



*Back to the future:
Old notes for new musicians*

12 notes  19 notes
24 notes  31 notes

Introduction

Terms

- EDO stands for *equal divisions of the octave*. TET has a similar meaning, but it is less precise.
- *n*-TET stands for *n-tone equal temperament*. 12-TET = 12-tone equal temperament.
- Temperaments only approximate frequency-ratios; they do not reproduce them exactly. The amount of error is noted in brackets beside each frequency-ratio.
- Errors are measured in cents (c). One cent = one-hundredth of a semitone from 12-EDO.
- MIDI pitch-bend data appears in Sibelius as light grey text. Pitch-bend data shifts note-frequencies up or down by a custom amount.
- *Septimal* refers to the number 7. Septimal intervals are sometimes beautiful.
- Septimal intervals are frequency-ratios that involve the number 7 or else a multiple of 7: for example, the tritone (7:5).

Instructions

- Download Offtonic's free, *n*-TET and "Remove MIDI Pitch Bends" plugins: www.offtonic.com/sib/plugins.html
- Install both plugins: www.sibelius.com/download/plugins/index.html?help=install
- If you use a sampler for Sibelius playback, check that it supports MIDI pitch-bend data. If it does not, switch to General MIDI playback.
- **Important:** MIDI pitch-bend only works for monophonic parts. Notate harmonies in SATB style.

Lesson summary

- 19-EDO and 31-EDO are old temperaments that offer new composers extra notes (pitch-classes).
- Francisco de Salinas proposed 19 near-equal divisions of the octave in 1577.
- Nicola Vincenzo proposed 31 near-equal divisions of the octave in 1555.
- 12-EDO was invented independently in Denmark and China in the 1580s.
- 12-EDO only offers one septimal interval (the tritone). 19-EDO offers composers more.
- 24-EDO's quartertones are ugly. 31-EDO offers composers quartertones that are more appealing.
- **Important:** The aim is to construct harmonies using unfamiliar pitch-classes. The aim is not to "re-tune" conventional music and make it sound a bit strange. That never works.

Septimal intervals

Choose 19-EDO over 24-EDO

Reilly Smethurst

12-EDO	7:5 (+17.5c) <i>High error rate!</i>			
19-EDO	7:6 (-14.3c)	9:7 (+7.0c) <i>9:7 is beautiful</i>	7:5 (-14.1c) <i>A different tritone</i>	10:7 (+14.1c)
24-EDO	36:35 (+1.2c)	35:27 (+0.7c)	7:5 (+17.5c) <i>High error rate!</i>	54:35 (-0.7c)

19-EDO	5 14:9 (-7.0c) <i>14:9 is beautiful</i>		12:7 (+14.3c)	
24-EDO	35:18 (-1.2c)			

12-EDO only offers one septimal interval: the tritone (7:5). Notice how many septimal intervals 19-EDO offers compared to both 12-EDO and 24-EDO. 19-EDO is more elegant than 24-EDO.

Excessively complex quartertone systems have been mocked since the time of Plato's *Republic* (Book VII, 531a-b). See Schoenberg's dismissal of pretentious quartertone musicians in *Theory of Harmony* (423-25). See also my article, "Alternatives to Semitones and Quartertones".

Extra notes on conventional staves

The return of B-sharp and E-sharp

Reilly Smethurst

The image displays musical notation for four different Equal Division of the Octave (EDO) systems: 12-EDO, 19-EDO, 24-EDO, and 31-EDO. Each system is represented by a single treble clef staff. The notes are organized into four measures, with pitch class numbers (0-15 for the first system, 11-31 for the second) written above the notes. The 12-EDO system shows a standard chromatic scale. The 19-EDO system includes notes with sharp and flat accidentals. The 24-EDO system includes notes with double sharp and double flat accidentals. The 31-EDO system includes notes with sharp, flat, and double sharp/double flat accidentals, and some notes are marked with an 'x' to indicate they are not present in the system.

19-EDO and 31-EDO do not have the same theory of enharmonic equivalence as 12-EDO. B-sharp and E-sharp exist as unique pitch-classes in these temperaments!

Suggestions

1. Select ≤ 12 notes from 31-EDO and write a piece for a conventional MIDI keyboard. Use a software synth or sampler that supports SCL or TUN files. A keyboardist will be able to play your piece without having to master 31 keys to the octave. This is very efficient.
2. Select ≤ 7 notes from 19-EDO or ≤ 12 notes from 31-EDO and write an elegant, uncomplicated piece for a MIDI keyboard plus a singer and/or fretless strings. Use the keyboard to assist the musicians' intonation during rehearsals.