Bruno Friedmann

serialism extended

or

the tunnel project

the memory of structures

proceedings of
Boulez-Symposium, 19/09/2009,
Alte Oper, Frankfurt am Main

What is a memory of a structure?
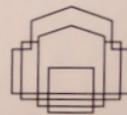
How does a „series' memory"
affect the resulting music?

das gedächtnis
der struktur
Der Komponist Pierre Boulez
Hans-Klaus Jungheinrich (Hg.)

edition neue zeitschrift für musik

ALTE OPER
FRANKFURT

statements

- in this book, **Pierre Boulez** stated: "serialism was a tunnel of 2 years, to reach virgin soil"

- **Ligeti**: "... the more tight the net of operations with pre-ordered material, the higher the extend of levelling of the results."

- **Lachenmann**: „... subordination of the expressive affects under the aspect of the structural idea ... because rigorous ordering systems have been dissolved the usual expressive effects a priori: quasi serialised it away.

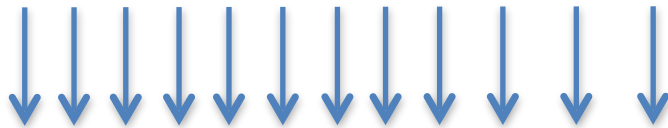- in the end: serialism is not to perceive, so, it sounds somehow random ...

  resulting question:
  —> does extended serialism also
  extend randomness un-expressiveness
  and down-levelling?

Dodecaphony
expl.: Pierre Boulez, Sonatine

f f# g g# a a# b c c# d d# e
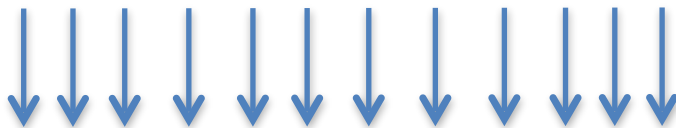
ordered pitch (classes)

1 2 3 4 5 6 7 8 9 10 11 12

1 2 6 12 5 9 10 4 11 3 8 7   **prime or basic row** with 12 elements (example)

mapped to entities,

f f# b*b* e a c# d a*b* e*b* g c b   **to pitch classes**

basic row	1	2	6	12	5	9	10	4	11	3	8	7
inversion (**I**),	1	12	8	2	9	5	4	10	3	11	6	7
retrograde (**R**),	7	8	3	11	4	10	9	5	12	6	2	1
retrograde inversion (**RI**)	7	6	11	3	10	4	5	9	2	8	12	1

and the usual transformations:
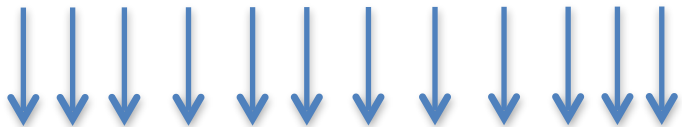
Dodecaphony
expl.: Pierre Boulez, Sonatine
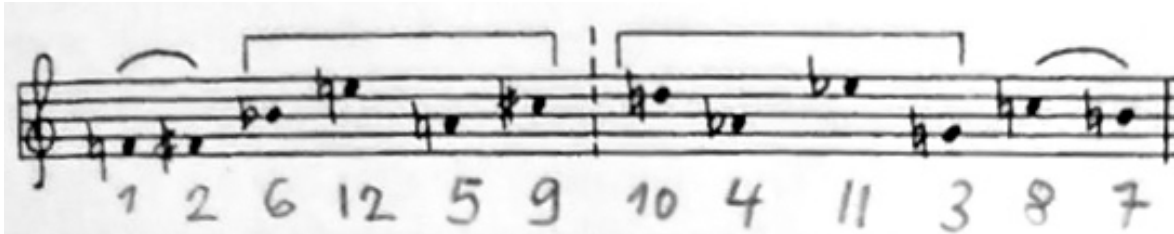
taken from: Susanne Gärtner,
in: Das Gedächtnis der Struktur

Pierre Boulez: *Sonatine*, Reihe (1946, published 1954)

1 2 6 12 5 9 10 4 11 3 8 7 **row with 12 elements**

mapped to entities,

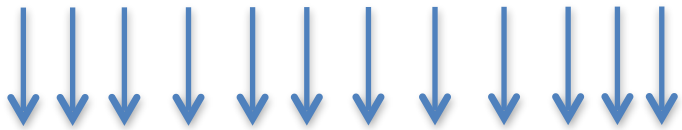f f# b*b* e a c# d *ab* *eb* g c b   the pitch classes

(integral or total) Serialism

taken from:
Wikipedia: Serialism

Olivier Messiaen's unordered series for pitch, duration, dynamics
and articulation from the pre-serial *Mode de valeurs et d'intensités (1949)*

1 2 6 12 5 9 10 4 11 3 8 7   row with 12 elements

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓   mapped to entities,

?

example: P. Boulez, Structures I

the pitch classes, dynamic levels, durations,
modes of attack, articulations, timbres, ...

Pierre Boulez, Structure Ia (1951)


serialised:

pitches

durations

dynamics

attack

Twelve-tone technique,
Dodecaphony:
mapping a 12-number row
to chromatic pitch classes

Serialism:
mapping a n-number row
to different parameters
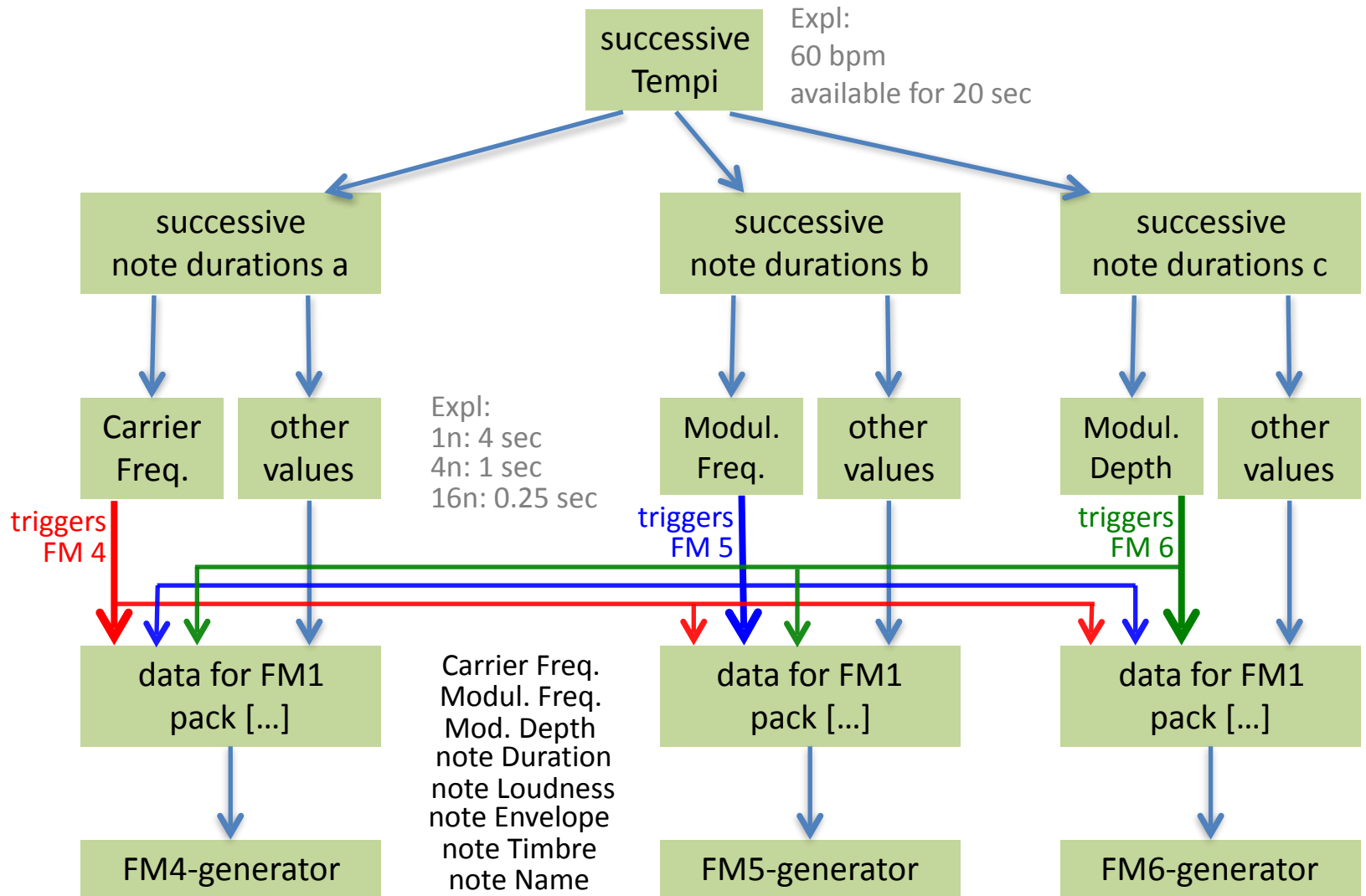
the tunnel project

