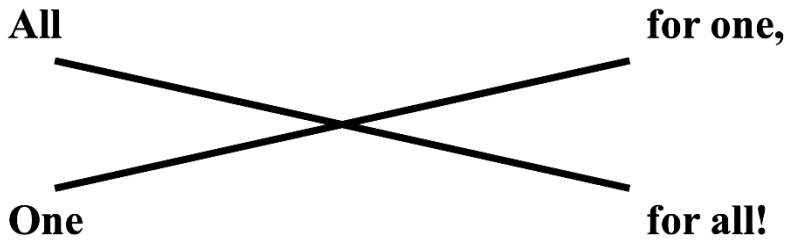
A JOURNAL OF THE SOCIETY FOR MUSIC THEORY

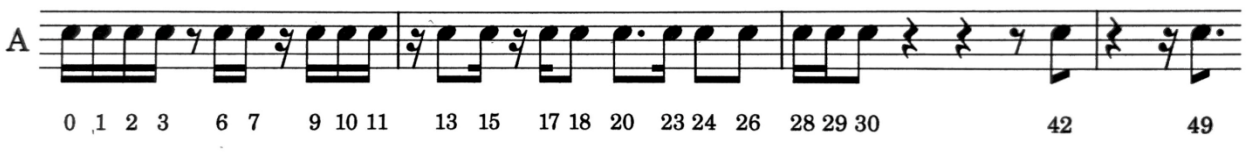
MTO 31.3 Examples: Chang, Symmetrical Structures in Xenakis's *Okho*

(Note: audio, video, and other interactive examples are only available online)
https://www.mtosmt.org/issues/mto.25.31.3/mto.25.31.3.chang.html

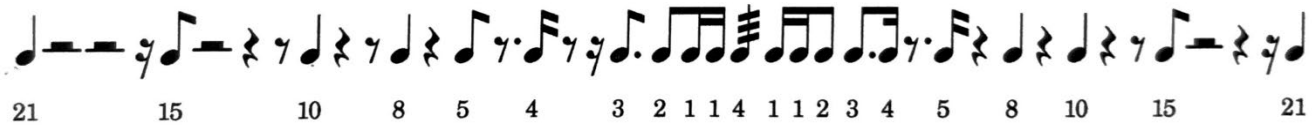
Example 1. Diagram representing chiastic structure from the phrase "all for one, one for all" in *The Three Musketeers*



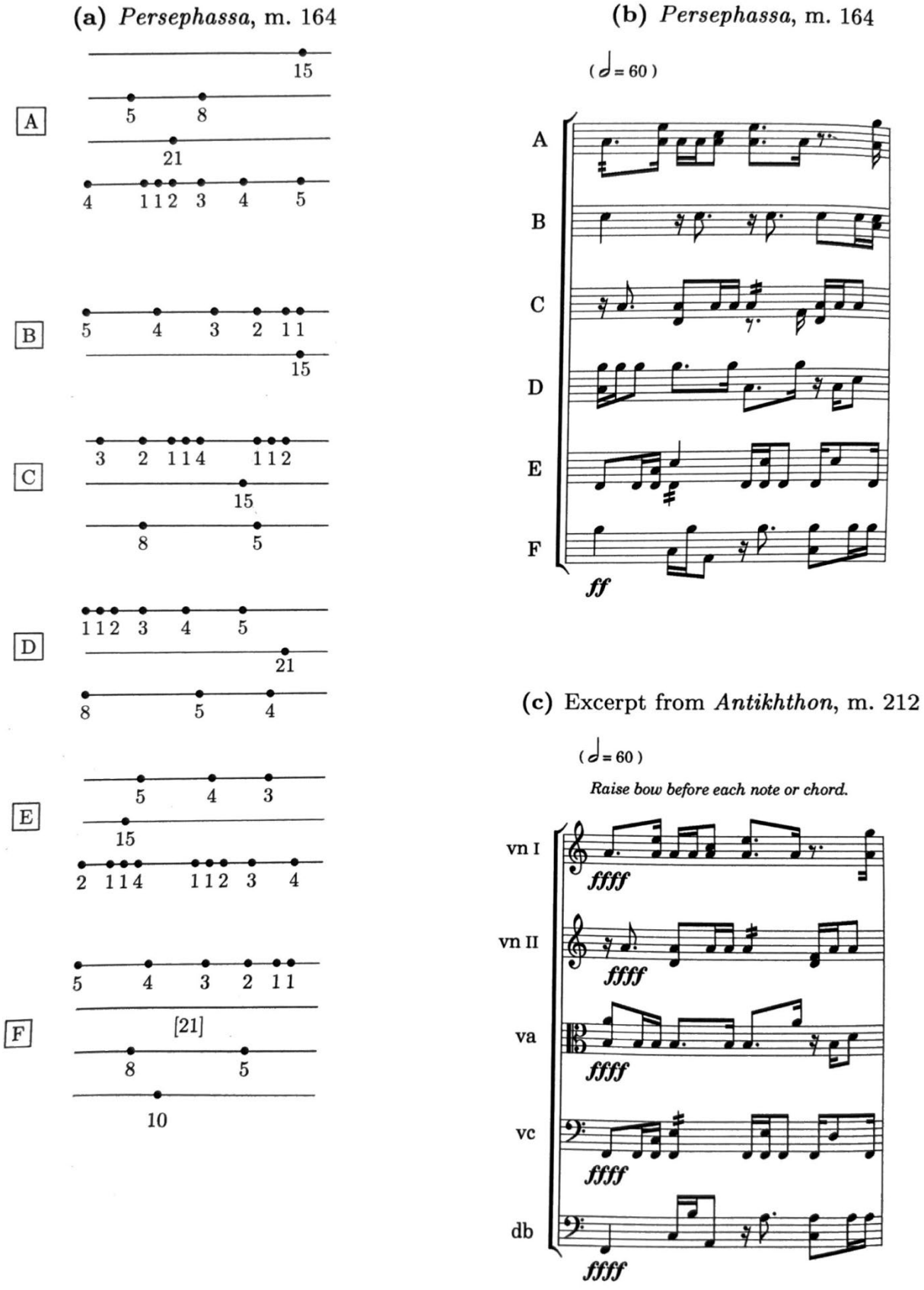
Example 2. Reproduction of Gibson's Example 6.1 (2011, 104) analyzing an excerpt of *Persephassa* (m. 222)



