5
f
mp
mf
3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I
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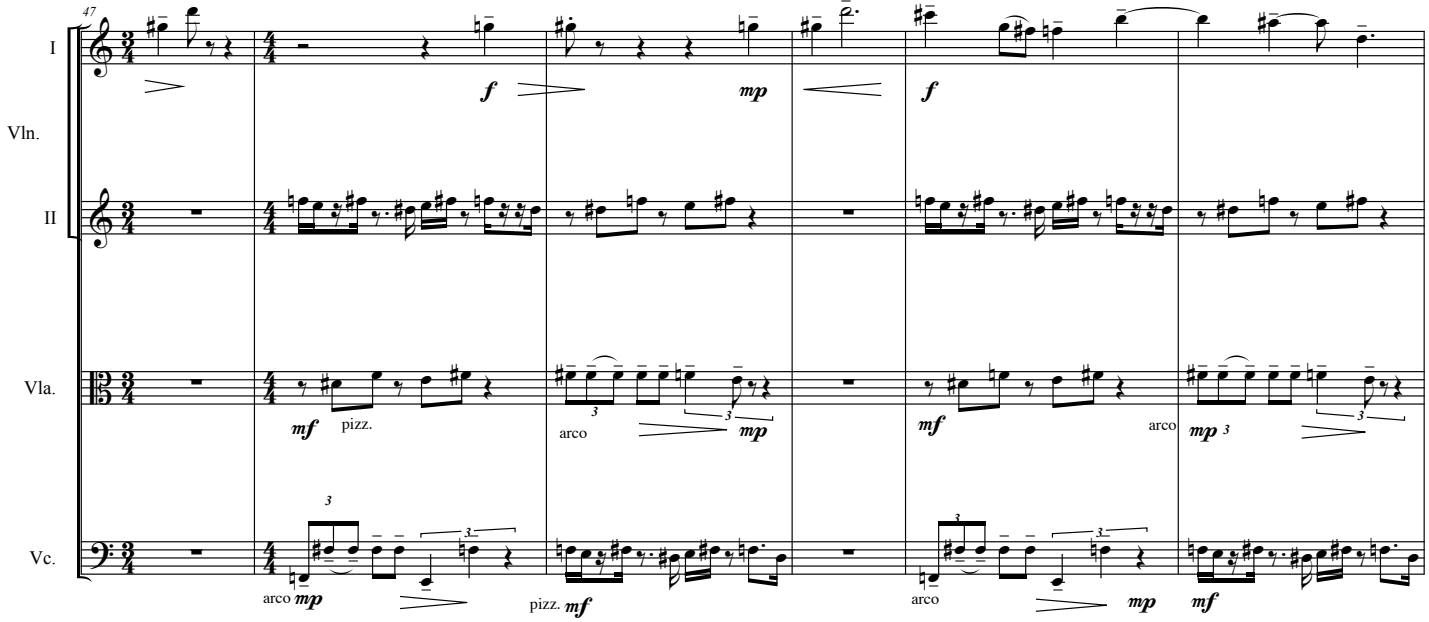
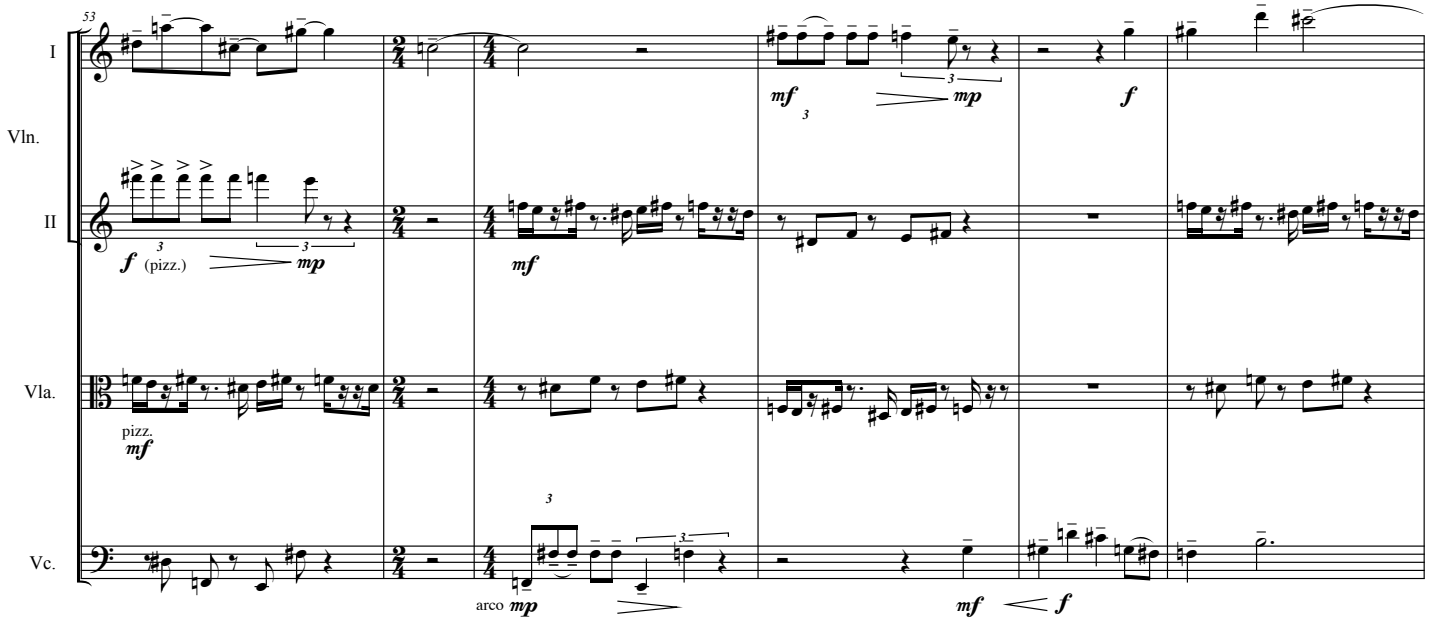
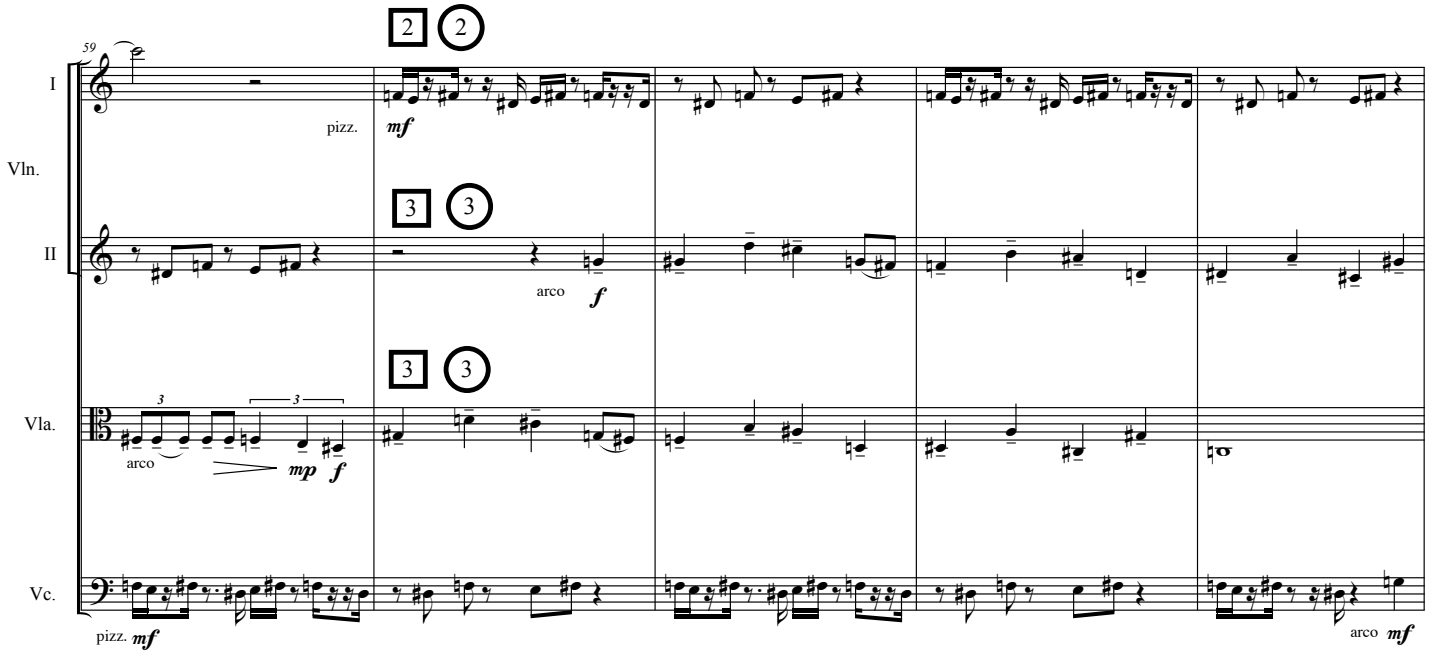
II
Vla.
Vc.
1
2
4
f
p
mf
pizz.
arco
mp
expressivo
3