- an algorithmic software composition (Max/MSP), based on the (main) rules of serialism
- many parameters should be serialised by one serial row with **arbitrary length**,
- **transformations** (revers, invers, revers-invers)
  are also used
- two triples of **FM generators** create the sound
- these will be envelope-shaped (serialised)
- and **spatialised** (SPAT); (serialised)

presets & org

↓

FM-generators

↓

sound shaping

↓

spatiali-sation
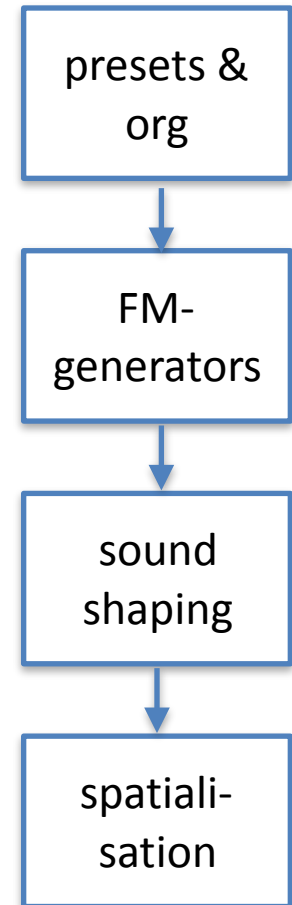
1st tripple of FM generators
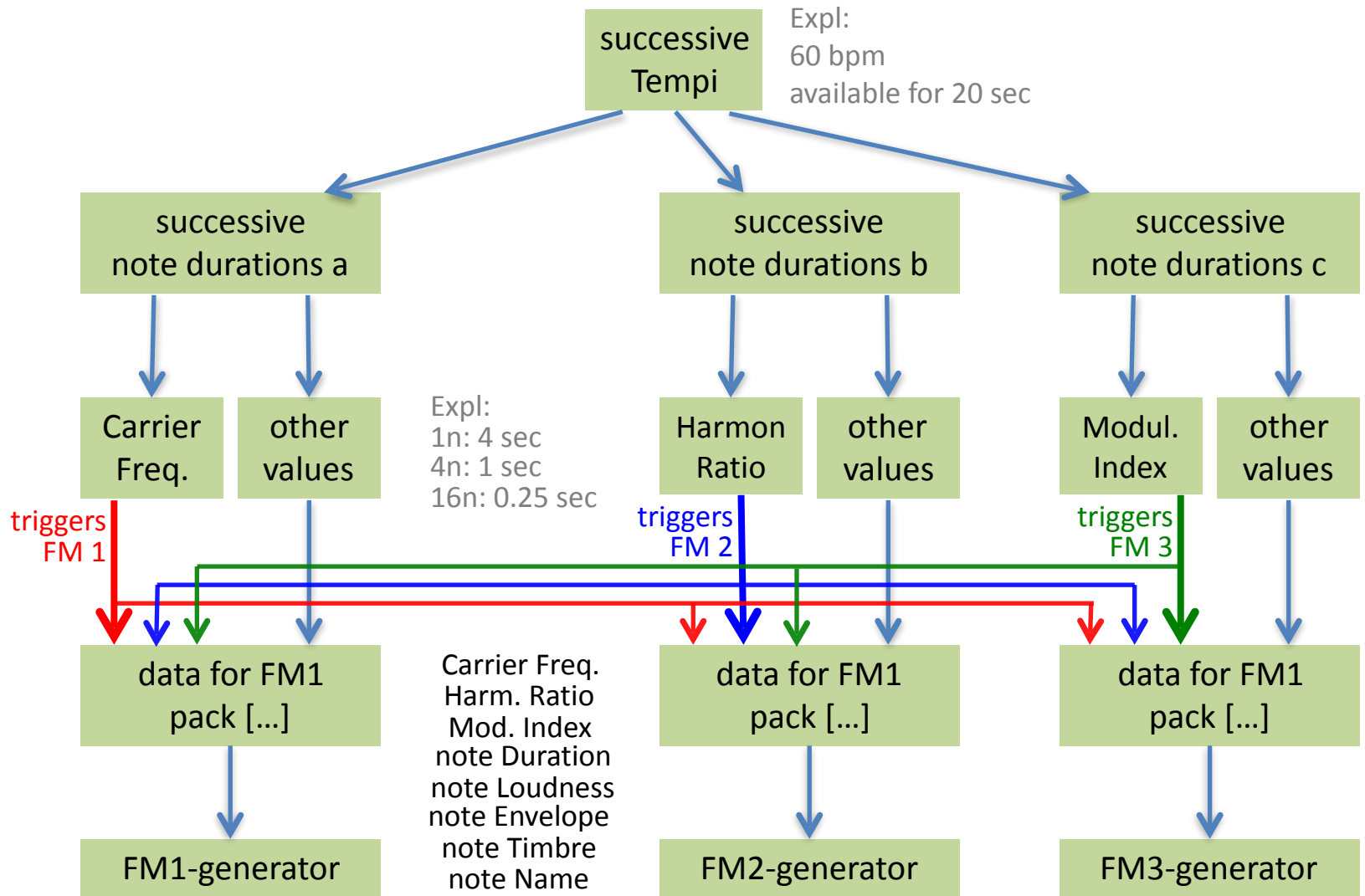
2nd tripple of FM generators

parameters of FM generators

- $FM(t) = A_c cos(\omega_c t + A_m sin(\omega_m t))$

$$= A_0(B)cos(\omega_c t)$$
$$- A_1(B)(cos((\omega_c - \omega_m)t) - cos((\omega_c + \omega_m)t))$$
$$+ A_2(B)(cos((\omega_c - 2\omega_m)t) + cos((\omega_c + 2\omega_m)t))$$
$$- A_3(B)(cos((\omega_c - 3\omega_m)t) - cos((\omega_c + 3\omega_m)t)) \ldots$$

  - ω_c : carrier frequency
  - ω_m: modulation frequency
  - A_c : Amplitude of carrier frequency
  - A_m: modulation depth (sort of frequency)
  - $A0_{123}$: Amplitudes depending on Bessel functions

possible FM-signal ->freq.
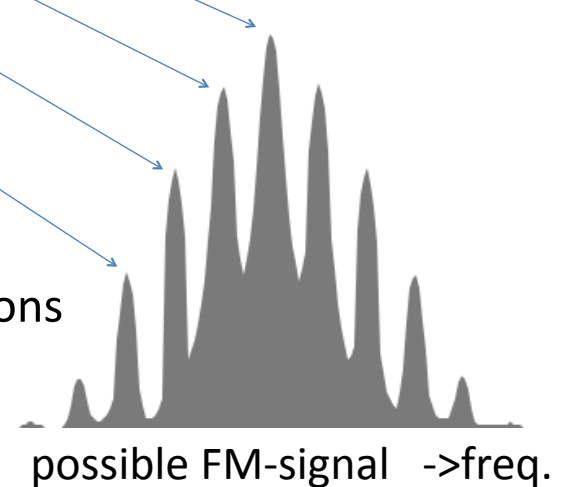
serialised parameters

- *presets*
  - *range of tempi*
  - *range of frequencies, 6 FM parameters*
- sound organisation
  - tempi b
  - durations of tempi r
  - which FM-sound sources are active; <=6 ir
  - durations of sound sources active i
- sound generation   *6 times*
  - notes r (&init ir)
  - FM parameters (&init)
  - timbre factors (&init)
- sound design
  - loudness (&init)
  - envelopes (&init)
- spatialisation
  - movements of 6 sources, every source individual (&init)

needed algorithms
to extend the "classical" serialism

- How to serialise a continuum, like a frequency range (0. Hz – 1000. Hz) or loudness (0. – 1.), etc.

- How to fit the matching of a given series and a definite amount of entities

- How to support a "memory of the structure of a serial row"

