

## THE CONFLUENCE OF SCIENCE AND ARTISTIC INSPIRATION IN GYÖRGY LIGETI'S MUSICAL THINKING

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**SUMMARY.** Original and contradictory, György Ligeti's work is rooted in a complex creative thought, influenced by several innated and personal factors. In this context premature affinity towards the natural sciences, the passion for music, and other qualities like synesthesia and a generalized artistic sensitivity proved to be definitive. He manifested during his an opened attitude towards (almost all kind of) music, though his output is basically dominated by several – extremely personal – dichotomies, which ultimately demonstrate a fundamental duality of his personality: science-art, craft-intuition, calculus-emotion, presence-distance, mechanic-kaleidoscopic, grotesque-absurd, manipulation-ecstasy. Our study tries to find out the roots of these dichotomies, mainly through his writings and memories.

**Keywords:** Ligeti, science and inspiration, static-dynamic, synesthesia.

Before he became a well-known and appreciated composer, Ligeti have had to experience a walk of life plenty of difficulties, mostly affecting his aesthetic view, and not only. Born in a small village of Transylvania (Tâmăveni, 1923), Ligeti have studied in Cluj, inclusively at the Conservatory up to the end of the Second World War, surviving miraculously the Nazi persecution and passing over definitively the Iron Curtain during The Hungarian Revolution of 1956, suffocated from the climate instituted by the communist dictatorship. Finally, he found the accomplishment of his artistic vision in Western Europe. As a descendant of an intellectual Jewish family, the composer cultivated from his youth a real passion for natural sciences, especially for mathematics, physics and chemistry, music being for him an eventual perspective for a future profession.

He started his musical studies relatively late and without too much systematic, which – alongside of his native interest for a parallel cultivation

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of several different fields of knowledge<sup>2</sup> – proved to be decisive (even after he had recovered the basic knowledge and skills of composing as a pupil of Ferenc Farkas) in a permanent search for basically new alternatives to the traditional paradigms of composition.

After a relatively short creative period spent under the influence of Bartók's music, Ligeti found himself suddenly in an occidental artistic environment among a limited number of avant-garde composers, excited by the resources of electronic music, like Eimert, Stockhausen, Maderna, Koenig and later Boulez or Kagel. This milieu offered him not only the chance to enlarge his perspectives with several innovative tendencies from the first half of the century, but also to recognize the possibility of new compositional paradigms, developed further in a very personal way.

His experiments carried on in the WDR Studio at Cologne and the Darmstadt meetings represented for Ligeti much more than an acquaintance with the new technics of composing offered by sound generators. Though he realized several electronic compositions (among them some notable pieces like *Articulation* and *Glissandi*), the significance of these experiments goes beyond their proper value. They rather offered him the perspective and possibility of sound modeling according to the ideals of his youth, regarding the connection between music and natural sciences. In spite of his enthusiasm aroused by these new compositional devices, the electronic music didn't represent to Ligeti an end in itself. By realizing relatively soon the limits of this medium, especially due to the artificial nature of these sonorities, he returned to the acoustic sound objects (voices and instruments), keeping however the new perspective of sound modeling: „The most important experience achieved in the Studio of Cologne represented to me the fact, that the clear and obscure textures can be controlled.”<sup>3</sup>

Beyond the object of his further experiments set in this statement, the composer also conceived in this period a new process, that demonstrate again his premature affinity toward the natural sciences, formulated later as it follows: “Though mathematics and music composition are quite distant areas of thought, their common feature is consistency and discipline.”<sup>4</sup>

Thus for Ligeti, the creative process begins with posing a problem, then fixing certain limits according to some basic principles and rules. In this context, the composition appears to be the result of an effort, directed

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<sup>2</sup> “There is, however, another type of creativity in which the attention is less monolithic, but spread over a broader territory of interests. I definitely belong to this second type and would feel very unhappy if I were a narrow specialist. I have always been very enthusiastic about many different realms of knowledge.” Kerékfy Márton (ed.): *Ligeti György válogatott írásai* (*The Selected Writings of György Ligeti*), Rózsavölgyi és Társa, Budapest, 2010, p. 30.

<sup>3</sup> Kerékfy Márton (ed.), *op. cit.*, p. 247.

<sup>4</sup> *idem*, p. 34.

toward the solving of a basic issue formulated from the outset either as a new self-provoking idea, or arose during a former creative process: "... the method changes from work to work, namely gradually: the experiences gained during the composition of a piece lead to the change of the technique, and every new piece arises the problems of compositional technique, which are going to be resolved in further works, which poses again some new questions."<sup>5</sup>

This creative view already appears in germs from the piano cycle called *Musica ricercata*<sup>6</sup> (1951-53), which carries certain marks of Ligeti's mature style, setting off at once the change of his compositional paradigm. Similarly, the late *Études for piano* (1985-2010) demonstrates the persistence of this principle: "In every work I have formed a musical texture consisting of chosen pitches and rhythm constellations, and during this process I kept myself to these established rules and limitations, partially unconstrained, partially as a slave of the rules."<sup>7</sup>