47
I
Vln.
II
Vla.
Vc.
f
mp
f
mf
pizz.
arco
mp
mf
arco
mp
arco
mp
pizz.
mf
arco
mp
mp
mf


53
I
Vln.
II
Vla.
Vc.
mf
mp
f
f
(pizz.)
mp
mf
pizz.
mf
arco
mp
mf
f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I
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II
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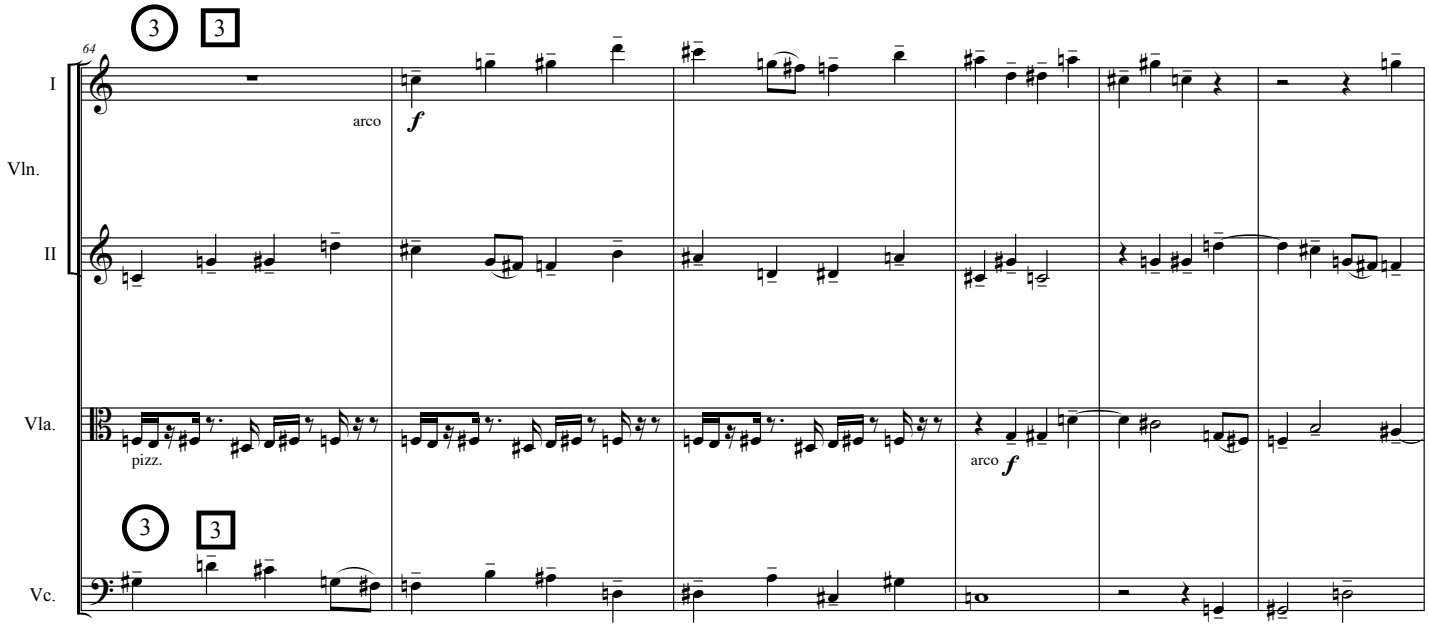
Vc.
pizz.
mf
arco
f
mp
arco
mf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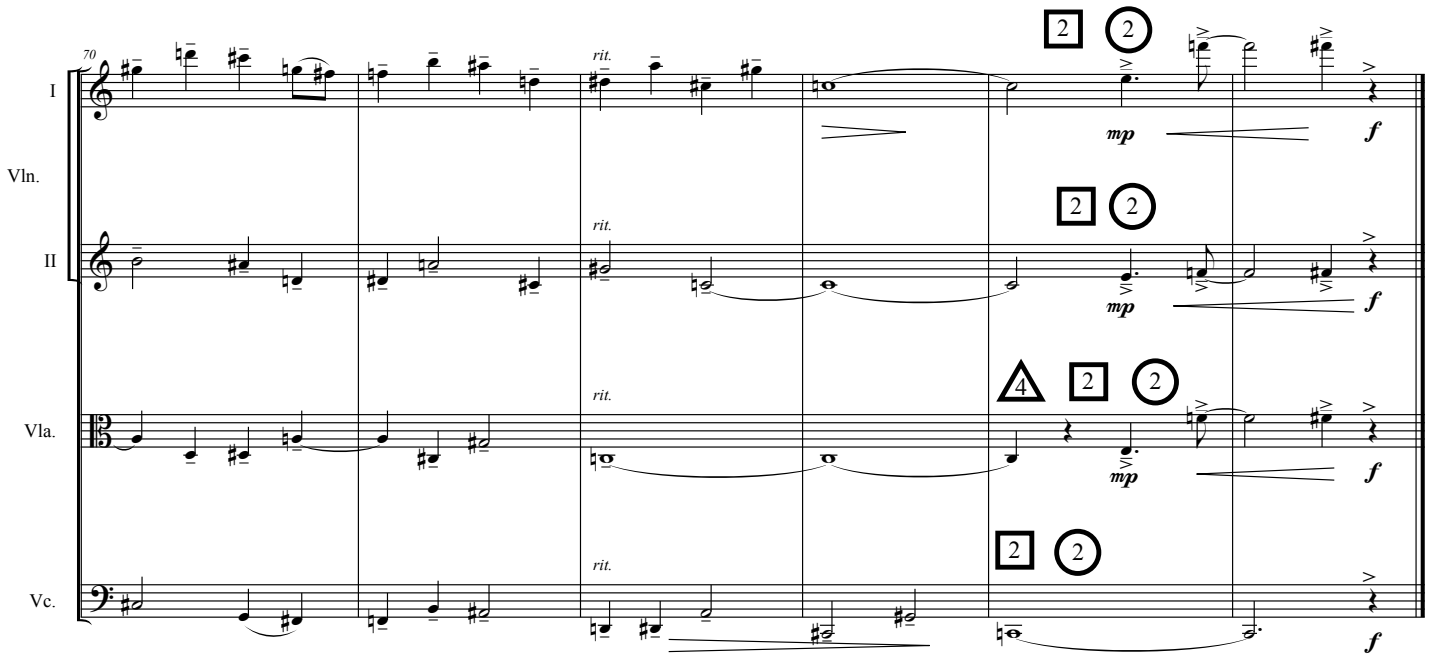
Vln.
II
Vla.
Vc.
arco
f
pizz.
arco
f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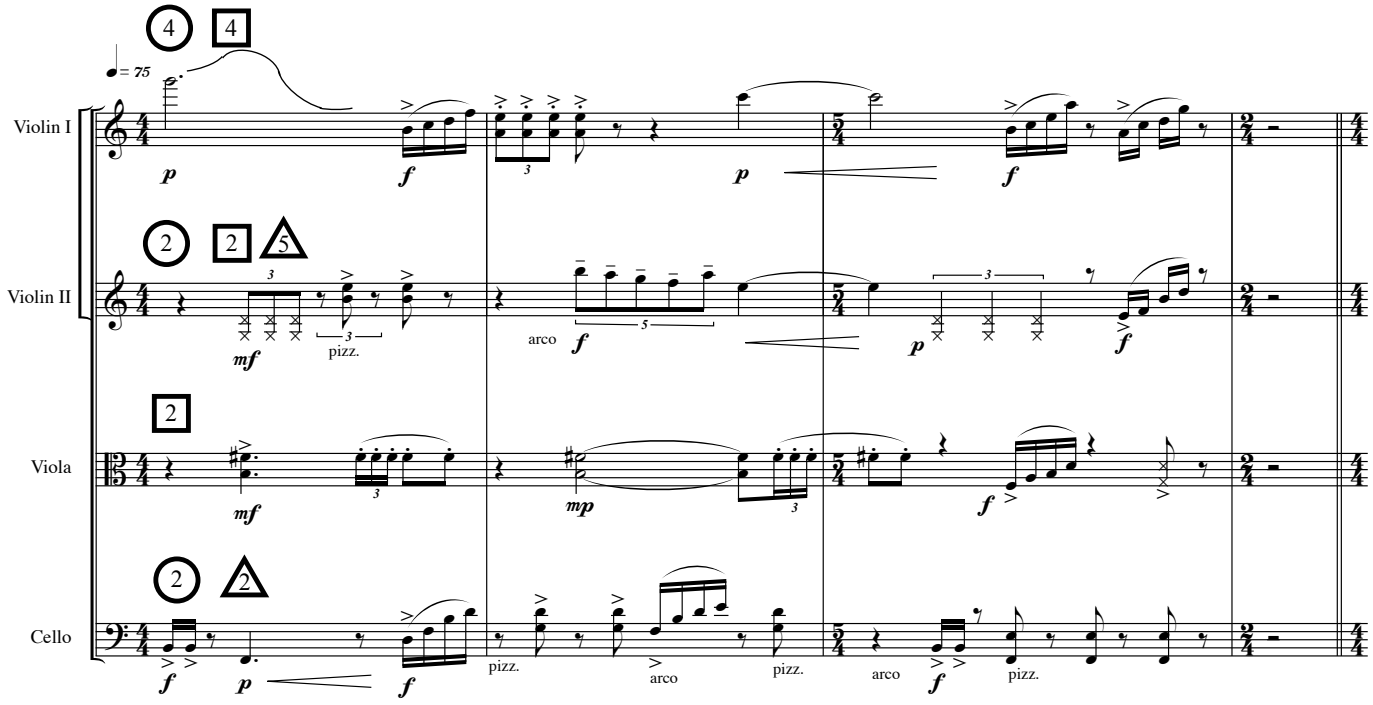
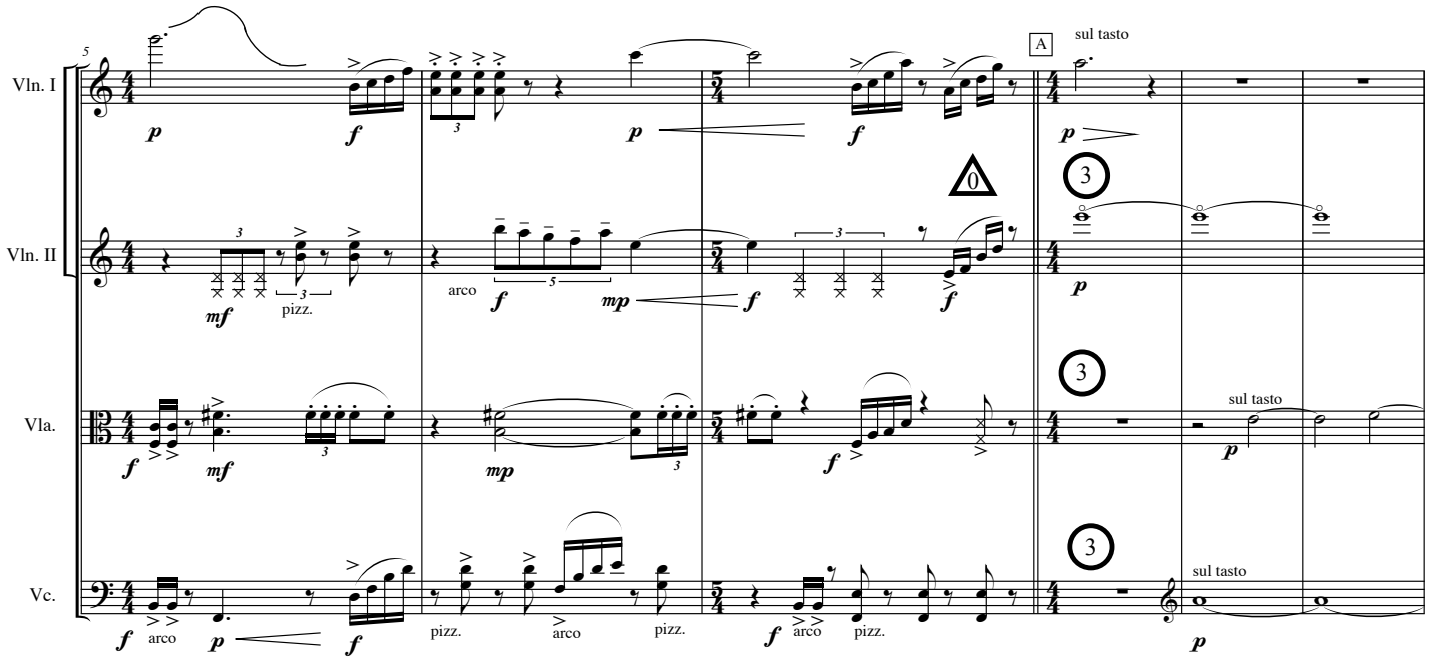
I
Vln.
II
Vla.
Vc.
rit.
mp
f

