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### Title

Orders of Magnitude: Three Works for Instruments and Electronics

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Orders of Magnitude:  
Three Works for Instruments and Electronics

by

Aaron Michael Einbond

A.B. (Harvard University) 2000

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 Edmund Campion, Chair

Professor David Wessel

Professor Cindy Cox

Fall 2009



Abstract

Orders of Magnitude:  
Three Works for Instruments and Electronics

by

Aaron Michael Einbond

Doctor of Philosophy in Music

University of California, Berkeley

Professor Edmund Campion, Chair

Orders of Magnitude comprises three works for acoustic instruments and live electronic sounds: *Temper* for bass clarinet and electronics, *Beside Oneself* for viola and electronics, and *What the Blind See* for bass clarinet, viola, harp, piano, percussion, and electronics. The works may be performed together in this order or separately. All works are performed using an interactive electronic patch programmed by the composer in the computer program *Max/MSP*.

The works respond to the question of how to organize noise-based sounds, arising from extended instrumental playing techniques, into a flexible and expressive live-electronic environment. The process of rapidly analyzing the live instrumental sounds and synthesizing responses based on their timbre becomes the basis of the work's structural logic. This technique is carried to a further degree in the notated score, where the computer programs *Max/MSP* and *OpenMusic* are used to produce timbrally-coherent acoustic combinations and trajectories that would be difficult to imagine otherwise.

The works are united musically by their instrumentation, their material, and by their

treatment of figurative scale. The temporal proportions of *Temper* and *Beside Oneself* are recast in *What the Blind See* transformed by different factors. Internally the works recall materials at different orders of magnitude, for example the conclusions of *Temper* and *What the Blind See* in which the material of the entire piece is compressed into increasingly concentrated outbursts.

The instrumental playing techniques and their amplification also relate to the notion of scale: certain gestures that are almost inaudible and invisible are amplified and brought into relation with material far different in its natural proportions. For example the opening of *Beside Oneself* and *What the Blind See* for viola is related to the close of *Temper* and *What the Blind See* for bass clarinet, in both of which punctual gestures alternate with silence. Finally, scale is treated in the spatialization of the works, which progresses from stereo to 4-channel to 8-channel and gradually fills the acoustic space with an increasingly-coherent landscape of electronic sound where gestures are spatialized in real time based on a mapping of their timbres.

*To My Parents*

*And My Teachers*

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for bass clarinet, viola, harp, piano, percussion, and electronics	

## Acknowledgements

### Temper:

*I gratefully acknowledge Peter Josheff and Florent Gerenton for their bass clarinet samples. I thank David Wessel, Edmund Campion, Adrian Freed, John MacCallum, Ali Momeni, Matt Wright, Michael Zbyszynski (CNMAT), Michel Pascal, François Paris, and Nicolas Déflache (CIRM) for their technical assistance and Max/MSP abstractions and externals.*

### Beside Oneself:

*I gratefully acknowledge Ellen Ruth Rose for her samples and experimentation. I thank David Wessel, Edmund Campion, Adrian Freed, John MacCallum, Ali Momeni, Matt Wright, Michael Zbyszynski (CNMAT), Alexis Baskind, Diemo Schwarz, Mikhail Malt, Emmanuel Jourdain, and Jean Lochard (IRCAM) for their technical assistance and Max/MSP abstractions and externals.*

### What the Blind See:

*I gratefully acknowledge Ensemble L'Instant Donné for their samples and collaboration. I thank Diemo Schwarz for the CataRT concatenative synthesis package, and Diemo Schwarz and Jean Bresson for their research contributions. I thank Eric Daubresse, Yan Maresz, Mikhail Malt, Emmanuel Jourdan, Jean Lochard, and Alexis Baskind for their guidance and Max/MSP objects and externals.*



## ORDERS OF MAGNITUDE

### I. *Temper* for bass clarinet and electronics

Written for Florent Gerenton for the Festival MANCA, Nice, France, 2006.

The bass clarinet sounds as if constantly on the verge of hysterics: its low register never far from breaking, squeaking, and splitting into multiphonics. These choleric fits are explored through a rotating sequence of multiphonic harmonies. Computer analyses of these sounds are resynthesized in response to the live clarinetist, shadowing him with evolving resonances, sonic X-rays. Despite repeated attempts at decorum, another outburst is always just beneath the surface. A clarinetist myself, it is a self-portrait. I dedicate *Temper* to my advisor Edmund Campion and his encouragement to push oneself to extremes.

### II. *Beside Oneself* for viola and electronics

Written for Ellen Ruth Rose for Ensemble Earplay, 2007-08.

*Most people think what could I do, I think what shouldn't I do. What I should do perhaps is involved with the fact that I'm Jewish and what is known as Jewish paranoia. I don't feel comfortable enough to feel that everything is on my side and that it's going to work just the way I want it.*

--Morton Feldman

In *Beside Oneself* the violist alternates obsessively among a repertoire of gestures, testing the different responses they elicit from the electronics. Not until the end can she settle on a tenor incantation that unites the other gestures and the electronics into a plaintive call. The work takes as its point of departure *Temper* for bass clarinet and live electronics, written for the 2006 Festival MANCA in Nice, France. Computer analyses of complex sounds from the viola and bass clarinet are treated as models, re-sculpted, and

combined to produce a new environment in which their distinctions are blurred. I dedicate *Beside Oneself* to the memory of great composer and teacher Andrew Imbrie. The final elegaic melody is a tribute to his saying "music is singing and dancing."

III. *What the Blind See* for bass clarinet, viola, harp, piano, percussion, and electronics  
Commissioned by IRCAM / Centre Pompidou for Ensemble L'Instant Donné and the Festival Agora, 2008-09.

*What the Blind See* takes as its point of departure the sonic and visual imagery of science: stars and particles, the infinitely small and infinitely large. Written in coordination with video artist Pierre Edouard Dumora, we attempted to realize a modular project, each part complemented by the other. The film alludes to an unheard musical work; the music evokes images isolated and abstracted from the film narrative. But all is unified by the notion of scale: perspectives that are distant and desolate, or close and distorted.

