

for 17 instruments

by

Matthew William Goodheart

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy

in

Music

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Ken Ueno, Chair
Professor Cindy Cox
Professor Edmund Campion

Spring 2013

Copyright © 2012 Matthew William Goodheart

All rights reserved

Abstract

for 17 instruments

by

Matthew William Goodheart

Doctor of Philosophy in Music

University of California, Berkeley

Professor Ken Ueno, Chair

For 17 instruments is a musical composition for large mixed ensemble. The work explores microtonality through the use of multiple tuning systems based on instrumental acoustics, and audience-performer relationships through the use of immersive staging.

Instrumentation:

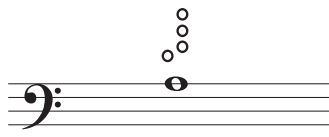
Flute, doubling alto
 Bass clarinet
 French Horn (straight mute)
 F Tuba (straight mute) - tuned 31¢ flat
 Vibraphone (5 soft mallets, 4 medium mallets, 2 bows)

3 first violins - 1st scordatura
 3 second violins - 1st scordatura
 3 viola - 1st scordatura
 2 celli (mutes)
 contrabass (mute)

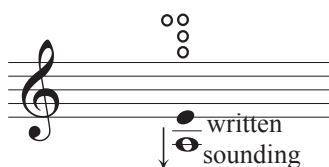
Tuning:

Brass:

Tune the open A (5th partial) of the Tuba



to the 7th partial A (concert) of the French Horn



so that the Tuba will sound 31¢ flat (septimal comma).

Strings:

All string instruments should be tuned in pure 5ths (or 4ths in the contrabass), making no adjustments for equal temperament. For all string instruments, except Violins I - 1 and II - 1, and Viola 1, A = 440.

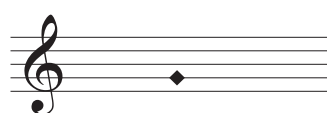
Violins I - 1 and II - 1, and Viola 1 are scordatura a septimal comma lower than usual, or approximately 31¢ flat, (about a 1/6th tone.) To achieve the proper tuning, match the first harmonic (second partial) of the G string of these instruments instrument to the 7th partial harmonic of the A string of the contrabass.

The partial (overtone) series for the A string of the contrabass is notated as follows (note that the open string is considered the "first partial"):



The seventh partial G is flat from equal temperament. With the bass sound this pitch, the affected violins and viola can match this note with the 2nd partial (octave G natural harmonic) of the G string.

violin/viola G string harmonic used to tune to bass



Once this string is tuned, the players can then tune the rest of their instruments in pure 5ths, using the G string as a starting point, so that the entire instrument ends up slightly flatter than normal.

Notations

All triplets are eighth note triplets, all quintuplets are sixteenth note quintuplets.

crescendi



A dynamic marking within the arms of the end of a hairpin crescendo indicates the ultimate loudness reached at the instant of release.



Unless otherwise indicated, the initial dynamic should be returned to at the end of a swell.

microtonal notations

♯ = 1/4 tone sharp

♯ = 3/4 tone sharp

♭ = 1/4 tone flat

With scordatura string instruments, quarter-tone notations indicate pitch deviations relative to the tuning of the instrument. A quarter-tone sharp notation on an instrument tuned 31¢ flat will sound approximately 19¢ sharp (a little less than an 1/8th tone) when compared to equal temperament.

Brass specific microtonality:

Microtonality in the brass instruments is indicated through the use of valve notations in conjunction with the approximate sounding pitch. No further adjustments are required.

♯ = 11th or 13th partial, approximately 1/4 tone sharp

↓ = 7th partial, approx. 1/6 tone (31 ¢) flat

♯ = 11th or 13th partial, approximately 3/4 tone sharp

vibraphone

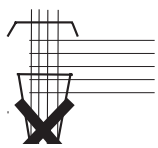


= leave pedal down until note naturally dies away.



