

# Dave Soldier & Brad Garton

String Quartet #3 opus 21  
with electroencephalograms or recordings

## “The Essential”

after the second movement of Arnold Schoenberg's Second String Quartet

1. Sample & Hold Variation
2. Fractal Variation “Benoit meets Arnold in 5 Dimensions”
  3. Fourier Transformations
  4. Integral Variation
  5. First Derivative Variation

June 19 2011 version

about 30 minutes

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## **Performance notes for “The Essential Quartet”**

This piece can either be performed by a string quartet using EEG headbands that trigger previously recorded samples, or using a fifth musician as an engineer who triggers the samples. The EEG triggering is accomplished via MAX/MSP programs that Brad Garton has devised. The triggered samples are only required in the first movement, but a creative programmer can use the EEGs to trigger appropriate sounds for the other movements except for the Fractal Variation, which should be entirely live. Samples already prepared for the 1st and 3rd movement can be downloaded from my website davesoldier.com

### *1. Sample & Hold*

This uses the EEGs or the prerecorded music. The sections with repeat signs are repeated at will by the players: move on when they become tedious unless you decide that tedium is actually desired. Either the EEGs or the engineer can repeat the same sections out of phase. Thus, these repeat sections can either use tracks the players have recorded previously, or one could download versions that we have already prepared.

### *2. Fractal Variation*

Inspired by Benoit Mandelbrot, who passed away just before this piece was written, a fractal shows similarity and multiple scales. We took five pitches that reoccur throughout Schoenberg’s and produced a fractal pattern where the same intervals occur between each set of 5 note, every 5<sup>th</sup> note, every 25<sup>th</sup> note, and every 125<sup>th</sup> note. It should be played very quickly, and extreme changes in timbre to the taste of the performers are encouraged – do your best to make this not sound dry and predictable and to have the rapid notes sound as if they are passed from voice to voice.

### *3. Fourier Transformations*

The bar graphs show each instrument’s pitches times it’s total duration times its volume. For instance if C is played for 8 beats in the 2<sup>nd</sup> movement of Schoenberg’s second, and Eb for 16 beats, and both are at the same volume, the bar is twice as high for Eb. Choose the notes at will, and use whatever sounds and effects you like, but attempt to represent them as the fractions shown, i.e., in the case above, Eb should be played twice as much as C. Don’t let it last to the point where it is tedious, unless that’s the effect you would like for your listeners. Here too, timbral changes and a thick sound are desired. Eventually, drift to your average note, which is the average of all your bars in the graph, and eventually everyone slowly slides together to the average note of the entire piece.

### *4. Integral Variation*

This sums all of the pitches, and this rapidly goes beyond the range that the instruments can play, and then beyond the range of hearing. It is thus very short.

The value of the lowest note is an arbitrary constant: the reason that the cello lasts longest is that the low D is chosen as the constant, so that succeeding Ds add zeroes, and the low C makes the integral negative. Nevertheless, even starting at a very low range, the pitches inevitably climb rapidly.

### *5. First Derivative Variation*

This uses the first derivative of each separate part. For example, if the viola plays in succession C, E, Bb below the C, the intervals are a major third up and a tritone below. If A is chosen as the pitch center, the resulting notes would be A, C# (A plus a major third), D# (A minus a tritone).

While all of the notes are from the first derivative of the original Schoenberg movement, quite a few are removed to make the piece less dense: it feels like making a sculpture of David by removing everything from the stone that isn't David.

-Brad Garton & Dave Soldier NYC April 18, 2011

# String Quartet #3 "The Essential"

June 19, 2011 version

after Arnold Schoenberg's 2nd Quartet, with electroencephalograms

Dave Soldier &amp; Brad Garton

1. Sample & Hold  $\text{♩} = 70$  Each repeat section is repeated at least 3 times, and more at will of 1st violinist

solo cello

The musical score consists of six staves for a string quartet. The instruments are Violin I, Violin II, Viola, Cello, Vln. I, Vln. II, Vla., and Vc. The score is divided into four sections labeled B, C, D, and E. Section B starts with a sample and hold pattern for the solo cello. Section C follows, with dynamic markings *free dynamics*, *mf*, *p*, *pp*, *mp*, *tr*, and *tr*. Section D continues with dynamic markings *mf*, *tr*, and *tr*. Section E concludes the page.

