Pieces that are a single full cycle of a polyrhythm
(beginning and ending on a tutti rhythmic unison)

by Erik Carlson

2022 - ongoing

43:51:52:55:59

A polyrhythm that contains every melodic permutation of 5 notes when each speed is assigned to a different pitch.

122:180:183

A polyrhythm for which the time-gaps between notes consist of every (and only) integer number of seconds between
1 (one second) and 60 (one minute) when a single full cycle lasts 10980 seconds (about 3 hours).

16:17:19:20:21:22:23:24:25:26:27:30

A polyrhythm in which a 12-tone row appears melodically in each of the 4 classical transformations (prime, inversion, retrograde, and retrograde inversion).

There are a several options for assigning 12 pitches to the 12 speeds, but most pairings will not work.
I suggest assigning the pitches
g a d g# a# d# f e c# b f# c
to the speeds in order from slowest to fastest.

1:2:3:4 ... 999:1000

For this piece, a full cycle unfolds over the span of one year, from midnight on January 1 to midnight on January 1.

Performers may tap into the cycle at any time.

I suggest assigning all speeds to a single pitch or sound.

1:2

For this piece, a full cycle unfolds over the span of one year, beginning at the first rhythmic unison and ending at the second rhythmic unison.

1:Φ

A polyrhythm of one to phi, the golden ratio.

A full cycle lasts for eternity. For this piece, the cycle started at midnight on my birthday, March 31, 1980. The tempo is such that the slower speed sounds once per minute.

Performers may tap into the cycle at any time.

5:19:21:23:24:26:27:28:31:32:34:41

A polyrhythm that contains every set class (in adjacent notes) when the notes of a chromatic scale are assigned to the twelve speeds (lowest to highest; slowest to fastest)

56:63:72:84

A polyrhythm that contains Morse Code for the word "time", observing precise International Morse Code timings for tones and silences, when the speeds 56 and 72 are assigned a tone-duration of 1/504 of the total piece-length (dot), and speeds 63 and 84 are assigned a tone-duration of 1/168 of the total piece-length (dash).

2:4:8:16:32...

A polyrhythm that is an audible fractal, with the degree of resolution at the performer's discretion.

0:1

A single tone.

?:1000

A polyrhythm that consists of

1) points in time that divide the day of the performance (midnight to midnight) into 1000 equal divisions

2) points in time that divide the chosen length of the performance into 1000 equal divisions

The performance must begin and end on any two (probably non-consecutive) moments from collection 1 and contain all moments from collection 2.

262:370:6906

A polyrhythm which sounds ~999999.99999999999 total vibrations of its fundamental frequencies, when each note is sustained for one second, and the equal-tempered pitches C1, A6, and G1 are assigned to the speeds from slowest to fastest.

9:19:20

A polyrhythm that functions as a comma pump (which descends four syntonic commas then reverses course and rises four syntonic commas) when the pitches D5, A4, and C4 are assigned to the speeds from slowest to fastest, and when only the just melodic intervals 5:3, 4:3, and 9:4 are used.

?:?:...

(For clarity, I have added brackets around phrases describing individual variables that must be decided on):

[A duration for the piece] and [a number of vibrations] are decided by an ensemble of any size.

Each performer chooses [a polyrhythm speed (number of notes in one cycle)], [a duration for their notes], and [a pitch frequency], such that over the course of one complete cycle of the polyrhythm, each performer sounds the same number of vibrations ([number of notes] X [duration of notes] X [frequency of notes]).

1:1000000

Over any duration, the 1000000 speed is created by a series of electronic clicks, and the 1 speed is created by two short notes from a live performer (at the beginning and end of the electronic part).

40:45:60:72

A polyrhythm which, when performed over a grid of 360 beats (each note sounds on and for one beat), contains at least one instance of every unique 4-beat combination of notes and rests.

20:28:35

A polyrhythm which, when performed on a grid of 140 beats (each note sounds on and for one beat), contains the six unique orderings of 3 pitches (on sets of consecutive beats with rests before and after), when a different pitch is assigned to each speed.

210:330:462:770:1155

A polyrhythm that contains at least one simultaneous sounding (chord) of each subset of 5 pitches when each speed is assigned to a different pitch.

13:131

A polyrhythm that is an 8-voice prolation canon when both speeds are assigned to a different pitch. The sequence of pitches is identical when looking at every note, every other note, every third note, etc. up to every eighth note.

21:26:55:87

A polyrhythm that contains every 9-note set class when each speed independantly loops a 12-note ascending chromatic scale.

1:2:3:4

The first of a series of 4-speed polyrhythms that are played in sequence. Each time this piece is performed, the polyrhythm changes in the following way:

The slowest speed is raised by 1. The speeds of the polyrhythm are then evaluated from slowest to fastest. If a speed is now equal to the next fastest speed, the next fastest speed increases by 1 and all speeds slower than that are reduced back to their lowest (original) numbers (1, 2, and/or 3). So the next polyrhythms in the series will be 1:2:3:5, 1:2:4:5, 1:3:4:5, 2:3:4:5, 1:2:3:6, etc.

The other details of the performance (instrumentation, pitch, duration, etc.) are up to the performer(s). I will keep a log of the performances. Please contact me if you would like to play the next polyrhythm in the series.

6:10:14:105

A 4-speed polyrhythm for which the ratio between the longest time between two notes and the shortest (non-zero) time between two notes is as small as possible, 2:1.

6:10:15

The densest polyrhythm (out of polyrhythms where no speed is a multiple of another speed).

If the polyrhythm is played over a grid of 30 beats (each note sounds on and for one beat), 22 beats will have at least one note and 8 beats will have a rest.

24024:25740:27720:30030:32760:36036:40040:45045

A polyrhythm which begins with the (rhythmically accurate) opening 8-note melody of Bach's C-major Prelude (BWV 846).

The polyrhythm finishes a full cycle in exactly 24 hours when Bach's melody is played at the tempo 62 9/16 bpm.

The pitches of Bach's melody (first to last) are assigned to the speeds of the polyrhythms (fastest to slowest).

?:?:?

A 3-speed polyrhythm in the proportions of the street address number of the performance venue and the street address numbers of the buildings on either side of it.

?:?:?

A 3-speed polyrhythm in the proportions of the measured co-perpendicular dimensions (height, width, depth, to any degree of precision preferred by the performer) of a physical object that is valued by the performer.

The object could be anything… perhaps an object associated with a treasured memory, or the performer's own body, or an object found on the way to the performance.

19:21:23:29:31:37:47:53:55

A polyrhythm which contains every possible 6-note sequence of two pitches when the six slowest speeds are assigned to one pitch and the three fastest speeds are assigned to different pitch.

?:?:…

Polyrhythms with speed ratios that are same as frequency ratios of the pitches assigned to each speed.

A specific example:

$$\mathbf{1}:\mathbf{2}^{\frac{\mathbf{1}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{2}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{3}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{4}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{5}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{6}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{7}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{8}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{9}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{10}}{\mathbf{12}}}:\mathbf{2}^{\frac{\mathbf{11}}{\mathbf{12}}}$$

For this piece, the concept is applied to 12 adjacent equal tempered pitches. Performers should begin at the 12-note unison and play for as long as desired.

9:10:13:17

The longest 4-speed polyrhythm in which each ordered set of 4 sequential notes is unique when each speed is assigned to a different pitch