Wilsonic

• MTS-ESP + Simple Synth WilsonicController

• MTS-ESP + MIDI Effect

<u>wilsonic.co</u>

Public Beta Downloads

- MacOS 0.37 Beta
- Windows 10 64-bit 0.37 Beta

Support in <u>Wilsonic Discord</u> Updated 2024-04-19



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- <u>Architecture</u>
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What is MTS-ESP?

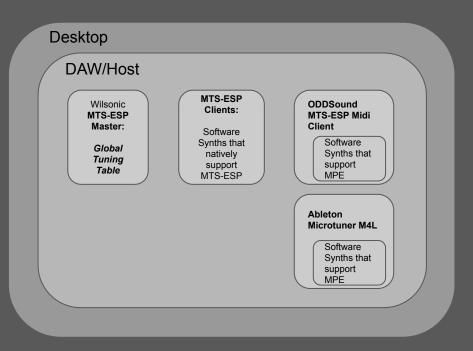
- MTS-ESP is a protocol for automatically and invisibly sharing tuning data between plug-ins in a DAW in real-time, without any routing or other setup required. <u>ODDSound Github link</u>
- MTS-ESP does not use MIDI data and is not routed through MIDI connections in a DAW.
 - Wilsonic is an MTS-ESP Source and has a simple synth for reference tones
 - WilsonicController is both an MTS-ESP Source and a MIDI Source, but has no simple synth
- Sharing of tuning data happens directly between plug-ins. It does not involve the DAW at all and therefore it will work in any DAW.
- Developers must explicitly add support for MTS-ESP to their plug-ins for this to work. A list of supported plug-ins can be found <u>here</u>
- Most synths that support MTS-ESP will automatically retune to Wilsonic when loaded, however some have a UX preference to enable MTS-ESP (like SurgeXT).
- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This can even work polyphonically for synths that support MPE.

What is MTS-ESP?

- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This works best for synths that support MPE.
- Re-tuning via MIDI pitch bend requires a plug-in that can receive tuning data via MTS-ESP and generate MIDI pitch bend messages in response. Available options are:
 - Paid:
 - ODDSound MTS-ESP MIDI Client (part of the MTS-ESP Suite)
 - Free:
 - Ableton Microtuner M4L device (in MTS-ESP client mode) and
 - Xen MIDI Retuner
- The Wilsonic installer includes everything required for MTS-ESP to work on your computer, however if you have problems you can do a clean install of the MT-ESP components here
 - Mac-specific MTS-ESP installer
 - Windows-specific MTS-ESP installer

Architecture

- Wilsonic should be the *only* MTS-ESP **Master** active in your DAW/Host session
- Your software synths are the "clients"

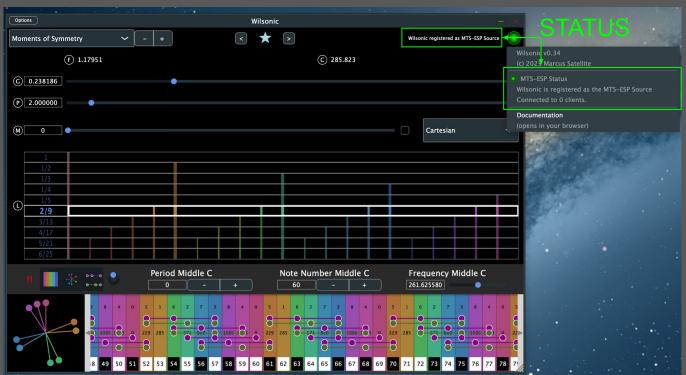




See <u>Wilsonic MTS-ESP</u>

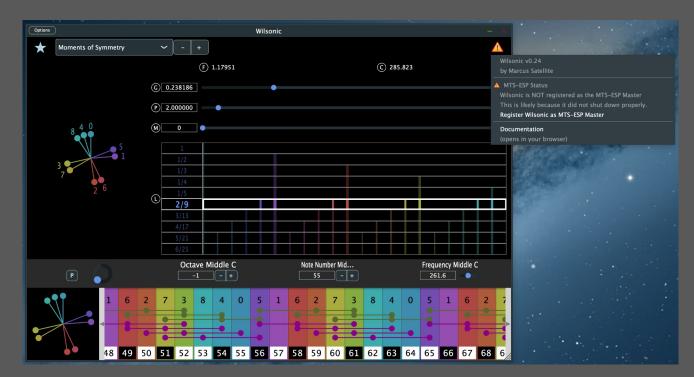
MTS-ESP Status Indicator: Green

- Wilsonic should be the only MTS-ESP Master active in your DAW/Host session
- The green indicator means Wilsonic is actively managing the global tuning table
- Do not run Wilsonic and WilsonicController simultaneously–I'm still figuring out how to gracefully manage multiple apps wanting to be the Master
- Hover over status label for status history



