

Music's Incited 'Augmented Reality' in Xenakis's *Polytopes*, Scriabin's *Mysterium* and Polymediality

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Abstract: *The Polytopes by Iannis Xenakis is the collective name of a series of spatial multimedia installations and musical land art pieces realised on the second half of the 20th century, which take part in the tradition that links Richard Wagner's conception of the total art work, the Gesamtkunstwerk. In the first decade of the same century, Alexander Scriabin envisioned his interpretation of a total art work, the utopian multimedia and multisensorial symphony Mysterium. By providing a brief description of the Concept of Polymediality (2003) and representative compositions associated with its two dimensions, this paper forms the hypothesis that all aforementioned works come under the contemporary notion of 'augmented reality'. This is understood within a hybrid and polyaesthetic context, in which the composer defines a spatial unity of all media elements interacting with the music.*

Key-words: *polytope, polymediality, music and multimedia, Gesamtkunstwerk, aesthetics of contemporary music*

1. Xenakis's *Polytopes* and Scriabin's *Mysterium*

According to Iannis Xenakis's own words in an interview on the occasion of the production of the *Polytope de Mycènes* in 1978: a poly-tope is a superimposition of spaces (cf. Solomos 2015); the coexistence of many places, the convergence of several topoi. The word "place", used in its general sense, denotes the abstract and the physical: a geographical place, a place of art such as music, of light, a place of history, a place of poetry, etc. Conceived between 1967 and 1984, Xenakis's Polytopes are the collective name of a series of spatial multimedia installations that mix together sound, light, colours, movement and architecture during live performances. They are tied to a concrete architecture (Polytope de Montréal, de Cluny and de Beaubourg) or to an archaeological site (Polytope de Persépolis and

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de Mycènes). In the latter, Xenakis deploys electroacoustic music, an ensemble of instrumentalists and percussionists, a female chorus, readings from Homer and works by the composer drawn from ancient Greek texts intoned in archaic dialects, children's choirs and soldiers bearing torches, laser beams, campfires, large anti-aircraft projectors, fireworks and light projectors, as well as animals equipped with bells and a diode between the horns. Archaism and technology follow a precise scenario established by Xenakis and guided by him via a walkie-talkie.

Xenakis's audiovisual scenographies take part in the tradition that links Richard Wagner's conception of the *Gesamtkunstwerk*, the total work of art as in the operatic tetralogy *Der Ring des Nibelungen* (1848-1878), with contemporary notions of cyberspace and the amalgamation of physical, virtual and augmented reality within an immersive and artificially evolved environment (cf. Sterken 2001, 263).

Except from the *Polytope d'Athènes*, one of Xenakis's unrealised concepts was for an interstellar *Global Polytope* (1974), a kind of proto-metaverse, that would incorporate a network of electronic flashes, powerful lasers, satellite tracking, computers, advanced methods of light and sound composition. Polytopes – ensemble of actions and electroacoustic sounds – were to be installed in various cities around the world – in the open air, on public squares, or in public shelters – and would be controlled by computers governed by rules of play established either with the help of the mathematical theory of games, or independently.

In a parallel world, beginning in 1902, Alexander Scriabin conceived the cataclysmic work *Mysterium*, a seven-day multi-sensory spectacle derived from a theosophical spirit that would synthesize various art forms moving beyond the limits of the individual arts and of art in general – a multimedia of sound, sight, smell, feel, dance, textures of nature and décor. To house his magnum opus, Scriabin initially conceived of a temple in the Himalaya mountains “in the form of a hemisphere surrounded by water, creating a sphere in the reflection, and on a scale that made Wagner's architectural projects appear modest. The landscaping and construction would be part of the score and performance” (Shaw-Miller 2002, 65).

Although *Mysterium* remained uncompleted, Scriabin's intermedial intention was accomplished in his last orchestral score, the fifth symphony, *Prometheus – The Poem of Fire*, op. 60 (1910), by synthesizing two dissimilar elements, namely sound and colour. The work, whose melody and harmony is based on Scriabin's mystic (synthetic) chord made up of fourths (C, F-sharp, B-flat, etc.), with the augmented fourth (tritone) being an inclination towards the twelve-tone music since it divides the octave into equal halves of six semitones (Roberts 2011, 137), is scored for large orchestra, a wordless chorus as well as a *tastiera per luce*, a light keyboard, written on the top line of the score in conventional music notation. The

colour-pitches employed are arranged in a circle of fifths and hence on an *organized* pattern than a synesthetic experience: C=red, G=orange, D=yellow, etc.

