flint
for ensemble mosaik

by

Rama Jesse Gottfried

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Doctor of Philosophy
in
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and the Designated Emphasis
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Committee in charge:

Professor Franck Bedrossian, Chair
Professor Edmund Campion
Professor Cindy Cox
Professor Gregory Niemeyer

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Abstract

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Striking flint rock against iron pyrite, tiny sparks leap from seemingly nowhere into existence. Like the combination of sounds, when a spark contacts flammable material a flame forms; expanding and transforming as it grows, feeding itself on the material, continuing until it has released as much of the material’s content as it can before diffusing into the air.

The machinery of life follows a similar progression — from the microscopic drama of atoms, cells, neurons, leaves, amoebas, and digital bits — to the macro-scale drama of lives, societies, and universe-sized ecosystems.

The piece flint for ensemble mosaik, is not universe-sized, but instead is comprised of millions of microscopic lives and deaths in sound.

By magnifying these most minuscule of sonic gestures through extreme amplification and human computer interaction instrument systems, the work extends the gestures of the ensemble and reaches into the space around the listeners.

flint was premiered by ensemble mosaik at the Bluderzer Tage zeitgemäßer Musik Festival in Bludenz, Austria, November 2014.
for Sophie
I dedicate this dissertation to my family who has supported me through many years of study, and especially to my amazing wife Celeste who has given me the courage to keep going whenever doubts creep in, and my daughter Elodie who reminds me of the importance of play.

I would like to also acknowledge the many teachers I have had through my academic career, starting with T.L Read, and Ernest Stires who told me I was a composer, Justin Dello Joio, Nils Vigeland, Marc Sabat, and Walter Zimmermann.

In particular, I would like to acknowledge the intellectual engagement of the faculty at UC Berkeley: David Wessel, Edmund Campion and Adrian Freed at the Center for New Music and Audio Technologies who have guided my work and holistic growth as an artist and technologist; Franck Bedrossian whose careful listening and thoughtful reflections have greatly refined my aesthetic handling of material; and at the Berkeley Center for New Media, Abigail De Kosnik and Greg Niemeyer who helped expand my artistic and scholarly thinking putting me in dialog with other graduate students from many other backgrounds.

Thank you.
instrumentation:

piccolo with internal mic, handheld speaker
oboe with internal mic, handheld speaker
clarinet in Bb with internal mic, handheld speaker
soprano saxophone with close mic, handheld speaker

percussion:
  close mic:
    plant pot base
    cleaning brush on bongo drum
    2 rocks
    cymbal with contact mic
    midi pedals (see schematic)

piano:
  wacom tablet computer interface
  4 transducers
    attached to various objects sitting on piano strings:
      wooden frog
      tibetian bowl
      piece of wood
      unattached ping-pong balls
    midi pedals and mixer (see schematic)

violin
viola
violoncello

duration: ca. 12 minutes
MacBook Pro
Wacom tablet
MIDI mixer (UC-33, BCF2000 or sim)
CME GP33 Foot pedal
ebody MIDI-USB
2x MIDI Pedals
1x MIDI Expression pedal
USB hub
10ch audio interface (FF800 or sim)
8ch amplifier
4x small transducers (Dayton Audio)
6x KM184 (or sim)
4x AKG C417 (or sim)
3x string DPA (or sim)
1x sax DPA (or sim)
2x contact mics
4x small handheld speakers (with housing)

Note: for best results all winds should have compression and EQ to create a highly flat, electronic sound. Boost extreme low and high frequency ranges for maximum boom and click.
piccolo

amplification:
a small omni-directional microphone should be placed inside the instrument, wrapped with plastic-wrap to avoid water damage. For the piccolo, the mic should be placed inside the mouthpiece and secured with a rubber band to keep the air in place. The gain to the PA speakers should be quite loud, and should be compressed, and ED with heavy air pressure in the very low and very high ranges -- as loud as possible without feeding back. Some distortion is desirable, for example, with the “heavy air tone”.

graphic notation:
for some techniques in the piece, graphic notation is used to visually describe the resulting sound. In general, the vertical position of a shape refers to the relative pitch of the sound, while the vertical width and darkness of the shape indicates the relative loudness of the sound. The internal variations of each shape indicate that a change in quality should be apparent, for example this might possibly achieved by changing the embouchure shape.

