Paweł Hendrich's Emergent Sound System

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ABSTRACT

Paweł Hendrich's compositions can be compared to macrocrystals – solids composed of numerous small and identical elements, constructed in accordance with a strict pattern. Importantly, the same internal crystal structure can produce forms highly diversified with regard to external shape. Similarly, this composer's works are very precisely structured already on the level of individual sounds, but this structure is only a tool for the creation of very clear musical macroforms. The idea of emergence – of new values resulting from the combination of simple elements – is of key importance to this composer.

The paper presents the principles of organising music material in the works of Paweł Hendrich. These are, among others: periodicity, multi-layered structures, permutations and flexibility. These ideas are reflected in the musical work in many dimensions, both on the level of micro- and macro-structure. Their application exerts a major impact on the forms created by the composer.

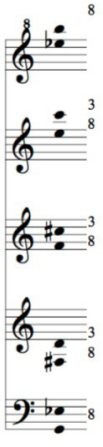
With the development of his musical language, the composer transforms his initial material more and more radically. Simple elements and processes that underlie the construction of his works become progressively more and more difficult to reconstruct, largely due to the application of a computer in the composition process. A comprehensive look at Paweł Hendrich's entire output of compositions proves that his work is emergent as a whole. With each new piece, a new element is added, but all of them form a coherent system. No wonder, then, that one of the composer's works bears the telling title of *Emergon*.

Keywords: chain technique, permutations, heterochrony

Paweł Hendrich's compositions can be compared to macrocrystals – solids composed of numerous small and identical elements, constructed in accordance with a strict pattern. Importantly, the same internal crystal structure can produce forms highly diversified with regard to external shape. Similarly, this composer's works are very precisely structured already on the level of individual sounds, but this structure is only a tool for the creation of very clear musical macroforms. The idea of emergence – of new values resulting from the combination of simple elements – is of key importance to this composer. As I am supposed to discuss Paweł Hendrich's musical language, I will attempt to follow in this paper the process of the emergence of new qualities, beginning with the principles of constructing sound material, then discussing its structure, formal disposition, and eventually – looking at the composer's work from a global perspective.

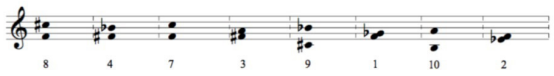
A key aspect of Paweł Hendrich's music (and the one most frequently discussed) is his way of generating the pitch material, that is, the so-called system of periodic constructions. The point of departure is always a simple harmony, a single interval, less frequently – a combination of several intervals. A sequence of at least two different intervals forms a **polygenous sequence** (e.g. bi-, tetra- or octagenous, consisting respectively of two, four or eight intervals) by means of a specific **constituent movement**. This sequence is then multiplied in various registers in accordance with a certain type of **periodicity**, that is, repetitions of sound structures shifted by a constant interval. In his music, Paweł Hendrich most frequently applies periodic structures consisting of 11 and 13 semitones (p), which allow for transpositions of a given structure to each pitch-class set, resulting in harmonies characterised by the smallest possible number of repetitions of each set. The composer also makes use of hybrid periodicity, in which each tone in the chord is transposed by a different constant interval, e.g. the bottom tone by 11p, the top one – by 13p. As a result of such multiple transpositions, a single interval transforms into a periodic structure, and the entire polygenous sequence – into a **polygenous structure**.

For a better understanding of the functioning of such a system, we will study the process of constructing the harmonic material in the compositions *Emergon* $\alpha\beta$ and *Sedimetron*. Out of the single interval of a minor sixth, a **structure** is formed, following the **periodic pattern** of 11p. This construction – k(8p) – consists of alternating intervals 8p-3p-8p-3p-etc. (cf. Ex. 1)



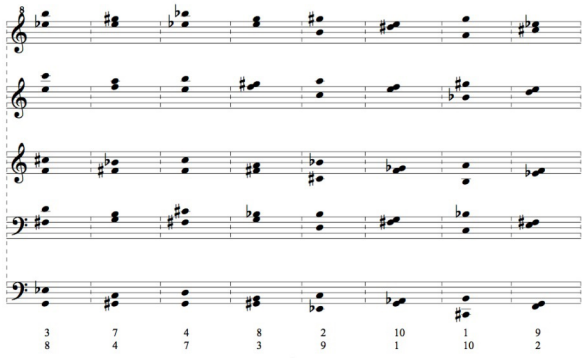
Ex. 1. Structure k(8p) following the periodic pattern of 11p.

More intervals are added to the initial one, forming by the application of a specific constituent movement an **octagenous sequence**: 8p-4p-7p-3p-9p-1p-10p-2p (cf. Ex. 2).



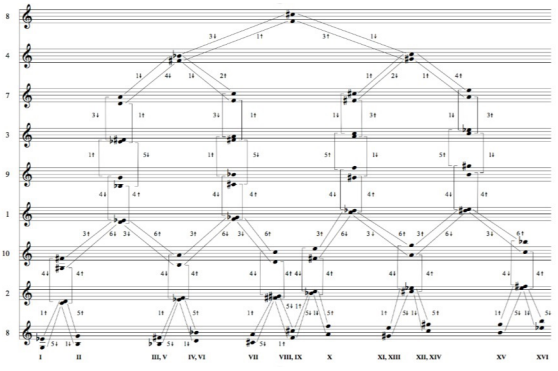
Ex. 2. The octagenous sequence applied in *Emergon αβ*.