**Section B:** Solo cello part. Violins play eighth-note patterns. Viola and Cello play eighth-note patterns.

**Section C:** Violin I starts with a sustained note. Violin II, Viola, and Cello play eighth-note patterns. Dynamics: *free dynamics*, *mf*, *p*, *pp*, *mp*, *mp*, *tr*, *tr*.

**Section D:** Violin I starts with a sustained note. Violin II, Viola, and Cello play eighth-note patterns. Dynamics: *mf*, *tr*, *tr*.

**Section E:** Violin I starts with a sustained note. Violin II, Viola, and Cello play eighth-note patterns.

## 1. Sample &amp; Hold Variation

12

E F

Vln. I

Vln. II

Vla.

Vc.

pp

(b) d. pp f

pp f

pp f

pp

19

$\text{♩} = 70$

Vln. I

Vln. II

Vla.

Vc.

mp

mp

mp

25

$\text{♩} = 100$

Vln. I

Vln. II

Vla.

Vc.

ff mp

ff mp

ff mp bounce

mf

## 1. Sample &amp; Hold Variation

3

29

Vln. I

Vln. II

Vla.

Vc.

*p*

*p*

*p*

G

33

Vln. I

Vln. II

Vla.

Vc.

fierce rock n' roll

*ff*

H

37

Vln. I

Vln. II

Vla.

Vc.

super sul tasto

*p*

*mf*

lyric

super sul tasto

*p*

super sul tasto

*p*

*p*

*p*

$\text{♩} = 90$

43

Vln. I      very jazzy

Vln. II      *mf* very jazzy  
end tasto

Vla.      *f*  
*mf* very jazzy  
end tasto

Vc.      *f*  
*mf* pizz.  
walking bass sound

*d*=60      Nancarrow light & bouncy      I

49

Vln. I      Nancarrow light & bouncy

Vln. II      Nancarrow light & bouncy

Vla.      Nancarrow light & bouncy

Vc.      Nancarrow light & bouncy arco

53

Vln. I

Vln. II

Vla.

Vc.

## 1. Sample &amp; Hold Variation

5

J 55

Vln. I

Vln. II

Vla.

Vc.

K

**ff**

L

legno battuto

**ff**

**ff**

p legno battuto

p legno battuto

p legno battuto

58

Vln. I

Vln. II

Vla.

Vc.

legno battuto

pizz. arco, mechanically

pizz. arco, mechanically

pizz. arco

pizz. arco

$\text{♩} = 60$

62

Vln. I

Vln. II

Vla.

Vc.

pizz. arco

pizz. arco

pizz. arco

pizz. arco

## 1. Sample &amp; Hold Variation

66

Vln. I

Vln. II

Vla.

Vc.

pizz. arco dolce

pizz. arco dolce

pizz. arco dolce

pizz. arco dolce

M

Vln. I

Vln. II

Vla.

Vc.

*mp*

*p*

*mp*

*p*

*mp*

*p*

*melody*

*expressive*

*mf*

N

Vln. I

Vln. II

Vla.

Vc.

*gradually to smoother texture*

*mf*

## 1. Sample &amp; Hold Variation

7

*L=100*

81

Vln. I

Vln. II

Vla.

Vc.

85

Vln. I

Vln. II

Vla.

Vc.

O  
89

Cajun

Vln. I

Vln. II

Vla.

Vc.

## 1. Sample &amp; Hold Variation

P 94

Vln. I

Vln. II

Vla.

Vc.

pizz.

100

Vln. I

Vln. II

Vla.

Vc.

pizz.

arco

*Sinatra*

pizz.

arco

pizz.

arco

pizz.

107

Vln. I

Vln. II

Vla.

Vc.

arco

arco

arco

pizz.

## 1. Sample &amp; Hold Variation

9

112

Vln. I

Vln. II

Vla.

Vc. arco

Q

120

Vln. I

Vln. II

Vla.

Vc. arco

R

126

Vln. I

Vln. II

Vla.

Vc.

S

pizz.

T  
131

Vln. I

Vln. II

Vla.

Vc.

136

Vln. I

Vln. II

Vla.

Vc.

141

Vln. I

Vln. II

Vla.

Vc.

## 1. Sample &amp; Hold Variation

11

146

**Vln. I**

**Vln. II**

**Vla.**

**Vc.**

**G.P.**

**c. 108**

**stress beat 2**

**mp**

**f**

**pizz.**

**Wayne Shorter**

**Wayne Shorter**

**Wayne Shorter**

**stress beat 2**

**pizz. Wayne Shorter**

152

**Vln. I**

**Vln. II**

**Vla.**

**Vc.**

**stress beat 2**

**sim.**

159

**Vln. I**

**Vln. II**

**Vla.**

**Vc.**

**U**  
solo cello

**W**

**f**

**p**

**f**

**espress.**

167

X

Vln. I

Vln. II

Vla.

