Marc Sabat
Lying in the grass, river and clouds
for 15 solo instruments
PLAINSOUND MUSIC EDITION
Lying in the grass, river and clouds (2012)
for 15 instruments

Alto Flute in G (Piccolo), Oboe d’Amore, Clarinet in A, Bassoon, Double Horn in F, Tenor bass Trombone (with F Extension), F Tuba (5 Valves), Percussion (1 Player on Crotales, Vibraphone, Chimes, Low Tuned Gongs), Solo Piano, Digital Keyboard, Violin I, Violin II, Viola, Violoncello, Contrabass (5 Strings tuned G-D-A-E-C)

commissioned by Alexander Mooshruger and the Bludenz Tage zeitmaßler Musik with assistance from the Ernst von Siemens Musikstiftung and the Canada Council for Daan Vandewalle and Ensemble Contrechamps

This work is the fourth piece of music belonging to Wave Piano Scenery Player, preceded by Part 1: WAKE for JIM; Part 2: to Damascus; Part 3: Wave Scenery. It may be performed as a concert work, either on its own, or taking place alongside a setting of the three earlier works in a scenery with Lorenzo Pompa’s paintings Mapping the Universe. The solo piano part is identical with to Damascus, but here is played on a normal concert piano rather than an acoustic computer piano, while the 14 additional solo instruments superimpose a free elaboration replacing the computer-generated harmonic cantus firmus.

Lying in the grass, river and clouds is a sound machine observed as landscape, a gradual coming into being and dissolving of sonorities: harmonic relationships, enharmonic variations, interferences. The equal-tempered points of the piano intonation are connected within a larger frame of 23-limit Just Intonation based on tuneable intervals.

Each player, including the conductor, are free soloists. Time is conducted very slowly, about 1-3 seconds per beat, and flows in a continually changing rubato grouped in 2, 3 or 4 patterns without accented beats, allowing the various solo lines to remain harmonically co-ordinated. The individual lines are written in 4/4 subdivisions of the conducted pulse, but may be interpreted with considerable freedom, as precise intonation and phrasing might require.

Dynamically, the music is generally soft, taking place in the resonances and interferences between sounds produced by the sometimes complex Just Intonation intervals. Tone production should seek to emphasize the resultants between instruments (combination tones, shared partials, periodic beating patterns) and allow expressive phrases to arise of themselves as a result of listening precisely to these sound characteristics.

The solo piano part will often produce detunings and collisions with the microtonal instruments, which are asked to adjust to each other based on modulating, interlocking natural harmonic and subharmonic series. The piano is always related to these harmonies, even if distantly, a connection articulated by pitches doubled and echoed by the percussion, and by the sum and difference tone structures generated by the digital keyboard.

Several materials are provided to explain the extended Just Intonation notation and intervals based on whole-number ratios of frequencies: a legend defining the accidentals, a table of the harmonic series and a list of tuneable intervals, many of which occur in the music and which may be precisely determined by ear. Throughout the score, annotations cue the melodic and harmonic intervals (expressed as ratios and cents) and indicate instruments each player may be able to adjust to while playing. In addition, woodwind players are provided cents deviations from equal temperament to assist in finding alternate fingerings, and brass players have a table describing the microtonal valve-slide retunings, which allow all of the valve combinations to be used.

September 2012
remembering John Cage (1912-1992)
THE HARMONIC SERIES 1 - 64 above “A0” (overtone row)

notated using the Extended Helmholtz-Ellis II Pitch Notation
microtonal accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004
In learning to read HE accidentals, without having to rely on an electronic tuning device, it is important to be familiar with three things:

First, to keep in mind the natural tuning of intervals in a harmonic series, which deviate from the tempered system.

Second, to get to know how the accidentals refer to these overtone relationships.

Third, to observe that each written pitch may be related to many other pitches by natural intervals, and to tune it accordingly.

In most cases, this approach will allow the player to quickly and intuitively play just intonation (JI) pitches quite accurately. Any remaining adjustments can be made by ear, based on the specific sound of JI intervals.

Just intervals are readily learned because they are built up from simple, tuneable harmonic relationships. These are generally based on eliminating beating between commonpartials, finding common fundamentals and audible combination tones, and establishing a resonant, stable sonority which maximizes clarity: both of consonance and of dissonance.

A well-focussed JI sound is completely distinct from the irregular, fuzzy beating of tempered sounds. Just consonances, when marginally out of tune, beat slowly and sweetly and may be corrected with the most subtle adjustments of bowing or breath. Just dissonances produce a sharply pulsing regular rhythm and have very clear, distinct colors.

To become familiar with the notation and sounds of JI, the fundamental building blocks are prime number overtones 3, 5, 7, 11 and 13, each of which is associated with a specific pair of accidentals and a basic musical interval.