how to serialise a continuum

Basic row: 2 3 1 4

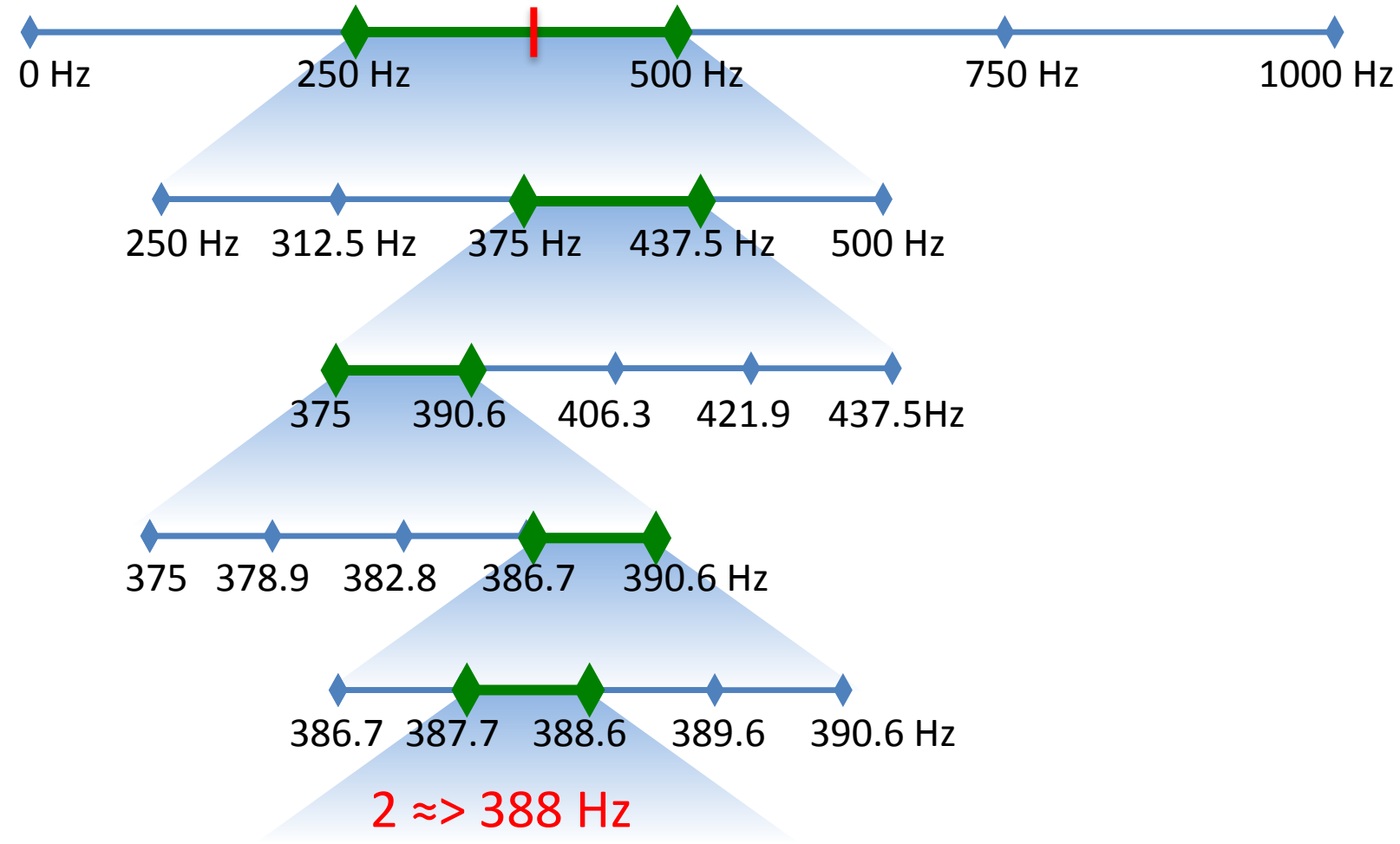0. Hz   333.33 Hz   666.66 Hz   1000. Hz

? not really acceptable:
for rows with N numbers (expl: N=12) you have always
the same entities (expl: 12 frequencies)
no matter how the series is organised
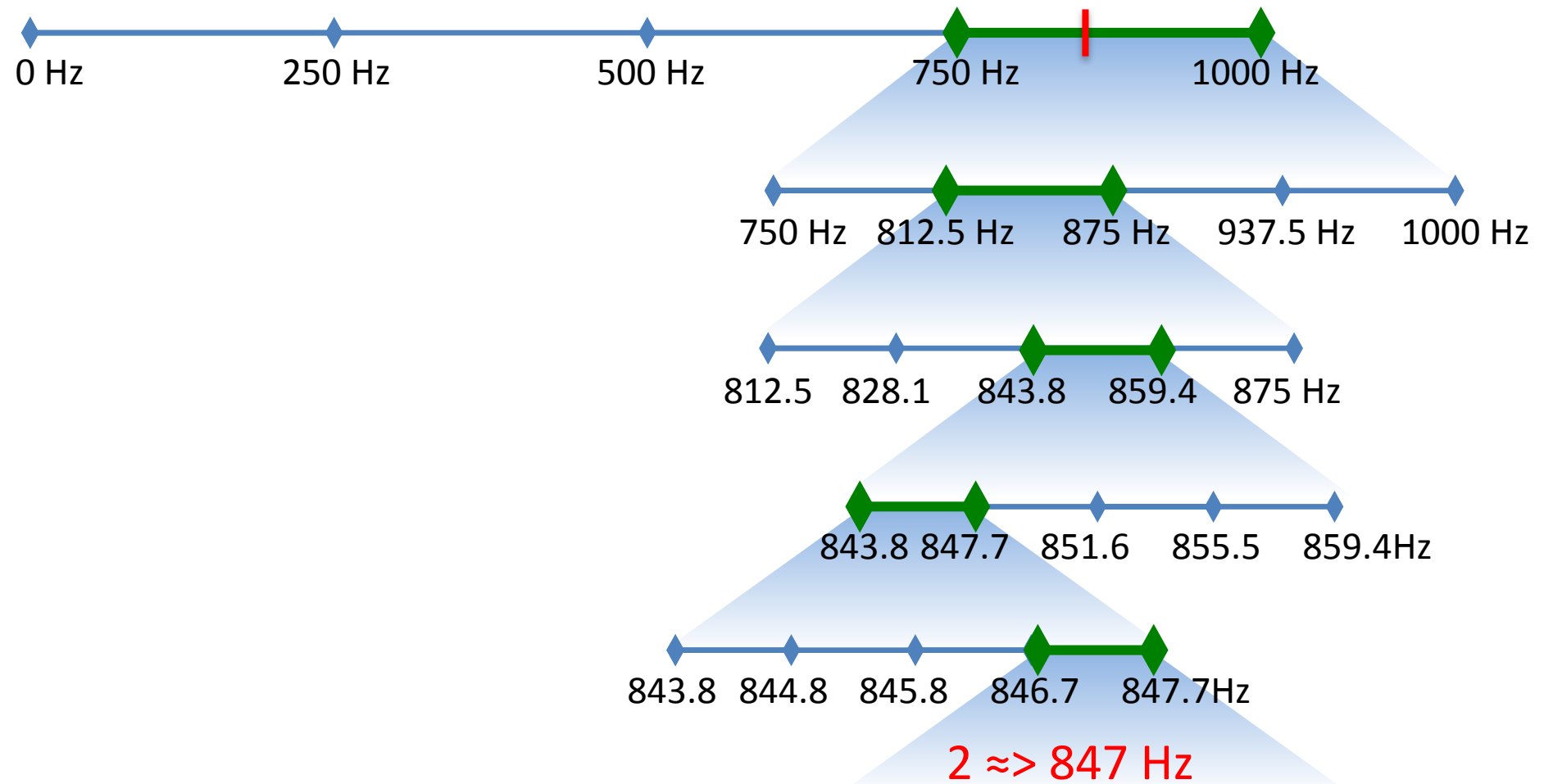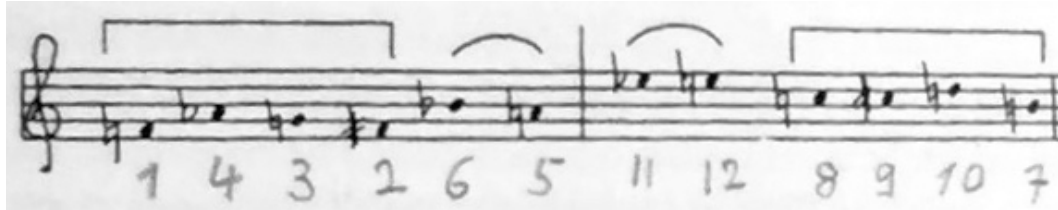
how to serialise a continuum

Basic row: **2** 3 1 4

2 ≈> 388 Hz

how to serialise a continuum

Basic row: 2 3 1 **4**

0 Hz   250 Hz   500 Hz   750 Hz   1000 Hz

750 Hz   812.5 Hz   875 Hz   937.5 Hz   1000 Hz

812.5   828.1   843.8   859.4   875 Hz

843.8 847.7   851.6   855.5   859.4Hz

843.8   844.8   845.8   846.7   847.7Hz

2 ≈> 847 Hz

expl: A. Webern, Symphonie op. 21
1 4 3 2 6 5 11 12 8 9 10 7 (2 parts, Pali)

taken from: Susanne Gärtner,
in: Das Gedächtnis der Struktur

mapped to a frequency range of 30 – 3000 Hz:

- 1 4 3 2 6 5 **11 12** 8 9 10 7 (original)
  - 95.52   816.24   554.92   389.07
    1368.86   1246.26   2745.17   2911.99
    1943.83   2205.98   2381.71   1520.46

- 1 4 3 2 6 5 **12 11** 8 9 10 7 (changed)
  - 95.52   816.24   554.93   389.2
    1370.43   1265.17   **2972.04   2664.49**
    1943.83   2205.98   2381.71   1520.46

- 1 4 3 2 6 **11 5** 12 8 9 10 7 (changed)
  - 95.53   816.31   555.71   398.52
    1482.29   **2607.51   1260.17**   2911.99
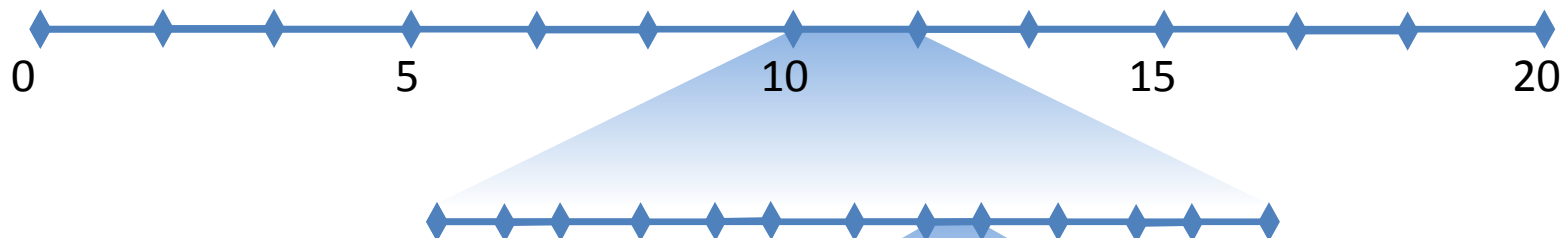   1943.83   2205.98   2381.71   1520.46

expl:
20 notes given

- row with N=24

- row with N=12
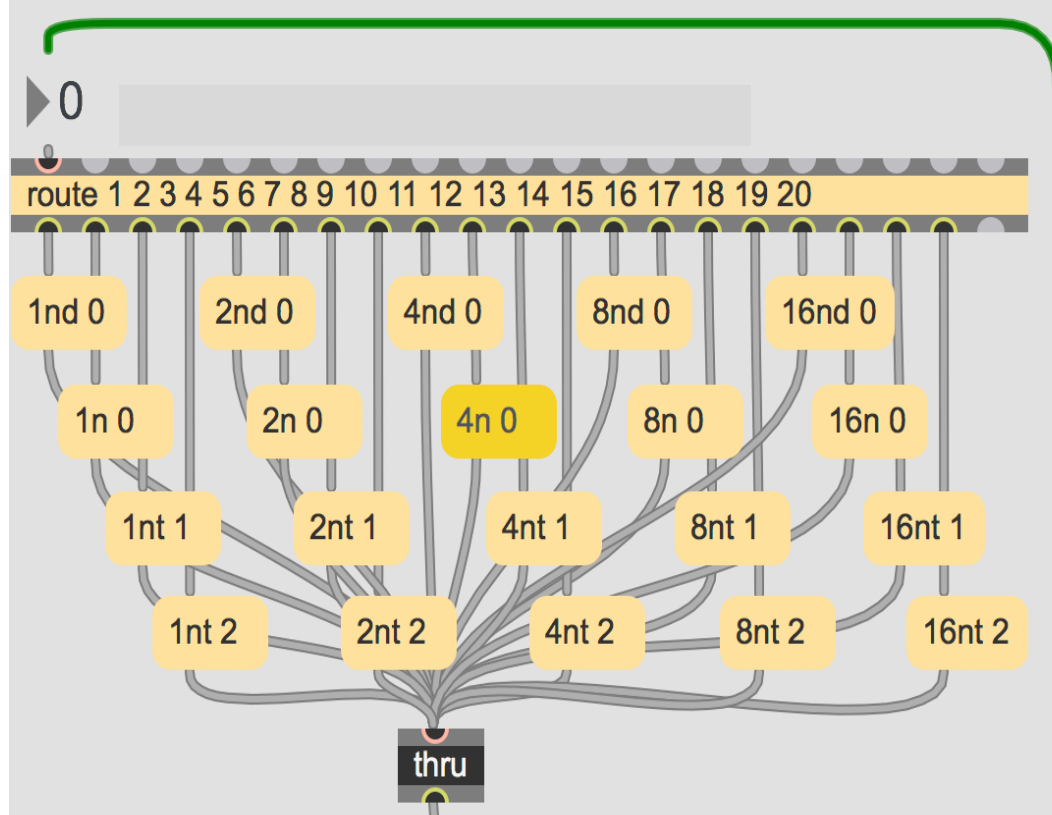
N=12   revers row PB, Sonatine: 7 8 3 11 4 10 9 5 12 6 2 1

number of the entities (notes) of PB', Sonatine: 11 12 5 17 16 14 9 19 9 2 1

spatialisation

- the source position in a 2D-space is defined by x/y, each dimension is determined by a series,