The microscopic sounds of the instruments are amplified with contact microphones, as if captured by scientific instruments. The electronics are modeled on field recordings of rain and snow, diffracted and projected in space. These "concrete" sounds from instruments and natural sources are manipulated using tools developed at IRCAM in Paris and inspired by research in music cognition. The title, taken from an article by neurologist Oliver Sacks, suggests perception as the focus of the listening experience.

I dedicate *What the Blind See* to Philippe Leroux and his insistence that we "continue to go farther."

## Instrumentation

Viola (scordatura C → B flat)

Bass clarinet in B flat, notated at *fingered* pitch.

Harp (with triangle beater, plastic plectrum, knitting needle, and contrabass bow)

Piano (with plastic plectrum, wooden snare drum stick, knitting needle, and plastic fishing line)

Perussion (1 player):

Vibraphone (motor with adjustable velocity)

Marimba (5 octaves)

6 Crotales (F#6, C#7, D#7, E7, A7, B7)

Tam tam (large symphonic)

Bass drum (large symphonic)

mallets: very hard Vibraphone mallets, superball mallets with wooden handles, brass glockenspiel mallets, wire brushes, wooden bundles, pine cone, and contrabass bow.

## Notes


♯ > ♭ 1/4-tone above, below. Accidentals hold for the entire measure.

- - -> Gradual change between playing techniques.



Black diamond noteheads indicate a quarter-note value. Hollow diamond noteheads are used to indicate all other values.



Gracenotes before the beat and  on the beat to be played as fast as possible.



Deceleration, beginning as fast as possible.



Clef used for un-pitched playing techniques, indicating the relative register on the instrument.

Viola:



Scordatura, written at the *sounding* pitch.

m.s.p. *molto sul ponticello* (directly on the bridge).

s.p. *sul ponticello* (near the bridge).

s.t. *sul tasto* (near the tailpiece).

m.s.t. *molto sul tasto* (directly on the tailpiece).

c.l.b., c.l.t. *col legno battuto, tratto* (wood of the bow without hair).

1/2 c.l.b. *1/2 col legno battuto* (wood of the bow with some hair).



Dampen the string with several fingers to produce white noise without pitch.



Exaggerated bow pressure to produce a distorted sound with some of the indicated pitch remaining.



Play between the bridge and the tailpiece.



Strike the table of the instrument with the fingers near the indicated position:



Natural harmonic at the indicated pitch, two octaves above the G-clef.



With the string dampened, ricochet *c.l.b.* while moving the bow toward (or away from) the bridge to produce a *glissando* up (or down).



With the string dampened, slide the hand in the indicated direction to produce a *glissando* of filtered noise.

Bass clarinet:

tk Double-tongue.



Colored breath with some pitch.



Breath or articulation alone to produce white noise with no pitch.



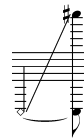
Key noise *ad lib.* following the approximate register indicated.



Tongue slap combined with colored breath.



Tongue as fast as possible for the duration indicated by the large note.



Explore the partials of a multiphonics following the indicated contour.

### Bass clarinet fingerings:

#### Multiphonics (approximate pitches)

Bass clarinet in B $\flat$

#### Quarter tones (suggested fingerings)

Bass clarinet in B $\flat$

### Harp:



The C1 and F3 strings are retuned to the indicated pitches. The score is written at the *sounding* pitch.



The indicated strings are muted with a cloth woven between the strings.



The indicated strings are muted with a piece of paper woven between the strings.



Xylophonic sound: play while pressing on the string with the other hand near the table.



Dampened: play while pressing with the other hand in the middle of the string.



Draw a plectrum along the string lightly and quickly.



Play the strings between the nuts and tuning pegs.



On the tuning pegs, *glissando* while applying pressure.



Strike the table or back of the instrument with the palm, fingers, or fingernails.



Draw the palm lightly along the table to produce a sustained white noise without pitch.

### Piano:



Prepare the three indicated strings with plastic fishing line, rosined and threaded around the strings.



Play on the keyboard while muting the string near the nut to produce some pitch.



Play on the keyboard while muting the string in the center to produce almost no pitch.



Play on the keyboard while touching the string lightly in the center to produce a harmonic-rich sound.



Draw a plectrum along the string lightly and quickly toward the keyboard.



Draw the plectrum along the string with pressure to produce the indicated rhythm against the coils.



Play on the strings between the nuts and tuning pegs.



On the sides of the tuning pegs, *glissando* while applying pressure



Play on the metal harp.



Draw a mallet along the harp to produce a sustained white noise.



Tremolo with a mallet on the harp, moving toward or away from the keyboard to produce a *glissando*.

#### Percussion:



“Dead stroke”: strike while leaving the mallet in contact with the instrument to dampen the sound.



Play on the resonant tubes of the Vibraphone or Marimba in the approximate register indicated.



Vibraphone and Marimba: draw the mallet along the key or resonant tube to produce a sustained sound. With superball add pressure to produce a distorted sound with some of the indicated pitch remaining.

Tam tam and Bass drum: draw the hand or mallet in a curve along the surface of the instrument to produce a sustained sound accentuating the friction with the skin or metal. With superball add pressure to produce a sustained pitch.



Draw the superball lightly over the instrument to produce a fine staccato at the indicated pitch.



## Technical Specifications

# TEMPER

Aaron Einbond

Premiere 9 November 2006, Festival Manca, Nice, Florent Gerenton bass clarinet.

### Equipment

- 2 cardioid microphones (Neumann KA 140/KM 184)
- 1 pedal (optional)
- mixer, 4 ins, 3 outs, plus additional outs to speakers in hall
- stereo reverb
- 2 speakers on stage, additional speakers in hall as available
- 1 Apple MacBook Intel 2.0 GHz, 1GB RAM, Max/MSP 4.6
- 1 audio interface, 1 in, 2 outs, 1 pedal in (optional)

### Audio Connections

- 2 mics -> 2 ins console -> reverb -> 2 outs console -> 2 speakers on stage
- 1 out console (2 mics summed) -> 1 in interface
- 2 outs interface -> 2 ins console -> 2 speakers on stage and speakers in hall

The two microphones are placed close to the left-hand keys and to the bell of the bass clarinet, respectively. The bass clarinet is reinforced, with light reverb, only in the onstage speakers. The two channels of the electronics are diffused in all of the speakers in the hall.