Scientific thought, combined with creative intuition appears in his compositional view as a series of dichotomies: science-art, craft-inspiration, static-dynamic, mechanic-kaleidoscopic, absurd-grotesque, cold-emotional. However, Ligeti doesn't turn the knowledge of science into sonorous theses. According to the composer and scholar Dora Cojocaru "Though Ligeti's composition method remains permanently an empirical one, it contains a series of aspects which situates it at the borders of the natural sciences, thus it may be stated, that it represents a pseudo-science of which analogies with the fractal geometry are evident."<sup>8</sup>

These principles also were developed (with or without conscience) into certain composing paradigms, starting from his electronic pieces. While *Glissandi* (1957)<sup>9</sup> appears as a premature example of the static principle, *Artikulation* (1958) exposes the dynamic<sup>10</sup> aspect of his thought. These appear either individually, defining certain categories of composition, or in several synthesis forms, though Ligeti considers that the dynamic type encompasses the static one.

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<sup>5</sup> *idem*, p. 342.

<sup>6</sup> According to Ligeti, "the attempt (*ricercare*) character of this work consists in that in the first work I gave myself a strict, limited task: what I'm able to do with a single note (and by its octave transpositions), adding a new one only at the end." *Idem*, p. 368.

<sup>7</sup> Kerékfy Márton (ed.), *op. cit.*, p. 35.

<sup>8</sup> Dora Cojocaru: *Creația lui György Ligeti în contextul stilistic al secolului XX (The Work of György Ligeti in the Context of the 20th Century Style)*, Editura MediaMusica, 1999, p. 108.

<sup>9</sup> Other pieces belonging to this type: *Atmosphères, Volumina, Lux Aeterna, Continuum, Lontano, Ramifications, Harmonies, Coulée*.

<sup>10</sup> Other pieces belonging to this type: *Apparitions, Aventures, Nouvelles Aventures, 10 Pieces for Wind Quintet*.

In a self-interview, he confessed some details regarding these aspects of his creative view: “The orchestral pieces *Atmosphères* and *Lontano* belong to the static type [...] the apparent stop of the formal process, the »stretched time« appears here more consequently as in *Apparition* [...] I also dealt with dynamic, anxious, broken up forms, like in the *Aventures*, *Nouvelles Aventures* and in the third movement of *Requiem*.”<sup>11</sup> Moreover, the composer speaks about several other types of form, developed in his works, like the mechanic and kaleidoscopic ones. These appear, however, as particular examples of the already mentioned static-dynamic dichotomy. Interestingly, Ligeti discovered in the 70’ a metaphorical formula for his compositional preferences during the lecture of an essay written by the Anglo-Austrian philosopher Karl Popper, entitled “On Clocks and Clouds”, which confronts the dichotomy between physical determinism (according to the Newtonian laws) and its apparent opposite, indeterminism (developed in the field of quantum physics). According to the composer: “I liked Popper’s title and it awakened in me musical associations of a kind of form in which rhythmically and harmonically precise shapes gradually change into diffuse sound textures and vice-versa, whereby then, the musical happening consists primarily of processes of the dissolution of the »clocks« to »clouds« and the condensation and materialization of »clouds« to »clocks«.”<sup>12</sup>

The same dichotomy appears in the emotional content of his œuvre, as a predominant coolness of the static moments, and the sudden and violent eruption in the dynamic ones. However, his pupil and later assistant, Wolfgang-Andreas Schultz confessed that “Ligeti saw himself in the tradition of the »cold« composers, hence his affinity to Stravinsky.”<sup>13</sup>

Certainly, one of the causes of his originality lays on the identification of certain creative ideas, which challenges the traditional perspectives about time and space, by conceiving structures and laws coming outside of the traditional musical thought, especially from scientific fields. The composer made several confessions regarding these sources of inspiration: “It was especially the many hexagonal and pentagonal carbon cycles which evoked in me a passion for “structures” [...] I guess that a main source of my later compositional fantasies and structural ideas was organic chemistry.”<sup>14</sup>

Another definitive aspect of Ligeti’s thought is based on his other innate qualities, like sensitive phantasy and synesthesia. Regarding the first aspect, let’s quote a fragment from a horrific dream of his childhood, recounted later by the composer relating to the structural basis of *Apparitions*:

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<sup>11</sup> Kerékfy Márton (ed.), *op. cit.*, p. 341.

<sup>12</sup> Kerékfy Márton (ed.), *op. cit.*, p. 412.

<sup>13</sup> Louise Duchesneau & Wolfgang Mar (ed.): *György Ligeti. Of Foreign Lands and Strange Sounds*, The Boydell Press, 2011, p. 219.

<sup>14</sup> Kerékfy Márton (ed.), *op. cit.*, p. 32.

