

A discussion of Xenakis and Varese, metaphor and simile, music and architecture

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This paper aims to examine the possible cross pollination between music and architecture through two of the most successful proponents of this translation. Since by its very nature translation involves an interpretation of meaning from one set of symbols into another it has an associated direction – even if the movement of information is only actually seen by the creator. The exemplary figures of Xenakis and Varese illustrate both a shift from architecture into music and from music into architecture. The literary techniques of metaphor and simile become useful to critique this process, and help to explain the very different approaches taken by these two artists. This discussion naturally leads itself to be split into three unequal sections – that of Xenakis’ and Varese’s work, that of their work in terms of metaphor and simile in music and that of their work in terms of music and architecture. This final section is exemplified by the project that links both artists and provides one of the most interesting fusions of these two disciplines – the Philips Pavilion at the 1958 World Fair.

Keywords: Xenakis, Varese, metaphor, simile, music, architecture, Philips Pavillion

Un debate de Xenakis y Varese, metáfora y símil, música y arquitectura

Este trabajo se propone examinar la posibilidad de una fusión entre música y arquitectura por parte de dos de los defensores más conocidos de esta translación. Por su autentica naturaleza, la translación supone una interpretación del movimiento de un juego de símbolos a otro bajo una determinada dirección - aunque este movimiento sólo sea visto por su creador. Las figuras ejemplares de Xenakis y Varese ilustran tanto una transferencia de la arquitectura hacia la música como de la música a la arquitectura. Las técnicas literarias de la metáfora y el símil son útiles para una visión crítica de este proceso, y ayudan a explicar los diferentes enfoques de estos dos artistas. Este debate se divide naturalmente en tres secciones desiguales, la del trabajo de Xenakis y Varese, la de sus trabajos con la metáfora y el símil en la música y la de sus trabajos en relación con la música y la arquitectura. Esta parte final se ejemplifica en un proyecto que une a ambos artistas y nos ofrece una de las fusiones más interesantes de estas dos disciplinas – el pabellón Philips en la Exposición Mundial de 1958.

Xenakis, Varese metáfora, símil, música, arquitectura, pabellón Philips

The speculations about the relation between music and architecture are probably as old as both arts themselves (Sven Sterken).

The creation of music and the creation of architecture are easily paralleled, since both order time and space and both are “as difficult to begin as they are to complete” (Quek 2008 p.1) due to their complex, gestalt and mediated nature. The obvious difference between the results of these creative processes is that music is primarily perceived with two ears, while architecture is perceived with two eyes. The problem with the cross over of these fields is usually dealt with by tying sound to a visual representation – notation – before being appropriated within architecture and by giving space an acoustic value – voice – before being appropriated within music.

Xenakis and Varese

Iannis Xenakis was born in Romania in 1922 and spent his childhood in Greece. Moving to Athens in 1938 he intended to study engineering, however with the Italian invasion in 1940 he only completed his studies in 1947 (Matossian 1986). During these intervening years he actively participated in the communist underground, but decided that he wanted to “drop politics and study music” when peace came (Matossian 1986: 25). However in quick succession, the Germans evacuated Greece, the British occupied it and Xenakis was hospitalised by a large piece of shrapnel from a British shell, which took his left eye. Fleeing Greece, he moved to Paris and in 1951 began working for Le Corbusier, continuing to compose (Barthel-Calvet 2002).

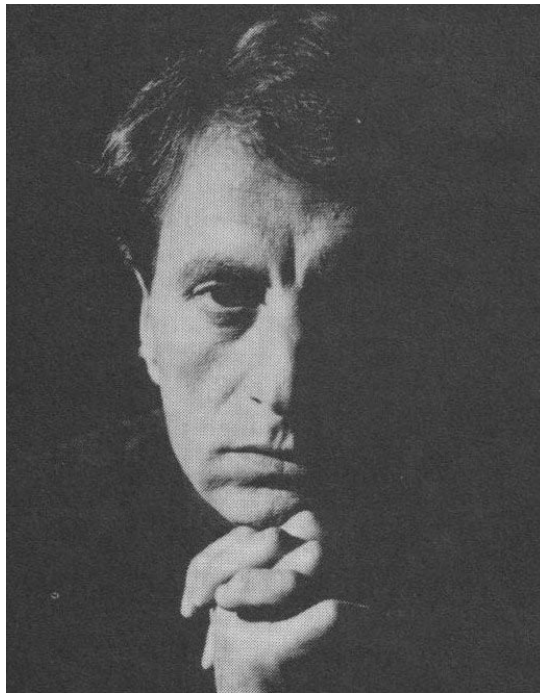


Figure 1
Collection Xenakis, *Xenakis in 1963*
(as reprinted in Matossian, Nouritza; *Iannis Xenakis*: 168).



