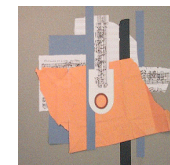


COLLOQUE INTERNATIONAL

HOMMAGE À

# ELLIOTT CARTER

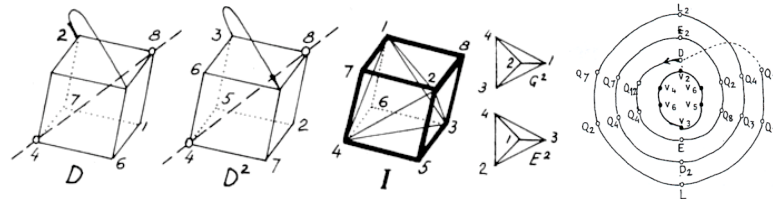
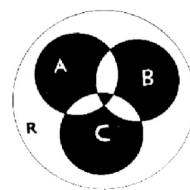


Outils set-théoriques et informatiques pour  
analyser la musique d'Elliott Carter

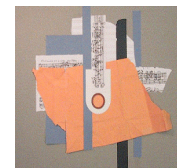
Moreno Andreatta (Ircam/CNRS, Paris, France),  
Gérard Assayag (Ircam, Paris, France)  
Georges Bloch (université Marc-Bloch, Strasbourg, France / Ircam)

© Denis Brevin

# Modélisation du processus compositionnel en *OpenMusic*

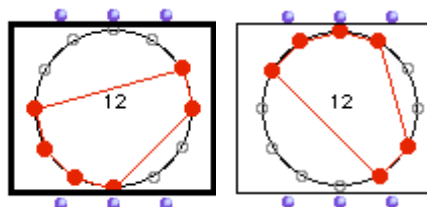


- *Herma* (Xenakis)
- *Nomos Alpha* (Xenakis)
- *Achorripsis* (Xenakis)
- *Structures pour deux piano* (Boulez)
- *Désintégration* (Murail)
- *Modulations* (Grisey)
- *Mode de valeurs et d'intensités* (Messiaen)
- *Harawi* (Messiaen)
- *Sonata* (Scriabine)
- ...



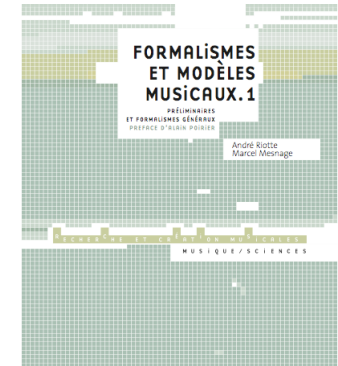
Voici le mode:

(la Division I est utilisée dans la portée supérieure du Piano)