The structure-forming stage is then repeated for the other intervals in the sequence, so as to arrive at an **octagenous structure** (cf. Ex. 3).



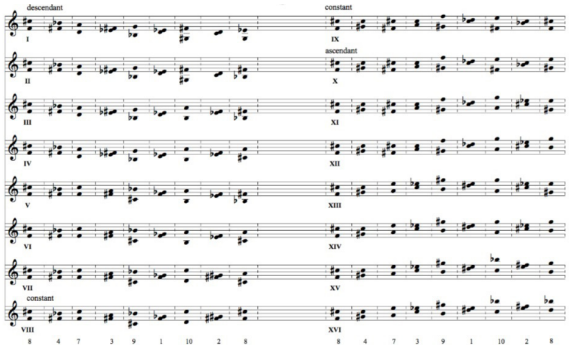
Ex. 3. The octagenous structure based on the sequence represented in Ex. 2.

By changing the constituent movement, but preserving the same **interval series** and periodicity, the composer forms more periodic structures (cf. Ex. 4).



Ex. 4. Forming a series of related octagenous sequences by means of variable constituent movement.

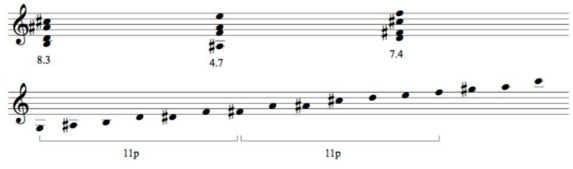
The sound material of *Emergon αβ* consists of 16 structures formed in this manner (cf. Ex. 5).



Ex. 5. Sixteen periodic structures making up the harmonic material of *Emergon αβ*.

The same sixteen octagenous structures are applied in the composition entitled *Sedimetron*. This time, however, the octagenous structures are based on the hybrid periodicity of 11p/13p. Notably, the same material, but with the periodic pattern of 13p was used by the composer in the piece entitled *Alopopulo*.

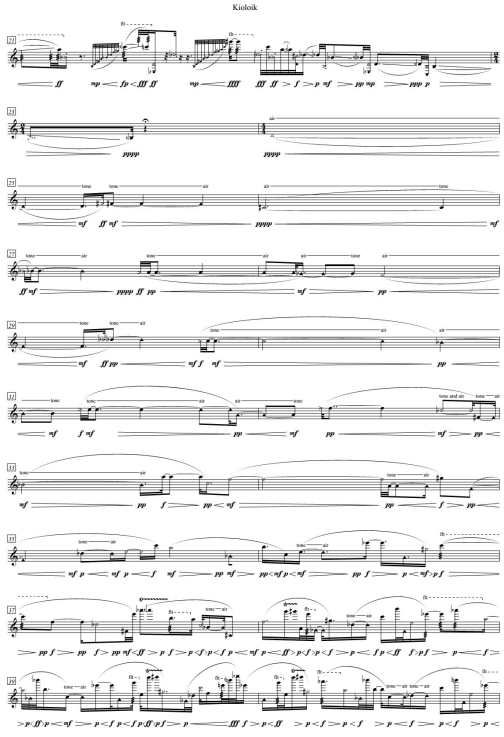
The individual periodic structures within the polygenous structure are not chosen at random, but deliberately selected so that the superimposition of several such periodic structures should result in a **linear structure**: a kind of scale with a constant sequence of intervals, repeated throughout the periodic pattern (cf. Ex. 6).



Ex. 6. Forming a linear structure in *Emergon αβ*.

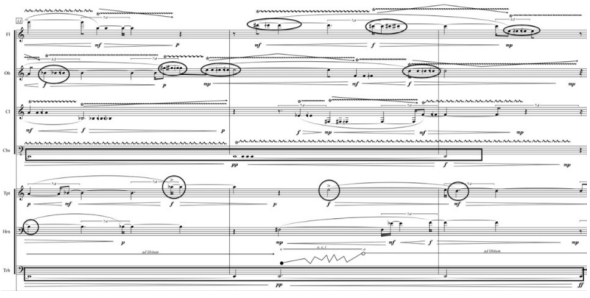
The composer's individual aesthetic decision to rule out the sequence of two consecutive semitones within the scale is crucial to the formation of linear structures. The composer's favourite structures are: 3p-1p-3p-1p-2p-1p for the periodic pattern of 11p, and 3p-1p-2p-1p-2p-1p-2p-1p for the periodic pattern of 13p. This kind of structure, beginning with the given sound, may locally play the role of a harmonic centre, which the composer calls ***locus***. Within the given locus only a limited set of periodic constructions can be used. This additionally consolidates the harmonic material.