One or two assistants are required to trigger the electronic events (or they are triggered with optional pedal by the clarinetist), adjust the amplification of the clarinet, and diffuse the electronic sounds throughout the hall.

The provided electronic patch, written in Max/MSP 4.6, plays recorded sound files, granulation (excited by the amplitude envelope of the clarinet), and resonances (excited by the signal of the clarinet). The placement and level of microphones and speakers must be carefully adjusted to avoid feedback from the resonances.

*I gratefully acknowledge Peter Josheff and Florent Gerenton for their bass clarinet samples. I thank David Wessel, Edmund Campion, Adrian Freed, John MacCallum, Ali Momeni, Matt Wright, Michael Zbyszynski (CNMAT), Michel Pascal, François Paris, and Nicolas Déflache (CIRM) for their technical assistance and Max/MSP abstractions and externals.*

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## Technical Specifications

# BESIDE ONESELF

Aaron Einbond

Cursus 1 in Music Composition and Technologies, IRCAM, Paris.  
Premiere 11 February 2008, Earplay Ensemble, San Francisco, Ellen Ruth Rose Viola.  
Atelier 9 February 2008, IRCAM, Adrian LaMarca, viola.  
Aaron Einbond, Alexis Baskind, and John MacCallum, technical realization.

### Equipment

- 1 DPA microphone affixed to tailpiece
- 1 MIDI pedal (optional)
- mixer, 5 ins, 6 outs, plus additional outs if available
- stereo reverb
- 4 channel output, distributed among speakers in hall as available
- 1 Apple MacBook Intel 2.0 GHz, 1GB RAM, Max/MSP 4.6.3 with FTM 3.0.
- 1 audio interface, 1 in, 4 outs, 1 pedal in (optional)

### Audio Connections

- mic -> console -> reverb -> console -> speakers 1-2
- mic -> console -> 1 in interface
- 4 outs interface -> 4 ins console -> 4 speakers on stage and in hall, more if available

- Approximate speaker placement:

	Viola	
1		2
	Audience	
3		4

One microphone, preferably model DPA 500, is affixed to the tailpiece pointing towards the bridge. The viola is reinforced, with light reverb, only in the onstage speakers. Amplification may be adjusted to give extra reinforcement at quiet passages.

The electronic events are triggered by the violist with the pedal, or from the computer by an assistant who may also adjust the amplification of the viola and diffuse the electronic sounds.

The electronic patch provided requires the computer program Max/MSP 4.6 and the signal processing package FTM 3.0. The audio input to the patch may be lightly compressed. The placement and level of microphones and speakers must be carefully adjusted to avoid feedback.

*I gratefully acknowledge Ellen Ruth Rose for her samples and experimentation. I thank David Wessel, Edmund Campion, Adrian Freed, John MacCallum, Ali Momeni, Matt Wright, Michael Zbyszynski (CNMAT), Alexis Baskind, Diemo Schwarz, Mikhail Malt, Emmanuel Jourdain, and Jean Lochar (IRCAM) for their technical assistance and Max/MSP abstractions and externals.*



## Technical Specifications

# WHAT THE BLIND SEE

Aaron Einbond

Cursus 2 in Music Composition and Technologies, IRCAM, Paris.

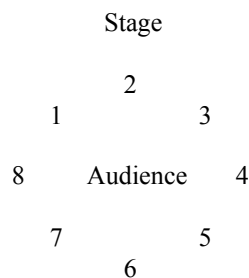
Premiere 13 June 2009, Ensemble L'Instant Donné, CentQuatre, Festival Agora, Paris.

Aaron Einbond and Eric Daubresse, technical realization.

### Equipment

- 2 Apple MacBooks Intel 2 GHz, 4GB RAM, Max/MSP 4.6.3 with FTM 2.3.7
- 2 audio interfaces (RME Fireface 800, 400, or similar)
- 2 MIDI pedals and interface
- 8-channel output, plus additional speakers to amplify the ensemble
- microphones as necessary to amplify and treat the five musicians (see attached diagram of microphones used for the premiere)

- Approximate speaker placement:



Microphones are chosen to give as close an amplification of the quiet sounds of the ensemble as possible. Contact microphones may be used on certain instruments: Schertler contact microphones on the surface of the bass drum and metal interior of the piano, Accusound contact microphones on the surface of the tam tam and table of the piano, and DPA microphones clipped on the tailpiece of the viola and interior of the harp. These are complemented with aerial microphones (see attached diagram).

The electronic events are triggered by the violist and bass clarinetist with the pedals, or from the computer by an assistant. The two pedal sources are not differentiated in the patch.

The electronic patch provided requires the computer program Max/MSP 4.6.3 and the signal processing package FTM 2.3.7. The audio input to the patch may be lightly compressed.

*I gratefully acknowledge Ensemble L'Instant Donné for their samples and collaboration. I thank Diemo Schwarz for the CataRT concatenative synthesis package, and Diemo Schwarz and Jean Bresson for their research contributions. I thank Eric Daubresse, Yan Maresz, Mikhail Malt, Emmanuel Jourdan, Jean Lochar, and Alexis Baskind for their guidance and Max/MSP objects and externals.*

## What the Blind See — Interface Audio Connections

Patch Concert --- Aaron EINBOND - AGORA 09

		Instrument	MAX/MSP Input	ADC input															
				1	2	3	4	5	6	7	8								
Fireface 800	Port ADAT 1 Input	Alto DPA	13																
		Clarinet aérien up	14																
		Harpe DPA in	15																
		Piano aérien up	16																
		Vibra	17																
		Marimba	18																
		Grosse caisse aérien up	19																
		Tam aérien up	20																
	Analog IN	Piano Schertler	7																
		Piano Accusound	8																
		GC Schertler	9																
		Tam Accusound	10																
		Retour CataRT	1																
		Retour CATART	2																
				MAX/MSP Output	DAC														
					1	2	3	4	5	6	7	8							
	Port ADAT 1 Output	HP 1	13																
		HP 2	14																
		HP 3	15																
		HP 4	16																
HP 5		17																	
HP 6		18																	
HP 7		19																	
HP 8		20																	
Analog OUT	Audio to CataRT (FF400)	1	Sortie sur analog 1																
	Audio to CataRT (FF400)	2	Sortie sur analog 2																

