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Aurel Stroe - Morphogenetic conception on Music (Dissipative structures)

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Abstract: *Aurel Stroe is one of the greatest composers and thinkers of the Romanian musical art in the post-Enescu period. Shaper of musical consciousness, author of great originality, he can be placed – in music and thinking – at the border between science and art, between art and music, between philosophy and mathematics. His art is infused by concepts taken over from all of these fields, out of which we will deal here with the ones connected to dissipative and morphogenetic structures.*

Key-words: *morphogenetic, modernity, structures, mathematics,*

1. Introduction

Aurel Stroe is one of the greatest composers and thinkers of the Romanian musical art in the post-Enescu period. Shaper of musical consciousness, author of great originality, he can be placed – in music and thinking – at the border between science and art, between art and music, between philosophy and mathematics. His art is infused by concepts taken over from all of these fields, out of which we will deal here with the ones connected to dissipative and morphogenetic structures.

2. THE THEORY OF DISSIPATIVE STRUCTURES: generalities

The theory of dissipative structures is one of the great theoretical mathematical-physical constructions which Aurel Stroe embraces at the conceptual level, but especially at the concrete level of the development of his musical creation. "**A dissipative structure** is a thermodynamically open system operating far from

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thermodynamic equilibrium, that exchanges energy, matter, and information with the external environment.

In this kind of systems, organization can emerge through a spontaneous self-organization process, by virtue of the exchanges with". A dissipative system is a thermodynamically open system which operates out of, and often far from, thermodynamic equilibrium in an environment with which it exchanges energy and matter. A tornado may be thought of as a dissipative system. Dissipative systems stand in contrast to conservative systems.

A dissipative structure is a dissipative system that has a dynamical regime that is in some sense in a reproducible steady state. This reproducible steady state may be reached by natural evolution of the system, by artifice, or by a combination of these two. A dissipative structure is characterized by the spontaneous appearance of symmetry breaking (anisotropy) and the formation of complex, sometimes chaotic, structures where interacting particles exhibit long range correlations.

Examples in everyday life include convection, turbulent flow, cyclones, hurricanes and living organisms. Less common examples include lasers, Bénard cells, droplet cluster, and the Belousov–Zhabotinsky reaction (Li, HP 2014, 1–6). At the level of the musical expression, these phenomena could correspond to: development (within the forms which entail the existence of a central section of this type), excessively ornate segments, different variation typologies, the vanishing point or the stretto area within the sonata form, rhythm fracture points and fragmentations of the musical discourse.

The dissipative thermodynamic problematic of the musical composition for Aurel Stroe is formulated by I. Prigogine: the Nobel prize laureate of 1977 (precisely for the analysis and description of these structures "which have dynamical regimes that can be regarded as thermodynamic steady states, and sometimes at least can be described by suitable extremal principles in non-equilibrium thermodynamics. Thermodynamic systems far from equilibrium can have drastically different behaviour from systems close to equilibrium: near equilibrium, the local equilibrium hypothesis applies and typical thermodynamic quantities such as free energy and entropy can be defined locally" (Prigogine 1978, 777-785).

In a different study, Prigogine refers to the principle of minimum entropy production (Prigogine, 1945, 600-606), in connection to systems distant from the equilibrium state. Aurel Stroe treated the work of art – especially the type of works he composed, where he intentionally introduced tensions difficult to manage – as a system distant from the equilibrium state: close to equilibrium, the entropy tends to a stable maximum. Far from equilibrium stability is no longer a universal

property and can be broken. (...) Systems with such dynamic states of matter that arise as the result of irreversible processes are dissipative structures.

Also, I. Prigogine approached the problem of dissipative structures from the perspective of the IRREVERSIBLE TRANSFORMATIONS OF OPEN SYSTEMS (in the study *Modération et transformations irréversibles des systèmes ouverts*). The phenomenon affects both the massive plan of the major structures, as well as the discursive microstructures (the multimobiles, which populate most of his works in order to create a watermark that reproduces, in reduced dimensions, the dramas visible on a large scale): “the conceptual problems have both macroscopic and microscopic aspects. For example, from the macroscopic point of view classical thermodynamics has largely clarified the concept of equilibrium structures such as crystals” (Prigogine 1977, 263).

