

Form follows harmony

An imaginary exchange of ideas between Le Corbusier and Steven Holl about the concept design of the Stretto House.

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Abstract

In this thesis, it is being examined how music influenced the design strategy of two renowned architects: Le Corbusier and Steven Holl. The projects that are analyzed regard the Philips Pavilion in Brussels (1958) and the Stretto House in Dallas Texas (1989-1992). The design of the Philips Pavilion followed from a number of concept try-outs that led to the physical translation of a “*Poème électronique*”, created by Edgar Varèse and Le Corbusier. An analysis of this building shows how sound and design are inevitably interwoven with each other in a practical way and it states Le Corbusier’s opinion about the interference of music and architecture.

The Stretta House displays the design of a piece of music in a more philosophical way. The continuous and discontinuous tonal properties of the concert of Béla Bartok (1937) “*Music for String Instruments, Percussions and Celesta*” are interpreted as horizontal and vertical structures. Roof form, window proportions, sizing and open and closed spaces display the different instruments used in the concert. A mathematical analysis brings together the idea of these two art pieces: A symphony and a residential house.

By discussing the used design methods and reviewing these two case studies, general differences and similarities can be stated about design techniques inspired by music over a time span of 30 years. Therefore, an imaginary discourse between Le Corbusier and Steven Holl, based on citations and true quotes, illustrates what could have happened if the two architects would have been working together on the design of the Stretto House. A crucial moment in the conceptual design phase of the Stretto House shows a breakthrough in linking the two arts. The result is a better understanding on what architectural designing with music entails. Therefore the following research question is asked:

“How can the implementation of musical elements contribute to an architectural design concept?”

Rhythm, proportion, harmony, unity, sound projection and other elements are key points that should be taken into account when designing. Holl and Le Corbusier strive to find a balanced interaction between order and disorder in their designs to create harmony. By comparing the definition of harmony in a musical structure with the definition in the field of architecture, new innovative ideas and alternative design approaches concluded in a reflection and conclusion of the imaginary discourse. There has been some experimenting with this concept before, so by reflecting on previous studies and critically analyzing the discourse between Le Corbusier and Steven Holl, a creative way of conceptual designing will be established. Learning from different arts like music opens possibilities to review and change existing design methods.

Keywords

Music – concept – idea – space – harmony – architecture – Le Corbusier – Steven Holl – Xenakis

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Introduction

There has always been an interplay between spatial design and music, since they can influence each other and share the same principles. Inspired by Vitruvius, who conceived architecture as “one of the most inclusive and universal human activities,” Dewidar et. al. wrote an article in 2006 in which they state that the branches of all arts are unified in one connected chain. Thus should the architect be educated in all the arts that show overlapping elements, in order to create a piece that contributes to culture and society and stimulates all the human senses. In this thesis, possibilities and outcomes of designing with the use of musical elements is shown a creative way. Therefore, the following research question is stated:

“How can the implementation of musical elements contribute to an architectural design concept?”

In the first two chapters, two case studies are presented that demonstrate a successful design that is inspired by music. The first case study (Chapter 1) involves a project in 1958, by Le Corbusier, Iannis Xenakis and Edgar Varèse. The result is a temporary audio-visual experience, called the Philips Pavilion. Here, music, sounds, film and architecture come together.

The second case study (Chapter 2) breaks down elements used in the Stretto House, a villa in Texas designed in 1982 by Steven Holl. This architectural play of forms derives its inspiration from a symphony, composed by Edgar Varèse. It shows a fluid connection between spaces.

The first two chapters, partly function as a background story for the third chapter, the creative part. In Chapter 3, an imaginary discourse between Le Corbusier Steven Holl based on historical citations and valid arguments, elaborates on the main theme, which encloses the relation between music and architecture. It provides a philosophical answer to the research question and provides a lavishly illustrated example on how to link the two arts of the theme together. A comparable method of the imaginary discourse has been applied by Binmore (2020).

By linking music and architecture, an example is set out on how an architectural concept could be developed and strives to create an architectural piece that is has a harmonious relationship with its surrounding environment. The outcome might create a link that interferes architecture with all the other arts.

There have been numerous studies about this subject, like that of Tayyebi (2013), Handa (2018) and Kouni (2020). They describe the relation between music and architecture, which will be a background knowledge in my thesis. The case studies about the Philips Pavilion and the Stretto House provide a detailed analysis of the cases, but fail to put the cases into context on a bigger scale. A comparison between the two and an imaginary dialogue on the subject will hopefully bring fresh ideas and outcomes to the designing world. Besides that, differences between architectural movements and periods are emphasized and analyzed in this thesis.

In the end, a brief discussion will criticize my own text and tell something about the relevance of the thesis.

A study of Gur et. al. (2019) states the importance of learning to design in different ways and shares the positive results of students who involved musical elements in the concept of their designs. The assignment given to the students strengthened their ability to transform abstract thinking into physical representation, assisted them in understanding multidimensional thinking and how to engage in creative thinking, contributed to their architectural education, and improved their study skills by giving them experience in coordinating design elements, principles, and materials, all of which served to stimulate improvisation and reflection of emotions. According to the findings of this study, music, which has techniques and principles comparable to those of architectural design, may be utilized as a tool in design and architectural education to assist different stages of the creative and expression process.

1. The Philips Pavilion (1958)

In this chapter, the conceptual design of the Philips Pavilion (1958) by Le Corbusier and Iannis Xenakis in Brussels will be analyzed. Throughout this analysis the design method of Le Corbusier and Xenakis applied to the Pavilion will become clear and the connection between music and architecture in order to create a total harmony of elements according to Le Corbusier and Xenakis will be discussed.



The Philips Pavilion (1958)

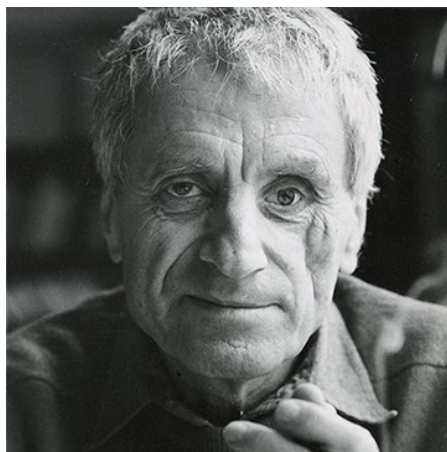
Derived from: Louis Warzée. (2008). *Expo 1958 – Philips Pavillion*

<https://structurae.net/en/media/103296-expo-1958-philips-pavillion>

Figure 1.