*Pour ADC 4 : mixage dans Fireface mixer de 16 + 7 +8 ou dans Max/MSP...*

*Pour ADC 7 : mixage dans Fireface mixer de 19 + 9 ou dans Max/MSP....*

*Pour ADC 8 : mixage dans Fireface mixer de 20 + 10 ou dans Max/MSP....*

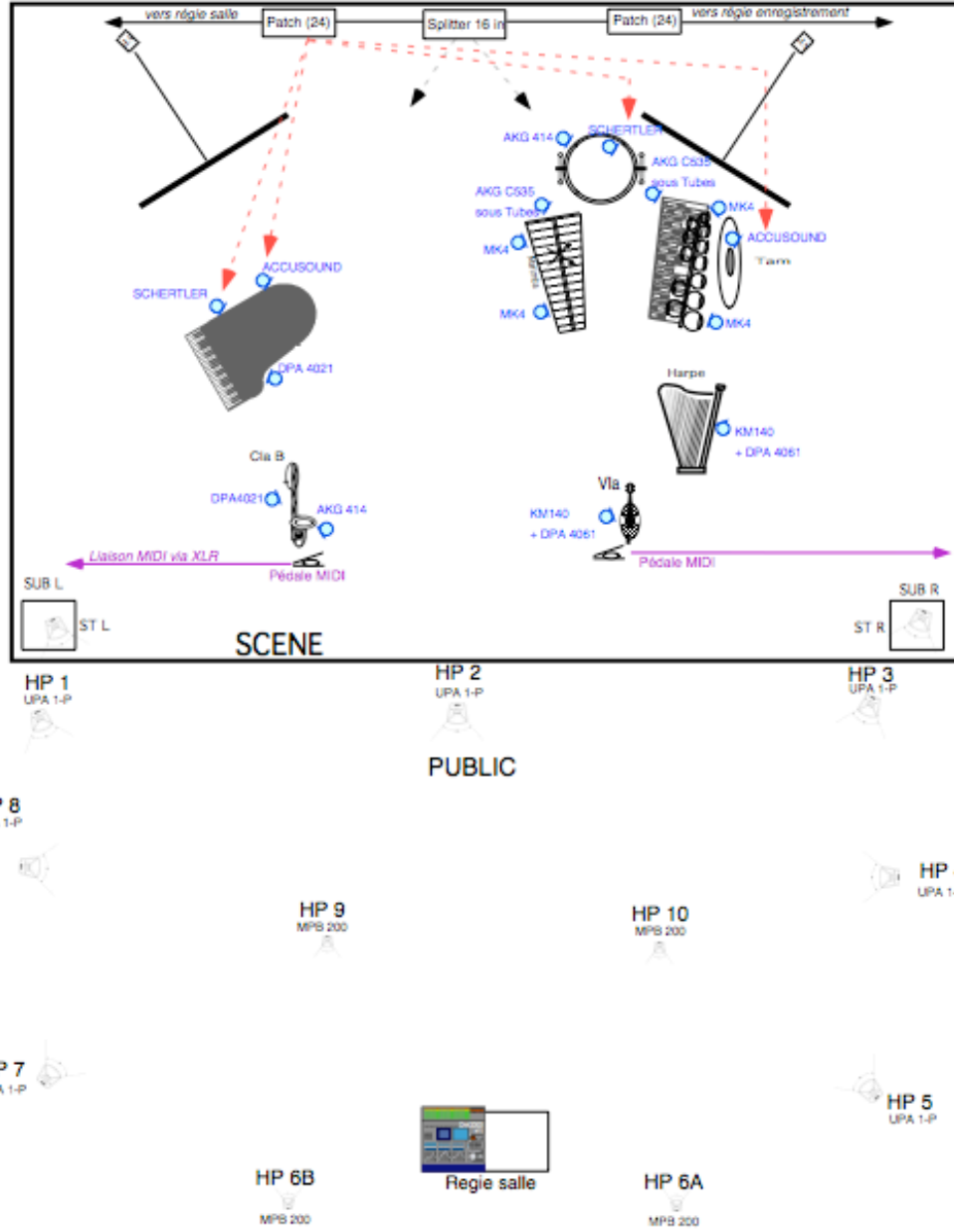
		Instrument	MAX/MSP Input	ADC input									
				1	2	3	4	5	6	7	8		
FireFace 400	Analog	Audio from Fireface 800	1	■									
		Audio from Fireface 800	2		■								
				MAX/MSP Output	DAC								
					1	2	3	4	5	6	7	8	
		Port ADAT 1 Output	HP 1	13	■								
			HP 2	14		■							
			HP 3	15			■						
			HP 4	16				■					
			HP 5	17					■				
			HP 6	18						■			
	HP 7		19							■			
	HP 8		20								■		
	Analog	Audio to FireFace 800	1	Sortie sur analog 1									
		Audio to FireFace 800	2	Sortie sur analog 2									

# What the Blind See — Microphone and Speaker Placement

<b>IRCAM</b> <small>Centre de Recherche en Acoustique et Musique</small>	
plan n°: 002	Création
date : 25/05/2009	<b>Implantation</b>
Etude Sylvain CADARIS Tel : 00 33 1 44 78 48 78 Fax : 00 33 1 44 78 15 40 cदारिस@ircam.fr	<b>&amp;</b>

CONCERT AGORA du 13 Juin 2009 - Salle 400

Aaron EINBOND: "What the blind see"  
Pour Clarinet Bass, alto, piano, harpe et percussions



