

Wolfgang von Schweinitz

JUZ
(a Yodel Cry)

INTONATION STUDY
for trombone solo
and pre-recorded echo sounds

op. 40

1999/2009

REVISED VERSION
for Matt Barbier

PLAINSOUND MUSIC EDITON

Performance Notes

'Juz' (Swiss German for 'yodel') is an intonation study featuring the various just intervals derived from the first seven notes of the overtone series. The harmonic progressions gradually modulate through the three-dimensional pitch lattice of Septimal Harmonic Space (see tuning table on the next page). Whenever the trombonist is changing the position of the slide, it is tuned to the "echo" of some previous sound, which is played through two monitors posted center stage right behind the performer. These prerecorded echo sounds establish the possibility of keeping the intonation on track throughout the entire course of the performance. – The piece explores the peculiar timbre and musical potential of "tuned distortion". This so-called non-linear distortion or "natural ring modulation" is created whenever the trombonist is singing into the instrument while playing, thus generating a multiphonic sound which consists of the two notes played and sung and their partials, plus all their mutual combination tones. If the two primary pitches are precisely tuned, then all the difference and summation tones will indeed reinforce and enrich the harmonic sound spectrum of the tuned interval, rather than distorting it. – An extended experimentation with this highly virtuoso performance technique will enable the musician to reach a stunning degree of control, precision and refinement in projecting the magical beauty of these tuned multiphonic sounds.

PLAYBACK of the prerecorded echo sounds

Trombonists interested in performing JUZ are encouraged to produce their own sound-files with the 57 prerecorded echo sounds needed for the performance of this piece. But they may also use the sound-files produced by trombonist Matt Barbier in the large studio space of the composer. These (as well as a Max/MSP-patch for playback during the concert performance) can be obtained from Matt Barbier (e-mail: zythobone@gmail.com), the author (e-mail: schweinitz@plainsound.org) or from his website www.plainsound.org.

PERFORMANCE DURATION *circa 48 minutes*

NOTATION

The notes that are to be played are notated with standard round note heads.

The tube lengths with which these notes are to be played are specified with square note heads.

The notes that are to be sung are notated with diamond note heads.

The pitches are notated in the "Extended Helmholtz-Ellis JI Pitch Notation" (see legend below). An additional cent number for every note specifying its pitch deviation from the respective pitch in Equal Temperament is given in the tuning table on the next page. This pitch bend information is needed if a tuning machine or a microtonal synthesizer is used to check the intonation during the rehearsals – and especially during the recording session for the production of the 57 prerecorded echo sounds.

The just intervals between the played and sung pitches are also specified by their frequency ratios, which offer some helpful information for the tuning tasks by denoting the partial unisonos and the combination tones that inform the timbre of these non-tempered intervals.

ACCIDENTALS EXTENDED HELMHOLTZ-ELLIS JI PITCH NOTATION for Just Intonation

The exact intonation of each pitch is written out by means of the following harmonically defined accidentals:

$\flat\flat$ \flat \natural \sharp \times

Pythagorean series of non-tempered perfect fifths
(based on the open strings : ... c g d a e ...)

\flat \natural \sharp \times $\flat\flat$ \flat \natural \sharp

Lowers / raises the pitch by a syntonic comma
 $(81/80) = \text{circa } 21.5 \text{ cents}$

\flat \natural \sharp \times $\flat\flat$ \flat \natural \sharp

Lowers / raises the pitch by two syntonic commas
 $(81/80)*(81/80) = \text{circa } 43.0 \text{ cents}$

\flat \natural

Lowers / raises the pitch by a septimal comma
 $(64/63) = \text{circa } 27.3 \text{ cent}$

\flat or $\flat\flat$ \natural or $\natural\sharp$

Raises / lowers the pitch by two septimal commas
 $(64/63)*(64/63) = \text{circa } 54.5 \text{ cents}$

The attached arrows denoting the pitch alteration by a syntonic comma are transcriptions of the notation that Hermann von Helmholtz used in his book "Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik" (1863). The annotated English translation "On the Sensations of Tone as a Physiological Basis for the Theory of Music" (1875/1885) is by Alexander J. Ellis, who refined the definition of pitch within the 12-tone system of Equal Temperament by introducing a division of the octave into 1200 cents. – The accidental for the pitch alteration by a septimal comma was devised by Guiseppe Tartini (1692-1770), the composer-violinist and researcher who first studied the production of difference tones by means of tuned double-stops.