1.1 The collaboration between Xenakis, Varèse and Le Corbusier

A man was born exactly 100 years ago who led a raucous life, fought for the Communist Resistance in World War II, and took part in the Greek civil war. Yannis Xenakis (1922-2001) was a political activist as well as an engineer who eventually relocated to Paris and met Le Corbusier, one of the twentieth century's most high-profile architects. They collaborated for twelve years, and in 1958 they designed the Philips Pavilion in Brussel, which was commissioned by Louis Kalff, Philips' art director (Jiménez, 2022). At the time, a general overlapping thought about music and architecture being parallel arts brought Xenakis and Le Corbusier closer: "...to make music or architecture is to create, to engender environments that envelop sonorously or visually, poems..." (Jiménez, 2022).



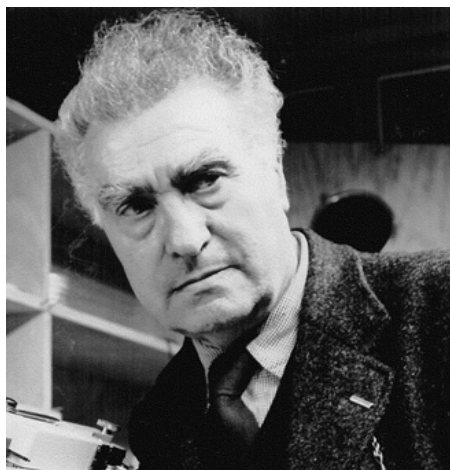
Iannis Xenakis

Derived from: nkoda. (2022). *Iannis Xenakis Sheet Music, Scores & Parts.*

<https://www.nkoda.com/artists/Iannis-Xenakis>

Figure 2

It was on the rooftop of Corbusier's Unité d'Habitation, where, during an anniversary of CIAM in 1953, Xenakis played music from Edgar Varèse and inspired Le Corbusier. The total experience, that included the highlighted sculptures on the concrete roofscape under a beautiful starry night sky, could be seen as a stepping stone to the idea of the *poème électronique* (Vreedenburg, 2017). Edgar Varèse was a French composer living in the United States who later became the co-producer of the spectacle that one could witness in the Philips Pavilion. He was born in 1883 and passed away in 1965.



Edgar Varèse

Derived from: Ensemble C Carré. (2021, 18 november). *Edgar VARÈSE*.

<https://www.cbarre.fr/en/compositeur/edgar-varese-en/>

Figure 3

Xenakis and Varèse experimented a lot with so-called “spatial music”, music that tried to create or form space by means of 4 used dimensions: time, pitch, dynamics (crescendo), and sound projection (Vreedenburg 2017). Xenakis was inspired by his own experiences in Athens during the second world war when high pitch sirens and air attack sounds defined the space where a bomb was going to fall and at what altitude it was located (due to pitch). The sirens in Xenakis' music became a metaphor for spatial tones, which were called “glissandi” in musical terms. Later on, he reversed the statement of Johann Wolfgang von Goethe that architecture is frozen music to music is dynamic architecture. Xenakis' creation of a three-dimensional pavilion out of the two-dimensional floorplan from Le Corbusier, is what he called a glissando in space.

The musical and mathematical elements that formed the base of the three-dimensional shape of the Philips Pavilion, came into discussion a lot. But with this specific project, also the technical requirements and the final function of the pavilion played key roles during the design process. The main architect, Le Corbusier, did not only design the floorplan of the Pavilion, but also the animations, that were shown inside during the Expo, and the light systems. The corresponding music had to sound overwhelming and from different angles to the spectator. Therefore, very precise calculations about the newly applied material for optimal acoustics needed to be executed, and the shape of the building had to be perfected in order to complement the music and movies that were going to be played inside the building.

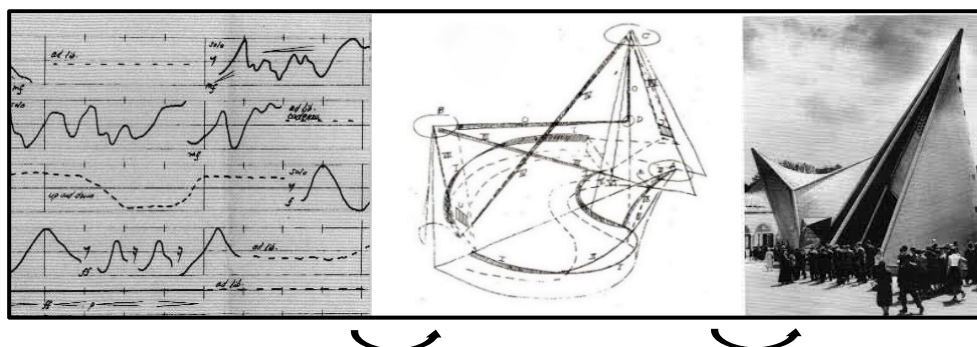
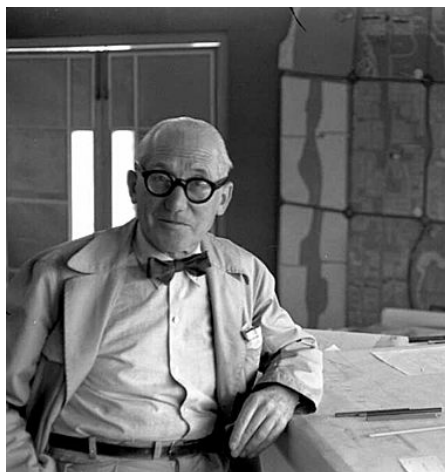


Figure 4. Design of the Poème électronique and the Philips Pavilion (1958)

Derived from: “The Virtual Electronic Poem project”, by Lombardo, V. & Valle A. (2009), *Università degli Studi di Torino*, https://www.researchgate.net/publication/265614005_The_Virtual_Electronic_Poem_project