- with b, i, r, ir, there are 12 x/y combinations

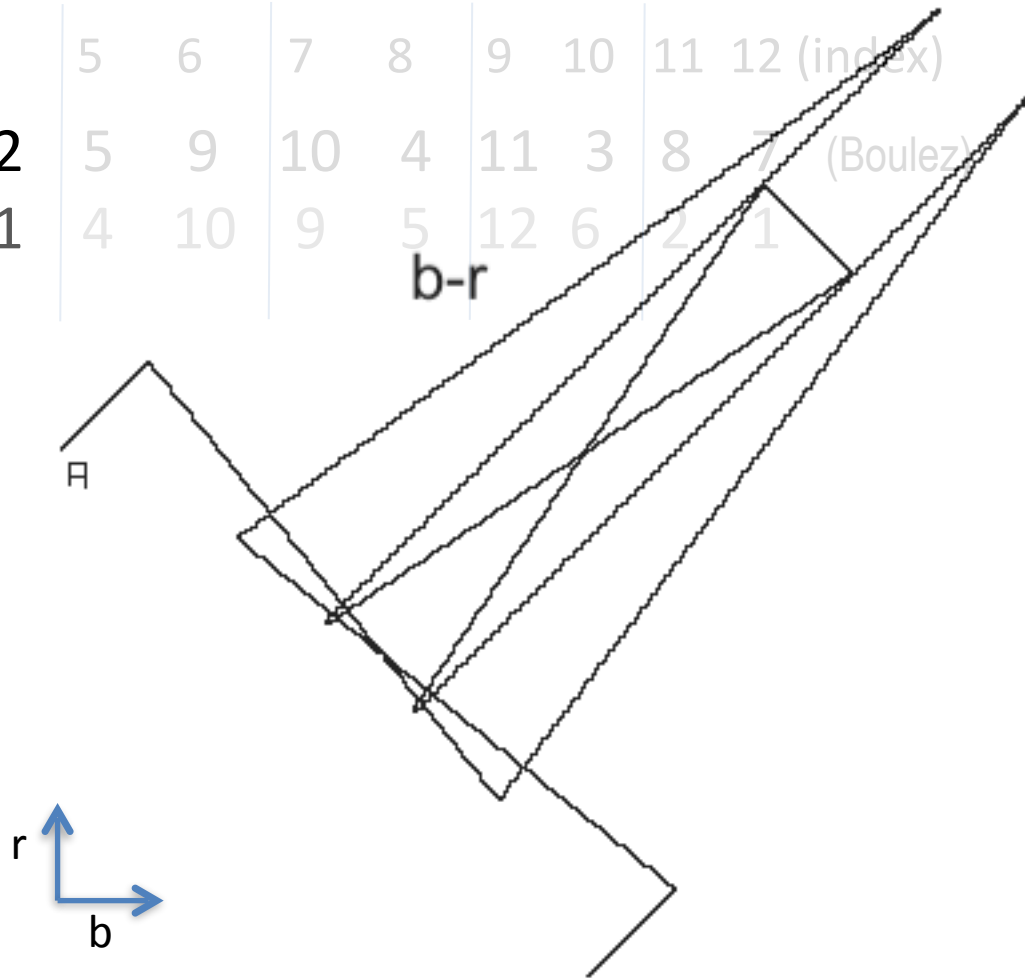- 6 of them, again, are defined by a certain series via serialisation

2.26 m

spatialisation serialised,
expl: P. Boulez, Sonatine

- every source has it's own movement path

- example 1:

1	2	3	4	5	6	7	8	9	10	11	12	(index)

  - **b**asic row:

1	2	6	12	5	9	10	4	11	3	8	7	(Boulez)

  revers row:

7	8	3	11	4	10	9	5	12	6	2	1

spatialisation serialised,
expl: P. Boulez, Sonatine

- every source has it's own movement path

- example 1: 1   2 │3   4   5   6 │7   8 │9   10 │11 12 (index)
  - **b**asic row: 1   2 │6   12 5   9 │10   4 │11   3 │8   7 (Boulez)

    revers row: 7   8 │3   11 4   10 │9   5 │12   6 │2   1

b-r

A

r

b

spatialisation serialised,
expl: P. Boulez, Sonatine
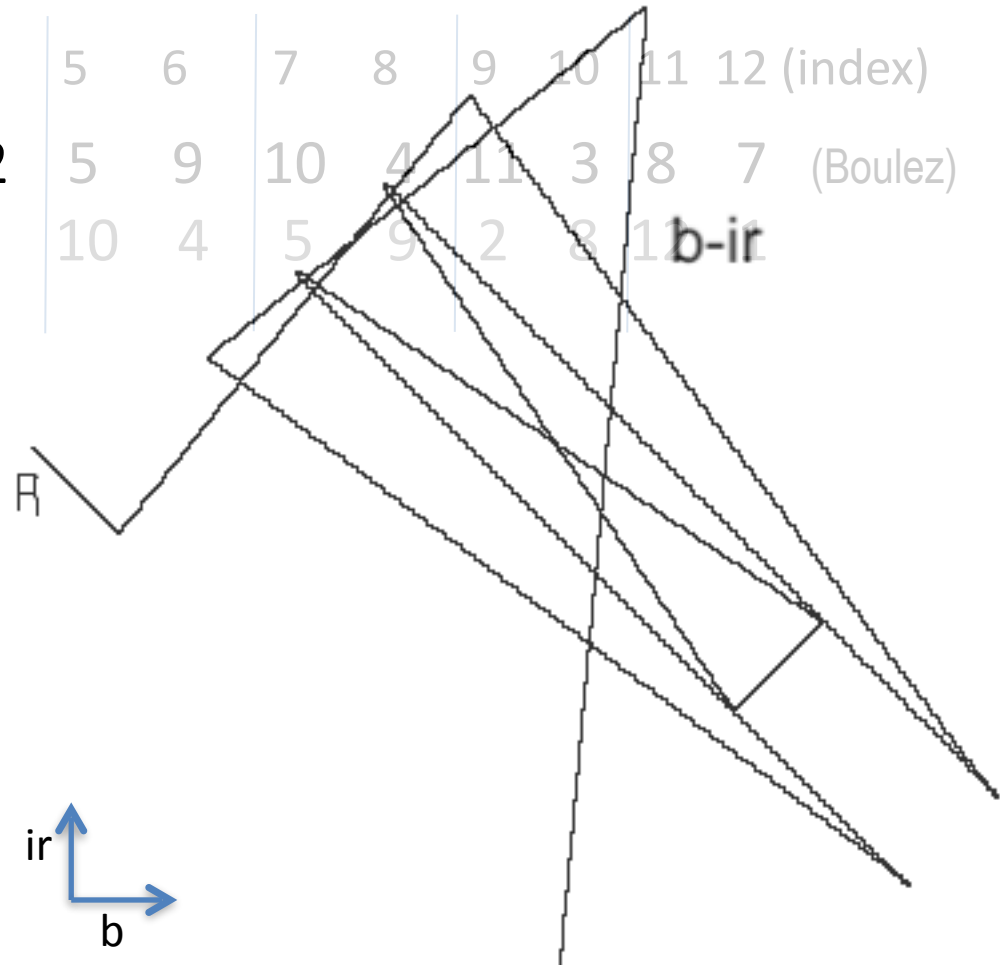
- every source has it's own movement path

- example 2:

index:	1	2	3	4	5	6	7	8	9	10	11	12
basic row:	1	2	6	12	5	9	10	4	11	3	8	7	(Boulez)
inv-**r**ev row:	7	6	11	3	10	4	5	9	2	8	12	1

spatialisation serialised,
expl: P. Boulez, Sonatine

- every source has it's own movement path

- example 2:

(index)	1	2	3	4	5	6	7	8	9	10	11	12
basic row: (Boulez)	1	2	6	12	5	9	10	4	11	3	8	7
inv-**r**ev row: b-ir	7	6	11	3	10	4	5	9	2	8	1	

ir
b

12 possible movements of P. Boulez, Sonatine

1 2 6 12 5 9 10 4 11 3 8 7
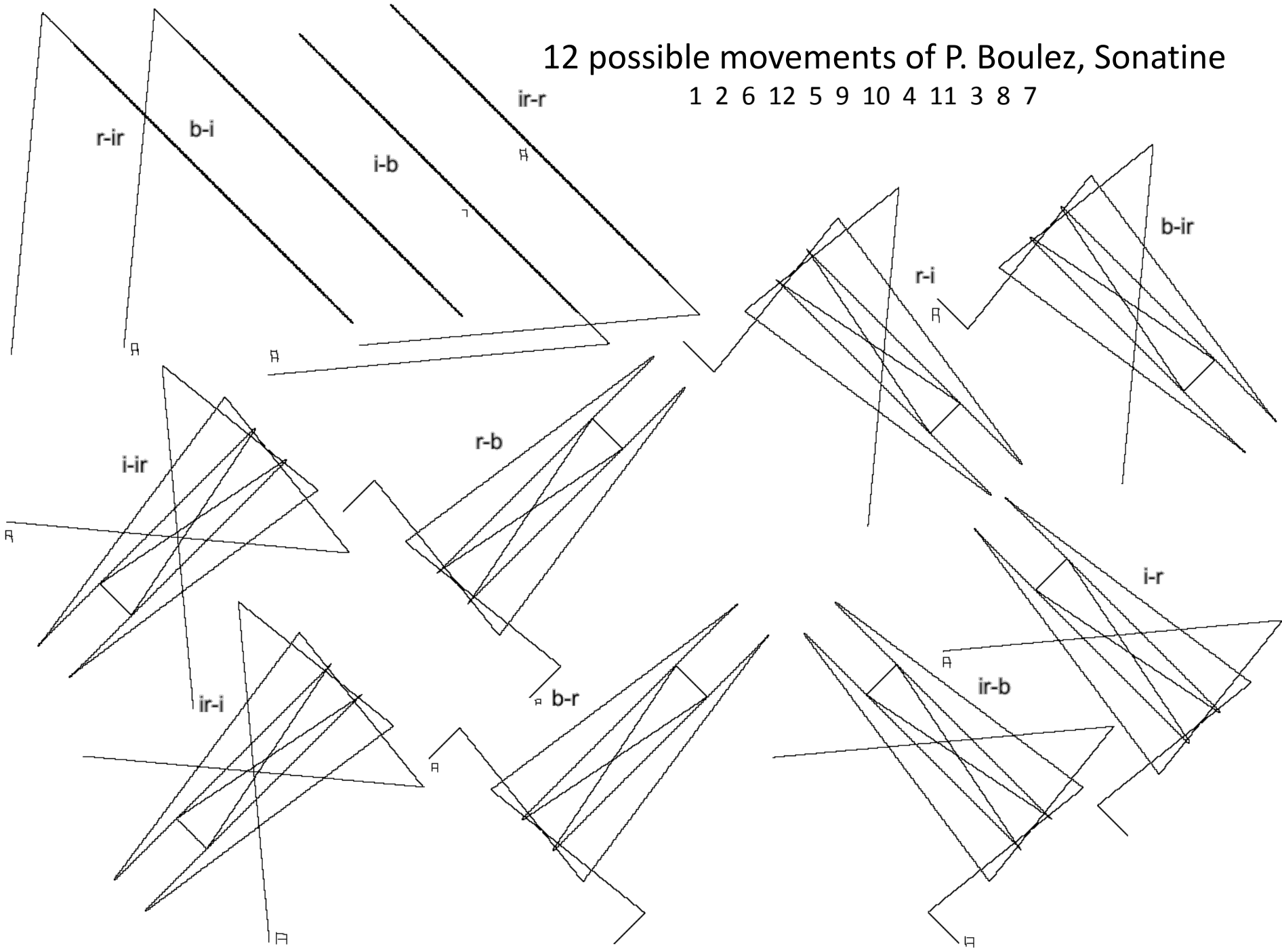
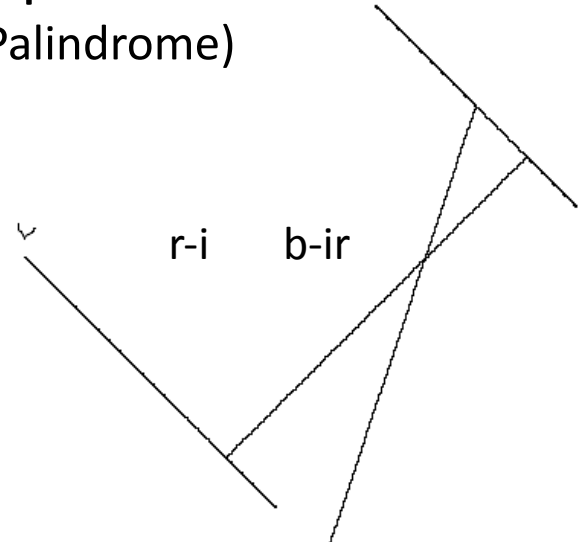# A. Schönberg, Klavierk. op.33a