In *Polytope de Cluny* (1972), 600 lights were used along with 400 small mirrors adjustable to reflect laser beams of red, yellow and blue, as if holograms. Xenakis emphasizes on the *Polytope de Persépolis* (1971) that the work is visual symbolism, neither theatrical spectacle nor happening, in which the sound – the music – must absolutely prevail (Albright 2009, 155). He 'imaged' music in a different way, other than synaesthesia that involves a link between colour and sound as by Scriabin or Wassily Kandinsky's attempt "to bring painting into the realm of pure abstraction by using the atonal compositions of Arnold Schoenberg" (Kanach and Lovelace 2010, 12). Xenakis was working through strategies to deploy physics and mathematics as means to organise sound, which he graphically and colourfully penned on paper.

"The synesthesia inherent to graphic gestures made while searching for new sounds (in contrast to the more analytical approach of traditional notation) certainly played a role in liberating Xenakis's musical imagination" (Kanach 2010, 113).

Le Corbusier titled *Poème Électronique*² the 1958 revolutionary volumetric architecture³ for the Philips Pavilion, with which Xenakis introduced a new architectural paradigm: the three dimensions are distinct and not homomorphic, thus generating a spatialized virtual experience in the spectator since the immaterial spatial qualities become the main subject of the entire architectural design. The title's notion of a "poem", from the Greek *poiesis* meaning "creation", as also used by Scriabin, evokes a creative perception in which the perceiver may discover a distinctive layer of poetic meaning within the work's content, of what's inside or behind, or a perspective in question. Xenakis was "frustrated by Le Corbusier's outmoded approach to the visuals" (Hewett et al. 2010, 63) and, for his first *Polytope* nearly ten years later, he shaped a sophisticated virtual architecture for the 1967 French Pavilion to the transmission of his music via four sets of

² Edgard Varèse provided the musical counterpart to Le Corbusier's *Poème Électronique*, a multi-channel tape composition that included instances of musical borrowing from pre-existing recorded music or naturally occurring sounds: filtered choir, machine noises, etc. It was synchronized to a film of black and white photographs selected by Le Corbusier. The music was projected via 425 loudspeakers, mounted in groups, enabling the creation of various 'sound routes' around the Pavilion and different spatial effects like echoes (cf. Mondloch 2004).

³ Based on hyperbolic paraboloids (ruled surfaces) and conoids, hyperbolic architecture was transferred into music by Xenakis with the technique of glissando, thereby solving the question of getting from one point to the other without breaking the continuity (cf. Varga 1996, 24).

loudspeakers (*Polytope de Montréal*). Xenakis's methodology⁴ was to use graphic geometries to visualise sound and, reversely, by using music's formal strategies to craft optical architecture, thus transforming the image in relationship to sound into a new architectural concept by creating a space that is truly three dimensional.

2. The two dimensions of the Concept of Polymediality

In 2003, I was invited to compose a work for the newly-built Transparent Factory in Dresden, a futuristic all-glass automobile production plant. This resulted in the composition of *Strophes* for 11 vocal soloists (or vocal groups), instrumental ensemble, loudspeaker ensemble, electronic sounds and live-electronic, employing the spacious foyer and its stairways, the glass elevator and the glass tower of the factory. The spatial disposition of the musicians requested a complex technical setting for their coordination, something that was unrealistic at that time (Figure 1). The solution, like a *deus ex machina*, was given by the use of the therein manufactured car, the VW Phaeton, which concurrently became an autonomous artistic element within the composition, variously exploited (Figure 2): Firstly, it is used as a producer of numerous sound effects or provides the kinetic energy for the in-car installed instruments to sound. Secondly, a CD with pre-recorded percussion music is produced for the car speakers; it is controlled by the conductor or an assistant entrusted with assorted tasks, who from the driver's seat pushes the buttons of the CD player and adjusts the height of the windows, openness and closure, because the window glasses function as 'dampers' for the inside-car projected music. Thirdly, the car contributes to the coordination of the musicians – by giving visual signals with the use of headlights or acoustic signals by pressing the vehicle horn (the application of whether optical or auditory signs depends on musical dramaturgy). Fourthly, loudspeakers are placed above and below the audience (four channels respectively) enabling the sound being spatially distributed and 'travelling' in real-time. The audience is seated in a π -formation around the car. Hence, it perceives a triple spherical dimension of acoustic events manifested one inside the other: a) inside the car; b) outside the car and inside the space

