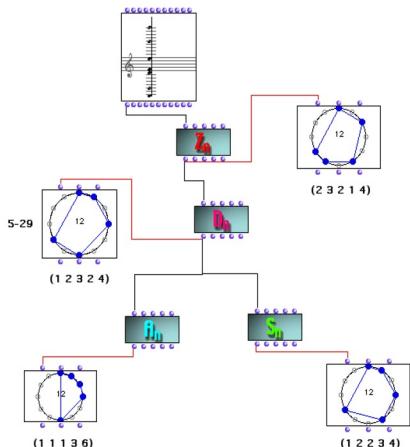


Rhythmic Tiling Canons: theoretical aspects and compositional applications



Conservatorio di Trento

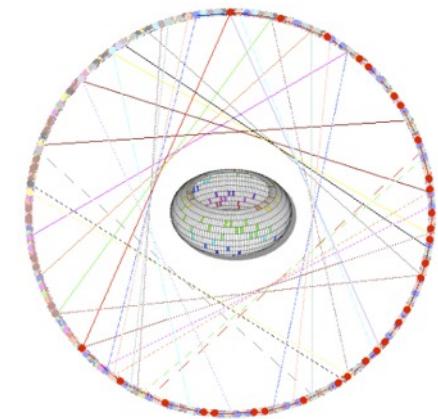
30 novembre 2022

Moreno Andreatta

CNRS / IRMA / Université de Strasbourg

CNRS / IRCAM / Sorbonne Université

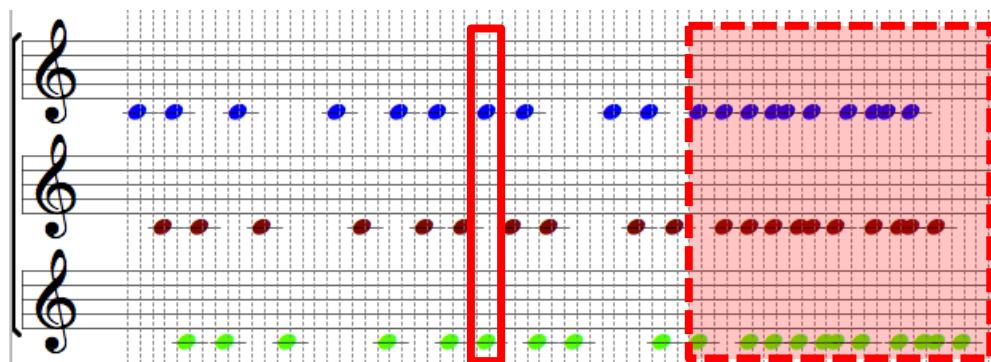
www.morenoandreatta.com



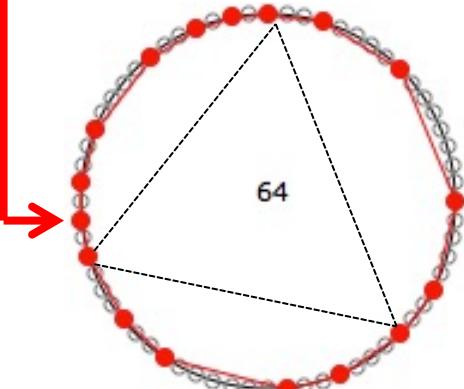
The ‘emergence’ of tiling rhythmic canons



Harawi (1945)

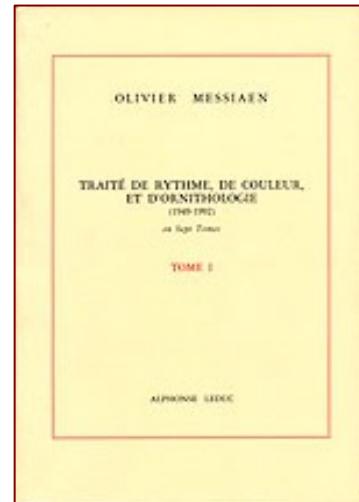


Harawi: rhythmic reduction

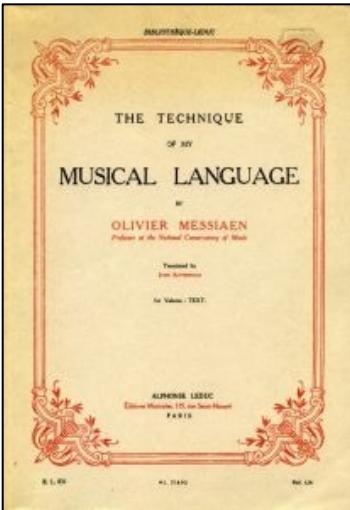


« ...il résulte de tout cela que les différentes sonorités se mélangent ou s’opposent de manières très diverses, **jamais au même moment ni au même endroit** [...]. C'est du désordre organisé »

O. Messiaen: *Traité de Rythme, de Couleur et d’Ornithologie*, tome 2, Alphonse Leduc, 1992.



The pitch-rhythm *mystic* isomorphic correspondence

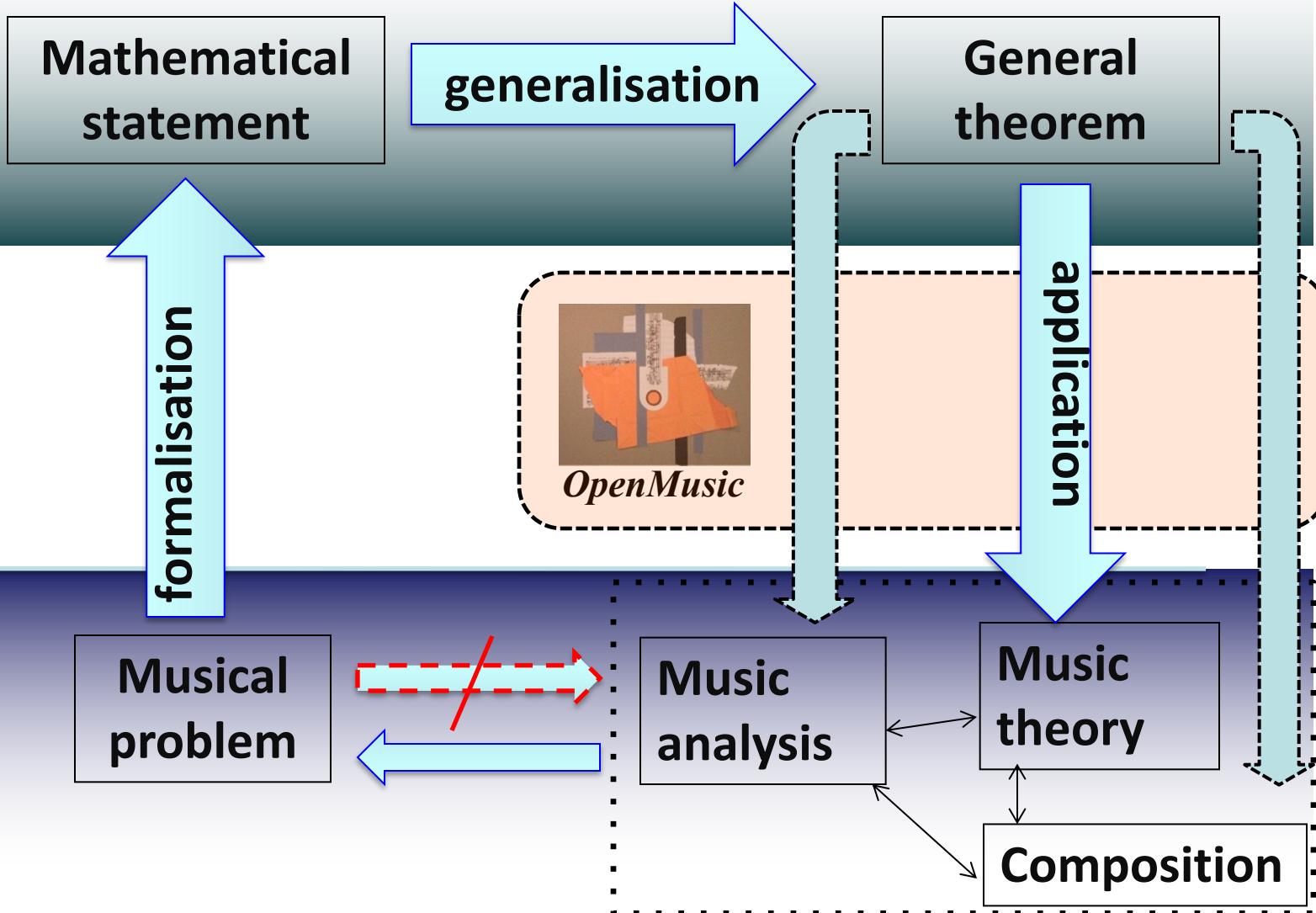


“These modes [of Limited Transpositions] realize in the vertical direction (transposition) what non-retrogradable rhythms realize in the horizontal direction (retrogradation). In fact, these modes *cannot be transposed* beyond a certain number of transpositions without falling again into the same notes, enharmonically speaking; likewise, these rhythms *cannot be read in a retrograde sense* without one’s finding again exactly the same order of values as in the right sense. These modes cannot be transposed because they are—without polytonality—in the modal atmosphere of several keys at once and contain in themselves small transpositions; these rhythms cannot be retrograded because they contain in themselves small retrogradations. These modes are divisible into symmetrical groups; these rhythms, also, with this difference: the symmetry of the rhythmic groups is a retrograde symmetry. Finally, the last note of each group of these modes is always *common* with the first of the following group; and the groups of these rhythms frame a central value *common* to each group. The analogy is now complete”.

- O. Messiaen, *Technique de mon langage musical*, Alphonse Leduc, 1944
- O. Messiaen, *Traité de rythme, de couleurs et d'ornithologie*, Alphonse Leduc, 1949-1992

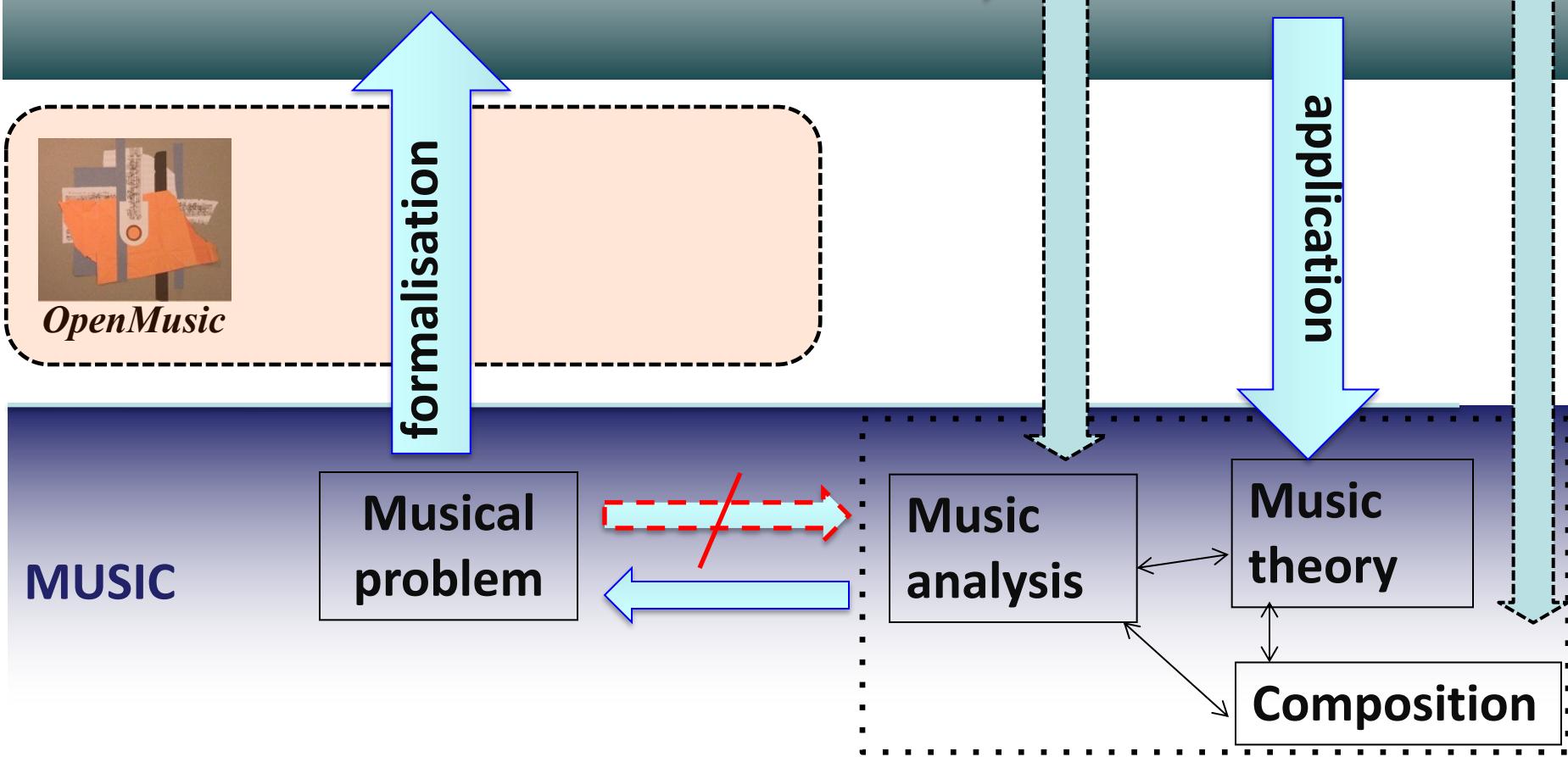
The double movement of a ‘mathemusical’ activity

MATHEMATICS



The double movement of a ‘mathemusical’ activity

MATHEMATICS



The double movement of a ‘mathemusical’ activity

MATHEMATICS



formalisation

generalisation

General
theorem

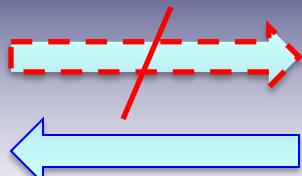
MUSIC

Musical
problem

Music
analysis

Music
theory

Composition



OpenMusic, a Visual Programming Language for computer-aided composition

www.repmus.ircam.fr/openmusic/home

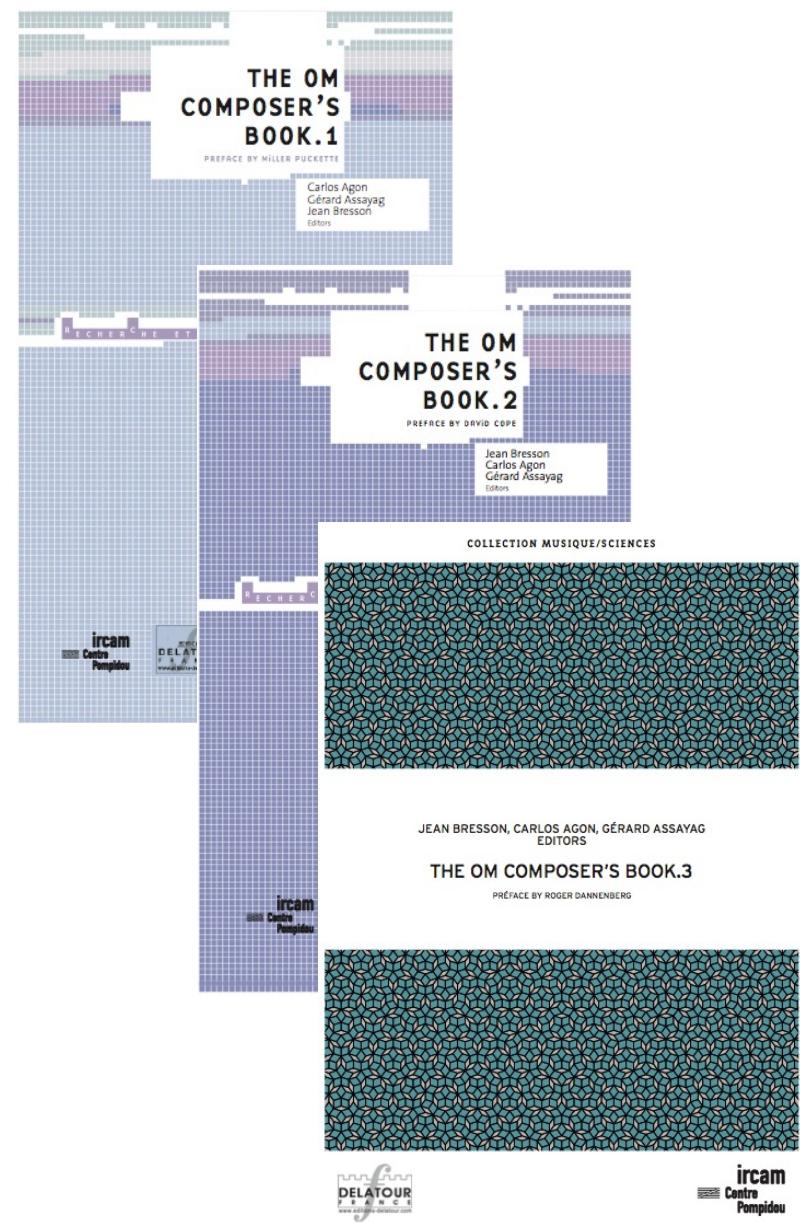
OpenMusic

(c) Ircam - Centre Pompidou



Dedicated to the memory of Gérard Grisey (French composer, 1946-1998)

Design and developpement : G. Assayag, A. Agon and J. Bresson
with help from C. Rueda, O. Delerue. Use Midishare (Grame)
Musical expertise by : M. Andreatta, J. Baboni, J. Fineberg, K. Haddad,
C. Malherbe, M. Malt, T. Murail, O. Sandred, M. Stroppa, H. Tutschku.
Artwork : A. Mohsen.



**C. Agon, G. Assayag and J. Bresson, *The OM Composer's Book* (3 volumes)
“Musique/Sciences” Series, Ircam/Delatour, 2006, 2007 and 2016**

“MathTools”: an algebraic environment within OpenMusic visual programming language



Computational Music Theory:

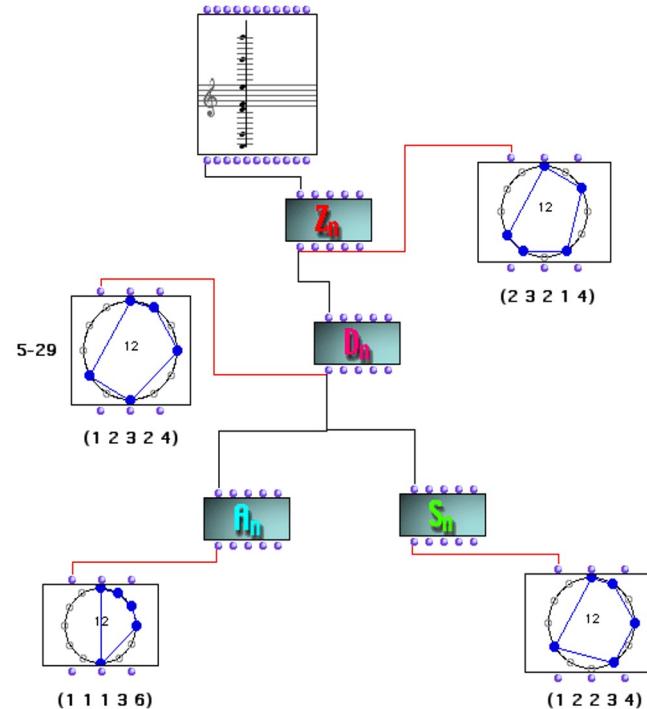
- Classification and Enumeration of musical structures
- Chords/scales, motifs and rhythms:
 - ♪ Catalogues (Costère, Zalewski, Vieru, Forte, Carter, Morris, Mazzola, Estrada, ...)
 - Σ Combinatorial algebra, Polya Enumeration Theory, Burnside Lemma, Discrete Fourier Transform
- **Rhythmic Tiling Canons** (by translation, inversion and augmentation)
 - ♪ Messiaen, Vieru, Levy, Johnson, Bloch, Wild, Lanza, Ghisi, ...
 - Σ Group and ring factorization theory and Discrete Fourier Transform (DFT)

Computational Music Analysis:

- *Set Theory*, Transformational Analysis and Sieve Theory
- Pitch-class sets, interval vectors and IFUNC, Z-relations:
 - ♪ Carter, Vieru, Xenakis
 - Σ Group Actions, Homometry, DFT
- Transformational progression/network, *K-nets*
 - ♪ Generalized Interval Systems (David Lewin)
 - Σ Group action and category theory

Computer Aided-Composition:

- Scales, modes, chords manipulation
- Rhythmic structures organizations

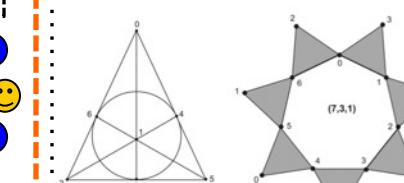
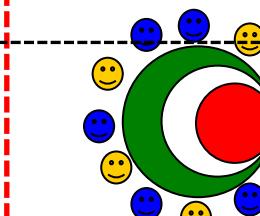
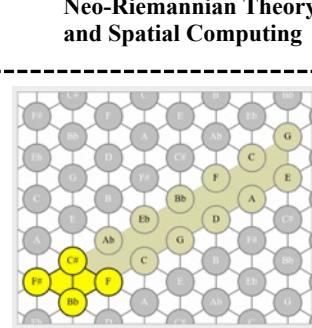
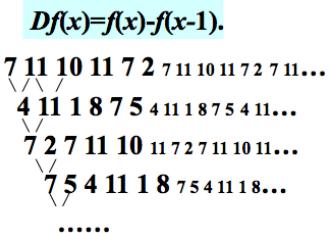
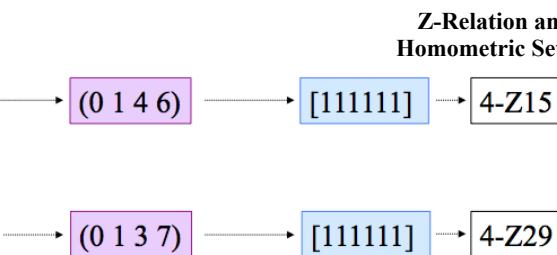
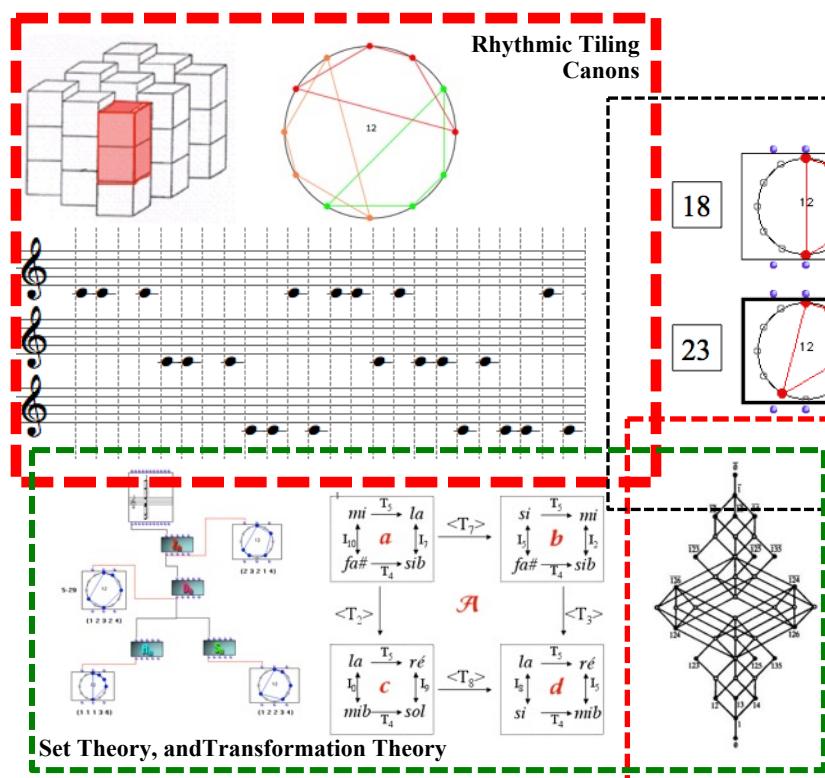
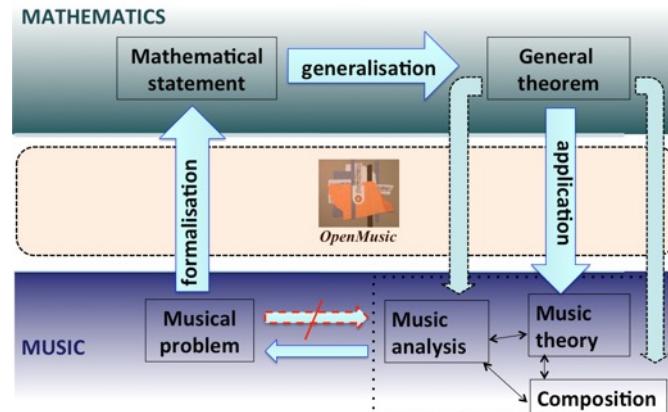