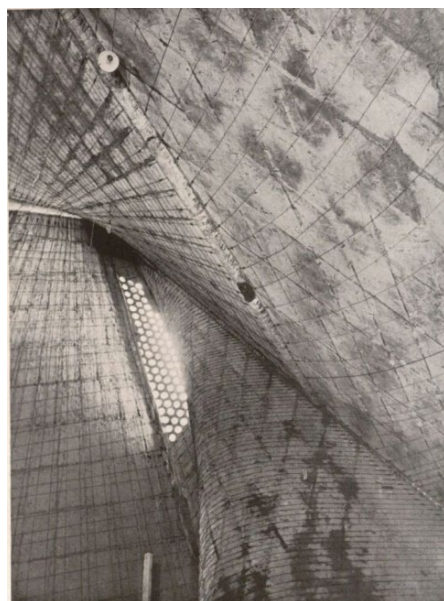
Le Corbusier (Charles-Edouard Jeanneret-Gris)

Derived from: Engel & Völkers Paris. (2022). *Le Corbusier, the story of a controversial architect*.

<https://www.engelvoelkers.com/en-fr/paris/blog/le-corbusier-the-story-of-a-controversial-architect/>

Figure 5

The music spectacle inside the pavilion, composed by Edgar Varèse and Le Corbusier, was entitled “*La poème électronique*”. Le Corbusier's famous poème was guided by the combination of architecture, visual art, music, and film. He desired a work of modern art that demonstrated how our increasingly automated civilization strives for a new harmony. The concept was to project colors, drawings, and images on the walls of the Philips Pavilion while simultaneously listening to an original musical piece by Edgard Varèse. The Philips Pavilion's interior would essentially serve as screens. Since the backside of a screen can be the same as the front, there was no need to make a difference in appearance on the outside of the Pavilion. Gerrit Rietveld got his hands on the design of the exterior of the Pavilion, but after Le Corbusier showed him his first sketches, Rietveld was being outplayed, since Le Corbusier said: “Rietveld, I’m designing a interior that doesn’t need an exterior.” (Tazelaar, & de Heer, 2022).



Interior of the Philips Pavilion

Derived from: “Philips Pavilion Technical review”, by Gradstein et. al. (1960) *Research Laboratories of N.V. Philips’ Gloeilampenfabrieken*, 20(1). https://web.media.mit.edu/~tod/media/pdfs/Philips-Pavilion_Technical-Review_1958.pdf

Figure 6

Xenakis wanted to take it even a step further. He wanted to create a single sound space that had to become a complete universe in which to generate an aesthetic stimulus for each sense. This idea was derived from a recent work from Xenakis himself called “*Metastasis*”. Used tone sequences relating to the Fibonacci sequence (golden section, harmonious sequence) can also be found the work of Béla Bartók. Inspired by his own musical work, Xenakis started to experiment with the generation of curved lines from straight lines, to make the pavilion as how he saw an electronic poem: Fluid and moving. Xenakis was responsible for the structure of the Pavilion (Lombardo, Valle, 2004).

1.2 Development of the concept makes a synthesis of arts – *Philips Pavilion*

The Pavilion passed a series of conceptual designs, before it acquired its final shape (Gradstein et al., 1960). The design was completely based on ruled surfaces of the roof and walls, on which the movies could be projected. Brussels' 1958 World Fair exposition had to show new technologies to the world and create multimedia masterpieces that had never been done before. The automatic performances completed the vision and meaning of the building. The requirements of the "poème électronique" dictated the establishment of the first ground-plan. In figure 7, the first design stages of the Philips Pavilion are hand drawn. The main key points and restrictions are shown in the first drawing (stomach-shaped floorplan) and from here the drawings slowly evolve by adding points in space and connecting them by straight lines. The "cow's stomach" could accommodate 500 people in 10-minute increments (Lycée Albert Schweitz, 2020). The spectators would leave the Pavilion through a different exit as if digested by the stomach (see figure 7). The curved surfaces appeared to be appropriate for the acoustic requirements, but the structure needed to be revised. The three peaks in the design had to be repositioned in space in order to obtain more harmonious proportions, corresponding with the flow of the electronic poem. The last modifications were based on making the entire structure self-supportive and adjusting some minor details.

From the drawings can be concluded that the placement of the three rooftop points in space decided what the final shape was going to look like. By setting the 425 loudspeakers into the asbestos coated walls, a textured look was created. The asbestos provided a cavernous acoustic. Varèse created a spatialization plan for his musical composition in order to make the best use of the Pavilion's physical layout. His explosive crescendos and sudden silences were calculated to make use of the space's reverberation.

The colored ambiances were inspired by watercolours in Le Corbusier's initial artistic illustrations of the poème électronique. The music (mainly abstract, seemingly random sounds), images, and architecture portrayed a story of humanity using art from all around the world, war scenes, and technological achievements. The rational key to understanding the great complexity in both music and architecture of the poème électronique was mathematics, and abstraction was the emotional interpretation. Xenakis' use of hyperbolic mathematical functions related space, music and construction through science on the one hand, but on the other hand, the organic space of the interior created movement and flowed. In figure 8, the similarity between one of Xenakis' musical compositions (*Metastaseis*) and the architectural design of the Pavilion can be seen. The graphic score shows remarkable similarities to the design sketches for the pavilion. The design of *Metastaseis*' transforming sound masses was the basis for the elaboration of the pavilion's architecture.

