# "NEW MORPHOLOGY OF MUSICAL TIME" BY K. STOCKHAUSEN (BASED ON THE ARTICLE “WIE DIE ZEIT VERGEHT”)

**E. V. Litvikh**

**Abstract.** The paper examines the theoretical provisions of K. Stockhausen's article "Wie die Zeit vergeht" ("How Time Passes"). Rejecting traditional methods of constructing the musical process, the composer searches for new, but no less effective means of organizing musical material in time. The fundamental idea that determined Stockhausen's concept was the understanding of the unified nature of duration, pitch and timbre of sound - all these parameters are determined by the vibrations of the sounding body. The consequence of this discovery is the development of an extremely differentiated system of durations (by analogy with dividing the octave into 12 semitones), which subsequently leads the composer to the idea of a "field" (a range of possible values of durations, pitches, etc.), which replaced the concept of a "point" (fixed values of the characteristics of musical sound). The article also examines the parallels between Stockhausen's ideas and some scientific and philosophical concepts of the 20th century.

**Keywords:** Stockhausen, Webern, musical time, formant rhythm, Bergson's theory of time

# NEW MORPHOLOGY OF MUSICAL TIME BY K. STOCKHAUSEN (BASED ON THE ARTICLE “WIE DIE ZEIT VERGEHT”)

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At present, the concept of metatext is being actively developed in musicology, which, in addition to the actual musical text,

musical works also include any explanations by the composer about his compositions (notes, interviews, etc.), as well as various extra-musical factors that influence the creation of the work and its functioning in culture as an element of musical discourse1 .

The study of metatext is especially relevant for the study of non-classical music, in relation to which (in contrast to the musical heritage of the previous period) a comprehensive system of scientific approaches and research methods has not yet been developed.
In this regard, it should be said that in relation to the work of K. Stockhausen, the study of the author's metatext has special significance, since, in addition to musical works, the composer is the author of the multi-volume work “Texte zur Musik” (“Texts about Music”, 1963–2014). In addition, one should not forget that Stockhausen

Zen created such a direction as intuitive music, where the traditional musical text is replaced by a verbal impulse to music-making. Therefore, foreign researchers of Stockhausen's work also face the acute problem of translating his

verbal texts from German.

This work is devoted to the analysis of Stockhausen's innovative interpretation of the phenomenon of musical time, outlined by the composer in the article "Wie die Zeit vergeht" ("How Time Passes") and aims to examine the most significant ideas of the German master in the context of the general aesthetic (ideological) paradigm of the 20th century, as well as to draw some parallels with the natural scientific and philosophical concepts of the

last century.

The theme of time is one of the central themes in Stockhausen’s reflections on music. Two extensive articles are devoted to it : “Wie die Zeit vergeht” (“How Time Passes,” 1957) and “Die Einheit der musikalischen Zeit” (“The Unity of Musical Time,” 1962). In addition, the composer touches upon the problems of time in other texts. Such attention to this problem is entirely natural, since time is of primary importance for musical art, and it is the change in the concept of time that is the “watershed” that separates non-classical music from classical. The article “Wie die Zeit vergeht” (“How Time Passes”), first published in the magazine “Die Reihe” in 1957, is a theoretical

1 In particular, the author's metatext as an element of musical discourse is considered in the dissertation of N. B. Kasyanova [Kasyanova, 2018]. The theory of musical metatext was put forward by M. G. Aranovsky [Aranovsky, 1998].

a theoretical understanding of Stockhausen's intense search for a theoretical basis for a new concept of time, which had in fact already been realized by the composer in some works of the previous period, and in a completely finished form

and artistically perfect form (for example, in the composition Kreuzspiel (“Cross Play”, 1951) for instrumental ensemble). The writing of the article was also preceded by training with O. Messiaen and acquaintance with the works of the French master.

In terms of musical time, Stockhausen was undoubtedly most interested in Etude No. 2 , “Mode of Duration and Intensity,” from Messiaen’s cycle “Four Rhythmic Etudes.”