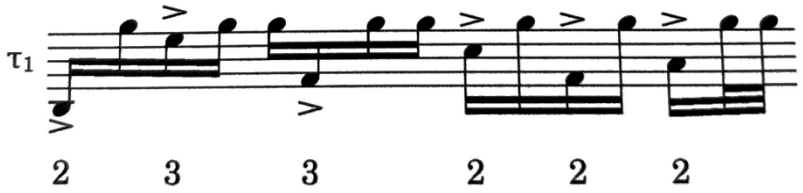
Example 3. Reproduction of Gibson's example (2011, 45) of the rhythmic pattern from *Synaphaï*



Example 4. Reproduction of Gibson's Example 3.7 (2011, 46), drawing parallel between *Persephassa* and *Antikhthon*



Example 5. Reproduction of Gibson's Example 3.11 (2011, 54), drawing the pattern T_i of *Idmen B*

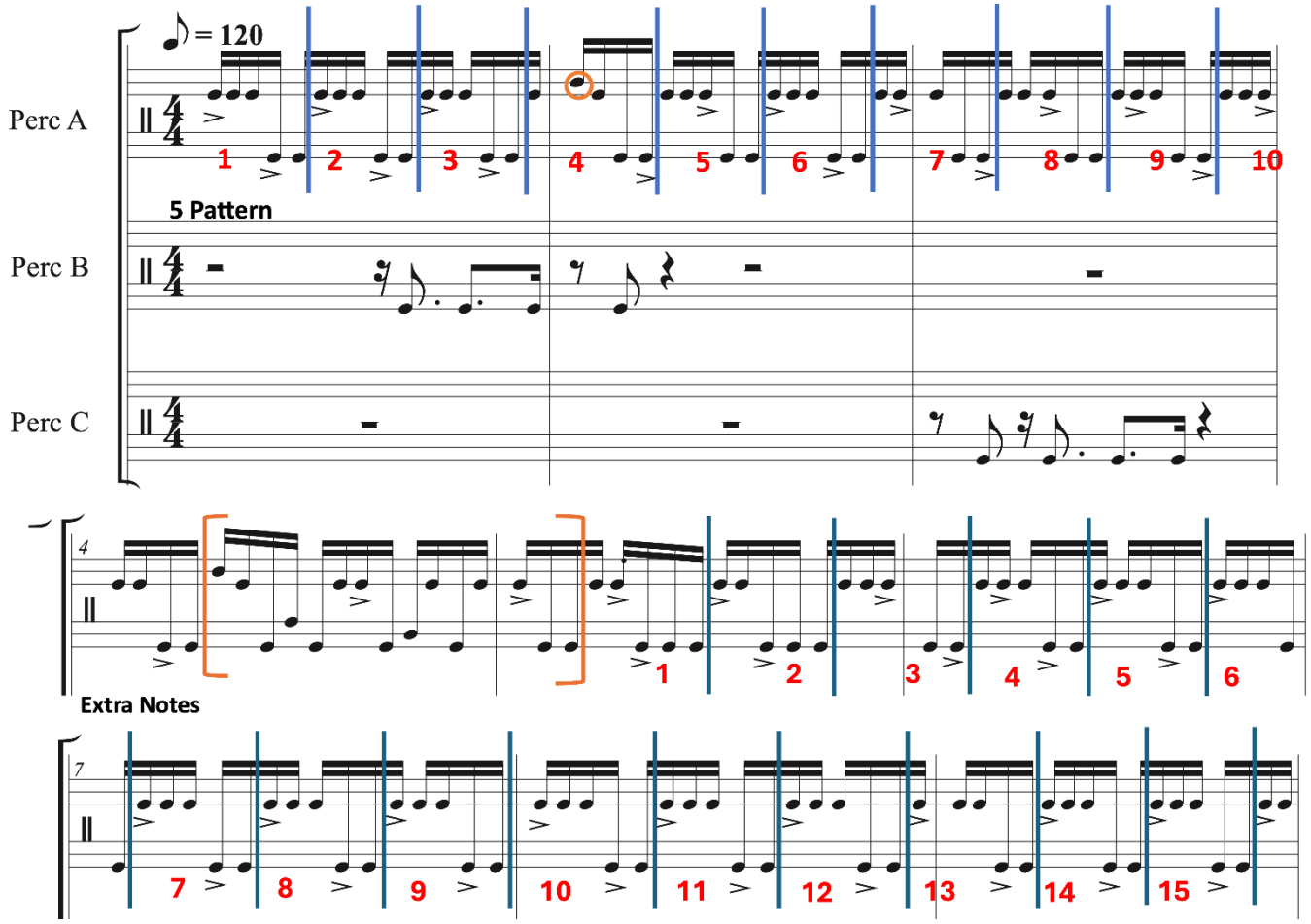


Example 6. Types of symmetrical structures presented according to their orders

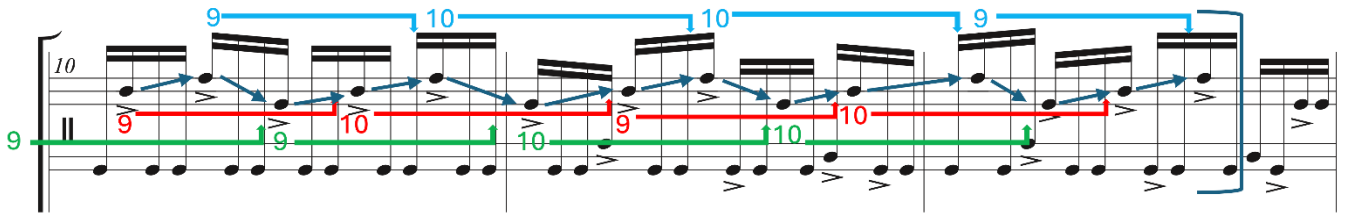
Type	Order	Characteristics	Reference
Palindromic	1st	Each timbre is considered individually in the analysis when calculating sieve sequences	Gibson, Example 3.7
Chiastic Palindromic	2nd	Groups of timbres are incorporated into the analysis when calculating sieve sequences	Gibson, Example 3.11, 3.13
Chiastic	3rd	Large-scale structures combining multiple secondary order structures	

Example 7. Two primary striking spots on the drum. The green dots indicate its precise location. The palm strikes the center of the djembe to emit the fundamental frequency in the bass range. For *Bord* notes, only the finger strikes the edge to emit the upper partials of the drum.