3 is associated with the signs flat, natural, sharp and refers to the series of untempered perfect fifths (Pythagorean intonation). Generally, A is taken as the tuning reference, and the central pitches C-G-D-A-E can be imagined as the normal tuning of the orchestral string instruments. The just C is rather lower than tempered tuning because of the pure fifths. The further this series is extended, the greater the deviation from tempered tuning: the flats are lower, the sharps higher.

5 is associated with arrows attached to the flat, natural, sharp signs and refers to the pure major third. These arrows correct the Pythagorean intervals by a Syntonic Comma, which is approximately 1/9 of a wholetone or 22 cents. So, for example, the note E-flat arrow-up is a just major third below G, and the note F-sharp arrow-down is a major third above D. In most music, flats are often raised by a comma and sharps are lowered. Because of the open string tuning, it is common to sometimes raise F and C (to match A and E) and to sometimes lower A and E (to match F and C).

Corrections by one Syntonic Comma have been used throughout Western music history and are relatively familiar to the ear. However, traditionally these corrections have been hidden by players, for example in Meantone Temperament where fifths are mistuned narrow by 1/7 of a wholetone or 27 cents. When the Pythagorean minor third is lowered by this amount, it becomes a noticeably low third often heard in Blues music.

11 is associated with the quartetone signs (cross and backwards flat). The accidental is used to raise the perfect fourth by 53 cents, producing the exact tuning of the 11th partial in a harmonic series. The sound is most easily learned by playing one octave plus one fourth and raising it by a quartetone.

13 is associated with the thirdtone signs (cross and backwards flat, each with 2 verticals). The accidental is used to lower the Pythagorean major sixth by 65 cents, producing the exact tuning of the 13th partial in a harmonic series. The sound is most easily learned as a neutral-sounding sixth, one-third of the way between the just minor and just major sixths (closer to minor than to major).

The following table presents the accidentals together with their associated ratios and cents deviations. To calculate the cents deviation from Equal Temperament of a specific written pitch (if desired) the following shortcut may be used:

1.) Find the cents deviation of the Pythagorean pitch, by calculating how many fifths it is away from A, multiplying by 2, and using a plus sign if it is on the sharp side and a minus if it is on the flat side.

2.) For each microtonal accidental, add or subtract its approximate cents value (as given above), keeping in mind whether the accidental is raising or lowering the pitch.

The resulting value should be a cents deviation within 1 or 2 cents accuracy, which is an acceptable starting point for fine-tuning by ear.
ACCIDENTALS EXTENDED HELMHOLTZ-ELLIS PJ PITCH NOTATION

for Just Intonation
designed by Marc Sabat and Wolfgang von Schweinitz

The exact intonation of each pitch may be written out by means of the following harmonically-defined signs:

\( \text{\#} \) \( \flat \) \( \natural \) \( \flat \# \) \( \natural \flat \) \( \natural \# \)

\[ \text{Pythagorean series of fifths — the open strings}
(\ldots e d c \ldots) \]

\( \flat \text{f} \) \( \# \text{b} \) \( \flat \text{b} \) \( \text{f} \) \( \text{b} \)

\[ \text{lowers / raises by a syntonic comma}
81:80 = \text{cgs \text{21.3 cents}} \]

\( \text{bb} \) \( \# \text{bb} \) \( \text{bb} \) \( \# \text{bb} \)

\[ \text{lowers / raises by two syntonic commas}
\text{cgs \text{43 cents}} \]

\( \flat \text{f} \) \( \flat \text{f} \) \( \text{f} \) \( \text{f} \)

\[ \text{lowers / raises by a septimal comma}
64:63 = \text{cgs \text{27.3 cents}} \]

\( \flat \text{f} \) \( \flat \text{f} \) \( \text{f} \) \( \text{f} \)

\[ \text{lowers / raises by two septimal commas}
\text{cgs \text{14.1 cents}} \]

\( \text{f} \) \( \text{f} \) \( \text{f} \) \( \text{f} \)

\[ \text{raises / lowers by an 11-limit undecimal quarter-tone}
33:32 = \text{cgs \text{33.3 cents}} \]

\( \text{bb} \) \( \text{bb} \) \( \text{bb} \) \( \text{bb} \)

\[ \text{lowers / raises by a 13-limit tridecimal third-tone}
27:26 = \text{cgs \text{63.3 cents}} \]

\( \text{bb} \) \( \text{bb} \) \( \text{bb} \) \( \text{bb} \)

\[ \text{lowers / raises by a 17-limit schisma}
256:215 = \text{cgs \text{68 cents}} \]

\( \text{bb} \) \( \text{bb} \) \( \text{bb} \) \( \text{bb} \)

\[ \text{raises / lowers by a 19-limit schisma}
\text{113:112 = cgs \text{3.4 cents}} \]

\( \text{bb} \) \( \text{bb} \) \( \text{bb} \) \( \text{bb} \)

\[ \text{raises / lowers by a 23-limit comma}
756:729 = \text{cgs \text{16.3 cents}} \]

In addition to the harmonic definition of a pitch by means of its accidentals, it is also possible to indicate its absolute pitch-height as a cents-deviation from the respectively indicated chromatic pitch in the 12-tone system of Equal Temperament.