⁴ For the *Polytope de Mycènes* (1978), Xenakis composed his first full-scale composition using the UPIC (*Mycènes Alpha*), a digitized musical drawing board with an electrostatic stylus that he invented: drawn shapes were translated into electronically generated sound; in other words, "all parameters of sound (including micro-elements such as waveforms, envelopes, etc.) as well as the music itself (from pitches and durations to the macro-level architecture of an entire work) are *all determined by hand*" (Kanach 2010, 126, emphasis added).

surrounded by the loudspeakers; c) outside the situated loudspeakers area and inside the factory.

Apart from the above, texts of the Tridentine Mass, by André Breton and Paul Éluard, unconventional sound utensils and apparatuses, precise performance and stage directions, theatrical expressions and body movements, programmed lighting – the coloured Kugelhaus, for instance, technological means and a dressing code are meticulously notated on the score, thus enriching the overall inherent aesthetic of the work, the basis of which led to the formulation of the Concept of Polymediality, whose contours arose a year earlier, in 2002, with the musicotheatrical piece *My Eyes, Only You*. According to the concept, two dimensions are implied: the work-immanent compositional dimension – as in the case of *Strophes* – and Polymediality in the process of staging.

“In the first dimension, unconventional musical materials and music-extraneous media elements become *integral* components of the composition. In the second dimension, the composition interacts with other art forms and media” (Elia 2017, 9, emphasis added).

Concerning the prefix poly, this does not denote a quantitative, but a qualitative paradigm shift: not a quantitative much, but a qualitative more (cf. Elia 2016, 5). In the broadest sense, regardless of the media quantity, the number of extraneous materials, the meaningful ratio between the integrated elements plays the central role. Therefore, heterogeneous individuality transforms and embeds into homogenous wholeness following hybridization processes, however without losing its distinctiveness. This is an aspect of the concept's related parameter of polyaesthetics. Besides, the term “polymediality” is defined within a musical context and connotation – such as polyphony, polytonality, polymodality and polyrhythmic.