“As a small child I once had a dream that I could not get to my cot, to my safe haven, because the whole room was filled with a dense confused tangle of fine filaments. It looked like the web I had seen silkworms fill their box with as they change into pupas I was caught up in the immense web together with both living things and objects of various kinds – huge moths, a variety of beetles – which tried to get to the flickering flame of the candle in the room [...] Sometimes the different kinds of movements reinforced one another and the shaking became so hard that the web tore in places and a few insects suddenly found themselves free. But their freedom was short-lived, they were soon caught up again in the rocking tangle of filaments, and their buzzing, loud at first, grew weaker and weaker. The succession of these sudden, unexpected events gradually brought about a change in the internal structure, in the texture of the web [...] All these changes seemed like an irreversible process, never returning to earlier states again. An indescribable sadness hung over these shifting forms and structure, the hopelessness of passing time and the melancholy of unalterable past events.”<sup>15</sup>

Paradoxically, Ligeti’s vivid phantasies, his ideal of a metaphysical music, definitely detached from reality appear as sonorous objects of a pronounced materiality, due to his synesthesia. The basis of this paradox lays on the procedure of depriving the sonorous elements of their traditional acoustic qualities, followed by their integration into a complex and quasi-calculated system, where these became elements of construction. Finally, the acoustic reproduction of such structures makes an impression of an imaginary sonority, totally foreign from the usual. The composer frequently remembered his imaginary compositions of his childhood, emphasizing that these appeared as “real” ones: “On my way to and from school, which took about twenty minutes, I would imagine a piece of music, for instance a symphony or a concerto (on shorter walks it would be an overture). This imagined music was never abstract, but “performed” before my inner ear, mainly by a large orchestra. In some way, I listened to these pieces as if I were a concert goer listening to real musicians and singers.”<sup>16</sup>

Ligeti mentioned on several occasions the significance of his synesthesia: “Sounds and colours (also smells, forms, letters and numbers) were connected in my imagination [...] I now know that Rimbaud imagined that colours were associated with certain letters, that he wrote a wonderful poem about this, and that Messiaen imagined »coloured« music. This also applies to me, but my colour associations are different [...] Even more stable for me have always been the connections between colours and numbers.”<sup>17</sup>

<sup>15</sup> Quoted by Richard Steinitz: *György Ligeti. Music of the Imagination*, Faber and Faber, 2003, p. 7.

<sup>16</sup> Kerékfy Márton (ed.), *op. cit.*, p. 33.

<sup>17</sup> *idem*, pp. 29-30.

But for his music, synesthesia represents much more, than some associations between pitches and other types of sensory information, affecting his entire work in its very basis. As it seems, the pronounced materiality of his sound shapes is also a result of synesthesia. According to the Belgian scholar, Hermann Sabbe, this aspect generates a series of inherent qualities of his music, formulated as complementary synesthetic and kinetic metaphors: spatial dimension (narrow/large), spatial distance (near/away), volume (less deep/deep), contour (clear/diffuse), spreading (diffuse/concentrated), body (empty/full), density (compact/transparent), luminosity (opaque/candescent), tone-color (matt/bright), color (consistent/iridescent), mobility (stationary/moving).<sup>18</sup> These lead ultimately to the recognition of new dimensions regarding his music: that of the analogy with the aggregation states of the materials.

For Ligeti, music appears not only as a structured order of its parameters, materialized in a score, but also as a psychoacoustic matter, with particular laws, which are extremely important during the process of the audition. Thus, he frequently takes into consideration the inherent limits of receiving and processing the acoustic phenomena as an aesthetic quality. In other words, Ligeti provokes constantly the extreme limits of receiving, even if their exploration (regarding the pitch, dynamics, and frequency of the movement) is balanced with the number, measure and complexity of the employed components. For instance, the rapidity of movements which exceed 16 units per second produces (similarly to the frames of a movie) the psychoacoustic sensation of the dissolution (for instance in *Continuum* for harpsichord). On the other hand, the extremely slow (or imperceptible) movements produce an impression of the static (*Lux Aeterna*). The same effect occur, when the inner movements of a saturated polyphonic plan generates an apparently move less sound mass, original technique developed by Ligeti, and employed in several compositions during the 70' and 80', called micro-polyphony. According to the composer's definition, this is "the most important technique I developed. By this, I mean orchestral (or vocal) webs of such complexity that the individual voices become inaudible."<sup>19</sup> This saturation of an unusual number of voices, in chromatic and hyper-chromatic states produces acoustic interferences, called by Ligeti the sound (tone-colour) of movement ("Bewegungsfarbe"), leading to a continuous transformation (metamorphosis) of the sonority.

Though Ligeti cultivated from his youth a deep interest towards the natural sciences, developed in his compositional thought in several manners and forms, like method of composition, a preference for the static and mechanic, for structures and expressive coldness, the keeping of a certain distance

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<sup>18</sup> According to Hermann Sabbe: *Ligeti György*, Continuum, 1993, p. 85.

<sup>19</sup> Kerékfy Márton (ed.), *op. cit.*, p. 42.

from his works, a pronounced self-criticism, his output is definitely influenced by his artistic sensitivity, combined with a rare quality of intuition and imagination and synesthesia. As a result, his music appears as an extremely original, but paradoxical synthesis of craft and art, calculus and emotion, presence and distance, manipulation and ecstasy.

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