

Structural Cycles in My Microtonal Compositions

On the question of structural cycle

While composing I usually search for some structural reason, a rule, according to which the musical material may be arranged in structural order, creating some kind of a structural cycle. I should say that the process of composition for me is rather a creation of 'Rule', instead of just writing notes and successions of notes, or chords. To create an 'order of creation', a principle that ensures the arrangement of different musical parameters, is a problem which I generally solve in my task of composing. After a structural rule is discovered, the formal decision of composition may suddenly come in one moment. Nevertheless it sometimes takes an enormously long time to discover.

Some features are constantly used by me as 'structural rules'. Cycles of the repetition of musical segments (*Twittering Machine*, 1984–1986), perpetual or spiral canon models (*Sybillia*, 1996), and permutation cycles can be mentioned (the latter will be discussed below). In my recent decade works I was especially interested in microstructural composition, just taking into account two musical parameters, i.e. pitches and rhythm. In the field of pitches my approach to intervals smaller than a semitone is based on an equidistant division (see below the analysis of *Form is Emptiness*). Analogically, extraordinary short durations attracted me together with microrhythmical and polytemporal constructions that sometimes emerge.

In general, typical technical means of my composition are cycles of proportional or mensural canons. The ideas of symmetry and infinity in musical form may be developed, searching for palindromic structures, or structures based on fractal symmetry and selfsimilarity (*Cum essem parvulus*, 2001 and *Ex una voce*, 2004).

The idea of the subdivision of the octave into 360 segments

Some series of my works were written in the period 1999–2006 exploiting the subdivision of a tempered semitone, or an octave into some numbers of equal parts. In *Talita Cumi*, the sound installation for voices and electronics (1999), a tempered semitone is divided into especially small segments, spacing 30 notes inside it (consequently the size of each microinterval is around 3.33 cents). The musical process in *Talita Cumi* is limited within an extremely narrow space: rows of microtones are built inside of three semitones (F-F#, G#-A, and B-C).

Making a review of my vocal music, a Polish musicologist Jan Topolski gives the idea of extending the microtonal scale into a range of an octave (Kultūros barai, 10/2005). Thus, there may be 360 different sounds within the octave (30 sounds within each of 12 semitones). Probably I was just pushed by Topolski to create a musical system with 360 sounds in an octave in my recent composition *Form is Emptiness* (2006) for 12 voices, cello and electronics. All the pitches written down in succession give an impression of an extremely long microtonal scale, ascending from C to C#, D, D#, E etc. (Example 1; the numbers above the notes indicate that the series of notes are higher in 10.0; 13.3; 16.6 cents etc.). A notable feature of the scale is that every sound is *different* from another, therefore we have a succession of 360 *different* unrepeated pitches.

The idea of permutations

In such works as *Talita Cumi*, *Canon mensurabilis* (2000) for six instruments, *Musica falsa* (2006) for four bassoons and electronics I have used the technique of permutations, as the arrangement of elements in a row (= a set) of microtones. This serial procedure is made according to Messiaen's interversion technique: the order of succession of sounds in the row is changed, and new constellations of the same row appear. In *Form is Emptiness*, using Messiaen-like interversions, the row is presented in "en éventail ouvert, du centre aux extrêmes" (from centre sideways).

There is a difference between a permutation technique used in my previous works from those in *Form is Emptiness*. The question is, if a single note or either a *group* of neighbouring sounds from the row will be considered as a structural element (=unit) to be affected by permutations.

Example 1

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90

91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150

151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180

181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210

211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240

241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270

271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300

301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330

331

In *Form is Emptiness* the system of pitches comprises 360 notes, and the row is very long. That's why I decided to consider the elements of the row as *groups* composed of a different amount of notes. A simple rule of the multiplication of notes is adopted, and the elements are: 1st note; 2nd and 3rd notes (2); 4th, 5th and 6th notes (3) etc. We may add one more note to each new group, and finally there is the longest group, consisting of 19 notes. After that the groups are gradually shortened: 18; 17; 16; 15 3; 2. As a result, there are totally 36 elements in the row.