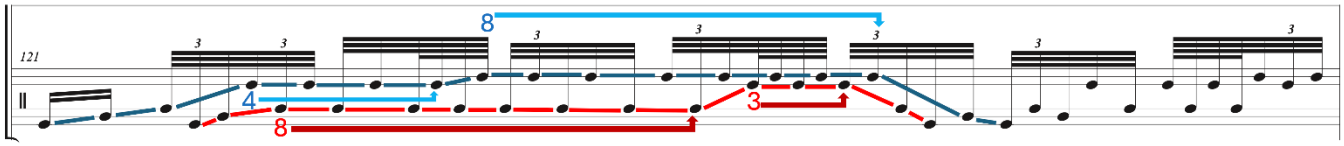
Example 8. First 10 measures of *Okho* (1989). Note the change of timbre for player A when player B finishes in m. 1. Also note the one-note extension after player C ends their first gesture in m. 3.



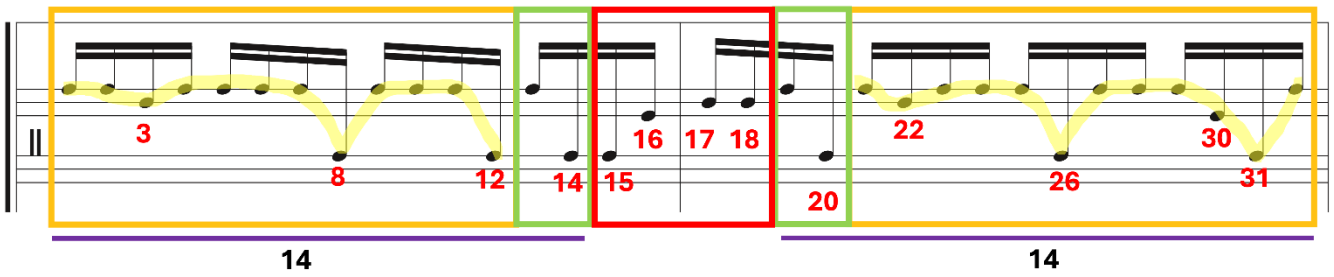
Example 9. Palindromic sequence hidden within player A in mm. 10–13. The distance between each *bord claqué résonnant* is marked by light blue lines and is represented numerically corresponding to the number of sixteenths.



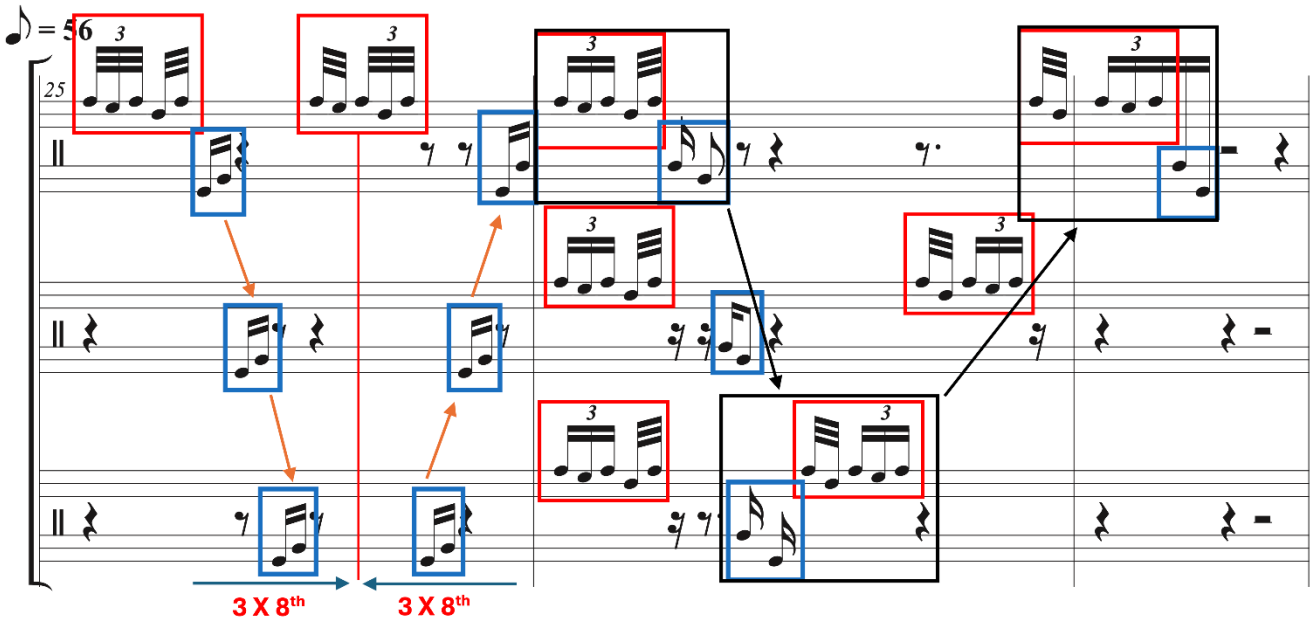
Example 10. The final symmetrical structure for player C in m. 121. The two arcs reveal a similar number of repeating timbres. Numeric sequences formed by the upper and lower arcs are almost opposed to each other.