Electronic String Quartet #1

movement 2

Ted Smoker





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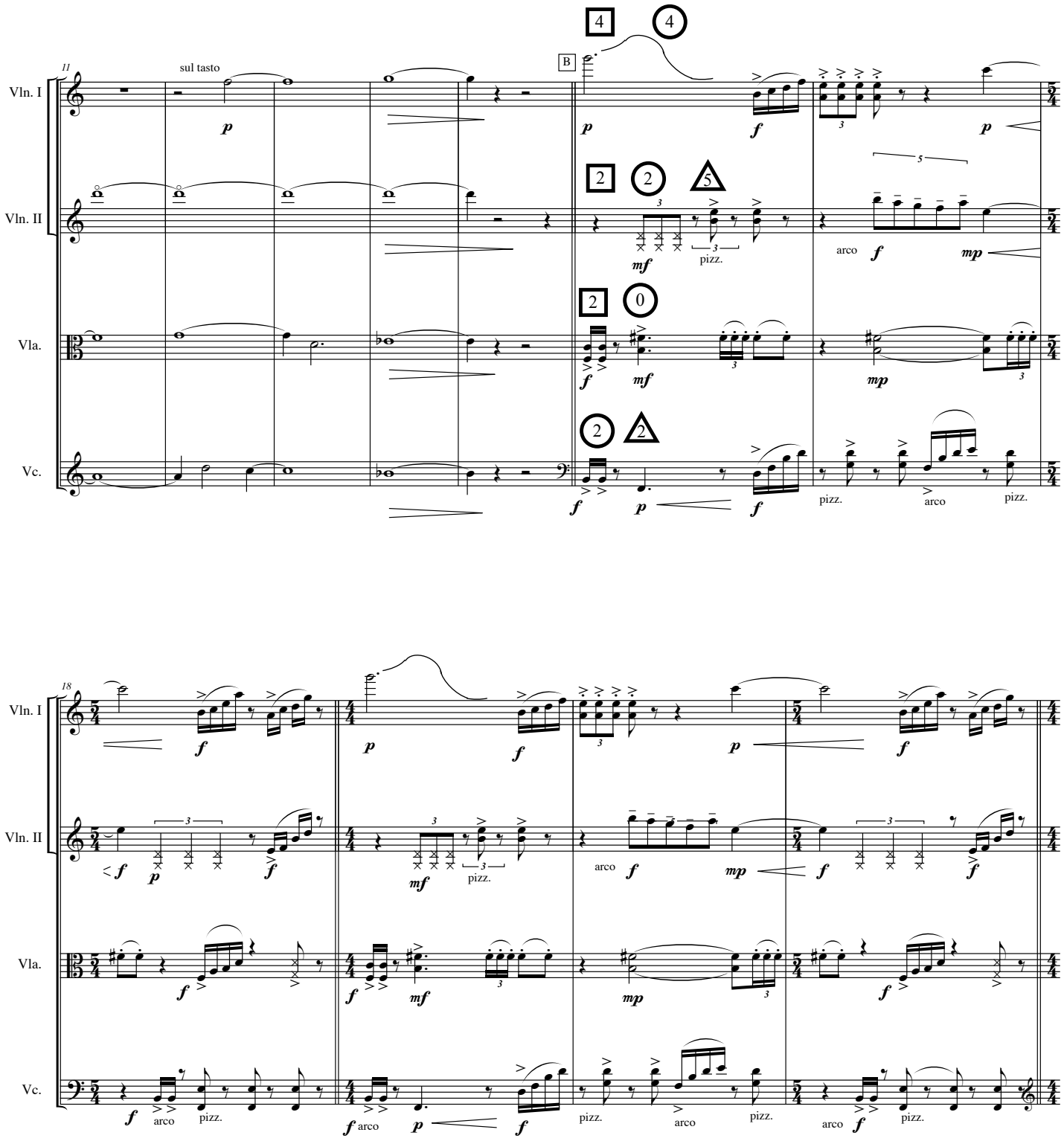
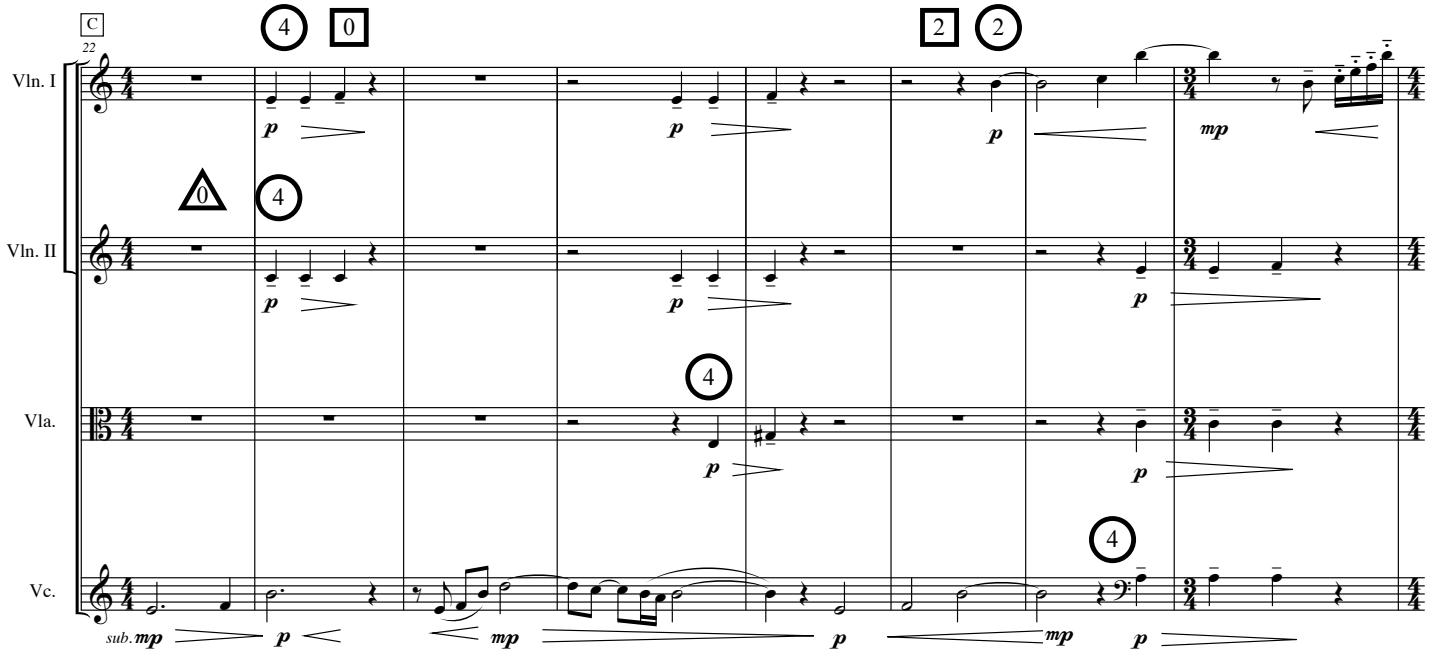
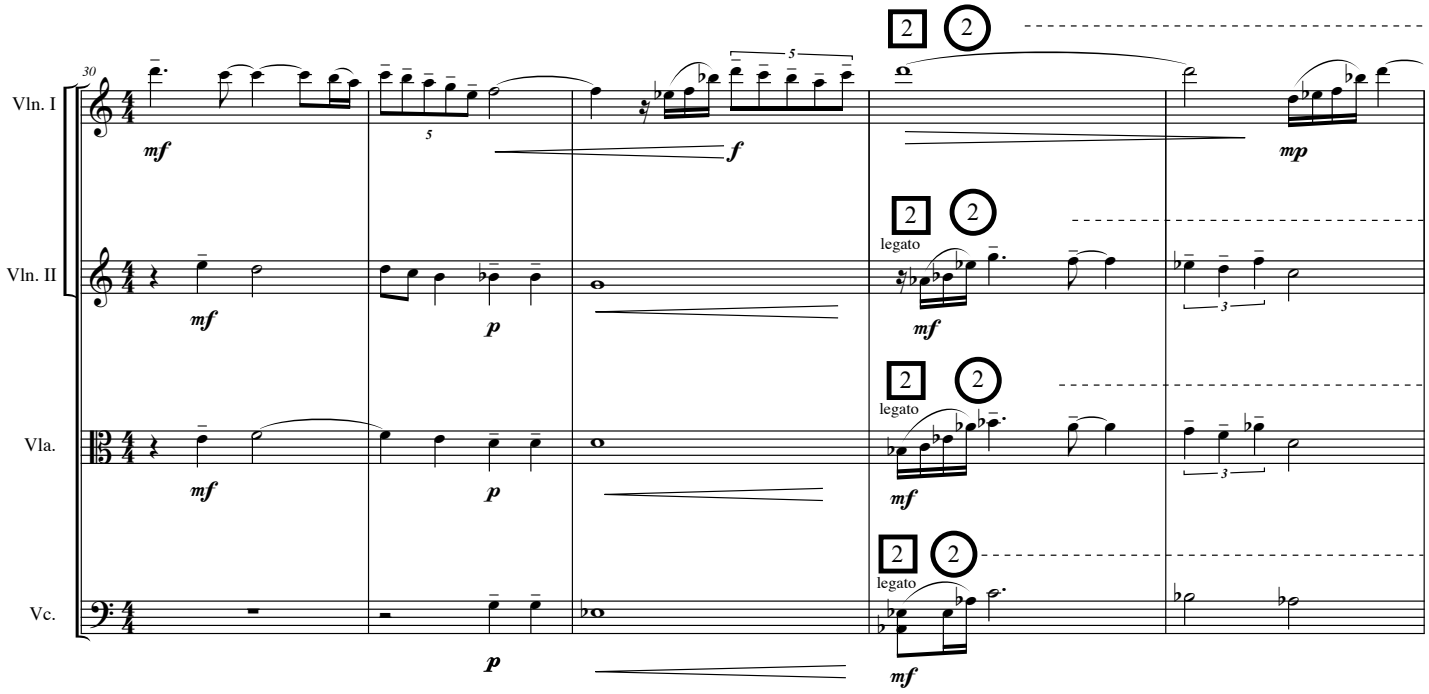
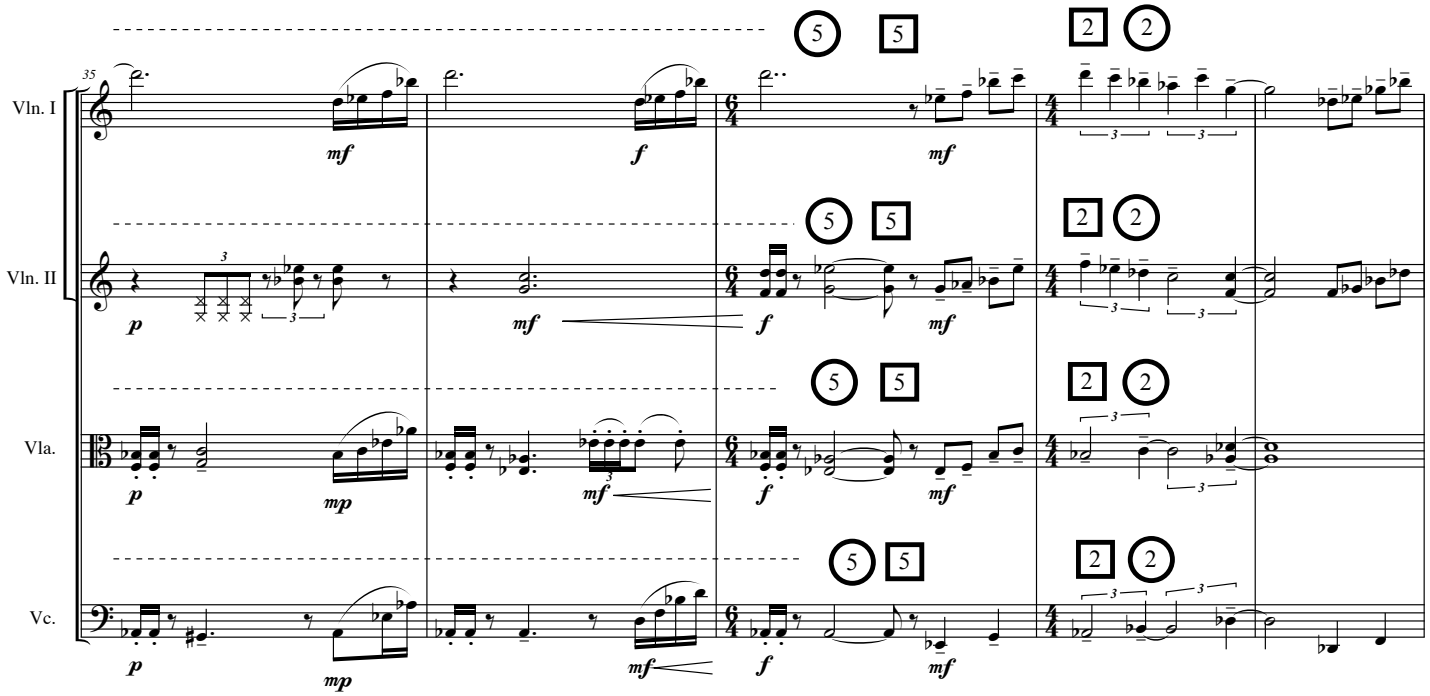