JUZ Tuning Table

SEPTIMAL HARMONIC SPACE

3-dimensional pitch-class projection space
notated in the Extended Helmholtz-Ellis JI Pitch Notation
with cent numbers specifying the pitch deviations
from the respective pitches of Equal Temperament

The image displays a musical score for the JUZ Tuning Table, organized into five systems of three staves each. Each staff contains a sequence of notes with cent deviations from Equal Temperament indicated below them. The notes are marked with accidentals (sharps, flats, and naturals) and stems. Some notes are grouped with brackets and labeled "Schisma".

Staff	Cent Deviation
1	-64.4
2	-60.5
3	-56.6
4	-54.6
5	-37.1
6	-35.2
7	-33.2
8	-31.3
9	-29.3
10	-27.4
11	-25.4
12	-23.5
13	-25.4
14	-21.5
15	-23.5
16	-54.6
17	-52.7
18	-50.7
19	-48.8
20	-46.8
21	-44.9
22	-42.9
23	-41.0
24	-39.0
25	-40.9
26	-23.5
27	-21.5
28	-19.6
29	-17.6
30	-15.6
31	-13.7
32	-11.7
33	-9.8
34	-7.8
35	-9.8
36	-72.1
37	-66.3
38	-62.3
39	-58.4
40	-40.9
41	-39.0
42	-37.0
43	-35.1
44	-33.1
45	-31.2
46	-29.2
47	-27.3
48	-25.3
49	-9.8
50	-7.8
51	-5.9
52	-3.9
53	-2.0
54	0
55	+2.0
56	+3.9
57	+5.9
58	-54.5
59	-46.7
60	-27.3
61	-25.3
62	-23.4
63	-21.4
64	-19.4
65	-17.5
66	-15.5
67	-13.6
68	+3.9
69	+5.9
70	+7.8
71	+9.8
72	+11.7
73	+13.7
74	+15.6
75	+17.6
76	+19.6
77	-11.6
78	-9.7
79	-3.8
80	+27.4
81	+29.3

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op. 40 (1999 / 2009)