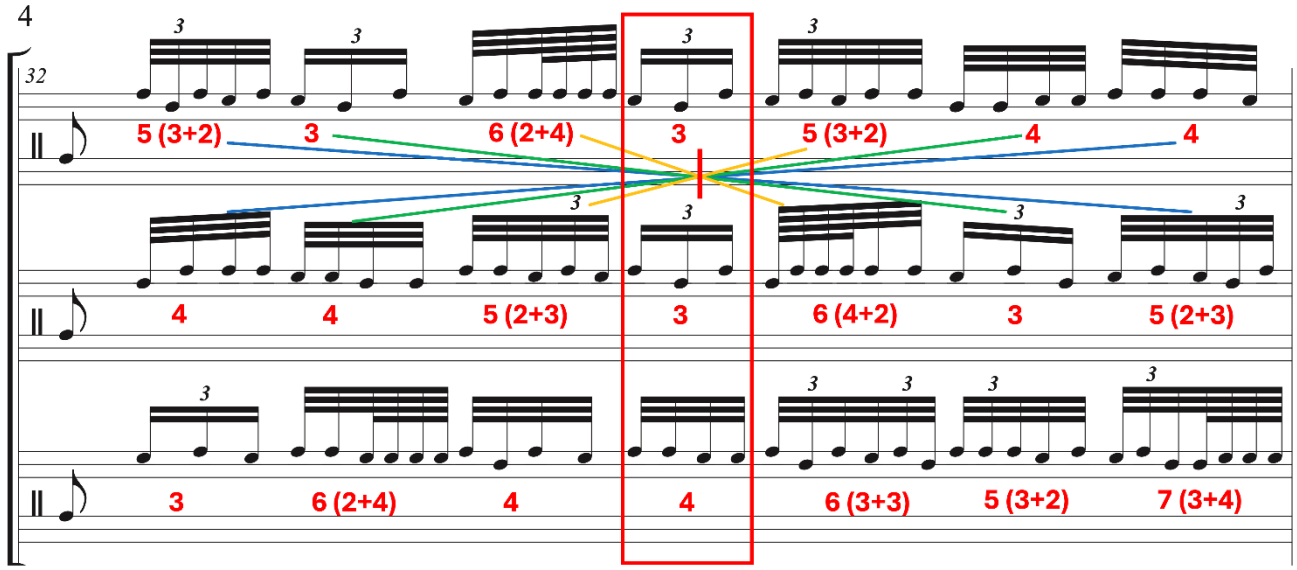
Example 11. Chiastic structure embedded in the solo part for player B in mm. 16–17. The red numbers indicate the position of each sixteenth note relative to the beginning of m. 16. The yellow rectangles reflect thematic similarity based on sporadic deviations of timbres from the uppermost line. The two sixteenth notes in green boxes surround the core of the chiasmus, indicated by the red box. The purple line and the number below represent the total number of sixteenths before and after the red segment (14).



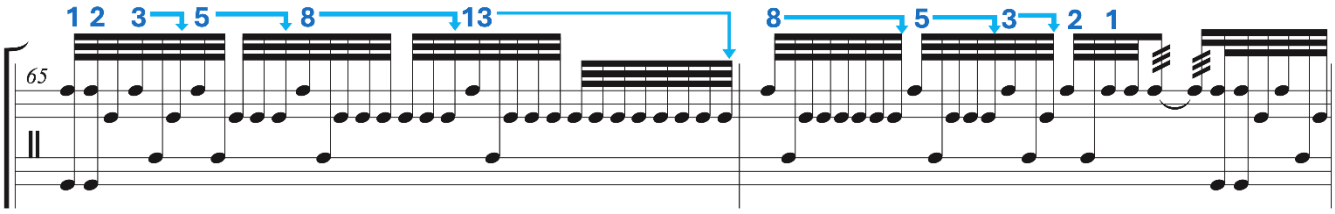
Example 12. Chiastic structure embedded within three parts in mm. 25–26. In m. 25, there are three eighth notes from the edge of the chiasmus to the center. In m. 26, the rhythmic elements of chiasmus are highlighted with a black box.



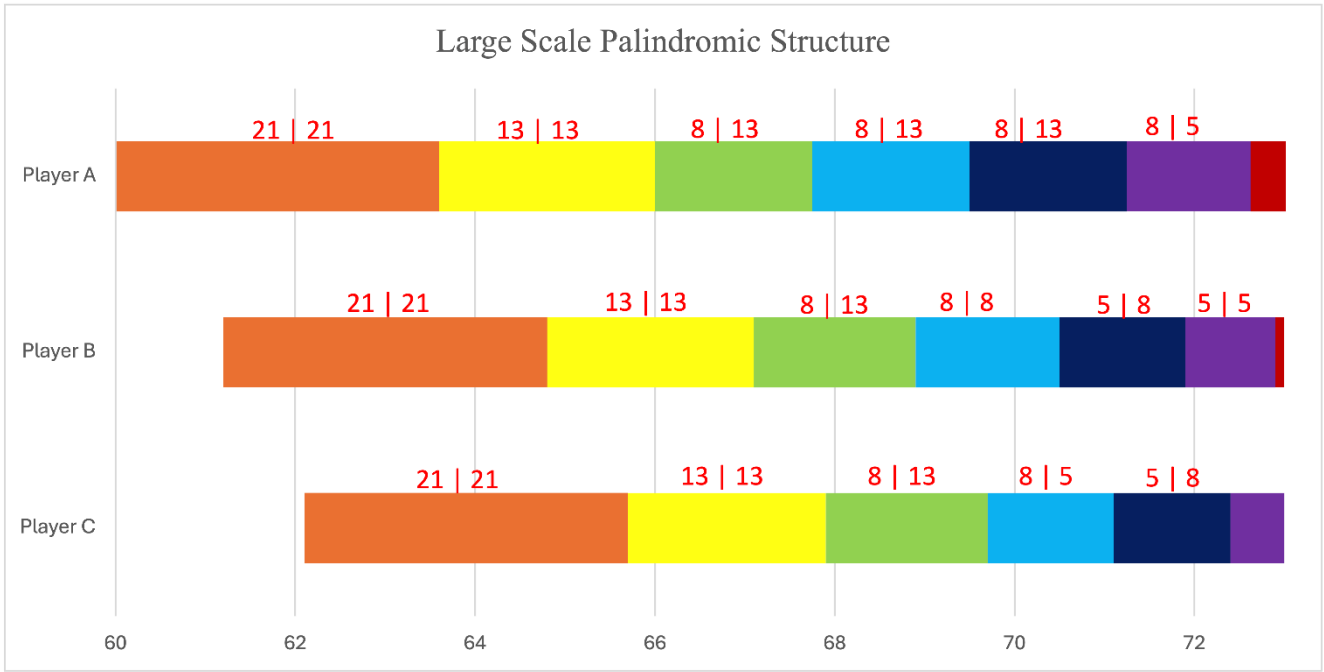
Example 13. Chiasmus embedded within player A and B in m. 32. Numbers of notes played in each 8-note grouping are marked below their rhythms. Note the difference in how rhythms are manipulated to avoid unison textures between parts. An example is the fifth eighth-note segment, which has 5, 6, 6 for each player, but the rhythms are arranged differently for players B and C.