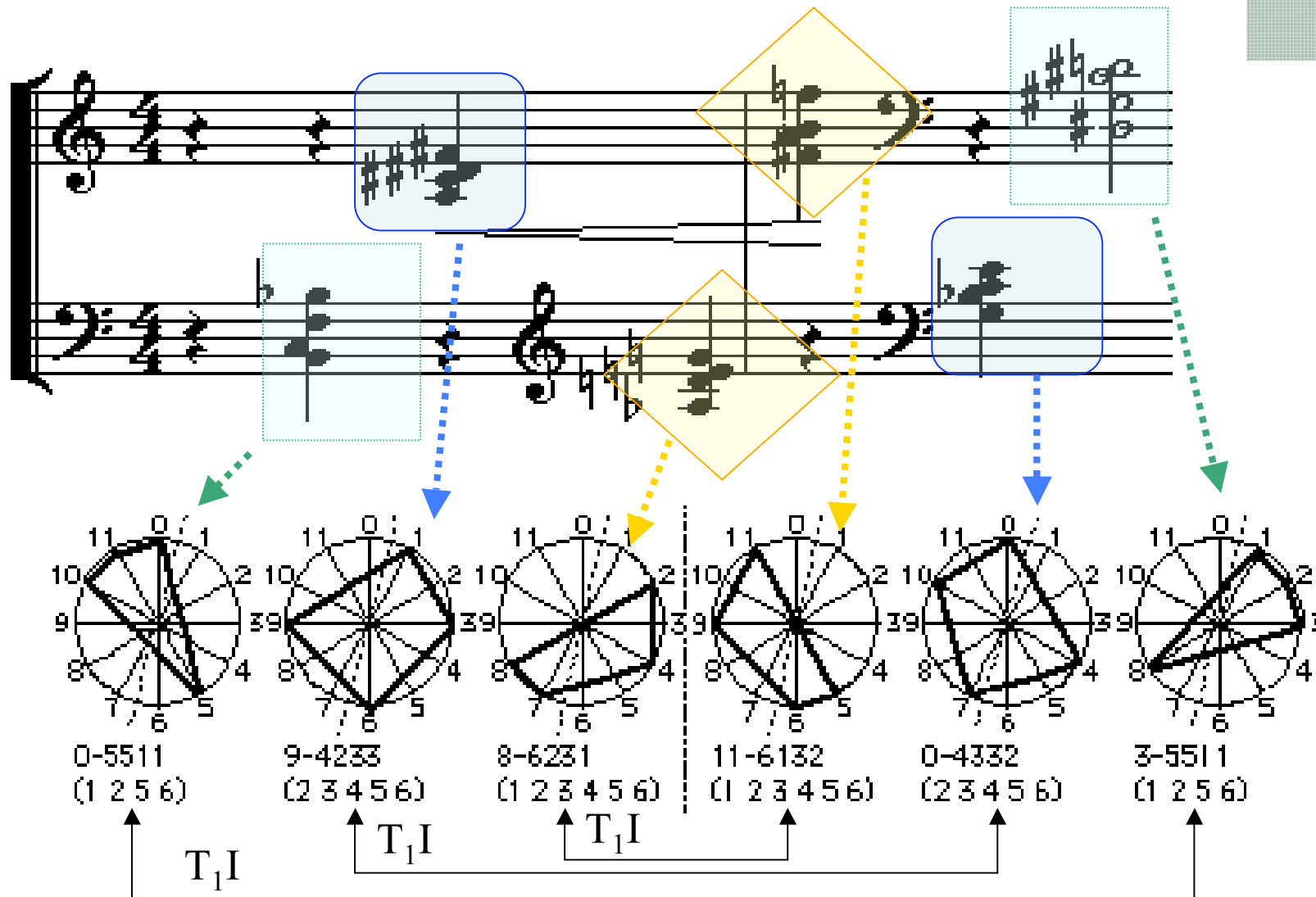


# Analyse musicale computationnelle

André Riotte et Marcel Mesnage: *Formalismes et modèles musicaux*

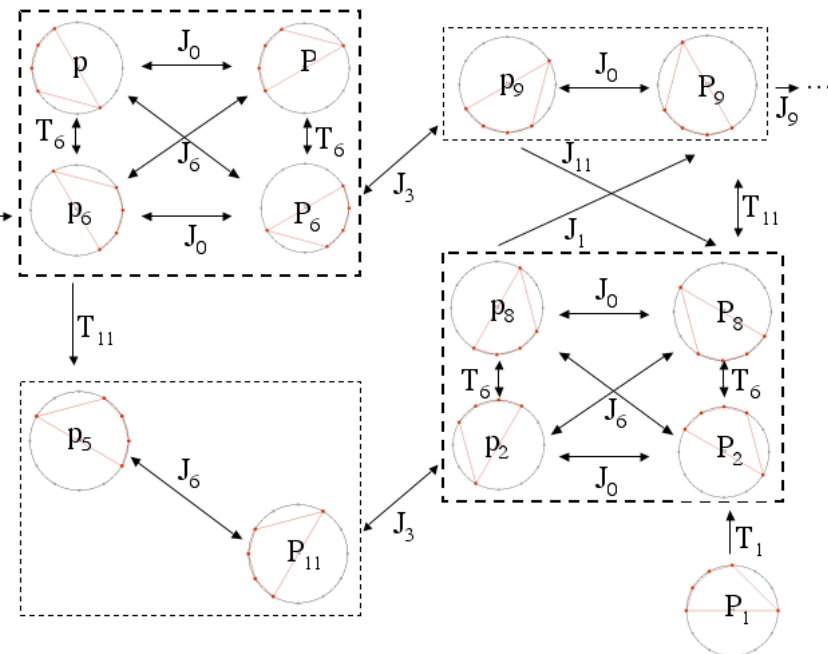
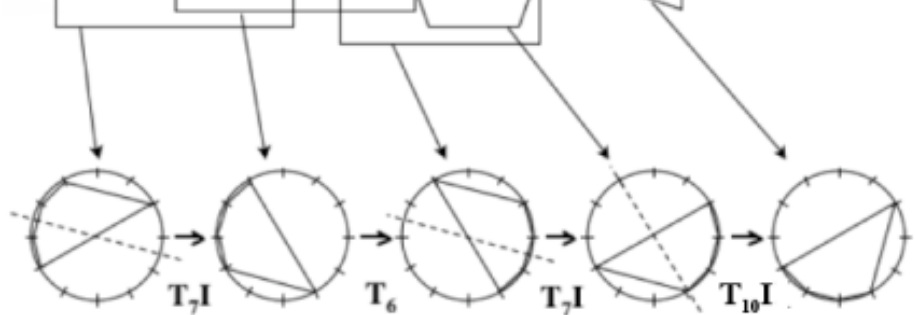
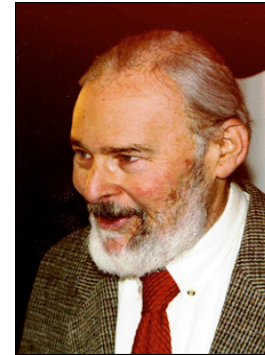


A. Schoenberg : *Klavierstück Op. 33a*, 1929



# Segmentation par imbrication : progression vs réseau transformationnels

Stockhausen: *Klavierstück III* (Analyse de David Lewin)



« [...] the sequence of events moves within a clearly defined world of possible relationships, and because - in so moving - it makes the abstract space of such a world accessible to our sensibilities. That is to say that the story projects what one would traditionally call **form**. »

# Arnold Schoenberg: *Klavierstück* op. 19 n° 4

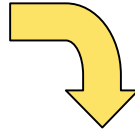
Rasch, aber leicht (♩)

poco rit. -

leicht

pp

reduction



Allen Forte, "Schoenberg's Op.19 n°4: A Set-theoretical perspective"



a)

8-28 octa (CIII)

6-223

5-28 octa CII

5-33 wt

4-19

4-229

CII

4-229 ( $T_4$ )

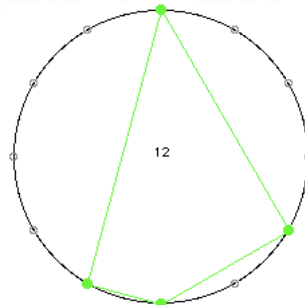
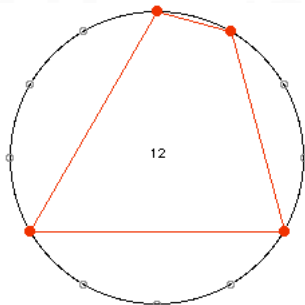
4-23

4-19 ( $T_{10}$  I)

4-23

4-19

$T_0$  I



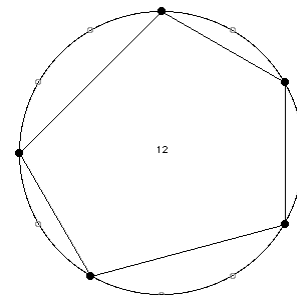
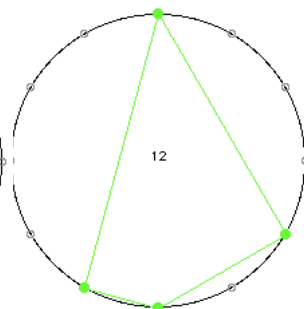
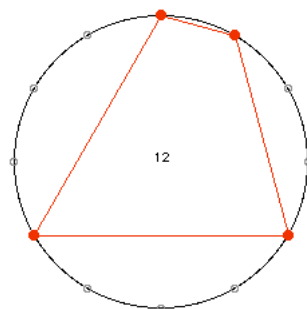
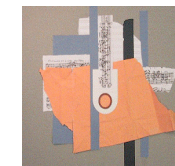
# Analyse du *Klavierstück* op. 19 n° 4 assistée sur OM

partition

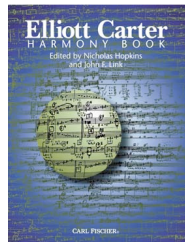
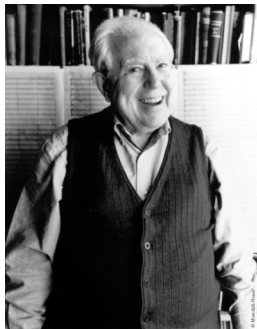
The original musical score for the piece, consisting of three staves (treble, alto, and bass clefs). The time signature is 16/7, which changes to 2/4 at the beginning of the second measure. The score includes various musical notations such as rests, notes, and accidentals. A vertical dotted line is drawn through the score at the end of the first system, indicating a point of analysis.