= tone bar should be muted with finger when struck.

string notations



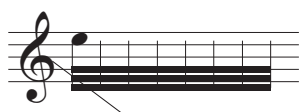
Muted bridge clef, indicating placement of the bow relative to the bridge and fingers. The X represents the performer's left hand muting the strings. The side of the hand should rest comfortably against the body of the instrument where the neck joins, with the fingers folding over onto the strings, angled about 45° toward the bridge. The notations at the top of the staff indicate the bow immediately next to the bridge, while notations at the bottom of the staff indicate the bow should touch the fingers of the left hand.



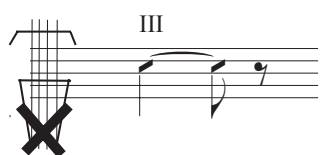
String clef, indicating strings behind the bridge, x notehead indicating pizzicato.



Body clef, indicating bowing on the body of the instrument in the indentation at the bottom of the upper bout and the corner. Violin and viola should bow on the right side of the instrument, bass should bow on the left side.



Used with pizzicato: play as fast as possible on the given note.



A very slow, relaxed ricochet bowing: a light drop of the bow onto the strings, with a slow draw allowing (mostly) the weight of the bow to bring it to rest. While the onset time is given, the duration is approximate. String numbers are indicated above. The use of the muted bridge clef indicates placement or movement of stroke between bridge and fingers.

Performance Instructions

Instruments should play without vibrato, except where indicated for the flute.

The vibraphone should be played without motor.

Due to the spatialization of the five ensembles, difficulty in executing rhythms between ensembles is expected.

Stage Set Up:

The instruments are set into 5 instrumental choirs to be placed antiphonally about the performance space. The groups are as follows, generally arranged from house left to right:

first violins

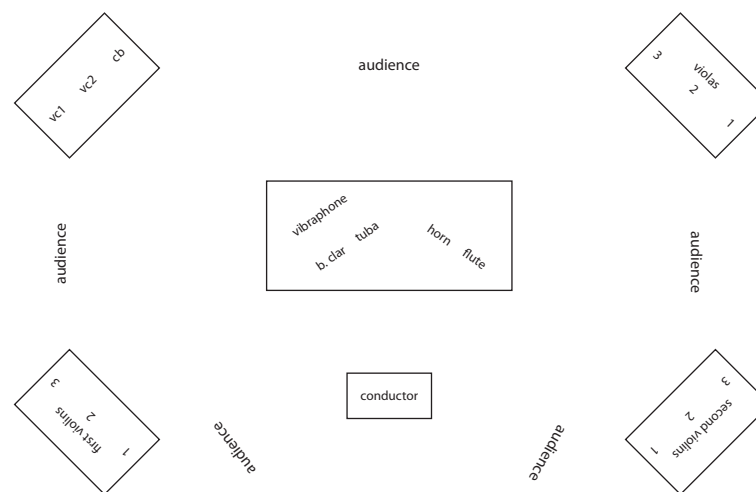
celli/contrabass

flute/bass clarinet/French horn/tuba/vibraphone

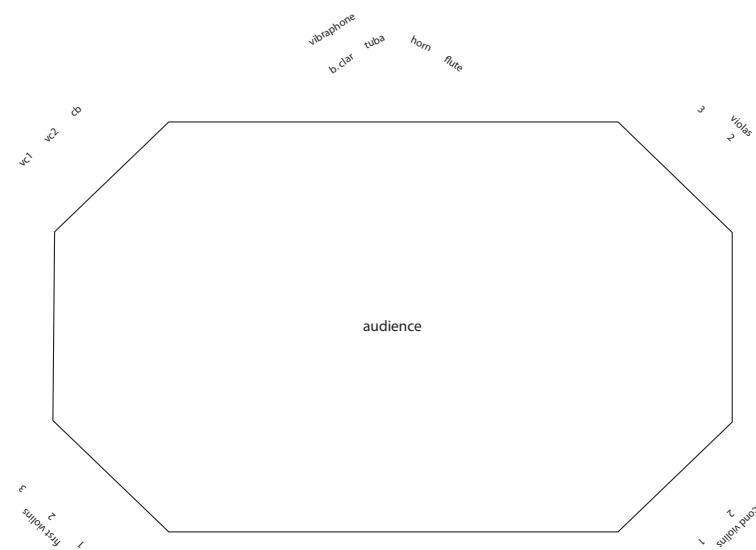
violas

second violins

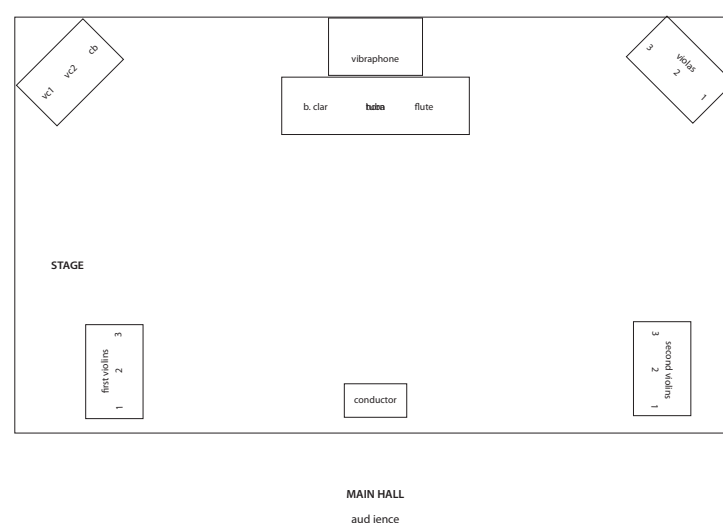
There is some flexibility in the arrangement of the instrumental choirs, depending upon performance considerations. The preferred performance environment enmeshes the audience within the larger ensemble - ideally with performers on raised platforms to enable coordination and enhance the performance aspect. This is the preferred performance environment.



A second possibility is to surround the audience with the ensembles. Placement of the conductor in this situation will depend on the specifics of the performance space in order to facilitate communication with the violin sections.



In situations where this is not possible, such as a traditional front-stage performance space, the violins should be placed as far left and right as possible.



Variations or hybrids between these arrangements are possible, but the left-to-right positioning of the ensembles must be maintained. Additionally, the above set-ups assume a conductor to coordinate the parts. Other variations, such as networked time displays, click tracks, video conduction, or other technological solutions are possible to allow other forms of staging.

for 17 instruments

(♩ = c. 80)

Flute

Bass Clarinet

Horn in F

F Tuba
(31♭ flat)

Vibraphone

without metrical accents

let it ring →
pizz. I

Violin I-1
(31♭ flat)

Violin I-2

Violin I-3

Violin II-1
(31♭ flat)

Violin II-2

Violin II-3

Viola I
(31♭ flat)

Viola 2

Viola 3

Cello 1

Cello 2

double bass

8

vln I-1 *mp* *pp* *f* *pp*

vln I-2 *f* *pp*

vln I-3 *f* *pp*

Vln II-1 *f* *pp*

Vln II-2 *f* *pp*

Vln II-3 *f* *pp*

Vla 1 *ff* *p* *f* *pp*

Vla 2 *p* *mp* *p* *f* *pp*

Vla 3 *pp* *f* *pp*

Vc 1 *pp* *f* *pp*

Vc 2 *pp* *f* *pp*

Detailed description: This page of a musical score contains measures 8 through 12 for a string ensemble. The instruments are Violin I (vln I-1, 2, 3), Violin II (Vln II-1, 2, 3), Viola (Vla 1, 2, 3), and Violoncello (Vc 1, 2). The score is written in treble clef with a 3/4 time signature. Measure 8 is marked with a rehearsal sign (8). Dynamics include *mp*, *pp*, *f*, and *ff*. The first violin parts (vln I-1, 2, 3) feature melodic lines with triplets and five-note slurs. The second violin parts (Vln II-1, 2, 3) play rhythmic patterns with triplets. The viola parts (Vla 1, 2, 3) have more complex rhythmic figures, with the first viola (Vla 1) starting with a *ff* dynamic. The cello parts (Vc 1, 2) provide a steady accompaniment with slurs and triplets. The score concludes with a double bar line at the end of measure 12.