MTS-ESP Status Indicator: Yellow

- This status may appear if there is another plug-in already managing the global tuning table, or after a crash.
- The yellow indicator means this instance of Wilsonic is NOT actively managing the global tuning table.
- Check there is no other instance of Wilsonic or any other MTS-ESP master plug-in in use, then select "Register" from the menu to make Wilsonic the master.



Installation

- Download installer at <u>wilsonic.co</u>
- Run installer
- Reboot your machine
- Run as a Plugin in your favorite DAW
 - Rescan plugins
 - Load Wilsonic as a AUv2 or VST3 on a MIDI track
 - Wilsonic's "simple synth" can be played from this track. Check that your synths are tuned.
 - Wilsonic's DAW automation will be on this track
 - Load your soft synths in other tracks per the ODDSound client documentation
 - See <u>next slide</u> for more details
- Run as a standalone:
 - Standalone synths such as Surge and Pianoteq are tuned up in real-time!



MTS-ESP Overview

- ODDSound MTS-ESP Overview
- ODDSound Client Support (DAW+Soft Synth setup)
 - \circ Ableton
 - Bitwig
 - Cakewalk
 - Cubase/Nuendo
 - Digital Performer
 - FL Studio
 - Kontakt
 - Logic Pro
 - Reaper
 - \circ and many more
- How To Install ODDSound Plug-ins (Mac and Windows)
- <u>Microtuning in Ableton Live with MTS-ESP</u> (YouTube)
- <u>Microtuning in Bitwig Studio with MTS-ESP</u> (YouTube)



Microtonal Keyboard

These 3 controls define the global tuning table root frequency:

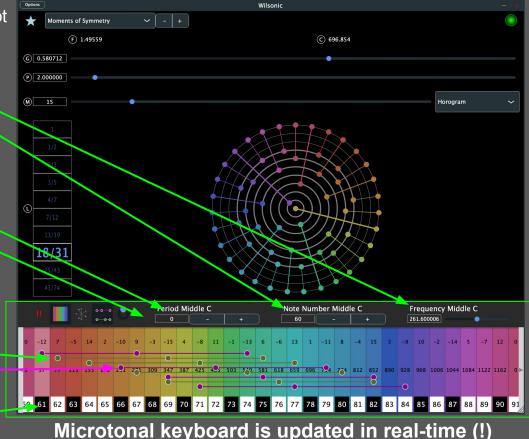
- Frequency of Middle C
- MIDI Note Number of Middle C:
 - Default = 60
 - TRANSPOSE = PERFORMANCE
- Period at Middle C:
 - lower/raise all notes by this octave/period
- NPO Override [not shown]
- Automatable in the DAW!
- Resize keyboard by dragging bar vertically

Real-time Major/Minor Analysis:

Pythagorean Means

- <u>Arithmetic Mean</u>: "Proportional Triad"
- Harmonic Mean: "Subcontrary Triad"

MIDI Note Number Mapping + Black and White Keys



Microtonal Keyboard

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Options

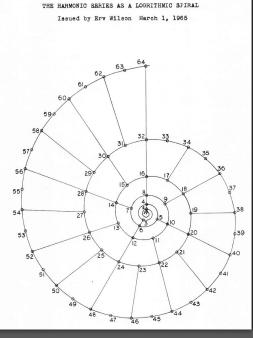
Offset Pitch Wheel color at Middle C Wilsonic < ★ 🔊 Moments of Symmetry Toggle Proportional Triads (F) 1.49562 (C) 696.888 Toggle Pitch Wheel on Keyboard G 0.580740 Toggle Microtonal Keyboard (P) 2.000000 MIDI Panic: turns all playing notes of (M) 0 Gral 5, 4, 4, 5, 5, 4, 4/7 Period Middle C Note Number Middle C Frequency Middle C 261.625580 3 1084 1121 1162 346 387 424 465 503 540 **16** 57 **58** 59 60 **61** 62 **63** 64 65 **66** 67 **68** 69 **70** 71 72 **73** 74 **75** 76 77 **78** 79