réduction

The reduced musical score, consisting of five staves (treble, two alto, and bass clefs). The reduction is annotated with several colored boxes: a red box highlights a sequence of notes in the first alto staff; a green box highlights a chord in the second alto staff; another red box highlights a sequence of notes in the second alto staff; a blue box highlights a sequence of notes in the second alto staff; and a red box highlights a chord in the bass staff. A vertical dotted line is drawn through the score at the end of the first system, corresponding to the one in the original partition.



# Elliott Carter : 90+ (1994)



- **Combinatoire d'accords**
  - Hexacordes
  - Tetracordes
  - Triades
- **Séries tous-intervalles**
  - *Link-chords*
- **Polyrythmie et modulations métriques**



(piano: John Snijders)

*mille e novanta auguri a caro Goffredo*  
**90+**  
Elliott Carter  
(1994)

♩ = 96

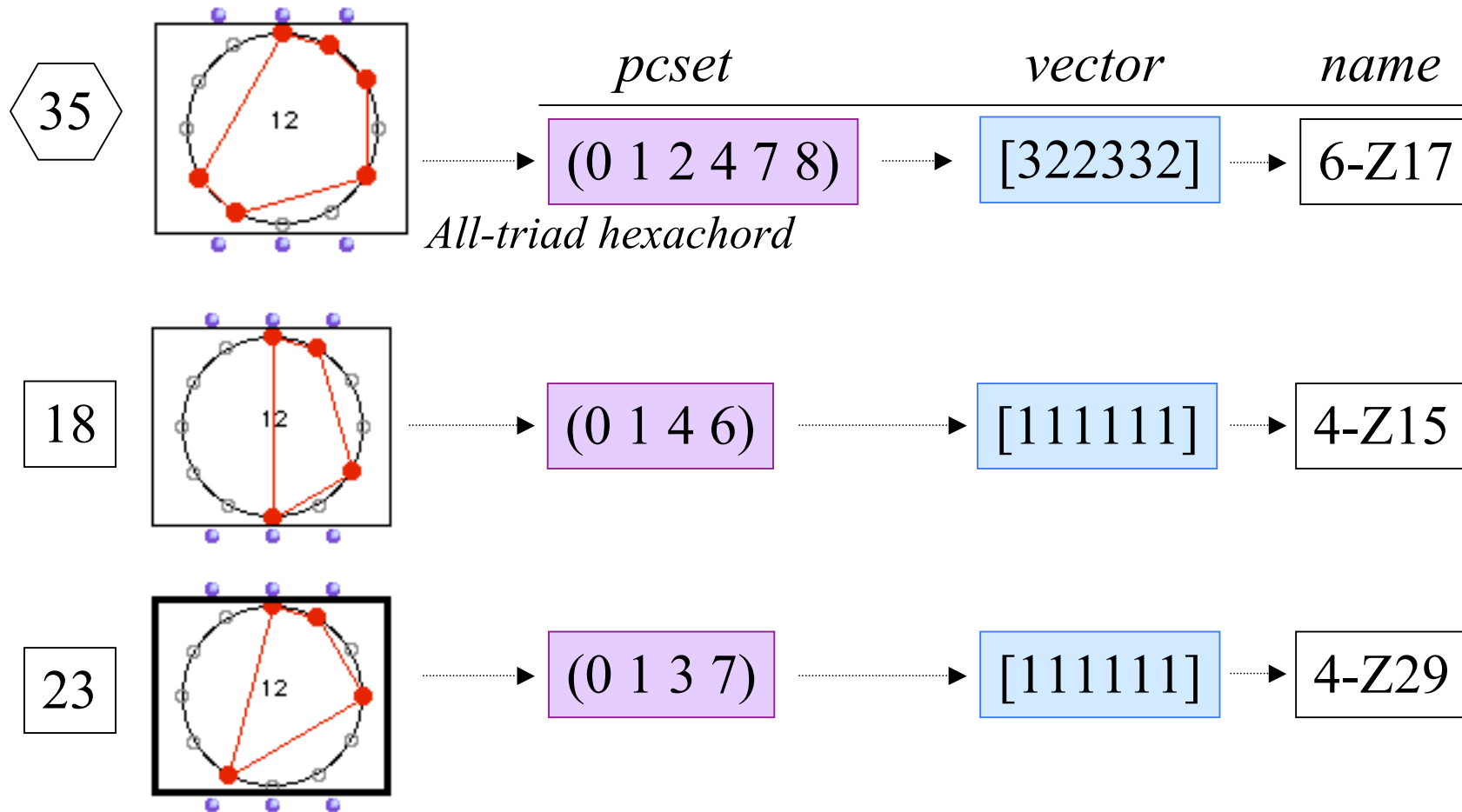
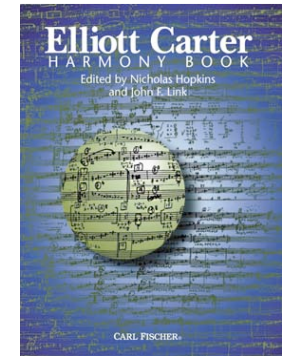
Piano

(senza pedale)\*

\* Use pedal only to join one chord to another *legato*, as in mm. 1–13, 16–21, 36–43, and 45–48.