à Florent Gerenton pour le Festival Manca

# TEMPER

for bass clarinet and live electronics

AARON EINBOND  
2006

Volatile, flexible, but with a groove (♩ = 72-84)

breath alone

Bass Clarinet in B $\flat$

Pedal

Granulated clicks *ppp*, low E resonance

1

ord. breath tone slap tongue, breath s.l. tone breath

*sfz* *pp* *sfz* *sfpp* *ppp* *sfz*

2 Sound file SF2

tone mph. 1 breath tone overblow ord. breath

*pp* *p* *ff* *ff* *sfz* *pp*

3 SF3, granulated clicks *mp*, low E resonance continues

tone s.t. flz. tone breath tone breath tone

*sfz* *pp* *sfz* *sfpp* *p* *pp* *fp*

s.t. breath tone

*ff* *pp* *p* *ppp* *sfz* *f*

4 SF4, granulation and resonance continue

15 *ff pp* *poco* *fp* *sfp* *sfp* *pp* *molto*

-----> breath tone

18 *ff* *p* *sfz f menacing* *sfz* *sfz* *sfz*

S.F.5a SF5b, granulated burbling *f*, low E mph. resonance,

21 *ff* *sfz f* *fff* *pp* *p* *sfz* *p <> ppp sotto voce* *molto* *p*

*poco allarg.* *a tempo* overblow breath tone mph. 1

⑥ SF6, granulation fades to *pp*

24 *ff pp sub.* *p < f* *sfz f* *p* *pp*

overblow mph. 1 ord. overblow mph. 1

⑦ SF7, granulation mounts in intensity

27 *ff* *sfz ff* *sfz ff* *sfz ff* *p*

overblow

⑧ SF8

30 *poco* *overblow* *ord.* *mph. 2* *overblow*

9 SF9, granulated taps *p*, open G resonance

34 *mph. 2* *mph. 2* *mph. 2* *mph. 2*

10 granulation continues, *mph. 3* resonance

39 *overblow* *overblow ord.* *breath* *tone* *breath* *tone*

11 SF11, *mph. 4* resonance granulated clicks, low G resonance

44 *breath* *tone* *breath* *tone* *breath* *tone* *breath* *tone*

12 SF12, granulation continues and fades out, low G resonance continues

53 *pp* *ppp* *ppp* *ppp* *breath*

13 SF13a (in tempo)



58 mph. 3 s.t. overblow breath -> tone overblow

*p* *sfz* *pp* *f* *pp* *sotto voce* *ff*

SF13b, granulated multiphonic *f*, mph6 resonance

granulation responds only to playing *f* and as little as possible to playing *p*

64 mph. 3 overblow ord.

*p* *ff* *ppp* *pp* *poco sfz* *pp*

14 granulation fades out, high C4 resonance

71 mph. 3 ord.

*p* *pp* *mp* *pp* *sfz* *pp*

15 high C4 fades out, high D resonance fades in

77 mph. 1 ord.

*f* *p* *sfz* *sfp* *sfp* *sfz*

16 SF16a (in tempo)

SF16b, mph. 7 resonance

84 mph. 4 breath tone mph. 4 ord. mph. 4 ord. mph. 4

*pp* *f* *sfz* *f* *sfz*

17 High G resonance

88

mph. 4      overblow -----<sub>1</sub>      mph. 5 ord.      mph. 5 ord.

*p sub.*      *ff funky*      *f*      *ff*

(18) SF18, resonance fades out

93

mph. 5 ord.      *poco allarg.*      gliss. 1/4 ton

*sfz:ff*      *hysterical*

96

*a tempo*      s.t. breath ---> tone      breath -> tone      s.t.

*sfz:ff menacing*      *pp*      *ff*      *pp*      *ff*      *f*

(19) SF19, low C resonance increasing in intensity

100

-----> overblow      breath -> overblow ord.      overblow      breath -----> tone      overblow      overblow

*fff pp*      *ff*      *f*      *ff*      *pp*      *sfz*      *fp*      *fp*      *fp*

(20) SF20, granulated burbling pp, low C resonance thickens

104

breath tone      overblow

*pp*      *sfz*      *pp*      *f*      *pp*      *f*      *sfz*

108

*mp*      *f*      *p*      *molto*      *ff*      *hysterical*

(21) SF21

111 *sfz sf sempre* *fff terrifying* *overblow*

(22) SF22, granulated burbling *ff*, low C mph. resonance

114 *f confused* *ff* *fffz* *ffpp* *sfpp*

(23) SF23, granulation responds only to playing *f* and as little as possible to playing *p*

117 *fff* *ff sub.* *sfpp* *fffz* *p hesitant* *sfpp*

(24) Granulation fades out, low C resonance

121 *mf sfz pp* *sfz* *p* *poco* *fffz f*

(25) Granulated burbling *pp*, low C resonance continues

124 *sfz p* *ppp* *sfpp* *ppp* *fffz pp* *poco* *poco sfz*

(25) Granulated burbling *pp*, low C resonance continues

128

overblow

breath tone

*f* *sfp* *pp* *p* *molto*

(26) SF4

132

breath flz. s.t.

tone breath tone

G. P.

*sffz* *pp* *sffz* *pp* *sffz* *ppp* *sotto voce* *sfp*

granulated clicks *pp*, resonance continues

136

G. P.

*sfp* *mp* *pp* *sfp* *ppp* *pp* *f* *desperate*

(27) SF27 (8 sec.)

140

overblow

G. P.

breath ---> tone

overblow

*ff* *sffz* *pp* *sffz* *f* *fff* *p* *ppp*

(28) SF28 (12 sec.)

to Ellen Ruth Rose  
**BESIDE ONESELF**  
 for viola and live electronics

AARON EINBOND  
 2007

Indifferent (♩ = 60-72, ♩ = 120-144)

Viola

Pedal

1 Concatenative taps and scrapes *pp*

2 Sound file SF2, high B resonance

3 Resonance gliss. and fade out, catart taps and scrapes *pp*

4 SF4, high B, F# resonances

5 Resonance gliss. and fade out, catart taps and scrapes *pp*

6 Start recording delay (5 sec.)

7 Stop recording delay, start catart, resonances

8 SF8, concatenative high D resonances

9 Start recording delay (3 sec.)

10 Stop recording delay, high B resonance

11 SF11, resonant chord

arco  
 c.l.t. → flaut.  
 ord.

pizz. arco pizz.

arco  
 flaut.  
 III

c.l.b. pizz. arco c.l.t. → flaut.  
 ord.