For instance in *Kioloik* the sound material of the first phase is determined by a single periodic structure k(3p) with the periodic pattern of 11p. However, the emerging appoggiatura groups form an incomplete scale with the pattern of 3p-1p-3p-1p-2p-1p, which in the one-line octave corresponds to the sounds D^1-F^1-$F\#^1$-A^1-$B\flat^1$-C^2-$C\#^2$, marking the *locus* of D. The intervals in the opening of the second phase of the piece, beginning with bar 24, follow the hexagenous sequence of 4p-9p-3p-8p-9p-7p with the periodic pattern of 11p. At the same time all the sounds of the composition fit into the said scale and its successive transpositions, which means that the *locus* of D is common to the entire composition despite the local presence of different vertical harmonic structures (cf. Ex. 7).

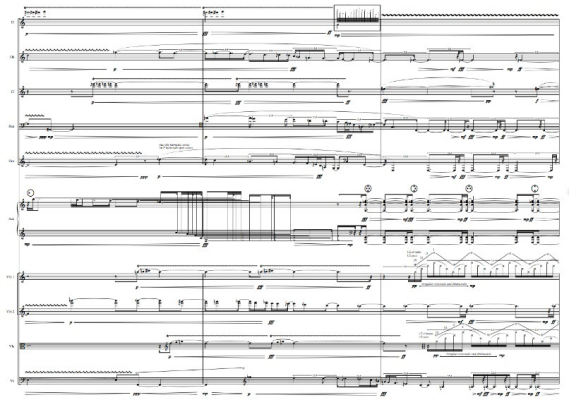


Ex. 7. Paweł Hendrich, *Kioloik*, bars 21–40. The transition from Phase I to Phase II of the composition, retaining a shared *locus*.

A different way of forming harmonic relations on a deeper level is to select elements of the structure in such a way as to make them overlap (as far as possible) with the spectrum of the given tone. This concept was originally applied in *Emergon αβ*, where the spectrum of E_1 locally emerges out of the context of octagenous structures. By applying a pedal point in the lowest register, many sounds of the high register that constitute remote partials of the base frequency can be inscribed into this spectral pattern. A similar device is used in *Pteropetros*, where the bass tone of F_1 constitutes at the same time the lowest note in this piece. Such quasi-spectral interpolations can be strictly correlated with the system of periodic structures. The harmonic series may also be interpreted as a periodic structure, whereby the constituents are transposed by a constant interval amounting to the frequency of the base note (cf. Ex. 8 and Ex. 9).

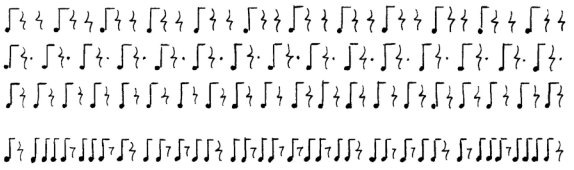


Ex. 8. Paweł Hendrich, *Emergon αβ*, bars 21–23. Interpolation of a complex tone.



Ex. 9. Paweł Hendrich, *Pteropetros*, bars 204–206. Interpolation of a complex tone.

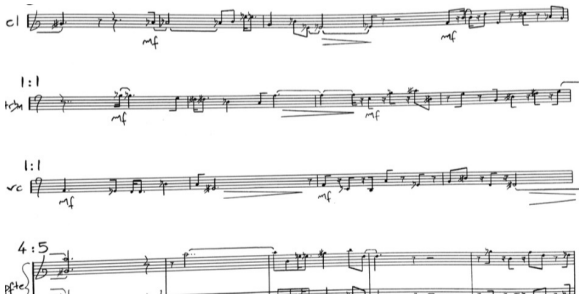
The idea of periodicity is not limited to pitch material; it determines all the parameters of the musical work. It is also important on the metro-rhythmic level, where the basic element of composition is the rhythmic interval. In *Diversicorium* the composer applied a three-layer rhythmic pattern, whereby on each layer successive sounds last respectively three, four and five quavers. This simple periodic movement results in a rich and complex rhythm when the three layers are executed simultaneously. The pattern repeats itself only after sixty-eight quavers (cf. Ex. 10).



Ex. 10. The three-layer rhythmic pattern applied in *Diversicorium*.

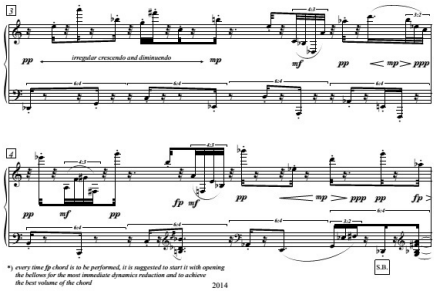
Importantly (also from the composer's point of view), the resulting pattern is symmetrical. A similar device is applied in *Emergon αβ*, where in Phase V of the composition the successive tones in the different voices last respectively 2, 3, 5, 7, 11, 13, 17 and 19 semiquavers. However, for two or more simultaneously sounding parts, those with the shortest rhythmic values come to a pause, which additionally blurs the initial pattern.

The idea of voices or parts moving at various (rhythmic) rates laid the foundation for the phenomenon of **heterochrony**, first presented in the eponymous piece of 2004. This phenomenon depends on the simultaneous occurrence of two or more layers of musical time organisation, described by means of a simple ratio (e.g. 2:3; 3:4; 4:5). For instance in *Multivalentis* (no. 20) we have a rhythmic canon performed by the clarinet, the trombone, and the cello at the ratio of 1:1, and in the piano part – at the ratio of 4:5. The rhythm resulting from the overlap of these parts appears extremely complex, though the underlying concept is relatively simple (cf. Ex. 11).