ca. 40 - 48 *adagio con rubato*

Trombone

Playback

4/3 4/3 1:1

p *f* *p* *f* *p*

8:7

sing

12

1

tune 8/7/6

3/2 3/2

2

tune 6/4/3

32:15

16:15

4/3 3/2

p *f*

sing

24

3/2 3/2

1:1

7:8

sing

p *f*

sing

36

3

tune 4/3/2

5/3 5/4

3/2

sing

-52.7

p *f*

sing

48

4

tune 5/4/3

7:4 6/5 6/5

5:4

sing

-19.6

p *f*

sing

60

5

sing 1/1

tune 7/6/5

sing 1/1

1/1 4/3

sing 5/4

4:3 3:4

20:21 21:20

6/5

p *f*

sing

2

72 *sing* 4:3 3:4 1/1 **6** *tune* 5/4/2 4/3 4/3

84 **7** *tune* 8/4/3 5/3 5/3

96 **8** 5/3 5/3

108 **9** *tune* 5/3/2 5/4 5/4

120 **10** *tune* 5/4/3 1/1 4/3

131 **11** 4/3 1/1 1/1

142 **12** *tune* 7/6/5 7:6

next measure:
SOUND 13

238 21 *sing* 7/5 7/5/3 *sing* 5/3

-48.8 7/5

250 22 *sing* 8/3 7/3 *sing* 5/3 7/3 8/3 *sing* 1/1 5/3

-48.8 7/5

262 *sing* 5/3 *sing* 5/3 5/2 23 *tune* 6/5/3 9:8 7:8 5/3

-35.1

274 *sing* 5/4 *sing* 4/3 *sing* 1/1 4/3 5/4

f *p*

286 24 *tune* 6:5 8/6/5 *sing* 1/1 8/5 3/2 *sing* 3/2 5/2

-3.9 4/3

298 *sing* 5/2 10/7 25 10/7 10/7

-19.6 5/2

310 *sing* 4/3 5/4 *sing* 5/4 *sing* 5/4 3/2 26 4:3 16:21

-50.7

322 *tune* 5/4/3 *sing* 1/1

sing 1/1 5/3 3/2 3/2

334 *sing* 1/1 5/3 3/2 **27** *tune* 3/3/2 *sing* 1/1 5/3

2:3 7:6 -48.8 3/2

346 5/3 *sing* 1/1 7/4 7/4 5/3 3/2 *sing* 1/1 **28**

-15.6 5/3

358 7/4 5/3 3/2 3/2 3/2 3/2 7/4

370 3/2 7/4 **29** 7/6 7/6 *sing* 1/1

-15.6 3/1

382 *sing* 1/1 4/3 5/4 5/4 1/1 4/3 5/4 4/3 5/4 **30** *tune* 5/4/3

4:3 20:21 -46.8 5/4

394 *sing* 1/1 1/1 5/3 3/2 3/2 3/2 3/2

p *pp*

407 sing 1/1 4/3 7/5 31 2:3

f *p* *sing* *f* *p* 14:15

1/1 4/3

419 *tune* 3/3/2 *espr.* *sing* 7/4 5/3 *sing* 7/4 5/3 *sing* 5/3

3/2 3/2 3/2 *f* *p*

431 5/2 5/3 5/2 5/4 4/3 5/2 *sing* 7/4 5/3 3/2

f *f* *p*

443 32 *tune* 8/5/3 *sing* 5/2 5/2 *f* *f*

5/3 5/2 5/3 8/3 5/4 4/3

455 *sing* 5/2 5/2 5/2 8/3 5/2

p *f* *p*

467 33 *tune* 7/2 *sing* 3/2 3/2 10/7

5/2 3/1 8/3 5/2 1:1 8:7 0 5/2 5/2

f *p* *f* *f*

479 3/2 10/7 4/3 5/4 5/3 5/2 34

p *f* *p* -29.2 5/3 8/3

491 $5/3$ $8/3$ $5/2$ $7/3$ **35** $7/4$ $7/4$ $5/3$ $3/2$ $5/3$

503 *sing* $1/1$ $7/4$ $5/3$ $3/2$ **36** *tune* $6/5/3$ *sing* $3/2$ $7/4$

515 $5/3$ $5/3$ *sing* $5/2$ $5/3$ $3/2$ $7/4$ $5/3$

527 $3/2$ $1:2$ *tune* $6/5/3$ *sing* $1/1$ $3/2$ $4/3$ $5/3$ $5/2$ $5/3$ $3/2$

539 $5/3$ $5/3$ $5/3$ $5/3$ $3/2$ $5/2$

551 *sing* $3/2$ $5/2$ *tune* $7/5/3$ *sing* $3/2$ *sing* $3/2$

563 $8/3$ $5/2$ $4/3$ *sing* $3/2$ $8/3$ $5/2$

575 $5/2$ $5/3$ $3/2$ **39** *sing* $3/2$ $5/2$ $4/3$

8
587 $\frac{8}{3}$ $\frac{5}{4}$ $\frac{3}{2}$ *sing* $\frac{5}{4}$ $\frac{3}{2}$ $\frac{8}{3}$ $\frac{5}{3}$
f *p*