Vc.

175

Vln. I

Vln. II

Vla.

Vc.

182

Vln. I

Vln. II

Vla.

Vc.

187

Vln. I  
Vln. II  
Vla.  
Vc.

192

Vln. I  
Vln. II  
Vla.  
Vc.

198

Y miserably dramatic Vienna

Vln. I  
Vln. II  
Vla.  
Vc.

**Z keep tempo (108)**

203

Vln. I      Vln. II      Vla.      Vc.

mf      arco      >      >

mf pizz.      >      >      >

mf arco

mf

208

Vln. I      Vln. II      Vla.      Vc.

< f

arco

sim.

AA

BB  $\text{d} = 90$

213

Vln. I      Vln. II      Vla.      Vc.

*f*

mf

mf

mf

218

Vln. I

Vln. II

Vla.

Vc.

This section shows four staves of musical notation for strings. Measure 218 starts with Vln. I playing eighth-note pairs. Measures 219-220 show a mix of eighth-note pairs and sixteenth-note patterns. Measure 221 concludes with a single eighth note followed by a fermata.

CC

222

Vln. I

Vln. II

Vla.

Vc.

This section shows four staves of musical notation. Measures 222-224 are mostly rests. Measure 225 begins with Vla. and Vc. playing eighth-note pairs, followed by Vln. II entering with eighth-note pairs.

DD

226

Vln. I

Vln. II

Vla.

Vc.

This section shows four staves of musical notation. Measures 226-228 feature eighth-note pairs from Vln. I, Vln. II, and Vla. with dynamic markings *mf*, *ff*, and *mf*. Measure 229 starts with a dynamic *f* and includes the text "thrash, nasty pont." above the notes.

## 1. Sample &amp; Hold Variation

230

Vln. I

Vln. II

Vla.

Vc.

This section contains four staves of musical notation for strings. The first three staves (Vln. I, Vln. II, Vla.) are in treble clef, while the Vc. staff is in bass clef. The music consists of six measures of eighth-note patterns, primarily consisting of eighth-note pairs and sixteenth-note pairs. Measure 230 starts with a treble clef, measure 231 with a bass clef, and so on. The key signature changes frequently between measures.

235

Vln. I

Vln. II

Vla.

Vc.

This section contains four staves of musical notation for strings. The staves are identical to the previous section, showing the same instruments and clefs. The music continues the eighth-note patterns established in the previous section, maintaining the dynamic and harmonic complexity.

240

Vln. I

Vln. II

Vla.

Vc.

This section contains four staves of musical notation for strings. The first three staves (Vln. I, Vln. II, Vla.) show eighth-note patterns with grace notes, while the Vc. staff shows eighth-note patterns with slurs. Measures 240-243 are followed by a dynamic instruction "ff pizz." with a crescendo arrow above the Vln. I staff. Measures 244-245 are also marked with "ff pizz." and a crescendo arrow above the Vln. I staff.

## 2. Fractal Variation: Arnold & Benoit in 5 Dimensions

### 2. Fractal Variation

Presto  $\text{♩} = 190$

use sul tasto & ponticello at will: impromtu dynamics are encouraged

245

Violin I  
Violin II  
Viola  
Cello

**245**

**p**      **f**      **pp**

**arco**      **arco**      **pp**      **arco**

**mp**

3

Vln. I  
Vln. II  
Vla.  
Vc.

**mf**

**f**

**mp**

7

Vln. I  
Vln. II  
Vla.  
Vc.

**pp**

**f**

**mp**

11

Vln. I  
Vln. II *mp*  
Vla.  
Vc. *pp*

15

Vln. I *f*  
Vln. II *pp* *mf*  
Vla.  
Vc.

19

Vln. I  
Vln. II  
Vla.  
Vc.

23

Vln. I

Vln. II

Vla.

Vc.

mp

pp

27

Vln. I

Vln. II

Vla.

Vc.

f

31

Vln. I

Vln. II

Vla.

Vc.

pp

mf

mf

35

Vln. I

Vln. II

Vla.

Vc.

*> pp*

*p*      *mf*

39

Vln. I

Vln. II

Vla.

Vc.

*ff*

*ppp*

*ppp*

*ff*      *ppp*

43

Vln. I

Vln. II

Vla.