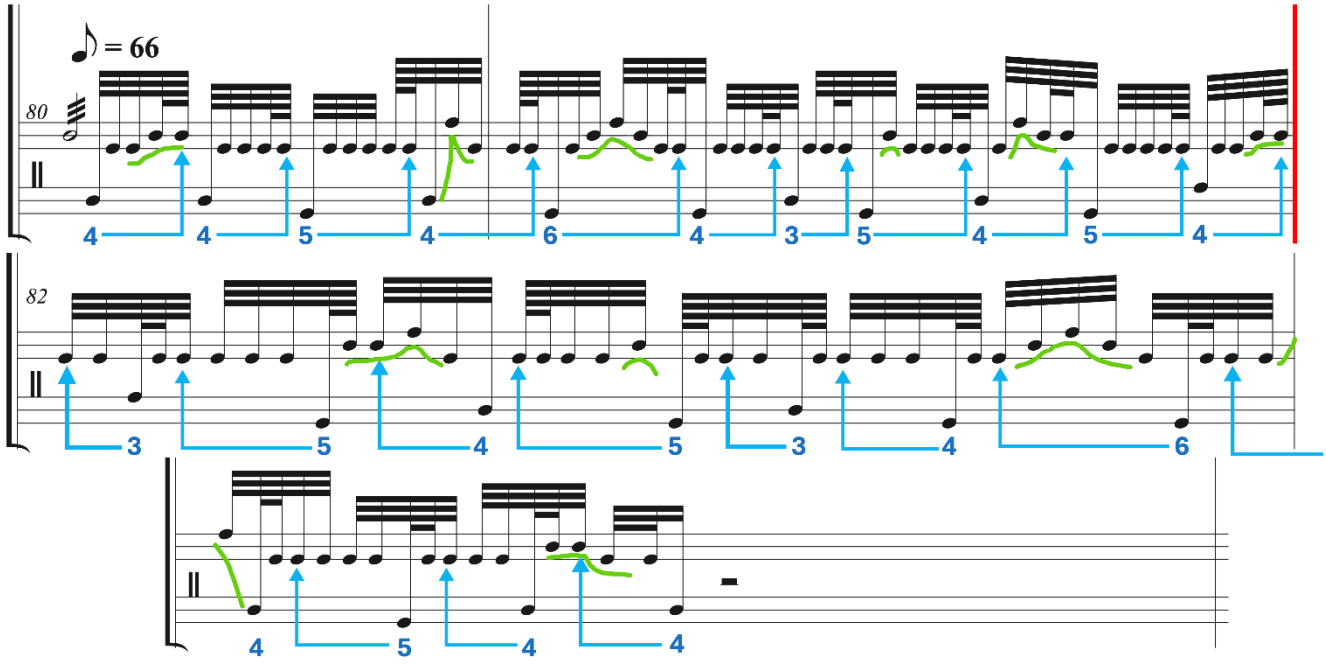
Example 14. How the palindromic structure starting from sequence 13 would lay out in two measures (mm. 65–66). The blue numbers indicate the amount of thirty second notes starting from the *bord claqué résonnant* before its next reoccurrence.



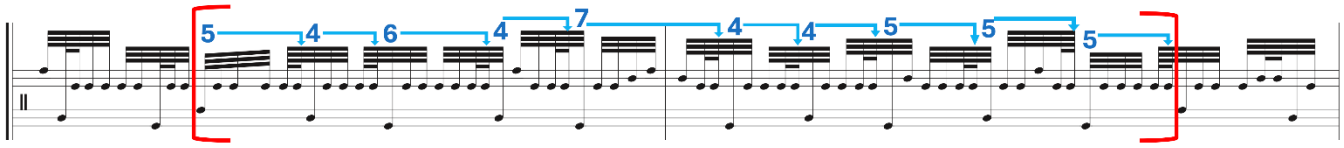
Example 15. A chart depicting the large-scale form in mm. 60–74. The x-axis represents the measure number, while the y-axis represents performers. The numbers indicate the starting and ending numeric sequences, descending to 1 and subsequently ascending back to the respective sequence. All performers exhibit similarities in the first three sequences. After, player A repeats the latest sequence two more times, while players B and C diminish their sequences further to eventually meet at m. 73.