10 5 12 11 9 6 1 3 7 8 2 4
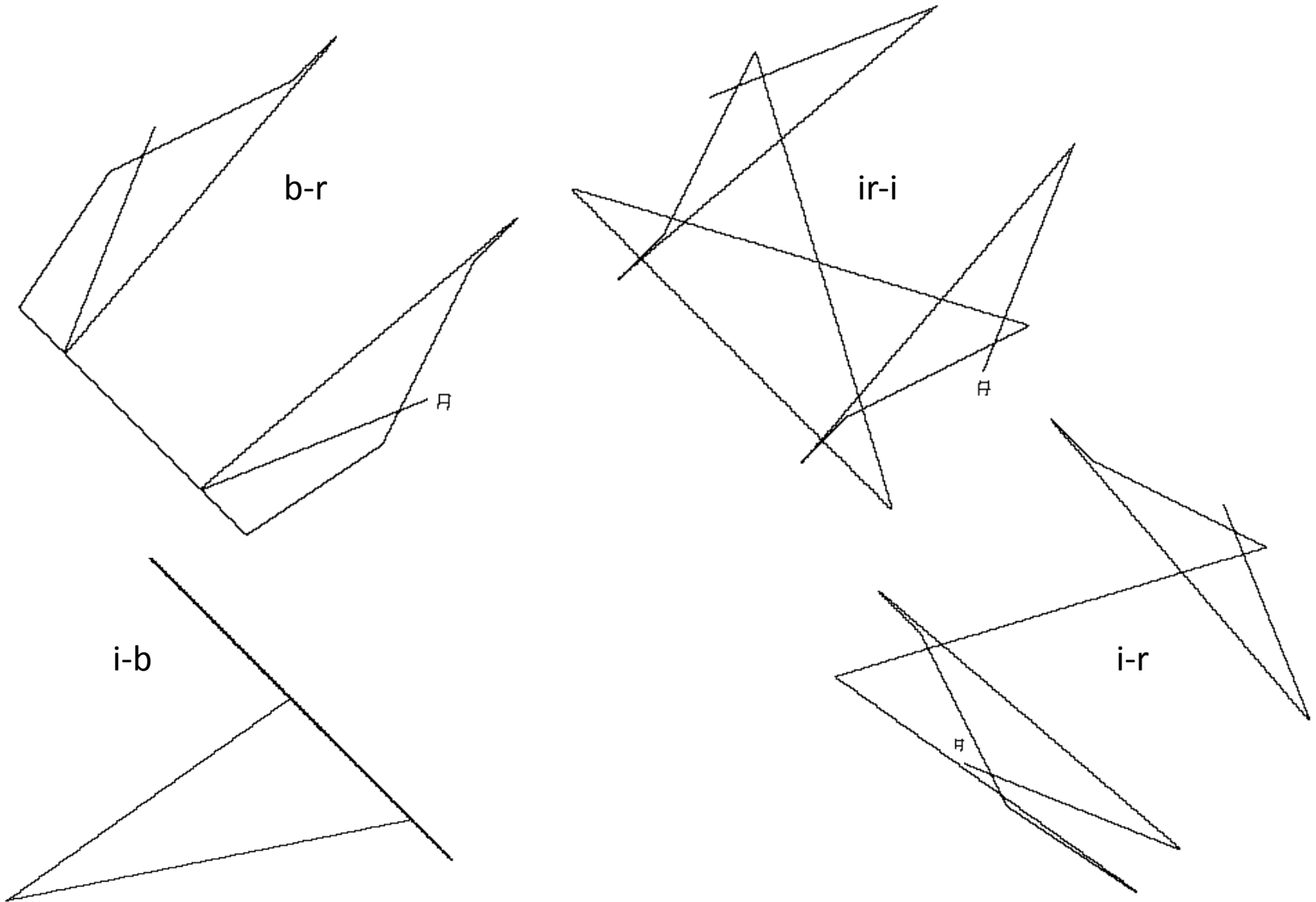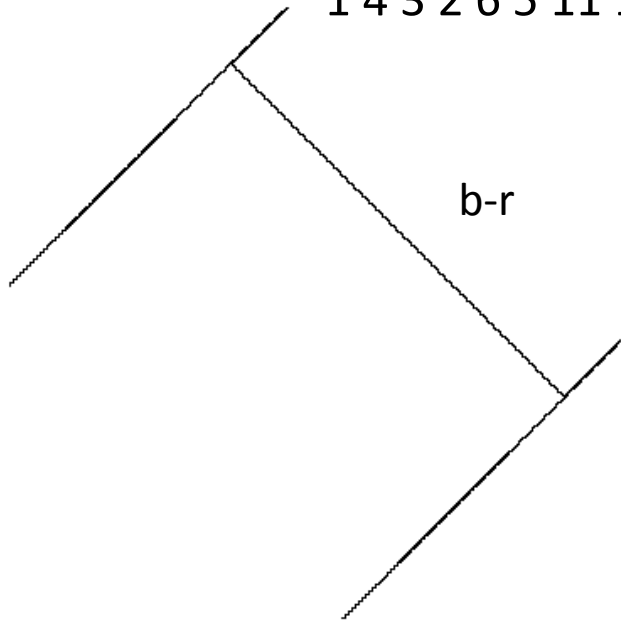
A. Schönberg, Serenate op.24 S5
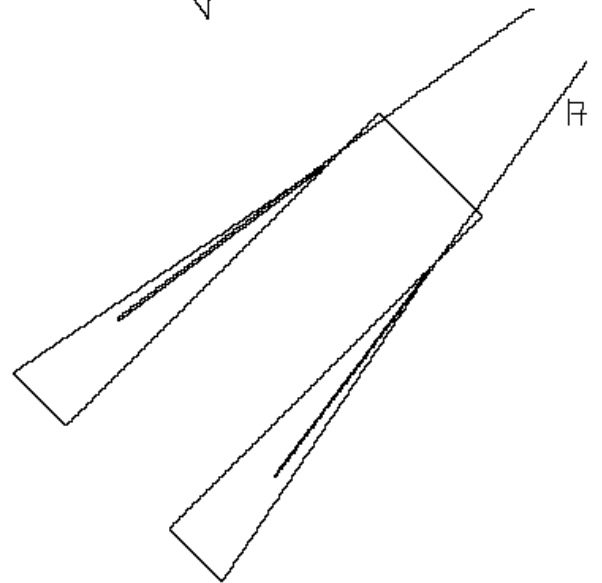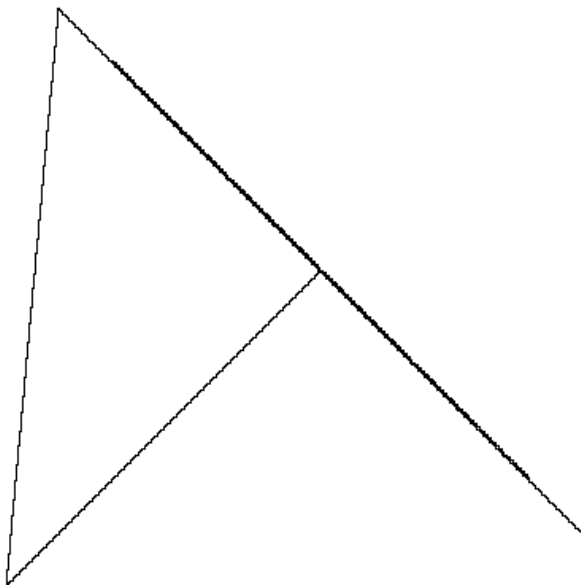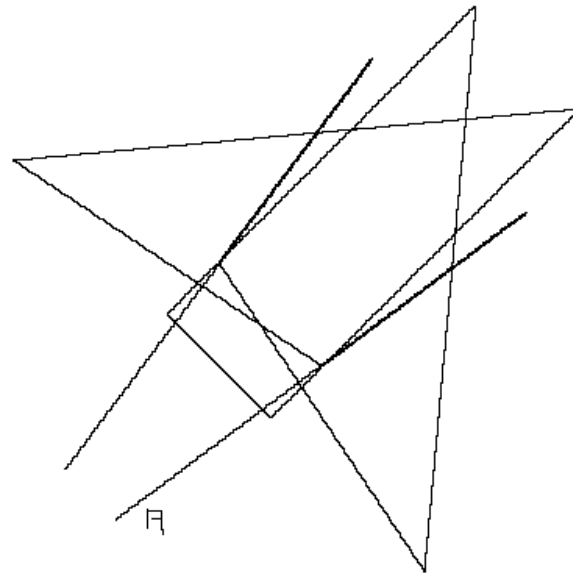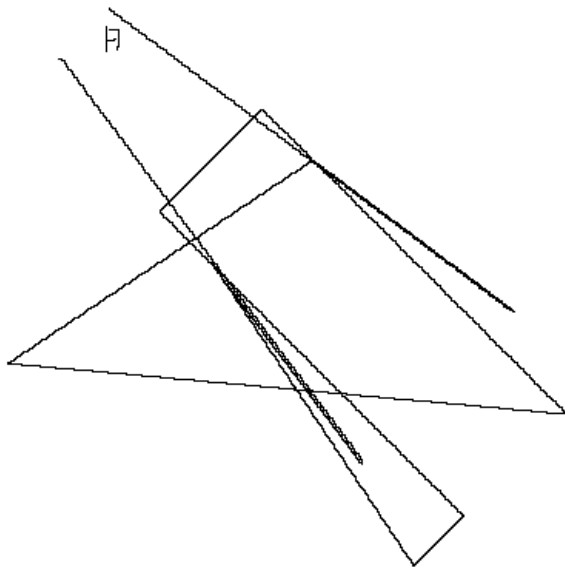10 11 1 4 5 7 6 8 9 12 2 3 (Palindrome invers)
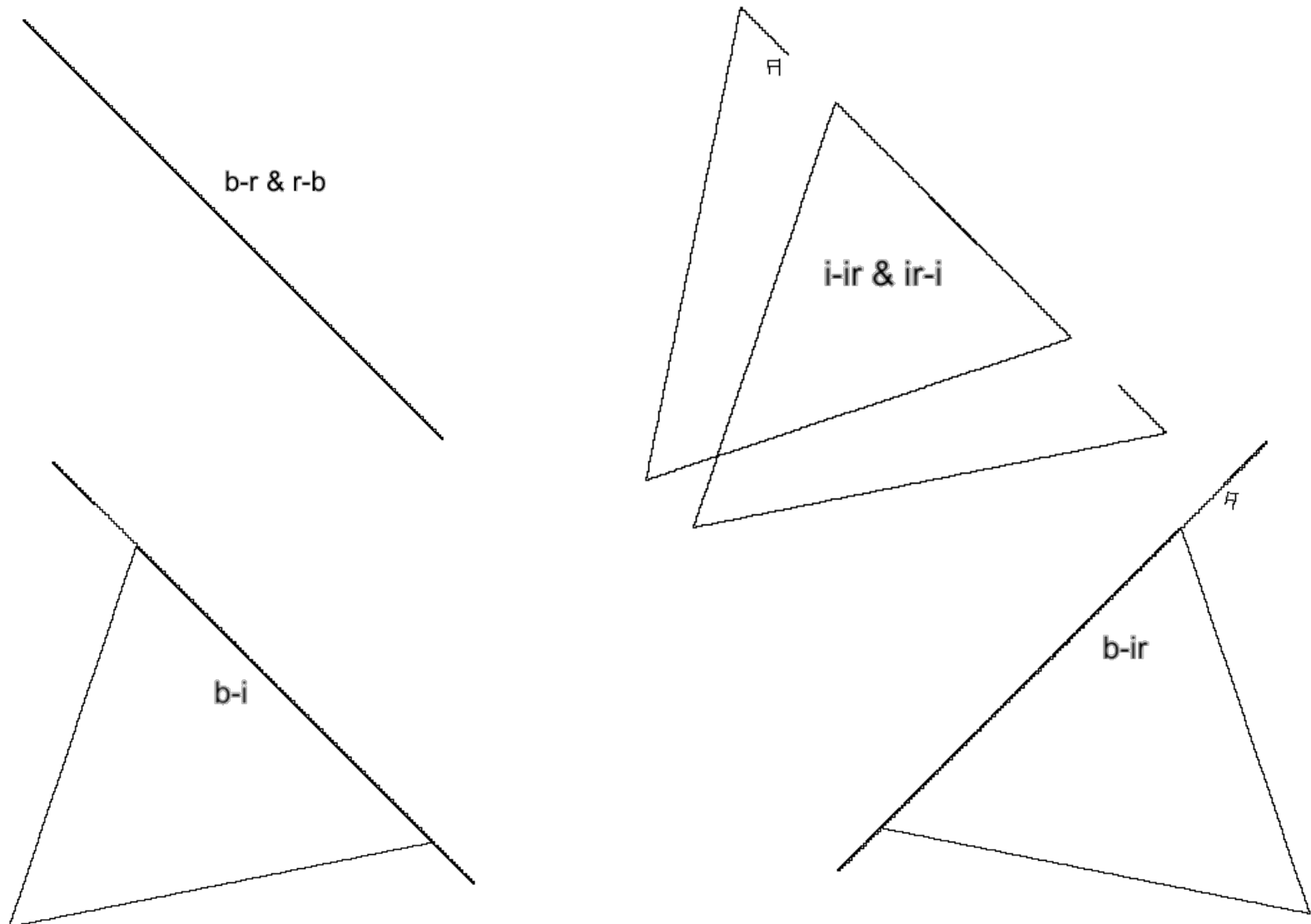
A. Webern, Symphonie op. 21
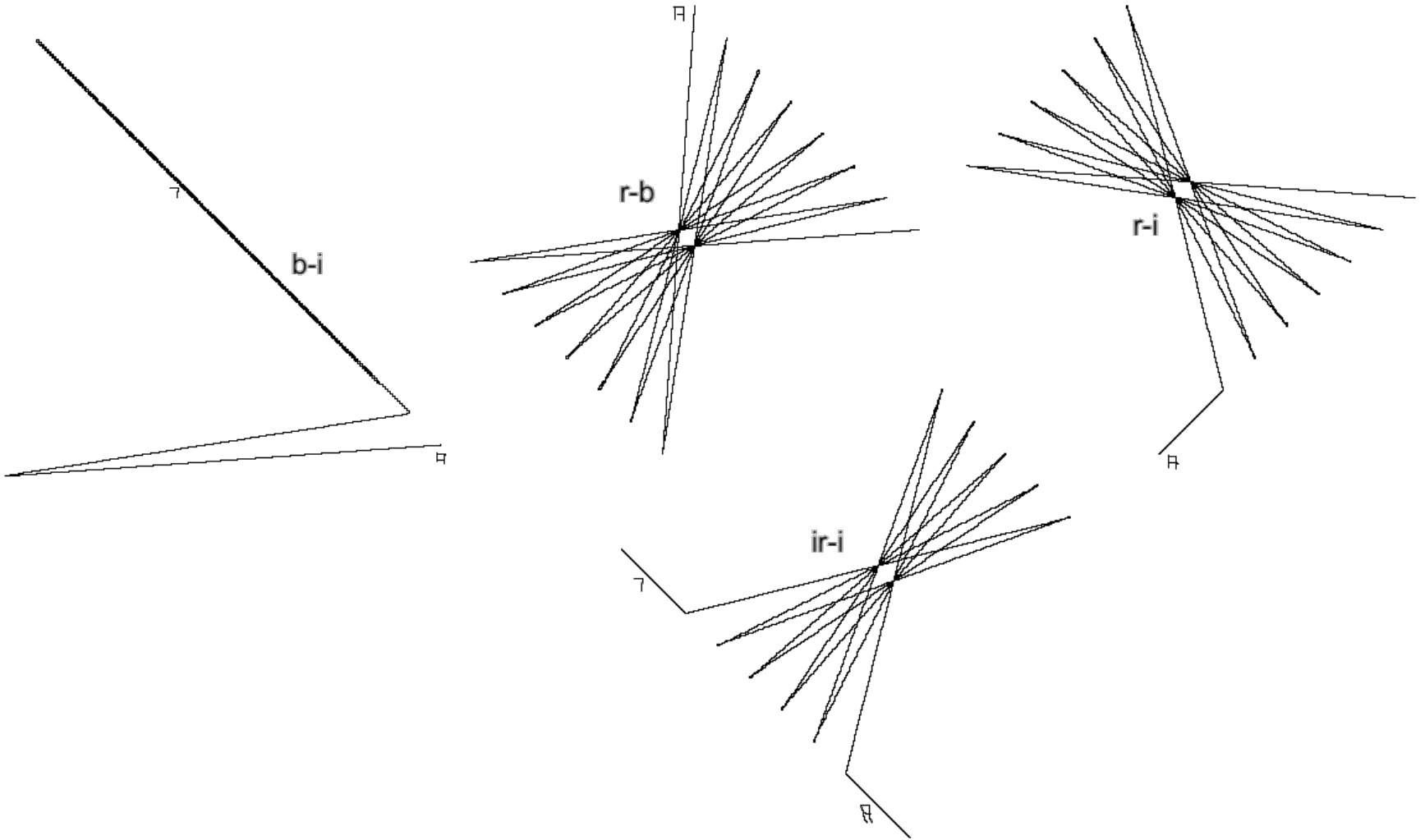1 4 3 2 6 5 11 12 8 9 10 7 (2 parts, Palindrome)