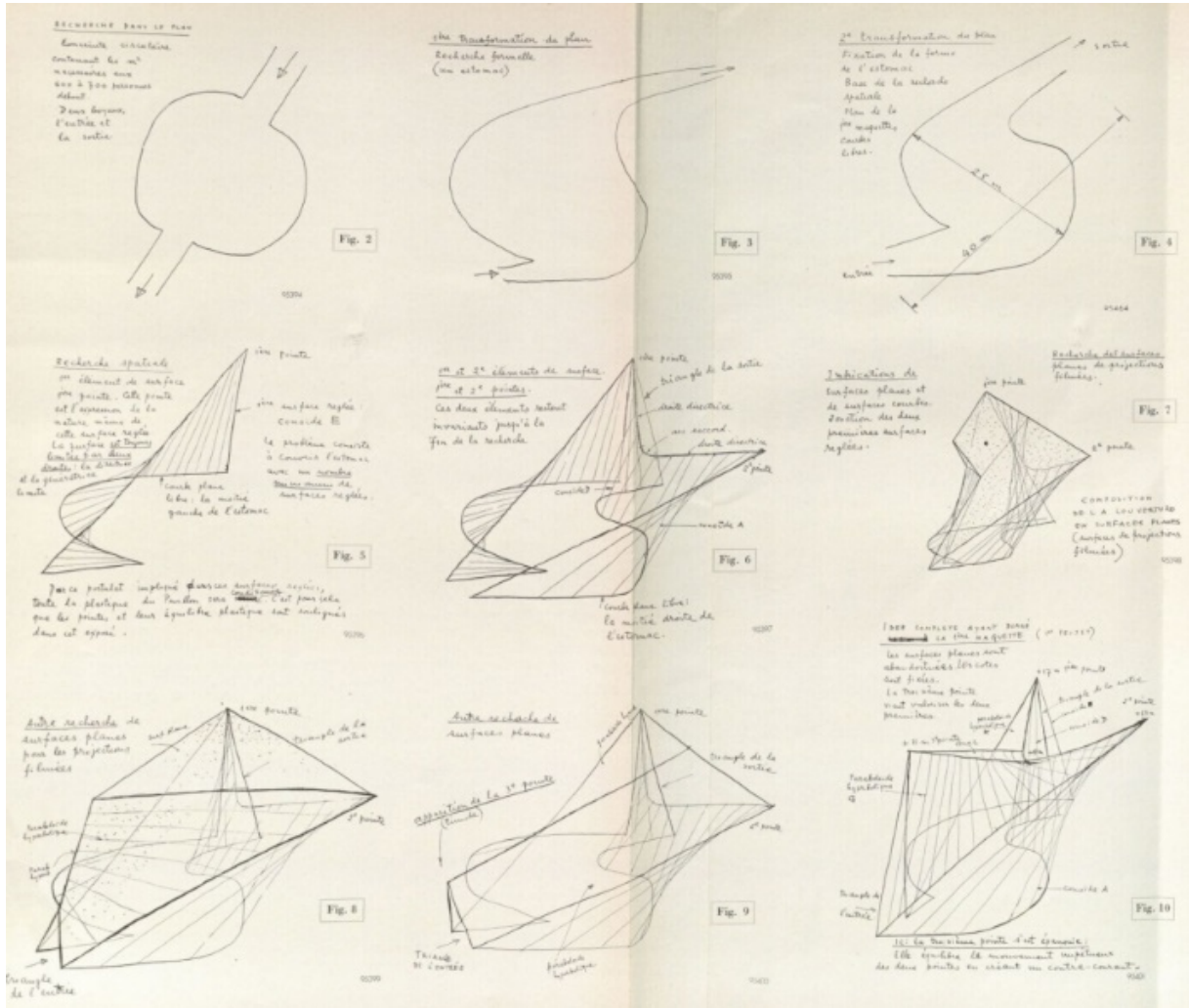


Figure 7. First design stages of the Philips Pavilion (1958)

Derived from: "Philips Pavilion Technical review", by Gradstein et. al. (1960) *Research Laboratories of N.V. Philips' Gloeilampenfabrieken*, 20(1). https://web.media.mit.edu/~tod/media/pdfs/Philips-Pavilion_Technical-Review_1958.pdf

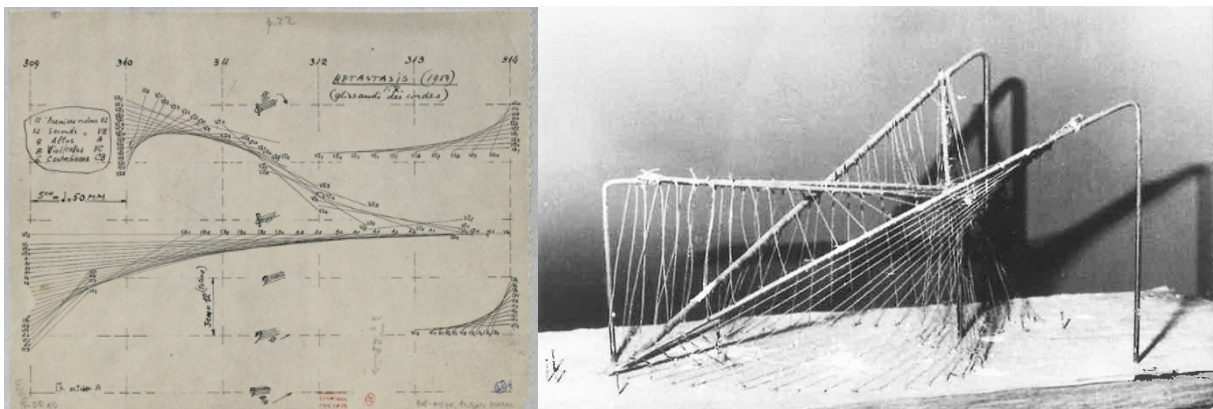


Figure 8. Comparison of the graphic notation of "Metastaseis" and the first model of the Pavilion.

Derived from: Vreedenburgh, E. (2018, October 8). *Le Corbusiers Le poème Électronique* -. Archined. <https://www.archined.nl/2017/09/le-corbusiers-le-poeme-electronique/>

Xenakis and Le Corbusier played with terms like proportion and rhythm to create an harmonious synthesis of arts and to bring every aspect of the audio-visual elements together. Therefore, the Philips Pavilion was designed simultaneously with the musical piece of the *poème électronique*. The artworks complemented each other, demonstrating a technological evolution and a fresh look on the concept of an electronic-spatial environment. The piece by Edgar Varèse and Le Corbusier is still regarded as one of the most important pieces in the history of electroacoustic music.