This musical score page contains measures 16 through 24 for a string ensemble. The instruments are arranged in three systems:

- System 1:** Violins I (vln I-1, vln I-2, vln I-3), Violins II (Vln II-1, Vln II-2, Vln II-3), and Violas (Vla 1, Vla 2, Vla 3).
- System 2:** Violin I-1, Violin I-2, and Violin I-3.
- System 3:** Violin II-1, Violin II-2, and Violin II-3.
- System 4:** Viola 1, Viola 2, and Viola 3.
- System 5:** Violoncello 1 (Vc 1) and Violoncello 2 (Vc 2).

The score features various musical notations including triplets, slurs, and dynamic markings such as *f*, *pp*, and *mp*. Measure numbers 16, 17, 18, 19, 20, 21, 22, 23, and 24 are indicated at the beginning of their respective staves.

(♩ = c. 72)

24

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3

Vc 1

Vc 2

pp *mf* *f* *pp* *p* *mf*

mf *f* *mp* *p* *mf*

p *mf* *f* *p*

mf *f* *mp* *p*

f *mf* *pp* *p*

mf *f* *mf* *p* *p* *ff* *p*

mf *f* *mf* *p*

mf *f* *pp* *p*

f *mp* *p* *ff*

f *mp* *p*

mf *f* *p* *p* *mf*

A (♩ = c. 120)

Musical score for string and woodwind instruments, measures 31-40. The score is divided into two systems. The first system includes Violin I (Vln I-1, Vln I-2, Vln I-3), Violin II (Vln II-1, Vln II-2, Vln II-3), Viola I (Vla 1), Viola II (Vla 2), and Viola III (Vla 3). The second system includes Violoncello I (Vc 1) and Violoncello II (Vc 2). The music is in 4/4 time and features a variety of dynamics including *p*, *ff*, *mf*, *f*, *fp*, and *ff*. The score includes numerous technical markings such as triplets, slurs, and accents. A boxed letter 'A' is placed above the first measure of the second system, indicating the start of a section. The tempo is marked as approximately 120 beats per minute.

48

Bass Clarinet
no attack →

Hn.
no attack →
stopped

Tuba
no attack →
con sord.
p

vln I-1
f *fp* *ff* *p* *f* *fp* *ff* *f*

vln I-2
fp *ff* *fp* *ff* *f* *fp* *ff* *fp* *ff* *f*

vln I-3
ff *f* *fp* *f* *fp* *ff* *fp* *ff* *p* *f*

Vln II-1
ff *fp* *ff* *f* *fp* *ff* *p* *f* *fp* *ff* *fp* *ff* *f*

Vln II-2
ff *f* *fp* *ff* *f* *fp* *ff* *p* *f*

Vln II-3
fp *ff* *p* *f* *fp* *ff* *fp* *f*

Vla 1
fp *fff* *fp* *ff* *fp* *fff* *p* *f* *fp* *ff* *f*

Vla 2
fp *ff* *fp* *ff* *f* *p* *f* *f* *fp* *fff*

Vla 3
f *fp* *ff* *fp* *ff* *p* *f* *fp* *ff* *f* *fp* *ff* *f*

Vc 1
p *ff*

Vc 2
p *ff*

cb
p *ff*

s.p. → ord.

no attack →
con sord.