Some examples of ‘mathemusical’ problems

M. Andreatta: *Mathematica est exercitium musicae*, Habilitation Thesis, IRMA University of Strasbourg, 2010

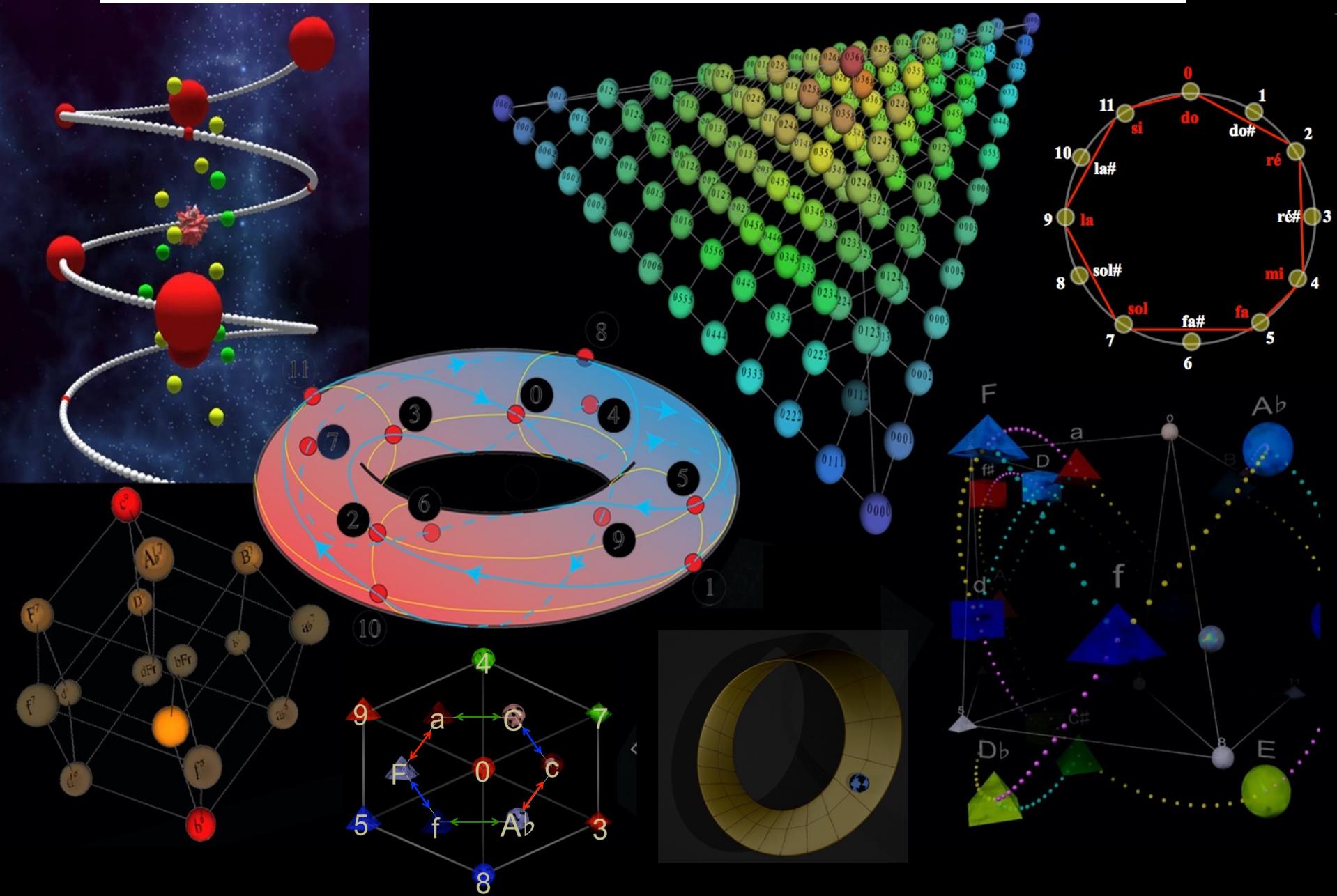
- The construction of Tiling Rhythmic Canons

- The Z relation and the theory of homometric sets
 - *Set Theory* and Transformational Theory
 - Neo-Riemannian Theory, Spatial Computing and FCA
 - Diatonic Theory and Maximally-Even Sets
 - Periodic sequences and finite difference calculus
 - Block-designs and algorithmic composition

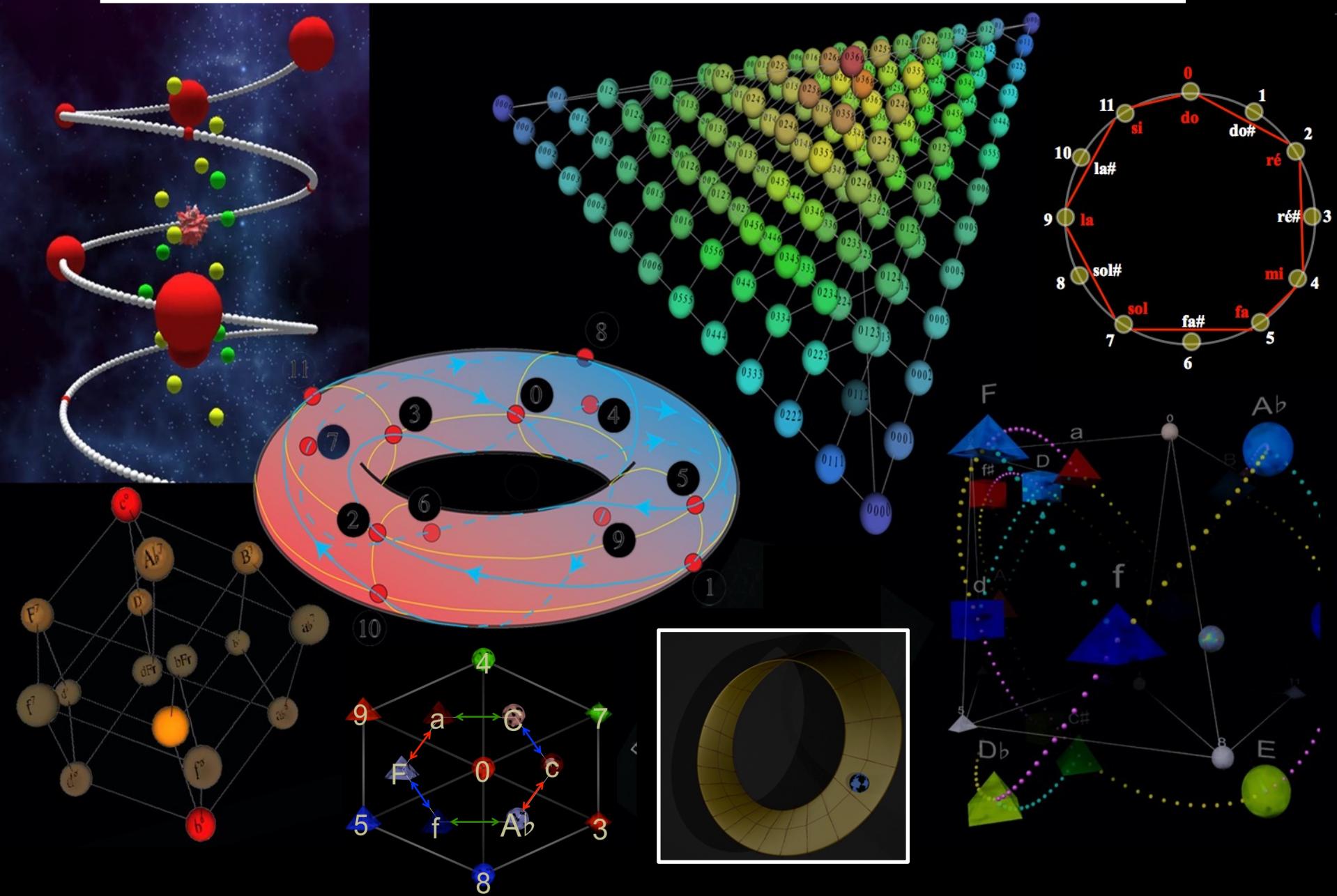


ets i : Block-designs

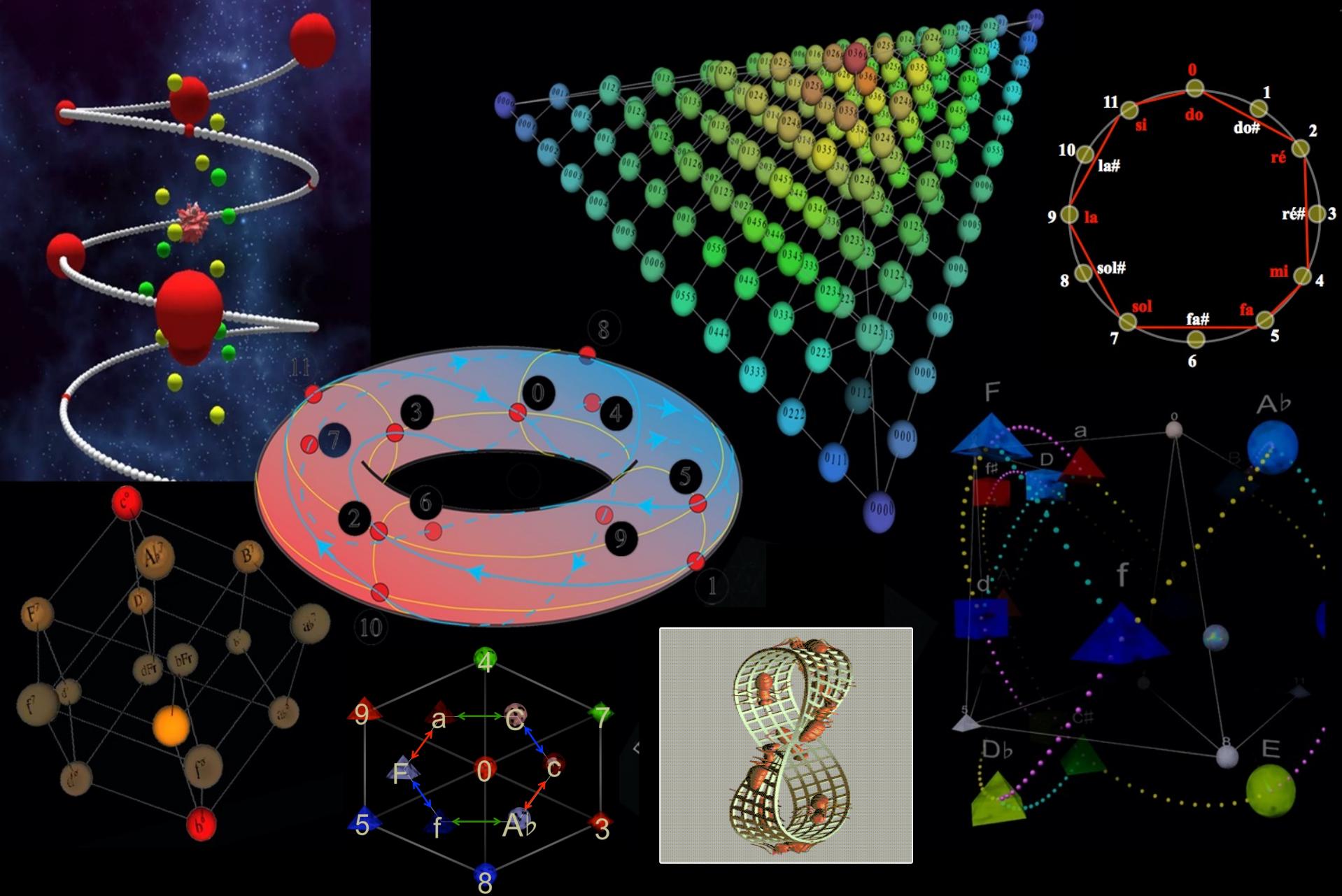
The galaxy of geometrical models at the service of music



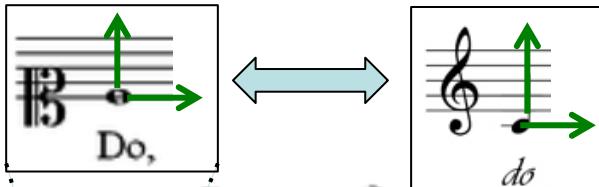
The galaxy of geometrical models at the service of music



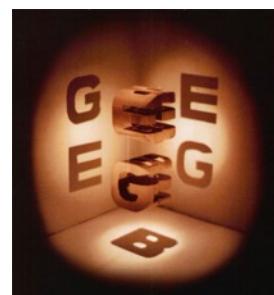
The galaxy of geometrical models at the service of music



Bach's enigmatic canons and geometry



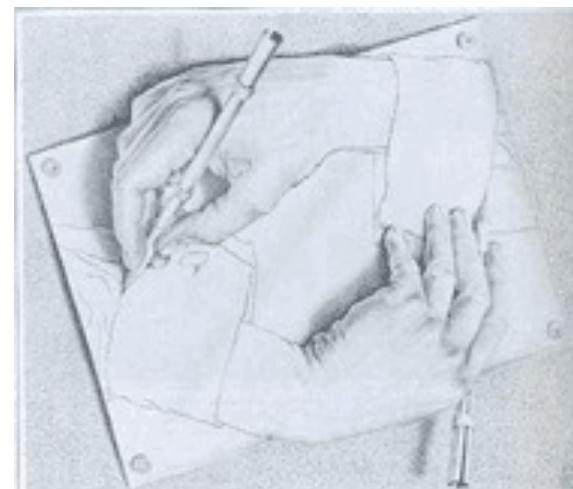
Canones diversi
super thema regium



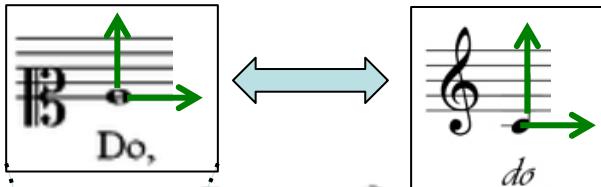
Canon a 2

1.

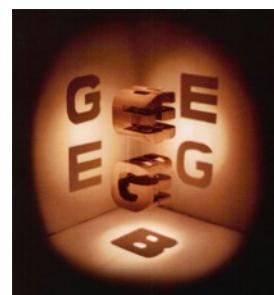
The musical score consists of two staves. The first staff begins with a bass clef (B) and a key signature of one flat (C major). The second staff begins with a treble clef (G) and a key signature of no sharps or flats (G major). The music is in common time. The score includes various note values such as quarter notes, eighth notes, sixteenth notes, and thirty-second notes, along with rests and dynamic markings like forte (f).



Bach's enigmatic canons and geometry



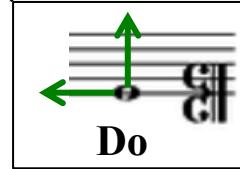
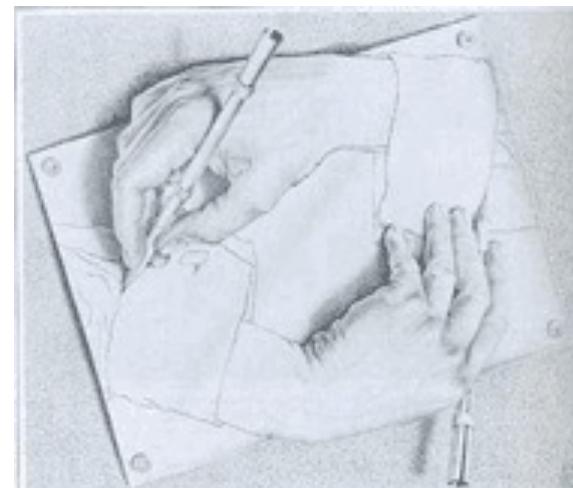
Canones diversi
super thema regium

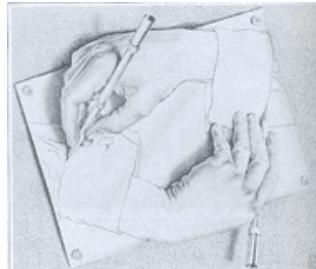


Canon a 2

1.

The musical score consists of two staves. The first staff begins with a bass clef (B) and a key signature of one flat. The second staff begins with a treble clef (G) and a key signature of one sharp. A blue arrow points from the bass clef to the treble clef.





My end is my beginning (but twisted!)

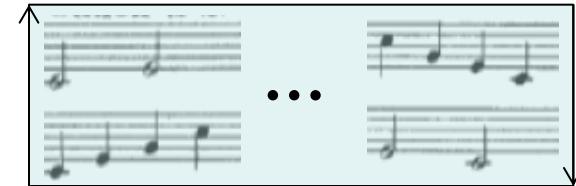
Canones diversi

super thema regium

Canon a 2

4.

B-flat major, common time

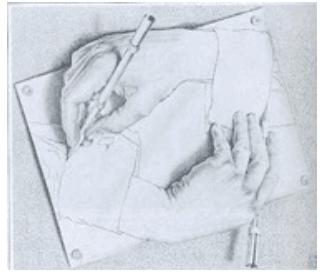


Canones diversi
super thema regium

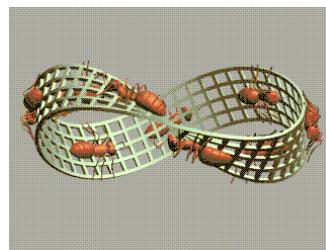
Canon a 2

4.

B-flat major, common time



My end is my beginning (but twisted!)



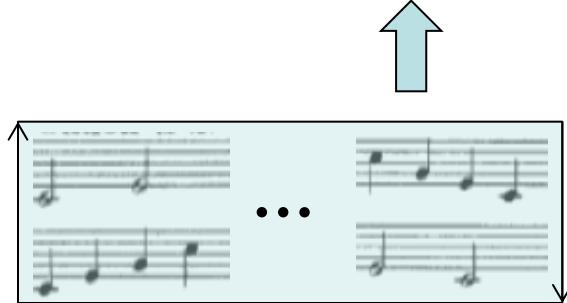
Canones diversi

super thema regium

4.

Canon a 2

Musical score for Canon a 2, showing three staves of music in E-flat major, 2/4 time. The score consists of three staves of music, each with a different rhythm pattern. The first staff starts with a quarter note, the second with an eighth note, and the third with a sixteenth note. The music is composed of eighth notes throughout.



Canones diversi
super thema regium

4.

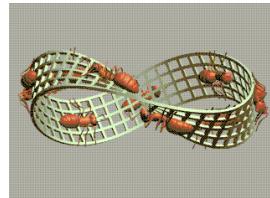
Canon a 2

Musical score for Canon a 2, showing three staves of music in E-flat major, 2/4 time. The score consists of three staves of music, each with a different rhythm pattern. The first staff starts with a quarter note, the second with an eighth note, and the third with a sixteenth note. The music is composed of eighth notes throughout.



<http://www.josleys.com/Canon/Canon.html>

[min. 1'14"]



Palindromic structures in ‘pseudo’ rhythmic canons

CLAPPING MUSIC

FOR TWO PERFORMERS

$\text{J} = 144-168$

CLAPS 1
CLAP2

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

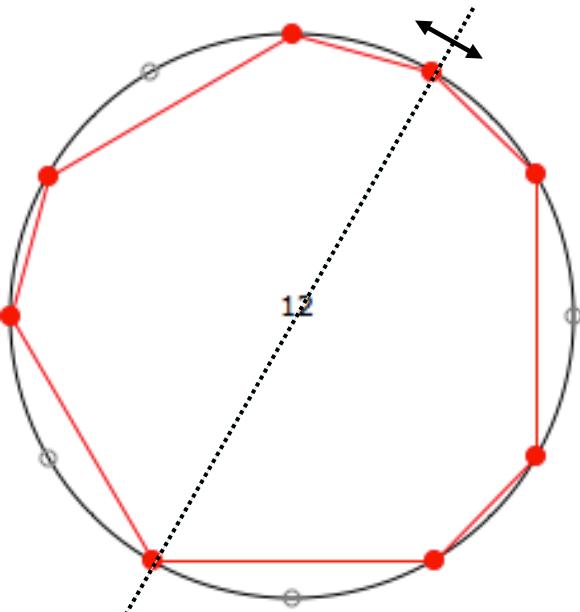
Repeat bar ⑪, then end.

The performance begins and ends with both performers in unison at bar ①. The number of repeats of each bar should be fixed at twelve repeats per bar. Since the first performer's part does not change, it is up to the second performer to move from one bar to the next. The second performer should try to keep his or her downbeat where it is written, i.e., on the first beat of each measure (not on the first beat of the group of three claps), so that his downbeat always falls on a new beat of his or her anchoring pattern.

The choice of a particular clapping sound, i.e., with cupped or flat hands, is left up to the performers. Whichever take is chosen, both performers should try to get the same one so that their two parts will blend to produce one overall resulting pattern.

Clapping Music de Steve Reich (1972)

Steve Reich / 1972
re-copied 1978



Palindromic structures in ‘pseudo’ rhythmic canons

CLAPPING MUSIC

FOR TWO PERFORMERS

J = 144-168

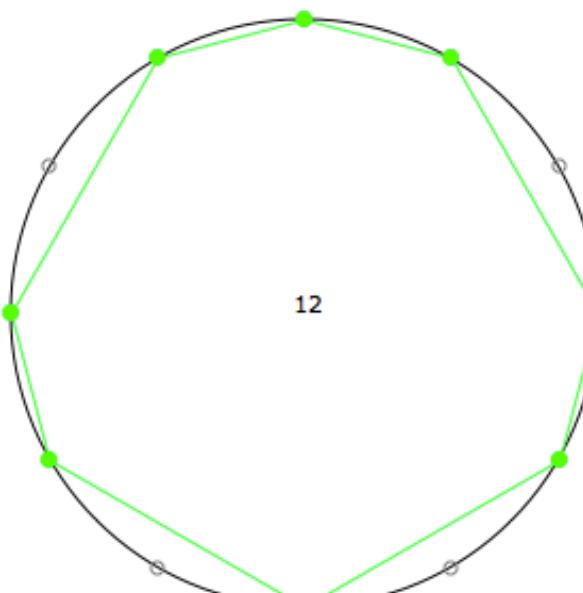
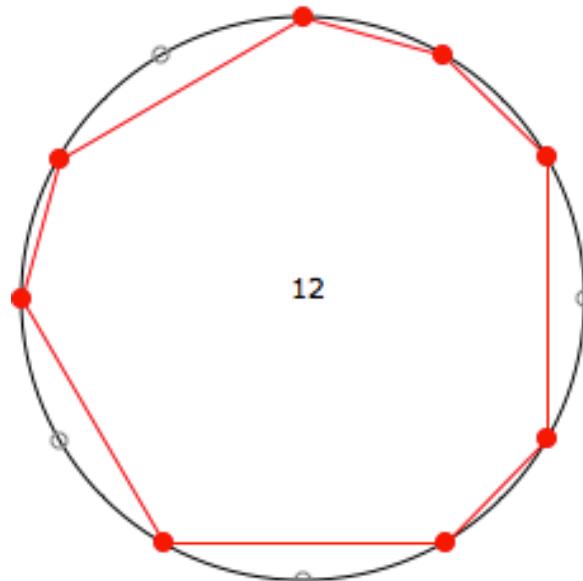
CLAPS 1
CLAPS 2

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Repeat bar ①, then end.

The performance begins and ends with both performers in unison at bar ①. The number of repeats of each bar should be fixed at twelve repeats per bar. Since the first performer's part does not change, it is up to the second performer to move from one bar to the next. The second performer should try to keep his or her downbeat where it is written, i.e. on the first beat of each measure (not on the first beat of the group of three claps), so that his downbeat always falls on a new beat of his or her anchoring pattern.

The choice of a particular clapping sound, i.e., with clipped or flat heads, is left up to the performers. Whichever take is chosen, both performers should try to get the same one so that their two parts will blend to produce one overall resulting pattern.