Vc.

Musical score for strings (Vln. I, Vln. II, Vla., Vc.) across three staves, numbered 47, 51, and 55.

**Staff 1 (Measures 47-51):**

- Vln. I:** Playing eighth-note patterns with grace notes, dynamic **pp** at measure 51.
- Vln. II:** Playing eighth-note patterns with grace notes, dynamic **ff** at measure 51.
- Vla. (Bassoon):** Playing sustained notes with slight slurs.
- Vc. (Cello):** Playing sustained notes with slight slurs.

**Staff 2 (Measures 51-55):**

- Vln. I:** Playing eighth-note patterns with grace notes, dynamic **f** at measure 51.
- Vln. II:** Playing eighth-note patterns with grace notes, dynamic **pp** at measure 51.
- Vla. (Bassoon):** Playing sustained notes with slight slurs, dynamic **f** at measure 51.
- Vc. (Cello):** Playing sustained notes with slight slurs, dynamic **f** at measure 51.

**Staff 3 (Measures 55-59):**

- Vln. I:** Playing eighth-note patterns with grace notes.
- Vln. II:** Playing eighth-note patterns with grace notes, dynamic **f** at measure 55.
- Vla. (Bassoon):** Playing sixteenth-note patterns.
- Vc. (Cello):** Playing eighth-note patterns with grace notes.

## 2. Fractal Variation

Musical score for string quartet (Vln. I, Vln. II, Vla., Vc.) in 2. Fractal Variation.

**Staff 1 (Measures 59-61):**

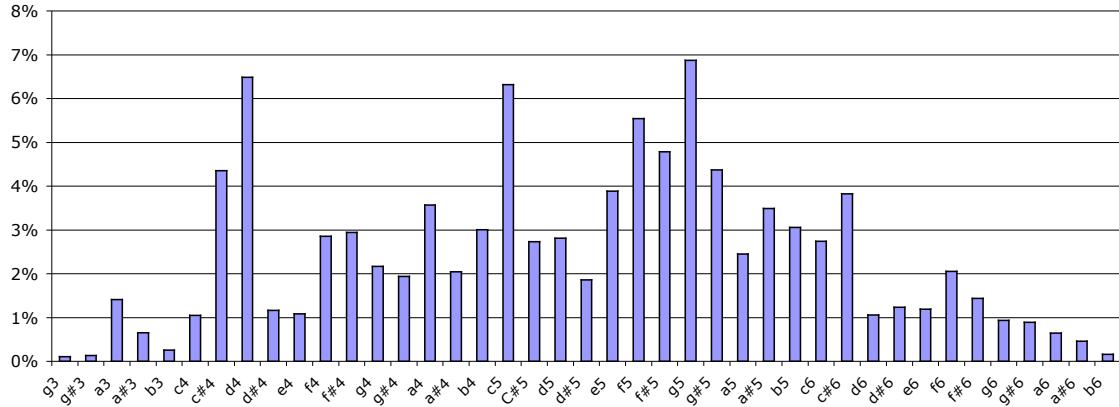
- Vln. I: Sixteenth-note patterns with slurs and grace notes.
- Vln. II: Sixteenth-note patterns with slurs and grace notes.
- Vla.: Sixteenth-note patterns with slurs and grace notes.
- Vc.: Sixteenth-note patterns with slurs and grace notes.

**Staff 2 (Measures 62-64):**

- Vln. I: Sixteenth-note patterns with slurs and grace notes. Dynamics: **pizz.**, **ff**.
- Vln. II: Sixteenth-note patterns with slurs and grace notes. Dynamics: **ff** pizz.
- Vla.: Sixteenth-note patterns with slurs and grace notes. Dynamics: **ff** pizz.
- Vc.: Sixteenth-note patterns with slurs and grace notes. Dynamics: **ff** pizz.

### 3. Fourier Transformations

April 20, 2011 version  
from the Essential String Quartet  
VIOLIN 1 PART



Bars indicate the power (duration \* volume) for each pitch in the original Schoenberg piece. C4 is middle C.

Play the amount of each pitch represented (for example, D above middle C, C above middle C, and G on top line of treble clef should be played twice as much as notes that are around 3%). You can use double stops, different tones, and rhythms at will, but try to make a sustained sound with the entire group.