Figure 2
Thomas Bouchard, *Varese in 1960*
(copyright G. Ricordi & Co Ltd as reprinted in MacDonald, Malcolm;
***Varèse : astronome in sound*: 327).**

Having grown up with the influence of serialist music – music composed using an ordered set of pitches – from the Viennese circle, Xenakis became critical of it and in 1948 wrote that it “destroys itself by its very complexity” (1971: 8), because its complexity is only perceived by the audience as a mass, rather than as individual elements. Thus Xenakis moved past serialist music in 1954 to a self declared “Stochastic Music”, named in 1956 (Xenakis 1971). This relied

on the use of probability to produce a single sound out of a large number of different notes. For example, “A multitude of short glissandi on strings can give the impression of continuity” (Xenakis 1971: 9). This encouraged his microtonal work, by thinking about the notes produced *in* the glissandi.

The use of averages from numerous parts found “support in certain areas of mathematics” (Xenakis 1971: ix) and by applying his engineering background he found that forms of music unimpeded by earlier genres could be created using mathematical formulae for density and probability (Sterken 2007). The use of graphical and mathematical methods to produce the forms within his music led him to declare “in music the importance is in the sounds structure and their relation” (Lawes 1995 part 2).

The first mature work to exhibit stochastic composition was *Metastaseis* (1953-54). The coda of this piece is displayed in figure 3 in graphical, rather than musical, notation. This illustrates the complete rendering of stochastic curves from ruled lines better, since the effect is lost when put into classical notation.

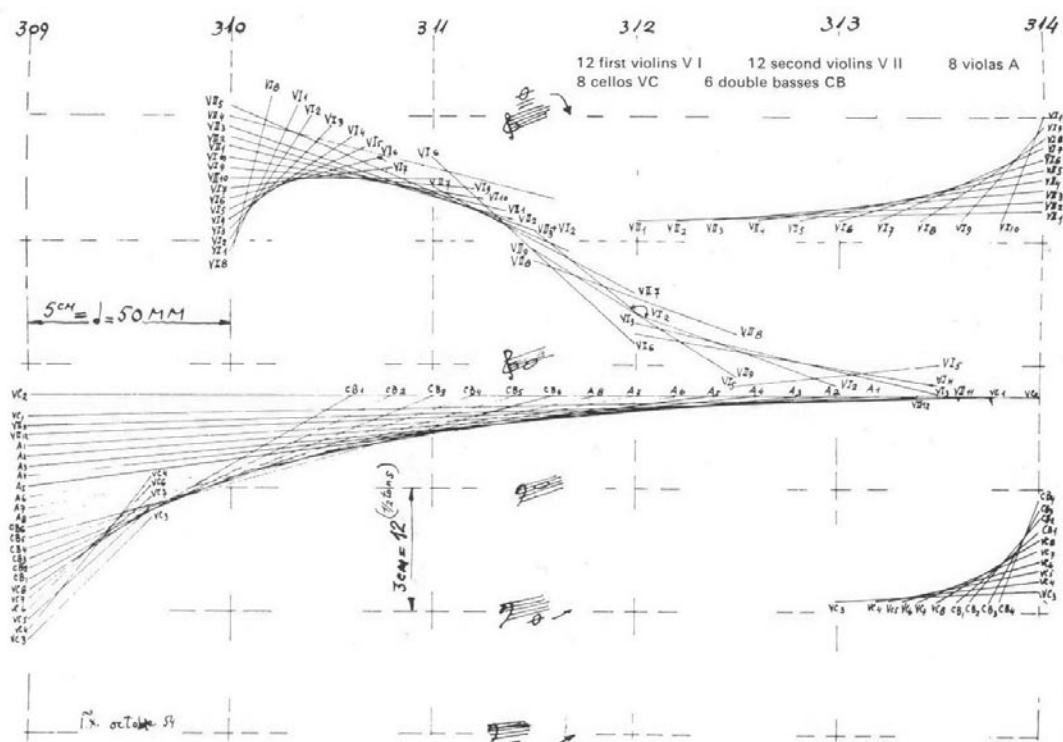


Figure 3

Iannis Xenakis, *Graphic score for Metastaseis*

(as reprinted in Treib, Marc; *Space calculated in Seconds : The Philips pavilion, Le Corbusier, Edgard Varese: 16*).