Ex. 11. Paweł Hendrich, *Multivalentis*, No. 20. A rhythmic canon in heterochrony.

Taking into account the fact that musicians are accustomed to traditional notation, in his later works the composer stopped notating each layer of heterochrony in its own separate tempo, but the fundamental idea remains unchanged. Another example of its application is *Accant* of 2014, where the left hand plays similar motifs as the right (isolated *staccato* sounds, triplets), but at the ratio of 3:2 (cf. Ex. 12).

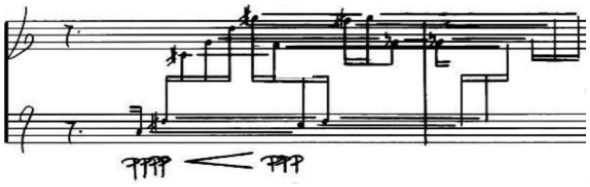


Ex. 12. Paweł Hendrich, *Accant*, bars 3–4. Similar textures performed in heterochrony.

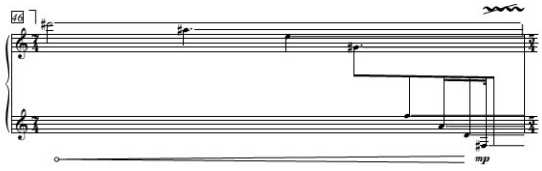
This particular proportion was used also for pragmatic reasons: The left hand is naturally less active on the accordion, as at the same time it is also responsible for the motion of the bellows.

Multi-layered thinking manifests itself not only in forming complex rhythmic structures by superimposing several relatively simple layers on one another. Polygenous structure develops in two dimensions: the vertical one determined by periodicity, and the horizontal one, determined by constituent movement. On the vertical plane, we have structures based on the successive segments of sequences. On the horizontal plane, successive layers are formed by n^{th} transpositions of the individual constituents of harmonies in the sequence. For instance, in *Emergon αβ* (beginning with bar 40) the individual wind instrument parts introduce the successive tones of the given layer in long values. Wind instruments are applied in a similar manner in *Sedimentron* (from bar 27 onward).

Much more significant is the vertical dimension of the polygenous structure. Typically of this composer, this dimension is rarely developed through a direct introduction of vertical harmonic structures. One rare exception to this rule is the presentation of harmonic material in chord form in *Diversicorium*. Chords also sporadically appear later in the course of this composition, marking the local culminations. Much more frequently, however, vertical harmonies (if they appear at all) are gradually built up by the entry of successive voices, and then dissolve gradually in an irregular fashion. Examples of the application of such structures can already be found in Hendrich's early composition – *Heterochrony*. Interestingly, even in the parts of instruments that typically perform chords, such as the accordion and the piano, the composer may occasionally introduce chords (as in the piano part in *Drovorb* and the accordion part in *Liolit*), but he prefers harmonies resulting from the uneven distributions of superimposed constituents from various voices (as in the accordion parts of *Diversicorium*, *Accant* and *Pteropetros* (cf. Ex. 13 and Ex. 14).

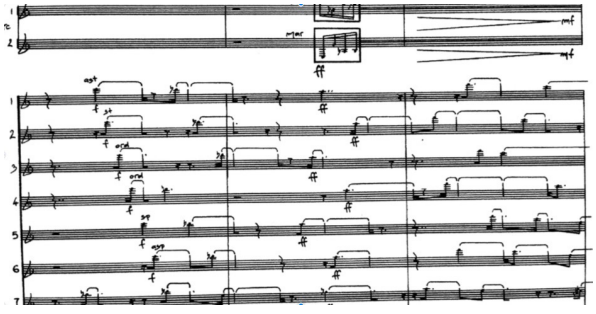


Ex. 13. Paweł Hendrich, *Diversicorium*, No. 17. A vertical harmony building up in the accordion part.



Ex. 14. Paweł Hendrich, *Accant*, bar 46. A vertical harmony building up in the accordion part.

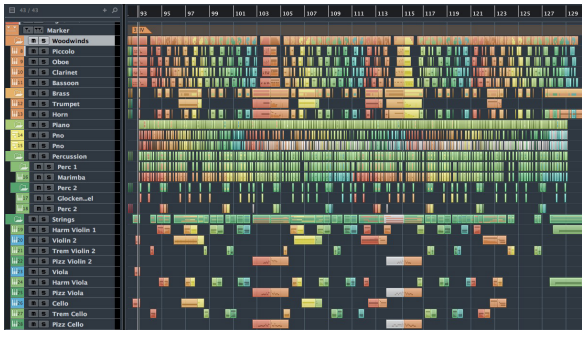
It is therefore difficult to talk of "vertical harmonic structures" in this composer's output. We should rather postulate "harmonic spaces". Even when several voices develop the same harmonic layer, the composer introduces rhythmic shifts between the parts. This can be distinctly observed in *Metasolidus I*, partly based on the sound material of *Diversicorium* (cf. Ex. 15).



Ex. 15. Paweł Hendrich, *Metasolidus* I, bars 37–39, vn I–VI. The original rhythmic pattern has been blurred by the introduction of semiquaver delays in the individual parts.