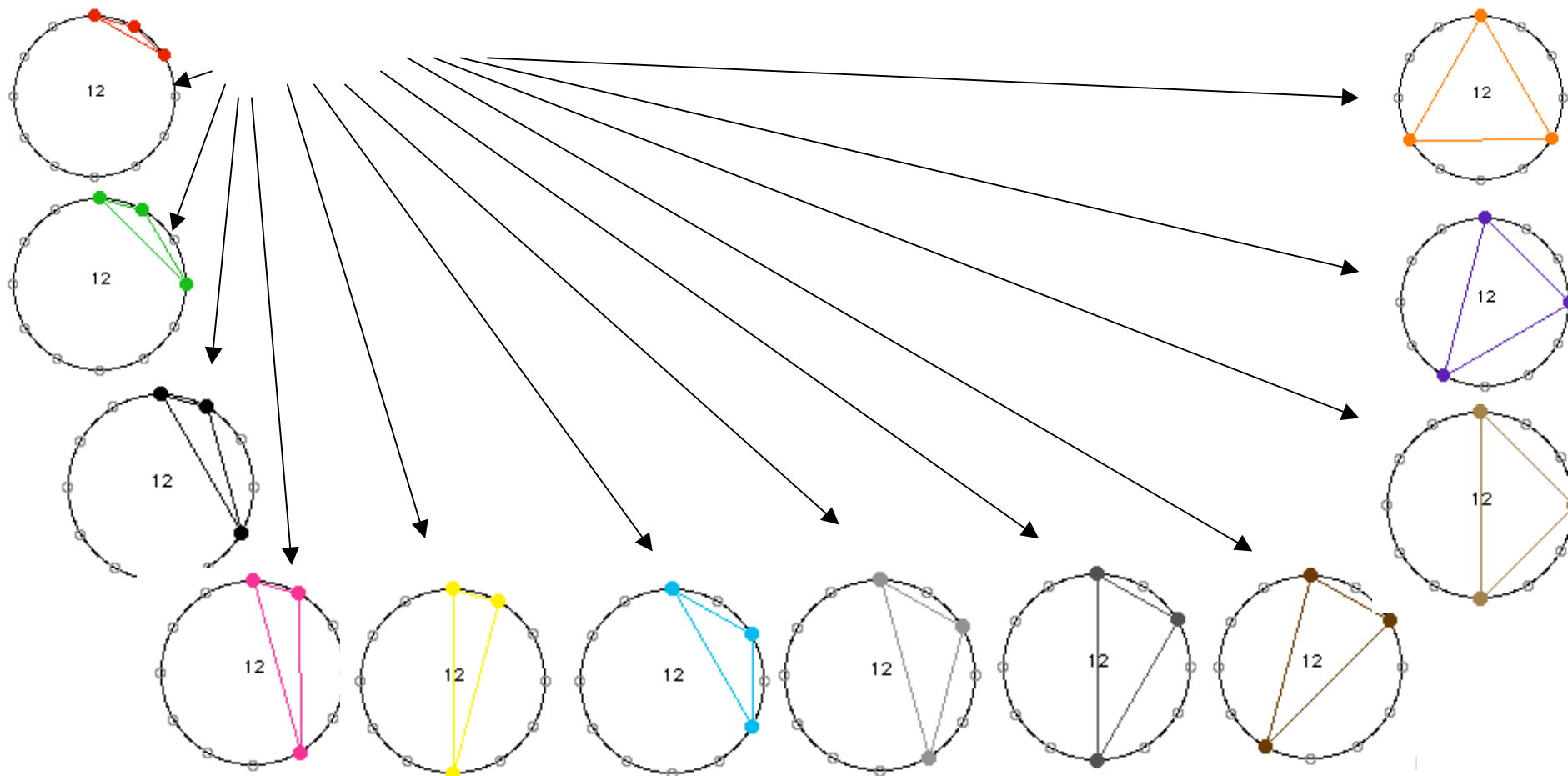
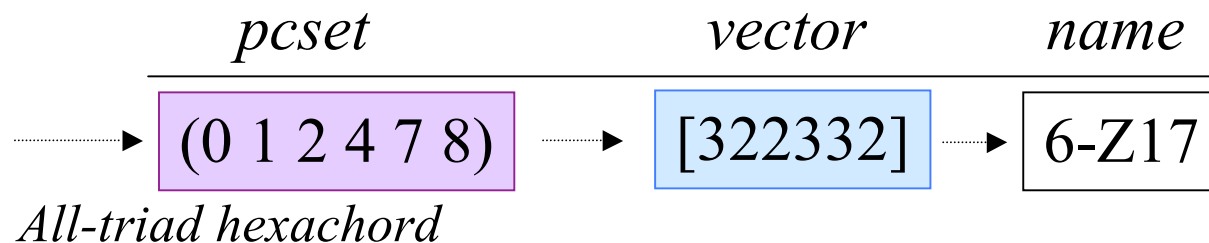
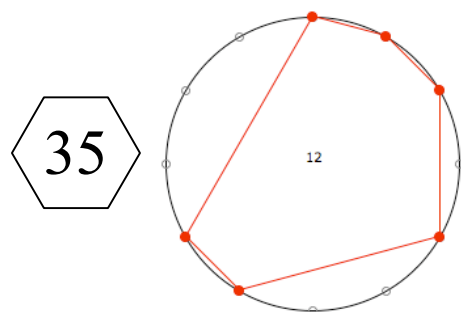
# Elliott Carter: 90+ (1994)

« From about 1990, I have reduced my vocabulary of chords more and more to the six note chord n° 35 and the four note chords n° 18 and 23, which encompass all the intervals » (Harmony Book, 2002, p. ix)



# Elliott Carter: 90+ (1994)

$G \setminus k$	1	2	3	4	5	6	7	8	9	10	11	12
$C_{12}$	1	6	19	43	66	80	66	43	19	6	1	1
$D_{12}$	1	6	12	29	38	50	38	29	12	6	1	1
$\text{Aff}_1(\mathbb{Z}_{12})$	1	5	9	21	25	34	25	21	9	5	1	1



# Elliott Carter : 90+ (1994) : combinatoire tetra/tricordale

*mille e novanta auguri a caro Goffredo*

90+

Elliott Carter  
(1994)