40
599 $\frac{5}{3}$ $\frac{8}{3}$ *tune* $\frac{5}{4/4}$ *sing* $\frac{3}{2}$ $\frac{7}{3}$ $\frac{3}{2}$
 $\frac{7}{6}$ $\frac{3}{2}$ $\frac{3}{2}$ $\frac{5}{2}$ $\frac{3}{2}$ $\frac{5}{2}$ $\frac{3}{2}$
f *p* *f* -17.5 $\frac{5}{2}$ $\frac{3}{2}$

611 $\frac{7}{3}$ $\frac{5}{2}$ $\frac{3}{2}$ $\frac{7}{2}$ *sing* $\frac{3}{2}$ $\frac{7}{2}$ $\frac{7}{2}$
 $\frac{5}{2}$ $\frac{3}{2}$ *p* *dolce* *f* *p* *dolce*

624 $\frac{5}{2}$ *sing* $\frac{7}{4}$ $\frac{21}{20}$ $\frac{5}{3}$ $\frac{25}{24}$ $\frac{8}{5}$ $\frac{16}{15}$ $\frac{3}{2}$
f *p*

636 $\frac{15}{14}$ $\frac{7}{5}$ $\frac{21}{20}$ $\frac{4}{3}$ $\frac{16}{15}$ $\frac{5}{4}$ $\frac{25}{24}$ $\frac{6}{5}$ 41
sing $\frac{3}{2}$ $\frac{7}{2}$ $\frac{7}{2}$ $\frac{5}{2}$
 $+15.6$ $+13.7$
"Auf Wie - der - sehn" "A - de"

649 *sing* $\frac{6}{5}$ $\frac{5}{3}$ $\frac{5}{3}$ $\frac{7}{4}$ $\frac{7}{4}$ $\frac{3}{2}$

661 $\frac{4}{3}$ $\frac{4}{3}$ *sing* $\frac{3}{2}$ $\frac{7}{2}$ 42 *tune* $\frac{7}{4/3}$ $\frac{2}{7}$ $\frac{16}{21}$ $\frac{4}{3}$
pp *f* *p* *dolce* $+15.6$

673 *sing* $\frac{4}{3}$ $\frac{5}{4}$ *sing* $\frac{4}{3}$ $\frac{5}{4}$
f *p*

684 *sing* 4/3 5/4 **43** *tune* 8/4/3 1:2 7:6 *f* *p* *f*

696 **44** 35/28/4 **45** *p* -13.6 4/3 5/4 +17.8

708 *sing* 3/2 4/3 *sing* 5/3 3/2 4/3 *f* 4/3 5/4

721 *sing* 4/3 **46** *tune* 8/7/6 8:7 32:35 *p* +3.9 4/3 *sing* 7/3

733 **47** *sing* 3/2 1/1 5/3 5/3 **48** *tune* 5/4/3 21:16 21:16 -25.3 7/3 -27.3 5/3

745 *sing* 5/4 3/2 7/2 5/3 7/4 5/3 3/2 **49** 5/3 +2.0 5/2

758 *sing* 5/4 3/2 3/2 7/4 5/3 5/4 *sing* 4/3 *pp*

771 **50** *tune* 7/4/3 4:5 **51** *sing* 3/2

32:35 *f* *p* -11.7 4/3 -41.0 8/5

783 **52** *sing* 3/2 **53** *sing* 3/2 5/2

-41.0 8/5 -41.0

795 *sing* 4/3 *sing* 3/2 5/2 **54** *sing* 3/2 5/2

8/5 -41.0 3/2

807 **55** *tune* 6/5/3 1:1 -9.8

7:9 *Schisma* (-1.95 c) 7/4 5/3 -7.8 -9.8

819 *sing* 5/3 3/2 **56** 10/7 3/2 5/3

f *p* *f* -9.8 7/4 5/3

830 5/4 4/3 3/2 5/3 3/2 5/4 4/3 3/2

p *f* *p espr.* *f*

841 **57** *ritardando* 4/3 3/2

-23.5 5/4 4/3 *p* 3/2