Palindromic structures in ‘pseudo’ rhythmic canons

CLAPPING MUSIC

FOR TWO PERFORMERS

$\text{J} = 144 - 168$

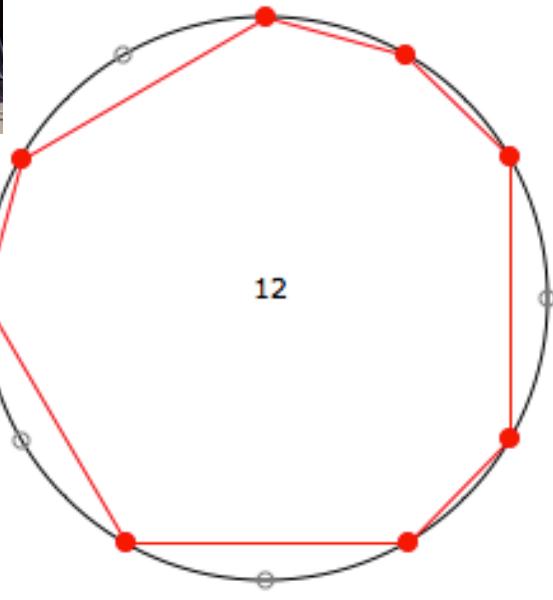
CLAPS 1
CLAPS 2

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Clapping Music (1972)

Alex Rech 1/2/72
rec. copied 1/78



YOUTUBE.COM/GERUBACH

12345678

YOUTUBE.COM/GERUBACH

Gerubach's Scrolling Score Project
<http://www.gerubach.com>

Characterizing the number of ‘common onsets’

CLAPPING MUSIC

FOR TWO PERFORMERS

$J = 144 - 168$

CLAPS CLAP2

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

Repeat bar ⑬, then end.

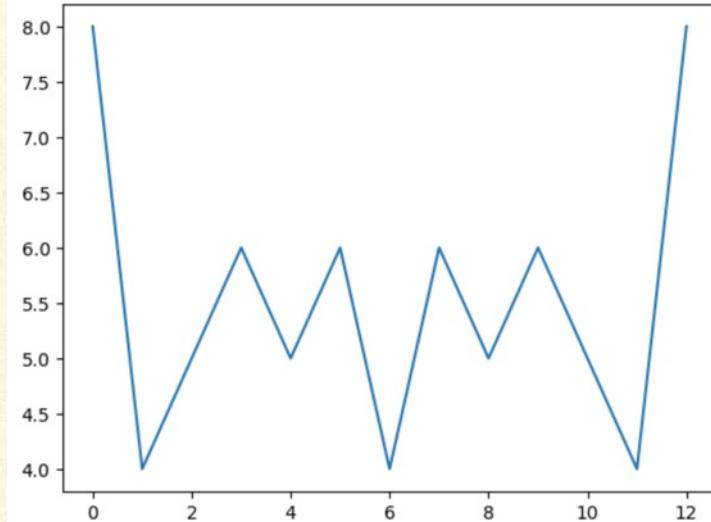
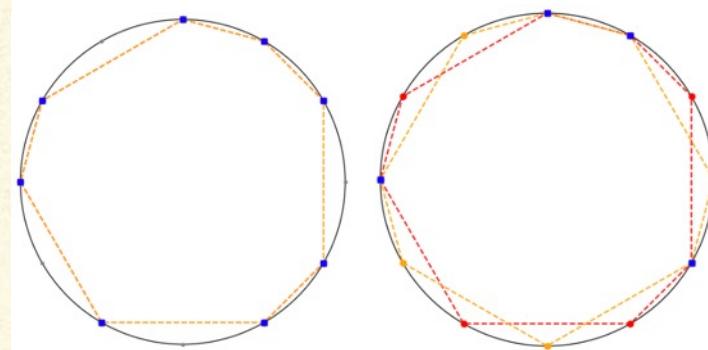


The performance begins and ends with both performers in unison at bar ①. The number of repeats of each bar should be fixed at twelve repeats per bar. Since the first performer's part does not change, it is up to the second performer to move from one bar to the next. The second performer should try to keep his or her downbeat where it is written, i.e., on the first beat of each measure (not on the first beat of the group of three claps), so that his downbeat always falls on a new beat of his or her anchoring pattern.

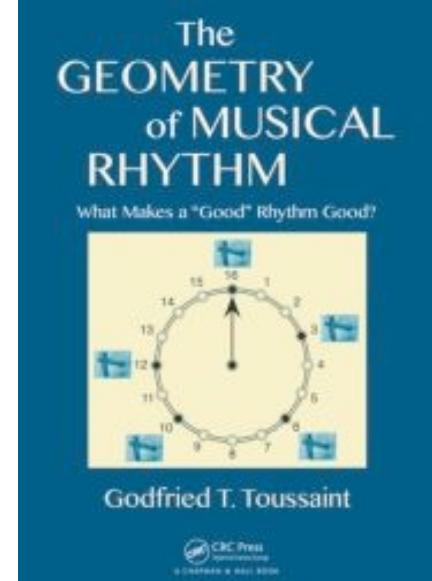
The choice of a particular clapping sound, i.e., with clipped or flat heads, is left up to the performers. Whichever take is chosen, both performers should try to get the same one so that their two parts will blend to produce one overall resulting pattern.

Clapping Music (1972)

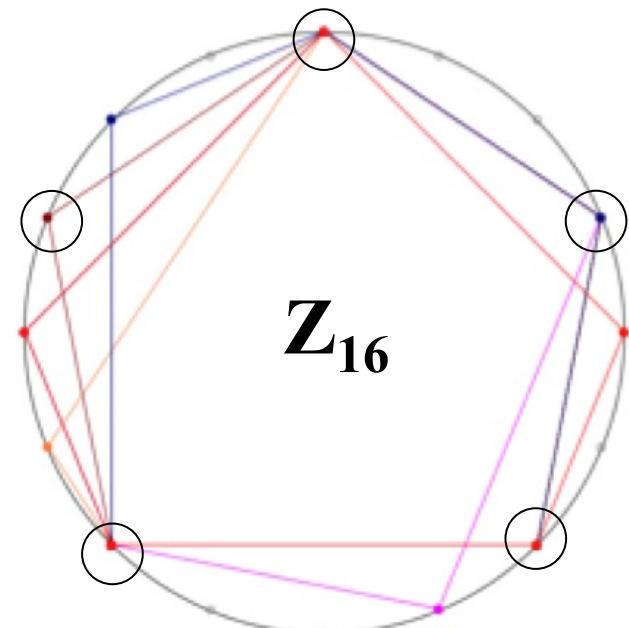
Alex Rode 1/72
re-copied 1/78



ME-sets and the geometry of African-Cuban rhythms

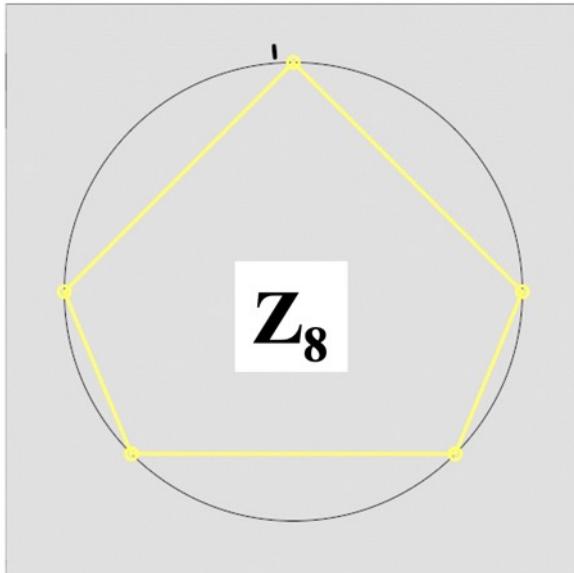


Shiko	● ● ●
Son	● ● ●
Soukous	● ● ●
Rumba	● ● ●
Bossa	● ● ●
Gahu	● ● ●



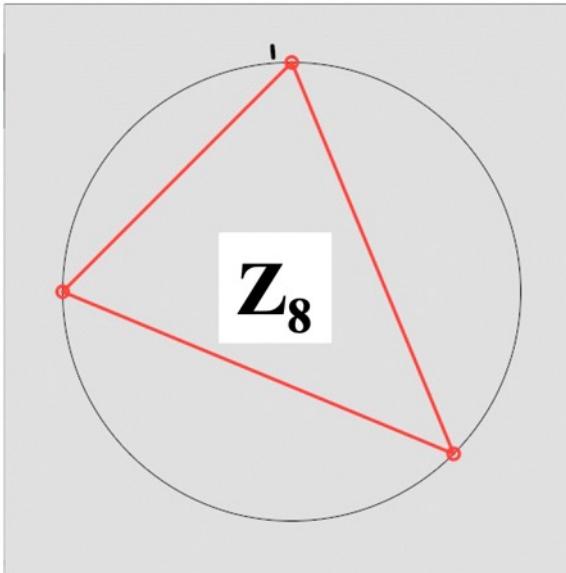
ME-sets and the geometry of African-Cuban rhythms

Cinquillo



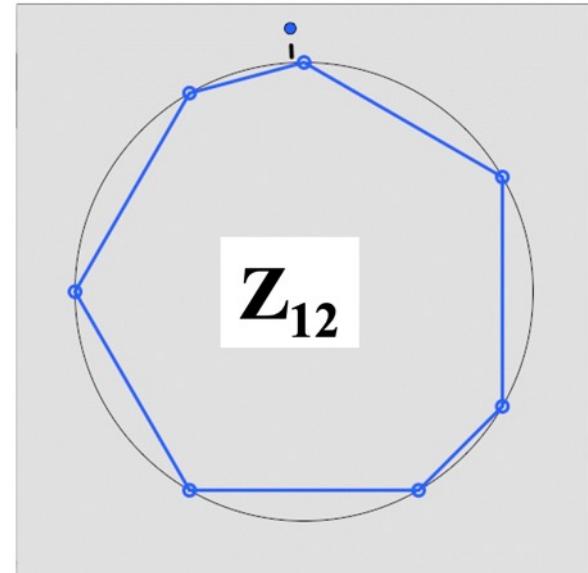
(2 1 2 1 2)

Trecillo



(3 3 2)

Bembé (Abadja)



(2 2 1 2 2 2 1)

Generalizing the process with maximally even sets

CLAPPING MUSIC

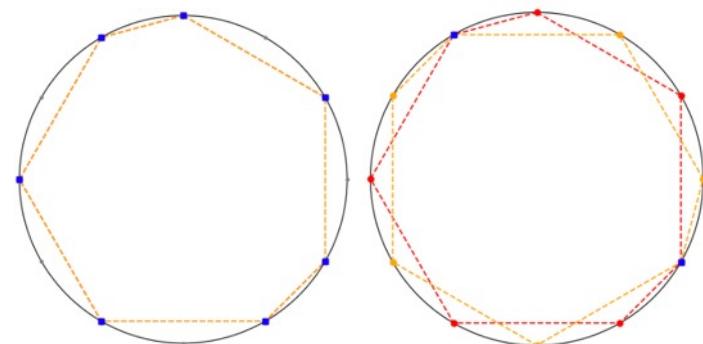
FOR TWO PERFORMERS

$J = 144 - 168$

CLAPS CLAP2

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Repeat bar ①, then end.

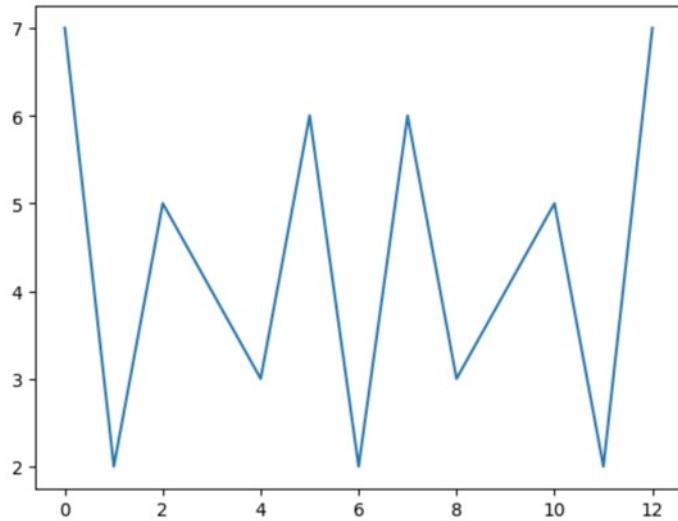


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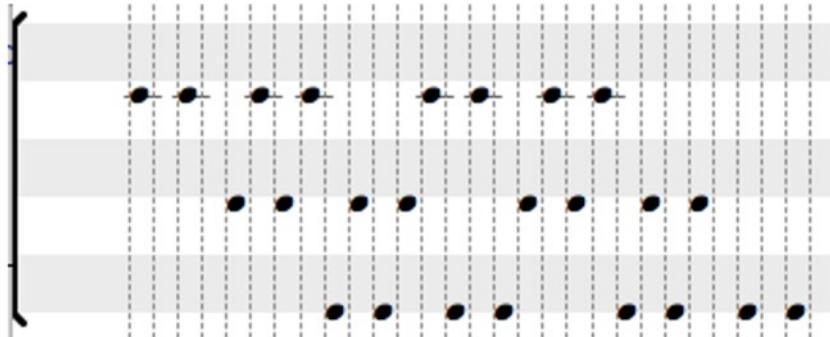
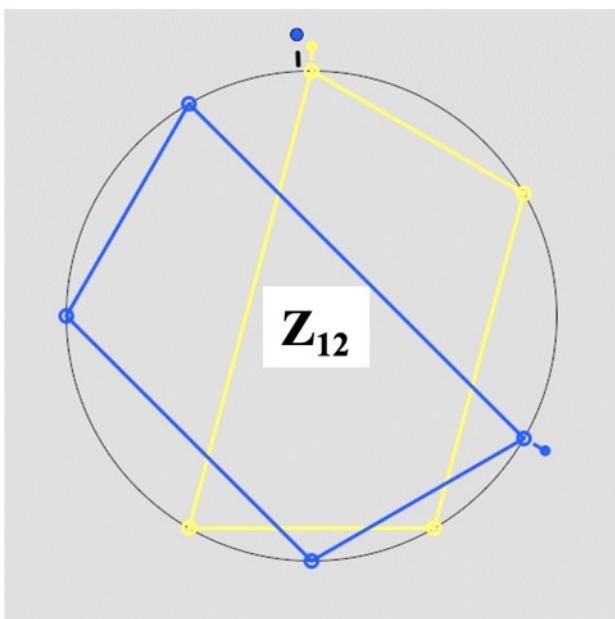
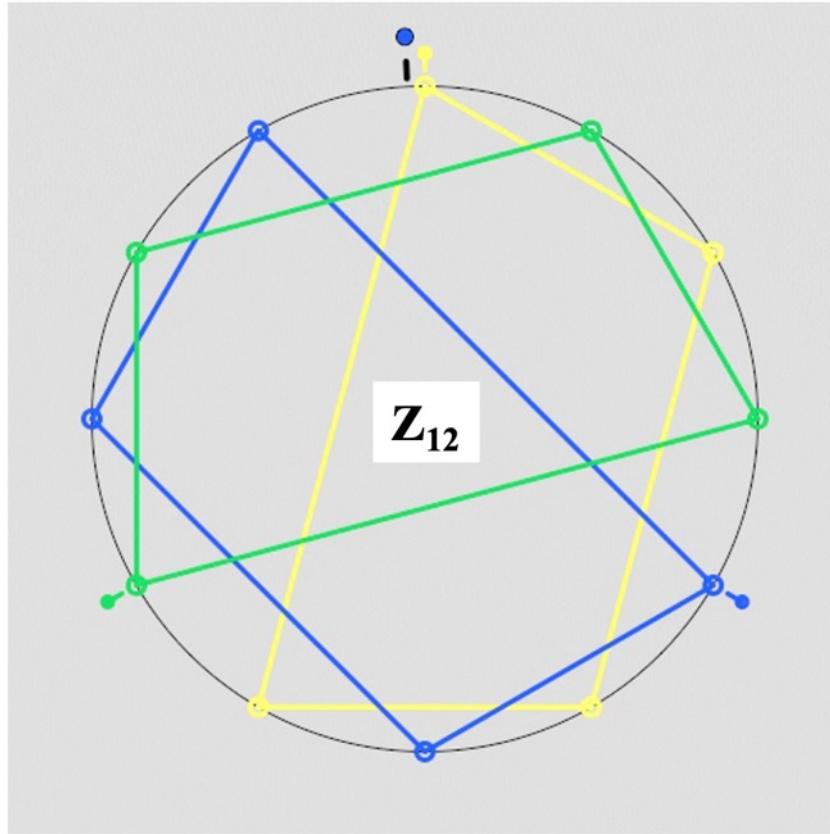
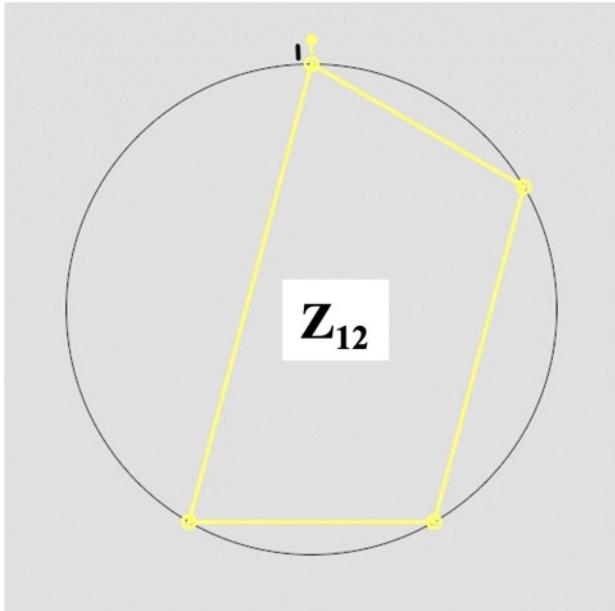
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Clapping Music (1972)