56

Fl. *p* *mf*

B. Cl.

Hn. unstop

Tuba remove mute

vln I-1 *sfz*

vln I-2 *sfz*

vln I-3 *sfz*

Vln II-1 *sfz*

Vln II-2 *sfz*

Vln II-3 *sfz*

Vla 1 *sf* *sfz*

Vla 2 *sfz* *f* *sfz*

Vla 3 *p* *f* *sfz*

Vc 1 ord. IV *p* *mf*

Vc 2 ord. I *p* *mf*

cb ord. *mp* *mf*

B (♩ = c. 72)

64

Fl. *p* *f* *pp* *f* *p* *mf* *p* *mf*

B. Cl. *p* *f* *f* *p* *mf* *p* *mf*

Hn. *p* *f* *p* *f* *p* *mf* *p* *mf*

Tuba *p* *f* *p* *f* *pp* *mf* *p* *mf*

Vib. soft mallets *ff*

Vln I-1 *ff* frequent, irregular, audible bow changes *n* *ff*

Vln I-2 *ff* frequent, irregular, audible bow changes *n* *ff*

Vln I-3 *ff* frequent, irregular, audible bow changes *n* *ff*

Vln II-1 *ff* frequent, irregular, audible bow changes *n* *ff*

Vln II-2 *ff* frequent, irregular, audible bow changes *n* *ff*

Vln II-3 *ff* frequent, irregular, audible bow changes

Vla 1 *ff* frequent, irregular, audible bow changes

Vla 2 *ff* frequent, irregular, audible bow changes *n*

Vla 3 *ff* frequent, irregular, audible bow changes

Vc 1 *ff* frequent, irregular, audible bow changes

Vc 2 *ff* frequent, irregular, audible bow changes

cb *ff* frequent, irregular, audible bow changes

74

Fl. *p* < *f* > *p* < *mf* > *p* < *f* > *p* < *f* > *p* < *mf* > *p* < *f* >

B. Cl. *p* < *mf* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* >

Hn. *p* < *mf* > *p* < *mf* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *mf* >

Tuba *p* < *mf* > *p* < *mf* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *mf* >

Vib. *p* < *mf* > *p* < *mf* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* > *p* < *f* >

vln I-1

vln I-2

vln I-3

Vln II-1 *n* *ff*

Vln II-2

Vln II-3 *pp* *ff*

Vla 1 *n* *ff* *n* *ff*

Vla 2 *ff* *n* *ff*

Vla 3 *n*

Vc 1 *n* *ff*

Vc 2 *n* *ff*

cb *n* *ff*

C (♩ = c. 90)

86

Fl.

B. Cl.

Hn.

Tuba

Vib.

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3

Vc 1

Vc 2

cb

con sord.

pp

con sord.

pp

con sord.

pp

s.p.

con sord.

pp

con sord.

s.p.

pp

con sord.

s.p.

pp

ff

ff

ff

94

Fl. *pp* *mp*

B. Cl. *n* *mp*

Hn. con sord. *pp* *mp*

Tuba con sord. *pp* *mp*

Vib. *p*

vln I-1

vln I-2

vln I-3

Vln II-1 ord.

Vln II-2 ord.

Vln II-3 ord.

Vla 1 con sord. s.p. *pp* ord.

Vla 2 con sord. s.p. *pp* ord.

Vla 3 con sord. s.p. *pp* ord.

(♩ = c. 112)

Fl. *pp* *mf* *pp* *mf* *ff* n.v. → slow vib → n.v.

B. Cl. *n* *n* *mf* *ff*

Hn. *n* *pp* *mf* *f* breath attack

Tuba *n* *pp* *mf* *f* breath attack

Vib. *mf* *ff* hard mallets

Vln I-1 *pp* II III

Vln I-2 *pp* II III

Vln I-3

Vln II-1 *s.p.*

Vln II-2 *s.p.*

Vln II-3 *s.p.*

Vla 1 *mp*

Vla 2 *mp*

Vla 3 *mp*

Vc 1 *mp* con sord.

Vc 2 *mp* con sord. arco

cb *mp* con sord. arco

106

Fl.

B. Cl.

Hn.