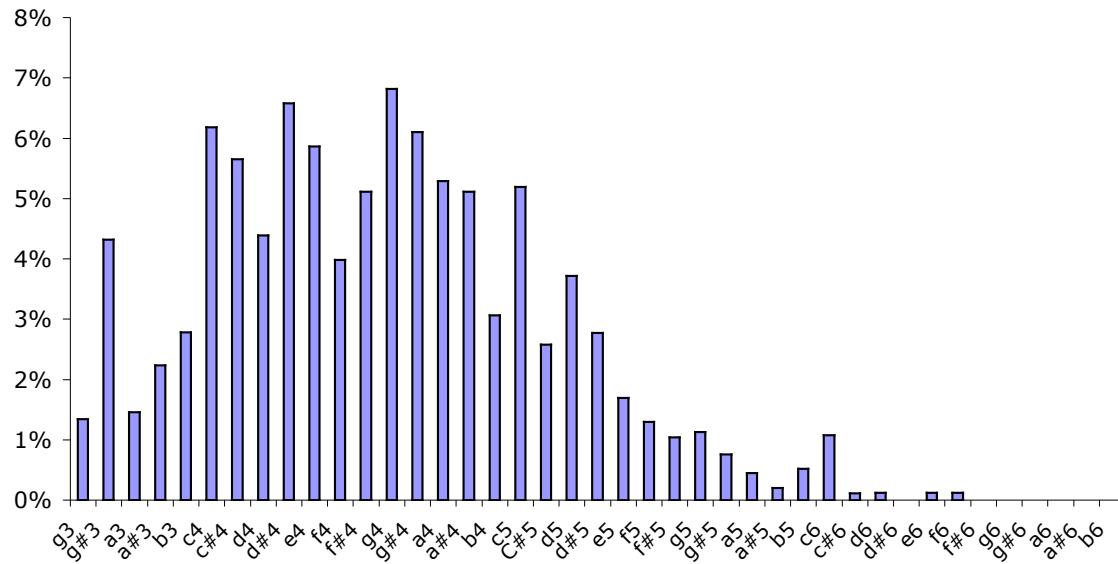
At cue 1, take 30-40 sec to slowly move the pitches closer to your average note:  
e5.1 (the open E string plus a tiny bit sharp)

At cue 2, take 30-40 sec to slowly move \ to the average note of the entire piece:  
e4.8, which is the e above middle C very sharp (almost F).

### 3. Fourier Transformations

April 20, 2011 version

VIOLIN 2 PART



Bars indicate the power (duration \* volume) for each pitch in the original Schoenberg piece. C4 is middle C.

Play the amount of each pitch represented (for example, D above middle C, G above middle C should be played the most. You can use double stops, different tones, and rhythms at will, but try to make a sustained sound with the entire group.

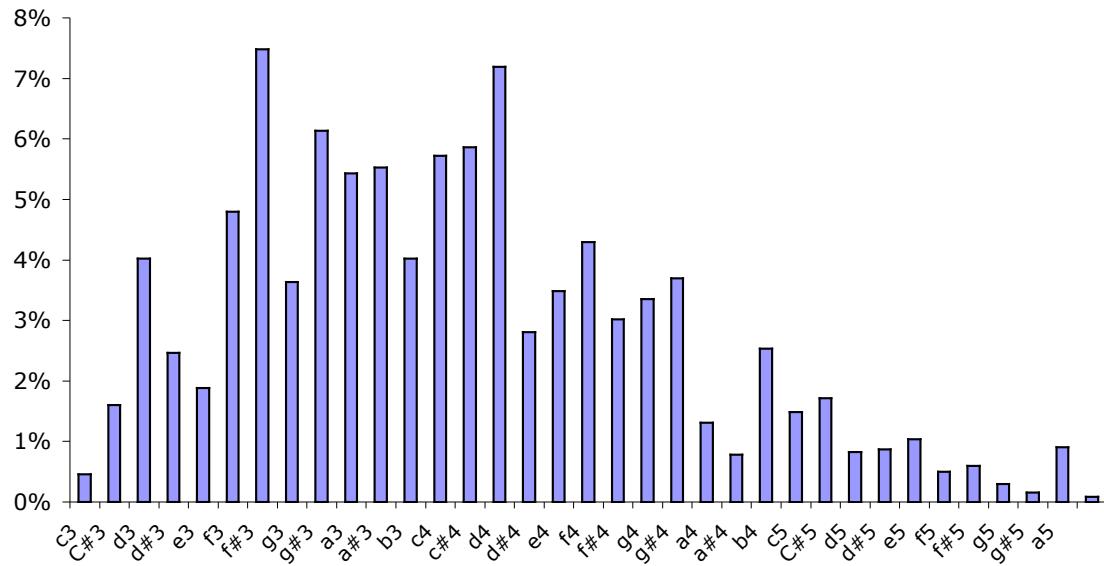
At cue 1, take 30-40 sec to slowly move the pitches closer to your average note: G#4.1 (G# below the A string a tiny bit sharp).