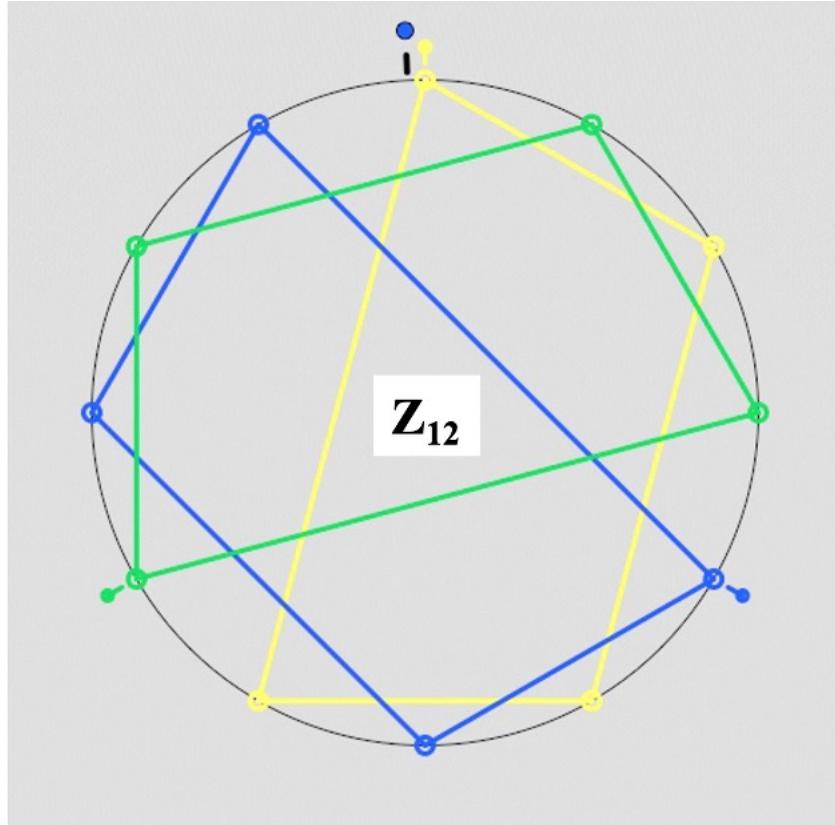
Steve Reich 1/72
rec. copied 1/78



Tiling the line with translates of one tile



Formalizing the tiling process as set-theoretical operations



$$A_1 = \{0, 2, 5, 7\}$$

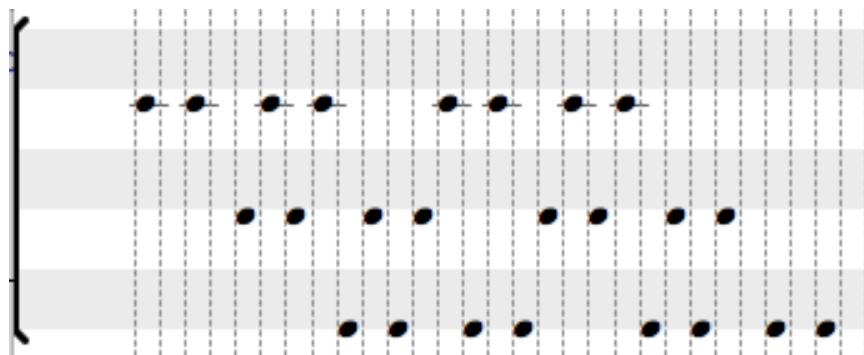
T_4

$$A_2 = \{4, 6, 9, 11\}$$

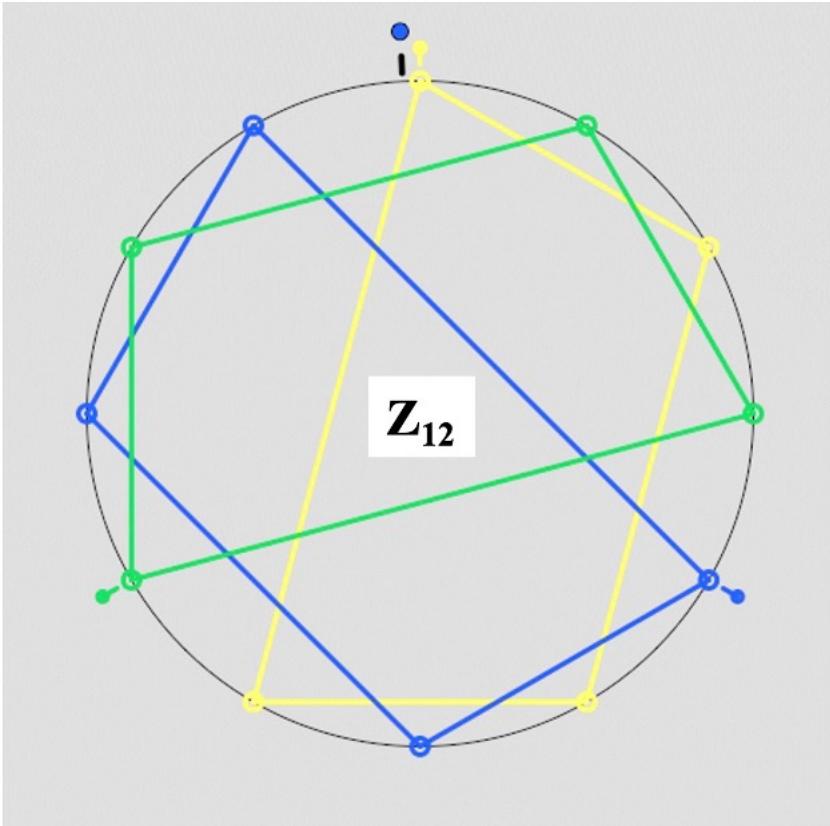
T_4

$$A_3 = \{8, 10, 1, 3\}$$

$$Z_{12} = A_1 \cup A_2 \cup A_3$$



Formalizing the tiling process as a direct sum of subsets



$$A_1 = \{0, 2, 5, 7\}$$

T_4

$$A_2 = \{4, 6, 9, 11\}$$

T_4

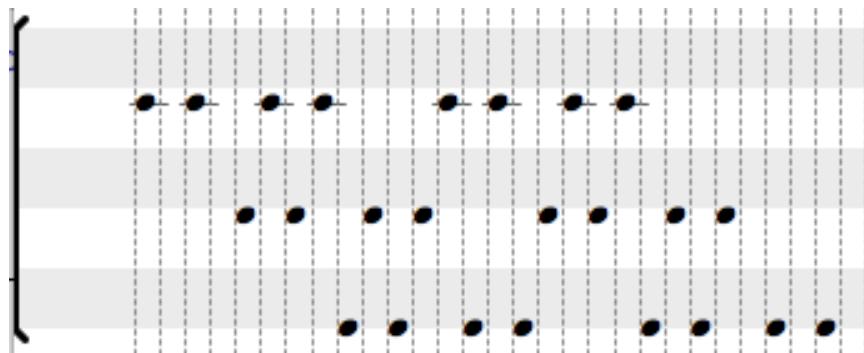
$$A_3 = \{8, 10, 1, 3\}$$

$$Z_{12} = A_1 \cup A_2 \cup A_3$$

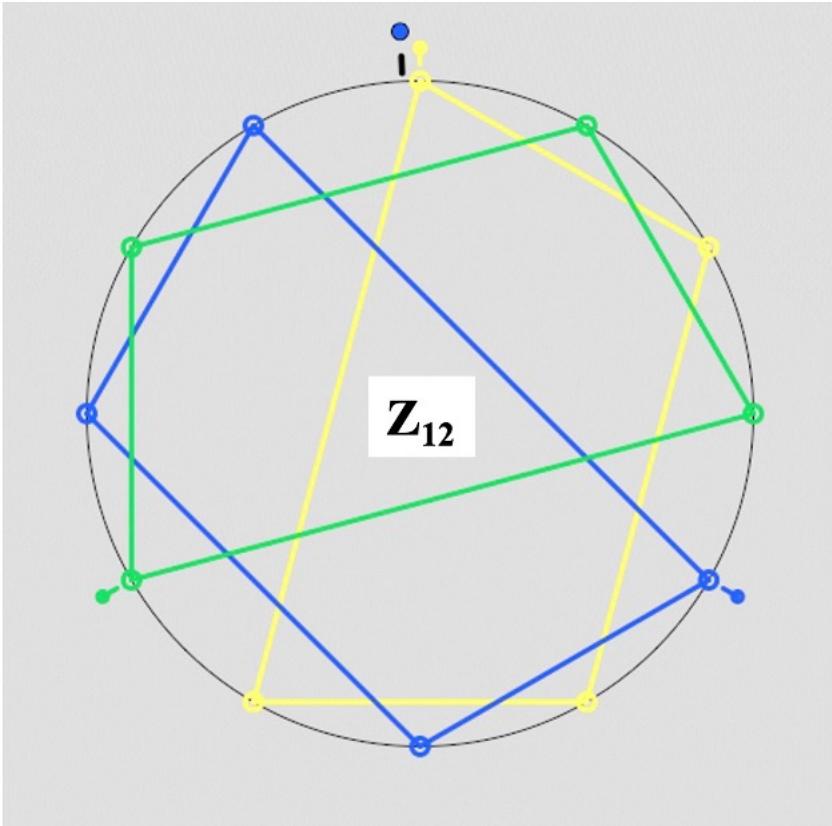
$$Z_{12} = A \oplus B$$

$$A = ?$$

$$B = ?$$



Formalizing the tiling process as a direct sum of subsets



$$A_1 = \{0, 2, 5, 7\}$$

T_4

$$A_2 = \{4, 6, 9, 11\}$$

T_4

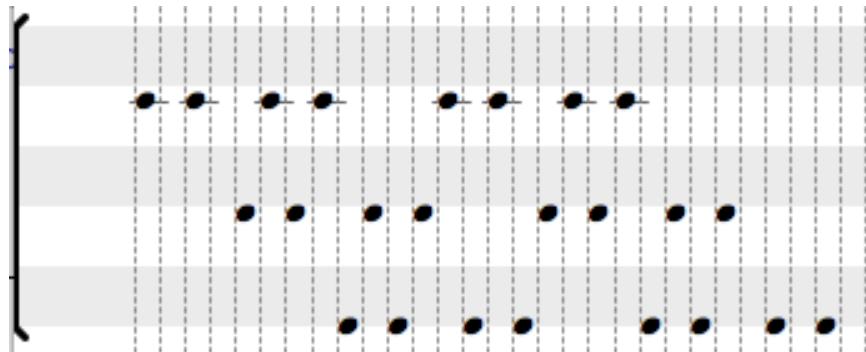
$$A_3 = \{8, 10, 1, 3\}$$

$$Z_{12} = A_1 \cup A_2 \cup A_3$$

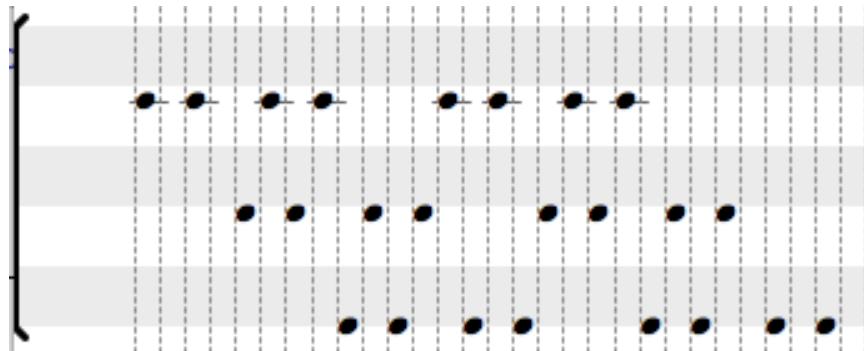
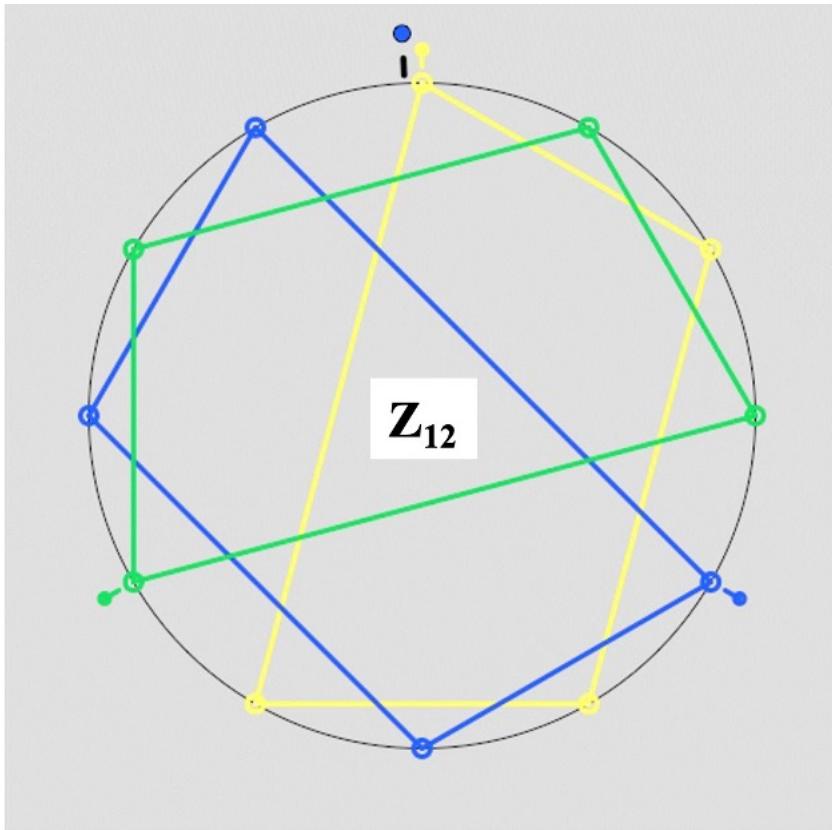
$$Z_{12} = A \oplus B$$

$$A = \{0, 2, 5, 7\}$$

$$B = \{0, 4, 8\}$$



Formalizing tilings as a transpositional combination



$$A_1 = \{0, 2, 5, 7\}$$

T₄

$$A_2 = \{4, 6, 9, 11\}$$

T₄

$$A_3 = \{8, 10, 1, 3\}$$

$$Z_{12} = A_1 \cup A_2 \cup A_3$$

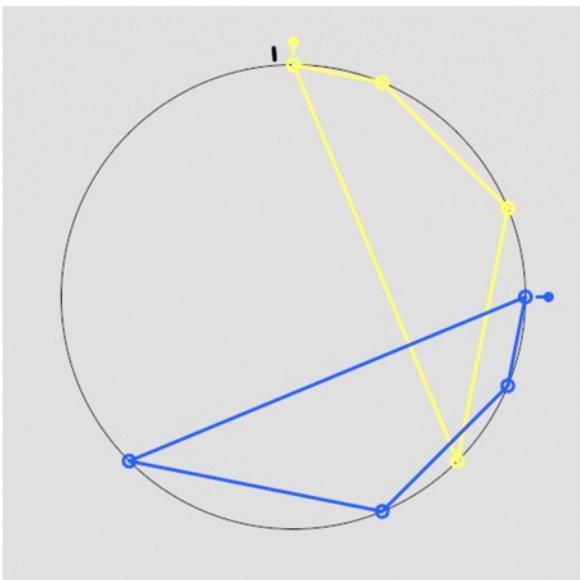
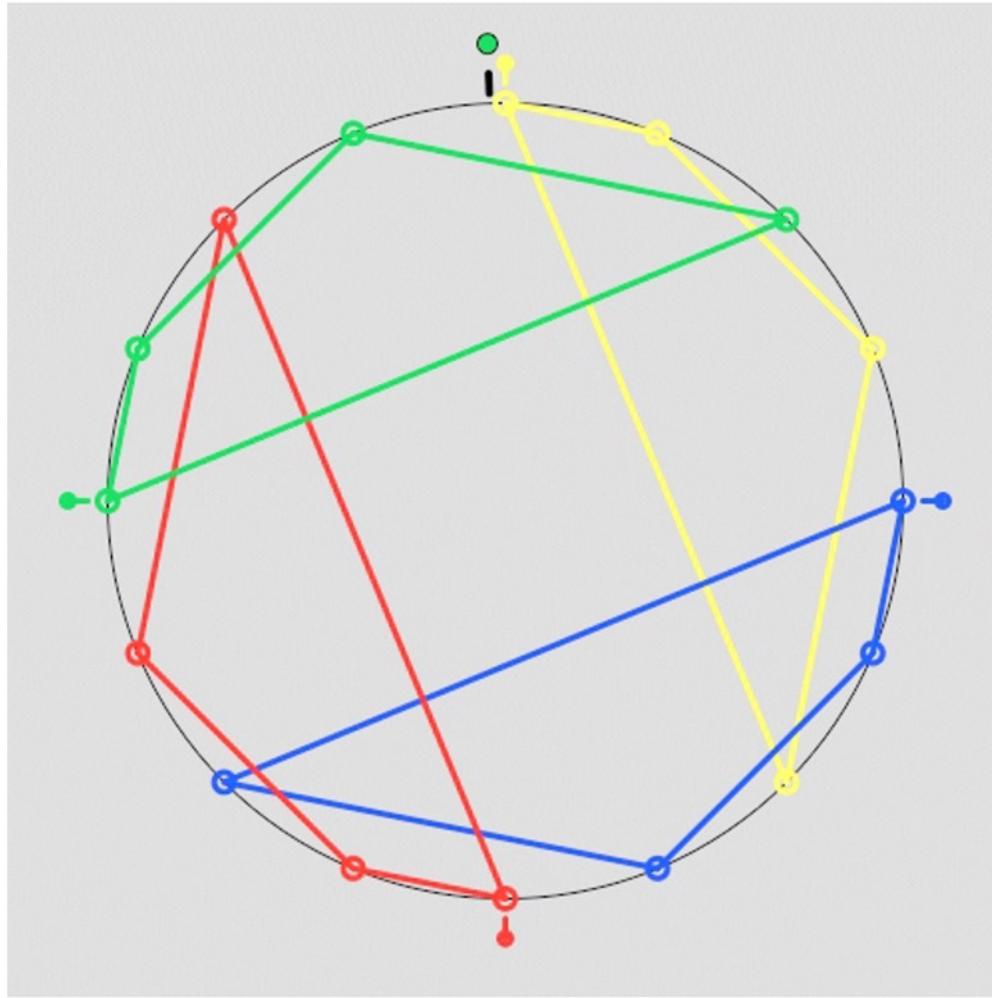
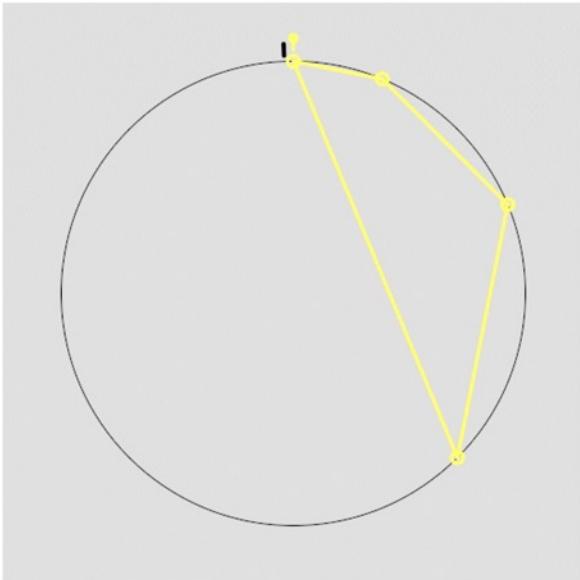
$$Z_{12} = A \oplus B$$

$$A = \{0, 2, 5, 7\}$$

$$B=\{0,4,8\}$$

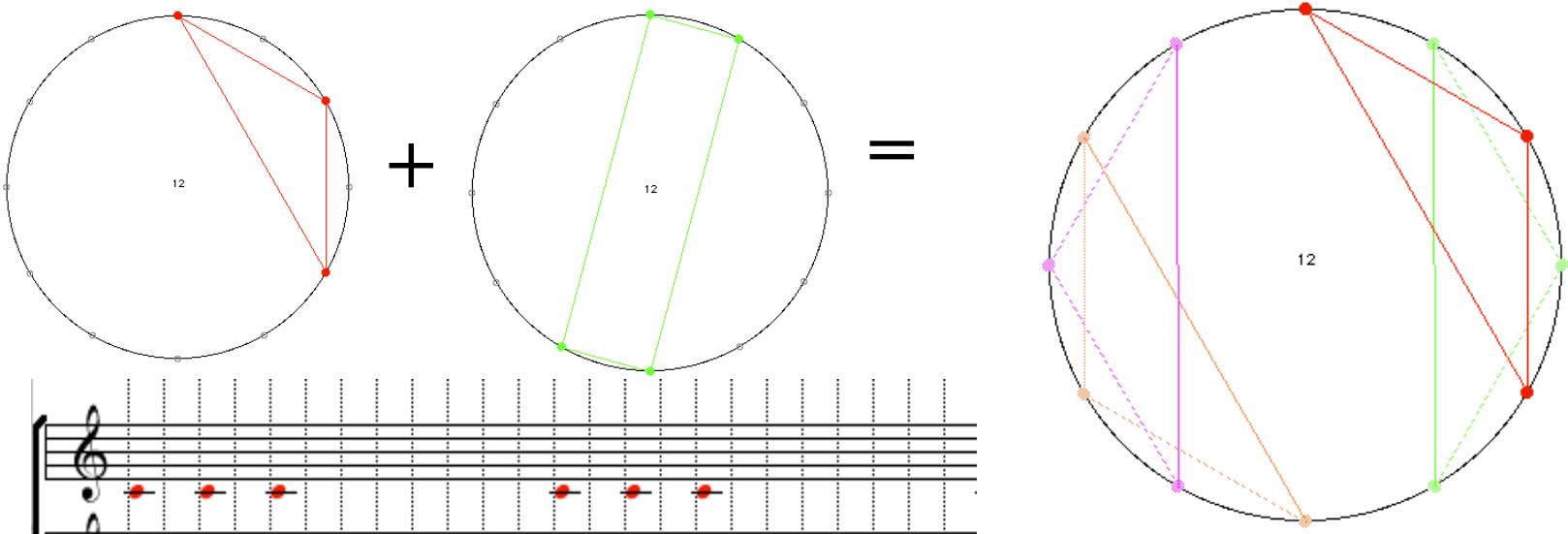
$$Z_{12} = (2 \ 3 \ 2 \ 4) \bullet (4 \ 4 \ 4)$$

An example of a melodic-rhythmic Tiling Canon



$$Z_{16} = A \oplus B \quad \left\{ \begin{array}{l} A = \{0, 1, 3, 6\} \\ B = \{0, 4, 8, 12\} \end{array} \right.$$

Rhythmic tiling canons with no regular entries



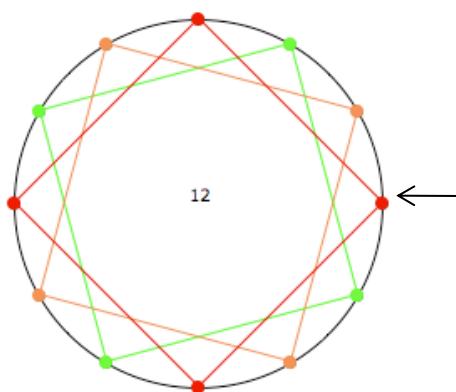
transpositional
combination

$$\{0,2,4\} \oplus \{0,1,6,7\} = Z_{12} = (2 \ 2 \ 8) \bullet (1 \ 5 \ 1 \ 5)$$

One of the two factors is a Messiaen's mode of limited transposition

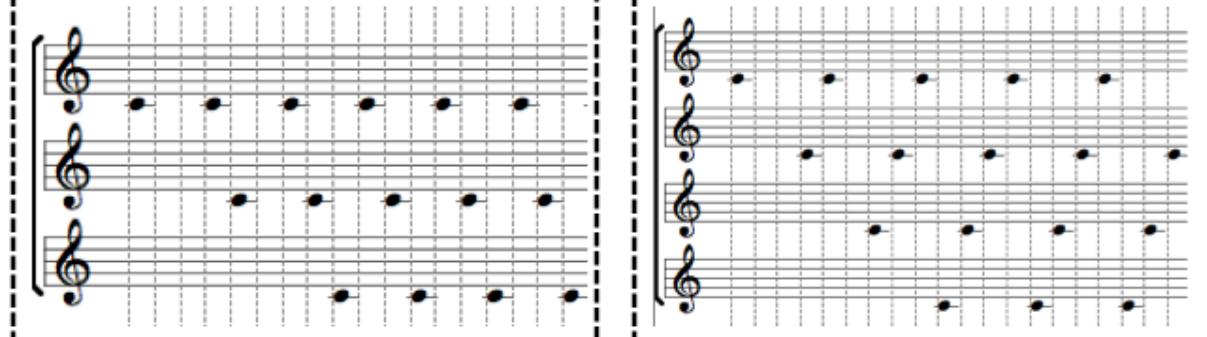
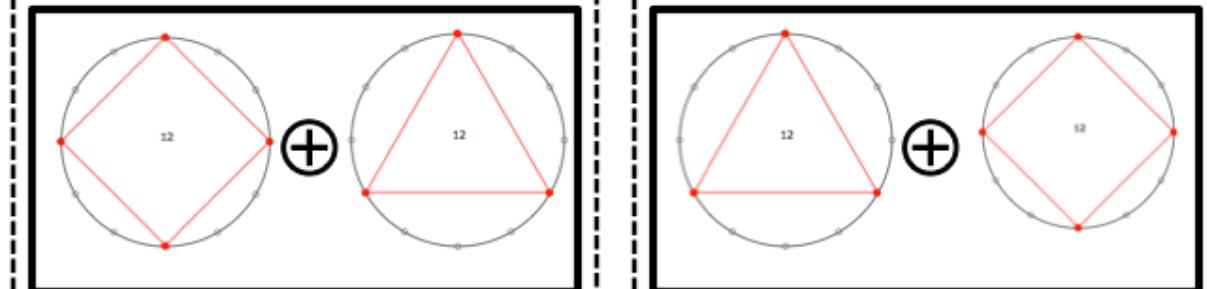
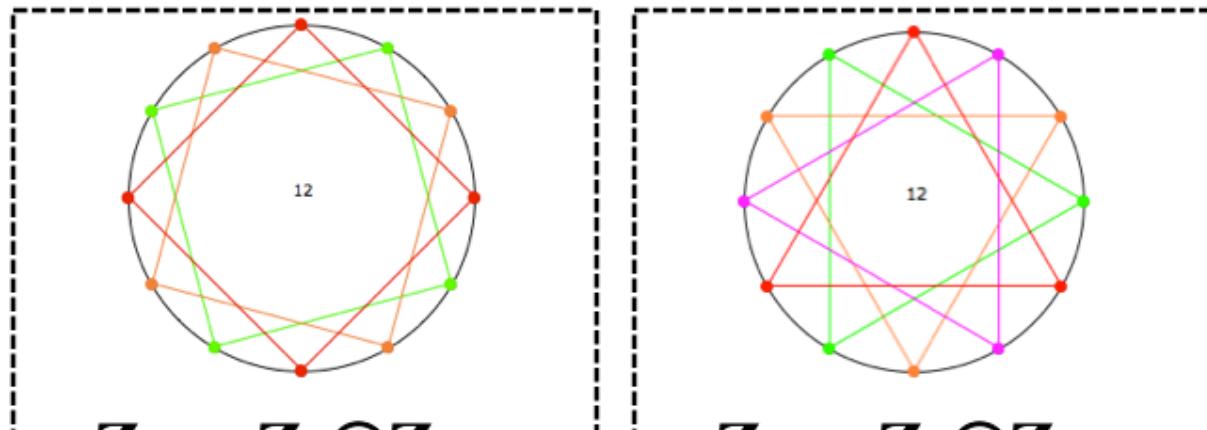
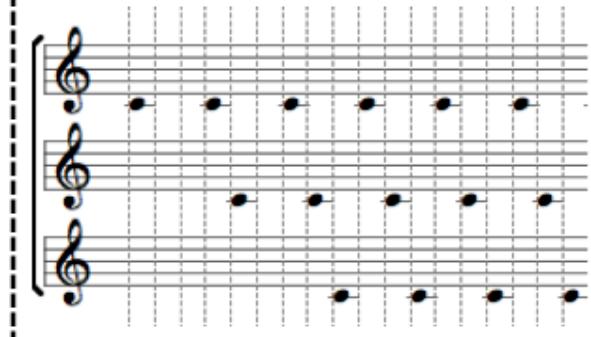
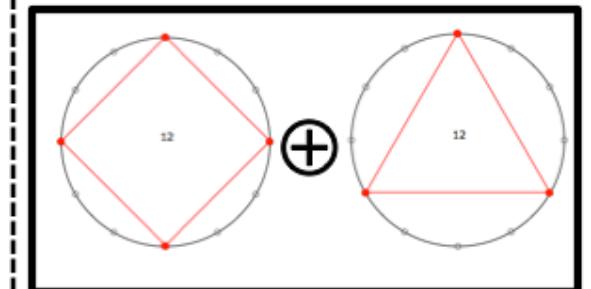
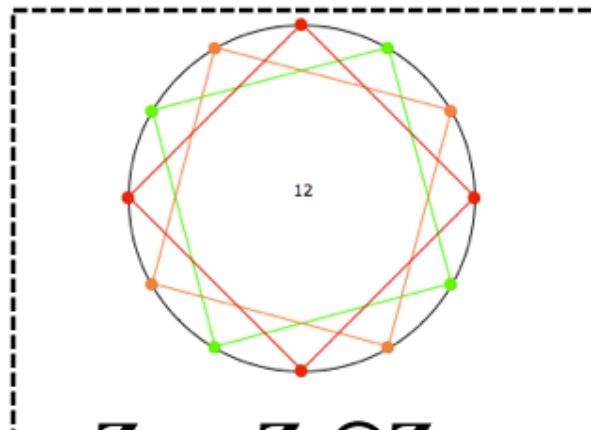
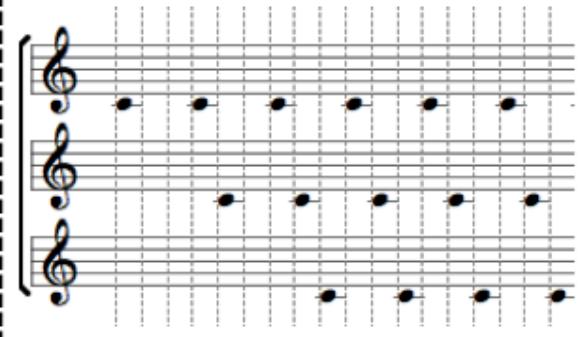
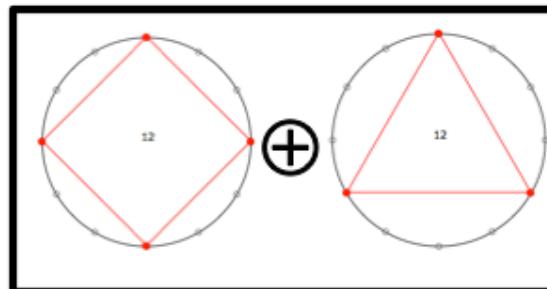
The three ‘elementary’ types of tiling rhythmic canons