Tuba

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3

Vc 1

Vc 2

cb

p *mp* *mf* *fp* *pp* *ord.*

Musical score for orchestra and strings, measures 113-118. The score includes parts for Flute (Fl.), Bass Clarinet (B. Cl.), Horn (Hn.), Tuba, Violin I (vln I-1, 2, 3), Violin II (Vln II-1, 2, 3), Viola I (Vla 1), Viola II (Vla 2), Viola III (Vla 3), Violoncello I (Vc 1), Violoncello II (Vc 2), and Contrabass (cb). The score features various dynamics such as *p*, *f*, *fp*, and *pp*, along with articulation marks like accents and slurs. The Flute and Bass Clarinet parts have a dynamic shift from *p* to *f*. The Horn and Tuba parts have a dynamic shift from *fp* to *f* and include the instruction "remove mute". The Violin I parts feature complex rhythmic patterns with triplets and slurs. The Violin II parts have a dynamic shift from *pp* to *f*. The Viola I and II parts have a dynamic shift from *pp* to *f*. The Violoncello I and II parts have a dynamic shift from *f* to *f*. The Contrabass part has a dynamic shift from *f* to *f*.

119

Fl. *pp* *f*

B. Cl. *pp* *f*

Hn. *p* *f*

Tuba *p* *f*

Vib. medium mallets *f*

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3 *pp*

Vc 1 *f* pizz. let it ring →

Vc 2 *f* pizz. let it ring →

cb *f* pizz. let it ring →

(♩ = c. 60)

Alto Fl. **D** breath as nesc.
re-sound note with breath attack

The musical score consists of 11 staves, each representing a different instrument. The instruments are: Flute (Fl.), Bass Clarinet (B. Cl.), Horn (Hn.), Tuba, Violin I-1 (vln I-1), Violin I-2 (vln I-2), Violin I-3 (vln I-3), Violin II-1 (Vln II-1), Violin II-2 (Vln II-2), Violin II-3 (Vln II-3), Viola 1 (Vla 1), Viola 2 (Vla 2), Viola 3 (Vla 3), Violoncello 1 (Vc 1), Violoncello 2 (Vc 2), and Double Bass (cb). The score is divided into two systems. The first system covers measures 127-130, and the second system covers measures 131-134. The woodwinds (Alto Fl., B. Cl., Hn., Tuba) play a melodic line starting in measure 127. The strings (vln I-1-3, Vln II-1-3, Vla 1-3, Vc 1-2, cb) provide harmonic support with various textures, including triplets and sixteenth-note patterns. Performance markings include dynamics such as *mp*, *fpp*, and *pp*, as well as articulation and breath instructions like "remove mute", "s.t.", "breath as nesc.", and "re-sound note with breath attack".

143 (♩ = c. 90)

Fl. *p mp pp mp pp mf pp p mf pp*

B. Cl. *n mp mf n mp*

Hn. *pp mp pp mp pp mf p mf pp*

Tuba *p pp mp pp mf* breath attack

Vib. *mp mf* bow

vln I-1 *n mp*

vln I-2 *n mp*

vln I-3 *n mp*

Vln II-1 *p mp*

Vln II-2 *n mp*

Vln II-3 *n mp*

Vla 1 *n mp* 7th partial ord. IV

Vla 2 *n mp* 7th partial ord. IV

Vla 3 *n mp* s.t.

Vc 1 *n mp* III ord.

Vc 2 *n mp* I ord.

cb *n mp* I

159 n.v. **E** → slow vib → n.v.

Fl. *p* *mp*

B. Cl. *n* *p* *pp* *mp*

Hn. *mp* *p* *mp* *pp* *mp* *pp* *mp*

Tuba *pp* *mp* *pp* *mp*

Vib. *mp*

vln I-1 *p* *mp* *p*

vln I-2 *p* *mp* *p*

vln I-3 *p* *mp* *p*

Vln II-1 *p* *mp* *p*

Vln II-2 *p* *mp* *p*

Vln II-3 *p* *mp* *p*

Vla 1 *mp* *p* *mp*

Vla 2 *mp* *p* *mp*

Vla 3 *p* *mp* *p*

Vc 1 *p* *mp* *p*

Vc 2 *p* *mp* *p*

cb *p* *mp* *p*

Musical score for measures 171-176, featuring parts for Violin I (1-3), Violin II (1-3), Viola (1-3), Violoncello (1-2), and Contrabass. The score includes various musical notations such as notes, rests, dynamics (*mf*, *mp*, *p*), and fingering/position markings (III, IV, II, I).