Born in 1883 Edgard Varese had a troubled childhood that hampered his move into composition (Clayson 2002), moving from Paris to Turin in 1892 to study engineering. A clean break from his family after assaulting his browbeating father prompted his move back to Paris in 1903 (MacDonald 2003). He studied and composed in both Paris and Berlin, but following the outbreak of world war one he relocated to New York. Here he began an almost completely new start, since most of his works prior to 1915 were destroyed in 1918 when the warehouse containing them caught fire (Clayson 2002).

From the surviving recollections of his early compositions – those from before 1915 – it appears that many of his pieces were intended for voice and orchestra. These took the form of operas, songs and poems – postulating an interchange between literature and music – with

images from literature and poetry infiltrating pieces such as *Martin Paz* and *Offrandes* (Clayson 2002). More confident metaphorical devices appeared in *Rhapsodie Romane* (1905) where he “was thinking of Romanesque architecture” and “working with blocks of sound; calculated and balanced against each other” (Clayson 2002: 14). This set Varese along the path that he was to take with the structure of the rest of his compositions, thinking in terms of forms, rather than polyphonic lines.

Life in America seemed to inspire Varese, and he began to experiment more with his lifelong struggle to produce new sounds. Referring to his first major work in America he stated that “with *Ameriques* I began to write my music” (Peysner 1999: 123).

Metaphor and simile

Both of these words come from the analysis of literature, but are liberally applied to the arts. Metaphor comes from the Greek *metaphora*, meaning “a transfer” – in this case literally a transfer of one word’s meaning into another word. A metaphor replaces one word with another, in order to talk about the first, but does not draw any parallels between the meanings of the words. A simile, by contrast, is different from a metaphor since it *does* claim a similarity between one thing and another. It is a weaker replacement of meaning – because it does not require the initial word to be removed – but a stronger illustration of parallels between the two meanings.

However, in music, use of the Italian *simile* means to continue an indication, or style of playing – such as *largo*. Most of these phrasings are themselves metaphor or simile based, illustrating the level of analogy already present within Western music. Indeed “if we wish to speak of music, we must speak in spatial terms” (Guck 1994: 2).

This relation between the spatial and the musical, and the translation between them can be seen to occur on two levels, “the intellectual and the phenomenological” (Sterken 2007: 21). The theoretical transposition of music stems from the work begun by Pythagoras on melody and the struggle for the “universal principle of an underlying mathematical or musical harmony” in the world (Hale 2000: 50). Harmony was easily transposed into ratios of resonating wires; and rhythm, by appropriating the idea of a relationship in time to a relationship in space, could be changed into ‘architectural rhythm’. These were later rediscovered and documented during the renaissance by Palladio and Alberti for whom geometry naturally turned into dimensions for buildings (Quek 2008). I believe that this tradition of using a metaphorical signifier to replace the idea of music can be found in the work of Xenakis. Indeed he dedicates an entire chapter in *Formalized Music* to “Symbolic Music” (1971: 155). His graphical scores and use of formulae became ‘stand ins’ for music while he composed, allowing a novel method of creation. These were then converted back into music when played – sometimes directly, as with his UPIC system (Hugill 2008).

Appreciating that the perception of music was a valid measure of beauty grew from 18th century aesthetic relativism. Here notions of beauty were not won from the intrinsic structure of music, but from its holistic apprehension and immersive properties (Sterken 2007). This holistic, immersive approach naturally leads to the idea of a *Gesamtkunstwerk*, combining all of the arts into a whole, where one part affects another. Varese worked in this more simile based way, where there is not such a strict delineation between structure and performance. He composed with sounds that he heard or imagined, even if they were orchestrated in radically new ways.

Music and architecture are easily cross fertilised because of a common conceptual background (Guck 1994). But it must always be kept in mind that this is something of a blind switch, where although concepts and words may appear conveniently interchangeable they

always pass through a distinct change between the two – the *y-condition* postulated by Elizabeth Martin (1994). This *y-condition* is the state between music and architecture, where the idea being translated is neither architecture nor music. It is this condition that the metaphor or simile bridges to translate the concept from one discipline to the other.

The fact that Xenakis arched his stochastic approach over the arts to include music alongside architecture, sculpture and film (Xenakis 1971) attests to how intrinsic it was to his way of working. Due to the theoretical background of his composition using mathematical, graphical methods it was only natural that he apply these mathematical, graphical methods to his architecture. Because of this, his work translates very smoothly between music and architecture, because it takes advantage of the transfer of the creation method, rather than what is created (Sterken 2007). Some of his scores became metaphors for music because of this, with pieces that are virtually unplayable, such as *Herma* (1960) - which requires the pianist to play a separate stave on each of his ten fingers (Lawes 1995). Indeed with *Tracées* (1987) he scored glissandos in the flutes, oboes, clarinets and bassoons knowing full well that this was a physical impossibility with these instruments (Hewett 2009).