1.3 How did Le Corbusier experience the design of the building?

The architecture of the Pavilion was not Le Corbusier's priority. He was involved in a gigantic project, notably in the construction of an entire city in Chandigarh, India, so his focus was put on that project and he did not work very closely on the Philips project with Xenakis. In the Pavilion project, Le Corbusier was much more concerned with the presentation of the multimedia performance within the pavilion than he was with its architecture. He considered himself more of an artist than an architect at that point in time when he was inspired by the synthesis of arts. His creation of sounds and lights can still be seen in today's modern halls. But it was Xenakis, who conceived the hyperbolic architectural creation and also invented solutions for structure and sound problems (Harley, 2000).

However, apart from the fact that Le Corbusier saw the execution of the *poème* partly as a failure, renowned writers like De Heer and Tazelaar – who wrote *From harmony to chaos* (2017) – considered the Pavilion and the *poème* as a milestone within the synthesis of arts.

1.4 Conclusion

The composition and the convergence of the arts evoked a wide range of reactions from the public: "terror, anger, awe, amazement, amusement and wild enthusiasm." (Lycée Albert Schweitzer, 2020)

A combination of experiments with "spatial music" and the generation of curved lines from straight lines, resulted in a fluid and moving space. The three created peaks of the Philips Pavilion were positioned in space in a way that the architectural design would complement the audiovisual spectacle that took place inside. The synthesis of two arts working together generated an electronic-spatial environment that showed technological advances at the time being. Glissandi were the main components used by Xenakis to translate musical sections to a spatial layout for the architecture. Mathematical solutions are used to link the components.

After the Philips Pavilion, Xenakis left Le Corbusier's company to devote himself entirely to music. He joined the GRM, Groupe de Recherche Musicale at the French Radio Studio with Pierre Schaeffer, its creator. Varèse, for his part, savored his success, for he was finally recognized in France as a great contemporary composer (Lycée Albert Schweitzer, 2020).

2. The Stretto House (1989 – 1992)

In chapter 2, the Texas Stretto House by Steven Holl will be illustrated and analysed. Throughout this analysis the design method of Holl applied to the house will become clear and the connection between music and architecture in order to create a total harmony of elements according to Steven Holl will be discussed.



Figure 9. Part of the Dallas Stretto House

Derived from: Weber, E. (2019, October 29). *Case Study: Addition to the Stretto House by Max Levy Architect*, Residential design magazine. <https://www.residentialdesignmagazine.com/case-study-addition-to-the-stretto-house-by-max-levy-architect/>

2.1 Steven Holl

Steven Holl, born in 1947, is the architect of the Stretto House in Dallas, Texas. As an American architect and aquarellist, he leads his own office and lectures at the Columbia University. He is a member of a new generation of architects from the late twentieth and early twenty-first centuries, who believe in the principles of phenomenological, place-based design. That is designing with a concern for man existentialist, and for physical engagement with his environment (Kouni, 2020). Holl's Stretto House can be seen as a transition between previous works, that were based on typologies, and his (new) phenomenological works, that are based on topology (Archipel, 2022). By treating each site as a source of inspiration with this new design approach, Holl would create a one-of-a-kind architecture.



Steven Holl

Derived from: Archipel (2022).

Steven Holl

<https://archipelvw.be/nl/archief/architecten/steven-holl>

Figure 10

Steven Holl is able to express his complete artistic freedom in the Stretto House, since the clients, who were art collectors, imposed no restrictions on him. So, after in-depth consultation on the preferred site, the analysis of the chosen place and a series of explorations led to a concept strategy of giving emphasis to the phenomenological link between building and site. The inspiration for the material and overlapping roofs of the Stretto House (see figure 9) came from the site, as Holl wanted to use the vernacular concrete block of Dallas and there was a need for protection of the Texas sun.

According to Holl the site, which consisted of four masonry dams and ponds, had a strong analogy of a spatial sequence that could be interpreted as a “stretto” (Kouni, 2020). A stretto is a musical term, which means that an imitation of the theme is played in close succession by different vocals. A tension during the movement is built up in this way. This intuitive concept of combining elements from the environment and elements from other arts like music, exemplifies Holl’s poetic nature. He imagined that the musical concept could be an idea for a fluid connection of architectural spaces, just as a stretto.

“I definitely believe in ideas driving a design, and that makes me different from the people who pretend to be phenomenologists. I am very different from them: you must have an idea to drive a design. Le Corbusier always had an idea; and so did Louis Kahn. That’s for me enormously important. I also believe that you don’t need to know what that idea is to appreciate a building.” (Steven Holl, 2013)

2.2 The development of a concept inspired by music – *Stretto House*

In Parallax (2000), a book/manifest in which Holl reveals his working methods, he writes: “Concepts are the tools one uses to drive design, transcend ideological arguments. We work from a limited concept, unique for each site and circumstance.” It shows with different illustrations in diverse topics how ideas merge into architecture.

For the extensive use of the stretto, the four movements of “*Music for Strings, Percussions and Celesta*” would be a representational symphony. Holl says that he and his company designed the Stretto House *parallel to* this music piece created by Béla Bartók in 1936 (Holl, 1996). The four-movement work clearly distinguishes between powerful, discontinuous percussion elements and lighter string elements, where sound flows without interruption as shown in figure 11 (Capanna, 2005). Especially in the first two movements, where the strings prevail, the continuous flow of music swells and then decreases to make room for the percussion. They lead into each other. The Stretto House also has four sections with inversions (figure 12) and contrasts between orthogonal walls, mostly housing the service spaces, and curvilinear roof elements (figure 13) (Schoof, 2017).

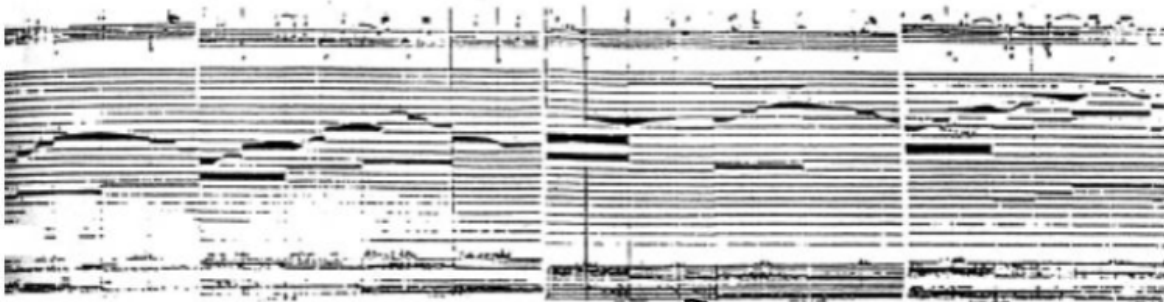


Figure 11. A musical composition that led to the composition of the roof form.