The fundamental idea expressed in the article “Wie die Zeit vergeht” may have been suggested to Stockhausen by his experience of working with sound in the group “Musiqie concrete” of French radio and the “Studio for Electronic Music” of West German Radio (WDR) in Cologne and consists in the fact that the pitch of a sound, its duration and timbre have a single nature – the vibrations of the sounding body. When a certain threshold of the frequency of sound impulses is reached, the human consciousness ceases to perceive them discretely, and they merge, forming the sensation of the “pitch” of the sound1 . Pitch, therefore, means only a very large number of sound impulses perceived non-discretely. In addition, the timbre of a sound is also determined by the characteristics of the vibrations of the sounding body.

This position gives the composer the opportunity to apply uniform methods of work both to pitches and to durations and timbre characteristics of sound. Despite the fact that Stockhausen's statements cannot be considered a discovery from the point of view of acoustics, and also the fact that Cowell had previously attempted to transfer the principles of organization borrowed from the field of pitch to the area of rhythm [Cowell, 1996], it was Stockhausen who managed to construct this theory in such a way that it was possible to implement it artistically convincingly in practice. The complexity of the task facing the composer is explained by the fact that, despite the apparent simplicity from the acoustic point of view2 ,

In relation to musical creativity, this idea was radically innovative at that time.

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[1] It is necessary to mention that G. Cowell pointed this out earlier in his book “New musical resources”, first published in 1930 [Cowell, 1996, 51].

[2] What is meant is that, since pitch, duration, and timbre are determined by the vibrations of the sounding body, there are no obstacles in the physical nature of sound to applying uniform working methods to these sound parameters.

The fact is that, in fact, throughout the entire preceding period of music development, rhythm and pitch were considered different characteristics of sound and were subject to different laws. At the same time, rhythmic structures were more stable than pitch systems. For example, Yu. N. Kholopov notes that the so-called "song forms", used in ancient times, retained their significance in academic music up until the first half of the 20th century (inclusive) [Kholopov]1 .

Perhaps this happened because music was primarily a means of expressing the composer's thoughts and feelings, a way of communicating with other musicians, etc., that is, it was *a statement by its author.* That is why the patterns of organizing the musical process (musical form) had so much in common with verbal speech.

However, already in the work of A. Webern there is a qualitative leap, which is in fact a breakthrough into a new concept of time. Despite the composer's subjective conviction that he writes in classical forms [Webern, 1975, 49], the radical compression in time of all structural units2 does not allow these structures to be felt as speech. Using at the same time a number of techniques that enhance visual associations when listening to music3 , Webern achieves that the musical composition ceases to resemble a verbal message and acquires a resemblance to a visual object, despite the absence of a real video sequence.

Probably, such an innovative concept with a subjective desire to preserve classical forms became possible due to the combination of strict adherence to the logic of the 12-tone method of composition with the composer's non-classical creative attitude: to create "a work of nature from human hands" [Webern, 1975, 14]. In Lectures on Music, Webern repeatedly mentions Goethe's natural philosophical ideas, drawing parallels with the serial method.

todom composition.

In a general aesthetic (cultural) sense, this creative method is an expression of the rejection of anthropocentrism,

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[1] As for the timbre, it played a predominantly decorative and coloristic role and did not take on form-generating functions. V. N. Kholopova

[2] and Yu. N. Kholopov call this a "shift in time parameters" forms by one division" [Kholopova, Kholopov, 1984, 167].

3 In particular, expressive drawings with an abundance of leaps over wide intervals, timbre, register and articulatory contrasts, the principle of symmetry, etc. [Litvikh, The Concept of Form in Anton Webern's Serial Music…, 2009, 108–119].

which had dominated art for many centuries, in favor of a more "objective" picture of the world1 . This new aesthetic paradigm loudly declared itself in the first half of the twentieth century, and by the 1950s it had become the dominant idea of avant-garde composers.