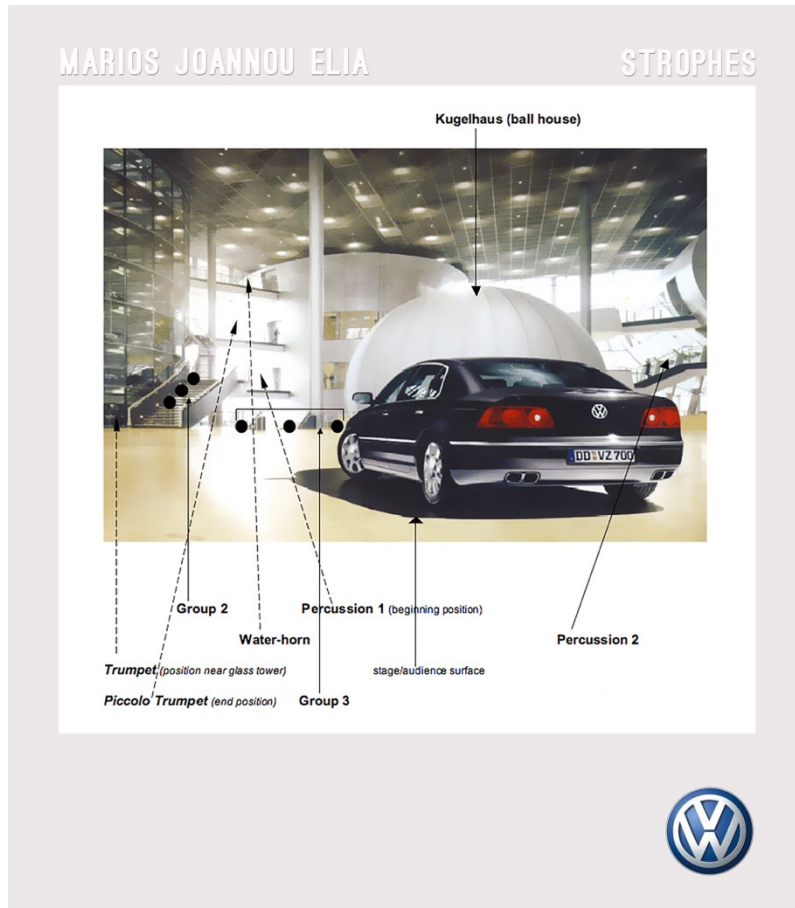


Fig. 1. "Strophes", spatial disposition of musicians ('musicalisation of space')

The image shows a handwritten musical score for the piece "Strophes" by Xenakis, page 31. The score is written for a large ensemble and includes several parts:

- Conductor:** Includes a tempo marking of 7 [x40] and a section of 3 measures marked "ca. 5''".
- Car:** Features a sequence of actions: "put finger-cymbals in the pocket", "S solo: interrupt until", and a series of actions in a blue-shaded box: "F.L.", "Fag.", "lights", "A.L.", "A.L.", "R.F.", "L.F.", and "ET open fuel tank".
- Vocalists (Soprano, Alto, Tenor, Bass):** Includes lyrics such as "go with gliss: free movements of the body" and "only Alto + Tenor: tuwn very quick".
- Instrumentalists (Trumpets, Tenor Trombone, Assistant, Percussion, Harp):** Includes various performance instructions and dynamics markings.

Fig. 2. "Strophes", music manuscript, p. 31: various car actions; openness and closure of windows that affect the projection of the pre-recorded 'car music'; the spatial distribution and 'travelling' of sounds in real-time audio processing

My recent diptych *Liberty* and *Weeping Madonnas* is attributed to the first dimension of polymediality. *Liberty* (2021) is a symphony composed for the 200th Anniversary of Greek Independence. Together with a symphony orchestra and choir, the instrumentation includes traditional instruments (Constantinople lyra, ney, mandolin and santouri), the vigorous beat of the tsarouchia clogs by Evzones, a rifleman group and cannons fired from Lycabettus. It was premiered at the ancient Roman Agora of Athens on the northern side of the Acropolis.

Within the concept of polymediality, the cannon appeared for the first time at the finale of *Sound of Vladivostok* – it is a sonic touch of Vladivostok's history (see below). In retrospect of music's history, Tchaikovsky's concert *Overture 1812* in E-flat major (1880), commissioned to commemorate Russia's defense against Napoleon's armies in 1812, includes in addition to the symphonic percussion, a peal of church bells and cannon shots.

Turning to *Weeping Madonnas* (2018-20), this is an oratorio composed for the Commemorative Event marking the Black Anniversaries of the coup d'état and the Turkish Invasion of July 1974 in Cyprus, dedicated to the mothers of the missing persons. The premiere took place at the Presidential Palace, the structure which was gutted by fire during the coup d'état. The music incorporates lyrical and laïko singers, a byzantine choir next to a youth choir, ecclesiastical items (semantron, censer, sceptre, diverse types of bells, etc.), a group of soldiers who shoot unbulleted ammunition and electronic sounds.

In both works, music-extraneous and atypical components are *subject* derived, as is the juxtaposition of Byzantine parasemantic and western sound systems. The interlinked texts comprise four idiomatic forms of the Greek language, ancient and demotic Greek as well as modern Greek and Cypriot dialect, all of which are merged on the path of a unified and holistic collective narrative, a procedure that unfolds during the compositional praxis.

Postscript: The third movement of Ottorino Respighi's tone poem *Pines of Rome* for orchestra (1924) incorporates a phonograph recording of a nightingale, rather than to imitate one on an instrument, representing the 'non-musical', hence a *music-extraneous* element. Earlier, in an analogous manner, Camille Saint-Saëns's *Danse Macabre* (1874) makes a particular use of the xylophone to give the sound effect of rattling bones.