Pitch Wheel

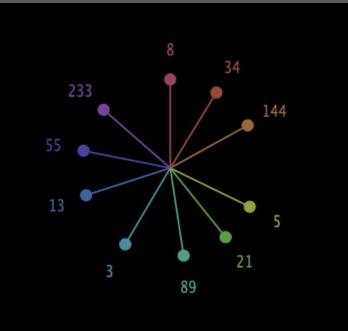
Pitch Wheel

- Pitch Wheels appear throughout the app
- Pitch is defined as log base-Period of Frequency
- Period = 2 = Octave: the most common period
- The Pitch Wheels also take the modulus of Period
- Period = Octave Equivalence: 1=2=4=8=16=32=64=...
- 12 o'clock = C = "1" = 2^0
- The colors of the Pitch Wheels correspond to the colors of the microtonal keyboard
- Wilsonic supports non-octave tunings such as Scala files and MOS
- When you change the Period the appearance of the Pitch Wheels do not change because by definition they are log-base-period

Log Base 2 of Frequency, drawn as a log2 spiral



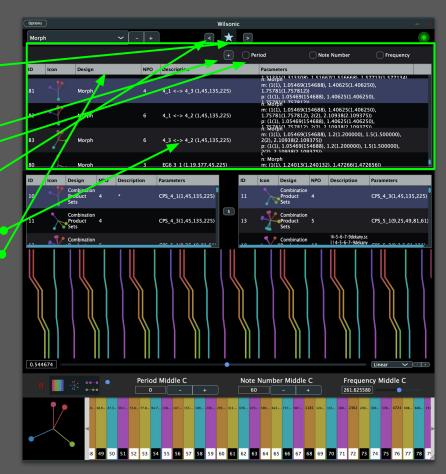
Log Base Period of Frequency, drawn as a circle



Favorites

Toggle Favorites panel by clicking on Favorites star icon

- Favorites takes up 1/3 of the vertical screen space: you can resize Wilsonic to increase the height
- Capture current scale as a Favorite by hitting "+" button
 - Toggle Period, Note Number, and/or Frequency before "+" to capture their values in the Favorite
- Navigate Favorites by hitting "<", or ">" buttons
- Delete a selected row by hitting "backspace"
- Double-click Description cell to add comments/description
- Tap column header to sort by:
 - o ID
 - Design
 - NPO ("number of notes per octave"),
 - Description



"Wilson's Garden"

- Select "Wilson's Garden" from the Scale
 Design menu
- Select a scale from the "Curated Presets" menu

Curated scales by

- Erv Wilson
- Kraig Grady
- Stephen James Taylor
- Jose Garcia
- Gary David
- Marcus Hobbs
- Elementary, archetypal scales

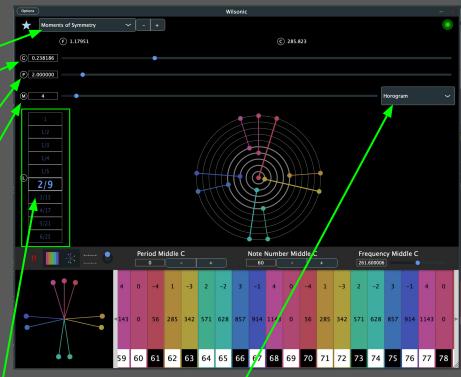
*Be sure to also explore the Scala Archives



Moments of Symmetry

Link to Erv Wilson's MOS papers

- Select "Moments of Symmetry" from the Scale Design menu
- Select the Generator with the slider.
 - Units are in "Pitch space", i.e., Log-base-Period of Frequency
 - 0 = Middle C
 - 1 = C one Period higher
 - G = 0.58333 = 7/12 = 12 tone equal temperament when Period = 2
 - The "F" label is the Generator in Frequency.
 - the "C" label is the Generator in Cents.
- Select the Period with the Slider
 - Units are in Frequency, default is "2", the Octave
- Select the Murchana with the slider
 - Murchana is a type of mode, or rotation
- Select the Level by click-dragging over the Level box



Four drawing modes:

- Cartesian
- Horogram
- Horogram Inverse
- Gral (continuum of generalized keyboards)