The rhythmic pattern borrowed from *Diversicorium* is executed by the wind instruments, while in the strings it is divided among several parts entering at the rhythmic interval of a semiquaver. Notably, the first entry of new parts in the strings always proceeds from top to bottom part, and later with the appearance of successive notes this order is transformed by permutation. Thanks to the rhythmic shift, the attack of each successive note in the given layer overlaps with the decay of the one from the previous layer. Thus the harmonies interlock as in a chain.

It is however not only the vertical harmonies that dissolve into harmonic spaces. The process of gradual blurring of the boundaries between successive spaces can also easily be observed. While in *Heterochrony* the vertical structures are only slightly "upset," in *Diversicorium* they become the product of independent, contrapuntally led voices or layers. In *Hyloflex α* the irregularly shaped structures could be referred to as sound clouds. The idea of irregular, ragged sound structures is developed especially in more recent works such as *Accant* and *Pteropetros*. *Sedimetron*, on the other hand, explores the idea of individual instruments introducing the harmonic material at various speeds, which results in a kind of polyphony of overlapping harmonies. In the second phase of this work (bars 93–130), the wind and string sections repeat the same octagenous sequence four times, while the piano presents it only three times in the same segment of time, and the marimba – only twice (cf. Ex. 16).

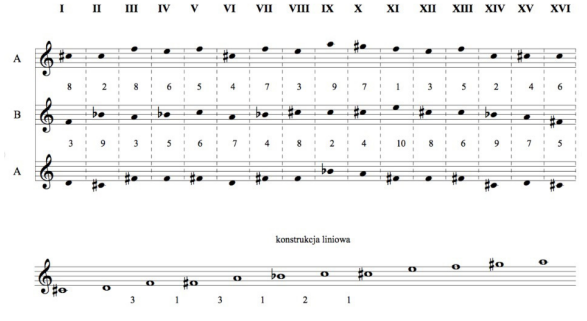


Ex. 16. Paweł Hendrich, *Sedimetron*, bars 93–130. Composition designed using Cubase software. Harmonic polyphony in Phase II of the composition.

The highest degree of harmonic complexity is achieved in *Accant*, which takes over the principal concept of *Sedimetron*, but entrusts the multi-layered harmonic structure to various textural layers of the same solo instrument part rather than to various instruments. The 16-element polygenous sequence has been presented here in eleven different textural variants, alternating and appearing at different tempi in the parts of both hands. The original sequence can hardly be deduced from the resulting harmonic mosaic. This shows the composer aiming at a progressively greater and greater deconstruction of the initial harmonic material (cf. Ex. 17).

Ex. 17. Paweł Hendrich, *Accant*, bars 1–45. Composition designed using Cubase software. A polygenous sequence introduced in different textural variants.

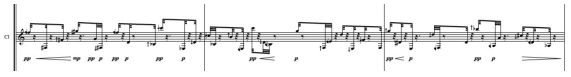
The idea of harmonic diversification also appears in a slightly different form in *Drovorb*, which introduces three separate harmonic layers, each developing its own periodic structures with the periodic pattern of 11p – respectively k(4p), k(3p) and k(10p). All these structures share a common *locus*. Similarly as in *Accant*, this mosaic of periodic structures from different sets within a 16-element sequence adds up to one linear structure, marked by the *locus* of D (cf. Ex. 18).



Ex. 18. The 16-element polygenous sequence applied in *Accant* and its reduction to periodic structure.

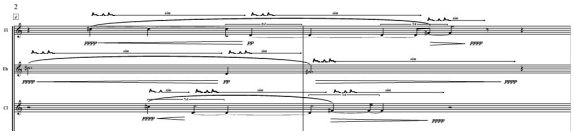
Multi-element polygenous sequences sharing a common *locus* also appear in *Kioloik*, *Exophor*, *Ertytre* and *Pteropetros*. Here, the greater degree of complexity of the harmonic material is also combined with the process of its integration on another, deeper level.

Harmonic material is rarely presented directly, though. Usually the parts of the individual instruments are determined by a section of the periodic structure known as the **polyplex** (thus, depending on the number of notes: a **duplex**, **triplex**, **quadruplex**, etc.). It may appear a single time in a sequence of polyplexes proper to the successive octagenous structures. One example comes from *Sedimetron*, where (beginning with bar 174) the individual instrumental groups play such sequences of polyplexes: duplexes in the strings, triplexes in the wind section, quadruplexes in the piano and the xylophone. Equally frequently, however, a looped polyplex may be used as the basis for a longer progression. The sequence of individual sounds may be variable and produced by successive permutations of an n-element set. The number of possible variants equals therefore the factorial of n, that is – two in the case of duplexes, six for triplexes and 24 for quadruplexes. An example of this kind of progression can be found in the final clarinet cadenza in *Sedimetron*, where sextuplexes are repeated twice for each successive periodic structure (cf. Ex. 19).



Ex. 19. *Sedimetron*, Cl., bars 241–243. Progression formed by the permutation of sextuplexes.