11
sul tasto
B
Vln. I
Vln. II
Vla.
Vc.
pizz.
arco
18


C
22
Vln. I
Vln. II
Vla.
Vc.
sub. mp
p
mp


30
Vln. I
Vln. II
Vla.
Vc.
mf
p
f
mp
legato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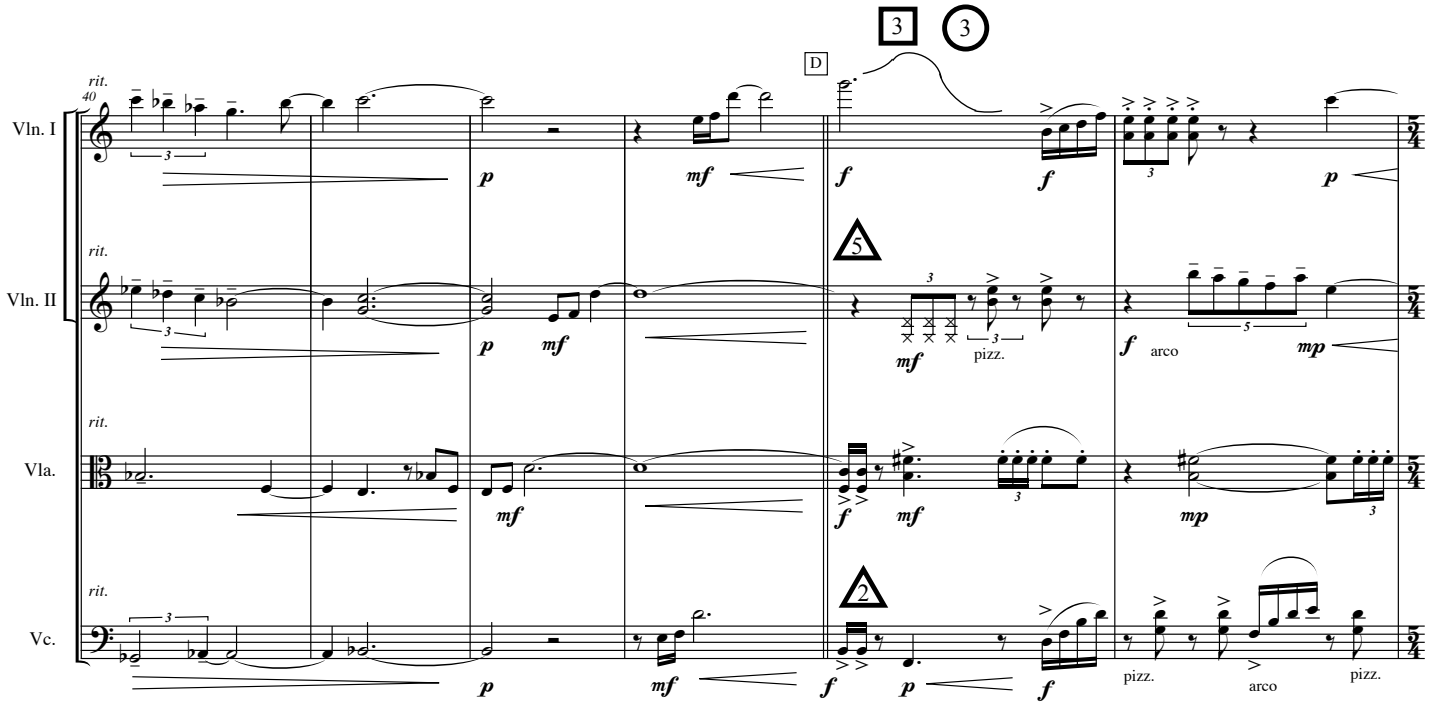
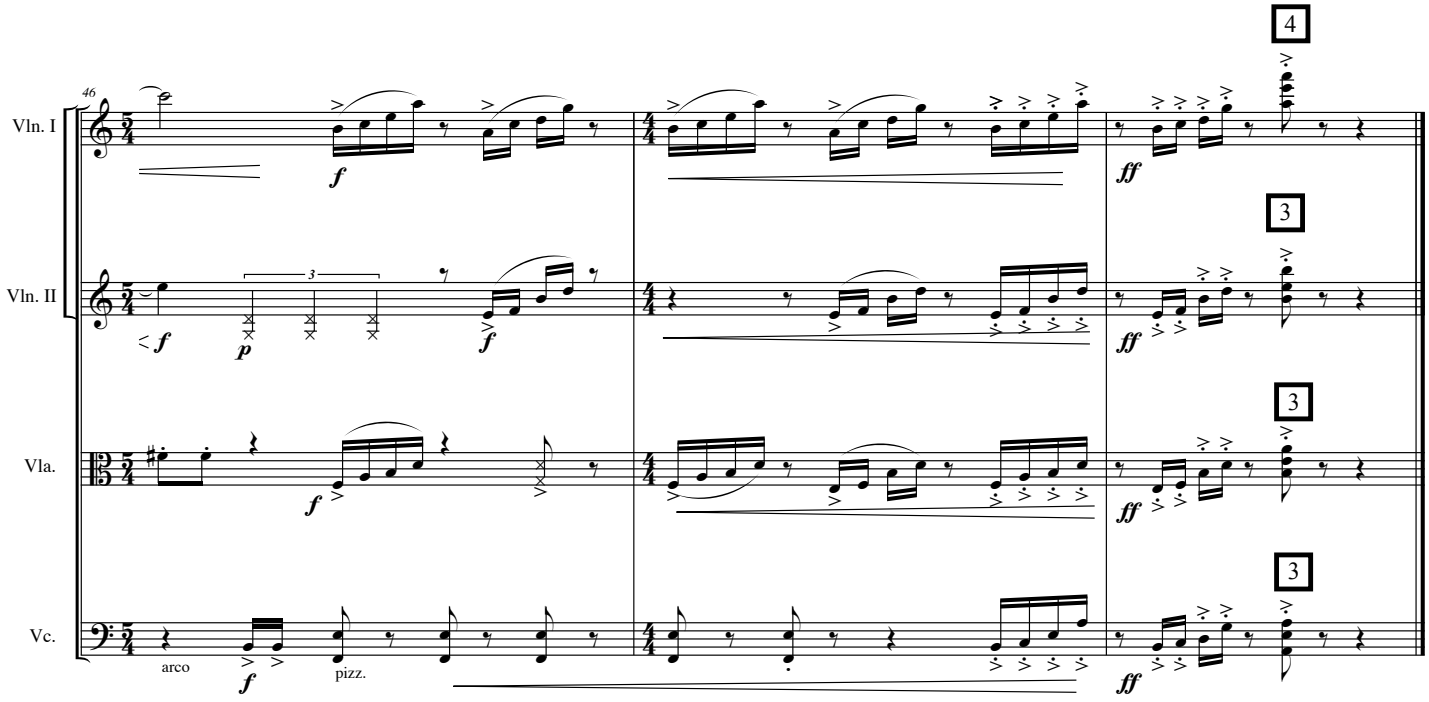
Vln. II
Vla.
Vc.
mf
f
p
mp
5
2