Piano

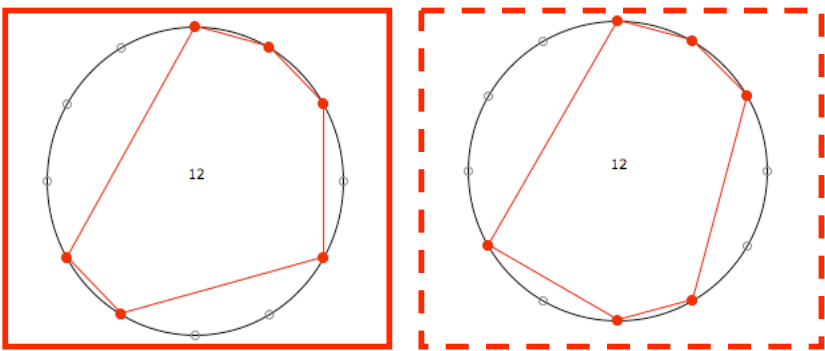
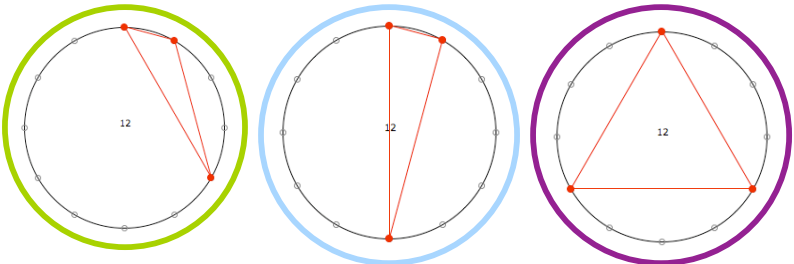
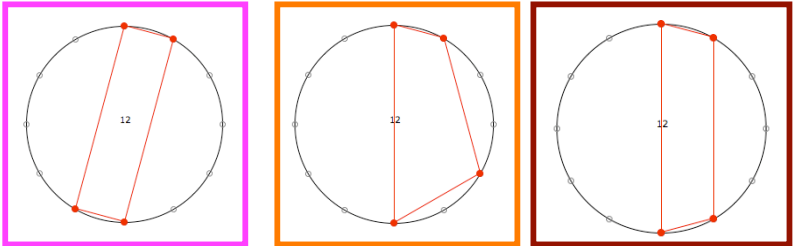
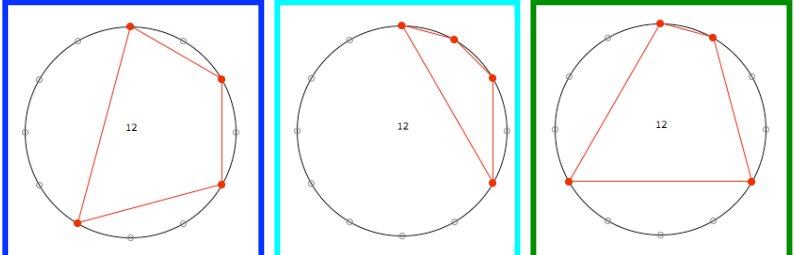
*mf*  
(senza pedale)\*

*mp*

*mp*

*mp*

*mp*

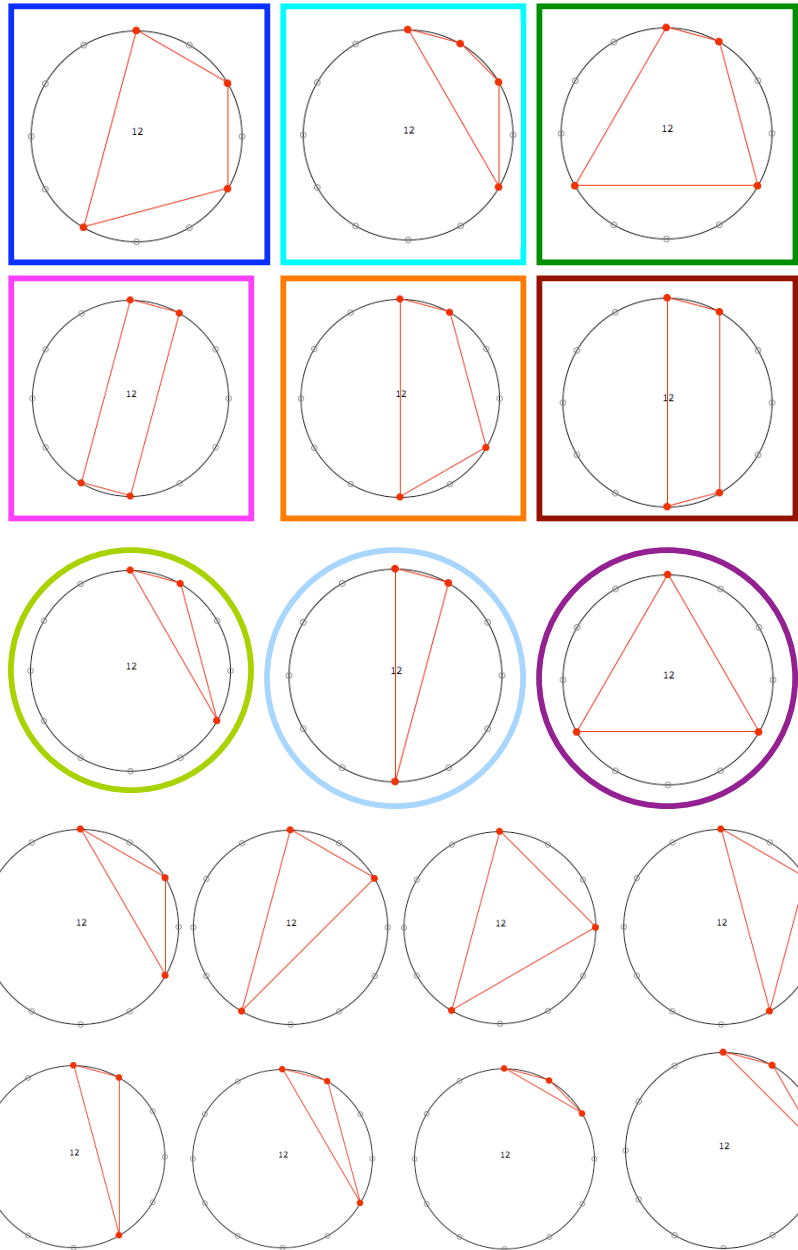


# Elliott Carter : 90+ (1994) : combinatoire tetra/tricordale

*mille e novanta auguri a caro Goffredo*

90+

Elliott Carter  
(1994)