Permutations are applied not only to the sequence of sounds within the given polyplex. Also rhythmic patterns are frequently determined by permutations of a given set of rhythmic values. For example, in the introduction to *Emergon* $\alpha\beta$ we hear triplexes (figures) in which two values are three times longer than the third. The sequence of longer and shorter values is subject to permutation (cf. Ex. 20).

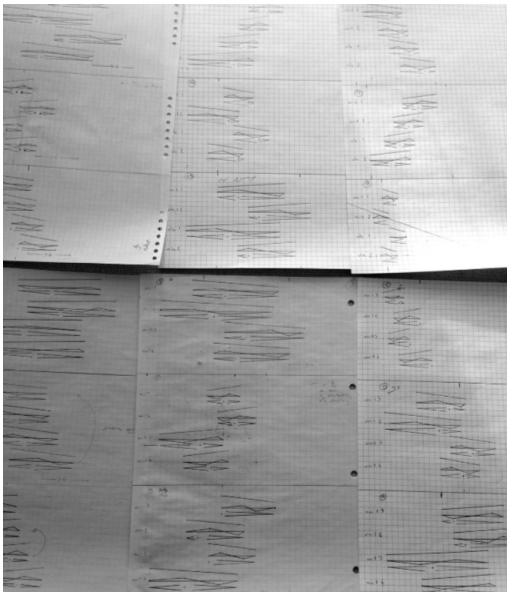


Ex. 20. Paweł Hendrich, *Emergon* $\alpha\beta$, Fl., C.i., Cl., bars 4–5, Rhythmic patterns formed by the permutations of an triplex figure.

Similar transformations may also apply to other musical components: dynamics, articulation, the order of voice entries, the order of adding notes to chords from the different layers, the order of changes in rhythmic density, directions of melodic movement, etc.

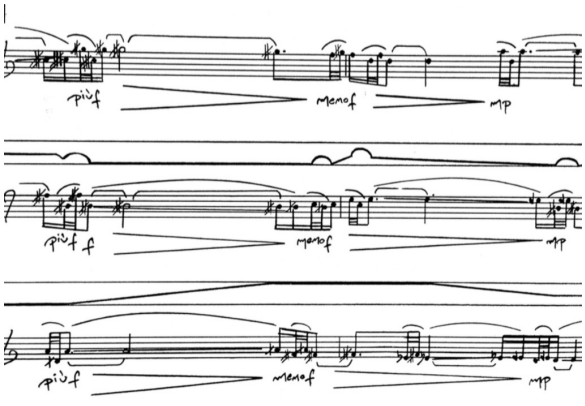
What is more, within one and the same voice or part these individual parameters can be described by means of sets of varying number of elements. The possibility of repetition (recurrence) of exactly the same sequence

of sound possessing exactly the same parameters can thus be calculated as the lowest common multiple of the cardinalities of the individual sets. In practice, before the given sound material is repeated, the elements of the individual sets will already have changed. Therefore, despite the constant principles of organising sound material, the sound structure retains maximum diversity. The computer is a useful tool for the generation of such sound progressions, but it will not take the responsibility for aesthetic choices off the composer's head. The role of the computer is rather – to facilitate the composition process (greatly) and perform the laborious calculations which in the past Paweł Hendrich had to do by hand with pen and paper (cf. Ex. 21).



Ex. 21. The composer's notes for *Hyloflex α*.

The music material generated in this manner might seem monotonous and mechanical, were it not for one quality of texture characteristic of Hendrich's music – namely, its flexibility, manifesting itself in constant changes of sound parameters. This changeability may appear on the level of pitch in the form of microtonal glissandos or vibratos and trills of varying frequency. Dynamic changes are also flexible: larger processes break down into many smaller dynamic arches. Articulation may change gradually, e.g. smoothly moving between *sul tasto* and *sul ponticello* in the strings or playing with open and stopped bell in wind instruments. This process has been very suggestively represented in the composer's score for *Multivalentis*, where diagrams of articulation changes are placed above the staves (cf. Ex. 22).



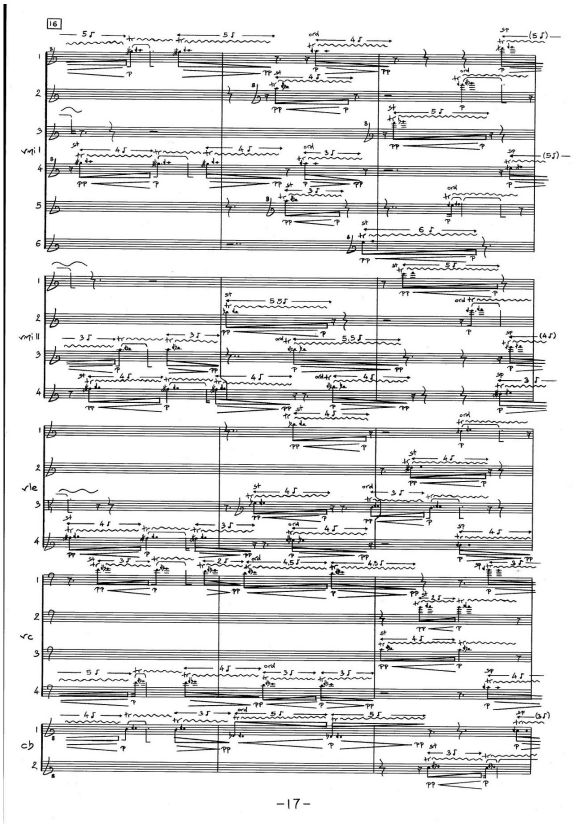
Ex. 22. Paweł Hendrich, *Multivalentis*, No. 5. Envelopes of articulation changes.