At cue 2, take 30-40 sec to slowly move \ to the average note of the entire piece: e4.8, which is the e above middle C very sharp (almost F).

### 3. Fourier Transformations

April 20, 2011 version

VIOLA PART



Bars indicate the power (duration \* volume) for each pitch in the original Schoenberg piece. C4 is middle C.

Play the amount of each pitch represented (for example, F# below middle C is the loudest and most played, followed by the D above middle C). You can use double stops, different tones, and rhythms at will, but try to make a sustained sound with the entire group.

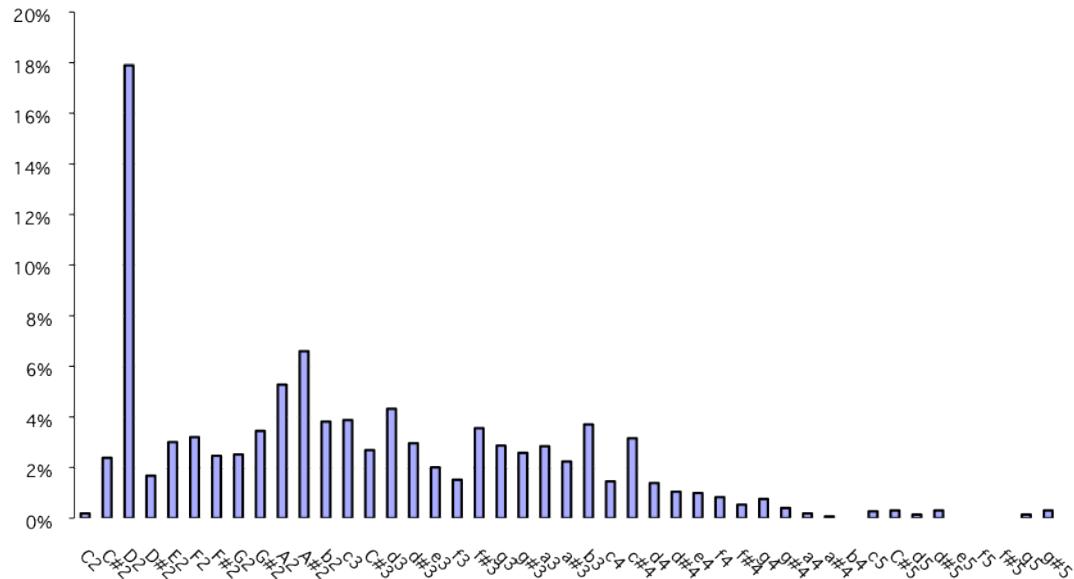
At cue 1, take 30-40 sec to slowly move the pitches closer to your average note: C#4.5, which is the C# above middle C plus a quarter tone.

At cue 2, take 30-40 sec to slowly move \ to the average note of the entire piece: e4.8, which is the e above middle C very sharp (almost F).

### 3. Fourier Transformations

April 20, 2011 version

CELLO PART



Bars indicate the power (duration \* volume) for each pitch in the original Schoenberg piece. C4 is middle C.

Play the amount of each pitch represented (for example, D above middle C, C above middle C, and G on top line of treble clef should be played the twice as much as notes that are around 3%). You can use double stops, different tones, and rhythms at will, but try to make a sustained sound with the entire group.

At cue 1, take 30-40 sec to slowly move the pitches closer to your average note: D3.3, which is the open D string plus a 3<sup>rd</sup> tone sharp.

At cue 2, take 30-40 sec to slowly move \ to the average note of the entire piece: e4.8, which is the e above middle C very sharp (almost F).

## 4. Integral Variation

### 4. Integral Variation

$\text{♩} = 116$

scherzo

Violin I

Violin II

Viola

Cello

Vln. I

Vln. II

Vla.

Vc.

Vln. I

Vln. II

Vla.

Vc.

mf

mf

mf

8va - - - -

pizz.

8va - - - -

## 5. First Derivative Variation

5. First Derivative Variation

*J=116*

Violin I

Violin II

Viola

Cello

Vln. I

Vln. II

Vla.

Vc.