Moments of Symmetry

Supports "Touch" Devices

- Select "Gral" from the display mode popup
- A secondary Level box appears...this is the keyboard mapping. The denominator is the number of columns in an octave. Shown here is the 4/7 layout of the 18/31 MOS.
- The toggle will set Murchana to 0 at the center of the chain, automatable
- The first rotary is the zoom •
- The second rotary is the rotation.
 Leave this at 0 for Wilsonic to optimize for horizontal layout
- The third rotary is "shear" which you a can use to make the columns vertical.
- The fourth rotary is the left-right position of the keyboard
- The fifth rotary is the up-down position
- Hex tiles have the same label as the Microtonal keyboard

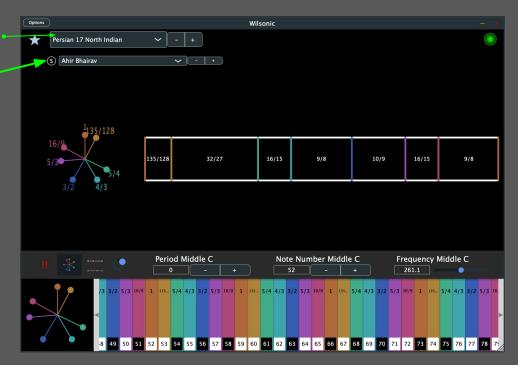


North Indian Raga Scales

<u> "17-Persian Version w. North Indian Raga Scales"</u>

- Select "Persian 17 North Indian" from scale design menu
- Select the variant from the scale menu

0. 1	. 2.3			. 6. 7	. 8	9. 1	0. 11	. 12.	13. 14	1, 15	. 16. 1	7.
1 7	18 9	3 10	24 4	3 <u>31</u> 4 4 64 3	134		3 44	. 12. 55 540	10 10	1		2
135	256 3	128	256 243	8 256 8 243	128	8 254 8 243	123	254 8	254	128	81 <u>256</u> 80 <u>243</u>	
9	/8	10/	9	9/8	3	16/15	10/	9	9/8	8	16/15	Kalyan
9	/8	10,	9	16/15	9,	/8	9/	8	10/9	Э	16/15	Bilawal
9	/8	10/	9	16/15	9	/8	10/	9.	6/15	9/	8	Khamaj
10/	9 1	6/15	9/	18	9,	18	10/	9	6/15	9/	8	Kafi
9/		256	9	/8	9	/8	9,	/8	256	9/	8	Kafi
9.	/8	256	9	/8	9	/8	25 <u>6</u> 243	9/		9/	8	Asawari
254	9/		9	/8	9	/8	256	9/	8	91	8	Bhairavi
135	32	/27		9/8	3	16/15	10/	9	9/8	3	16/15	Marwa
/35		/27		9/8	3	16/15	135	3	2/27		14/15	Purvi
12.8		/27	-	16/15	135		/27		9/8	3	16/15	Lalit 2
123	9/			32/27	128	16/15	135	3	2/27		16/15	Todi
128		2/27		16/15	135	9/			2/27		16/15	Lalit
128	9/			32/27	128	16/15	135	9/1		40	9.6	No Name
123		2/27	-	16/15	9/		129		9/	36	16/15	Anand
135	-				_					0		Bhairay
128	33	2/27		16/15	9/		135	27	2/27		16/15	Bhairav
128	9/1		34	45	Э,	6	128	34	141		7/15	Todi
9,	8	135	3	2/27		16/15	9/	8	10/	9	16/15	Madhubar
9	/8	10/	9	16/15	9,	/8	135		2/27		16/15	Bhairav
135	32	/27		16/15	9,	/8	10/	9	6/15	91		Ahir Bhairav
	/8	135	40	96	9	/8	135		_/27		16/15	Chandra Kanada
135	32	/27		16/15	9	/8	135	409		9	/8	Basant Mukhari
	/8	9	/8	10/	9	16/15	9/		135	40	96	Champak
9	/8	135		096	9	/8	9	/8		19	16/15	Patdeep
	/8	10	-	16/15	9	/8	135	409	6	2	/8	Mohan Kauns
135	400	6	-	/8		/8	129		16/15		/8	Paramesu