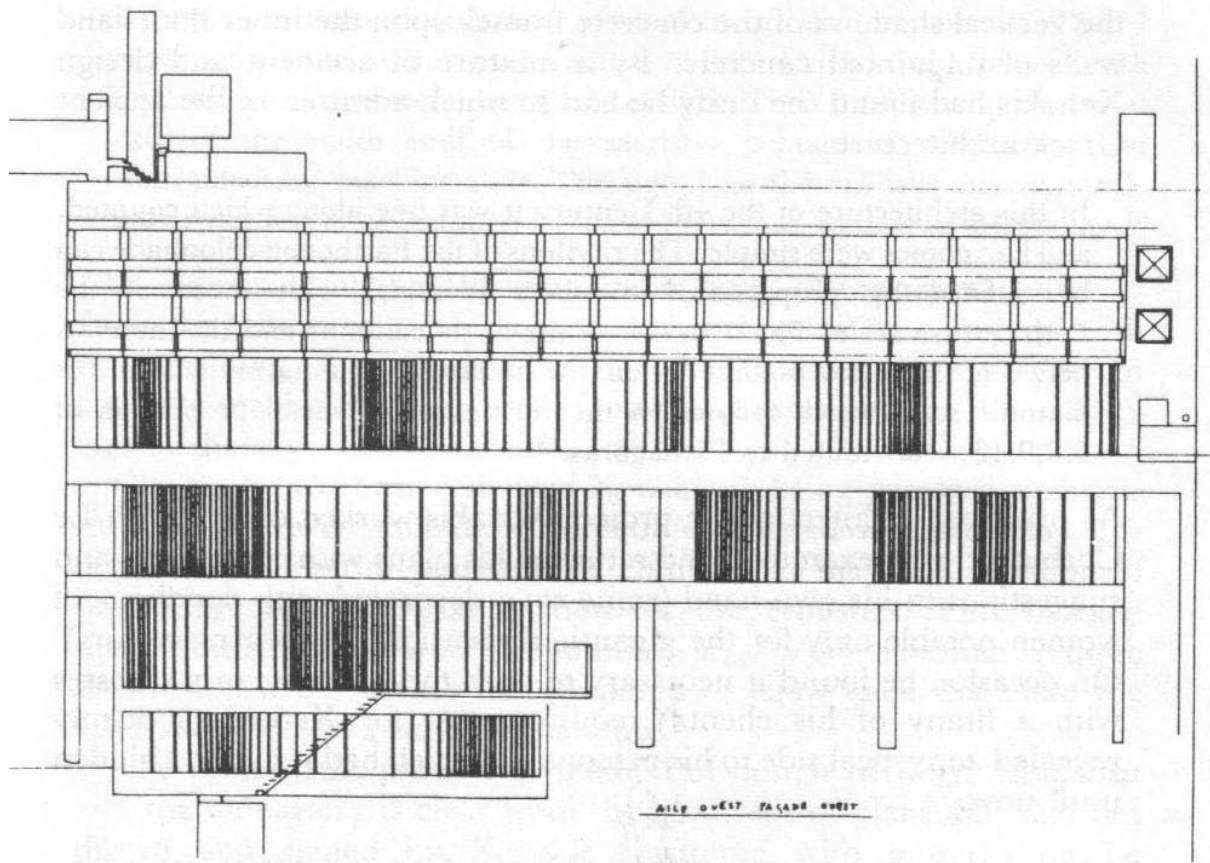


Figure 4
Unacknowledged (as reprinted in Matossian, Nouritza; *Iannis Xenakis: 67*).

With the West Façade at La Tourette monastery (1953-56) Xenakis had the opportunity to apply his compositional methods to architecture for the first time. In his designs he began by looking at the layering of defined musical rhythms to create a variation of window spacing across the façade. However this remained forced until he did away with the notion of rhythm and began to utilise densities (Sterken 2007). This created undulations rather than rhythm and sliding between time bases rather than strict delineation. In this way it began to increase the complexity of the work and when layered created a more complex polyphony, which was untied from its musical heritage, and more closely linked to physics (Sterken 2007).