3. The theory of dissipative structures for Aurel Stroe:

In Aurel Stroe’s creation, dissipative structures represent a principle identifiable in most of his works, in which the maestro cultivates an artistic system which is far from being in equilibrium. This is a very effective way to crack the musical discourse, with the aim of creating and sustaining a tension that otherwise does not find its source of power.

Master Aurel Stroe's study (from the position of first author) highlights essential discussions about unstable forms are bifurcation, oscillating forms. MUSICAL COMPOSITION is seen as a system based on the mechanisms of musical forms and genres, in fact the expression of the most advanced human vision on EXISTENCE, the UNIVERSE.

Aurel Stroe analyzes characteristics of COMPOSITIONS THAT BREAK, such as the final works of L. van Beethoven, G. Mahler, A. Berg, M. Kagel or J. Cage (characterized by heterogeneity – what affects their becoming), unlike by the works of J. S. Bach (the exponent of a mechanistic, stationary universe, of a state of equilibrium). "BEETHOVEN AND CAGE experimented the edges of music, trying to find out how much you can exploit the unknown, creating "THE BEGINNING OF A NEW TYPE of composition, which involves researching the birth, evolution and death of music, its structures, its ontology" (Stroe, Georgescu 7).

The displacement of the musical form and of a ritual under the destructuring pressure of the dramatic text represents a reality. Aurel Stroe’s music preserves, regardless of its genre, a powerful link to tragedy, within which the scene and text requirements dominate. In his writings about morphogenetic music, Aurel Stroe uses the opera Agamemnon as a main way of exemplification: it relies on a BOOK

OF CANONS (a kind of art of fugue), made up of 14 imaginary proto-canons (duplex, triplex, multiplex canons) which are characterized by multiple processes difficult or impossible to control (dissipative processes): rhythmically undetermined discourse, glissandos and enharmonics.

The dramatic action will gradually precipitate. The expansion of the literary text will come off as a REGRESSION OF MUSIC: if act I is a uniform platform, acts 2 and 3 contain a deep morphogenetic change: that is "the BIFURCATION POINT OF A SIGNIFICANT MACROSCOPIC FLUCTUATION that will push the musical structure into a slow, agonic, degenerative process, a process of AGEING AND DEATH OF A DYNAMIC SYSTEM" (Stroe 1983, 54).

The morphogenetic drift is the point of maximum informational uncertainty within the musical discourse, which allows the author to focus on the catastrophe, on the rupture, on the point of maximum tension. It is his surrealist way of loading the musical discourse with excrescences that, at a given moment, disturb its normal development, creating ruptures and de-tensioning of the questioned structures.

Morphogenetic music is different from NORMAL music: it has a structural ambiguity, a paradoxical uncertainty between the surface structure and the EIDOS (the essence, the eidetic reality of the musical composition); this can be exemplified by the closeness between Webern and Palestrina (through the coherence and clarity of structural procedures), beyond the closeness in style, cultural context, form, compositional techniques, personality and message.

The following figure illustrates the regressive dynamics of morphogenesis in the opera *Agamemnon* by Aurel Stroe, the first opera in the trilogy Orestia based on Esquil, a masterpiece in the opera genre. The three masterpieces in the cycle signed by Aurel Stroe based on Esquil' tragedies are: Orestia I (Agamemnon: 1979-1981), Orestia II (Coeforele: 1973-1977) and Orestia III (Eumenidele: 1988). The first of these tragedies refers to the character of Agamemnon, one of the most important heroes of mythological Greece (known from the Iliad).

The figure 1 describes the evolution of some dissipative processes in time (during the three acts), considering the dramatic text (libretto) and the sound construction (musical text). In this respect, we can notice:

- the degree of being graspable (manipulability, functional usage),) in the dramatic text (libretto)

- the degree of structuring in the zone of canons, of arias, of recitatives, of speech in the sound construction (musical text)

- the entropy of the musical process, which implies steady states (enclaves of order), towards a state of equilibrium.

The figure shows the correlation between the organizational degree of the musical text, the degree of the dramatic text of being graspable, and the entropy of

the musical process (entropy analysed in a different paper). The first two are control parameters, the last is a behaviour parameter defining the morphogenetic drift by the opera.