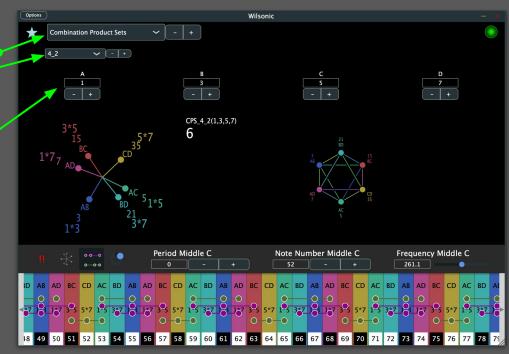


Combination Product Sets

Combination Product Sets

- Select "Combination Product Sets" from the scale design menu
- Select the CPS from the scale menu
 - "4_1" = "4 choose 1" = Harmonic Tetrany
 - "4_2" = "4 choose 2" = Hexany
 - "4_3" = "4 choose 3" = Subharmonic Tetrany
 - "6_3" = "6 choose 3" = Eikosany
- Set the seeds (A, B, C, D) of the master set

More CPS resources here

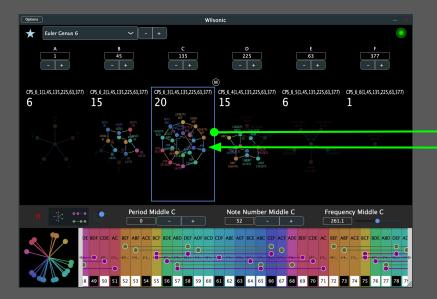


Euler Genus 6

Euler Genus 6

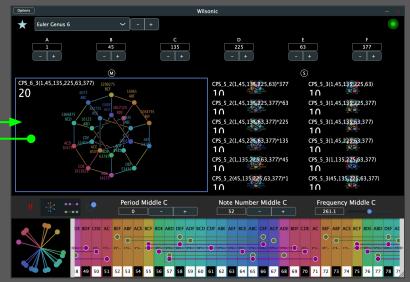
Euler Genus 6 page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Cursor Left-Right selects scale
- Ctrl-Click drills into Subset page



Euler Genus 6 Subset page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Ctrl-Click navigates down into subset
- Command-Click navigates up into superset
- Cursor Left-Right-Up-Down selects scale
- Superset on the left, subsets on the right



"Subsets of Combination Product Sets"

Wilsonic scale designs of "Combination Product Sets" and "Euler Genus 6" are implementations of these canonical microtonal papers:

- <u>D'Allesandro, Like a Hurricane</u>, Erv Wilson,
- <u>Combination-Product Set Patterns</u>, Kraig Grady, 1986
- <u>THE EIKOSANY VIEWED FROM THE CENTERED PENTAD LATTICE</u>, Kraig Grady
- <u>THE EIKOSANY VIEWED FROM A HEXANY LATTICE</u>, Kraig Grady
- Cycle of Hexanies in a Dekany, Kraig Grady, 1998
- <u>Resources Of The Eikosany</u>, Kraig Grady, 1985

Recurrence Relation

Options Wilsonic **Recurrence Relation** Select "Recurrence Relation" from Scale Design menu Terms Offset H[n] = H[n - 3] + H[n - 4] Select the **terms** of the recurrence relation from the dropdown. H [n-6] Selected terms are highlighted in H [n-1] H [n-2] H [n-3] H [n-4] Hi [n-5] H [n-7] H [n-8] H [n–9] 288 216 1 blue Select the **number** of terms to (C) 1 compute ~ 1/2 Select the offset (throws away ! H[n] = 2 * H[n-3] + (1/2) * H[n-4]previous terms) ! Integer Sequence, including seeds: 162, 216, 288, 384, 513, 684, 912 Set your **Seeds** for each term (initial ! Sequence converges to: ! F = 1.333333 ! P = 0.415038 conditions) 210 Set your Coefficients for each term ! Final Scale: 513, 288, 162, 684, 384, 216, 912 from the dropdown Final Scale: Sorted as if octave-reduced Period Middle C Note Number Middle C Frequency Middle C 0000 Period is 2 (i.e., an octave) 261.1 0-0-0 0 Recurrence Relations optimize for difference tones by creating an 84 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 91 additive sequence 18 49 50 **51** 52 53 **54** 55 **56** 57 **58** 59 60 **61** 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 75

Equal Temperament

"Equal Temperament"

- Select "Equal Temperament" from the
 Scale Design menu
- Select an ET ("EDO") from 1-128 notes
 per octave
- Select the period. "Octave" = period of 2 *