b-r

r-i   b-ir

r-ir

b-i

ir-i
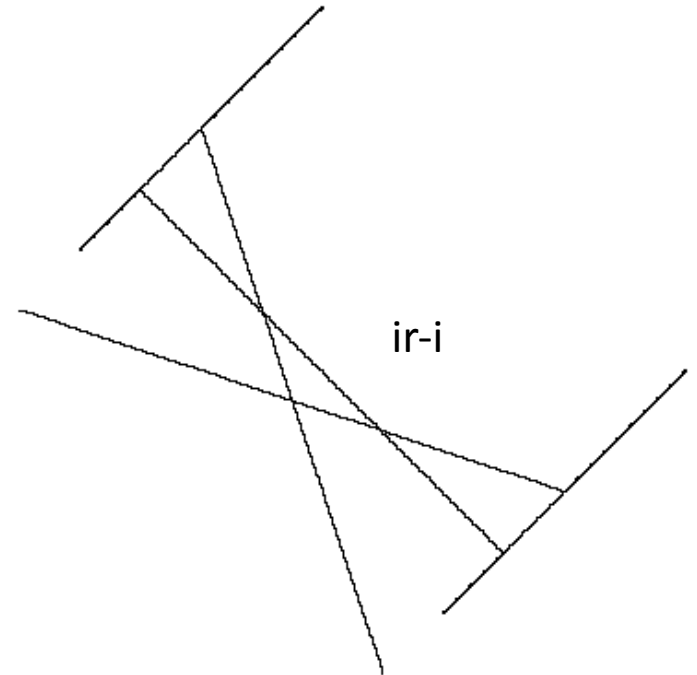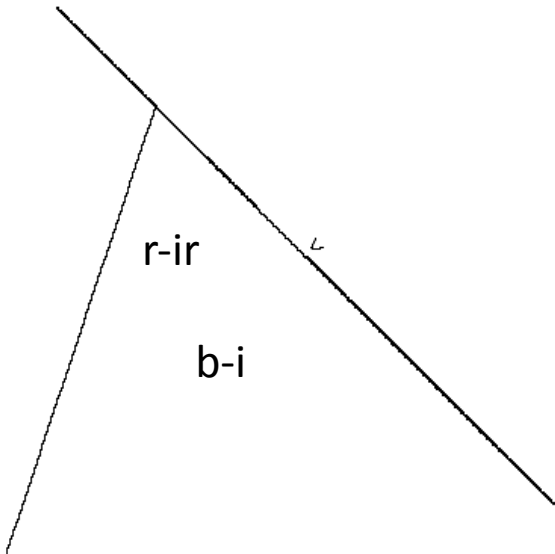
A. Berg, Wozzeck

3 11 7 1 12 6 4 10 9 5 8 2

Flip-Flop

15 1 14 2 13 3 12 4 11 5 10 6 9 7 8 (N=15)

row34

ir-i

i-r
b-ir

i-b
r-ir

b-r

34 envelopes, 2 minutes, of different row length, 2 to 34

24

12

6

3

2
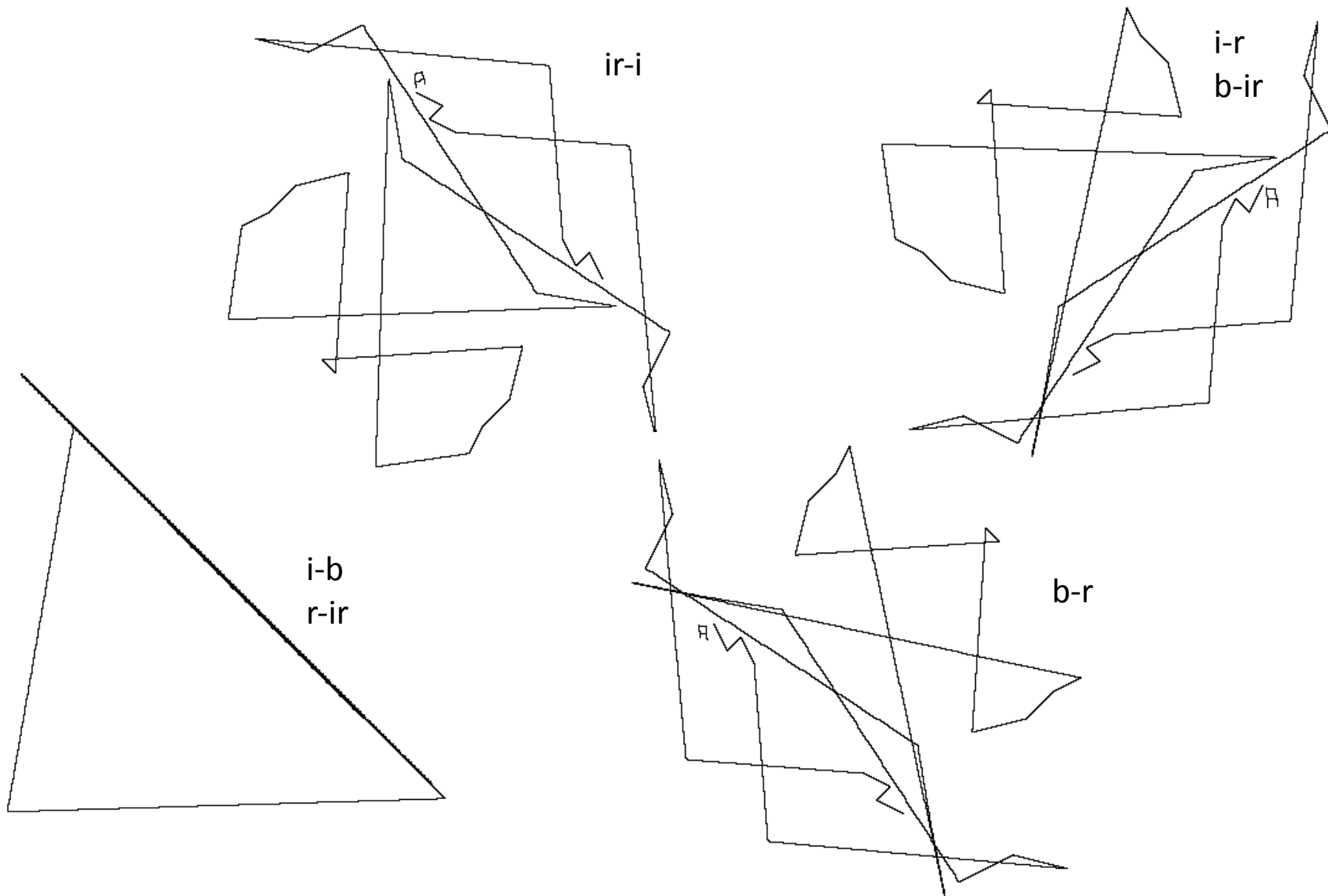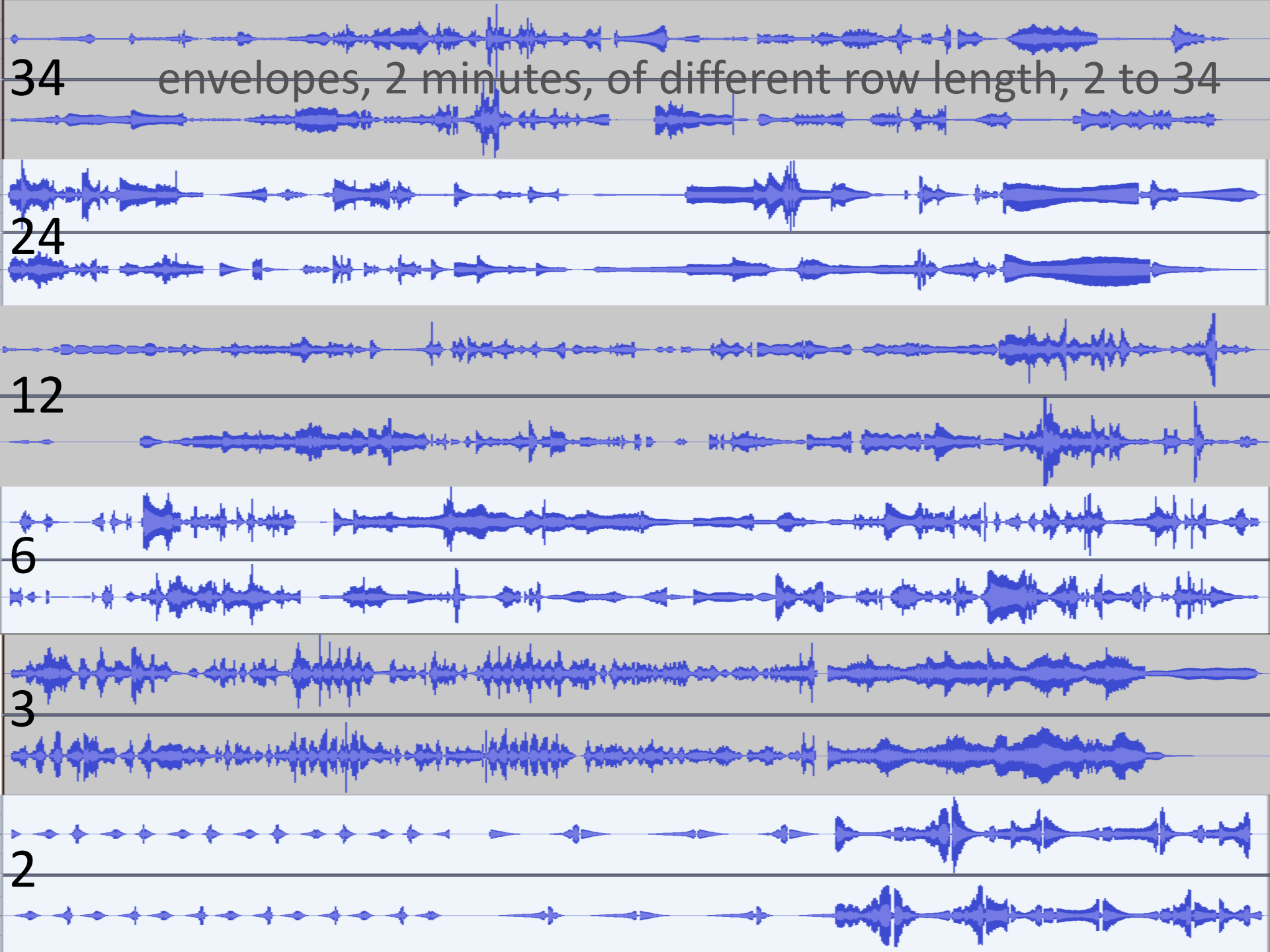
spectralSpread (descriptor), 2 minutes, of different row length, 2 to 34