The permutation in *Form is Emptiness* was executed without a mathematical severity. I just made a sketch on a page with the microtonal 360-sounds-row (Example 2). Rather there is a pass from the centre of the page to the margins, jumping from one staff to another, choosing groups of notes in succession, or sometimes in a broken order (the arrows show the way to pass from the preceding group to the next one, etc.). Everything seems to be done in a spontaneous and intuitive way, and that's why the moment of composing this stuff was so curious for me. Finally, the result is a present of the same aggregate of 360 sounds, without repetition of any sound (every sound appears only once during the whole piece). The scheme of permutation is as follows:

151 (1) – 122-123 (2) – 184-186 (3) – 97-100 (4) – 221-225 (5) – 76-81 (6) – 262-268 (7) – 59-60; 31-36 (8) – 277-285 (9) – 16-25 (10) – 326-330; 301-306 (11) – 337-348 (12) – 169-180; 152 (13) – 121-136 (14) – 197-210; 181 (15) – 92-96; 101-111 (16) – 232-240; 211-218 (17) – 69-75; 82-90; 61-62 (18) – 243-261 (19) – 52-60; 37-47 (18) – 288-300; 271-274 (17) – 5-15; 26-30 (16) – 331-336; 349-357 (15) – 153-166 (14) – 137-149 (13) – 182-183; 187-196 (12) – 112-120; 91; 219 (11) – 220; 226-231; 241-242; 269 (10) – 63-68; 48-50 (9) – 270; 275-276; 286-287; 307-309 (8) – 51; 1-4; 310-311 (7) – 358-360; 150; 167; 219 (6) – 312-316 (5) – 318-320 (4) – 321-323 (3) – 324-325 (2).

Rotation of the prime form of the row

The resultant constellation of 360 sounds is presented in the work as the basic (= prime) form of a structural row (Example 3). In order to get six forms (according to the required arrangement for a chamber vocal group, with six female and six male voices) I accomplished the *rotation* of elements within the row: the first prime-form consist of 36 elements in succession, but the 1st rotation (R¹) results starting with 2nd element, while the first one goes to the very end of the row. The 2nd rotation (R²) has 3rd element for the beginning, and 1st and 2nd elements go to the end; consequentially the 3rd rotation (R³) and 4th to 5th (R⁴ and R⁵) are derived under the same order. The following scheme appears:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	Prime
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	R ¹
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	R ²
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	3	R ³
5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	3	4	R ⁴
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	3	4	5	R ⁵

Canon construction process

The polyphonic presentation of six structural 'lines' in six vocal parts results as a six-part canon. The 'prime' form appears in the upper part, while the rotation forms in the rest parts (2–6). Starting together at the same time, six voices are in constantly changing textural relationships. The scheme above demonstrates a gradual shifting of segments from a vertical to a diagonal position. The simultaneous overlapping of different segments in six parts composes a very special harmony, and it is difficult to explain the quality of 'chords' in structural terms. On the one hand, the harmonical shape of the music may be considered as a logical consequence of the linear presentation of microtonal rows (actually the same notes and groups of notes appear in different parts, and we may follow the vertical situation in the score; see Example 4). On the other hand, a vertical aspect of music is not under control of the composer: the process is totally based on a canonic structure, and the harmony is rather a random result of a linear development. The physical phenomena resulting from the mixture of different pitches, as the fusion of harmonics, heterodyning of microtonal pitch spectra etc. were unexpected for me while listening to the sound first. Though, I could not succeed in controlling the acoustical parameters of sound, nevertheless just these aspects should be considered as the essential features of a harmonic language of the work.

Example 3

PART I

The Heart Sutra

Form is Emptiness

Rytis Mazulis

2 3 3.3 6.6 10.0 13.3 16.6 20.0 23.3 26.6 30.0 33.3 36.6 40.0 43.2 46.6 50.0 53.3 56.6 60.0 63.3 66.6 70.0 73.3 76.6 80.0 83.3 86.6 90.0 93.2 96.6

Here, o Sa - ri - put - ra, form is em - pti - ness and the ve - ry em - pti - ness is form; form is em - pti - ness, em - pti - ness does not

31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

di - ffer from form, form does not di - ffer from em - pti - ness, form is em - pti - ness, what - e - ver is em - pti - ness, that is form, form is

61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90

em - pti - ness, the same is true of fee - lings, form is em - pti - ness, per - cep - tions, im - pul - ses, and con - sciou - sness, form is em - pti - ness