189 (♩ = c. 90) (♩ = c. 100)

Fl.

Vib.

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3

ord.

s.p.

flaut.

p

Detailed description of the musical score: The score is for measures 189 to 193. It features a key signature of one sharp (F#) and a time signature of 4/4. The tempo is marked as '♩ = c. 90' for measures 189-190 and '♩ = c. 100' for measures 191-193. The instruments are Flute (Fl.), Vibraphone (Vib.), Violins I (vln I-1, vln I-2, vln I-3), Violins II (Vln II-1, Vln II-2, Vln II-3), and Violas (Vla 1, Vla 2, Vla 3). The Flute and Vibraphone parts are marked with a piano (*p*) dynamic. The Violin I parts include 'ord.' (order) and 's.p.' (sotto voce) markings. The Viola parts also include 'ord.' and 'flaut.' (flute) markings. The score contains various musical notations such as triplets, slurs, and accents.

210

Fl. *f*

B. Cl. *f*

Hn. *f*

Tuba *f*

Vib. *mf* *f* *mf*

vln I-1 *mf* *f*

vln I-2 *mf* *f*

vln I-3 *mf* *f*

Vln II-1 *mf* *f*

Vln II-2 *mf* *f*

Vln II-3 *mf* *f*

Vla 1 *mf* *f* *mf*

Vla 2 *mf* *f* *mf*

Vla 3 *mf* *f* *mf*

Vc 1 *mf* *f* *mf*

Vc 2 *mf* *f* *mf*

cb *f*

Detailed description: This page of a musical score covers measures 210 to 215. It features a full orchestral ensemble including Flute, Basset Clarinet, Horn, Tuba, Vibraphone, Violins I and II (three parts each), Violas (three parts), Violas I and II, and Cello/Double Bass. The score is written in a key with one sharp (F#) and a 4/4 time signature. The music is characterized by complex rhythmic patterns, including triplets and quintuplets, and dynamic markings ranging from *mf* (mezzo-forte) to *f* (forte). The woodwinds and brass play sustained notes, while the strings and vibraphone provide intricate melodic and rhythmic textures. The vibraphone part is particularly prominent, featuring a series of triplet and quintuplet figures. The strings play a dense, rhythmic accompaniment with various articulations and slurs. The overall mood is intense and dramatic due to the strong dynamics and complex textures.

216 (♩ = c. 60)

Hn. *mp* *fff* *p* bow *mp*

Vib. *f* bow *mp*

Vln I-1 *ff* *s.p.*

Vln I-2 *ff* *s.p.*

Vln I-3 *ff* *s.p.*

Vln II-1 *ff* *s.p.*

Vln II-2 *ff* *s.p.*

Vln II-3 *ff* *s.p.*

Vla 1 *ff* *s.p.*

Vla 2 *ff* *s.p.*

Vla 3 *ff* *s.p.*

Vc 1 *ff* *s.p.*

Vc 2 *ff* *s.p.*

H (♩ = c. 100)

227

Vib.

Vln II-1

Vln II-2

Vln II-3

238

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

247

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

pizz.

p

pizz.

p

258

vln I-1

vln I-2

vln I-3

Vln II-1

Vln II-2

Vln II-3

Vla 1

Vla 2

Vla 3

pizz.

p



(♩ = c. 80)

lip pizz.

slap tongue - very little pitch

tongue ram

tongue ram

soft mallets

266

p

mf

p

mf

mp

p

mf

p

ff

p

mf

ff

p

mp

p

ff

p

mf

p

ff

ff

p

p

mf

p

p

arco