Taking this into account, we can conclude that the reproach expressed by S. I. Savenko that Stockhausen's theory "ignores the qualitative difference between micro- and macro-oscillations" from the point of view of their perception by the human ear [Savenko] is not entirely fair: in the article "Wie die Zeit vergeht" the composer clearly indicates the thresholds of hearing,
determining the transition of discretely perceived impulses into the sensation of the "height" of sound, the boundaries of audible frequencies, etc. This suggests that the possibilities of human perception are certainly taken into account by Stockhausen.

Another thing is that the composer is not looking for the method of organizing sound material that is most easily and freely perceived by the human ear, but the one that is most organic to the nature of sound as a physical phenomenon. A similar concept was well formulated by P. Boulez: "Musical material, a musical object itself has something to tell us; this object can live its own life, and we its life -

"We torture when we use the material only for the development of musical speech, musical thought" (cited in: Tsaregradskaya, 2002, 228). A very similar thought was expressed by I. Xenakis: "What I strive for is… to feel things, think about them and express them; that's all" (cited in: Tsaregradskaya, 2002, 352).

These statements reflect the change in the worldview paradigm, which was already mentioned above. If the composers of the 17th–
In the 19th century, composers sought to express, first of all, their own worldview, that is, themselves (even if in a broad sense - themselves as a person of their time or even a person in general), then
In the second half of the 20th century, they strive to create works where the musical material speaks "on its own behalf," and the work does not *narrate* about certain events in the universe, but *demonstrates* these processes themselves.

In practice, this means finding ways to organize
musical material that was unknown not only to the music of the immediately preceding period, but also to earlier periods.

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1 Yu. N. Kholopov calls this aesthetic paradigm "the devaluation of anthropocentrism" [Kholopov].

dov, the creation of new methods of working with musical material at all levels of composition - from a single sound1 to the level of the musical whole (the level of composition). It is no coincidence that Stockhausen says that his observation of the nature of sound can form the basis of *a new morphology of musical time* (“eine neue Morphologie der musikalischen Zeit”
[Stockhausen, 1963, 99].

In solving the problem of organizing musical material in accordance with the new concept of time, Stockhausen proposes to extend the methods used for organizing pitches (that is, in his terminology, in the area of microphases2 — “im Bereiche der Microphasen” [Stockhausen, 1963, 105]) to the area of durations
(i.e. macrophases). Thus, if the distance between sounds, one of which contains twice as many vibrations as the other, (octave) is divided into 12 parts (semitones), then the difference
between durations, one of which is twice as long as the other, should be divided into 12 parts.

Thus, for example, between the whole and the half there should be 11 more gradations of duration. Due to the absence of corresponding signs in the existing system of musical notation, Stockhausen suggests calculating the length of durations using a metronome. Thus, for example, if the whole = 60 (that is, lasts 1//), then it will have the following variants: MM: 60, 63.6, 67.4, 71.4, 75.6, 80.1, 84.9, 89.9, 95.2, 100.9, 106.9, 113.3, 1203

. The latter option can also be written as a half note in the original tempo. Thus, the whole note will have the gradations MM. 60–113, the half note – 120–226, the quarter note –
240–452, etc. Stockhausen calls this *chromatic tempered scale of durations* (“chromatic tempered scale of durations”) [Stockhausen, 1963, 110].

An interesting aspect of Stockhausen's concept is that he partially "rehabilitates" the meter, which had already lost all significance in avant-garde music. The composer finds analogies between the meter and the internal structure of sound. Thus, sound usually does not represent a single vibration (a "pure" tone), but a whole spectrum of different vibrations - the fundamental tone

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1 And even from a deeper level, since thanks to the emergence of new technologies By means of logical means, the structure of sound can also be created by the composer.

2 Stockhausen calls the interval between two nearest sound waves a phase. impulses. This

[3] scale is very close to the one proposed by Cowell [Cowell, 1996, 107].

and overtones1 , which create their own intensity maxima
at different moments in time and periodically, the intensity maxima of the overtones coincide with those produced by the fundamental tone.