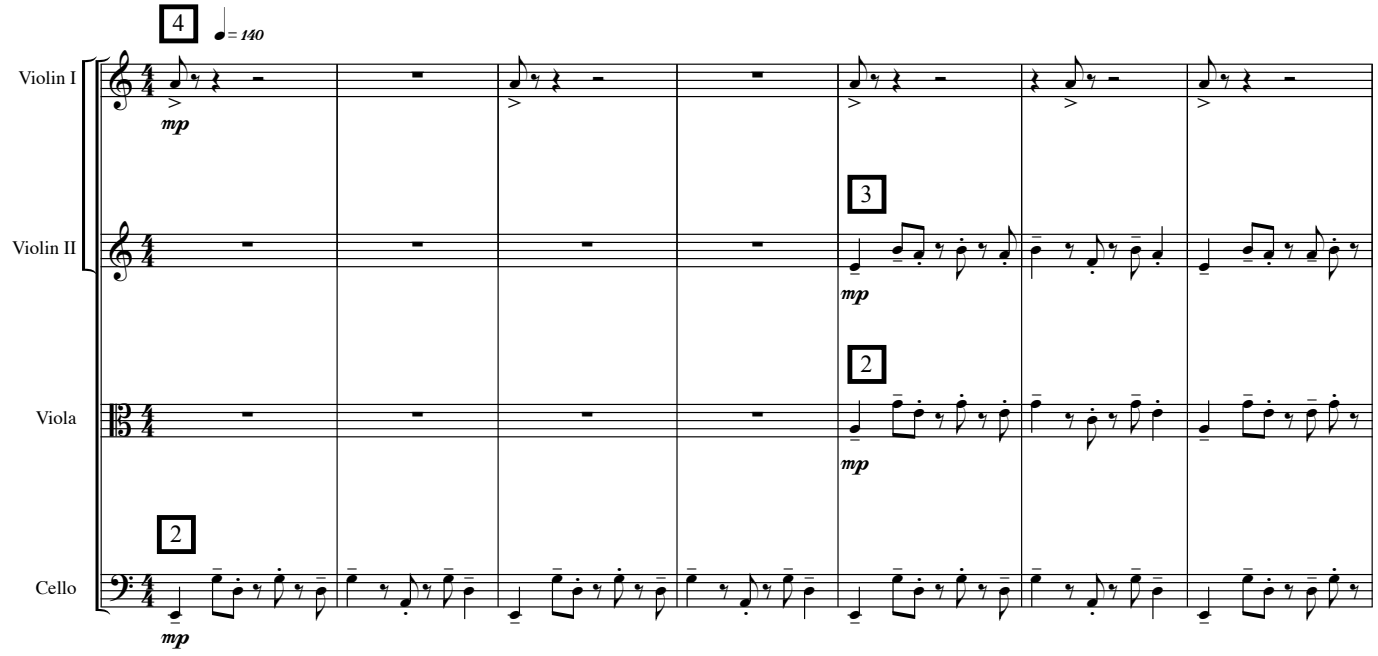

rit.
40
D
3
Vln. I
Vln. II
Vla.
Vc.
p
mf
f
mp
pizz.
arco

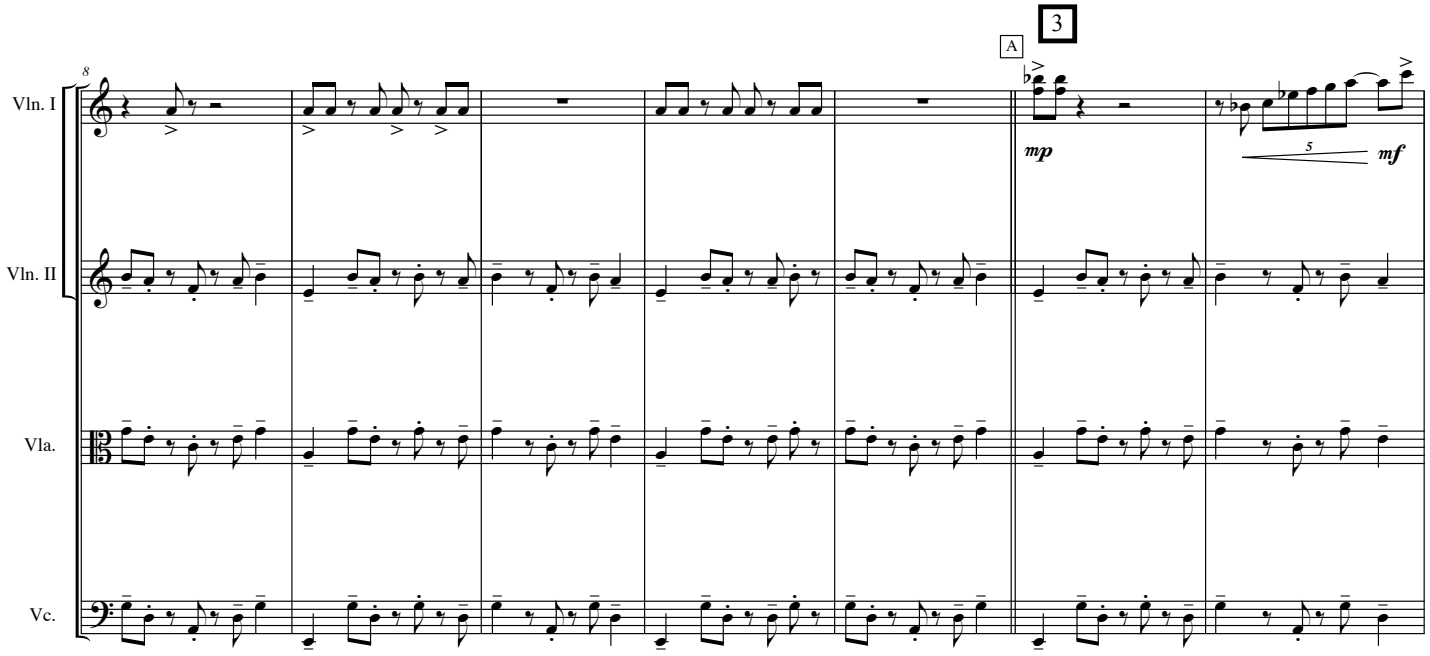

46
Vln. I
Vln. II
Vla.
Vc.
arco
pizz.
4
3
3
3

Electronic String Quartet #1

movement 3

Ted Smoker





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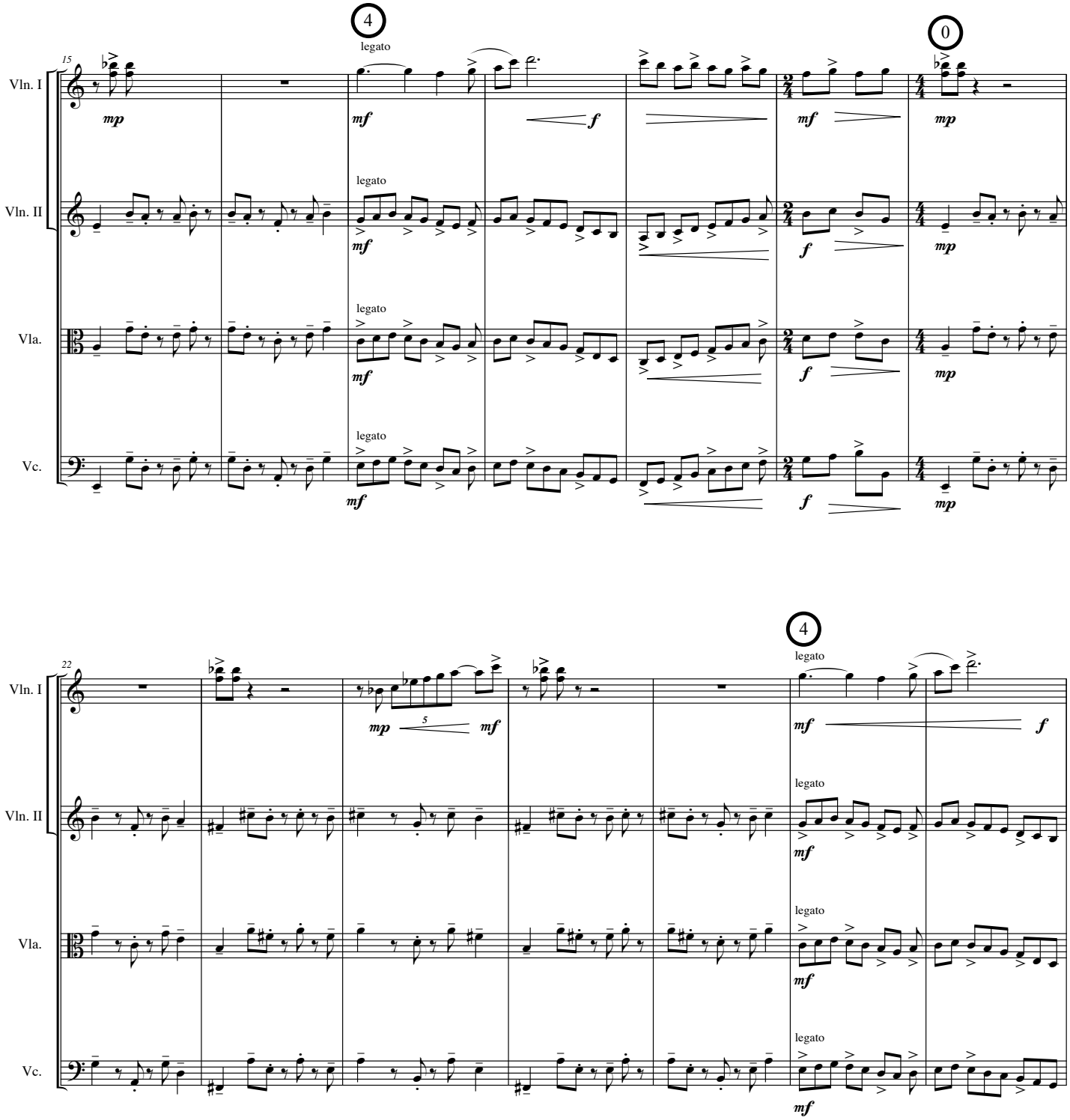