Comparatively Varese always thought in volumes and densities of sound with sonorous objects moving through this sound space (Peyser 1999). While living in America, after his basic Romanesque analogies, he began to use noise to create the effects he wanted, as much as structure. Influenced by the metropolis he lived in, he started to use industrial sound, for example in *Hyperprism* (1922-23) he used sirens (Varese 1986) and in one of his operas he intended to use aircraft propellers. In a piece entirely for percussion – *Ionisation* – he did not structure the parts according to their uses, but by their “qualities of sound: metal, wood, heavy, light” (Peyser 1999: 127). This gave a more texture based approach to music, drawing obvious comparisons to the materiality of building.

Varese’s struggle to create new spatial sounds led him to consider the use of building’s acoustic properties. This idea came to a head in *Intégrales* (1924-25), which was conceived for “spatial projections” and was to “employ acoustical means” (Peyser 1999: 126). In this piece the rapid crescendi and sudden silences¹ aimed to use the reverberation of the room it was performed in to ‘fill in’ and play back the music, creating an instrument out of the space. These reverberations “provide us with an impression, learnt by experience, of our surroundings” (Philips October 1958: 43), thus adding an interpreted spatiality. He then attempted to parallel this echo in the tape work of *Deserts* (1950-54). Here the conductor was directed by engineers, who played recordings at certain points in the performance (Macdonald 2003). The performance of this piece makes it almost impossible to discern when the tapes are playing and when the orchestra is, apart from the direction of the sound.

Music and architecture

The project that unites these two artists, and provides the most complete example of the fusion possible between architecture and music, is the Philips pavilion. This building was commissioned in 1956 for the 1958 Brussels World Fair as an artistic audiovisual presentation of the possibilities for Philips’ products (Treib 1996). The project was given to Le Corbusier, who insisted that Varese create the music, Xenakis create the façade and he would create the film and plan. Since the plan was arbitrary (Philips September 1958) and the lighting had no relation to the music, I will not dwell on Le Corbusier’s minimal contribution to this project.

Two years prior to this commission, Xenakis had completed *Metastaseis*, utilising ruled lines of mass glissandi to structure the orchestration. In Iannis’ graphical annotation the lines of smooth glissandi merge together to form a hyperbolic curve, as can be seen in figure 3. The notion that this facade would be the container for an ‘electronic poem’ naturally led to the use of a musical metaphor and the creation of “a design based entirely on the use of ruled surfaces” (Philips September 1958: 2). Thus, influenced by hyperbolic paraboloid shell structures (Treib 1996), Xenakis began to design a façade made from ruled surfaces, as can be seen in figure 5. These were not merely a representational translation of his graphical score, compared to Stephen Holl’s *Stretto House* in figure 6, for a number of reasons. The designs were not copies of any of his multi glissandi graphical scores, but they used the same compositional methods to define the cables that would create the tensioned concrete skin. The ground plane was ignored (Treib 1996), meaning that the design became a spatial composition, rather than being a hybrid of musical influences and strict structures. This enabled the walls to fully articulate the slide from the axis of the wall (x-axis) to the axis of the roof (y-axis) in a three dimensional form, rather than as an extruded two dimensional shape as with the *Stretto House*.