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	18	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	10	12	55		52	55		55		51	50	55	00	01	02		04	05		07		05	10	11	12		14		10			11

Tritriadic

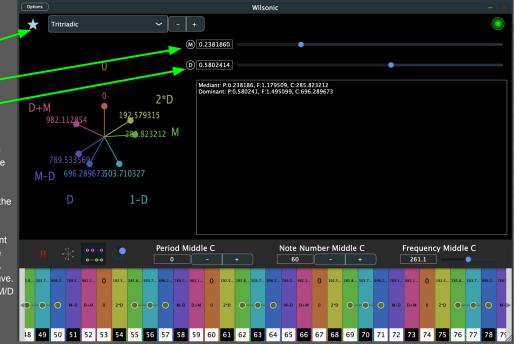
"Tritriadic" by John Chalmers

- Select "Tritriadic" from the Scale Design menu
- Select the Mediant with the slider
- Select the Dominant with the slider

Tritriadics are very simple and are based on the major scale as a template. They are defined as three triads composed of a tonic, mediant and dominant interval. Let us set the tonic to 0 [in Cents], then the basic triad has the form 0, M, D. By adding a subdominant triad 1200-D, M-D, 1200 and a dominant triad, D, D+M 2*D, one gets the notes in ascending order 0 2*D M 1200-D D M-D D+M 1200 for an octave spanning scale. In ET, 0 and 1200 are the same note an octave apart, in JI 1/1 and 2/1 have the same harmonic function.

They are also definable in JI--take any triad such as 4:5:6 and write it as 1/1 5/4 3/2. The subdominant is the octave-adjusted triad obtained by dividing by D (=3/2) or more conveniently as 4/3 5/3 2/1. The dominant triad is the tonic multiplied by the dominant interval. This operation yields 3/2, 15/8 and 9/8. Hence the three triads are 4/3 5/3 2/1, 1/1 5/4 3/2, and 3/2 15/8 9/8 (when reduced to the same octave. Symbolically written as 2/D M/D 2/1, 1/1 M D, D D*M D^2 or in ascending order 1/1 D^2 M 2/D D M/D D*M 2/1--1/1 9/8 5/4 4/3 5/3 15/8 2/1.

In both cases there are two supplementary triads which I refer to as conjugate r triads--M D D+M and M-D 1200 M. These have the form of 0 D-M D or in the JI case, 5/4 3/2 15/8 and 5/3 2/1 5/4, to be reduced to the same octave. Major and minor or more generally prime and conjugate are thus conjugates of each other



Any triad may be used--4:5:6, 4:5:7 or even irrational numbers.

Scala File Support

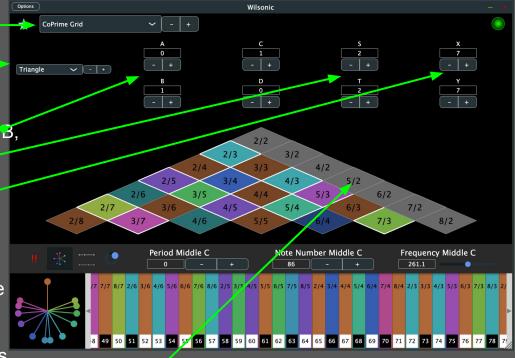
- Select "Scala" from the Scale Design menu -
- Select "Bundled" or "User" -
- Highlight the row and hit RETURN to tune up the Microtonal Keyboard
- Supports non-Octave tunings
- Mouse-Hover over the row to see the contents of the Scala file
- Only when "User" is selected can you import/delete .scl files:
 - Drag-and-Drop files into the window
 - Click on the "+" for a File Browser
 - Select-Backspace to DELETE
- When "Bundled" is selected:
 - 5,100+ .scl files (read-only)
 - Please see <u>Huygens-Fokker Centre for</u> <u>Microtonal Music</u>
 - Shoutout Manuel op De Coul!
- User/Bundled is automatable
- User and Bundled IDs are automatable
- You can "Favorite" Scala files