Derived from: “The phenomenon of spatial sequence”, by Kouni, S. (2020), ISSUU https://issuu.com/built_meaning/docs/sofia_kouni_thesis



Figure 12. Bars from “*Music for String Instruments, Percussions and Celesta*” that illustrates an inverted form.

Derived from: Capanna, A. (2009). Music and Architecture: A Cross between Inspiration and Method. Nexus



Figure 13. Associating the construction principles of the Stretta House to musical composition principles, West façade

Derived from: “The phenomenon of spatial sequence”, by Kouni, S. (2020), ISSUU https://issuu.com/built_meaning/docs/sofia_kouni_thesis

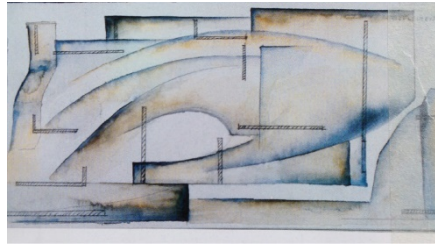
What stands out in a second analysis of the west façade (see figure 14), is that the number of architectural elements increases to a peak in the middle of the façade if seen from left to right. After this peak, the interplay of lines and rectangular shapes suddenly becomes less hectic, just like in the movements of *Music for Strings, Percussions and Celesta*. It represents a part of Holl’s original idea to let the spaces flow into each other. This analysis would also apply for the east façade. In one of Holl’s concept sketches, he mentions that “the ordering proportions are 45 percent by chance and 55 percent by mathematical ordering”. The golden ratio is significantly used in both the symphony of Bartók and the architectural design. The harmonious mathematical proportion once again plays a substantial role to link music to architecture.



Figure 14. Illustrating the flow of the Stretta House by the increase and decrease of orthogonal elements

Derived from: *Own work*, by Moens, J.. (2022)

The intention for areas to fluidly flow into and over one another can also be seen in some of the early watercolor sketches of the floorplan as in figure 15.



Steven Holl

Derived from: Archipel (2022).

Steven Holl

<https://archipelvw.be/nl/archief/architecten/steven-holl>

Figure 15

Holl wanted for the roof to mirror this concept by placing them above one another. The created openings were meant to "draw" light into the dwelling (Morimoto, 2016). The architect takes on the task of introducing daylight into spaces where it is not normally found in all of his creations (Schoof, 2017). In his description of the project, Holl touches his predilection to design with light in a comparison between music and architecture, saying that "Bartók's *Music for Strings, Percussion and Celeste* has a materiality in instrumentation which the architecture approaches in light and space." (Holl, 1996)

So, it can be said that the essential (musical) elements like the flow between harmonious tone scales, repetition of the theme by different vocals (stretto) and physical materialization of instruments used to create Bartók's symphony, form the base of concept sketching and modelling in the process of designing the Stretto House. The result is a house, that builds up a tension, brings the contrasting "light" and "heavy" parts together and stresses the spatiality in the symphony of Bartók.

2.3 The role of music in the Philips Pavilion and the Stretto House

Contrasting with the Philips Pavilion, the design of the Stretto house did not have acoustic requirements and the spaces were not built *for* a musical event, but as a tribute *to* a musical event. The design steps were taken slightly different from the design of the Pavilion.

While Corbusier's and Xenakis' project has clearly and explicitly stated musical connections (calculations for reverberation for example), it is not a literal translation of a symphony or composition, like Steven Holl accomplished in the Stretto House. Xenakis discovered a path to architecture in the manner he composed and arranged *Metastasis* (Morimoto, 2016). Xenakis expressively mentions in his book "Formalized Music" (1992) that his inspiration was pin-pointed by the experiment with *Metastasis*. Hyperbolic functions, golden ratio-related proportions and studies of space-time related to both his musical and architectural compositions. "Thus I believe that on this occasion music and architecture found an intimate connection", he says (Xenakis, 1992, p.10)

Similar mathematical terms seem to recur in the way Holl talks about his design. In order to achieve harmonious proportions, Holl borrows existing mathematical elements from Bartók's symphony and learns to design with them, while following the structure of the symphony. The difference is that Xenakis uses his already existing knowledge to create his musical symphonies as well as his architectural designs. The experience of sound in space has a key role in the Philips Pavilion, that is missed in the Stretto House. Nevertheless, Holl does in fact exemplify that space can be shaped by both arts. "I think architecture has several dimensions that relate to music," he said recently. "A painting or sculpture you can turn away from. Architecture, like music, surrounds you. Both are immersive experiences." (Holl, 2015)

The idea or the concept can be seen as an engine that drives the designs of Le Corbusier, Xenakis and Steven Holl. The ability to keep searching for the incorporation of knowledge from other arts and philosophies into the built environment, shows that architecture is not bound to a limited formal profession. The great spirit of the free-spirited early twentieth-century architects has not been lost along the way, but has instead been passed on to practitioners such as Holl, who have the skill and understanding to pick up where Le Corbusier and co left off.

2.4 Conclusion

The most prominent and recurrent theme in the Stretto House is the use of a musical element called “stretto”. Whilst further working out this design concept, Holl anchors the building into place focusing on the phenomenon of spatial sequence rather than on the visual appearance of the villa. This is evident in the layout of the house by sequence of spaces, and the formation of the roof. The second item is through organization. The four parts of the house mirror the four movements that compose Bartok’s piece. A third way in which Holl drew parallels between architecture and music is through the materiality.

Steven Holl imagined that the musical concept of the Stretto House could be an idea for a fluid connection of architectural spaces, just as a stretto. It incorporates the knowledge of different artforms to create a coherent and harmonious construction. Xenakis and Le Corbusier used “glissandi” to achieve a closely related product.