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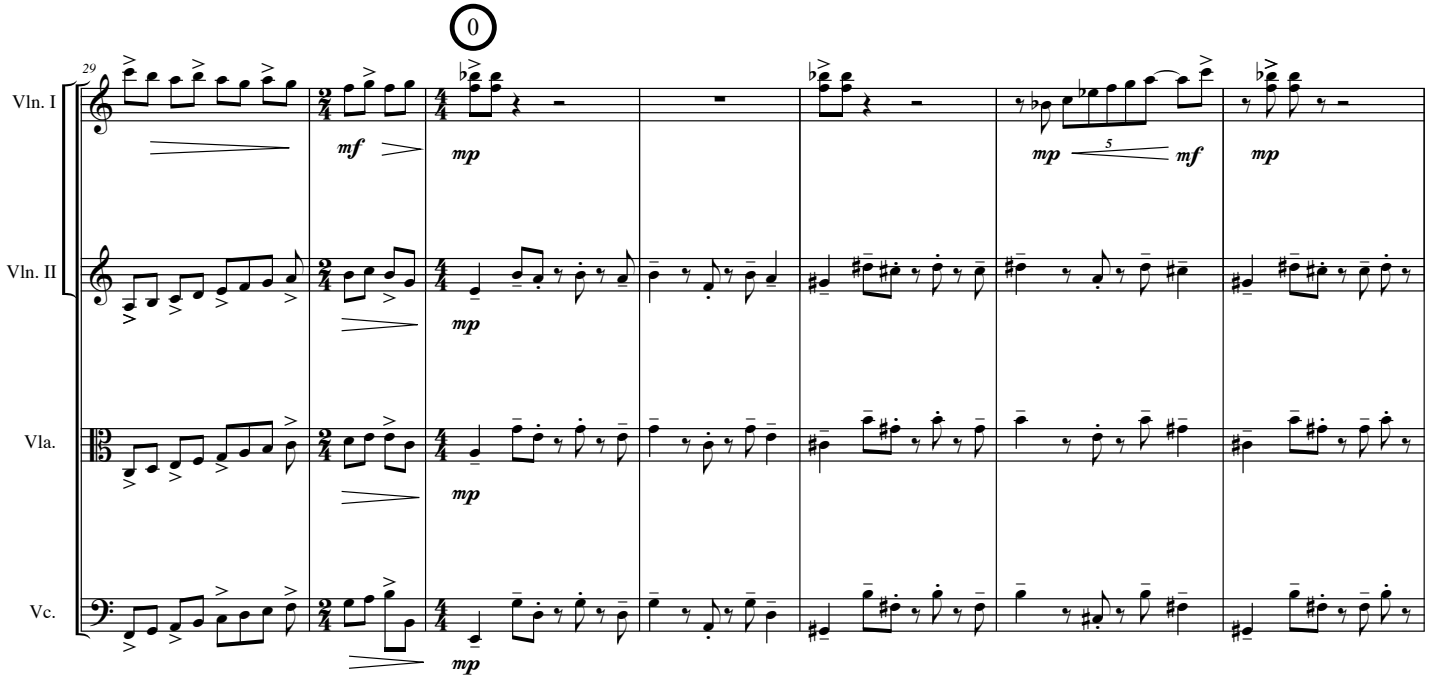
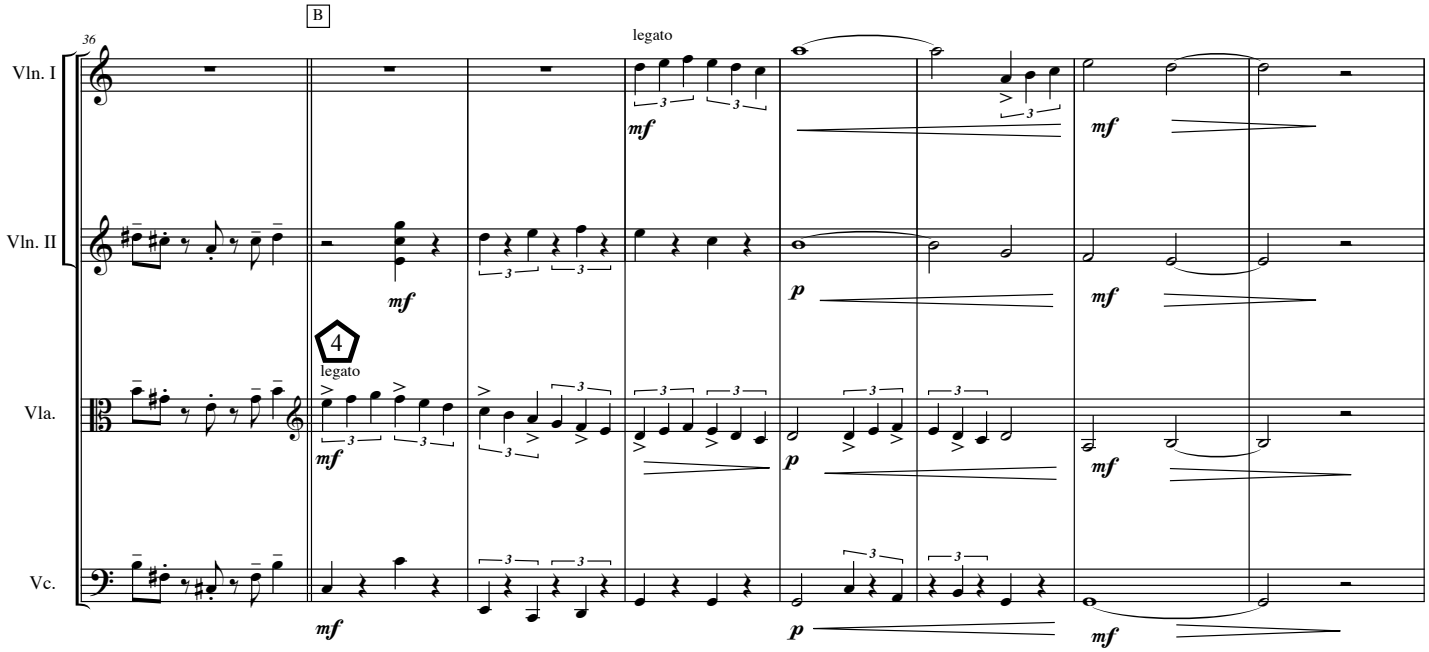
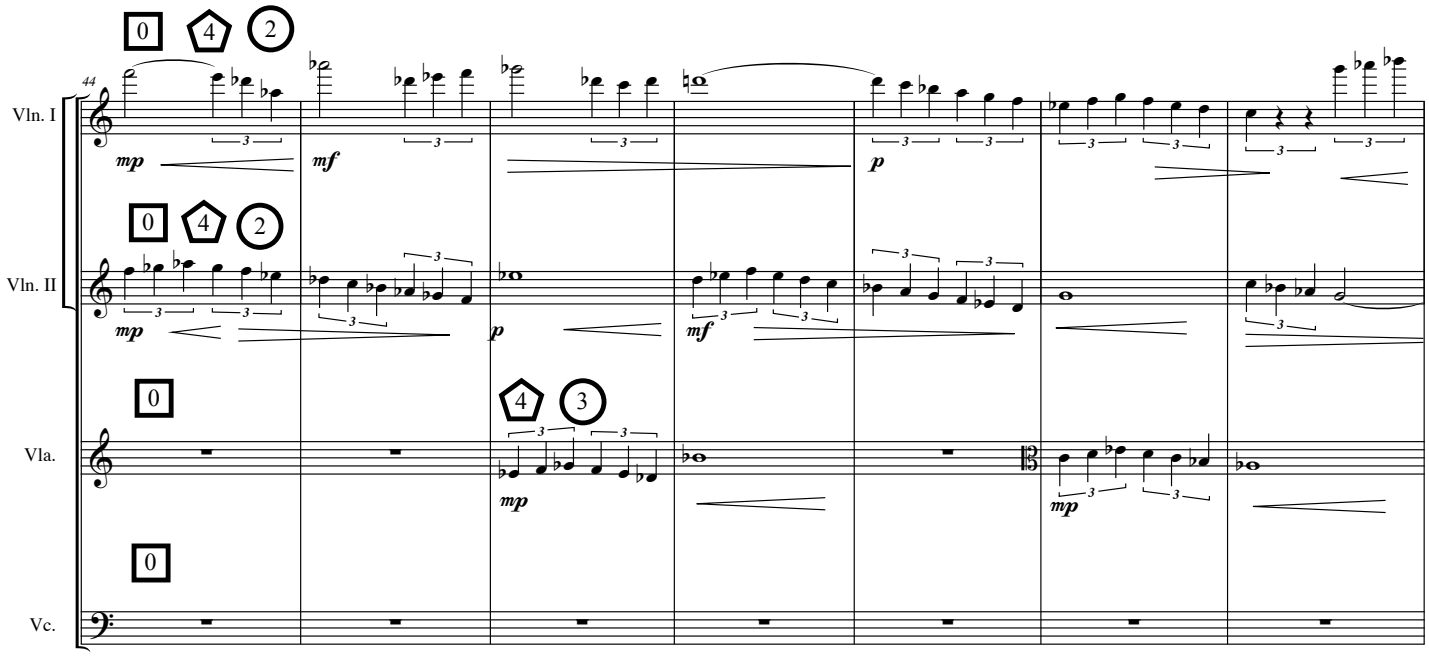
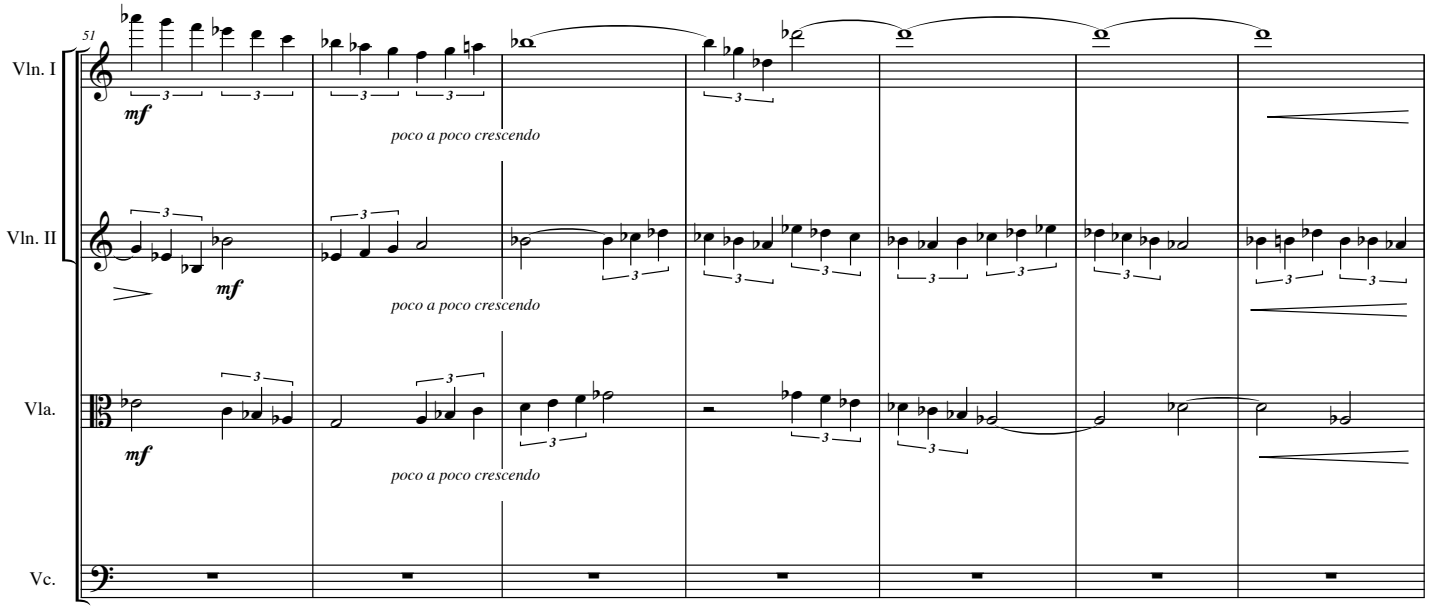
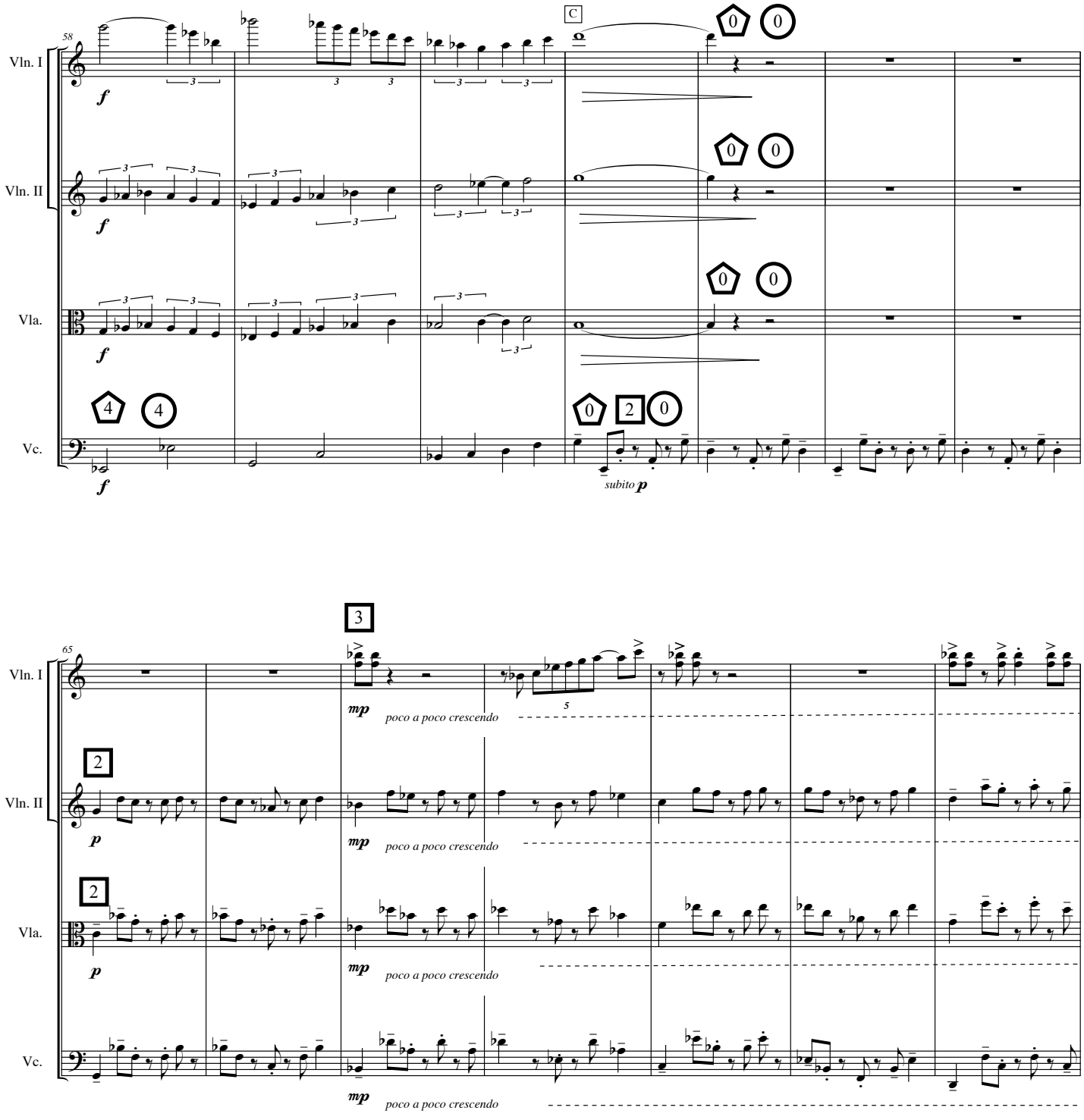
Vln. I
Vln. II
Vla.
Vc.
4
legato
0
mp
mf
f
22
5