A representative example attributed to the second dimension of polymediality is *Autosymphonic* (2010-11) – a multimedia symphony on the score of which a plethora of acoustical elements derived from a car orchestra consisting of 81 diverse automobile types is notated and performed by 120 percussionists (cf. Elia 2017, 94-95 and 2014). This is in addition to a symphony orchestra, a choir, a children's vocal octet, a pop-band vocal ensemble, a percussion octet, electronic

sounds and a 360-degree sound reinforcement system using 296 loudspeakers and a 12.1 surround sound system. The theme of the work, that is the invention of the automobile, instigates the content of the score and its contextual parameters. *Autosymphonic's* open-air premiere took place at the central square of Mannheim – a neo-Baroque and Art Nouveau structure that was transformed into a concert arena with an area of 65,000 square meters. The main audience was seated inside the arena while standing audience filled the periphery; the music was performed on 13 stages and platforms surrounding the audience in accurate time synchronisation with visual media – laser, lights, videos, 3D projection mapping and choreographed fountain, thus *augmenting* the work's holistic performance modus (Figure 3).



Fig. 3. "Autosymphonic", view of the semicircle of the concert arena (opposite the main stage); on the surrounding platforms a section of the car orchestra; in the centre, the interactive real-time system for the control of sound localization, digital audio processing and 360-degree distribution

2.1. The polytope as strategic property of polymediality

Advancing on a holistic approach of polyaesthetic quality; the polytope is in its physical implication a strategic property of polymediality. The conception “Sound of” (a cycle of works), oscillating between the two dimensions of polymediality, purposes the musicalisation of a city or a specified geographical region by creating a polytopic synthesis of sonic events. The topoi, the physical spaces – the places, in *Sound of Vladivostok* in the Russian Far East (2017) counted up to 80 locations in which soundscapes, natural, urban and human-generated sounds, as well as performances of composed miniatures performed by a total of 350 musicians, were recorded (Figure 4). For the cultural capital of Japan, *Sound of Kyoto* (2018-19), the sonic content, the entirety of musicians (560) and number of topoi embodied was significantly increased.



Fig. 4. “Sound of Vladivostok”, excerpt of the polytopic map of sonic events (spots of audiovisual action marked with black dots)

Neither the technical infrastructure nor the use of satellites for live-signal transmission, thus interconnecting the locations enabling a unified and continuous perception of the polytopic composition, was feasible. It was the film medium that

united the sites in a metaprocess (post-production, cf. Elia 2019), at the same time becoming an expressive element of music next to pitch/frequency, timbre, dynamics and tempo. In this context, the poetic dramaturgical layer of the cinematic image was added as well as Dolby Atmos, a hybrid object-based audio format that creates a 3D sound field using height and surround sound speakers.

3. Conclusion: Music's incited 'augmented reality'

The integration of topos as a fundamental parameter in the conception and realisation of the afore-discussed compositions entails various facets. In *Le Diatope* (Polytope de Beaubourg), Xenakis, who himself designed the space of the spectacle, replaced the floor of the pavilion with glass and used 1600 flashbulbs and four laser beams guided by 400 adjustable mirrors to develop an *immersive* architectural environment – “dia” signifies “through”. The Polytopes, Xenakis's own interpretation of the total work of art, were conceived of as dynamic systems and time-based art causing an immersive sensory experience. Xenakis states in the program notes of *Le Diatope* that “music inspires all sorts of fantastic meanings, like a crystal catalyst” (multiple exegesis) and points to “lights and sounds that provoke our two predominate senses”. Consequently, the Diatope is conceived as a topos of audiovisual condensation of “signs and signals from our various worlds” (Figure 5). Rational knowledge is blended “with intuitive knowledge, or revelation. It is impossible to dissociate them” (Xenakis 2008, 261).