1/2 c.l.t. c.l.b. arco c.l.t. → flaut. → m.s.t. → s.p.  
 ord. senza vib. ord.

c.l.b. ord. c.l.b. pizz. arco ord. c.l.b. pizz. arco  
 III III

*pp* *mf pp* *f pp*

*a tempo*  
 arco  
 ord. III IV II 1/2 c.l.b. ord. flaut. → ord. s.t.  
 III IV

*f pp* *f pp* *fp*

8 SF8, concatenative high D resonances 9 Start recording delay (3 sec.)

s.p. 1/2 c.l.b. → flaut. ord. al tallone pizz.  
 ord. III

*pp* *fp* *fp* *ff* *pp* *fff* *f sonoro*

10 Stop recording delay, high B resonance 11 SF11, resonant chord

gliss.

arco ord. II III pizz. +

*p* *transparente*

⑫ Concatenative resonant chord *p*

*pp* *mf* *pp* *fpp* *mp*

arco flaut. -----> ord. s.t. -----> ord.

⑬ SF13

⑭ Start recording delay (2 sec.)

⑮ Stop recording delay, catart to resonant chord *p*

*pp* *f* *f* *p* *sfz pp*

gliss. 4:3 gliss.

senza vib. -----> ord.

⑯ Harmonizers cresc. to *ff*

*sfz p* *molto ff* *violento* *sfzp* *sfzp*

ord. s.t. ord. III s.t.

⑰ Harmonizers fade out, high D and B resonance

⑱ Harmonizers on (2 sec.) and fade out, high B and D resonances

*sfzf* *p* *f* *sfzf* *pp* *f* *fp*

gliss. s.p. leggero ord. III

⑲ SF19, harmonizers on (2 sec.) and fade out

*f* *pp*

martellato -----> legato II

⑳ SF20, harmonizers on (2 sec.) and fade out

㉑ SF21, Harmonizers cresc.

*f* *p* *sfz f* *fp*

legato m.s.p. ca. 10 sec.

㉒ SF22 *ff* (30 sec.)

*sfzf ff* *intenso* *pp* *f*

c.l.b. pizz. arco c.l.t. → flaut. ord.

(23) Concatenative taps and scrapes *pp* (24) SF24, cataract fade out *p*

ord. senza vib. -----> vib. largo e intenso

*fp cantabile* *fp* *f* *gliss.* *gliss.* *gliss.*

(25) Fade out sound file, start recording delay (5 sec.)

riten. - accel. -----> a tempo

*p* *fp* *ff* *sfz*

(26) SF26, stop recording delay, high D resonance (27) SF27 (28) SF28, harmonizers

riten. - accel. -----> a tempo riten. - accel. ----->

*ff più intenso* *sfz* *poco fp* *fp* *f*

(29) Fade out sound file, start recording delay (3 sec.)

a tempo senza vib. -----> string. vib. intenso pizz. arco a tempo

*sub. p* *sfz* *fp* *f*

(30) SF30, stop recording delay

accel. -----> rall. -----> a tempo

détaché, sur la corde flaut. II I flaut.

*f* *p* *poco f* *p* *gliss.*

(31) Start recording delay, high F# resonance (32) Stop recording delay, resonances gliss. and fade out

ord. II -----> flaut. II I

*fp* *sfz* *p* *mf* *pp* *mp* *ppp*

(33) SF33, high F#, C# resonances (34) SF34, record delay (1 sec.), fade out

Transposed score

Lointain,  $\text{♩} = 60$ ,  $\text{♩} = 120$

Viola  
 fingers on the wood  
 c.l.b.  
*pppp*

Pédale 1

① consecutive Via.

② add Hp samples

Bass Clarinet  
 in B $\flat$

Pédale 2

Harp

Piano

Vibraphone,  
 Marimba  
 Percussion

Crotales,  
 Tam-Tam,  
 Bass Drum

*pppp*  
 muted with cloth  
 sempre

fingers sur la table



**Vla.** *pp* *pizz.* +1 *glass.* *c.l.t.* *pp* *filter Via.*

**B. Cl. in Bb.** *pp* *add Vib. samples, filter B.D.*

**Hp.** *pp* *fingers* *mut. sur la table* *finger*

**Pno.** *pp*

**Vib.** *pp* *drawn* *resonant tubes* *out. drum* *pp* *glass.* *mut. stop on the surface* *auth. stop on the surface* *pp*

**T.T. B.D.** *pp* *B.D. wire brushes*

The score consists of five systems of staves. The first system is for Viola (Vla.), the second for Bass Clarinet in Bb (B. Cl. in Bb.), the third for Harp (Hp.), the fourth for Piano (Pno.), and the fifth for Vibraphone (Vib.) and Timpani/Bass Drum (T.T. B.D.). Each system includes a musical staff with notes and rests, and a corresponding diagram of the instrument with arrows indicating specific playing techniques. Performance instructions such as *pp* (pianissimo), *pizz.* (pizzicato), *glass.* (glass), *c.l.t.* (cymbal), *filter Via.*, *add Vib. samples, filter B.D.*, *fingers*, *mut. sur la table*, *finger*, *drawn*, *resonant tubes*, *out. drum*, *mut. stop on the surface*, *auth. stop on the surface*, and *B.D. wire brushes* are used throughout. The score is marked with a double bar line (//) at the beginning of the first system and a circled number 3 at the start of the second system.



























Vla. *a tempo* ♩ = 120 *ppp* c.l.t.