Scala - + < > > Witch: registered as MTS-ESP Soc. Bundled Settered bundled Scala file ID: 54 10 tcon scl Period NPO 277 Seventeentosixteen.scl 2.0 Selected bundled Scala file ID: 54 278 diat25.scl 2.0 Selected bundled Scala file ID: 54 279 carlos_super.scl 2.0 Selected bundled Scala file ID: 54 280 parizek_epi2a.scl 2.0 Selected bundled Scala file ID: 53 281 valentine.scl 2.0 Selected bundled Scala file ID: 53 283 kacapi2.scl 2.0 Selected bundled Scala file ID: 53 284 Valentine.scl 2.0 Selected bundled Scala file ID: 53 285 diat31.scl 2.0 Selected bundled Scala file ID: 53 286 subshaq tetrachord 11-limit.scl 1.33333373069763 Selected bundled Scala file ID: 53 286 diat31.scl 2.0 7 IUMINOr.scl 287 deka6144.scl 2.0 7 Iundled Scala file ID: 277 286 singapore_coh.scl 2.0 7																	onic	Wils													ons	c
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Hover over status label for status history

CoPrime Grid

- Select "<u>CoPrime Grid</u>" from the Scale Design menu
- Select "Harmonic", "Triangle", or
 "Subharmonic". Same tones, just different layout
- <u>Reseed</u> the CoPrime Grid by modifying A, B
 C, D.
- Offset by modifying S and T*
- Expand/Reduce number of terms by modifying X and Y
- Touchscreens: You can play the geometry as a keyboard!
- Best played on a 2-d keyboard such as the Linnstrument
- See Erv's CoPrime designs on Kraig Grady's <u>Anaphoria website</u> for more details on the construction and properties of this remarkable object



If a note is greyed out it means there is no midi note assigned to it. Use "Note Number Middle C" to lower the root note to get the notes in range

* Miles a subsect for O and T to be some in the construction of the

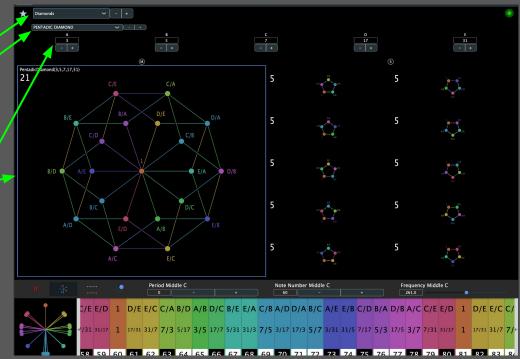
Diamonds

"Reciprocal Cross-Sets"

- Select "Diamonds" from the Scale Design menu
- Select a Diamond or one of its harmonic/subharmonic subsets
- Set the seeds of the master set, from (A,B,C) for Triadic, to (A,B,C,D,E,F,G,H)
 for Ogdoadic
- Selected scale is outlined in blue
 - Shift-Mouse-Hover selects scale
 - Cursor Left-Right selects scale

See next slide for the definition of "reciprocal cross-set"

<u>YouTube Demo of Diamonds</u>



Diamonds: Reciprocal Cross-Sets

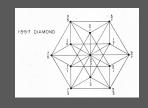
- Rows are the harmonic series of the master set
- Columns are the subharmonic series of the master set
 - Row 0 = Harmonic series divided by A
 - Column 0 = Subharmonic series multiplied by A
 - Diagonal = 1/1

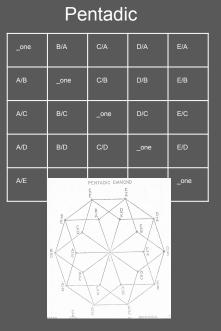
_one	B/A	C/A
A/B	_one	C/B
A/C	B/C	_one

Triadic

Tetradic







Ogdoadic

_one	B/A	C/A	D/A	E/A	F/A	G/A	H/A
A/B	_one	C/B	D/B	E/B	F/B	G/B	H/B
A/C	B/C	_one	D/C	E/C	F/C	G/C	H/C
A/D	B/D	C/D	_one	E/D	F/D	G/D	H/D
A/E	B/E	C/E	D/E	_one	F/E	G/E	H/E
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Morph

Morph between 2 Favorites

- Select "Morph" in Design Menu
- Left panel of Favorites are "A"
- Right panel of Favorites are "B" •
- Hit "S" to swap A and B -
- Top Box is A
- Middle Box is the Morph of A and B
- Bottom Box is B
- Interpolation slider morphs between A and B
- Select between Linear or Pitch interpolation
- ID A, ID B, Interpolation, and Interpolation Type are automatable in the DAW
- You can Favorite a Morph!
 - But you cannot Morph between two Morphs
- Pitch Wheel and Microtonal Keyboard reflect the state of the Morph, and show proportional triads