*arc deggiero*

*pp arco*

*arco leggiero*

*pp leggiero*

*pp*

*cresc.*

*p*

*mf cresc.*

*mf cresc.*

*mp*

*mf*

*mp*

*mp*

*mp*

*mp*

*mp*

16

Vln. I

Vln. II

Vla.

Vc.

*marcato*

*accel.*

*f*

*mp*

*f*

*marcato*

*f*

*marcato*

*f*

♩ = 80

23

Vln. I

Vln. II

Vla.

Vc.

*mf*

*mf*

*mf*

30

Vln. I

Vln. II

Vla.

Vc.

*cue*

*ff*

*ff*

*ff*

*ff*

*f*

*f*

## 5. First Derivative

 $d=70$ 

34

Vln. I

Vln. II

Vla.

Vc.

38

Vln. I

Vln. II

Vla.

Vc.

43

Vln. I

Vln. II

Vla.

Vc.

48

Vln. I

Vln. II *p*

Vla. *p*

Vc. *p*

mp

53

Vln. I *mp*

Vln. II

Vla.

Vc.

57

Vln. I

Vln. II

Vla.

Vc.

*pp*

*pp*

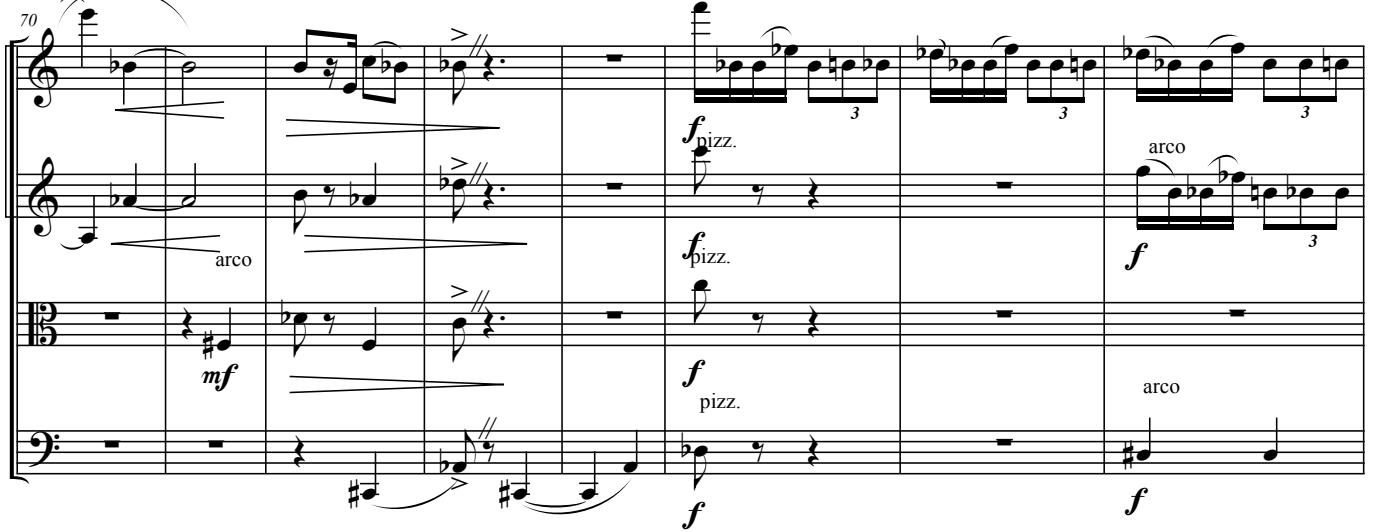
*pp*

*pp*

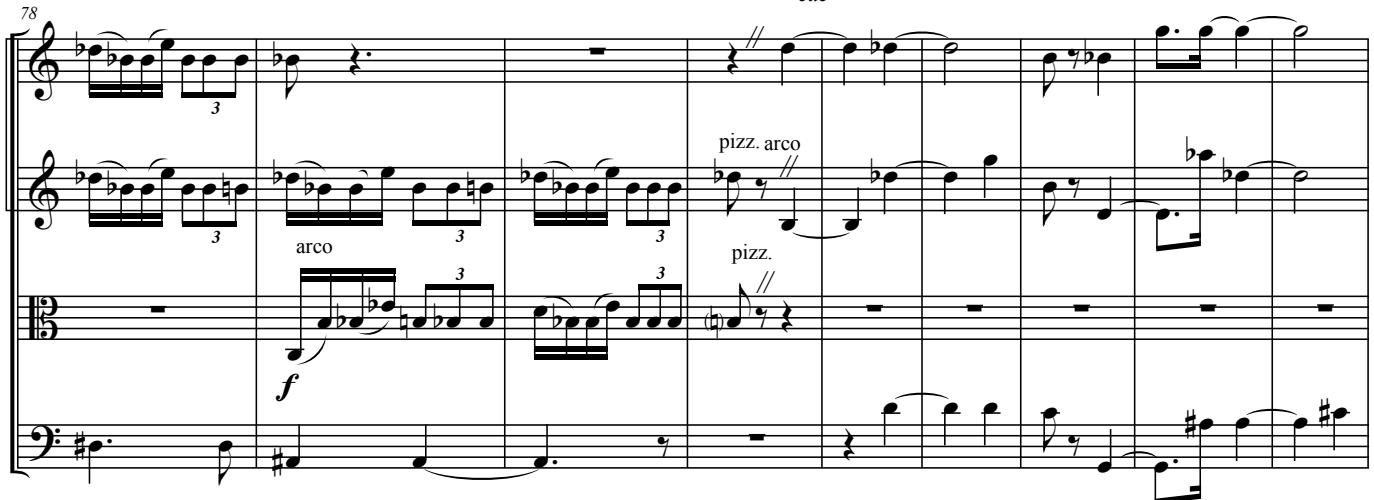
**63**

Vln. I       The score shows four staves: Vln. I, Vln. II, Vla., and Vc. The key signature is B-flat major (two flats). The tempo is indicated as  $\text{♩}=116$ . Measure 63 starts with pizz.  $\text{♯}\text{mp}$  for Vln. I. Measures 64-67 show eighth-note patterns with slurs and grace notes. Measure 68 begins with  $f$  arco. Measure 69 ends with  $f$ . Measure 70 ends with  $f$ .

**70**

Vln. I       The score continues with the same four staves. Measure 70 starts with a melodic line for Vln. I. Measures 71-74 show eighth-note patterns. Measure 75 begins with  $f$  pizz. Measures 76-77 show eighth-note patterns. Measure 78 ends with  $f$ .

**78**

Vln. I       The score continues with the same four staves. Measure 78 starts with a melodic line for Vln. I. Measures 79-82 show eighth-note patterns. Measure 83 begins with  $f$ . Measures 84-85 show eighth-note patterns.