These coincidences remind the composer-researcher of the strong beat in the measure, while the relationship of the general maxima of intensity with the intermediate ones, which give the overtones, resembles the relationship of meter and rhythm. This observation confirms the idea of the unified nature of micro- and macro-temporal relationships in music.

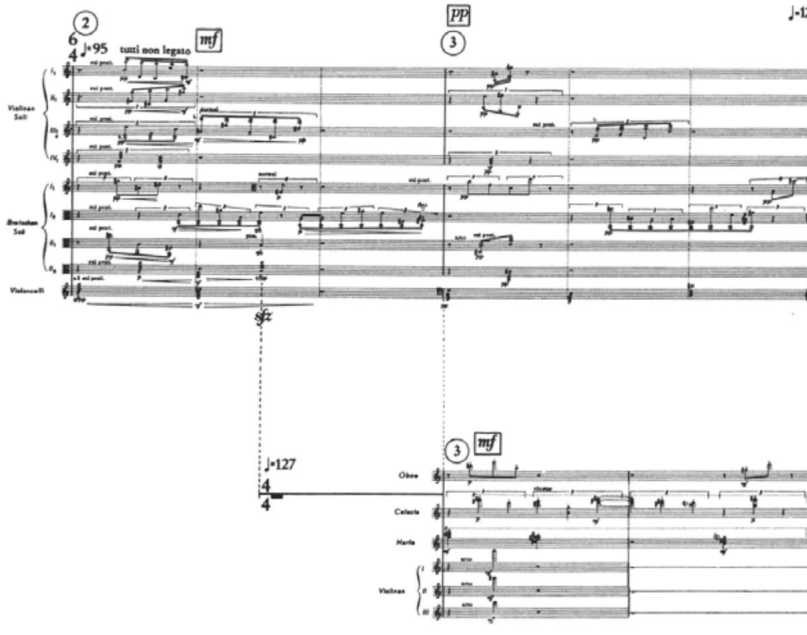
Considering that in German the word “timbre” (klangfarbe) consists of two parts – klang (sound) and farbe (colour) – Stockhausen believes that it is better to replace it with “Klangrhythmus” (“sound rhythm”), and in general one should speak of “formant rhythms” (For-mantrhythmen). In addition, he claims that the composer can “intervene” (eingreifen) in these relationships (i.e. in the structure of timbre), similar to what happens in electronic music [Stockhausen, 1963, 108].

Returning to the durations, we note that the use of such fine gradations as Stockhausen calculates in practice means frequent changes of tempo, which is difficult to implement. In this regard, the composer suggests using either three multi-voice instruments or three orchestras that would play under the direction of different conductors and synchronize only at certain moments in time. This would facilitate the change of tempo, since the conductors could prepare new tempos during the pauses,

checking with the metronome. This idea is realized in the composition “Gruppen” (“Groups”) for three orchestras (1955–1957; example 1):

As a result of such meticulous work with the musical material, a finely differentiated sound fabric with constantly changing characteristics (density, intensity, etc.) is formed. In such a structure of musical matter, on the one hand, one feels continuity with Webern's music. It manifests itself in frequent timbre, articulation and dynamic contrasts (including the sharp, cutting through sonority sforzandi), which creates an extremely detailed sound; in the pauses separating short sound structures from each other. In addition, the interval composition and melodic

[1] Instead of the term "overtone", Stockhausen suggests using the term "formant" - probably so that it could also be used in relation to macro-temporal relations (durations). He calls the fundamental tone the first formant, the second overtone the second formant, and so on [Stockhausen, 1963, 106].