$A < \mathbb{Z}_n$
 $B < \mathbb{Z}_n$



TYPE 1

$$\mathbb{Z}_{12} = \mathbb{Z}_4 \oplus \mathbb{Z}_3$$

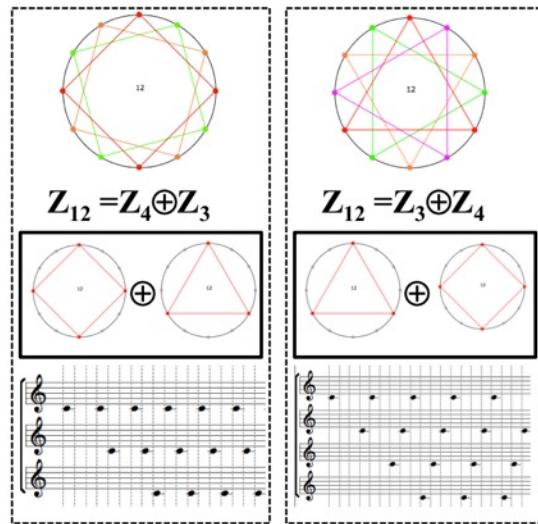
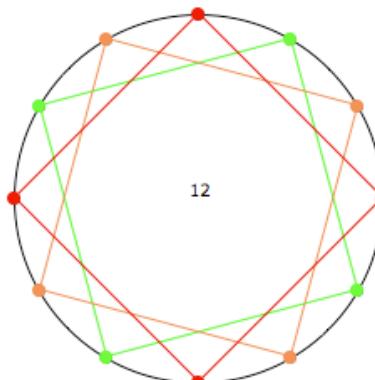


duality

The three ‘elementary’ types of tiling rhythmic canons

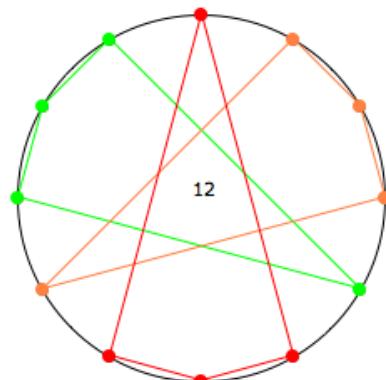
$A < \mathbb{Z}_n$

$B < \mathbb{Z}_n$

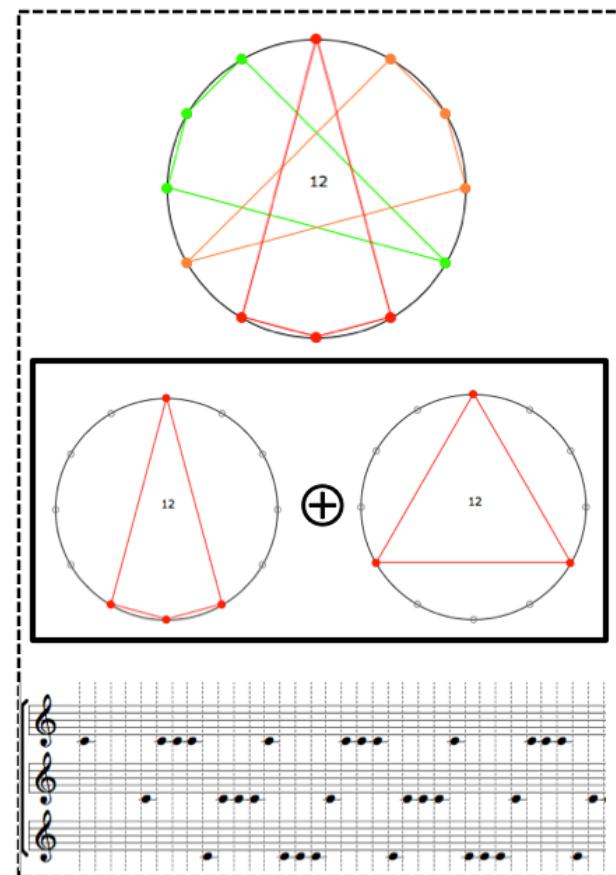


$A \subset \mathbb{Z}_n$

$B < \mathbb{Z}_n$

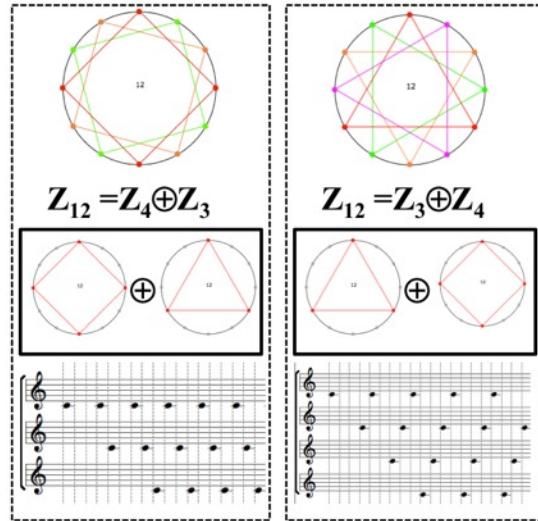
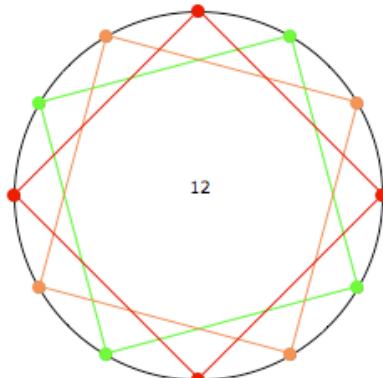


TYPE 2

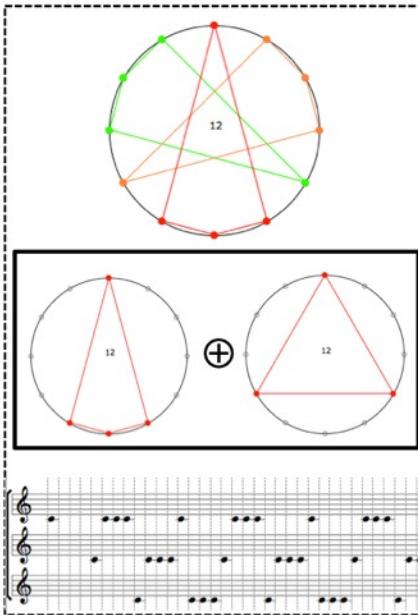
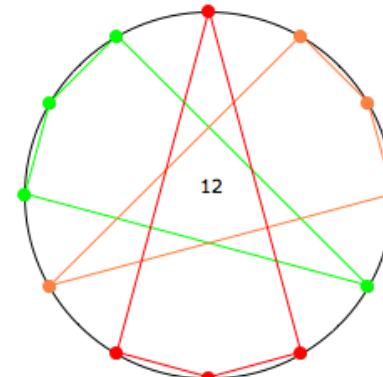


The three ‘elementary’ types of tiling rhythmic canons

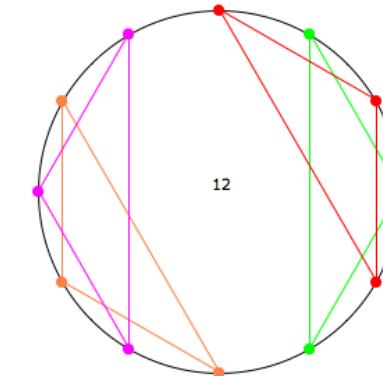
$A < \mathbb{Z}_n$
 $B < \mathbb{Z}_n$



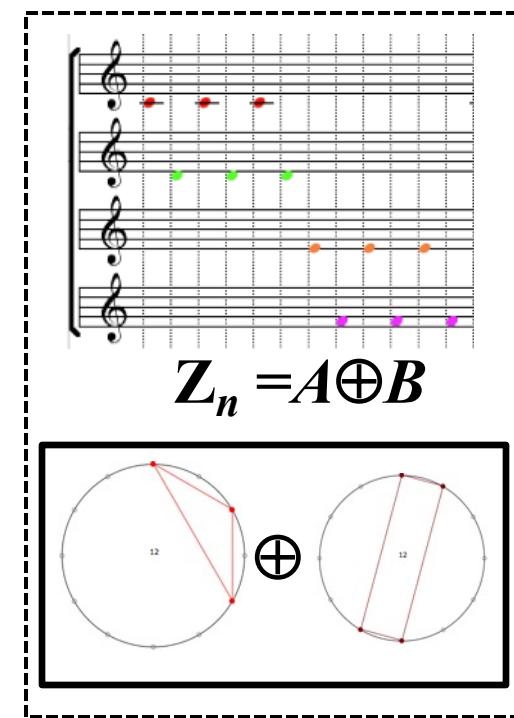
$A \subset \mathbb{Z}_n$
 $B < \mathbb{Z}_n$



$A \subset \mathbb{Z}_n$
 $B \subset \mathbb{Z}_n$
 B periodic
subset

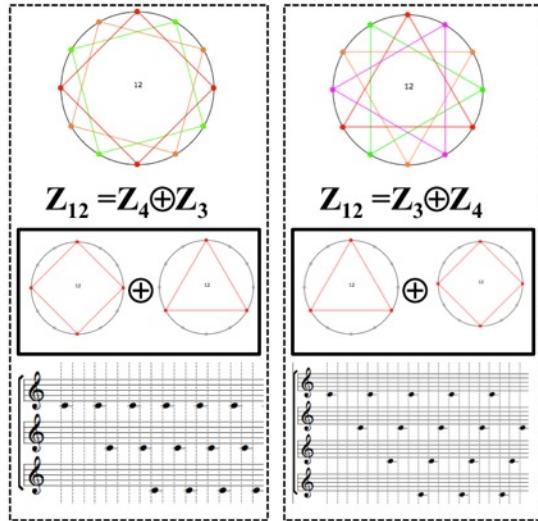
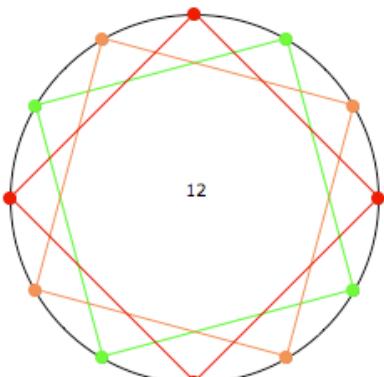


TYPE 3



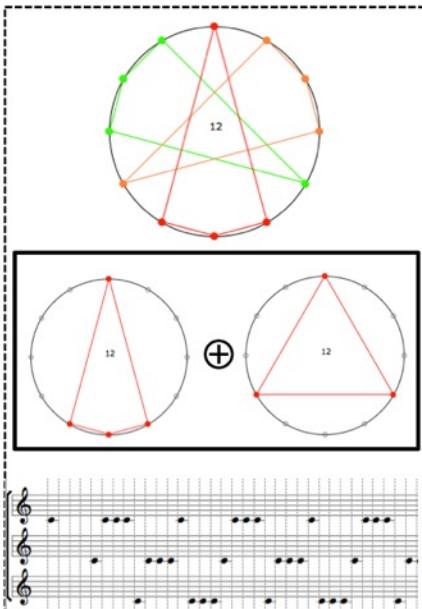
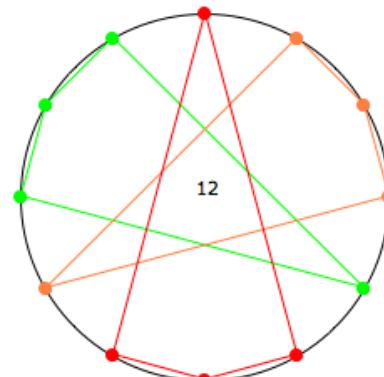
The three ‘elementary’ types of tiling rhythmic canons

$$A < \mathbf{Z}_n$$



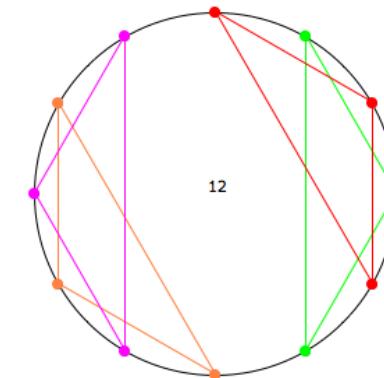
Is Messiaen’s Property mandatory
for tiling rhythmic canons?

$$A \subset \mathbf{Z}_n$$

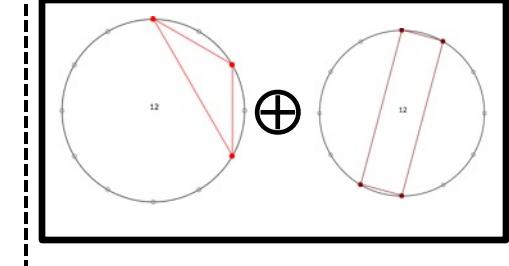


$$\mathbf{Z}_n = A \oplus B$$

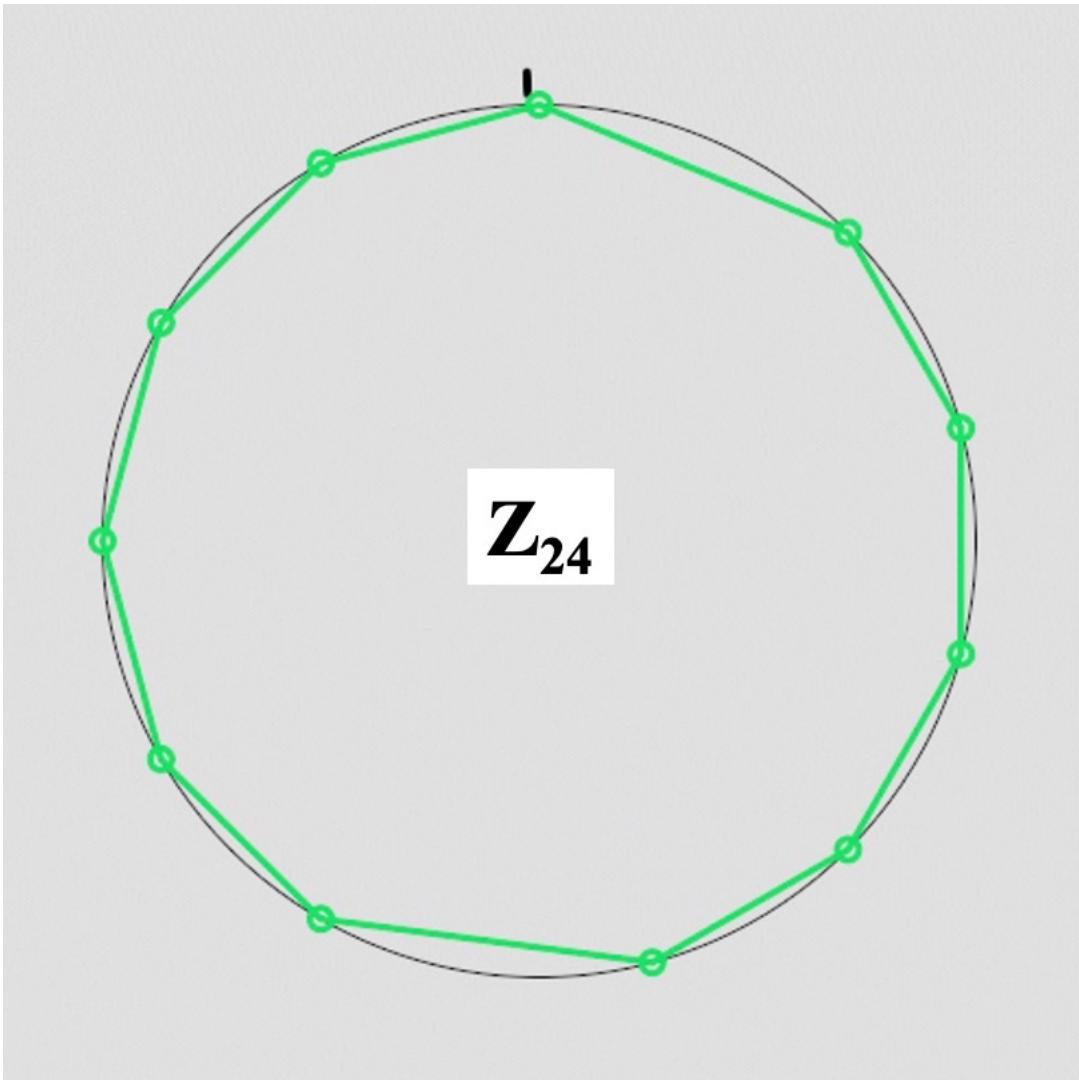
B periodic
subset



TYPE 3



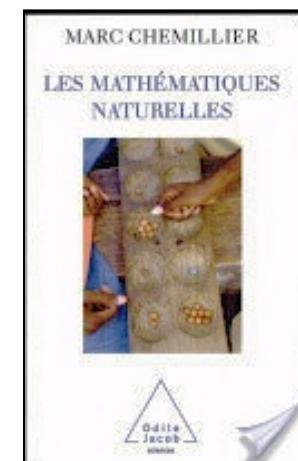
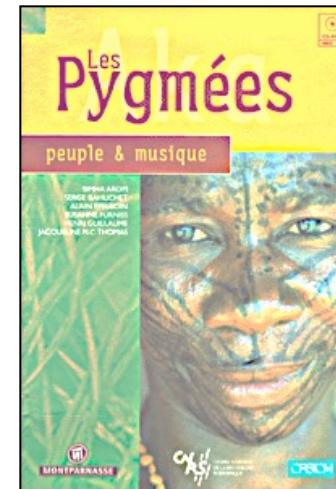
Type 2 canons and the odditive property of rhythms



Simha Arom



Marc Chemillier

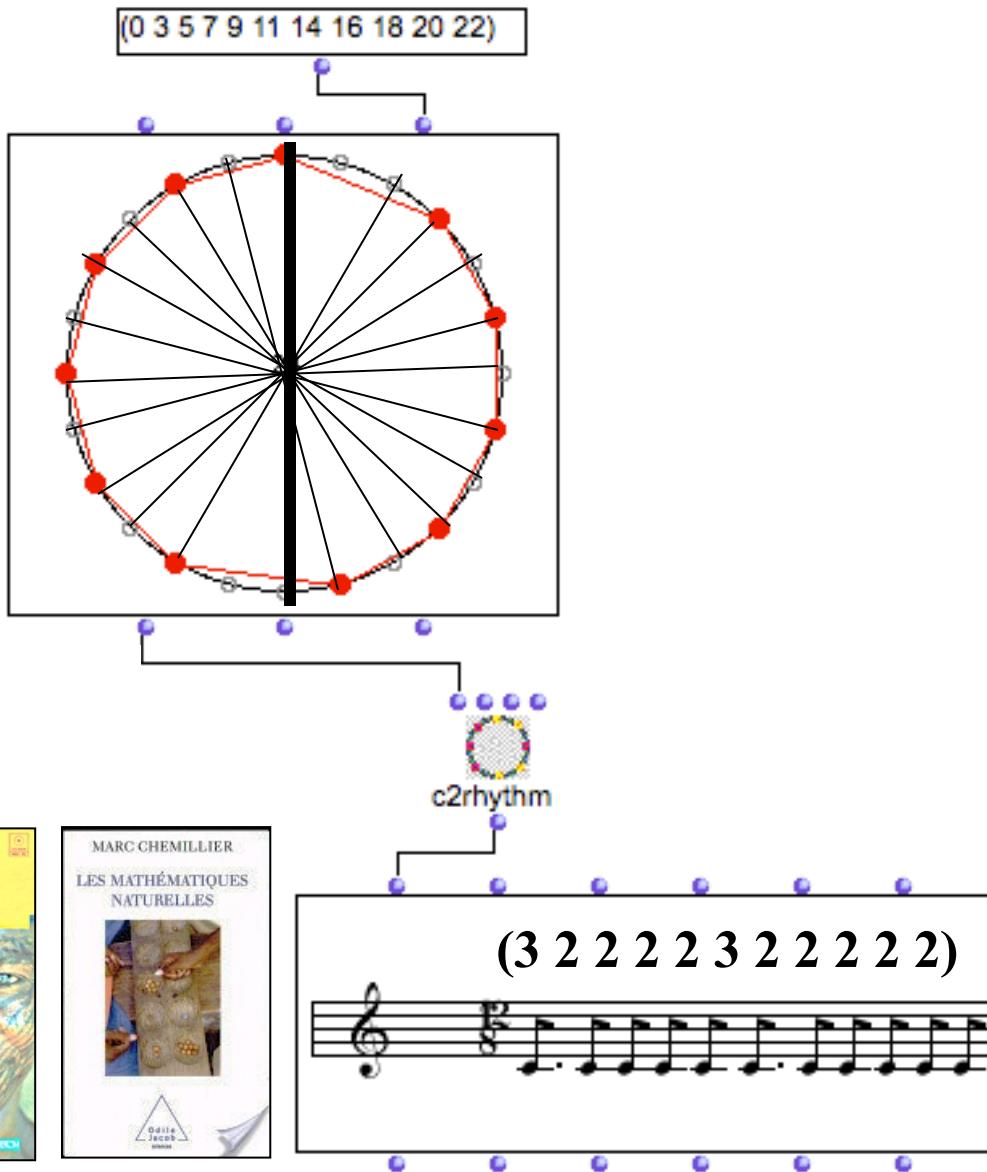


musimédiane
publiée avec le concours de la SFAM
revue audiovisuelle et multimédia d'analyse musicale

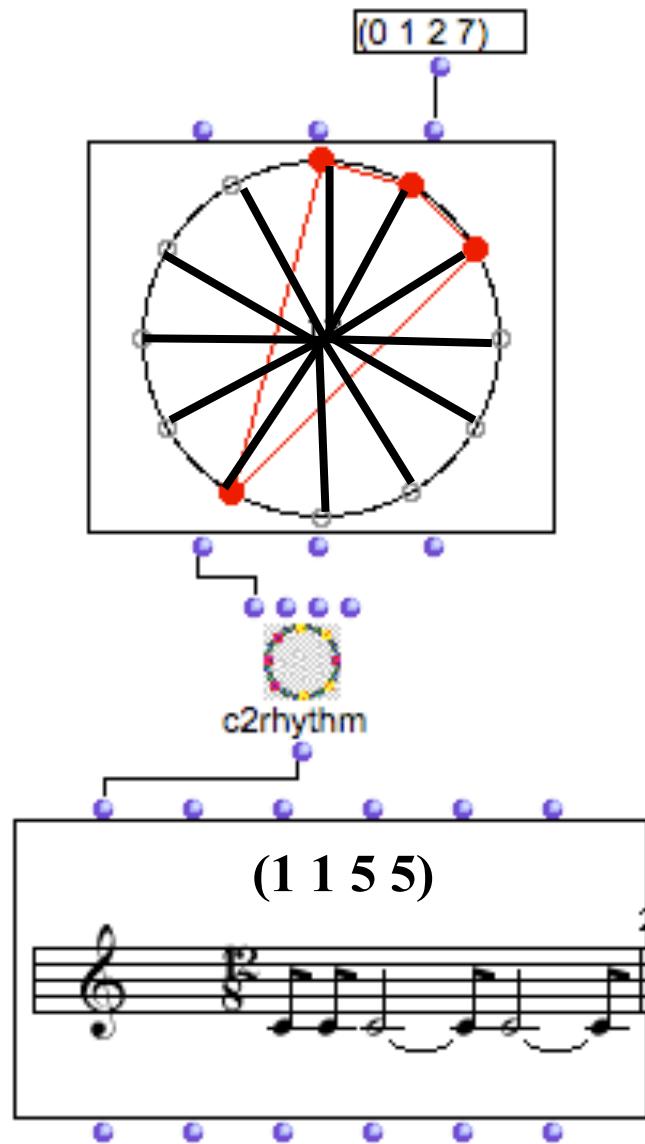
Rhythmic pattern : (3 2 2 2 2 3 2 2 2 2 2)

Type 2 canons and the (generalized) odditive property

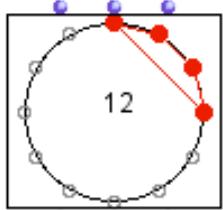
(Simha Arom & Marc Chemillier)



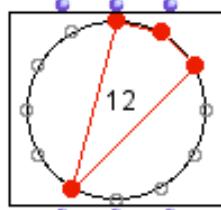
(Rachel W. Hall & P. Klingsberg)



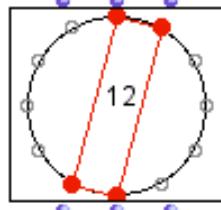
3-asymmetric rhythmic pattern and tiling process