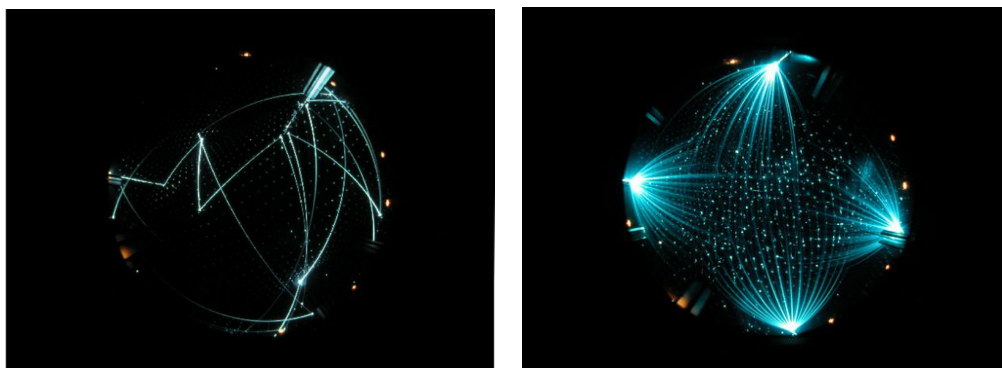


Fig. 5. “Le Diatope” (Polytope de Beaubourg)

Although perceived from a different perspective, *Le Diatope* by Xenakis is reminiscent of the *Mysterium*, envisioned by Scriabin as a kind of immense

liturgical rite inside a temple in the form of a hemisphere surrounded by water, creating a sphere in the reflection, during which the barrier between audience and performers would be dissolved “leading to an ecstatic dissolution and transfiguration of the world” (Garcia 2007, 9). Boris de Schloezer⁵ writes that

“Scriabin’s *Mysterium* was to be a unified work of *Omni-art*⁶. (...) Its tissue is analytically divisible into separate but intimately connected parts, among them musical, poetic and plastic, constituting a grandiose system of sonorous edifices, colours, forms, motions, and physical contacts. But none of these components possesses self-sufficient validity; none can be performed or even evaluated separately from the others” (1987, 260).

Moreover, Simon Shaw-Miller mentions that Scriabin’s earliest guides on employing the idea of the *Gesamtkunstwerk* were “Schopenhauer, from whom he understood the primacy of subjective consciousness, and Nietzsche, whose *Birth of Tragedy* supported aesthetic synthesis and sensuality” (57). Interestingly, Xenakis, who pleaded that music is neither language nor message, says:

“The power of music is such that it transports you from one state to another. Like alcohol. Like love. I wanted to learn how to compose music perhaps to acquire this power. The power of Dionysus” (1987, 18).

Sound is for Xenakis not merely a carrier of musical expression, but the medium to create temporary transformations or modulations of a specified topos. The listener is surrounded with music merged into an intermedial installation that augments spatial awareness and aural-visual attentiveness. Proportionally, while in virtual reality the emphasis is on the aesthetics of immersion (analogous to listening to spatial music only); augmented reality is polyaesthetic, bringing multiple senses into play by merging the physical and virtual, resembling a polytope (analogous to experiencing audiovisual installations, musical land art pieces or musical settings within an intermedial context). In the latter, the aesthetic strategy is hybrid.

Whereas the quality of hybridity makes augmented reality as an interactive experience less immersive than virtual reality, the concept of polymediality pleads for what Aristotle writes in his *Metaphysics* on the importance of synergy:

⁵ Xenakis wrote the postface to Schloezer’s and Marina Scriabine’s book *Problèmes de la musique moderne* (Paris: Minuit, 1959).

⁶ “Scriabin’s ‘*Omni-art*’ was a new synthesis of music, philosophy and religion, and a new aesthetic language, a unification of music, vision, olfaction, drama, poetry, dance, image, and conceptualization, all governed by logic, in the quest for the integrative action of the human mind toward a ‘higher reality’ of which music is only a component” (Triarhou 2016, 1).

"In the case of all things which have several parts and in which the totality is not, as it were, a mere heap, but the whole is something besides the parts, there is a cause" (*Met.* 1045 a7-10).

It is the unity of its being that counts and this unity is never just a collection of parts (cf. Brogan 2005, 32). It is therefore not the sensory dimension (this concerns the study of aesthetic responses to music and music perception) but the inherent content-related essence of the polymedial/polytopic composition that is in the focus of the concept. In other words, contrary to Xenakis's note who counts on the audience's intelligence to actively contribute to the construction of the sense of his art works (Sterken 2001, 10); the hermeneutics, the semantic relationships including intentional abstractions and the interactive dramaturgies *inside* the work are of significance for the concept of polymediality; hence, the creative process that embeds an all-encompassing aesthetic consistency between music and the entity of employed media elements, including the intellectual approach in conjunction with the intuitive framework (judgment and adjustments) as well as the creative license, all together expressed as a *spatial unity* within a unified environment by the composer.