3. An Imaginary Discourse between Le Corbusier and Steven Holl

3.1 Introduction

Imagine a conversation between Le Corbusier and Steven Holl at a crucial point in a design process that originated from one single idea. Imagine an exchange of ideas between a modernist architect from the mid-twentieth century and a free minded phenomenologist. Imagine that, at the drawing table where the idea of the Stretto House was made physical, the two architects discussed the design theme of the Stretto House in its early stages. Such a conversation underscores the importance of critical thinking and analyzing, discussing and repeatedly trying to improve/strengthen a design concept.

In this chapter, a made-up discourse illustrates the brainstorming on the Stretto House in order to understand better how an architectural concept inspired by music could be developed. In the previous chapters, some musical elements are presented as if they have led immediately to the end design of the two case studies, but in reality, a lot of experimenting precedes. This is something that is not explored in depth in the previous (more historical and theoretical) chapters and will therefore provide a fresh view on the process of designing, with the focus on combining two art forms. It could be most interesting if a new way can be formed to integrate an idea with the functional and programmatic essence of a building.

The dialogue takes place in the office of Steven Holl in New York, where Le Corbusier and Holl come together after visiting the building site for the second time. They have already decided to make use of the dams on the building site in their design strategy and that open and closed spaces alternate in the elevation view. It is 1988 and it is assumed that Le Corbusier still thinks and designs in the same way as thirty years earlier when the Philips Pavilion was built. The architects share some overlapping thoughts and principles, such as that a design comes from an idea and is an artform that surrounds you, just like music does. But, since almost thirty years have passed, unfamiliar philosophies that inspired Holl, new technologies and the development of architecture have a not-to-be-missed impact on the modernist that suddenly travelled thirty years in time to one of his least favorite places: America.

3.2 The discourse

Most of the quotes in this dialogue are derived from real quotes of the architects (according to interviews and stated phrases in articles, books and websites), but parts of them are adjusted for the sake of the storyline. Besides that, there are no reasons to assume that this conversation actually happened, but it is the writer's own interpretation of the meaning of different sayings from Holl and Le Corbusier and a dialogue is built around it.

On the drawing table, a small model of the building site is presented under a dimmed light. Steven is flipping through his Fabriano aquarelle pad, looking for the watercolor drawing he just made on his flight back from Texas to New York. Iannis Xenakis wasn't able to join the meeting, but he inspired Le Corbusier take part in the design of this villa in Dallas, since Holl's spatial concept (apparently influenced by a symphony of Béla Bartók), grabbed his attention. One of the junior architects is sitting on a chair a few meters from the table, overhearing the conversation and taking notes.

LE CORB: “Our aim is to find the best possible solution for this location, which naturally fits into the urban planning context. Here, too, we have intensively studied the location in advance, reacted to the local situation and found an answer that is appropriate and conveys interest in the new.”^[1]

HOLL: “I agree, architecture is bound to situation. And I feel like the site is a metaphysical link, a poetic link, to what a building can be.^[2] I think therefore, we can exploit the fact that these river dams underline the four movements of the *Music for Strings, Percussions and Celesta* even more as I told you in Texas. But let’s move on, we need to talk about the layout and the spatial problems we face.”

LE CORB: “Alright, you need to define the goal of this interplay between the architecture and the symphony a little more precise. We make one building, not four. Is there some way we can define the proportions of every part in your previous sketches of the façades? And substantiate that with a mathematical link in order to create a harmonious piece? It is hard to talk about it, I need to draw it to create this link. Harmony can only be achieved by the right succession of primary forms, since Architecture is the masterly, correct and magnificent play of masses brought together in light.”^[3]

HOLL: “My primary goal right now is indeed to link these movements and create a system of openings that brings in the light to unexpected places. Let me show you the sketch I made during my flight.”



Figure 17. Watercolor study for the Stretto House by Steven Holl.

Derived from: “The architectonics of music” by Holl, S. (1988), From the website: <https://www.famagazine.it/index.php/famagazine/article/view/54.6/1601>

- HOLL:** “For now I have imagined approximately 55 percent of the ordering system of elements to be mathematical and 45 percent by chance.^[4] You see the aqueous space flowing through the heavy concrete parts? The water flowing over the dams, like an overlapping stretto in music, is an overlapping reflection of the space of the landscape outside as well as the virtual overlapping of the spaces inside.^[5] How can we try to find the best way to translate Bartók’s piece into these spaces?”
- LE CORB:** “That is beautiful, here, as I see, art enters in.^[6] But let me tell you an anecdote. Negro music has touched America because it is the melody of the soul joined with the rhythm of the machine. It is in two part time; tears in the heart; movement of the legs, torso arms and head. The music of the era of construction; innovating. It floods the body and heart; it floods the USA and its floods the world. The jazz is more advanced than the architecture. If architecture were at the point reached by jazz, or in this case a complex symphony, it would be an incredible spectacle.”^[7]
- HOLL:** “Hmm...”
- LE CORB:** “As my friend Iannis Xenakis said to my lately: “*Any musical piece is a skin to a boulder with complex forms, with striations and engraved designs atop and within, which men can decipher in a thousand different ways without ever finding the right answer or the best one.*”^[8] I’m trying to say that this comparison with Bartók is really complicated. So don’t bother to find the best “translation”, we should maybe focus on some basic elements first and see what happens if we try to connect them?”
- HOLL:** “Yes, however I think we should still strive to achieve a feeling with our design, that resembles the feeling that Bartók leaves with his music. Of course a building cannot be similar to a symphony, but **both** music and architecture use space as a playground. The arts can surround you and you can immerse in it. I think we can create a harmony of mathematical precision.”^[9]
- LE CORB:** “Okay, let’s put these ideas on paper and start designing...”