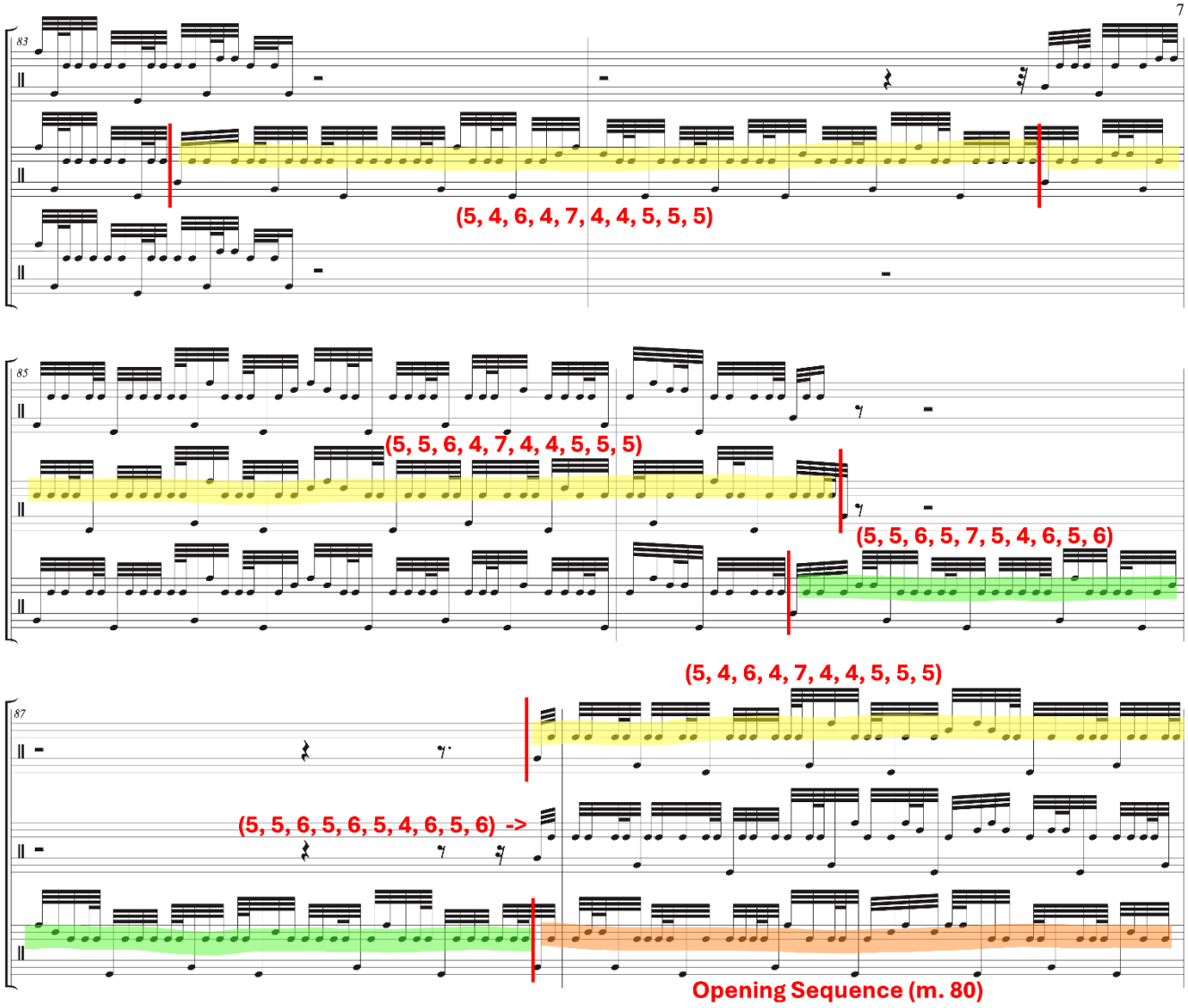
Example 16. Analysis of player C from mm. 80–83. Timbre changes are indicated in green. The numbers represent how many thirty second note-durations there are before the next *basse* note. Note that 32nd-note durations may be represented by two 64th notes, contrary to the beginning where the durations are unified as one 16th note.



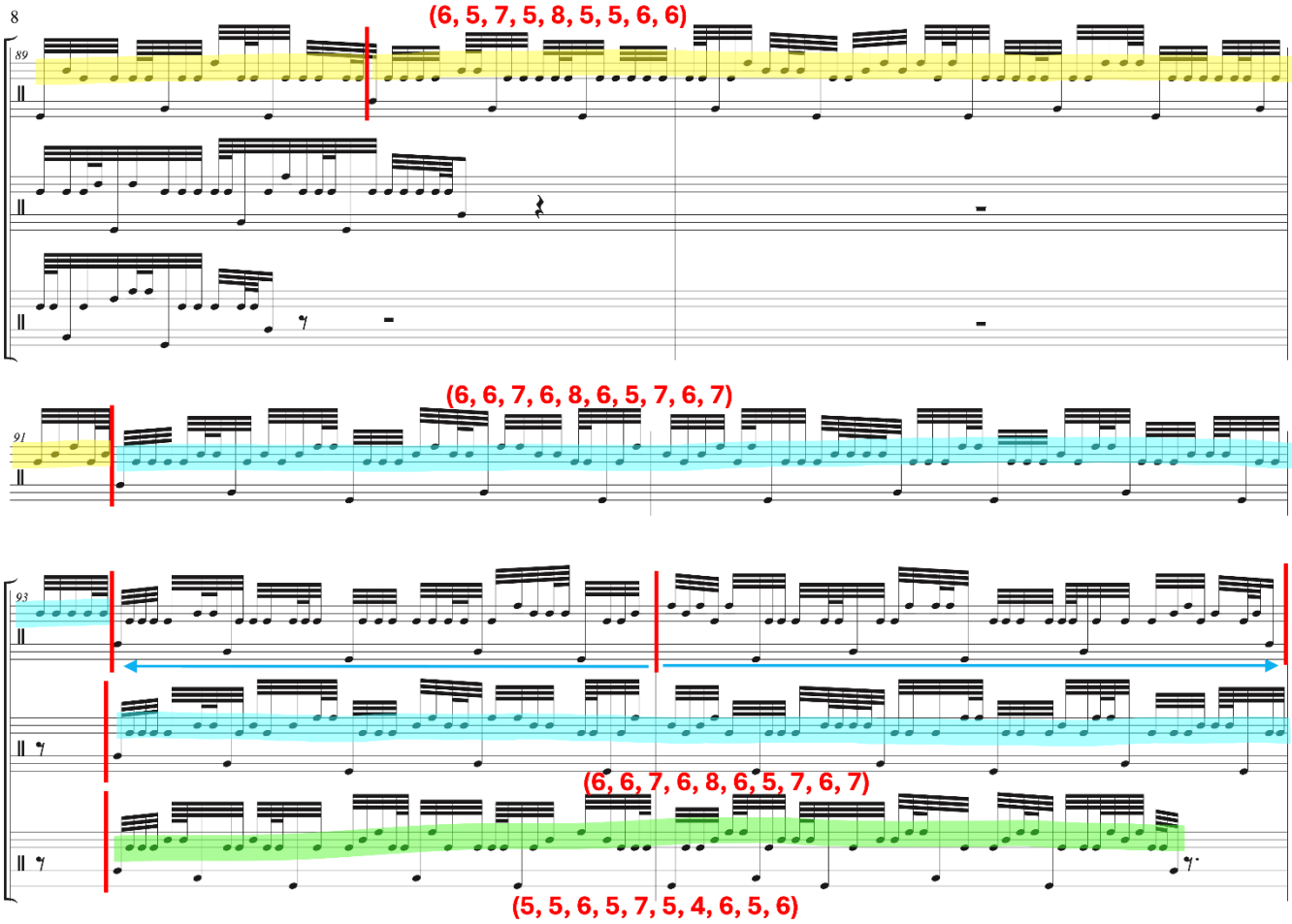
Example 17. The primary structure shown through player B's solo in m. 83. The blue numbers represent intervallic structures starting from each *basse* pitches.