flutter-whistle tone: fluttertongue technique with throat plus whistletone, a high frequency sound, with a bouncing rhythm a bit like a small stone skipping on water.

motor sound: a low-pitch fluttertongue technique with throat, with the mouth completely covering the embouchure hole, the resulting sound should be something like a motorcycle. Usually combined with keyclick glissando, and heavy air sound. See also the general graphic notation explanation.

light air tone not on staff, slight to no pitch
light air tone on staff, slightly more tone than above

heavy air tone, forceful air pressure, with mouth covering embouchure.

---

oboë

amplification:
a small omni-directional microphone should be placed inside the instrument, wrapped with plastic-wrap to avoid water damage. For the oboe, the mic should be placed inside instrument approximately at the mid point, and secured with a rubber band by the cable at the bell to keep the mic in place. The gain to the PA speakers should be quite loud, and should be compressed, and ED with heavy air pressure in the very low and very high ranges -- as loud as possible without feeding back.

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“geiger-counter”: staccatissimo, ingressive breath, dead tongue sound, very short click sounds. Possibly best produced with strong embouchure pressure, with the reed at the side of the mouth.

air fluttertongue -- even though the notehead is black here, the result should be a bit more pitch than the light air-tone on the staff, but not a full-bodied pitch.

Inpressive, lip sounds: very high pitch with irregular rhythm, and density. Here, the staccatissimo at end indicates as sharp ending point.

see also the general graphic notation explanation.
clarinet Bb

<table>
<thead>
<tr>
<th>14 cents from ET</th>
<th>31 cents from ET</th>
<th>50 cents from ET</th>
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**equal temperament (ET)**

relative pitch of keyclick/air-noise around held note, where the held note continues, there should also be a click.

light air tone not on staff, slight to no pitch

light air tone on staff, slightly more tone than above, should be an "almost" pitch, with a light, unstable grittiness.

air fluttertongue with relative pitch keyclick glissando

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amplification:

a small omni-directional microphone should be placed inside the instrument, wrapped with plastic-wrap to avoid water damage. for the clarinet, the mic should be placed inside the middle of the instrument, and secured with a rubber band or tape to keep the mic in place, the gain to the PA speakers should be quite loud, and should be compressed, and EQ'd with boosts in the very low and very high ranges -- as loud as possible without feeding back.

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**amplification:**

the saxophone uses a DPA mic, with gooseneck clip mounted on the instrument so that mic is over the keys, approximately at the mid-point between the two hands. the gain to the PA speakers should be quite loud, and should be compressed, and EQ'd with boosts in the very low and very high ranges -- as loud as possible without feeding back.

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percussion

hand brush on bongo drum -- three main sounds are used:
1) a gradient of rhythms created by moving the bristles against the drum head at different speeds and pressures, from sparse clicks, to white noise.
2) changing the relative pitch of the bristles, by using the other hand to alter the resonance of the drum head, and
3) rubbing the handle of the brush (smooth plastic) against the drum head to produce a slightly more pitched noise sound, the frequency of which is controlled by rubbing closer or further from the rim of the drum head.

press two rocks against each other with varying degrees of speed and pressure, using the graphic notation as a general guide for relative pitch and intensity.

dry brush on bongo drum -- three main sounds are used:
flower pot base: bow muted cymbal with contact mic

amplification:
at least two mics are used, one or two for the flower pot base, brush on bongo, and rocks -- a contact mic is taped to the cymbal and is routed into the piano/wacom computer interface.

hand brush on bongo drum -- contact mic

wacom/transducer/piano instrument

on top of the piano sits a multi-touch wacom tablet fitted with a tactile surface in a simple pattern to a two manual keyboard. the finger motions are sent into a computer running max/msp used as an impulse sound source for signals sent from the computer through four transducers sitting on the strings of the piano. one also the technical layout description for more indepth layout. the wacom part is the central electronic source in the piece.

graphic notation aims to describe the gesture of the hands/arms as well as the resulting sound.

three sound types per section preset

basic sound types:

- dry, percussive granular sounds
- pitched, or semi pitched granular sounds.
  for notated pitches, keyboard range is from C below middle C, to C above the staff.
- recording of a large group of people talking filtered with wacom interface and played into transducers into the piano.

amplification:
at least two mics are used, one or two for the flower pot base, brush on bongo, and rocks -- a contact mic is taped to the cymbal and is routed into the piano/wacom computer interface.

midi pedals:
1) section pedal changes the presets used in the wacom instrument
2) a midi expression pedal is used to jump the cymbal sound between transducers in the first sections, and later between hand-held speakers.