R. Cl. in B♭ *M*

Hp. *a tempo* ♩ = 120 *ppp* mit fitt sob. triangle beater between the strings tuning pegs doigts sur la table

Pno. *ppp* plectrum between mite and tuning pegs tuning pegs on the harp

Vib. *a tempo* ♩ = 120 *pp* wosden bundles







This musical score page includes the following parts and instructions:

- Viola:**
  - Measures 143-145: *mf*, vertical tremolo (c.l.t.), *ppp*, *mp pppp*.
  - Measures 146-150: *sfz*, *mf*, *pp*, *sfz*, *sfpp*, *mf*.
  - Measures 151-155: *pp*, *sfz*, *pp*, *mf*, *pp*, *sfz*, *ppp*.
  - Measures 156-160: *mf*, *ppp*, *mp*, *ppp*, *mp*.
- B. Cl. in Bb.:**
  - Measures 143-145: *sfz*, *pp*, *mf*, *pp*, *sfz*, *pp*.
  - Measures 146-150: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 151-155: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 156-160: *ppp*, *mp*, *ppp*, *mp*, *ppp*, *mp*.
- Hp.:**
  - Measures 143-145: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*.
  - Measures 146-150: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 151-155: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 156-160: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
- Pno.:**
  - Measures 143-145: *mp*, *pp*, *mf*, *pp*, *sfz*, *pp*.
  - Measures 146-150: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 151-155: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
  - Measures 156-160: *pp*, *mf*, *pp*, *sfz*, *pp*, *mf*, *pp*.
- Mba.:**
  - Measures 143-145: *ppp*, *mp*, *ppp*, *mp*, *ppp*, *mp*.
  - Measures 146-150: *ppp*, *mp*, *ppp*, *mp*, *ppp*, *mp*.
  - Measures 151-155: *ppp*, *mp*, *ppp*, *mp*, *ppp*, *mp*.
  - Measures 156-160: *ppp*, *mp*, *ppp*, *mp*, *ppp*, *mp*.

**Performance Instructions:**

- live spatialization* (40)
- fingers sur la table*
- fingers on the back*
- fingers*
- wooden handles*
- superball*
- placrum*
- Vib. motor off wire brushes*
- T.T. superball*



This page contains a musical score for five instruments: Viola, B. Cl. in Bb, Hp., Pno., and Vib. The score is divided into two systems. The first system includes dynamic markings *mf* and *f*, and performance instructions *mas.p.*, *s.p.*, and *flaut.*. The second system includes the marking *ffz*. The score features complex rhythmic patterns with many beamed notes, often grouped with slurs and fingerings (e.g., 1-7, 3-5, 7-5). There are also various articulation marks such as accents and slurs. The Viola part has a *mf* marking at the beginning. The B. Cl. in Bb part has a *f* marking. The Hp. part has a *ffz* marking. The Pno. part has markings for *(drawn)* and *(alythm)*. The Vib. part has a *f* marking. The score is written in a 4/8 time signature.

157

Via.

flaut. s.p.  $\text{mf}$

glass. (hand)  $\text{sfz}$

ppp

concentrative Eb resonance (44)

soundfile, live spatialization (43)

pp

ppp

arco

pp

Eb, multiphonic resonance (46)

live spatialization (45)

fk

$\text{f}^{\text{m}}$   $\text{sfpp}$

B.Cl. in B.

$\text{sfz}$

$\text{sfz}$

M

Hp.

fingers on the back

nails sur la table fingers

ppp

finger sur la table

knitting needle between muted strings

pp

$\text{sfz}$

pp

pp

Pno.

$\text{sfz}$

pp

f

pp

$\text{sfz}$

pp

Vib.

handle

$\text{sfz}$  f

wire brushes

pp

wire brushes

pp

motor on fast

pp

f

pp

Musical score for Viola, B.C. (Bass Clarinet in Bb), Hp. (Harp), Pno. (Piano), Vib. (Vibraphone), and T.T. B.D. (Timpani and Bass Drum). The score is divided into systems with various time signatures (3/4, 4/8, 3/4, 4/8) and dynamic markings (pp, p, mp, f, sfz, sfpp, sf).

**Viola:** Includes markings for *pizz.*, *arco*, *gliss. (hand)*, and *vertical tremolo*.

**B.C. in Bb:** Includes markings for *concentinative resonance* and *live spatulization triangle beater*.

**Hp.:** Includes markings for *F4/R* and *finger roll on the back of the instrument sur la table*.

**Pno.:** Includes markings for *wire brushes*, *motor off*, and *handle rubbed*.

**Vib.:** Includes markings for *senza*, *superball*, and *superball rebondissant*.

**T.T. B.D.:** Includes markings for *superball rebondissant*.









This page contains the musical score for five instruments: Viola, B.C. in Bb, Hp., Pno., and Mba. The score is divided into two systems.

**Viola:** The first system is in 3/4 time, starting with a *pp* dynamic. The second system is in 4/8 time, with dynamics ranging from *pp* to *p*. Performance instructions include *c.l.b.*, *III II*, and *pp*.

**B.C. in Bb:** The first system is in 3/4 time, with dynamics *f*, *pp*, and *sfz*. The second system is in 4/8 time, with dynamics *f*, *pp*, and *sfz*. Performance instructions include *triangle beater*, *gloss.*, and *fingers on the back*. Rehearsal mark 32 is indicated.

**Hp.:** The first system is in 3/4 time, with dynamics *p* and *f*. The second system is in 4/8 time, with dynamics *f* and *pp*. Rehearsal mark 33 is indicated.

**Pno.:** The first system is in 3/4 time, with dynamics *sfz* and *f*. The second system is in 4/8 time, with dynamics *f* and *pp*. Performance instructions include *gloss.* and *sfz*.

**Mba.:** The first system is in 3/4 time, with dynamics *sfz* and *f*. The second system is in 4/8 time, with dynamics *f* and *pp*. Performance instructions include *gloss.* and *sfz*.











266 arco

Via. arco  
 c.l.b. (low)  
 glass. (hand)  
 arco  
 glass. (hand)  
 c.l.b.  
 arco  
 m.s.p.  
 pizz.  
 until breath runs out

56 sound file: snow field recording

B. Cl. in Bb. *pp*

Hp. *pp*  
 finger sur la table

Pno. *f*  
 spectrum between nuts and tuning pegs

Vib. *pp*  
 wooden handle  
 superball  
 superball  
 B.D. wire brush drawn

20 sec.  $\frac{3}{4}$

20 sec.  $\frac{3}{4}$

5 sec.  $\frac{3}{4}$

211  $\frac{3}{4}$   $\frac{D1}{4}$  *a tempo*  $\text{♩}$  120  $\frac{4}{8}$

Vla.

R. Cl. in B $\flat$

57  $\frac{3}{4}$   $\frac{D1}{4}$  *a tempo*  $\text{♩}$  120  $\frac{4}{8}$

concatenative keyclicks

concatenative Pno.