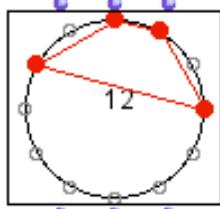
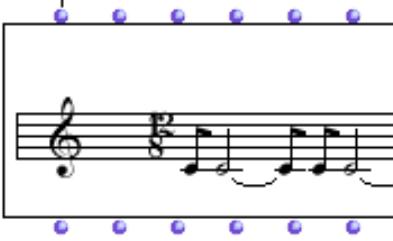
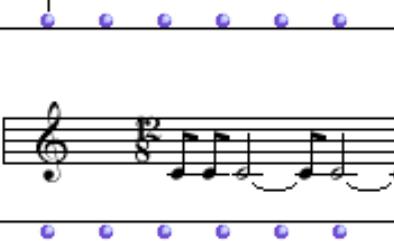
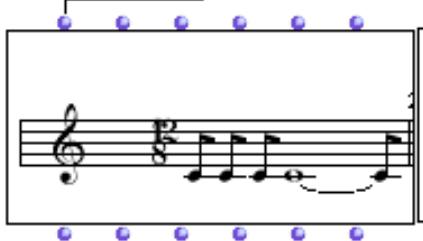
c2rhythm



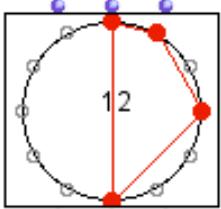
c2rhythm



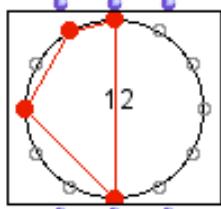
c2rhythm



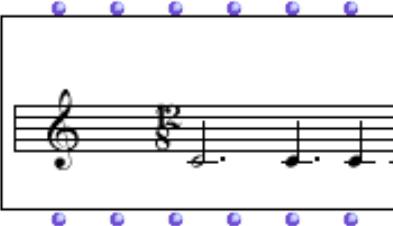
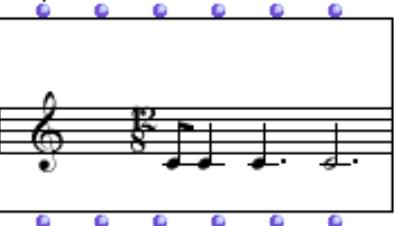
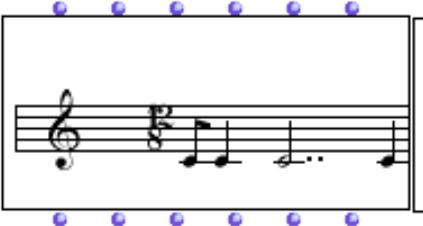
c2rhythm



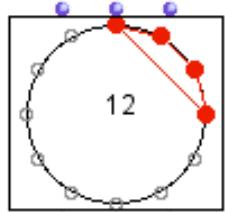
c2rhythm



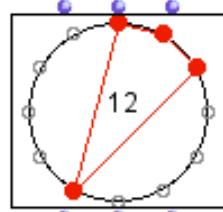
c2rhythm



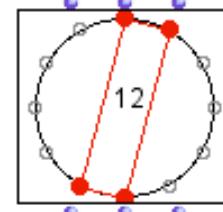
3-asymmetric rhythmic pattern and tiling canons



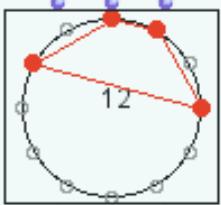
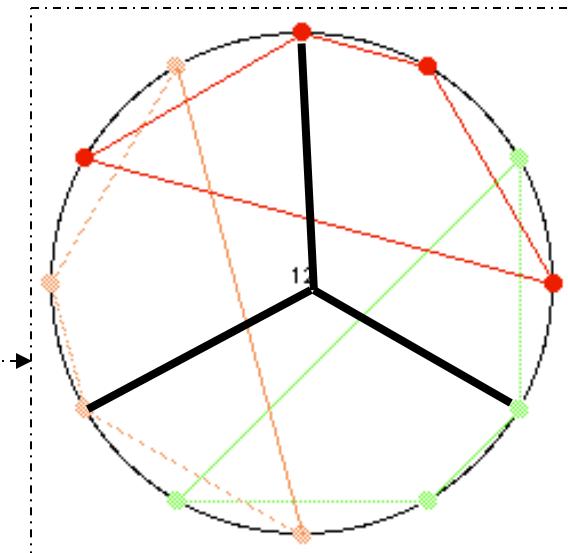
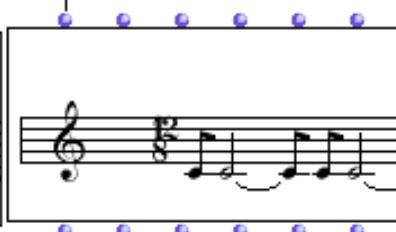
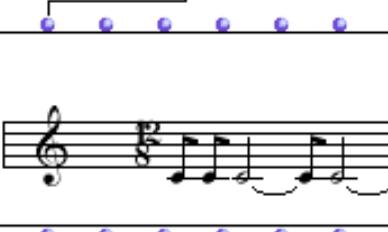
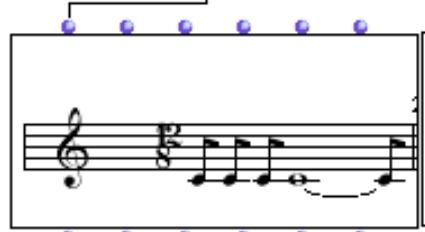
c2rhythm



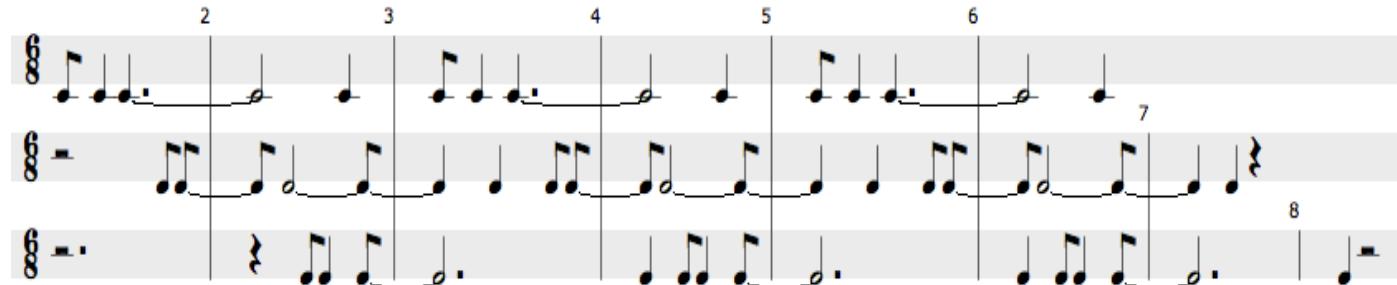
c2rhythm



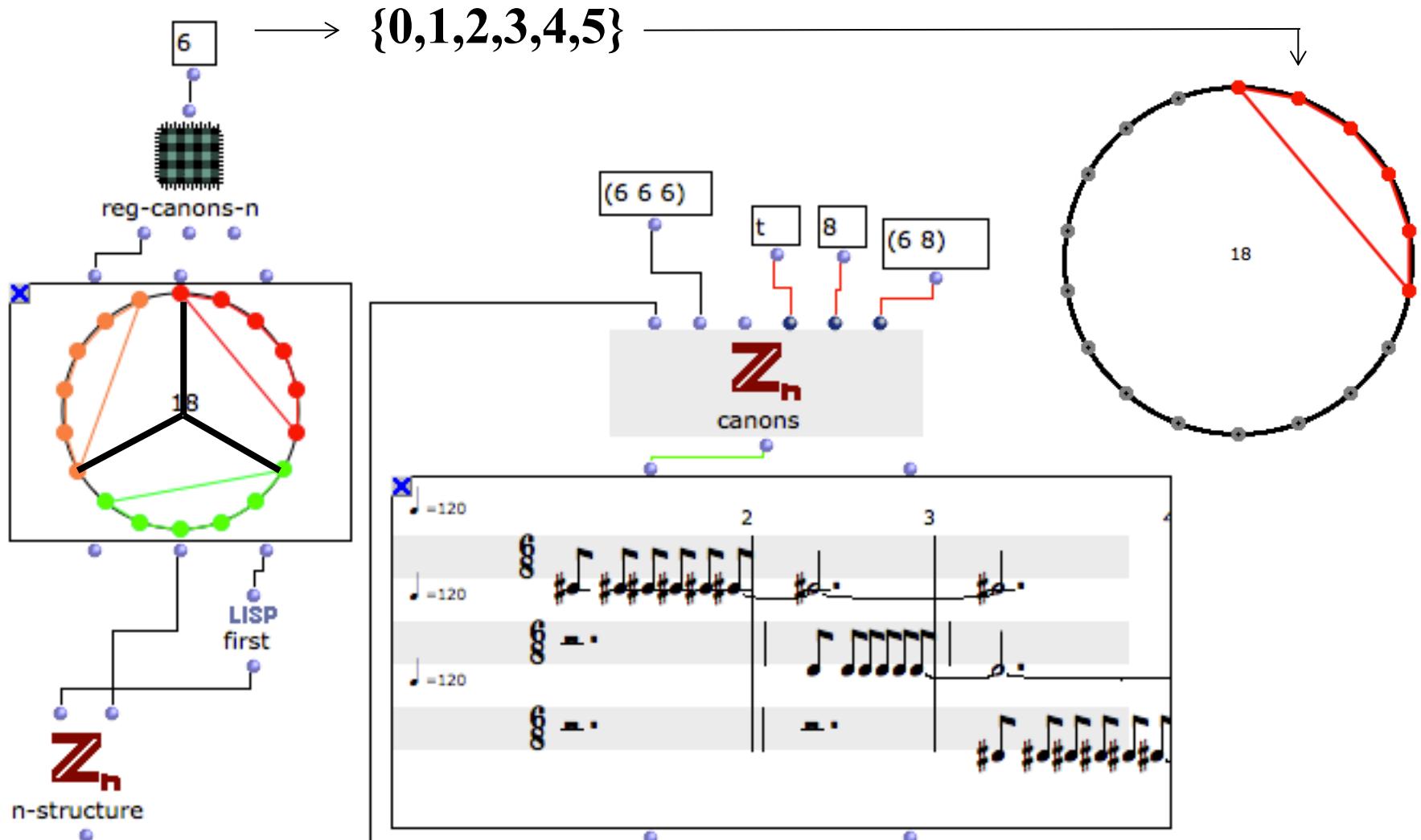
c2rhythm



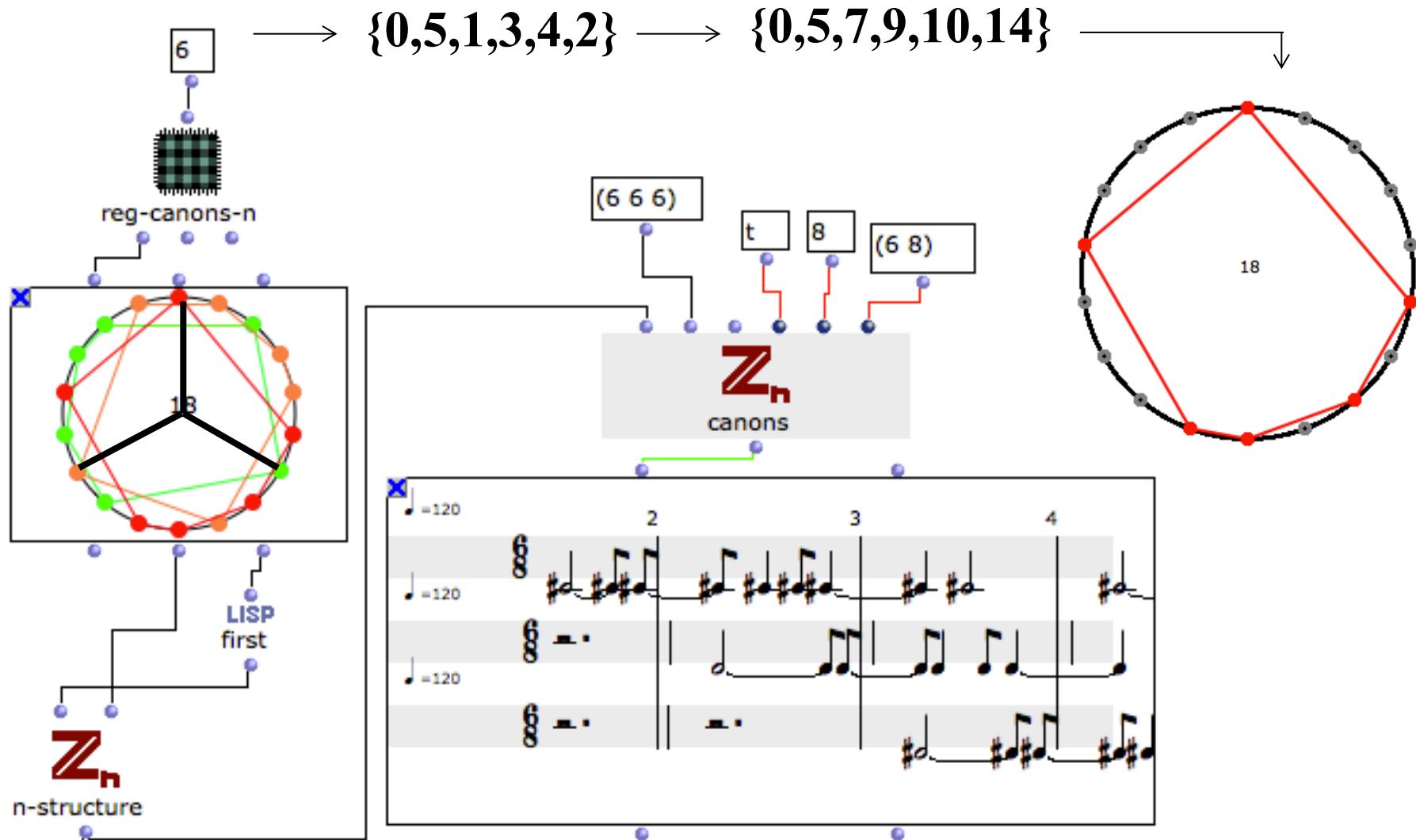
c2rhythm



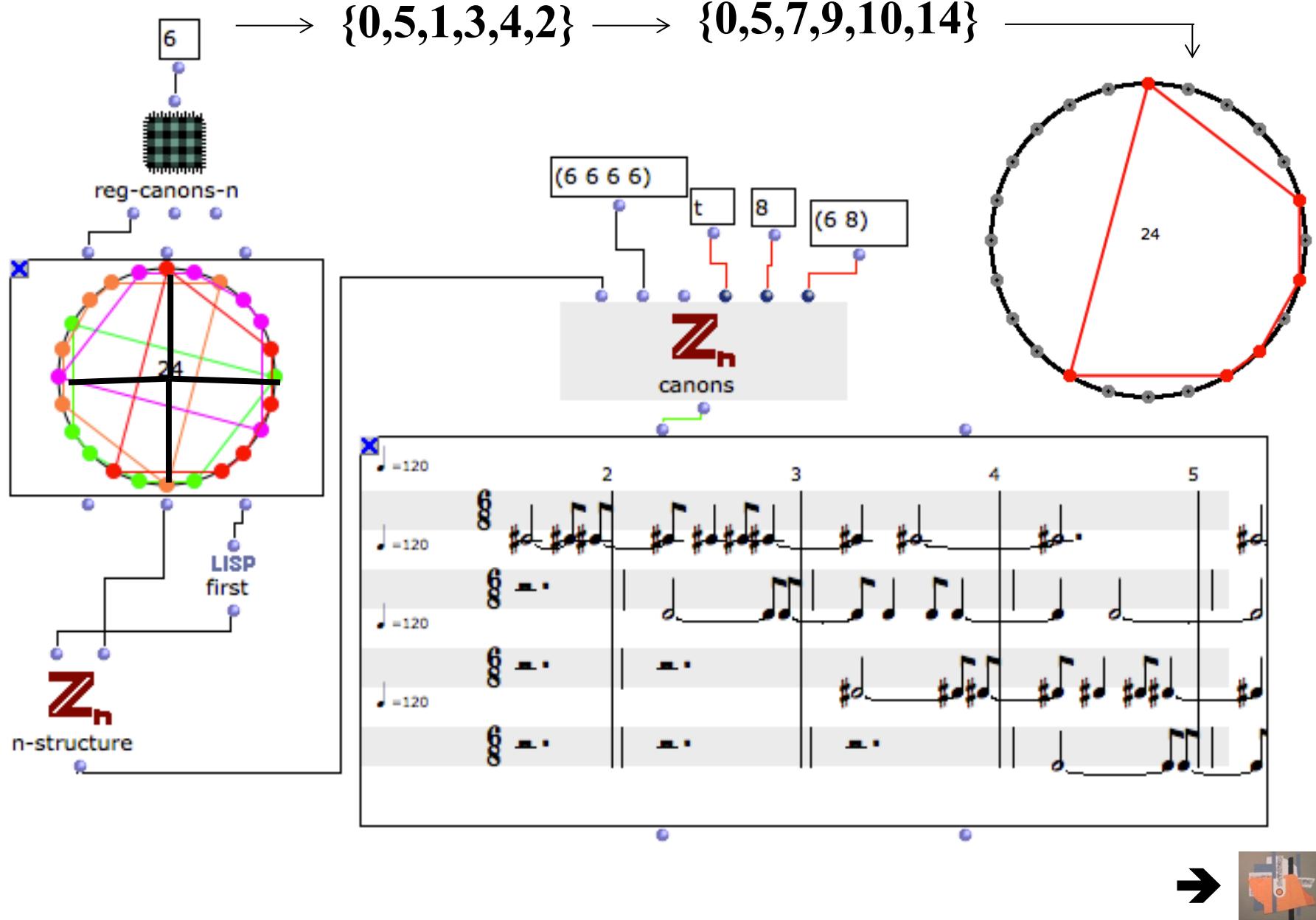
Permutational construction of a k -asymmetric pattern



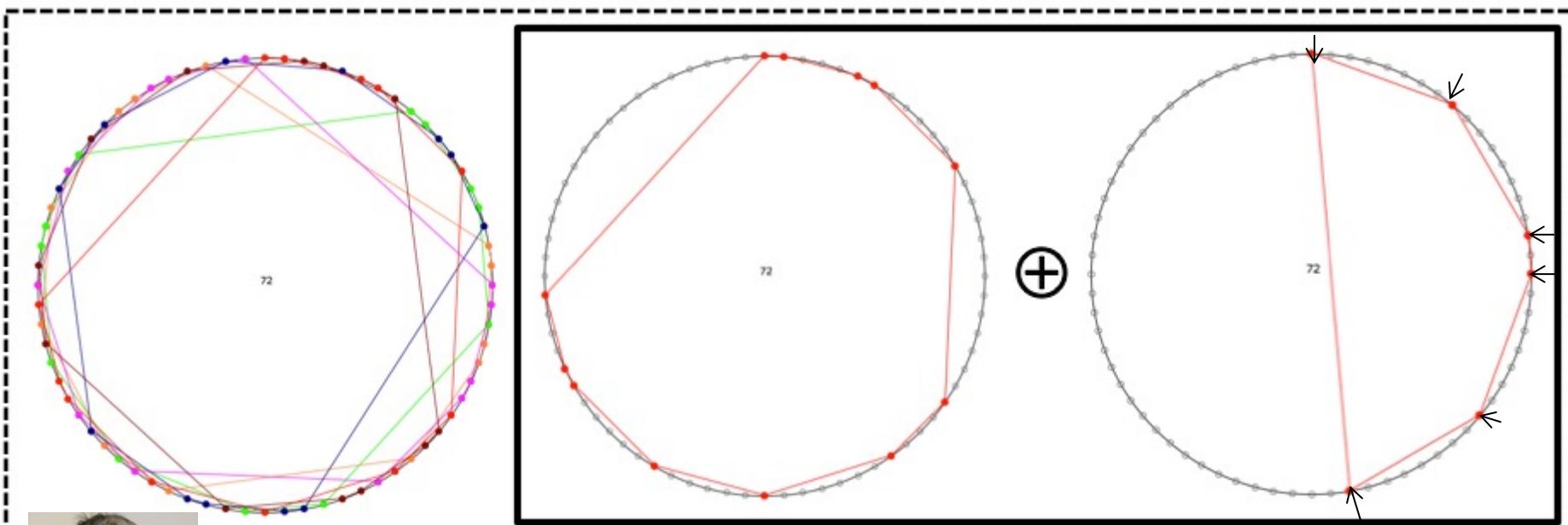
Permutational construction of a k -asymmetric pattern



Permutational construction of a k -asymmetric pattern



Aperiodic Rhythmic Tiling Canons (Vuza Canons)

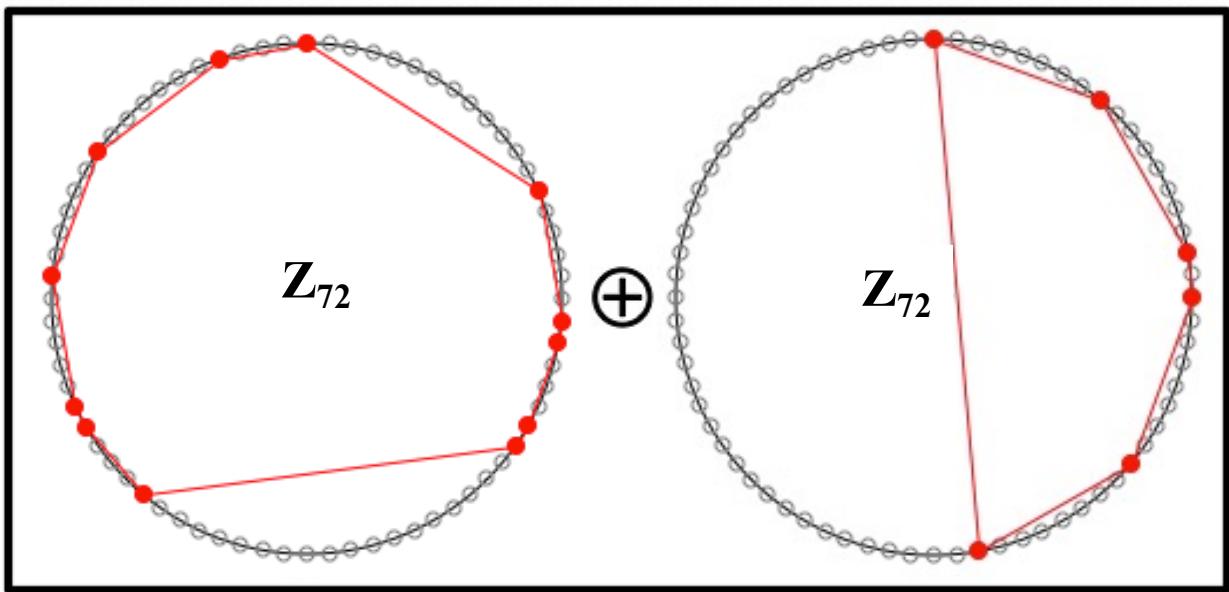
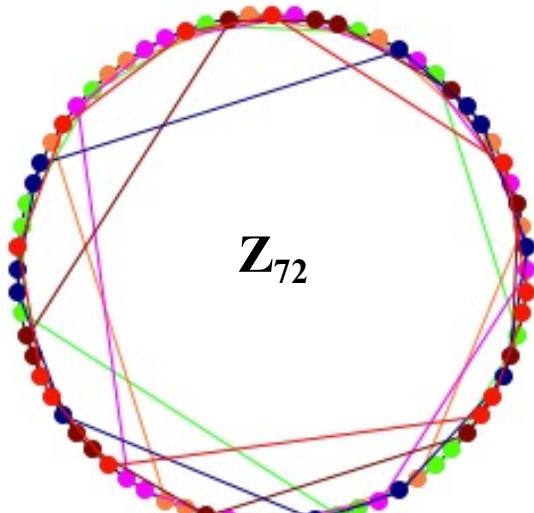


Dan Vuza



Anatol Vieru

Microtonal Vuza Canons (of period 72)

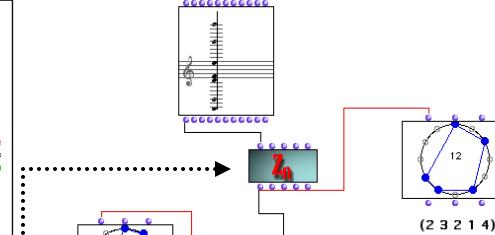
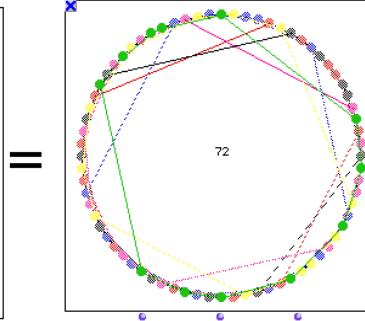
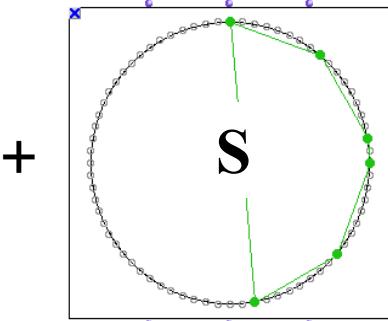
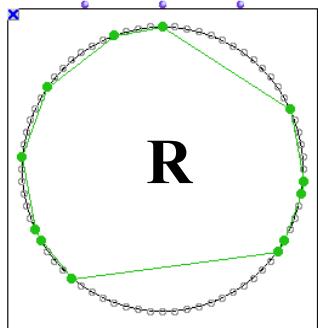