Similar "envelopes" could also be drawn for the other sound parameters, but here the composer remains true to traditional notation. One composition in which textural flexibility is elevated to the status of the central idea is *Hyloflex α*, where constant changes can be observed on the levels of pitch, dynamics and articulation.

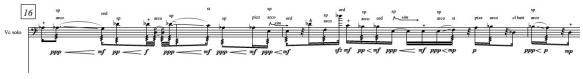
While in *Hyloflex α* the individual sound clouds explore just one area or problem of articulation, in Hendrich's later works the composer dedicates more and more attention to the problem of diversifying articulation, so that we can even speak, as it were, of a "melody of articulations." In the solo works *Kioloik* and *Ertytre*, a certain limitation of harmonic material coincides with a growing number of articulation changes (cf. Ex. 23 and Ex. 24).

The shift of emphasis to articulation and colour is yet another way in which the original harmonic material becomes blurred, concealed among microtonal detunings, noise colouring and a mosaic of articulatory effects. Even though the harmonic structure remains the backbone of Hendrich' music, its façade becomes more and more sonorist and sensual.

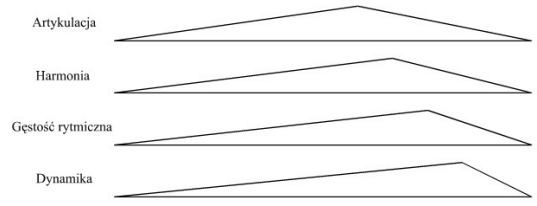
As the harmonic material gets blurred and concealed, the same process takes place with regard to the structure of the compositions. The individual arches of intonation, dynamics and articulation enter into contrapuntal relations, forming complex and musically ambiguous structures. The picture becomes even less transparent due to the application of the chain technique. It is in this context that we could interpret the bridge function of hybrid periodicities, heterochrony and multivalence as chain-like interlocking of links characterised by different harmonies, metres and tempi. The blurring of textural structures means that in the case of Paweł Hendrich's music we should talk of areas of culmination rather than culminating points. This is especially well illustrated by



Ex. 23. Paweł Hendrich, *Hyloflex α*, No. 16. A sound cloud with a single manner of articulation.



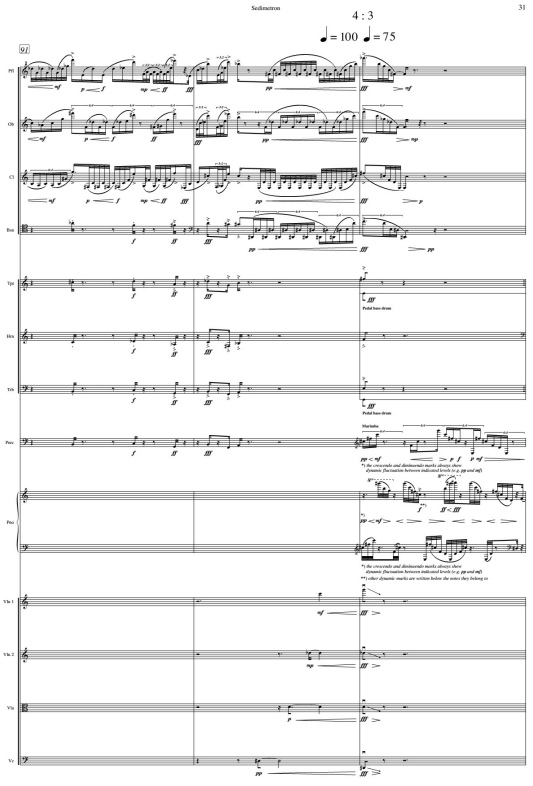
Ex. 24. Paweł Hendrich, *Ertytre*, Vc solo, bars 16–18; "A melody of articulations."



Ex. 25. Distribution of culminations in *Metasolidus I.*

the culmination of the second phase of *Metasolidus I*, in which the composer himself distinguishes four different areas of culmination, associated respectively with the levels of articulation, harmony, rhythm and dynamics. Each of them is minimally shifted in relation to the previous one (cf. Ex. 25).

Synchronised changes of many different sound parameters are rare, but when they do appear, they always clearly signal the next stage in the formal makeup of the work. In *Sedimetron*, synchronisation of harmonic material in the first phase occurs twice and in both cases it introduces the transition between the two halves of the octagenous sequence – one based on thirds (8p-4p-7p-3p) and the other – on the interval of a second (9p-1p-10p-2p). Also the transition to the second phase is clearly marked by a number of accented chords performed with progressively increasing volume. The last, eighth chord is played *fff*, and signals the beginning of the next phase, which relies on the sound material of a new sequence (cf. Ex. 26).



Ex. 26. Paweł Hendrich, *Sedimetron*, bars 91–93. An octagenous sequence presented in the form of chords, bridging Phases I and II of the composition.