The attached arrows for alteration by a syntonic comma are transcriptions of the notation that Hermann von Helmholtz used in his book “Die Lehre von den Tonompfindungen als physiologische Grundlage fur die Theorie der Musik” (1863).

The annotated English translation “On the Sensations of Tone as a Physiological Basis for the Theory of Music” (1877) 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 sign for a septimal comma was devised by Giuseppe Tartini (1692-1770) — the composer, violinist and researcher who first studied the production of difference tones by means of double-stops.
VORZEICHEN

EXTENDED HELMHOLTZ-ELLIS JI PITCH NOTATION

für die natürliche Stimmung
konzipiert von Marc Sabat und Wolfgang von Schweinitz

Die Stimmung jedes Tons ist mit folgenden harmonisch definierten Vorzeichen auszutasten:

- Pythagoreische Quintenreihe der leeren Streicher-Saiten
  
- Erniedrigung / Erhöhung um ein Syntonisches Terzkomma
  81: 80 = circa 21.5 cents

- Erniedrigung / Erhöhung um zwei Syntonische Terzkommas
  circa 43 cents

- Erniedrigung / Erhöhung um ein Septimenkomma
  64: 63 = circa 27.3 cents

- Erniedrigung / Erhöhung um zwei Septimenkommas
  circa 54.5 cents

- Erhöhung / Erniedrigung um den undezimalen Viertelton der 1:er-Relation
  32 = circa 33.3 cents

- Erhöhung / Erniedrigung um den tridezimalen Drittelton der 1:er-Relation
  26 = circa 65.3 cents

- Erniedrigung / Erhöhung um ein Selzehner-Schisma
  216: 215 = circa 6.8 cents

- Erhöhung / Erniedrigung um ein Neunehnzer-Schisma
  113: 112 = circa 3.4 cents

- Erhöhung / Erniedrigung um ein Dreundzwanziger Komma
  736: 729 = circa 16.7 cents

Zusätzlich zu der harmonischen Definition der Tonhöhe durch das Vorzeichen für jeden Ton ist auch der Cents-Wert der Abweichung der gewünschten Stimmung von der Tonhöhe des jeweils bezeichneten chromatischen Tons der gleichmäßig temperierten Zwölfton-Skala angegeben.

Die angedeuteten Pfeile für die Alteration um ein Syntonisches Terzkomma sind eine halbe Transkription der Notation, die Hermann von Helmholtz in seinem Buch “Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik” (1863) verwendet hat. Die kommentierte englische Übersetzung “On the Sensations of Tone as a Physiological Basis for the Theory of Music” (1855/1883) stammt von Alexander J. Ellis, der auch eine enorme Verfeinerung der Tonhöhendefinition innerhalb des Zwölftonsystems der gleichmäßig temperierten Stimmung durch die Unterteilung der Oktave in 1200 Cents eingeführt hat. —

Das Vorzeichen für die Alteration um ein Septimenkomma wurde von Giuseppe Tartini (1692-1770) erfunden, der als Komponist, Geiger und Wissenschaftler die durch Doppelfingriffe erzeugten Differenztonen untersucht hat.
23-LIMIT TUNEABLE INTERVALS below “A4”

tested and notated in three gradations of difficulty (large open notehead = easiest; small black notehead = most difficult)
by Marc Sabat (violin) with assistance from Wolfgang von Schweinitz (cello), Beltane Ruiz (bass), Anaïs Chen (violin)—Berlin, 2003

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+12</td>
<td>+31</td>
<td>+16</td>
<td>C+41</td>
<td>+4</td>
<td>+27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2  | 28  | 3   | -11 | -49 | -6   |

| 2   | +33 | G+59| +16 | +14 | +16  |

| 37  | -26 | -11 | -49 | -18 | +33  |

17/5 27/8 10/3 13/4 16/5 19/6 22/7 25/8 28/9
| -19 | -6  | -14 | -82 |

1/3 8/23 7/20 6/17 14/5 4/11 3/6 5/13 7/18
| -2  | -28 | -17 | -3  |

2/5 7/17 5/12 8/19 3/7 4/9 5/11 6/13 17/2
| -34 | -2  | -33 | G+59|

12/23 9/15 7/13 6/11 5/9 4/7 7/12 3/5 8/13
| -36 | -16 | -12 | -31 |

8/5 7/11 9/14 2/3 11/16 9/13 7/10 5/7 8/11
| -14 | -16 | -12 | -31 |

3/4 10/13 7/9 4/5 9/11 5/6 6/7 7/8 17/1
| +2  | +46 | +14 | +31 |
23-LIMIT TUNEABLE INTERVALS above “A3”

notated using the Extended Helmholtz-Ellis II Pitch Notation with cents deviations from 12-tone equal temperament based on $A = 0$ cents microtonal accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004
Double-Horn in Bb and F: Just Intonation Valve Tuning

valves 1 and 2 will be pulled out more than usual
and the main slides will be pushed in to tune
the slightly higher Bb and F fundamentals