34

SpectralSpread

24

SpectralSpread

12

SpectralSpread

6

SpectralSpread

3

SpectralSpread

2

how to compose

possibilities:

- developing a complete row
- defining the duration of the piece
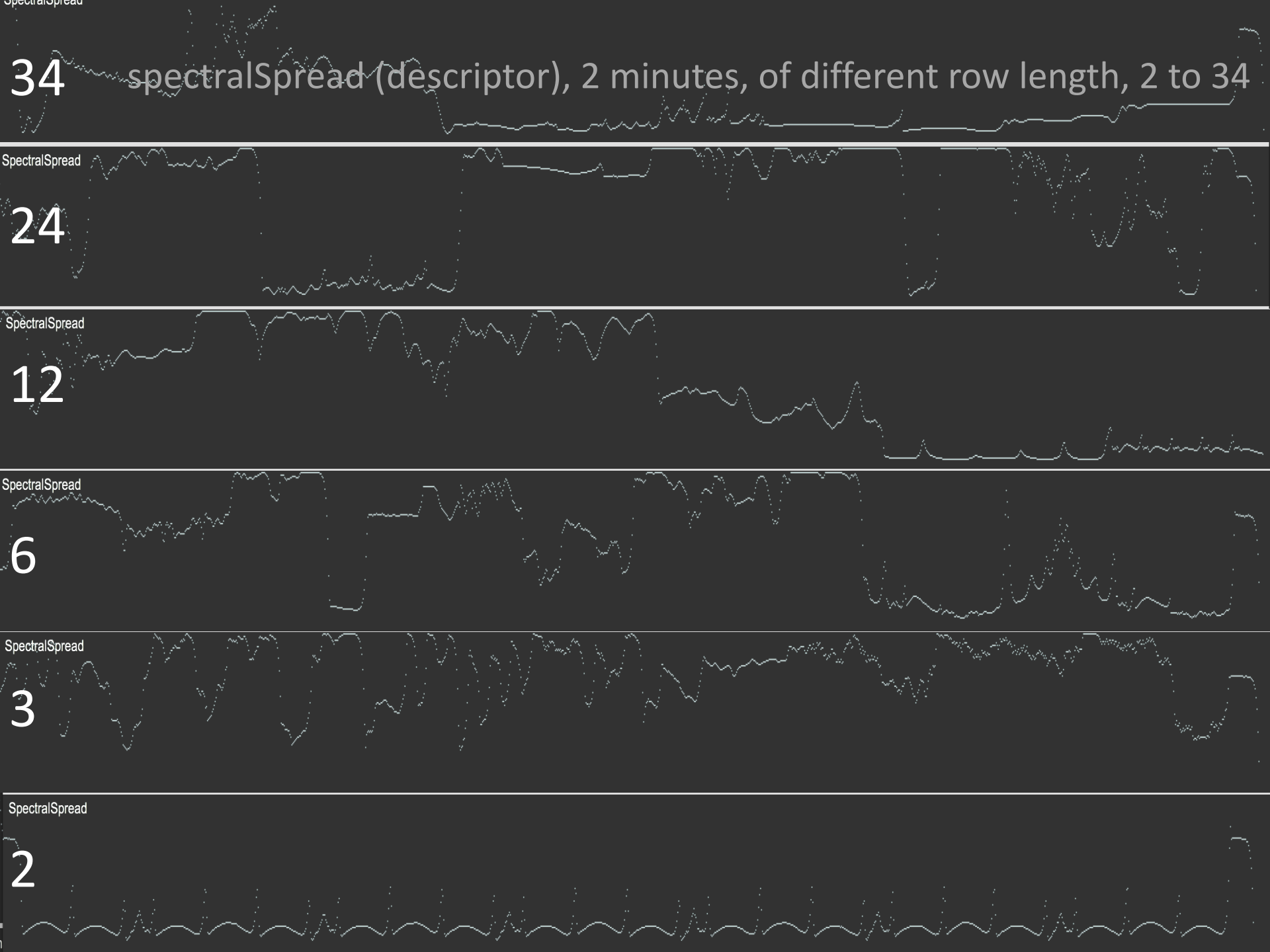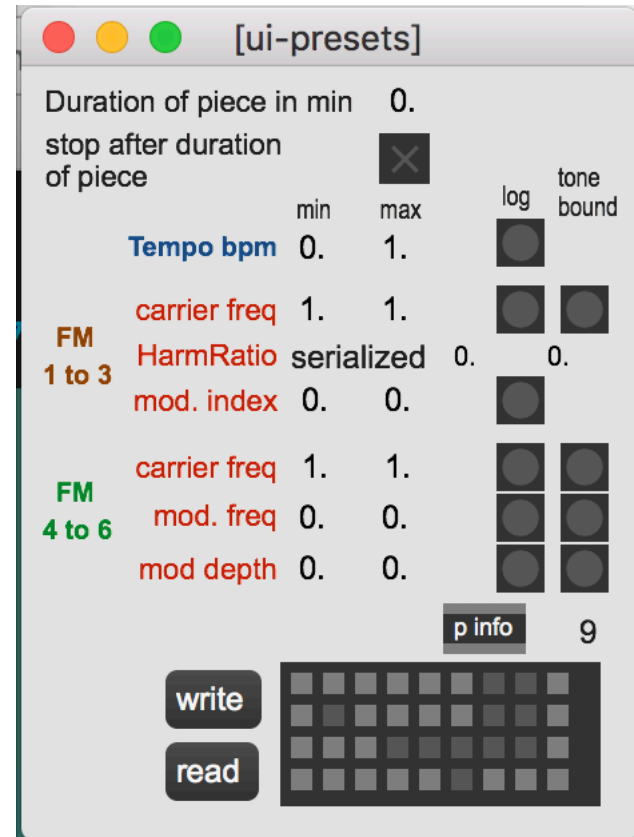- defining the range of tempi
- choosing the range of 5 parameters of FM generators

statements (again)

- in this book, **Pierre Boulez** stated: "serialism was a tunnel of 2 years, to reach virgin soil"

- **Ligeti**: "… the more tight the net of operations with pre-ordered material, the higher the extend of levelling of the results."

- **Lachenmann**: „… subordination of the expressive affects under the aspect of the structural idea … because rigorous ordering systems have been dissolved the usual expressive effects a priori: quasi serialised it away.

- in the end: serialism is not to perceive, so, it sounds somehow random …

—> does extended serialism
extend also randomness un-expressiveness
and down-levelling?

concerning serialism

- Pierre Boulez
  - (in: Musikdenken heute 2): … the global rhythm (of a composition) isn't anymore a periodic organisation with a certain timing but it's a ***statistics of coincidence provoked by structure-parallelism of different parameters.***

conclusions

- there isn't anything in a series to anticipate or predict the resultant music

- more elements, more complex music!

- the tempo touches the abilities of perception: going faster, the awareness changes from distinct via chaotic to a sort of cloud feeling

References

1. **Jungheinrich**, Hans-Klaus, Hg; ***Das Gedächtnis der Struktur.*** *Der Komponist Pierre Boulez.* Symposion, 19. 09. 2009. Edition: Neue Zeitschrift für Musik. Schott Music, Mainz (2010)
2. **Gärtner**, Susanne; **Pierre Boulez' Begegnung mit der zweiten Wiener Schule**. In: Das Gedächtnis der Struktur; s. o.
3. **Finnendahl**, Orm, Hg; ***Die Anfänge der seriellen Musik.*** Reihe: Kontexte, Beiträge zur zeitgenössischen Musik. Institut für Neue Musik, Berlin (1999)
4. **Priore**, Irna; ***Theories of histories of serialism: terminology, aesthetics, and practice in Post-War Europe – as viewed by Luciano Berio.*** Theoria 18. Made available courtesy of the University of North Texas (2011)
5. **Boulez**, Pierre; ***Musikdenken heute 2***. Darmstädter Beiträge zur Neuen Musik VI, hrsgg. von Ernst Thomas, Mainz (1985)
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7. **Lachenmann**, Helmut; ***Komponieren im Schatten von Darmstadt.*** In: Helmut Lachenmann, Musik als existentielle Erfahrung. Breitkopf & Härtel, Wiesbaden (1996)