58  $\frac{4}{8}$   $\frac{2}{4}$   $\frac{2}{4}$   $\frac{4}{8}$

add concatenative Pno.

59  $\frac{4}{8}$   $\frac{2}{4}$   $\frac{2}{4}$   $\frac{4}{8}$

concatenative multiphonics

Hp.

Pno.

plectrum between nuts and tuning pegs

on the strings

60  $\frac{3}{4}$   $\frac{D1}{4}$  *a tempo*  $\text{♩}$  120  $\frac{4}{8}$

Vib.

T.T. B.D.

$\text{pp}$



3/4 4/8

Vla.

B. Cl. in Bb.

Hp.

Pno.

Mbsa.

(61) concatenative multiphonics

(60) concatenative B.CI., Pno., Mbsa.



232

Vla.  $\frac{3}{4}$   $\frac{4}{8}$   $\text{III}$   $\text{clib.}$   $\text{pizz.}$   $\text{gliss. (low)}$   $\text{pp}$   $\text{f}$   $\text{pizz.}$

B.Cl. in Bb.  $\text{f}$   $\text{pppp}$   $\text{pp}$   $\text{sfp}$   $\text{sfp}$

Hp.  $\frac{3}{4}$   $\frac{4}{8}$   $\text{concatenative unit}$   $\text{triangle beater between the strings}$   $\text{pp}$   $\text{fingers over frettable}$   $\text{wooden stick between nuts and tuning pegs}$   $\text{pp}$   $\text{sfp}$   $\text{pp}$

Pno.  $\text{sfp}$   $\text{pp}$   $\text{pp}$   $\text{pp}$

Mba.  $\frac{3}{4}$   $\frac{4}{8}$   $\text{pp}$   $\text{pp}$   $\text{pp}$

T.T. B.D.  $\text{mp}$









267  $\frac{3}{4}$  c.l.b. II  $\frac{4}{8}$   $p$   
 1 arco II  $\frac{3}{4}$   $f$   
 s.p.  $\frac{4}{8}$   $sfp$   
 flaut. non lib.  $\frac{4}{4}$   $pp$

268  $\frac{3}{4}$   $sfp$   $f$   $sfp$   $pp$   $\frac{4}{4}$   $\frac{4}{4}$   
 cross-synthesis  $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{4}{4}$   $\frac{4}{4}$   
 77 fade out cross-synthesis

Hp.  $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   
 $p$  nails fingers  $f$   $p$   $f$

Pno.  $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   
 $pp$   $f$   $p$   $f$   $p$   $f$   $p$   $f$   $p$   $f$

Mba.  $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   
 $sfp$  wooden handles  $p$

T.T. B.D.  $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   $\frac{3}{4}$   $\frac{4}{8}$   
 $mp$  T.T. wooden handle drawn along edge  $mf$



The score is divided into five systems, each with a specific instrument label and performance instructions:

- Viola:** Measures 274-278. Includes dynamics *ppp*, *pp*, and *sfz*. Performance instructions include *pizz.*, *c.l.b.*, and *1*.
- B. Cl. in Bb:** Measures 274-278. Includes dynamics *ppp*, *pp*, and *sfz*. Performance instructions include *triangle beater on tuning legs*, *fingers*, and *dob*.
- Hp.:** Measures 274-278. Includes dynamics *ppp*, *pp*, and *f*. Performance instructions include *consecutive unit*, *resonance, cross-synthesis*, and *7p*.
- Pno.:** Measures 274-278. Includes dynamics *p*, *mf*, and *f*. Performance instructions include *Mba. fingers* and *superball*.
- Vib.:** Measures 274-278. Includes dynamics *ppp* and *f*. Performance instructions include *Vib. superball* and *7*.

The score features complex rhythmic patterns, including 5/4 and 3/4 time signatures, and various articulation marks such as accents and slurs.

Musical score for Viola, B.C. in Bb, Hp., Pno., Vib., and T.T. B.D. The score is divided into systems for each instrument.

**Viola:** Starts at measure 280. *arco sp.*, *poco allarg.*, *a tempo*. Dynamics include *fp*, *pp*, *sfz sf*, *ff*, *gl.*, and *gliss.*. Includes a *flaut. sp.* section.

**B.C. in Bb:** *sfz sf*, *pp*, *ppp*. Includes a section marked (81) *concatenative Vla. and Hp. resonance*.

**Hp.:** *poco allarg.*, *a tempo*. Dynamics include *ppp* and *pp*. Includes a section marked (80) *fade out cross synthesis* and a *bowed* section.

**Pno.:** *piano fishing line*, *mp*.

**Vib.:** *poco allarg.*, *a tempo*. Dynamics include *mp* and *p*. Includes a section marked *T.T. unmit. bowed*.

**T.T. B.D.:** *p*.

Musical score for Viola, B.C. in Bb, Hp., Pno., Vib., and T.T. B.D. The score is divided into systems, each with a time signature of 4/8.

**Viola:** Measures 290-291. Performance instructions include *pppp*, *arco*, *unipiece*, *pp*, *cl.b.*, *cl.t.*, and *cl.f.*.

**B.C. in Bb:** Measures 290-291. Performance instructions include *pp*, *mp > pp*, *concatenative multiphonic resonance*, *concatenative staccato*, and *(G#)*.

**Hp.:** Measures 290-291. Performance instructions include *pp*, *triangle beater between the strings*, *oud.*, *fingers sur la table*, and *pp*.

**Pno.:** Measures 290-291. Performance instructions include *pp*, *p*, *pp*, *plectrum on the strings*, *wooden stick rubbed on the harp*, *fishing line*, and *oud.*.

**Vib.:** Measures 290-291. Performance instructions include *bowed muted with hand* and *oud.*.

**T.T. B.D.:** Measures 290-291. Performance instruction includes *mp*.







256

B. Cl. in B $\flat$

8/4 3/4 10/4 4/8 4/4 11/4 8/8 8/8

pp p ff sfz f pp pp>pppp

96) shorter concatenative resonance

97) fade out concatenative resonance

8/4 8/4 10/4

Crot.

T.T.  
B.D.

B.D. superball

ppp p