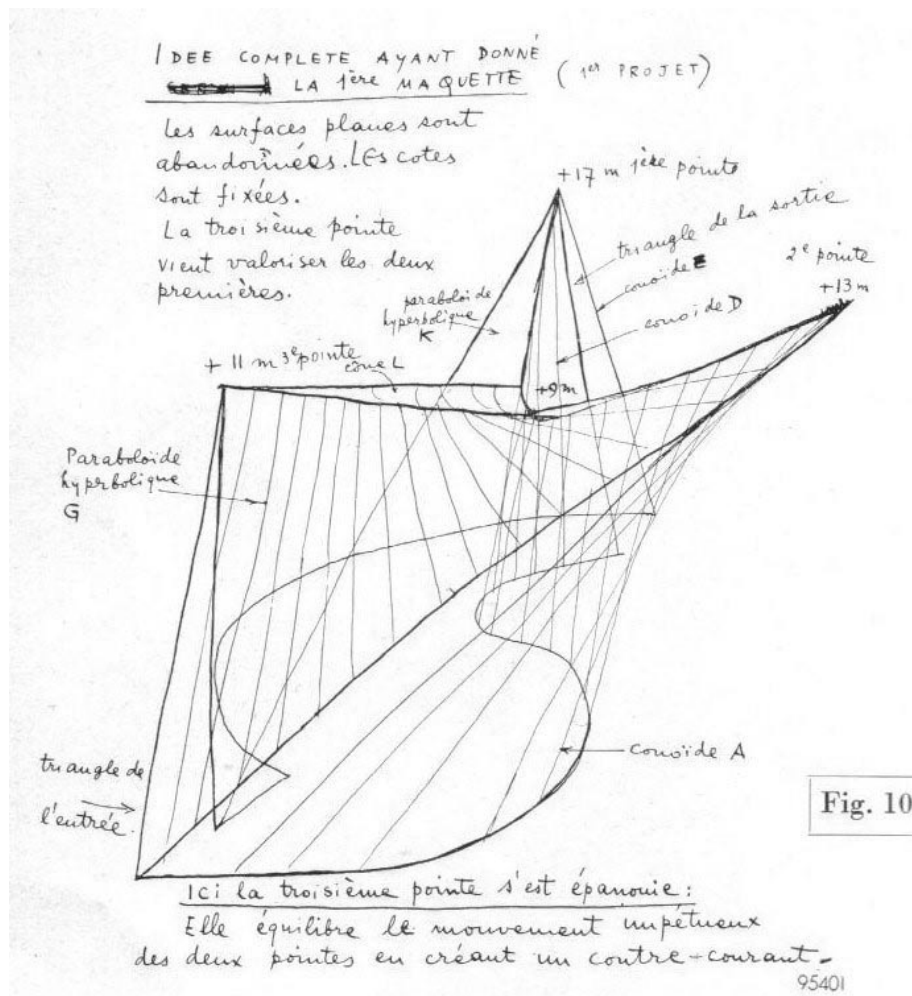


Fig. 10

Figure 5
Unacknowledged (Le Corbusier's handwriting)
(as reprinted in Philips technical review; *The Philips pavilion at the 1958 Brussels World Fair: 2/3*).

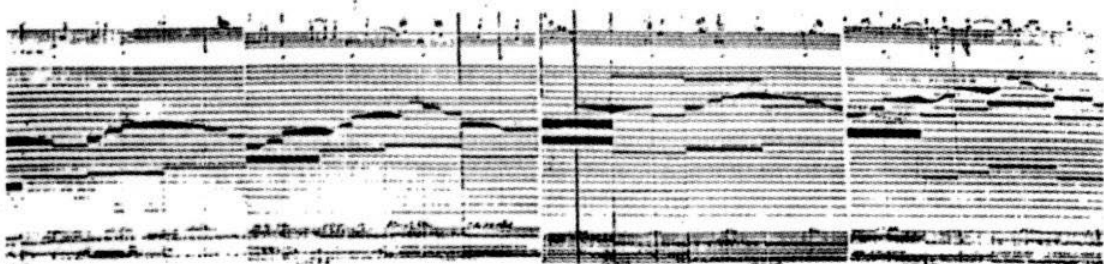


Figure 11 Paul Klee's analysis of a musical score.

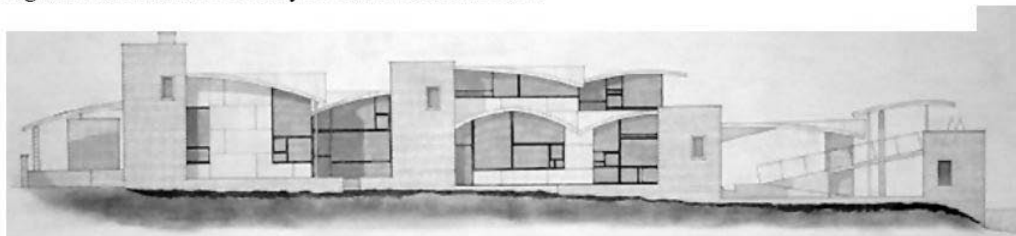


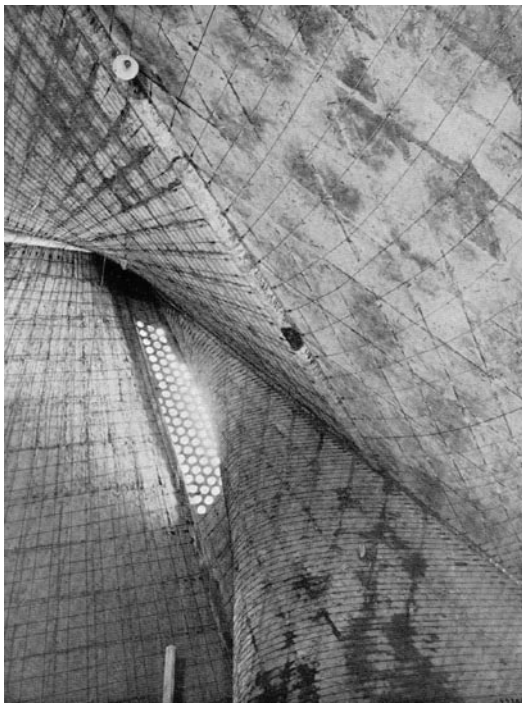
Figure 12 Watercolour of the Stretto House East Elevation.