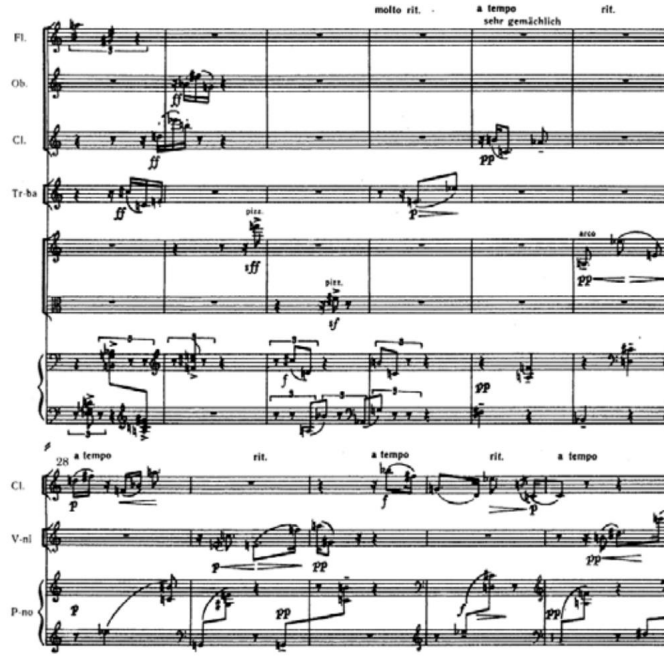

Example 1. K. Stockhausen. Groups

The contour of the elements of Stockhausen's sound fabric has a clear "genetic" relationship with Webern's: the composer often uses leaps over wide intervals (including more than an octave), and Webern's favorite combinations of thirds (sixths) and sevenths (ninths)1 are also often encountered . For clarity, we will cite a fragment of Webern's Concerto for 9 instruments (op. 24; example 2): However, there is also a significant difference: if in Webern each sound was heard as clearly as possible and the sound fabric was extremely transparent, then Stockhausen comes to the idea of a "sound mass", however, unlike the classical concept of this kind of sonority, they are now based not on inert "general forms of sound"2 , but consist of discrete superimposed

sound structures with individualized pitch contour and rhythm, and often contrasting in timbre and articulatory characteristics.

Thus, if in Webern, in accordance with the principle “everything is important”, the background disappears and only relief remains, then in Stockhausen the signs of “relief” (expressiveness and individualization)

1 In particular, in the violin part I1 and viola I2 in the given example.
2 The term was coined by E. A. Ruchevskaya [Ruchevskaya, 1998, 78].




Example 2. A. Webern. Concerto op. 24, Part I

The complexity of pitch patterns, the presence of internal division) and the “background” (the sum of perception) are combined to form sound groups with a complex internal structure.

The artistic effect produced by such music fully corresponds to the aesthetic ideal expressed in the words of Boulez: “listening to sounds, hearing the inner life of sounds,

see them grow, transform, maybe even die <>
What interests me most is the replacement of activity with contemplation” [quoted from: Theory of Contemporary Composition, 2005, 281].

It is necessary to mention another important point of Stockhausen’s concept, described in the article “Wie die Zeit vergeht”. As a practicing musician, Stockhausen understood well that with such a degree of differentiation it is extremely difficult to maintain (and control) the accuracy of the execution of all the details of the score. This naturally leads him to the idea of variability of some parameters of the composition. As a result, the concept of the “point” (fixed value of pitch, duration, etc.) is replaced by the concept of the “field” (range of possible values of sound parameters). As an example of a composition in which this principle is applied, Stockhausen describes his piece Klavierstück XI (1956).

Certainly, the German avant-gardist's appeal to the principle of variability was influenced by the works of D. Cage1 . In providing a theoretical basis for his new concept, the composer also turns to the experience of performing ornamentation in classical music, in which the durations within melismas were not calculated separately.