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References

- Albright, Daniel. 2009. *Music Speaks: On the Language of Opera, Dance, and Song*. Rochester, NY: University of Rochester Press.
- Brogan, Walter A. 2005. *Heidegger and Aristotle: The Twofoldness of Being*. Albany: State University of New York Press.
- Elia, Marios Joannou. 2019. *Das Konzept der Polymedialität am Beispiel von "Sound of Vladivostok."* Salzburg: European Academy of Sciences and Arts. <https://euro-acad.eu/library?id=19>. Accessed 16 Oct. 2022.
- Elia, Marios Joannou. 2017. *The Concept of Polymediality: Literary Sources as an Inherent Polymedial Element of Music*. Mainz: Schott.

- Elia, Marios Joannou. 2016. *Zeitgenössische Musik im Kontext von Polyästhetik und Polymedialität*. Mainz: Schott.
- Elia, Marios Joannou. 2014. "Polymedialität als Konzept: Die Multimediasinfonie 'autosymphonic'". In *Ästhetik des Vorläufigen: Skizze – Entwurf – Probe*, ed. by Thomas Hochradner, 189-196. Heidelberg: Winter.
- Garcia, Emanuel E. 2007. "Scriabin's *Mysterium* and the Birth of Genius." <http://faculty.washington.edu/jdwest/russ420s/scriabin.pdf>. Accessed 11 Oct. 2022.
- Hewett, Ivan, Sharon Kanach, Carey Lovelace and Makhi Xenakis. 2010. *Iannis Xenakis: Architect, Composer, Visionary*. New York, NY: The Drawing Center.
- Mondloch, Katie. 2004. "A Symphony of Sensations in the Spectator: Le Corbusier's 'Poème Électronique' and the Historicization of New Media Arts." *Leonardo*, 37(1): 57–61.
- Roberts, David. 2011. *The Total Work of Art in European Modernism*. Ithaca: Cornell University Press.
- Schloezer, Boris de. 1987. *Scriabin: Artist and Mystic*, trans. by Nicolas Slonimsky with an Introduction by Marina Scriabine. Berkeley and Los Angeles: University of California Press.
- Shaw-Miller, Simon. 2002. *Visible Deeds of Music: Art and Music from Wagner to Cage*. New Haven and London: Yale University Press.
- Solomos, Makis. 2015. "The Complexity of Xenakis's Notion of Space." In *Komposition für hörbaren Raum. Die frühe elektroakustische Musik und ihre Kontexte / Compositions for Audible Space. The Early Electroacoustic Music and its Contexts*, ed. by Martha Brech and Ralph Paland, 323-337. Bielefeld: Transcript.
- Sterken, Sven. 2001. "Towards a Space-Time Art: Iannis Xenakis's Polytopes." *Perspectives of New Music* 39(2): 262-273.
- Triarhou, Lazaros C. 2016. "Neuromusicology or Musiconeurology? 'Omni-art' in Alexander Scriabin as a Fount of Ideas." *Front Psychol. Sec. Human-Media Interaction*. <https://doi.org/10.3389/fpsyg.2016.00364>. Accessed 6 Oct. 2022.
- Xenakis, Iannis. 2008. *Music and Architecture*, translated, compiled and presented by Sharon Kanach. Hillsdale, NY: Pendragon Press.
- Xenakis, Iannis et al. 1987. "Xenakis on Xenakis." *Perspectives of New Music* 25 (1/2): 16-63.
- Xenakis, Iannis. 1978. *Polytope de Mycènes*. Presentation of the cultural event "Polytopon", which took place in Mycenae in 1978. Documentary film, ERT Hellenic Broadcasting Corporation. <https://archive.ert.gr/7117>. Accessed 21 Sept. 2022.
- Varga, Balint Andras. 1996. *Conversations with Xenakis*. London: Faber & Faber.