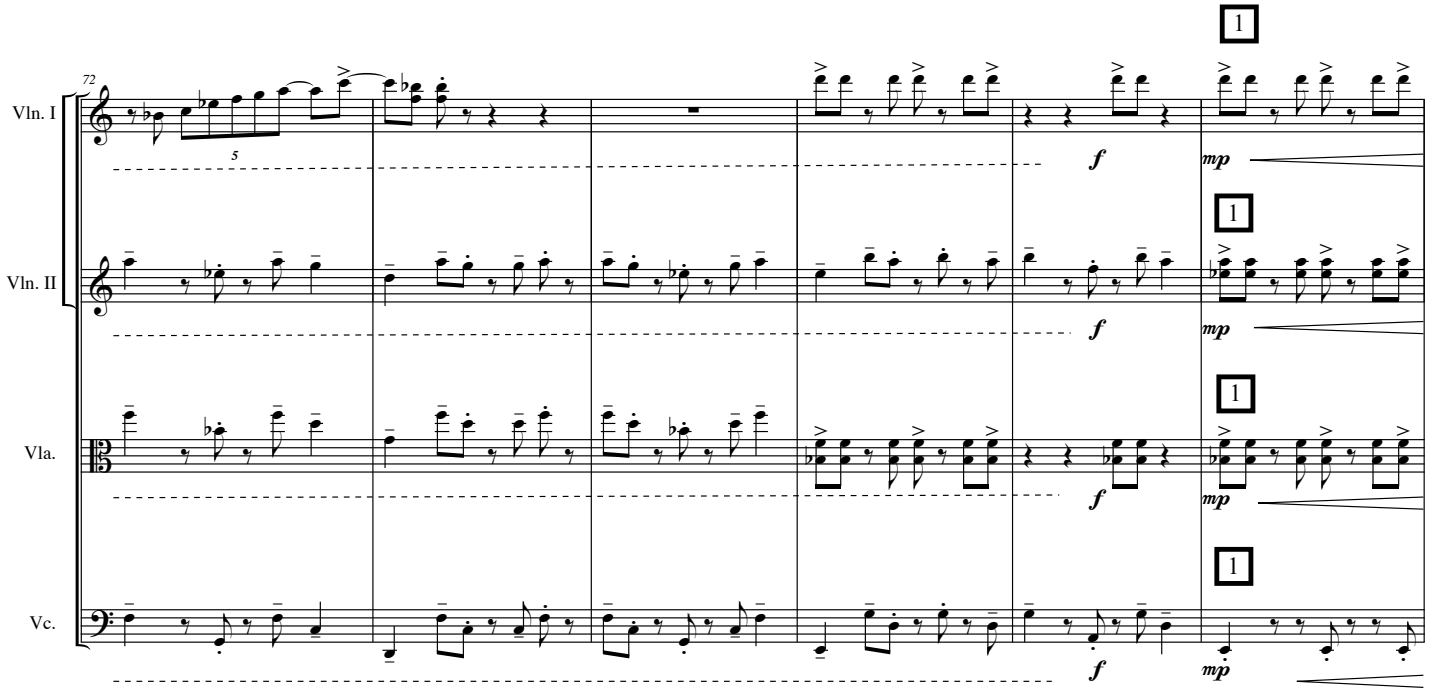

0
29
Vln. I
Vln. II
Vla.
Vc.
mf
mp
mp
mp
mp
5
mf
mp


B
36
Vln. I
Vln. II
Vla.
Vc.
legato
mf
mf
mf
4
legato
mf
mf
p
mf
mf
p
mf
p
mf


44
Vln. I
Vln. II
Vla.
Vc.
mp
mf
p
mf
mp
mp
mp


51
Vln. I
Vln. II
Vla.
Vc.
mf
poco a poco crescendo
mf
poco a poco crescendo
mf
poco a poco crescendo


58
C
Vln. I
Vln. II
Vla.
Vc.
f
subito p
mp
poco a poco crescendo
p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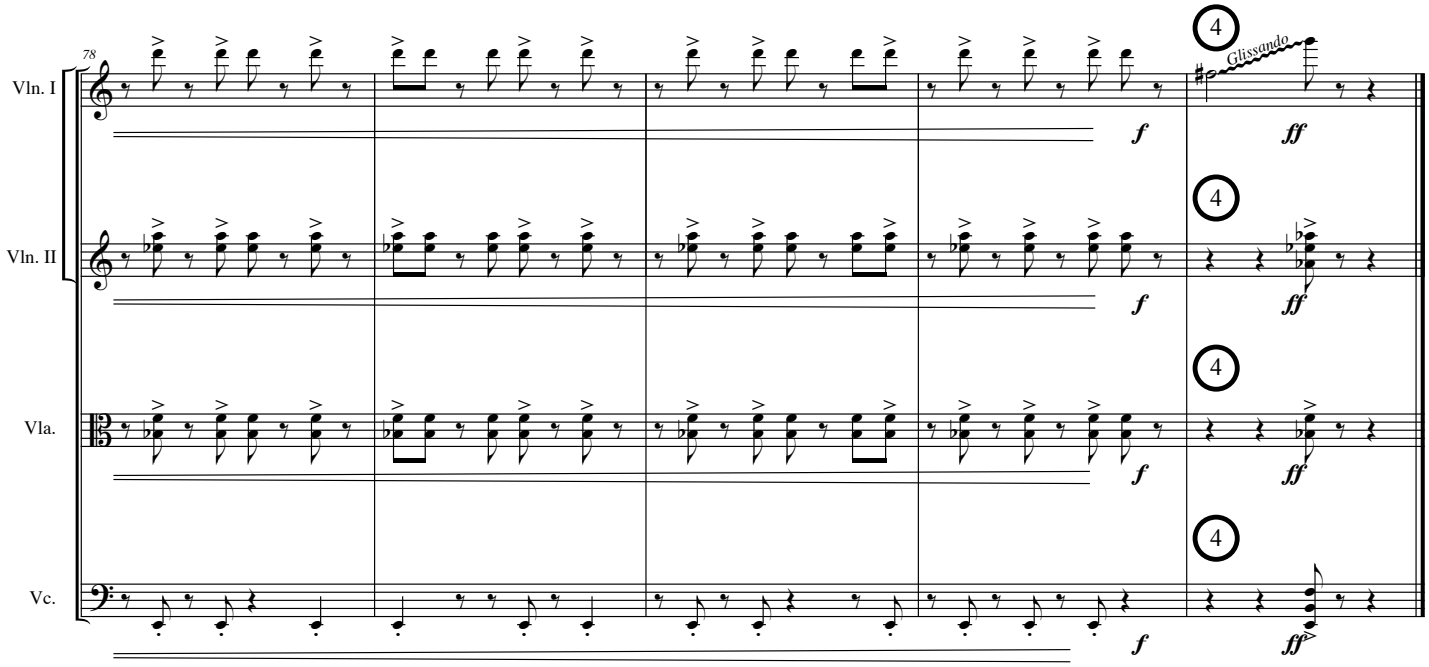
Vln. I
Vln. II
Vla.
Vc.
5
1
f
mp


78
Vln. I
Vln. II
Vla.
Vc.
4
Glissando
f
ff

Analysis Paper

Introduction

Electronic String Quartet #1 is a three-movement work written in partial fulfillment for a Master of Music Technology Degree at Duquesne University. Music technology is an important part of this composition, from the ideas that influenced its conception to the means of its performance. This paper will analyze important aspects of the work and discuss the role of technology in its inception and production.

Technological Aspects

As a result of composing music in a digital medium I have grown accustomed to not only adding effects such as reverb and delay to my music, but also incorporating them integrally in my writing. The goal of Electronic String Quartet #1 was to include these sonic possibilities in an artistic composition for string musicians. Issues arise, however when one attempts to transfer digital recording techniques to live performance. Unlike in a live performance, the atmosphere of the recording studio provides the luxury of working with the material in fine detail. The engineer is able to rewind, pin–point an opportunity for modification, and preview many possibilities before printing the mix. In live performance there is no rewind button; the performance is mixed, mastered, and printed simultaneously.

Another limitation arises when considering dynamic changes in the effects processing. It was my desire to use the technology expressively, controlling it in real-time instead of making a setting and leaving it unchanged for the duration of the performance. However, asking string

musicians to control effects pedals and processors seems implausible knowing that the equipment would be new to most string instrumentalists, if available at all. Furthermore, it would be infeasible to add the task of controlling this equipment to the otherwise intensive concentration required to perform as a quartet. Simplifying or limiting the music in order to facilitate the equipment would be contradictory to the goal of the composition.