However, most likely, the turn to aleatoricism is to a greater extent determined by the internal logic of the development of Stockhausen's creative thought. The fact is that the spontaneous unpredictability of the flow of the musical process corresponds much better to the essence of the serial method of composition than the purposefulness and orientation towards the linear cause-and-effect relationship of events (primarily due to the functional equivalence of all the conductions of the series, as well as the sounds within the series [Litvikh, The Concept of Form in Serial

[in the music of Anton Webern…, 2009, 24]). In addition, the effect of chance in the “behavior” of certain elements of the sound fabric also agrees well with the desire of avant-garde composers not to impose anthropomorphic patterns on musical material2 . However, creating on this basis increasingly sophisticated methods of working with sound, Stockhausen comes to the conclusion that some of his ideas cannot be adequately reflected within the framework of a fixed musical text. Considering Stockhausen's understanding of musical time, one cannot help but note the parallels with the natural scientific and philosophical concepts of the 20th century. Thus, the “single nature” of those elements of the musical fabric that were traditionally

called “pitches” and “durations” revealed by the composer, and the development of new (unified) methods of working with them evokes associations with the spatio-temporal concept of G. Minkowski. “From now on, space itself and time itself must become fictions, and only some kind of combination of the two must still retain independence,” wrote the outstanding mathematician in 1908 [Minkowski, 1973, 167].

The manifestations of the spatio-temporal concept in 20th century art are varied: thus, ideas of movement and modification penetrate into painting, sculpture and even architecture, and visual (in particular, spatial) associations are strengthened in music.

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1 On the pages of the article “Wie die Zeit vergeht” a fragment of one of the pairs is given Cage's title [Stockhausen, 1963, 122].

2 This is probably why Stockhausen’s serial works, the composition technique of which seemingly does not allow for a single “random” note, are perceived by ear as a spontaneous, unpredictable process.

and time ceases to correspond to classical ideas of fluidity, linearity and irreversibility [Litvikh, Unity of space-time..., 2009]1 . The idea expressed by Stockhausen that durations and pitches (that is, those elements of the sound fabric that are primarily associated with the direct experience of time and those that evoke vivid spatial associations) have a single nature, and therefore the methods of working with them should not differ fundamentally, is in good agreement with Minkowski's concept of the space-time continuum.

In addition, in the 20th century it became clear that many physical processes are not strictly deterministic, but are subject to probabilistic laws. For example, in experiments with microparticles it became clear that, even knowing the initial conditions, it is impossible to accurately predict the behavior of each individual particle. It is only possible to establish the probability with which it will end up at a particular point in space. Accordingly, the concept of the "field" developed by Stockhausen as a range of possible values of various sound parameters also fits quite organically into the scientific context of the 20th century.

Stockhausen's understanding of the musical process also echoes A. Bergson's theory of time, the key concept of which is "pure duration"2 . According to the French philosopher, "pure duration is the form that the sequence of our states of consciousness takes when our "I" is actively working, when it does not establish a distinction between the present states and the states that preceded them" [Bergson, 1999, 750]. According to Bergson, pure duration is the deep essence of consciousness, while the distinction between mental states and their sequential arrangement "in a line" (one after another) refers to the outer layer of consciousness, which is in closer contact with the surrounding world [Bergson, 1999, 770–772].

[1] Probably, the rethinking of such fundamental concepts as space and time in the art of the 20th century caused the penetration of the term “chronotope” into the humanities (including musicology), borrowed by M. M. Bakhtin from A. A. Ukhtomsky, who, in turn, relied on the idea of the space-time continuum of G. Minkowski. In the most general terms, this term (this concept) denotes the inextricable relationship between space and time. However, unfortunately, in musicology it is currently quite “blurred” and is often used by different authors in different meanings [Astakhova, 2019].

[2] M. A. Arkadyev believes that the translation of the French word “duree” proposed by V. I. Vernadsky as “duration” rather than “length” is more correct [Arkadyev, 1999, 9].

It is quite significant that, to explain his idea of “pure duration,” Bergson gives the example of a musical phrase, which is, indeed, conceived as a whole, not reducible to a sequence of sounds [Bergson, 1999, 751]. Of course, the ability to holistically represent a musical work and its individual parts is absolutely necessary for the perception of music. At the same time, classical musical form relies to no lesser extent on the linear interrelation of musical events. In Russian science, this concept is interpreted as the duality of the processual and crystalline aspects of musical form1 .