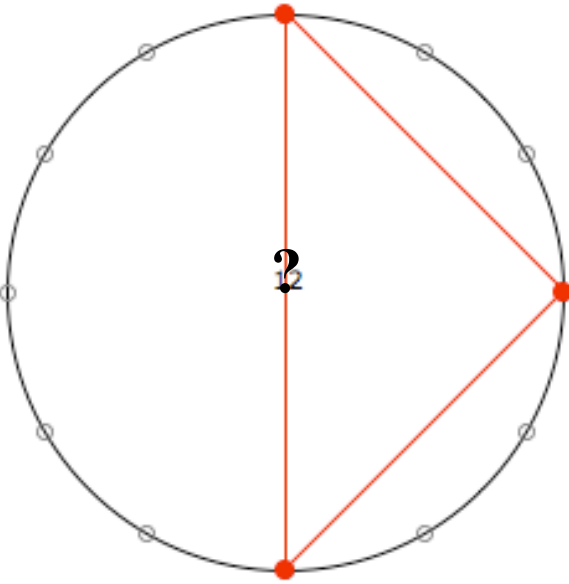
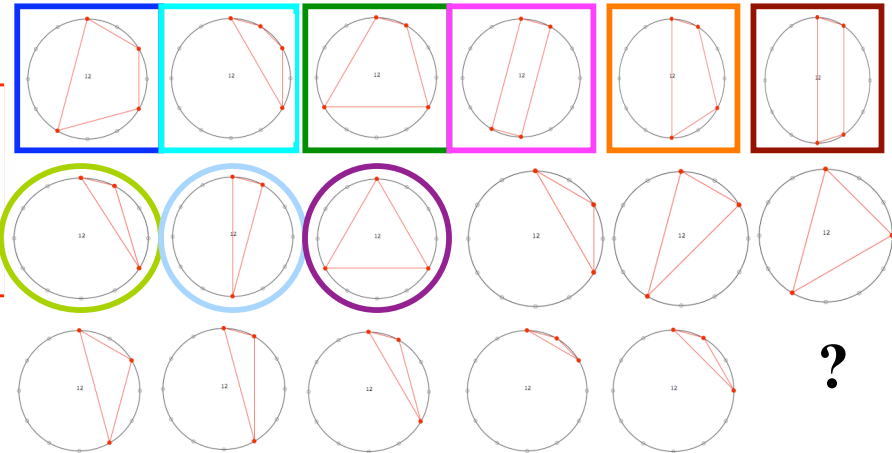


# Elliott Carter : 90+ (1994) : combinatoire tetra/tricordale

*mille e novanta auguri a caro Goffredo*

90+

Elliott Carter (1994)

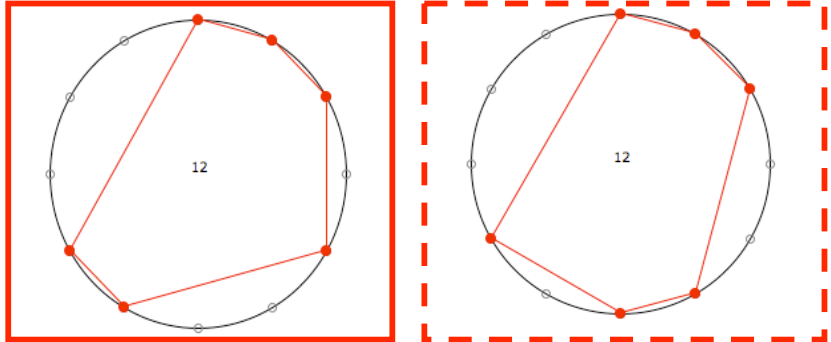
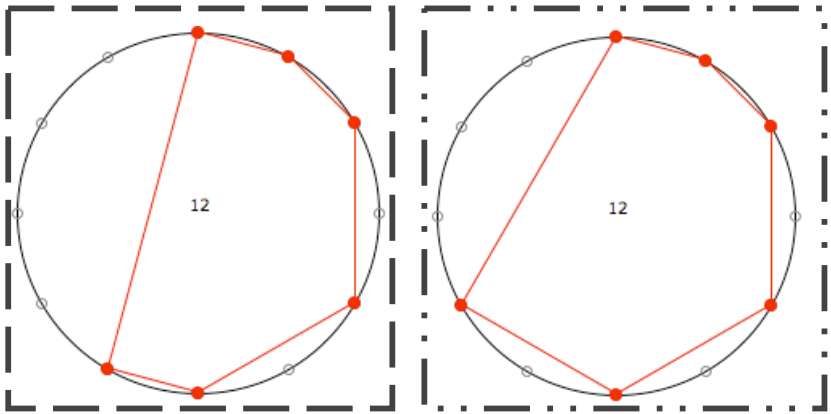
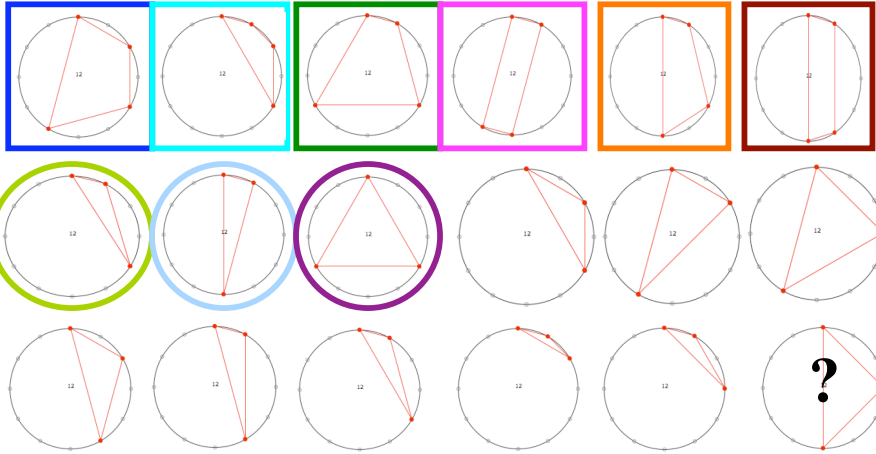


# Elliott Carter : 90+ (1994) : combinatoire tetra/tricordale

*mille e novanta auguri a caro Goffredo*

90+

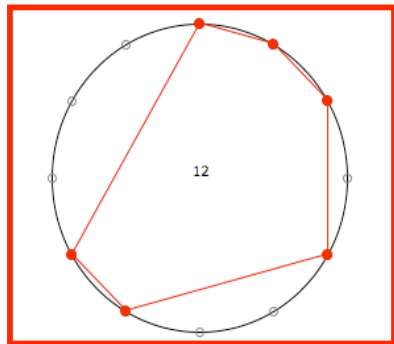
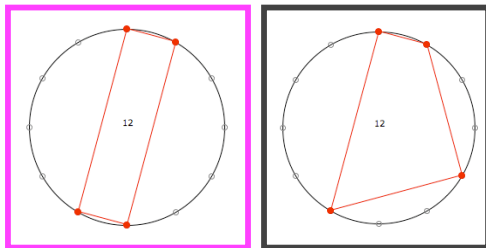
Elliott Carter (1994)