Bb-side tuning procedure:

1.) Tune main slide so that 5th partial matches sounding D
2.) Tune valve slide 2 so that partials 4, 8, 12 match sounding A and E
3.) Tune valve slide 5 to sounding G, D, and A (compare written E unison with valve slide 2)
4.) Tune valve slide 1 so that 1+2 = 5 (check on various partials)
5.) Verify that the combination 1+2+5 produces a sounding D as its 7th partial (compare to open horn and valve 5)
6.) Compare written E unison for the combination 1+5 against both 5 alone and 2 alone

F-side tuning procedure:

1.) Tune main slide so that 5th and 10th partials match sounding A
2.) Tune valve slide 2 so that partials 4, 8, 16 match sounding E (compare high written B to open horn)
3.) Tune valve slide 5 to sounding D, A and E (compare written B unisons with valve 2 and open horn)
4.) Tune valve slide 1 so that 1+2 = 5 (check on various partials)
5.) Verify that the combination 1+2+5 produces a sounding A as its 7th partial (compare to open horn and valve 5)
6.) Compare written B unisons for the combination 1+5 against both 5 alone and 2 alone
F-Tuba with 5 Valves: Just Intonation Valve Tuning

Valves 1 and 2 will be pulled out more than usual
and the main slide will be pushed in to tune
the slightly higher F fundamental

Some of the common tones shared between the valve combinations in this tuning

Suggested tuning procedure:

1. Tune main slide so that 5th partial matches Cello A
2. Tune valve slide 2 so that 6th partial matches E (check as fourth/fifth to A)
3. Tune valve slide 5 to D, A and E (compare E unison with valve slide 2 and A unison with open tuba)
4. Tune valve slide 1 so that 1+2 = 5 (check on various partials)
5. Tune valve slide 4 so that 9th and 10th partials match E (compare with each of valves 2 and 5)
6. Verify that 1+5 = 4 (check on various partials, adjust 1 as needed, check 1+2 = 5)
7. Tune valve slide 5 so that partials 5 and 10 of 4+5 match D (check against Cello or Violin D)
8. Verify that the various combinations are well tuned by checking partial unisons (see table above for some possibilities)
9. Smaller notes indicate enharmonic simplifications of high prime partial relationships and in theory require slight adjustment when playing, although the errors are so small that one may make them without conscious effort
Sempre molto rubato: any of the suggested tempo changes may be altered as the musical flow and density suggests.

rhythmic alignments are approximate: allow precise intonations and phrasings to freely emerge and dissolve:

non-tempered instruments to tune as justly to each other as possible, ignoring the piano temperament.

rhythmic alignments are approximate: allow precise intonations and phrasings to freely emerge and dissolve:

Sempre molto rubato: any of the suggested tempo changes may be altered as the musical flow and density suggests.

Tune open strings in just untempered fifths.

Trombone positions are indicated approximately in 1/10th of the small positions based on B - Ab - G - F. 

Tentative pitches for non-tempered instruments to tune as justly to each other as possible, ignoring the piano temperament.

Non-tempered instruments to tune as justly to each other as possible, ignoring the piano temperament.

Non-tempered instruments to tune as justly to each other as possible, ignoring the piano temperament.
Tono: 2 3 molto ritenuto 3 ca. 20 poco a poco più mosso 3 (→ ca. 26)
Time 3 (ca. 35) accel. 3 (ca. 54) 2 ritenuto

Time

Alto Fl (G)

Ob d’A (A)

G (A)

Bsn.

Hn (F)

Tbn I

Tba

Cst

Vib

Gonne

Time 3 (ca. 35) accel. 3 (ca. 54) 2 ritenuto

Fl Solo

Kbd

Vln I

Vln II

Vla

Va

Ch
3

3, ca. 24

3, ca. 60

4

Time

Alto Fl

(A)

G

(Bn.

Horn

(F)

Trumpets

(Tb.)

Cornet

Vibraphone

Chimes

Gong

PI

Solo

Kbd

Violins

1

1st

2nd

Vla.

Vc.

Cello

(Trombones, horns, etc.)
4 poco a poco accel. 3 ca. 40 ritenuto

Alto Fl (G)
Ob d’A (A)
G2 (A)
Bsn
Hrn (F)
Tbn
Tba
Crot
Vib
Chimes
Gong