In serial music, the functional equivalence of all the executions of a series already effectively eliminates the need to preserve linear cause-and-effect relationships in the musical process, which Webern repeatedly pointed out and which was realized in his works [Litvikh, The Concept of Form in Anton Webern’s Serial Music…, 2009, 60]. As a result, it becomes practically impossible to distinguish between the processual and crystalline aspects of musical form [Litvikh, The Concept of Form in Anton Webern’s Serial Music…, 2009, 157].

Taking into account all of the above, there is reason to assert that Stockhausen takes the next step on this path, since the application of uniform methods of work to various parameters of sound contributes to the closest interconnection of all elements of the musical fabric and brings the musical process even closer to Bergson's “pure duration”, which is characterized by the total interpenetration of mental states without their clear delineation and alignment in a linear sequence.

In this regard, it would also be appropriate to mention the concept put forward by M. A. Arkadyev of two “levels” (or two “layers”) of musical time found in European music of the 17th–
19th century in a tense, sometimes conflicting interaction: a real sounding rhythm and a tactometric system of accents, which, according to the scientist, represents “a living and independent functional structure of the gravitation of a “non-sounding” time pulsating field, on which “sounding” elements of the musical fabric will be placed with their own accentual initiative, which is by no means isomorphic to the meter” [Arkadyev, 1999, 63].

[1] Thus, L. A. Mazel writes that “at any given moment the listener perceives a musical-temporal process, and at the end of the whole (or part) – its result (complete or partial)” [Mazel, Zuckerman, 1967, 38].

According to Arkadyev, the “silent expressive continuum” in modern European music, which the researcher also calls “time-energy” or “time in a special sense” [Arkadyev, 1999, 22] and which arises as a result of overcoming the quantitative nature of the rhythm of the preceding period with its clear proportionality of time segments, performs a vital function: it is an expression in music of the process itself (“Bergsonian time” [Arkadyev, 1999, 100]), which is not divided into separate segments1 . In this regard, it can be said that the Stockhausen idea of a “chromatic tempered scale of durations,” which excludes any perceptible metric uniformity of pulsation, allows one to feel “duration” in all its fullness, qualitative diversity, and irreducibility to quantitative characteristics.

The analysis of the concept of musical time, presented by Stockhausen in the article “Wie die Zeit vergeht”, carried out in this work, allows us to come to the following conclusions.

1) Stockhausen’s concept is based on the study of sound as an acoustic phenomenon, as well as the psychophysiological laws of perception of musical sound.

2) The composer identifies the unified nature of the various parameters of the musical fabric and, based on this, justifies the need to search for unified methods of working with these parameters.

3) Stockhausen's attitude to musical material inherits the principles of Webern's serial music. In addition, the composer develops some ideas of Messiaen and Cowell.

4) Stockhausen’s concept reflects the fundamental component of the non-classical aesthetic paradigm – the rejection of the anthropocentrism of the previous era and an interest in the fundamental laws of the universe.

5) Stockhausen’s concept echoes the scientific discoveries and philosophical ideas of the 20th century, in particular, Minkowski’s spatio-temporal concept, the discovery of the random factor in the behavior of microparticles, and Bergson’s idea of “pure duration”.

The ideas expressed by Stockhausen in the article “Wie die Zeit vergeht” remained relevant for the composer throughout his entire life, despite the fact that his work subsequently underwent significant evolution. Considering the importance of the factor

[1] According to Bergson, the measurement of time prevents the sensation of duration, since it reduces qualitative characteristics to quantitative ones [Bergson, 1999].

time for musical art, as well as the scale of Stockhausen's creative discoveries, it can be said with confidence that the study of this and other musicological works of the German composer and, if possible, their translation into Russian is one of the pressing tasks of Russian musicology.

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