

Tuning the Notes of the Piece *Dsilton* by Ear

Excerpt of the ensemble Dsilton's recital at the international symposium „Microtones - Small Is Beautiful“ of the International Ekmelic Music Society in Salzburg, June 30. 2017

Georg Vogel 2017

The tonal space of the pieces *Dsilton* /*dsi:ltton*/ and in extended versions also of *Duschscha* & *Utcis Gesol in fbb* is based on a transcription of a fieldrecording of a gylil-instrument, alternately spelled dzil.

(*Dzil Duett - Ghana: Ancient Ceremonies, Dance Music & Songs, Nonesuch Records 1979*)

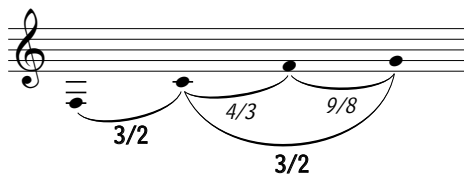
The Instrument used for transcribing and exploring the tonality is the Clavinet, which can be tuned by ear very easily. The intervals found on the recording can be easily described by using whole-number-ratios of multiples of the simple prime-numbers 2, 3, 5 & 7.

1. Middle C

The starting point for the basic grouping is a middle **c**. Its the most important note, the base of the grouping. It is tuned to 263,092 Hz, which is the minor third, the **c** above **a** 440 Hz of 31-et.

2. Pure Fifths

The ratio of the first intervalls to tune is based on the prime-numbers 2 & 3. 3 to 2, the ratio of 1.5, is used to tune a **g** above the c and an **f** below the c to have two purely tuned perfect fifths.



III. 1

Whats a fifth? For intervalls this term referres to the fifth note of a scale, basically constructed by stacking the ratio of 3/2 to create a tonal space of wholetones and semitones, used to visualise this grouping.

How is it possible to say, whether an intervall is pure, almost pure or defenitely tempered?

The deviation to the possible ratio is indicated by the intensity of beats on the intervall.

When the tempo is getting slower, the precise ratio is going to be approached.

So, obviously and logically, a perfectly pure intervall without any movement cannot be tuned by ear. The aim is to approach at best.

In the first overview you can see the ratio used for tuning pure fifths as well as some resulting intervalls between the new notes, again of course only based on the prime-numbers 2 & 3, such as 4/3, the perfect fourth or 9/8, the so called pythagorean whole tone.

3. Septimal Sevenths / Augmented Sixths

As a second step i tuned a septimal intervall by ear. $7/4$ is a flattened minor seventh. Tuned above \underline{c} purely, controlling with its inversion $8/7$ from the upper \underline{c} .

Now the question occurs: *How to visualise septimal intervalls?* Since the wholetone / semi-tone system in pythagorean or 12-et tuning do basically not include any septimal ratios or approximations.

The method used is via the enharmonic change of $1/4$ -comma meantone temperament.

This tuning is based on pure $5/4$ major thirds and tempered fifths and shows a very close approximation to $7/4$ as an augmented sixth. The deviation is only about an $1/8$ of a syntonic comma, which is about 3 cents of 12 equal - 31-et is even closer.



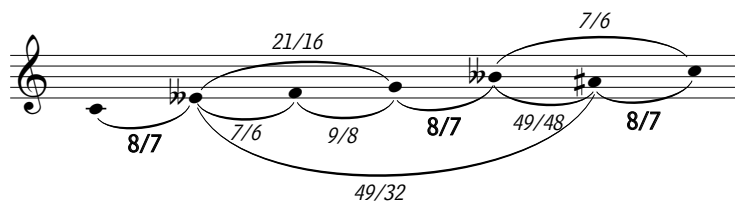
III. 2

This means the tuned septimal seventh above \underline{c} is visualisable as an **a sharp**, changing the enharmonic from b flat. The speciality of $1/4$ -comma meantone tuning is, that the ratios of its intervall are fully transposeable by transposing the intervalls name: An augmented sixth is everywhere an amented sixth with the approximate ratio of $7/4$ (infact: 1,7469281074217 instead of 1,75). This is used for the next two septimal seventh to be added to the grouping: one below \underline{c} to get an **e double flat** and one below \underline{g} for a **b double flat**.



III. 3

Again, there was just one ratio used for tuning, but created many other new septimal intervalls. For example: $8/7$, $7/6$, $21/16$ or $49/48$, the first microtone (a ,diesis'-tone between semi-tones and commata) of the grouping: between a# & bbb.



III. 4

4. Pure Major Thirds

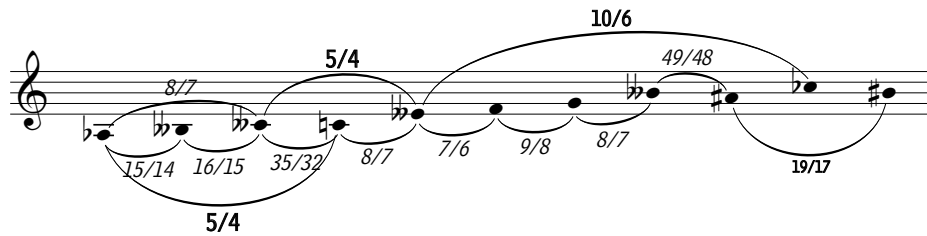
As a third and last category of harmonics there are finally two major thirds tuned, based on the fifth harmonic. The purely tuned ratio of $5/4$ is two times used for a major third below ebb to tune a **c double flat** and below c to tune an **a flat**.

This major third is the base of $1/4$ -comma meantone temperament and it is very very well approximated by 31 -et.



III. 5

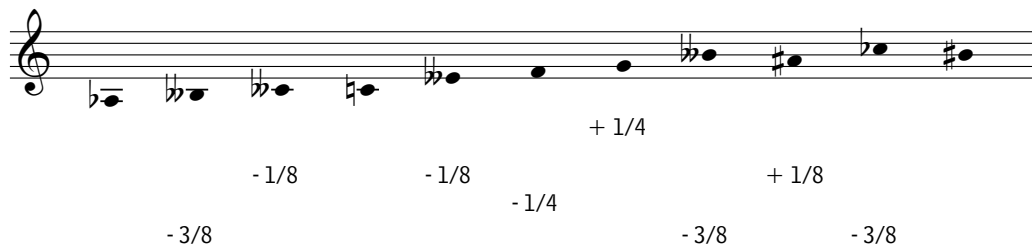
Finally, to complete all notes used in the piece *Dsilton*, two more wholetones are added on top of the grouping, to have a **b sharp** above a\# and a **c flat** above bbb .



III. 6

5. Deviations

The last overview shows the deviations compared to $1/4$ -comma meantone temperament as parts of a syntonic comma. All fifths deviate a $1/4$ -comma, the septimal intervalls about an $1/8$ -comma and the quintal thirds are identical.



III: 7