# Elliott Carter : 90+ (1994) : 90+ Hexacordes toutes-triades



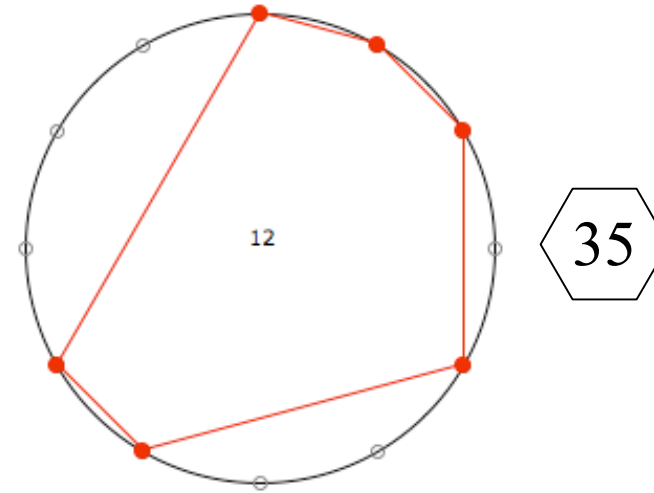
mm. 114–118



## Contenu des triades/tetracordes

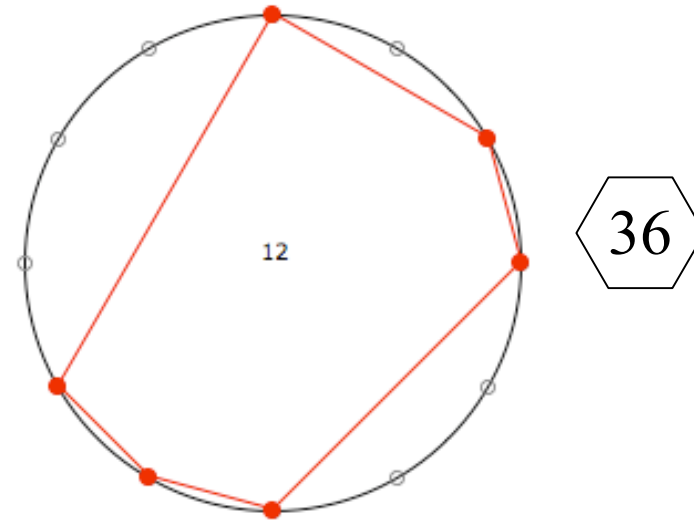
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(0 1 2 7)	(0 1 2) (0 2 7) (0 1 6)
(0 1 2 6)	(0 1 2) (0 1 6) (0 2 6) (0 1 5)
(0 1 5 6)	(0 1 6) (0 1 5)
(0 2 4 7)	(0 2 4) (0 2 7) (0 3 7) (0 2 5)
(0 2 4 8)	(0 2 4) (0 4 8) (0 2 6)
(0 1 5 7)	(0 1 5) (0 1 6) (0 2 6)
(0 1 4 8)	(0 1 4) (0 1 5) (0 4 8) (0 3 7)
(0 1 3 6)	(0 1 3) (0 1 6) (0 3 6) (0 2 5)
(0 1 3 7)	(0 1 3) (0 1 6) (0 3 7) (0 2 6)
(0 1 6 7)	(0 1 6)
(0 1 4 7)	(0 1 4) (0 1 6) (0 3 7) (0 3 6)
(0 1 4 6)	(0 1 4) (0 1 6) (0 2 6) (0 2 5)



(0 1 2)	(0 1 2 4)(0 1 2 7)(0 1 2 6)
(0 2 4)	(0 1 2 4)(0 2 4 7)(0 2 4 8)
(0 2 7)	(0 1 2 7)(0 2 4 7)
(0 4 8)	(0 2 4 8)(0 1 4 8)
(0 1 5)	(0 1 2 6)(0 1 5 6)(0 1 5 7)(0 1 4 8)
(0 1 3)	(0 1 2 4)(0 1 3 6)(0 1 3 7)
(0 3 6)	(0 1 3 6)(0 1 4 7)
(0 3 7)	(0 2 4 7)(0 1 4 8)(0 1 3 7)(0 1 4 7)
(0 2 5)	(0 2 4 7)(0 1 3 6)(0 1 4 6)
(0 2 6)	(0 1 2 6)(0 2 4 8)(0 1 5 7)(0 1 3 7)(0 1 4 6)
(0 1 6)	(0 1 2 7)(0 1 2 6)(0 1 5 6)(0 1 5 7)(0 1 3 6)(0 1 3 7)(0 1 6 7)(0 1 4 7)(0 1 4 6)
(0 1 4)	(0 1 2 4)(0 1 4 8)(0 1 4 7)(0 1 4 6)

## Contenu des triades/tetracordes

$(0\ 1\ 2\ 5)$	$(0\ 1\ 2)$ $(0\ 1\ 5)$ $(0\ 2\ 5)$ $(0\ 1\ 4)$
$(0\ 1\ 4\ 5)$	$(0\ 1\ 5)$ $(0\ 1\ 4)$
$(0\ 1\ 2\ 6)$	$(0\ 1\ 2)$ $(0\ 1\ 6)$ $(0\ 2\ 6)$ $(0\ 1\ 5)$
$(0\ 1\ 5\ 6)$	$(0\ 1\ 6)$ $(0\ 1\ 5)$
$(0\ 2\ 3\ 6)$	$(0\ 1\ 3)$ $(0\ 2\ 6)$ $(0\ 3\ 6)$ $(0\ 1\ 4)$
$(0\ 2\ 3\ 7)$	$(0\ 1\ 3)$ $(0\ 2\ 7)$ $(0\ 3\ 7)$ $(0\ 1\ 5)$
$(0\ 1\ 5\ 7)$	$(0\ 1\ 5)$ $(0\ 1\ 6)$ $(0\ 2\ 6)$
$(0\ 1\ 5\ 8)$	$(0\ 1\ 5)$ $(0\ 3\ 7)$
$(0\ 2\ 5\ 8)$	$(0\ 2\ 5)$ $(0\ 2\ 6)$ $(0\ 3\ 7)$ $(0\ 3\ 6)$
$(0\ 1\ 3\ 7)$	$(0\ 1\ 3)$ $(0\ 1\ 6)$ $(0\ 3\ 7)$ $(0\ 2\ 6)$
$(0\ 2\ 6\ 8)$	$(0\ 2\ 6)$
$(0\ 1\ 4\ 7)$	$(0\ 1\ 4)$ $(0\ 1\ 6)$ $(0\ 3\ 7)$ $(0\ 3\ 6)$
$(0\ 1\ 4\ 6)$	$(0\ 1\ 4)$ $(0\ 1\ 6)$ $(0\ 2\ 6)$ $(0\ 2\ 5)$