Dan Vuza



Anatol Vieru

Towards the complete classification of Vuza Canons



R

(1 3 3 6 11 4 9 6 5 1 3 20)
(20 3 1 5 6 9 4 11 6 3 3 1)
(1 4 1 19 4 1 6 6 7 4 13 6)
(6 13 4 7 6 6 1 4 19 1 4 1)
(1 5 15 4 5 6 6 3 4 17 3 3)
(3 3 17 4 3 6 6 5 4 15 5 1)

S

(8 8 2 8 8 38)
(16 2 14 2 16 22)
(14 8 10 8 14 18)

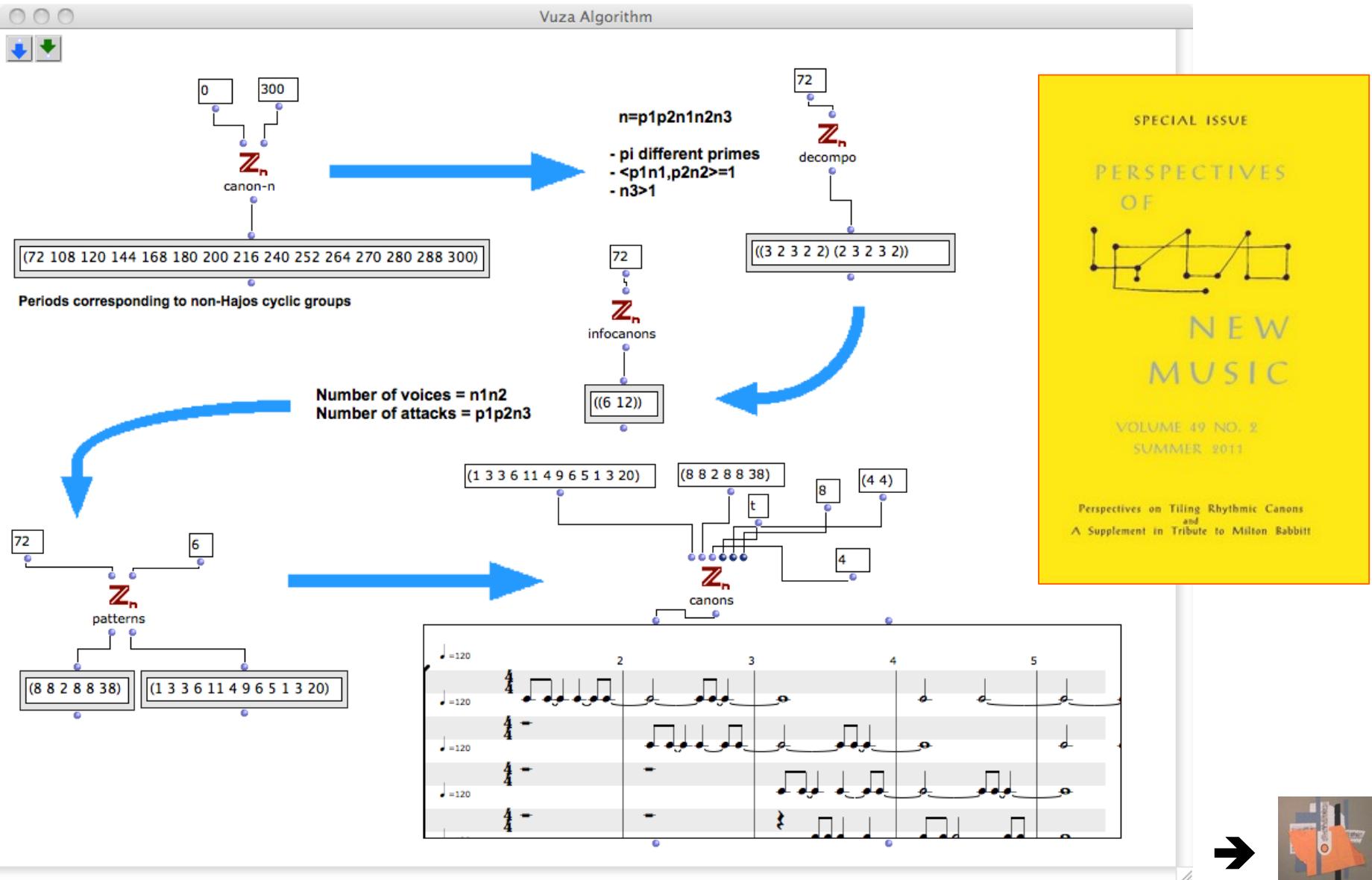
(1 3 3 6 11 4 9 6 5 1 3 20)
(1 4 1 19 4 1 6 6 7 4 13 6)
(1 5 15 4 5 6 6 3 4 17 3 3)

(1 3 3 6 11 4 9 6 5 1 3 20)
(1 4 1 19 4 1 6 6 7 4 13 6)

(14 8 10 8 14 18)



Vuza Canons in OpenMusic ‘MathTool’ environment



Some compositional applications of the Vuza Canons model

voix I
voix II
voix III
voix IV
voix V
voix VI
mes. : 158 167 172 173 174 175 184

voix I
voix II
voix III
voix IV
voix V
voix VI
mes. : 187 188 189 190 192 193 194 195 197 199 200 203 204 205 206 208 209 210 211 212 213

voix I
voix II
voix III
voix IV
voix V
voix VI
mes. : 213 215 217 218 219 220 221 222 223 224

(superposition voix V, VI et I) | (superposition voix IV, I et III)

a/=: montée vers accord puis "mise en pulsation"
 b/=: mise en pulsation superposé à un gliss. descendant
 c/=: montée vers accord (tête de a/=)
 d/=: mise en pulsation" en diminuendo (fin de a/ =)
 [e*f*]: accord mis en "cross rythm III" (durée double)
 g/V: gliss. descendant puis ascendant
 [h+i+]: accord mis en "cross rythm III" (durée double)
 JV: gliss. ascendant puis descendant avec accent
 kc: "son à l'envers"
 l": deux impacts courts et piano

Coincidences (1999)

La bataille de caresme et de charnage

(pour violoncelle et accompagnement, 2012)



M. Lanza

A piece based on Monk (2007) ("Well You Need'n't")



G. Bloch



F. Lévy

474 (poco accel.) Poco più mosso (a = 80 col.) AD

La notte poco prima della foresta

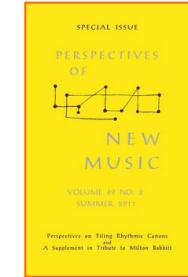
(opéra de chambre pour acteur, mezzo-soprano, baryton, ensemble et électronique, 2009)



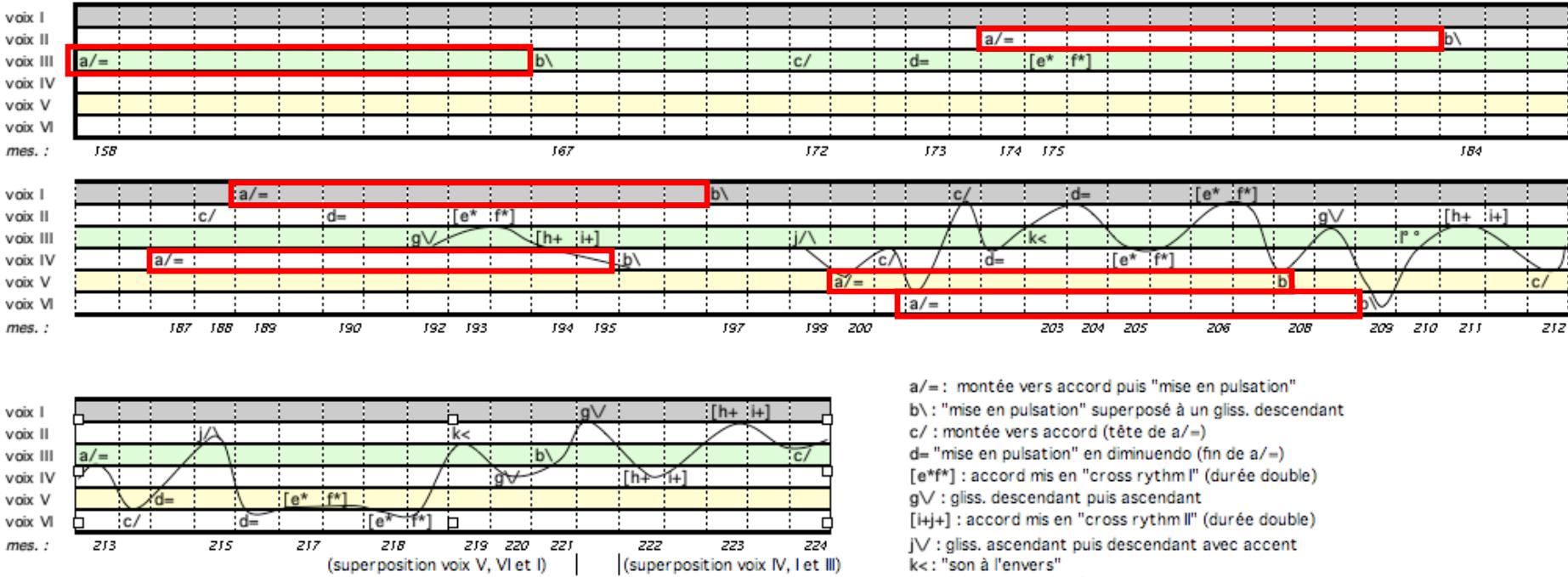
D. Ghisi

Fabien Lévy

Morphological Tiling Canons



- *Coïncidences* (pour 33 musiciens, 1999-2007)



Coïncidences - Fabien Levy : déroulement du canon (mes. 158 à 226)
 (chaque impact fait 3 temps)

Tokyo Symphony Orchestra, Dir.: Kazuyoshi Akiyama, 05/09/2007, Suntory Hall, Tokyo, Japon

F. Lévy, « Three uses of Vuza Canons », *Perspectives of New Music*, 49(2), 2011, p. 23-

Georges Bloch

Several compositional strategies

- Metrical organization of a tiling canon
- Self-similarity processes
- Metrical modulations between canons

- *Projet Beyeler* (2001)
- *Projet Hitchcock*
- *Visite des tours de la cathédrale de Reims*
- *Noël des Chasseurs*
- *Canons à marcher*
- *Canon à eau*
- *Harawun* (2004)
- *L'Homme du champ* (2005)
- ***A piece based on Monk* (2007)**
- *Peking Duck Soup* (2008)



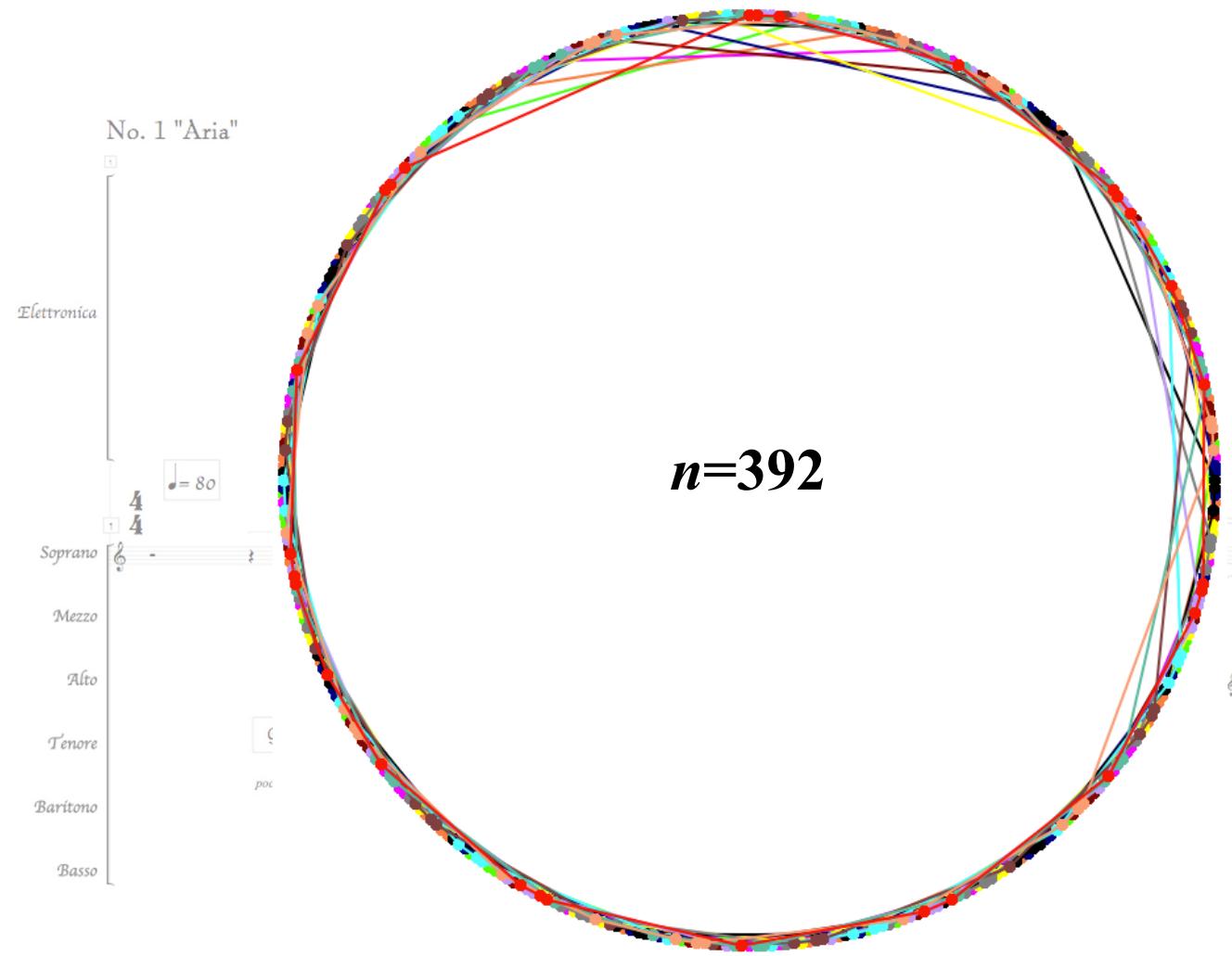
- *A piece based on Monk*, 2007 (« Well You Need'n't »)

Mauro Lanza

Vuza Canons and local periodicities



- *La descrizione del diluvio* (Ricordi, 2007-2008)



“6 voices are live and 8 are in the electronic part. The choice of the notes and the durations is made in order to stress some quasi-periodicities of the underlying Vuza canon and this gives to each voice a much more “redundant” character”.

Mauro Lanza

Vuza Canons and local periodicities



- *La descrizione del diluvio* (Ricordi, 2007-2008)

“The choice of the notes and the durations is made in order to stress some quasi-periodicities of the underlying Vuza canon [...]”

(1 3 25 27 1 3 11 14 27 1 3 25 27 4 25 27 1 3 25 14 13 1 3 25 27 1 3 52)

(1 3 25 27 1 3 11 14 27 1 3 25 27 4 25 27 1 3 25 14 13 1 3 25 27 1 3 52)

(1 3 25 27 1 3 11 14 27 1 3 25 27 4 25 27 1 3 25 14 13 1 3 25 27 1 3 52)

(1 3 25 27 1 3 11 14 27 1 3 25 27 4 25 27 1 3 25 14 13 1 3 25 27 1 3 52)

(1 3 25 27 1 3 11 14 27 1 3 25 27 4 25 27 1 3 25 14 13 1 3 25 27 1 3 52)

Mauro Lanza

Vuza Canons and local periodicities



No. 1 "Aria"

- *La descrizione del diluvio* (Ricordi, 2007-2008)

Local Dynamics :

L'a - ria e - ra os - cu - ra per - la spes - sa

piog - gia pie - ga-ta dal tra - ver - sal-cor - so dei ven - ti

$\bullet = 80$

Soprano *la - - - - - ria os - - - - -*

Mezzo

Alto

Tenore General Dynamic: *ppppp - pp*

Baritono

poco a poco crescendo fino a misura 40 (pppp - mf)

Basso

Mauro Lanza



LA BATAILLE DE CARESME ET DE CHARNAGE

per violoncello e accompagnamento (2012)

(min. 10'15")

190 $\frac{3}{4}$

Canone sulla II corda $\frac{4}{4}$

Musical score for cello part, page 1. Measure 190 starts with a dynamic *p*. Measure 191 shows a canon on the second string with a dynamic *pp*. Measures 192 and 193 continue the canon. Measure 194 begins with a dynamic *pizz.*

194

Musical score for cello part, page 1. Measures 194-197 show a continuation of the canon on the second string. Measure 195 includes a dynamic *pizz.* Measure 196 includes a dynamic *pizz.* Measure 197 includes a dynamic *pizz.* Measure 198 concludes with a dynamic *pizz.*

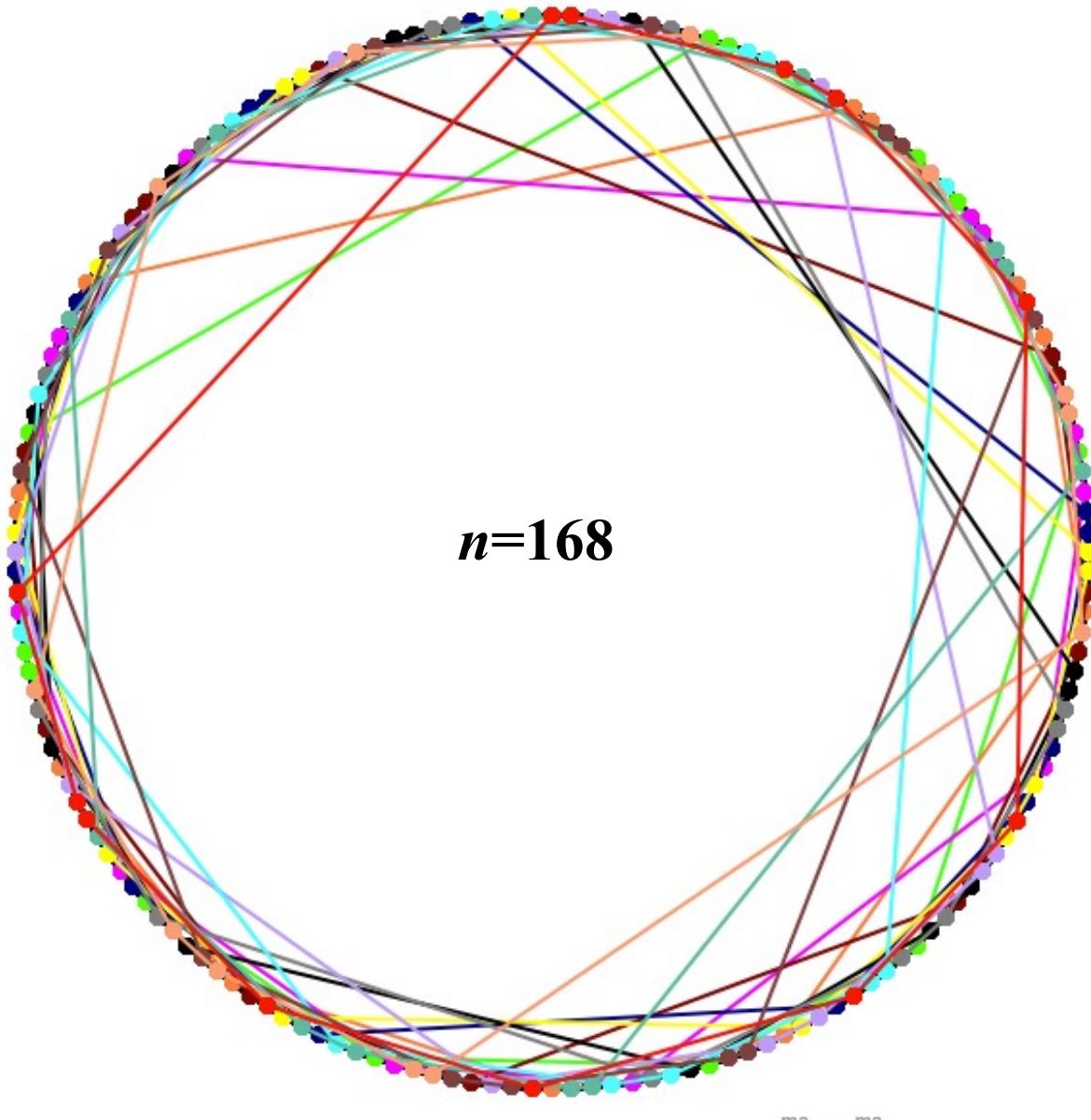
La notte poco prima della foresta (2009)

(opéra de chambre pour acteur, mezzo-soprano, baryton, ensemble et électronique)



457 AC

Musical score for *La notte poco prima della foresta* (2009) page 457, section AC. The score includes parts for Flute (Fl.), Clarinet (Cl.), Bassoon (Fis.), Piano (Pf.), Accordion (Att.), Mezzo-Soprano (Mz.), and Bass (Bar.). The piano part features a complex arpeggiated pattern with dynamics *p*, *pp*, and *s*. The mezzo-soprano part has lyrics "mama ti amo" and "ma - ma". The bass part has a sustained note.



Musical score for D. Ghisi, featuring multiple staves of music. The top staff shows a melodic line with dynamics *s*, *b*, *+*, and */ma/*. The middle staff shows a rhythmic pattern with dynamics *p*. The bottom staff shows a melodic line with dynamics *nV*, *s*, and *pp*. The final staff shows a rhythmic pattern with dynamics *p*. The lyrics "mama ti amo," are present in several staves.

La notte poco prima della foresta (2009)

(opéra de chambre pour acteur, mezzo-soprano, baryton, ensemble et électronique)



457

AC

Sprechgesang
sommesso, dolce (senza suonare)

D. Ghisi

Vuza Canons and electronic music

ALLA BREVE : L'INTÉGRALE
PAR ANNE MONTARON LE DIMANCHE DE 22H30 À 23H

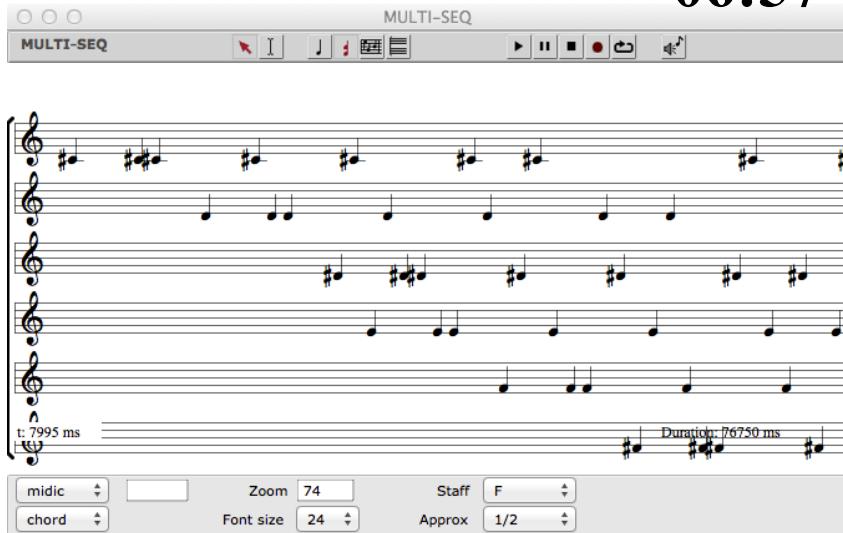
[réécouter](#) | [contactez-nous](#)  [podcast](#)



« Cinq canons de Vuza » de Sébastien Roux (Diffusion intégrale et portrait)

le dimanche 10 avril 2016

06:57



MULTI-SEQ

MIDI: 7995 ms Duration: 76750 ms

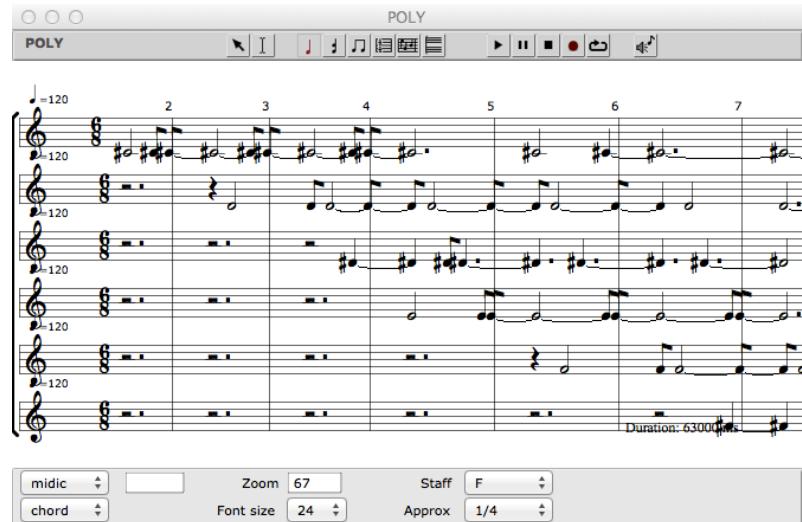
Zoom: 74 Staff: F Font size: 24 Approx: 1/2

midic chord

chord



Sébastien Roux
(ATIAM 2001-2002)



POLY

MIDI: 120 Duration: 6300 ms

Zoom: 67 Staff: F Font size: 24 Approx: 1/4

midic chord

chord

- ➔ <https://podcloud.fr/podcast/alla-breve-lintegrale/episode/cinq-canons-de-vuza-de-sebastien-roux>
- ➔ <https://musiquealgorithmique.fr/entretien-20-sebastien-roux/>

Recent pieces using Vuza Canons

Als Gregor und Griselda (2000)

Kanon für 6 Stimmen (auch Amateure)
(deutsche Fassung)

Fabien Lévy

Auftrag des Rümlingen Festivals
à Melba Fenouil

Dieser Kanon folgt das mathematische Prinzip des "Vuza-Kanons". Ich bedanke Moreno Andreatta, von Ircam, für seine Hilfe, um diesen Vuza-Kanon zu rechnen, und Melba Fenouil für die deutsche Fassung des Textes.