Figure 6
Unacknowledged
(as reprinted in Quek, Raymond: *The Metaphor of Music in Architectural Theory and Practice: 99*).

The forms were created by using a model to work with multiple variables, which, when they looked right, were drawn orthogonally, creating a fusion of compositional methods (Philips September 1958). This design solved its own problems structurally, as well as aesthetically, when it moved from omni directional ruled surfaces to hyperbolic paraboloid shells. These meant that the façade became self supporting, requiring no extraneous details (Philips September 1958). The constantly changing radii of the curved elements also reduced “uncontrolled acoustic contributions” of echo and resonance (Philips September 1958: 3), creating a space inside where the various spatial methods Varese would employ could be heard more clearly.

While the design and construction of the pavilion façade continued, Varese paralleled it with his own development of the musical part of the *Poème électronique* (1957-58). The gestation of this piece began almost as soon as Le Corbusier wrote to him, asking for his contribution to the project (Treib 1996). However it was only much later that the actual piece began to be made. Due to the difficulty that Varese had of realising the sounds that he wanted – he had attempted with orchestration, but found it restrictive, and had tried with new, electronic means, but found them too under-developed – it was only when he had access to Philips new music studio at Eindhoven that he began to create the piece in earnest (Treib 1996). Utilising both concrete and electronic methods to create his sounds, the piece came together slowly and haphazardly, with constant chiding from Philips (Treib 1996).

The piece itself utilises spatial techniques from his previous works with the intention that “the listeners were to have the illusion that various sound-sources were in motion about them” (Philips October 1958: 43). In fact the control tape for the movement of these sounds was more complex than that for the sounds themselves – a 15 track tape compared to a three track tape (Philips October 1958). Stereophony (the effect of creating apparently moving sounds), which took up the whole of track three on the acoustic tape, was enabled by using repeating motifs and



Ruled Lines

Figure 7

Unacknowledged

(as reprinted in Philips technical review; *The Philips pavilion at the 1958 Brussels World Fair*: 8).



Sound Paths

Figure 8

Lucien Herve, Untitled

(copyright 1996; ARS, New York / SPADEM, Paris as reprinted in Treib, Marc; *Space calculated in Seconds : The Philips pavilion, Le Corbusier, Edgard Varese*: 98).

sections of ontologically similar sounds – bells, hums and buzzes, ‘boops’ and opera singing². Thus listeners would identify the ‘same’ sound in a different place and assume that it moved in the intervening time, giving “sound routes” (Philips October 1958). In addition to this panning, which even on a stereo tape can be heard clearly,³ a third dimension was introduced. By using clear and muffled sounds, louder and quieter sounds and sharper and softer sounds⁴, the effect of distance could be created. To suggest even more depth, track two of the acoustic tape controlled reverb and echo⁵, used to give the effect of volumes of sound at these various distances.