$(0\ 1\ 2)$	$(0\ 1\ 2\ 4)$ $(0\ 1\ 2\ 7)$ $(0\ 1\ 2\ 6)$
$(0\ 2\ 7)$	$(0\ 2\ 3\ 7)$
$(0\ 1\ 5)$	$(0\ 1\ 2\ 5)$ $(0\ 1\ 4\ 5)$ $(0\ 1\ 2\ 6)$ $(0\ 1\ 5\ 6)$ $(0\ 2\ 3\ 7)$ $(0\ 1\ 5\ 7)$ $(0\ 1\ 5\ 8)$
$(0\ 1\ 3)$	$(0\ 2\ 3\ 6)$ $(0\ 2\ 3\ 7)$ $(0\ 1\ 3\ 7)$
$(0\ 3\ 6)$	$(0\ 2\ 3\ 6)$ $(0\ 2\ 5\ 8)$ $(0\ 1\ 4\ 7)$
$(0\ 3\ 7)$	$(0\ 2\ 3\ 7)$ $(0\ 1\ 5\ 8)$ $(0\ 2\ 5\ 8)$ $(0\ 1\ 3\ 7)$ $(0\ 1\ 3\ 7)$ $(0\ 1\ 4\ 7)$
$(0\ 2\ 5)$	$(0\ 1\ 2\ 5)$ $(0\ 2\ 5\ 8)$ $(0\ 1\ 4\ 6)$
$(0\ 2\ 6)$	$(0\ 1\ 2\ 6)$ $(0\ 2\ 3\ 6)$ $(0\ 1\ 5\ 7)$ $(0\ 2\ 5\ 8)$ $(0\ 1\ 3\ 7)$ $(0\ 2\ 6\ 8)$ $(0\ 1\ 4\ 6)$
$(0\ 1\ 6)$	$(0\ 1\ 2\ 6)$ $(0\ 1\ 5\ 6)$ $(0\ 1\ 5\ 7)$ $(0\ 1\ 3\ 7)$ $(0\ 1\ 4\ 7)$ $(0\ 1\ 4\ 6)$
$(0\ 1\ 4)$	$(0\ 1\ 2\ 5)$ $(0\ 1\ 4\ 5)$ $(0\ 2\ 3\ 6)$ $(0\ 1\ 4\ 7)$ $(0\ 1\ 4\ 6)$

# Contenu des triades/tetracordes

(0 1 2 4)	(0 1 2) (0 1 4) (0 2 4) (0 1 3)
(0 1 2 5)	(0 1 2) (0 1 5) (0 2 5) (0 1 4)
(0 1 4 5)	(0 1 5) (0 1 4)
(0 1 2 7)	(0 1 2) (0 2 7) (0 1 6)
(0 1 2 6)	(0 1 2) (0 1 6) (0 2 6) (0 1 5)
(0 1 5 6)	(0 1 6) (0 1 5)
(0 2 3 6)	(0 1 3) (0 2 6) (0 3 6) (0 1 4)
(0 2 3 7)	(0 1 3) (0 2 7) (0 3 7) (0 1 5)
(0 2 4 7)	(0 2 4) (0 2 7) (0 3 7) (0 2 5)
(0 2 4 8)	(0 2 4) (0 4 8) (0 2 6)
(0 1 5 7)	(0 1 5) (0 1 6) (0 2 6)
(0 1 5 8)	(0 1 5) (0 3 7)
(0 2 5 8)	(0 2 5) (0 2 6) (0 3 7) (0 3 6)
(0 2 6 8)	(0 2 6)
(0 1 4 8)	(0 1 4) (0 1 5) (0 4 8) (0 3 7)
(0 1 3 6)	(0 1 3) (0 1 6) (0 3 6) (0 2 5)
(0 1 3 7)	(0 1 3) (0 1 6) (0 3 7) (0 2 6)
(0 1 6 7)	(0 1 6)
(0 1 4 7)	(0 1 4) (0 1 6) (0 3 7) (0 3 6)
(0 1 4 6)	(0 1 4) (0 1 6) (0 2 6) (0 2 5)

(0 1 2)	(0 1 2 4)(0 1 2 7)(0 1 2 6)
(0 2 4)	(0 1 2 4)(0 2 4 7)(0 2 4 8)
(0 2 7)	(0 1 2 7)(0 2 4 7)(0 2 3 7)
(0 4 8)	(0 2 4 8)(0 1 4 8)
(0 1 5)	(0 1 2 6)(0 1 5 6)(0 1 5 7)(0 1 4 8)(0 1 2 5)(0 1 4 5)(0 2 3 7)(0 1 5 8)
(0 1 3)	(0 1 2 4)(0 1 3 6)(0 1 3 7)(0 2 3 6)(0 2 3 7)
(0 3 6)	(0 1 3 6)(0 1 4 7)(0 2 3 6)(0 2 5 8)
(0 3 7)	(0 2 4 7)(0 1 4 8)(0 1 3 7)(0 1 4 7)(0 2 3 7)(0 1 5 8)(0 2 5 8)(0 1 3 7)
(0 2 5)	(0 2 4 7)(0 1 3 6)(0 1 4 6)(0 1 2 5)(0 2 5 8)
(0 2 6)	(0 1 2 6)(0 2 4 8)(0 1 5 7)(0 1 3 7)(0 1 4 6) (0 2 3 6)(0 2 5 8)(0 2 6 8)
(0 1 6)	(0 1 2 7)(0 1 2 6)(0 1 5 6)(0 1 5 7)(0 1 3 6)(0 1 3 7)(0 1 6 7)(0 1 4 7)(0 1 4 6)
(0 1 4)	(0 1 2 4)(0 1 4 8)(0 1 4 7)(0 1 4 6) (0 1 2 5)(0 1 4 5)(0 2 3 6)