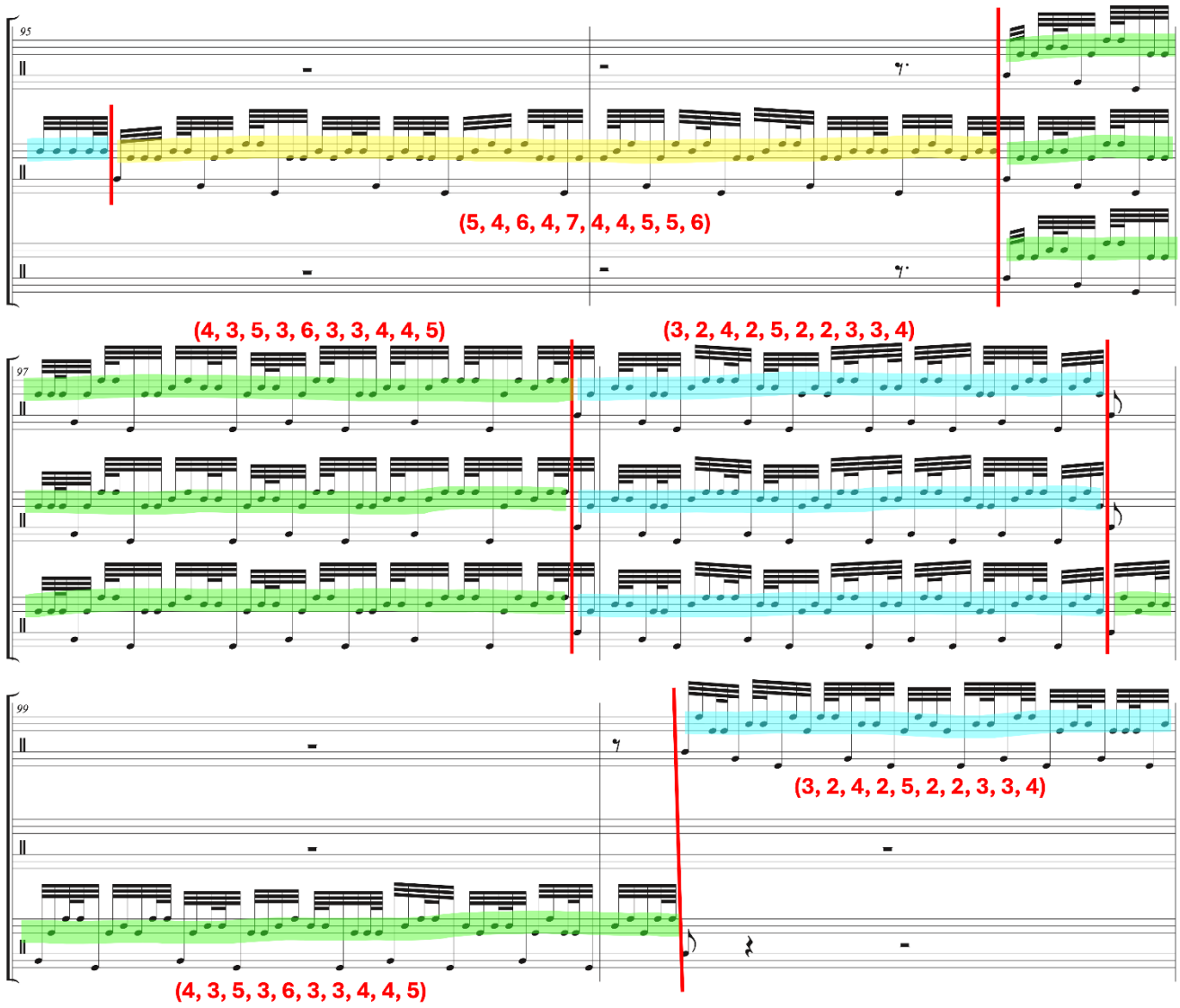
Example 18. Larger chiastic structure in mm. 83–88. The yellow and green structures exhibit similarities between intervallic structures. The green structure will be repeated in the subsequent example.



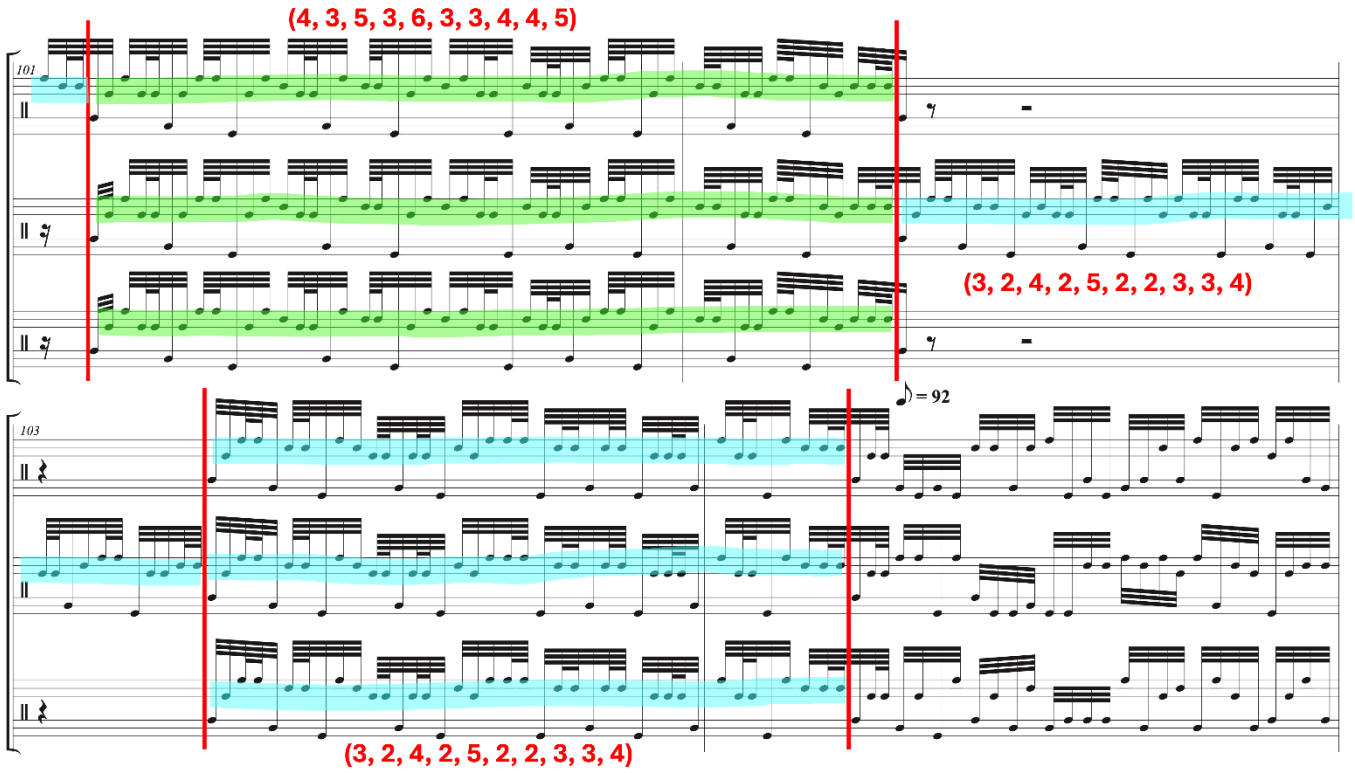
Example 19. Continuation from previous example from mm. 89–94. Player C's green structure embeds the identical intervallic structure in Example 10. The turquoise structure performed by player A in mm. 91–92 is copied directly to player B in m. 93. In this section, player A additionally embeds a mirrored sequence of *basse* sounds.