91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

Here, o Sa - ri - put - ra, form is em - pti - ness and the ve - ry em - pti - ness is form; form is em - pti - ness, em - pti - ness does not

121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150

di - ffer from form, form does not di - ffer from em - pti - ness, form is em - pti - ness, what - e - ver is em - pti - ness, that is form, form is

151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180

em - pti - ness, the same is true of fee - lings, form is em - pti - ness, per - cep - tions, im - pul - ses, and con - sciou - sness, form is em - pti - ness

Example 3 (continued)

2

181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210

Here, o Sa - ri - put - ra, form is em - pti - ness and the ve - ry em - pti - ness is form; form is em - pti - ness, em - pti - ness does not

211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240

di - fier from form, form does not di - fier from em - pti - ness, form is em - pti - ness, what - e - ver is em - pti - ness, that is form, form is

241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270

em - pti - ness, the same is true of fee - lings, form is em - pti - ness, per - cep - tions, im - pul - ses, and con - sciou - sness, form is em - pti - ness

271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300

Here, o Sa - ri - put - ra, form is em - pti - ness and the ve - ry em - pti - ness is form; form is em - pti - ness, em - pti - ness does not

301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330

di - fier from form, form does not di - fier from em - pti - ness, form is em - pti - ness, what - e - ver is em - pti - ness, that is form, form is

331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360

em - pti - ness, the same is true of fee - lings, form is em - pti - ness, per - cep - tions, im - pul - ses, and con - sciou - sness, form is em - pti - ness

Rhythm and literary text

The piece is rather a study of micro-intonation of pitches, but not of precise rhythm or tempos. There is no strict synchronization in time between 12 vocal parts and cello part. Every performer has an individual 'pilot track' (made as MIDI-sequence) with an exact intonation of notes that should be performed. Thus 13 CD players (or multichannel sound system) should be used for performance, to ensure the possibility of live-performance of the piece.

The well-known quotation from The Sutra Prajnaparamita was used as a literary text in the composition: "Form is emptiness and the very emptiness is form; emptiness does not differ from form, form does not differ from emptiness, whatever is emptiness, that is form, the same is true of feelings, perceptions, impulses, and consciousness". The words are divided into syllables, and each syllable is fixed to every individual note. To achieve 360 syllables (as well as notes), very simple calculations allowed to find out some phrases of the text to be repeated for several times.

Conclusion: spontaneity in a creation process

Structural methods of composing do not eliminate intuition and spontaneity. I always need some emotional tension during certain moments of my creative work. Finding the right solution to structural arrangement in composition may be compared with the status of 'enlightenment' that usually comes after a long period of searches and endeavour.

References

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 Topolski J. *Talita cumi, Cum essem parvulus*, Kultūros barai, Vilnius, 2005, No 2, p. 40.

Santrauka

Struktūriniai ciklai mano mikrotoninėse kompozicijose

Esminė mano komponavimo problema – struktūrinio principo, cikliška organizuojančio medžiagą, paieška ir sukūrimas. Dažniausiai naudojami segmentų pasikartojimo ciklai, permutaciniai ciklai, spiralinio kanono modeliai (*Canon mensurabilis*, *Talita cumi*, *Forma yra tuštuma*, *Sybilla*). Specifiniai mikrotoninės kompozicijos aspektai (struktūra – realizacija – percepcija), eksploatuojant ekvidistancines garso aukščio sistemas. Mikroritminių konstrukcijų tipai: menzūriniai politempų ciklai (*Cum essem parvulus*). Mastelio simetrija ir savipanašumas skirtingų parametrų sąveikoje, kūrinio – palindromo idėja. Kompozicijos *Forma yra tuštuma* (2006) analizė: 360 garsų ekspozicija oktavos apimtyje; serijos išskleidimas per intersijas „iš centro – į kraštus“; segmentų multiplikavimas nuo 1 garso iki grupių po 18 garsų; kanono konstravimas, rotacijos būdu dėliojant serijos formas 6 struktūrinėse linijose. Kūrinio harmonijos vaizdo prognozavimas ir atsitiktinumas (mikrotoninių spektrų samplaikos). Spontaniškumo nuojauta kūrybos procese (budizmo idėjų paralelės – kūryba kaip „nušvitimas“) ir mikrotoninio komponavimo „romantika“.