The solution to combining quality live performance with dynamic effects processing was brought about in part by the forward–thinking practices of Kronos Quartet. Kronos is a string quartet that has embraced and explored the possibilities of technology in live performance. In his article reviewing a Kronos performance in Ithaca, New York, Paul Lehrman interviewed Scott Fraser, the sound engineer of the ensemble. In many cases it is his responsibility as the "fifth performer" to manipulate the effects processing while the instrumentalists concentrate on their part in the performance (Lehrman 2005).

Electronic String Quartet #1 is intended for a situation like this in which the sound engineer is a vital part of the performance. As a result of the fifth performer, this piece has been written in its full form, without modification to accommodate the technology. The instrumentalists are able to perform instruments they are accustomed to, allowing them to concentrate on performing the music artistically while the effects are controlled responsively and expressively.

Movement 1

The first movement revolves around a four-note pitch set of D-sharp, E, F, and F-sharp referenced as pitch–set A and seen in figure 1. The set is played in

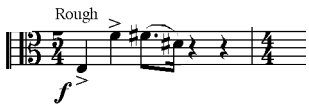


Figure 1, Motif A

various contexts throughout the movement. Sprinkled throughout the movement is a contrary pitch set B as seen in figure 2. This set contains the remaining eight chromatic pitches not already represented in the first set. The movement is not intended to have a tonal center in the traditional sense but replaces the notions of tonic and dominant with these pitch sets. A third pitch–set is introduced near the end of the movement. It uses all twelve tones in a melodic canon, though it is not at all obedient to the strict rules of twelve–tone theory.

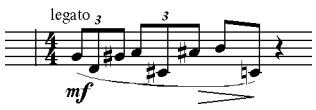


Figure 2, Pitch–set B

The first section introduces the materials to be developed throughout the rest of the movement. The opening motif, motif a, is seen in figure 1 and begins on a minor ninth. This interval evokes strength and boldness, a characteristic that continues throughout the movement. This statement is followed immediately by a pacifying answer of pitch–set B. The section ends on one of only two moments in the piece in which each of the four tones of pitch–set A are played simultaneously, forming a sort of pitch class tone cluster. This can be seen in figure 3.

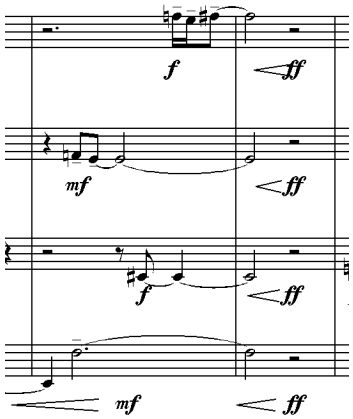


Figure 3, Pitch–class cluster

In the second section, each tone of pitch–set A is repeated to create a sixteenth-note pulse. Digital delay is used here in order to highlight this pulse and the cello is effected by a filter sweep, giving it an added dimension of motion. This sixteenth-note texture is contrasted with a short legato passage of the upper two instruments consisting of set B and set A in counterpoint. The original motif A occurs once in the violin part in measure 30 and in the cello part from

measure 36 to the second occurrence of the quasi-cluster in measure 40. This second and final appearance of the four pitches played simultaneously is expanded through the use of a lower tri-tone in the upper three voices.

The third section is characterized by the repetition of a three-measure canon in the lower voices while the violin 1 plays a melody that, for a variety of reasons, seems out of place. The most apparent cause of this is that it seems distant and somewhat otherworldly as a result of the reverb and delay effects. It also introduces the third pitch set, incorporating all the tones of the chromatic scale. Finally, through a series of "interruptions" in the canon, the violinist seems like an outsider eager to join an exclusive conversation.

The abrupt interruptions of sound are influenced by a technique of music technology – the art of turntable manipulation by hip-hop DJ artists. By stopping and starting a pair of phonograph turntables, DJ's blend smoothly the sound of two distinct recordings. This style has been revisited using digital techniques, such as that of the compositions of BT.

The section eventually disintegrates into a legato fugue of pitch–set C. As before, the section ends with an augmentation and finally three of the four notes of the opening motif are played to finish the piece.

Movement 2

"The more intense a sound or texture is, the less you can endure it over a period of time."

This quote by Rimsky Korsakov inspired the second movement of the Electronic String Quartet #1. The movement opens with only three measures of a densely-packed texture. This intense segment, incorporating a wide variety of sounds and phrases incorporating all of the instruments is repeated in its entirety at various points throughout the movement. The complicated nature of this brief section is enhanced by the use of digital effects. Although foreign and difficult to comprehend at first, this section possibly becomes the most anticipated part of the movement.

The repeated use of a very short segment hints at one common trend in music technology sometimes called loop recording. This technique, born from the digital age and more recently popularized by Apple Computer's "Garage Band, " consists of segments of recorded material that are recycled and mixed creatively to form a new piece of music.

The opening three measures will be referred to as the A section which is printed in its entirety below (figure 4). This section contains an incredible variety in rhythm, dynamics, tessitura, and playing techniques. One notable motif appears at the end of the first measure. This motif

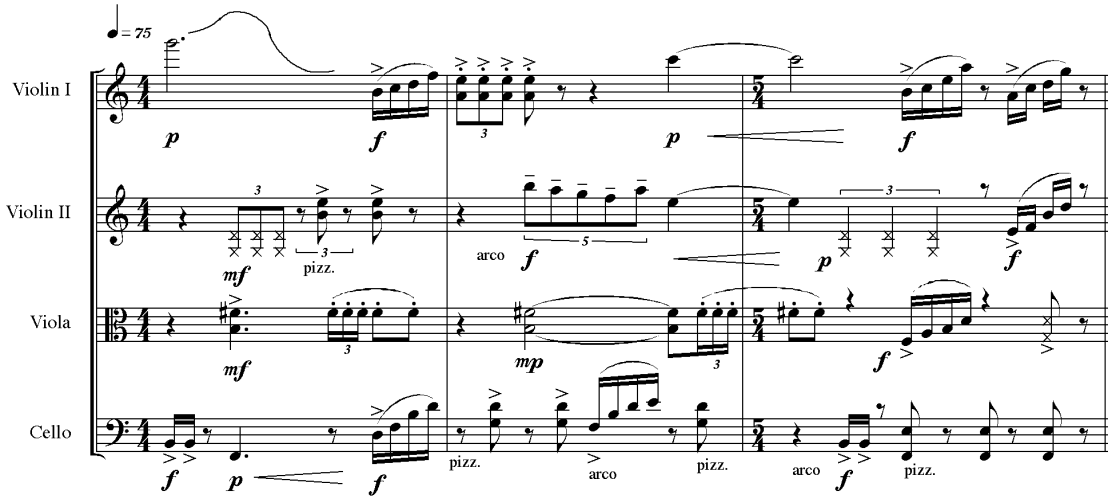


Figure 4, Section A

consists of ascending sixteenth notes in parallel motion and is used often throughout the movement. Another prominent feature of the A section is the quintuplet motif found in the second measure.

After repeating the first three measures, the music moves to the contrasting B section. This section is played *sul tasto* (on the fingerboard) and is characterized by sustained whole notes. The section begins on open fifths of D and A and resolves to an E-flat major seventh chord with the fifth in the bass.

Section A is again repeated twice in measures 16 through 22 before section C begins. This is by far the longest and most harmonically functional section of this movement. The tonal center is at first obscured by the heavy use of quartal chords, but eventually the harmony clearly points to the F Lydian mode. In a number of occasions the tri-tone above the root is used in what could otherwise be identified as a major triad as seen in figure 5. Though some might analyze this as a sharp eleventh chord, I prefer to think of it as a sort of Lydian triad because of its distinctive modal sound. Examples of this chord appear in measures 29, 33, 35, 38, 39, and 40.

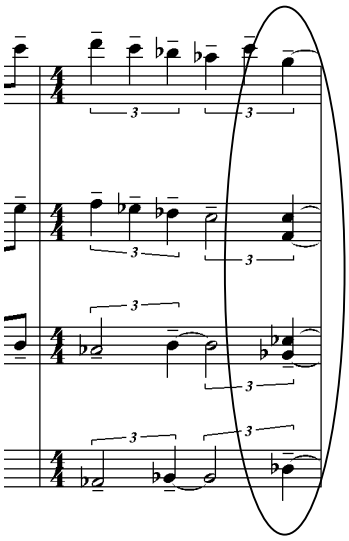


Figure 5, Lydian chord

A progression of Lydian tonicizations descends through the circle of fifths in measures 32-41. During this time the opening of section A is briefly quoted. The progression of tonal centers would predictably lead to a C-flat Lydian in measure 41, but instead the cello produces a false

cadence with an unexpected B-flat, seen in figure 6. After a short transition, the opening A section is at last repeated to end the movement.

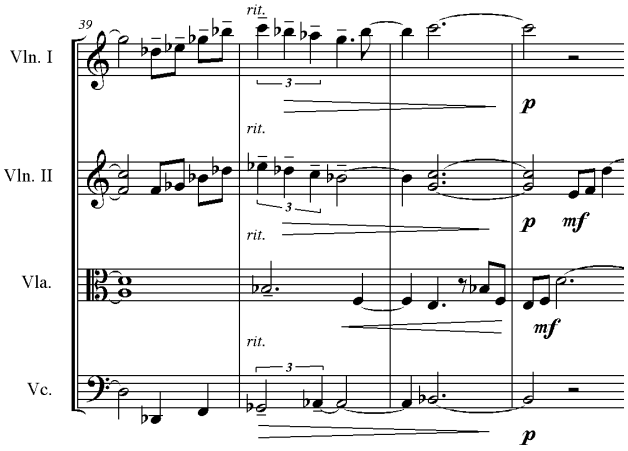


Figure 6, False Cadence

Movement 3

Movement 3 is a sort of dance movement comprised of a parallel ostinato played by the lower three instruments and percussive effects added by the violin and delay effects processor. After the opening introduction, phrase A is stated by the violin in the key of B-flat juxtaposed against the E Phrygian ostinato. The second phrase of the period is in C Major and is accompanied by parallel major triads running in scalar motion. This second phrase contrasts the steady metrical dance rhythm of the other phrase by colliding duple and triple rhythms in succession.

The period is repeated three times, each time the ostinato is modulated up a whole step. The second section develops phrase B through augmentation and modulation. This section explores a number of major key centers, including C, D-flat, B-flat, A-flat, G-flat, and culminates with the entrance of the cello in the key of E-flat. After establishing this key, the piece quickly reverts

back to the opening ostinato in E Phrygian, which modulates rapidly and builds to a dramatic close through the use of irregular eighth-note rhythms.

Conclusion

Electronic String Quartet #1 is a true integration of technology with artistry both in its inception and its production. The merits of this piece do not rest solely on the fact that it has incorporated technology, nor is the piece complete without the intended technology. Music technology is and will continue to have a paradigmatic influence on the history of music theory. It is my hope that this piece will be one contribution to that end.

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