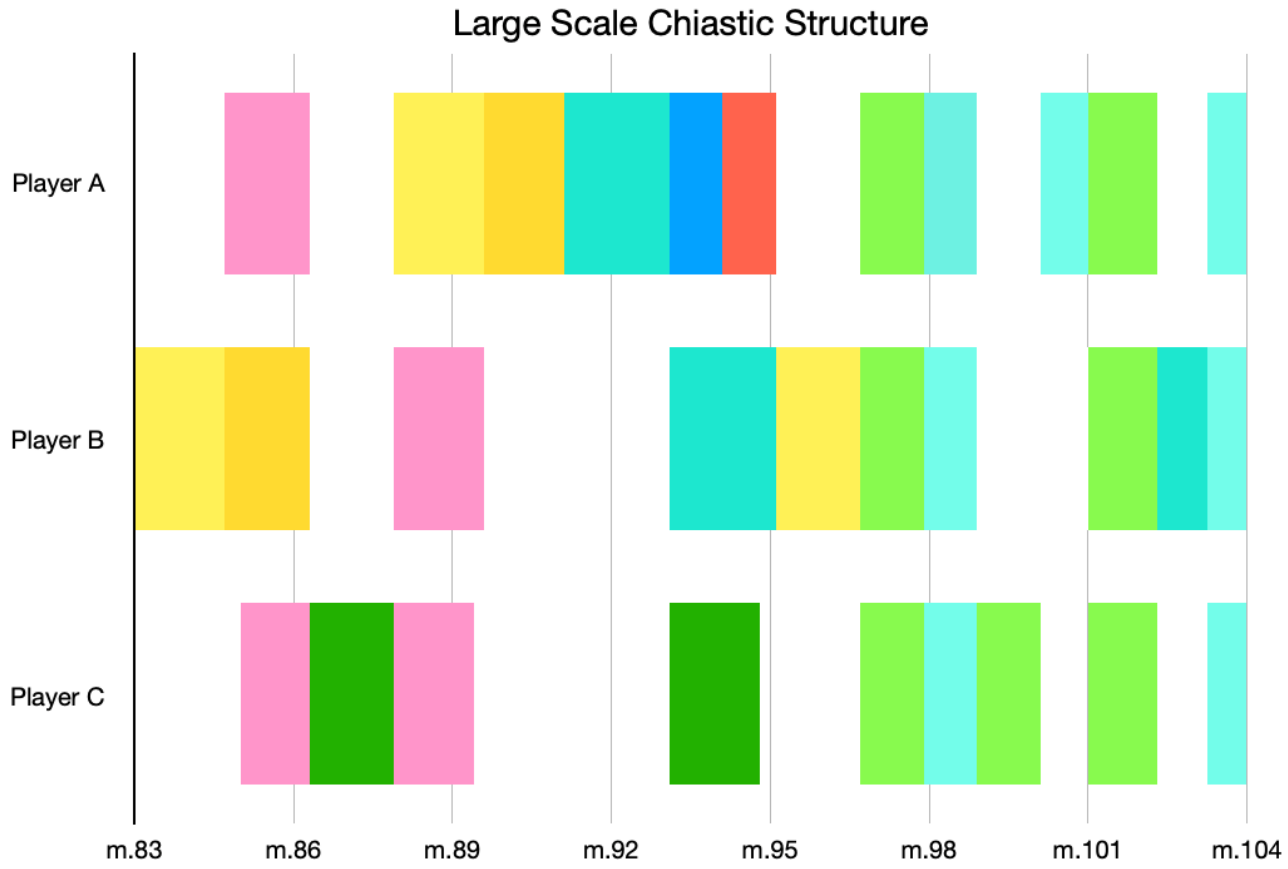
Example 20. Final large-scale symmetric structure from m. 96. Here, Xenakis emphasizes a contrast in texture through employing unison tutti, or solo passages with similar material. Identical intervallic sequences are found between structures highlighted in green, and others highlighted in turquoise.



Example 21. Continuation of final large-scale symmetric structure. The green and turquoise highlights display identical intervallic structures from Example 13. Player B's solo part at mm. 102–3 keeps this structure from becoming a complete chiasmus.



Example 22. A chart summarizing large scale symmetrical structures from Examples 11–14. The x-axis indicates measure numbers, and the y-axis indicates performers. The larger green boxes denote chiastic structure, encapsulating the bridge structure boxed in red. The colors used in this example are similar hues from the previous example. One exception is the color pink, which indicates unrelated intervallic structures. The blue and red hues colored for player A additionally denote the palindromic structure in mm. 93–94.



Example 23. Formal diagram of *Okho*