Phonetisches Alphabet

Konsonanten

- b : Bad
- s : Sellerie
- k : Käse
- d : Datum
- f : Fön
- g : Sagen
- ʒ : jolie
- l : Lärm
- m : Mutti
- n : Nein
- p : agneau
- p : Punkt
- r : Relevant
- t : Tanken
- v : Wagon, Witwe
- z : Süsse, sagen
- ʃ : Kirsche



Vokalen

- a : Papa
- ɑ : Kartoffeln
- ə : wieder
- ɔ : Fön
- œ : Fleur
- e : Merit
- ɛ : fern
- ø : Oktopus
- ɔ : Ort
- i : wieder
- u : du, Suppe
- y : lügen

Nasale Vokalen

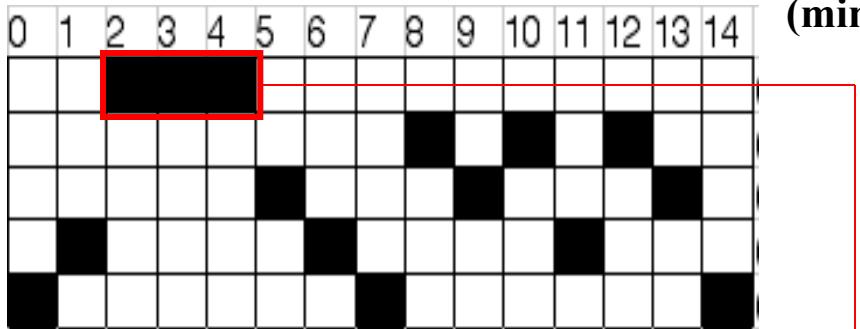
- ã : rang, avant
- ɛ̄ : rein, brin, pain
- ɔ̄ : bon, ton
- œ̄ : brun, un

Halbe-Konsonanten (oder halbe-Vokalen)

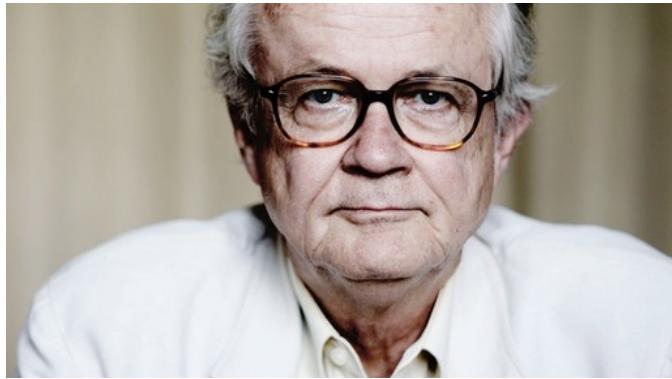
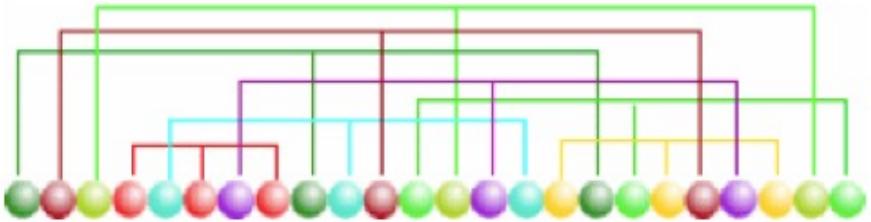
- j : jodeln
- w : fouet (/fwe/), voir (/vwɑʁ/)
- ɥ : Suite (/sɥiٹ/)

The image shows two staves of musical notation for six voices. The top staff starts at measure 23 with dynamic 'mf'. The lyrics are: Schwap, ze [tse] mf, an, pen, der o [dəʁ], Schwipp. The bottom staff continues the lyrics: - nein, sich arm lang, hin ter [təʁ], ein aalt, naß glat in, ta-ucht Aal der [dəʁ]. Measure 29 begins with dynamic 'mf'. The lyrics are: dunk-len, fe gurrt [fə], sie, ein, tie, cu-cu-rru!, maunzt sie (mauzen), wie 'ne, Täub-chen (gurren), wie ein, miau, miau, wie rruu!. The score concludes with the lyrics: dunk - len tie - fe, gurrt sie wie ein Taib - chen, cu-cu - racou, eu maunzt sie wie ei - ne Kat - ze Miau - miau - ser Rand.

Tom Johnson's Perfect Tilings



(min. 08'15")

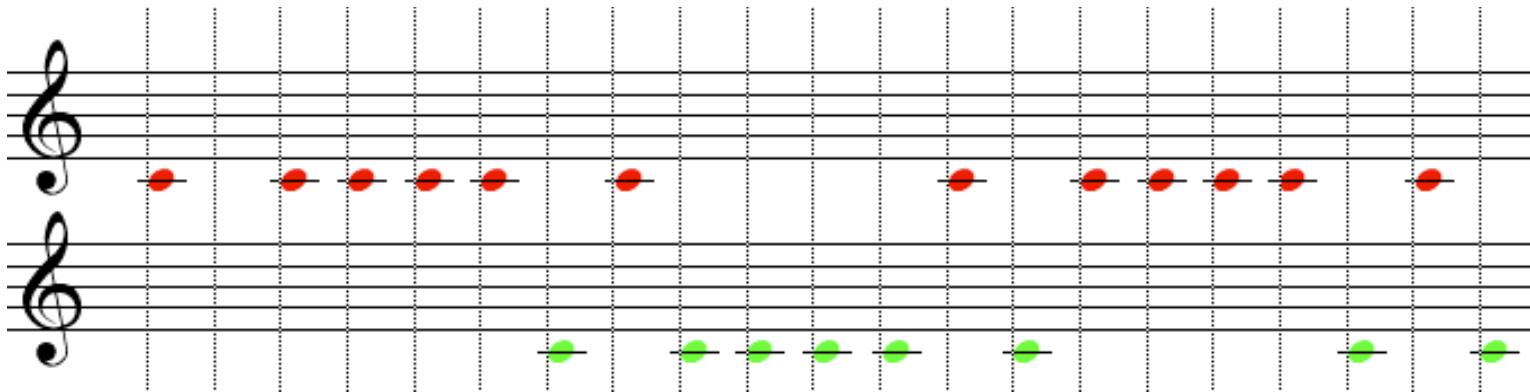


Tilework for Piano

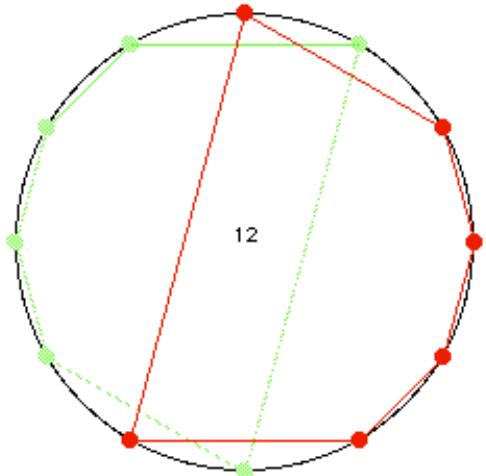
perfect triplet tilings, 5th order
with thanks to Jon Wild and Erich Neuwirth

short pauses between sections

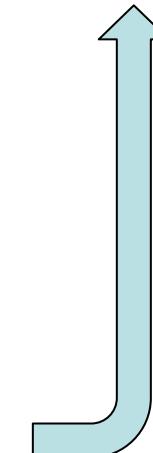
Tiling canons by translation and augmentation



Thomas Noll

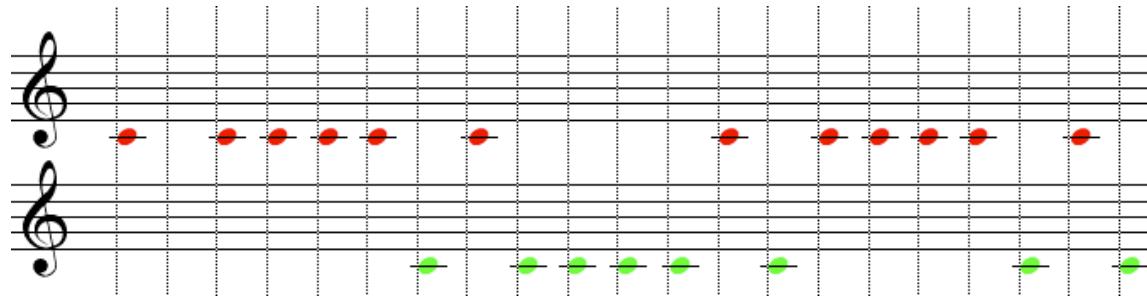


((0 1 2 3 4 6) ((1 11)))
((0 1 2 3 4 5) ((1 11) (1 1)))
((0 1 2 3 5 7) ((1 11) (1 7)))
((0 1 3 4 7 8) ((1 5)))
((0 1 2 3 6 7) ((1 11)))
((0 1 3 4 6 9) ((1 11) (1 5)))
((0 1 3 6 7 9) ((1 11) (1 5)))
((0 1 2 6 7 8) ((1 11) (1 7) (1 5) (1 1)))
((0 1 4 5 8 9) ((1 11) (1 7) (1 5) (1 1)))
((0 1 2 5 6 7) ((1 7) (1 5)))
((0 2 3 4 5 7) ((1 11) (1 7) (1 5) (1 1)))
((0 1 4 5 6 8) ((1 11) (1 7)))
((0 1 2 4 5 7) ((1 5)))
((0 1 3 4 5 8) ((1 5) (1 1)))
((0 1 2 4 5 8) ((1 11)))
((0 1 2 4 6 8) ((1 11) (1 7)))
((0 2 3 4 6 8) ((1 11)))
((0 2 4 6 8 10) ((1 11) (1 7) (1 5) (1 1))))

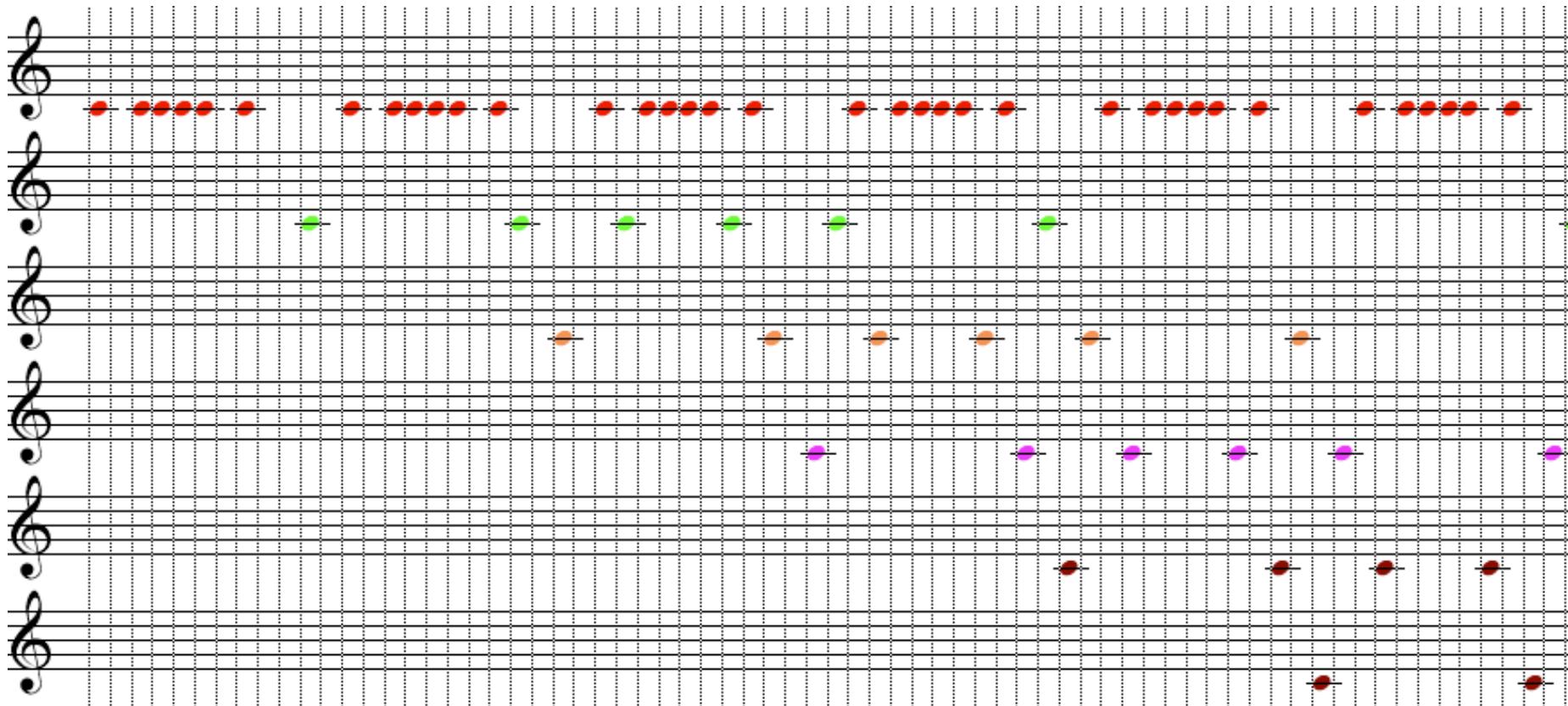


Augmentation
by factor 1
=
translation

Augmented Tiling Canons (Noll Canons)

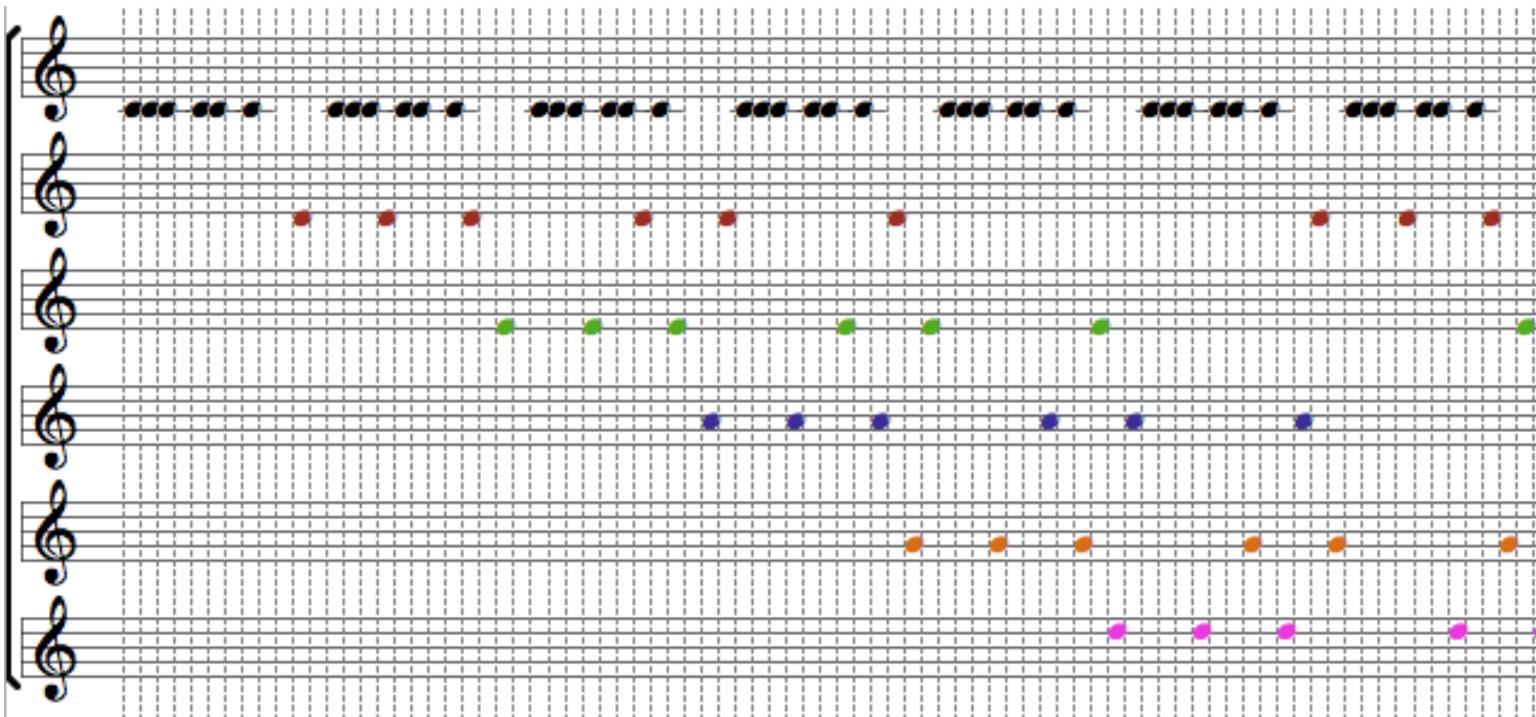
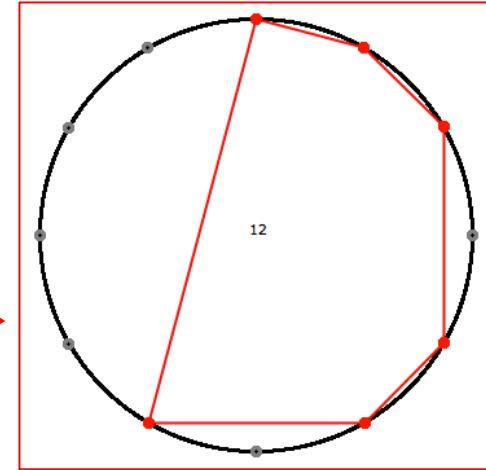


x5
↷



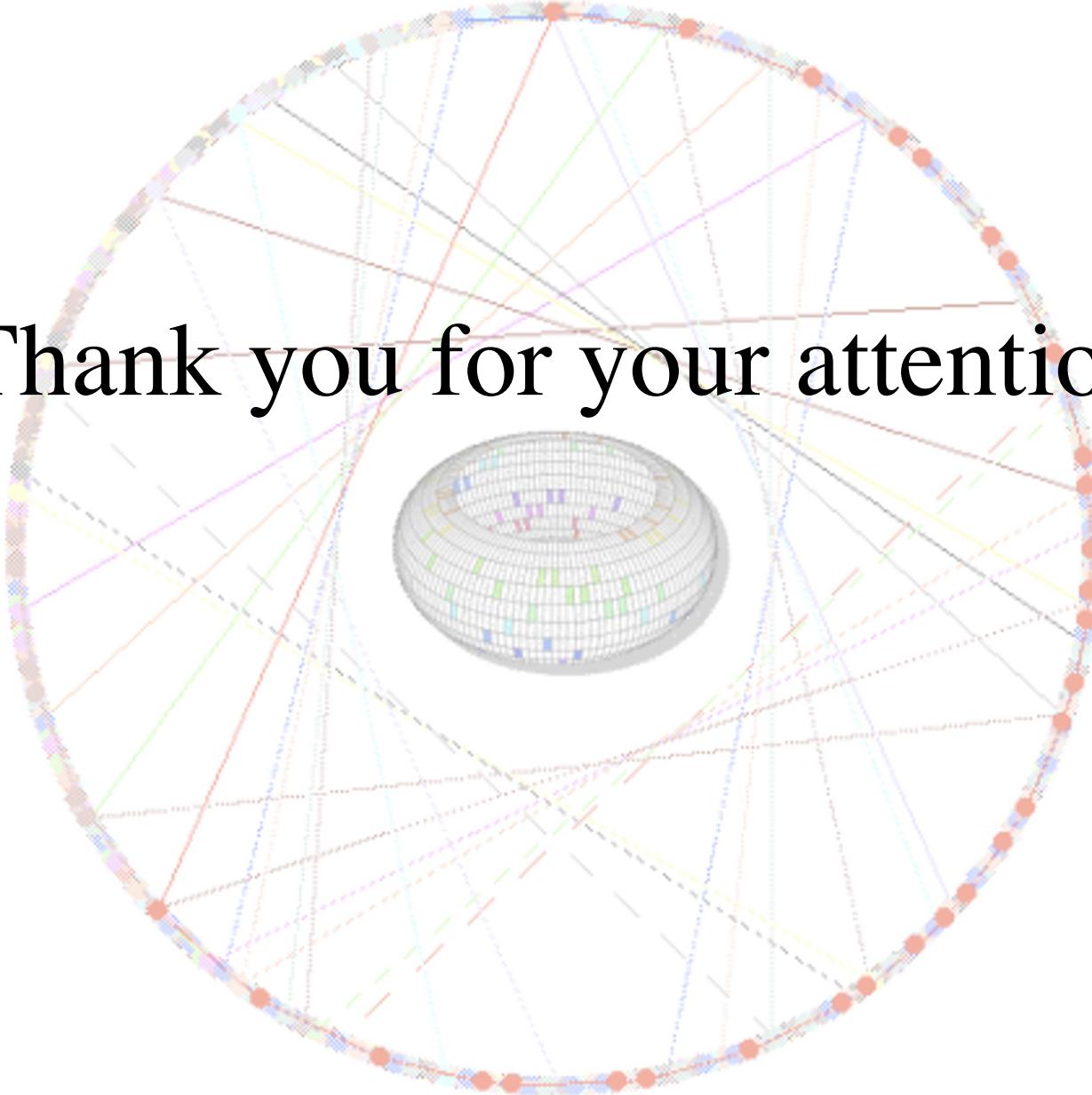
Augmented Tiling Canons (Noll Canons)

((0 1 2 3 4 6) ((1 11)))
((0 1 2 3 4 5) ((1 11) (1 1)))
((0 1 2 3 5 7) ((1 11) (1 7)))
((0 1 3 4 7 8) ((1 5)))
((0 1 2 3 6 7) ((1 11)))
((0 1 3 4 6 9) ((1 11) (1 5)))
((0 1 3 6 7 9) ((1 11) (1 5)))
((0 1 2 6 7 8) ((1 11) (1 7) (1 5) (1 1)))
((0 1 4 5 8 9) ((1 11) (1 7) (1 5) (1 1))) ((0 1 2 5 6 7) ((1 7) (1 5)))
((0 2 3 4 5 7) ((1 11) (1 7) (1 5) (1 1))) ((0 1 4 5 6 8) ((1 11) (1 7)))
((0 1 2 4 5 7) ((1 5)))
((0 1 3 4 5 8) ((1 5) (1 1)))
((0 1 2 4 5 8) ((1 11)))
((0 1 2 4 6 8) ((1 11) (1 7)))
((0 2 3 4 6 8) ((1 11)))
((0 2 4 6 8 10) ((1 11) (1 7) (1 5) (1 1))))



x5





Thank you for your attention!