Similarly in *Pteropetros* a synchronised entry of all the voices preceded by a general pause distinctly signals the beginning of the last phase of the piece.

All the harmonic changes – in harmony itself, periodicity, constituent movement and sequences – are clear markers of the overall form, which accompany textural changes or local culminations. In *Metasolidus I*

sections with the periodic pattern of 11p/13p function as a kind of interludes between larger segments of the composition. On the third occasion, this kind of interlude serves the purpose of "modulation" from a segment with the periodic pattern of 11p to one with the pattern of 13p. And conversely, in *Metasolidus II* a monogenous section with the periodic pattern of 11p acts as an interlude for a piece maintaining the hybrid pattern of 10p/11p. In *Sedimetron*, relaxation and a kind of calm is introduced by a section employing the monogenous sequence of 2p-9p with the pattern of 11p, which comes after the mosaic-like Phase II discussed above. This is especially striking as all the composition is dominated by structures with the hybrid pattern of 11p/13p.

Disposition of harmonic material may play a major role in the creation of form. In *Hyloflex* α, Phase I develops by adding new harmonies and new harmonic layers resulting from the entry of successive instrumental parts. The central phase of *Kioloik* for solo flute depends on successively adding and then taking away layers of periodic structure. Interestingly, the process is symmetrical, just like the palindromic title of this piece (cf. Ex. 27).

Ex. 27. Paweł Hendrich, *Kioloik*. Composition designed using Cubase software. Symmetrical distribution of harmonic material in the composition.

Parameters on the metro-rhythmic level are also related to the form of the compositions. Heterochrony allows for smooth changes of tempi within the given ratio, whereas hybrid periodicity makes possible similar smooth changes in the area of harmony. In the second phase of *Heterochrony* transition from tempo 168 to tempo 56 takes place via the ratios of 3:2, 4:3, 5:3 and 2:1, after which the whole process is reversed and proceeds through the ratios of 2:3, 3:4, 5:4 and 6:5. Heterochronic technique plays a similar role in *Metasolidus I*, where the tempo changes from 148 to 111 via 74.

Form, however, is not the ultimate value that emerges from Paweł Hendrich's works. Each of these works is an implementation of a specific idea contained in its title. *Heterochrony* concentrates on various levels of musical time organisation. *Diversicorium* takes up the problem of multi-layered structure. *Multivalentis* deals with the metrical ambivalence of rhythmic patterns. *Metasolidus* explores the concept of a meta-work based on material previously created by the composer. *Hyloflex* is dedicated to the flexibility of textures. The titles of other compositions, such as *Kioloik*, *Ertytre*, or *Drovorb* are verbal games, but their palindromic qualities point to the key role of symmetry in these works, both on the level of individual structures and of macroform. The title of *Pteropetros*, performed at the Warsaw Autumn in 2015, encapsulates not only the opposition of something heavy and light, smooth and ragged, but also the permutation of elements in a set, so characteristic of this composer's technique.

Each of these ideas is not limited to a single composition. They derive from the composer's earlier explorations and are developed in his later works. Heterochrony appears also in *Multivalentis* and *Accant*. Flexible textures originate directly from the irregular vertical harmonies of *Heterochrony* and are successfully applied in the composer's most recent music. Permutations, multi-layered structures and symmetry are fundamental principles of organising music material. However, we can clearly observe in the composer's output a tendency to transform the initial material more and more radically. Simple elements and processes that underlie the construction of his works become progressively more and more difficult to reconstruct, largely due to the application of a computer in the composition process. It therefore transpires that all of Paweł Hendrich's output is emergent as a whole. With each new piece, a new element is added, but all of them form a coherent system. No wonder, then, that one of the composer's works bears the telling title of *Emergon*.

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Paweł Hendrich obtained a master's degree from the Management and Productions Engineering Department PO Engineering of Wrocław University of Economics. He also graduated in composition from the Department of Composition, Music Theory and Music Therapy of the Academy of Music in Wrocław after studies with Grażyna Pstrokońska-Nawratil (degree with distinction). In late 2005 and early 2006 he studied with York Höller at the Hochschule für Musik in Cologne as a Socrates-Erasmus scholarship holder. Paweł Hendrich's music has been performed at such festivals as the Warsaw Autumn, Musica Polonica Nova, Musica Electronica Nova in Wrocław, the Festival of First Performances in Katowice, Audio Art in Warsaw and Kraków, Musica Viva in Munich, Rudens Kamermūzikas Festivāls in Riga, Suså Festival in Næstved (Denmark), Rudersdal Sommerkoncerter in Hørsholm (Denmark), the World Music Days in Wrocław, University of Louisville New Music Festival (USA), 24th Composer Portraits in Warsaw, as well as concerts in Germany, Austria, Sweden, Spain, the Czech Republic, Turkey, the United States, China, Hungary, Slovakia, Malta, Lithuania, Latvia and Estonia. His compositions have been commissioned by: the "Warsaw Autumn" International Festival of Contemporary Music, Deutschlandfunk, Ensemble Modern, the City of Wrocław, the Polish Institute in Madrid, Institute of Music and Dance, New Music Orchestra, the National Forum of Music, Society of Authors ZAiKS and the Polish Composers' Union.

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