Used citations:

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- [5] Holl, S. (2012). *Stretto House*. Architect. Derived from: <https://www.architectmagazine.com/project-gallery/stretto-house-506>
- [6] Corbusier, L. (1924). *Vers Une Architecture* (1st edition). G. Cres.
- [7] Fields, D. W. (2000). *Architecture in Black*, p.11 [E-book]. THE ATHLONE PRESS. ISBN 0 485 00411 9 HB
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Reflection on the discourse – A twisted history

Striking a balance between writerly freedom and the application of proper argumentation based on historical events is a difficult task. The first question that comes to mind when reading about a conversation between two architects that have not lived together, is: Why them? Why not people who knew each other and share a history? It is hard to believe that Le Corbusier collaborated with someone in America to develop a plan for a villa in the hands of millionaires, since a close friend of Le Corbusier brings his criticism on wastefulness in America to the table multiple times (Drew, 1977). On the one hand, the Le Corbusier and Holl share the same views on some design principles, for example that architecture needs to be free from the styles* and that light plays an utterly important role in defining space and creating a spectacular show. On the other hand, an informal discussion in a coffee corner, where the two discussed about Holl's approach to design the Stretto House, might have been more credible, because it could show the contrast between Corbusier's way of designing and Holl's way of designing years later on a different continent. Different sources that could have been used illustrate the stubbornness of the architects:

“Le Corbusier was so egocentric that I once teased him about the fact he could not talk for 10 minutes without bringing himself into the conversation! He realized this was true.” (Drew, 1977)

“Holl has become more resolute in his philosophies during the eighties” (Archipel, 2022).

This alternative dialogue could have evoked a more personal outcome in which the characteristics of the architects would have been highlighted.

I have tried to be in the shoes of two men whose personalities are only known by me through texts. So, since I did not have enough information about it and it might not have fulfilled the answer on the research question, the main goal of the discourse of Chapter 3 is not to sketch a credible story with the focus on elucidating the thoughts of two famous architects, but to present a possible outcome of a decisive moment in the design stage of the Stretto House. Besides that, it shows the kind of challenges that are faced in a conceptual design stadium where music interferes with architecture. An architect focuses on many different aspects of the built environment in various layers at the same time (from detail level to landscape). Thus, a conversation between two professional architects should try to address every layer and let it come together in a conclusion of maybe a few sentences.

The main problem that the architects face is that there needs to be a link between the concept and the goal of the architecture. How can they create a feeling with their building, that equals the feeling that Bartók evokes with his symphony? Le Corbusier subtly suggests to make use of primary forms by saying that “*harmony can only be achieved by the right succession of primary forms*”. This quote however is derived from one of the manifests in Corbusier's younger years. It is not totally representative for Corbusier's position in the fifties and later. When Holl talks about “*the aqueous space flowing through the heavy concrete parts*” and compares it with “*an overlapping stretto in music*”, he unveils a possible solution for the connection of spaces. The flow of the stretto that is used in the symphony, could be reference for the same flow between parts of the building. After this, Le Corbusier puts the statement into question and tries to broaden the view on the subject. How is music even related to architecture? An anecdote shows his interest in the topic and it cannot be missed, that he owes a lot of his knowledge about this to Iannis Xenakis.

A more philosophical outcome of the conversation that is presented in Chapter 3, states that music and architecture can be compared by the infill of space, with the use of forms or sounds which are (partly) based on mathematics. It is assumed that the two arts are different, but have impact on the same pleasing effect that space can evoke; one can immerse in it.

* With “the styles”, a collection of external influences that shape the materiality of architecture is meant. Think of the correct use of classical elements for example.

Conclusion and Discussion – A synthesis of form and symphony

In this thesis, The Philips Pavilion and the Stretto House, two individual projects inspired by musical elements, are discussed in chapter 1 and 2 whereby information about the architects is provided. Steven Holl and Le Corbusier have a slightly different perspective on design strategy if it comes down to the development phases of a conceptual idea. In both case studies, they focus on creating a harmonious flow of space, by making use of representational music pieces. As Le Corbusier and Xenakis are working in a three dimensional way for the Philips Pavilion, Holl is mainly drawing in sections and floorplans to design the Stretto House.

In the introduction, the main research question stated: **“How can the implementation of musical elements contribute to an architectural design concept?”**

The first two chapters give an example of what a case-specific answer to this research question looks like.

In both the architectural works, a key element derived from music is chosen to build the design around. “Glissandi” were used to create curved lines from straight lines and make an electronic-spatial environment from the Philips Pavilion. Hyperbolic functions, golden ratio-related proportions and studies of space-time strengthen the link between musical and architectural compositions in the design. A “Stretto” is used to create a flow between parts of the Stretto House and connect the symphony of Bartók with the design of the building.

The Philips Pavilion was designed simultaneously *with* the musical piece of the *poème électronique* to create a synthesis of arts. The Stretto House was designed as a tribute *to* the Music for Strings, Percussion and Celeste.

A problem is created in the third chapter, that opened the possibility to discuss about the topic and show how a solution could come about. The discourse between two architects in different timelines, discuss (musical) key points in architectural concept designing. A critical discussion on the development of a concept is something that is not explored in depth in the previous chapters and provides a fresh view on the process of designing, with the focus on combining two art forms. The idea or the concept can be seen as a starting point that drives the designs of Le Corbusier, Xenakis and Steven Holl.

A conclusion can be drawn from the discourse, which provides a more general answer to the main research question: Music and architecture can be compared by the infill of space, with the use of forms or sounds which are (partly) based on mathematics. A combination or follow-up of the right dimensions/tones, for example by using the golden ratio, can create harmony, which has a pleasing effect for the human senses. Both Holl and Le Corbusier strive to find a balanced interaction between order and disorder in their designs to create a harmonious piece that links all the arts together.

Discussion

Looking back at this thesis taught me that Iannis Xenakis was an extremely passionate and intelligent man, who made a design for the Philips Pavilion almost by himself, since Le Corbusier had to work in India on his Chandigarh project most of the time. A dialogue between Xenakis and Holl could have gone more into depth about musical details and would have been more realistic. However, the strong (and stubborn) ideas of Le Corbusier gave a twist to the development of the design of the Stretto House in this story. For another thesis or article, it would be most interesting to write about another conversation between Holl and Corbusier, but more closely focused on light, since they share the same principle ideas about light and architecture.

Understanding the musical language in the *Poème électronique* and the *Music for strings, percussion and celesta* I experienced as a hard part of writing this thesis. Although I play an instrument for more than ten years now, abstract modern sounds and fast themed ‘fuges’ are not easy to comprehend.

Holl teaches about this subject for numerous years now at Columbia University by which he pulls his craft and its norms back to a center position aimed at reaching architecture's full potential (Steven Holl Architects, 2022).

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