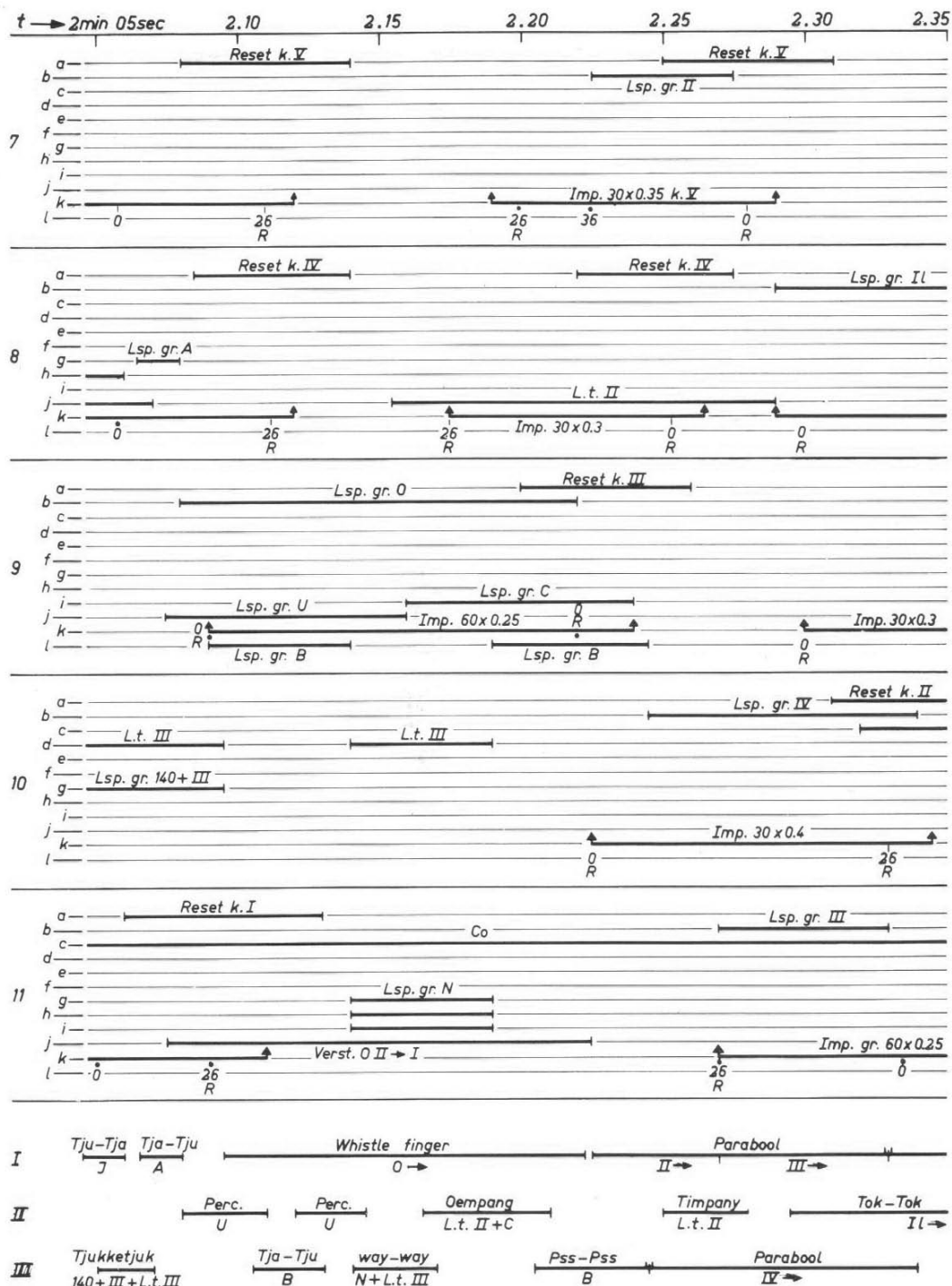


Figure 9

Unacknowledged

(from Philips Technical Review p. 48 as reprinted in Treib, Marc; *Space calculated in Seconds: The Philips pavilion, Le Corbusier, Edgard Varese: 202*).

Off the tape, the loud noises and sudden silences⁶ in the piece stimulate reverberations within the space of the pavilion, much like with *Intégrales*. Movement is regularly accompanied by an amplitude and pitch change⁷, adding to the effect of articulation in space and time. Finally single standing tones interact, producing standing waves⁸ through reverberation in our ear canals (Martin 1994), much like telephone tones. The fact that “architecture, color, voice, sound, and images were superimposed, without any full comprehension in advance of the nature of the resulting work”(Treib 1996: x) relates to the notion of this pavilion being a *Gesamtkunstwerk*, with all parts affecting one another.

Conclusion

If Xenakis can be said to have put music into his architecture then Varese put architecture in his music. The structures Xenakis produced were made more complex, yet with rigorous creation processes, by the use of techniques he developed within his music. Varese, on the other hand, used his tectonic sensibilities and critical ear to compose works that didn't parody buildings, but created completely new forms in the air they passed through. Both artists worked in entirely different ways and if Varese heard his music and then wrote it, Xenakis, by comparison, drew and then saw his architecture. But with each composer there was a middle position between music and architecture where this creation happened. This point of fusion is where the true innovation lay and without it, neither could have produced works that have stood as exemplars for over 50 years.

Notes

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|---|---|
| 1. At 0:58 in <i>Intégrales</i> | 5. At 4:27 in <i>Poème électronique</i> |
| 2. At 0:00, 0:30, 1:40 and 3:40 respectively in <i>Poème électronique</i> | 6. At 3:27 in <i>Poème électronique</i> |
| 3. At 1:28 in <i>Poème électronique</i> | 7. At 2:25 in <i>Poème électronique</i> |
| 4. At 6:10, 1:50 and 4:00 respectively in <i>Poème électronique</i> | 8. At 5:54 in <i>Poème électronique</i> |

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- Poème électronique* - <http://www.youtube.com/watch?v=rC3OXai7W9I>.

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