*cue*

87

Vln. I pizz. arco  
pizz. *mf* 3 3 arco

Vln. II pizz. *mf* 3 3

Vla. pizz.

Vc. pizz. arco *mf* 3

94

Vln. I 3 3 3 3

Vln. II 3 3 3 3

Vla. arco 3 3 3 3 *mf*

Vc. 3 *mf* 3 *mp*

100

Vln. I - - - - - 3 3 3 *mp* 3 3

Vln. II 3 - - - - - 3 3

Vla. - - - - - 3 3 3 3 arco

Vc. - - - - - *mf* - -

107

Vln. I

Vln. II

Vla.

Vc.

*f*

114

Vln. I

*f*

pizz.

arco

Vln. II

*f*

pizz.

Vla.

*f*

pizz.

Vc.

120

Vln. I

*mf*

Vln. II

*mfco*

*f arco*

Vla.

Vc.

*f*

126

Vln. I      ff      pizz.

Vln. II      ff      mf

Vla.      3      3      3      3

Vc.      3      3      3      3      pizz.      mf

133

Vln. I      #p      #p      #p      #p

Vln. II

Vla.      B

Vc.      b p      b p      b p      b p      b p      b p

141

Vln. I      arco      mf

Vln. II      mp      arco      mp

Vla.      B

Vc.      b p      b p      b p      b p      b p

## 5. First Derivative

150

Vln. I      *p*      *f*      *mp* arco      *mp*

Vln. II

Vla.

Vc.      *mp* arco

157

Vln. I      *f*

Vln. II      *f*      *f*

Vla.      *f*

Vc.      *f*

163

Vln. I      *f*

Vln. II

Vla.

Vc.

168

Vln. I

Vln. II

Vla.

Vc.

173

a bit of nasty ponticello

Vln. I

*ff*

a bit of nasty ponticello

Vln. II

*ff*

a bit of nasty ponticello

Vla.

*ff*

a bit of nasty ponticello

Vc.

*ff*

some accel. to end

178

Vln. I

Vln. II

Vla.

Vc.

183

Vln. I  
Vln. II  
Vla.  
Vc.

188

pizz.

Vln. I  
Vln. II  
Vla.  
Vc.