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graphical notation:

press two rocks against each other with varying degrees of speed and pressure, using the graphic notation as a general guide for relative pitch and intensity.

midisynthesizer pedals:

1) section pedal changes the presets used in the wacom instrument
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strings

equal temperament (ET):

- 14 cents from ET
- 31 cents from ET
- 50 cents from ET

light to normal bow pressure

heavy bow pressure

note

amplification:
all strings should have IPA mics attached — amplified sound should be balanced and clean, mixed with the rest of the ensemble.

light pressure

on the edge of where the note begins to emerge

semi-pitched noise

bow position on string, higher indicates closer to bridge, closer to note means more sul tasto

light pressure

on the edge of where the note begins to emerge

semi-pitched noise

bow position on string, higher indicates closer to bridge, closer to note means more sul tasto

finger sounds:

pizz

very high notes

bottom of range

mezzo string with bow

string fingers on string as loud as possible, so that some pitch is audible between finger and bow

violins & viola:

interlocking col lego jete, between violin and viola to create a semi-continuous texture

a: “extended gravity jete”, where bow bounces for a very long time, using the weight of the bow to keep it bouncing. speed and bow position are indicated graphically.

b: “one hair” from the bow is pressed into the string and dragged vertically, creating little pitched clicks as it chafes against the grains in the string.

pressed bow gestures:

1/2

a

b

c

d

a: press bow wood into hairs into string and twist, creating a granular pitched sound

b: semi-circular bowing, from light horizontal molto sul tasto bowing, to pressed vertical bowing up to the bridge (ob = on bridge)

d: heavy pressure and slow bowing that produces one pitched click at a time.

handheld speakers

at a climatic moment in the piece, the winds put down their instruments and stand holding hand held speakers. at first the sound coming out of the speakers is a mezzoforte white noise. as the performers slowly move the speakers through the air we hear soft aliasing and cancellation effects. there is a short interruption by the ensemble at rehearsal number 44, and then after another section of white noise, the ensemble enters again — the white noise is cut and replaced with the amplified sound of the percussion. for a long period of time, only the percussion comes through the handheld speakers until the last section (59-64), where the piano/wacom instrument shifts from the transducers into the speakers, and ends with high sinewaves also in the speakers.

the moments of the speaker performers should be as unified as possible; very smooth, somewhat majestic, yet impersonal, like robots. transitions between poses are notated, where arrows continue between positions, there should be no stop, but a fluid continuation, to the next location.
ped
cab
... sim.

10"
(sul pont trem)
very slow → a tempo

1 4 3

ppp sempre
3-4" 2 rocks, crushed against each other

ped 3-4"
on the verge of pitch

subito

sff

ped.
**mute wind mics**

(view from audience)

**mirror image in parts**

---

Put down instrument, and pick up small speaker

Suddenly stand with handheld speaker

*White noise in speakers on section 8*

---

Extreme to molto vibrato

---

Stop suddenly and freeze

---

*White noise in speakers on section 8*
white noise in speakers
mute direct signal for piano (keep mics)

conductor and the rest of the ensemble freeze

wacom instrument controls filtered white noise, follow gestures of winds with noise gesture

white noise in speakers
mute direct signal for piano (keep mics)
percussion in speakers, white noise cut

(sound is in handheld speakers)
recording of a large group of people talking filtered with wacom interface and played into transducers into the piano sim.
rocks

finger tip crush

ped.
poco a poco vibrato
molto vibrato

subito

ppp

l.v.

x

ped.
wacom + percussion in speakers

unconducted unison with piano

10"