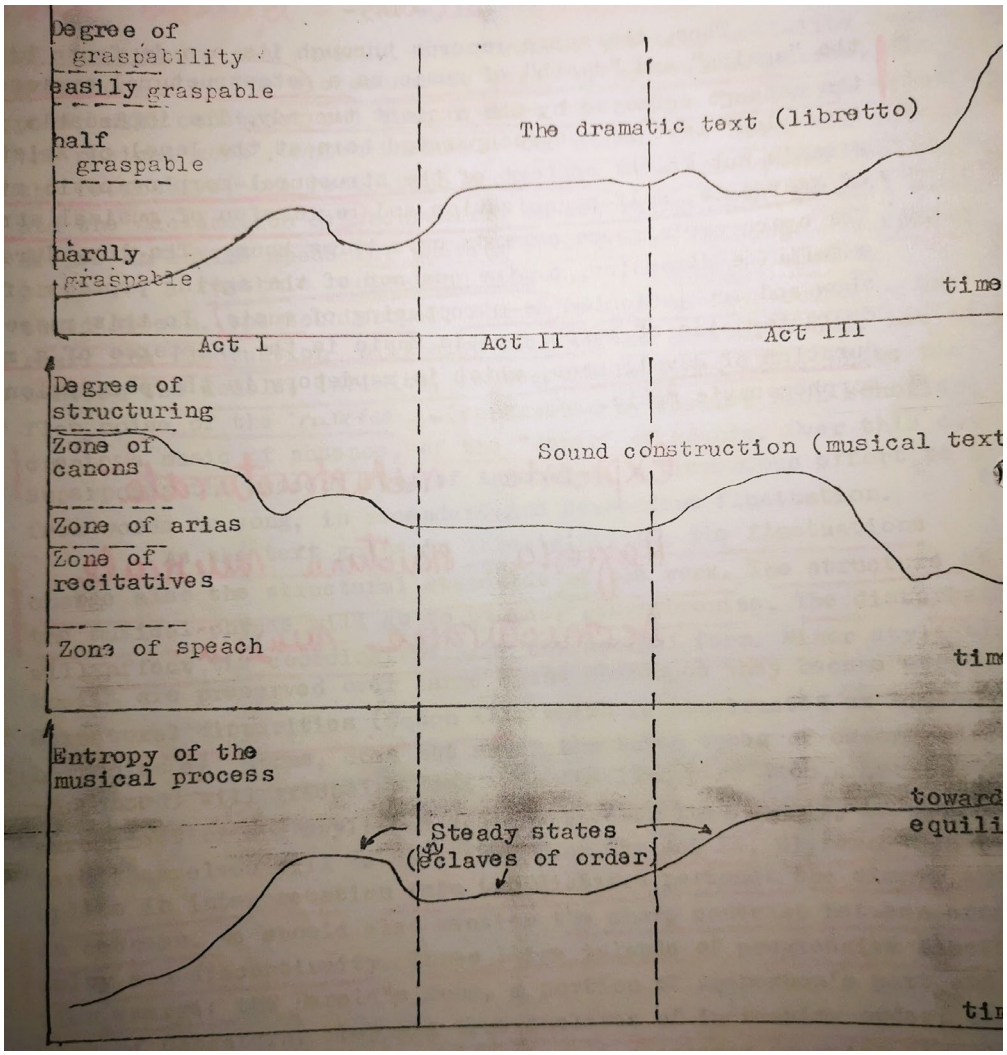

Fig. 1. *Aurel Stroe, Agamemnon, The regressive dynamics of morphogenesis* (Stroe, 6).

4. Conclusions

Aurel Stroe is one of the most original composers of the post-Enesian generation, nicknamed THE MUSICIAN WHO SEES IDEAS precisely because he did not limit himself to his own compositional act, but was an unparalleled thinker on the musical phenomenon in the art of sounds in the second half of the 20th century, on Romania's territory. Only Ștefan Niculescu and Anatol Vieru are on the same line from this point of view, duplicating an important creation with a significant musicological thought.

However, Aurel Stroe ventures into territories unexplored by artists, into the areas of exact sciences that are related, from the perspective of music, to the sound act itself. An encyclopedic personality, connoisseur of the philosophy of science (which had gained unprecedented momentum in the years of his youth - 1950-1960), beneficiary of the most modern avant-garde ideas of Europe, Aurel Stroe was able to bring to fruition in his creation these elements of great novelty.

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