Architecture as a Translation of Music
Music - A Generative Tool for Design
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Undergraduate Thesis 2005
Supplemental CD and DVD included

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Presentation on DVD+R

This twenty minute DVD presents the entire thesis project through video. The DVD may be viewed through COMPUTER MEDIA PLAYERS.
Supplemental Music CD

To fully appreciate the auditory experience of this book, it is recommended that the reader cue the CD [included in the sleeve below] at the points indicated by the text.
Introduction

I have been involved in music most of my life. From an early age, I was exposed to music when my parents began singing in churches. My mother plays the piano and my father plays the guitar. I picked up the guitar around the age of 5, and later learned to play other instruments such as the bass, trombone, piano, and violin. Because of my interest in music, I want to study its connection to architecture in my thesis. After doing several weeks of initial research, I designed two different performance spaces, testing ideas of spatial interpretations of music in each. In these studies, I analyzed techniques of creating emotion in music and applied these ideas to the design of architectural space.

Composers of music create moving pieces through structure, composition, style, dynamics, orchestration, and time signature. Musicians must work within these parameters to create music. Architects, too, are given a set of tools, with which to create space. These include, for example, form, structure, views, site connections, light control, acoustic control, circulation, scale, and materials. I want to learn how composers use their tools to create good music and see how I can begin to use the resources available to me as a designer to enhance the experiential qualities of users.

Lacrymosa

Larghetto - a composition or passage played in a slow tempo slightly faster than largo but slower than adagio
13/8 time signature - the numerator is the number of beats per measure [12] and the denominator represents the kind of note getting one beat (eighth note).
Musical notations - express dynamics and intricacies of the music.
Some Musical Dynamics and their Architectural Translation

**Diminuendo - Getting quieter**

The beginning of Mozart’s Lacrymosa is characterized by a quiet, foreboding dynamic. This tight, dark corridor was interpreted from the “diminuendo” of the music.

**Crescendo - Getting louder**

The resolving “Amen” at the end of Mozart’s Lacrymosa is characterized as a musical crescendo. The image below was interpreted from this portion of the music through lighting.

**Slur - Play melody smoother**

Interpretable model of Beethoven’s symphony No. 9. Waves are interpreted from the smooth melodic lines of the musical piece.
What characterizes an evocative piece of music/architecture?

Dynamic

Variations in intensity build to a climax in music. A similar sense of dynamic is created in building through manipulation of scale, light, and dynamic viewpoints.

\[
\begin{array}{lc}
pp & Pianissimo - Very quiet \\
p & Piano - Quiet \\
ff & Fortissimo - Very loud \\
f & Forte - Loud \\
mf & Mezzo forte - Fairly loud \\
mp & Mezzo piano - Fairly quiet \\
sf & Sforzando - Sudden accent \\
\end{array}
\]

Dissonance/Consonance

Conflict/resolution enriches a piece of music through tempo change, key switch, or timing adjustment. A similar sense in architecture can be created by integrating different ordering systems. Spatial proportion, light quality, and scale are the devices which may be used to create this sense in buildings.

Rhythm

Patterned, recurring alternations of contrasting elements of sound define an underlying beat which unifies an entire piece of music. In architecture, devices such as pattern, fenestration, structure, and ornamentation may create a similar sense in buildings.

Style

Music is categorized by genre and era. Music from different periods contains certain characteristics which give it a distinct style. In architecture, ornamentation, formal order, structure, and materiality may be combined to generate a "style."

Acoustics

This musical characteristic relates to the "total effect" of sound and encompasses such characteristics as reverberation, echo, absorption, and sound control. In architecture, spatial proportion, materiality, and scale affect acoustical quality.
Richard Meier’s Westchester House. Two competing ordering systems collide [Dissonance].

View of Tadao Ando’s Church of the Light. Small cuts in the facade allow slices of light to penetrate into the space, creating a sense of mystery and discovery in the spaces [Dynamic].

Le Corbusier’s La Tourette. Rhythmic divisions in exterior layers of building skin [Rhythm].
What has been said about music and architecture?

Stretto House -- Rhythm

Research on the topic includes such readings as Architecture as a Translation of Music, which explores using musical structure as a catalyst for design. Included in the book were such works as Steven Holl's Stretto House where form was inspired by musical notations. The Stretto House was designed as a parallel to Beia Bartok's Music for Strings, Percussion and Celesta. Broken up into four sections, each of different ordering systems, the house relates to Bartok's four movement composition. In both the music and the house there is a sense that several layers are working beneath the structure.

The Stretto House captures the character of the site in a series of concrete spatial dams with "aqueous space" flowing through them. Each of the four sections consists of two modes: heavy orthogonal masonry and light, curvilinear metal. The plan is strictly orthogonal while the section is curvilinear. An inversion of this established ordering system is found in the guest house, where the plan is curvilinear and the section is orthogonal. The "aqueous space" in the main house is developed by floor plans pulling the level of one space through to the next, roof planes pulling space over walls, and arched walls pulling light down from skylights. Several combinations of inversions and melodic mismatches in Bartok's music apply to the architectural details of the house. The Stretto House manifests these mismatches through solid/void relationships of walls and openings, window mullions, mirrors, cabinets and drawers.

[top] Computer animation translating a synthesizer piece of music into space
[middle] Views of Steven Holl's Stretto House
[bottom] Steven Holl's Stretto House
Epicyclarium [Architecture as a Translation of Music] -- Dissonance, Dynamic, Rhythm

Elizabeth Marin, in *Architecture as a Translation of Music*, studied musical dissonance, style, rhythm, and dynamic in a design experiment for an Epicyclarium. This theoretical program houses instruments of advanced electronics technology and its staff of creative scientists. Site was chosen as a metaphor for minimalist music because it contained the following characteristics: simplicity, repetition, illusion/perception, events, phase-shifting, complexity and sudden alterations of density. After studying several scores, Elizabeth Martin chose contemporary classical music as the musical type to translate into architectural space. Musical analysis showed how minimalist music differed from traditional classical music. From the analysis, Martin concluded that minimalist music is composed in such a way as to deny the hierarchic structure and patterning found in traditional music. Traditional music is linear, having a beginning and end similar to that of a classical novel where the denouement resolves the conflict of the plot [Dynamic]. Minimalist music creates a cyclical experience much like that of a factory: repetition of a product being made [Rhythm]. Music with a clear progression often is more related to emotions than directionless, non-dramatic music [Dynamic]. Minimal music discards the traditional harmonic schemes of tension and relaxation and the musical narrative that goes with them. Unlike repetition in traditional music, Repetition in minimalist music creates a feeling of movement and pulls attention away from the details of the form to the overall process [Rhythm].

From this analysis, Martin constructed a piece of graphic music by mapping notes and rhythms on a grid and later developed a building in the same way: One square equaled the smallest unit—a beam, wall, or floor plane—within a range of forty-five units and the larger squares represented larger groups of units. The separate parts of minimalist music are often connected by the first beat of their measure. Likewise, in space this point of confluence may be recognized as a feature that appears as a repetitive pattern which breaks into smaller sub-units which accelerate to take it out of a phase. The result is a set of figures that rise and fall creating a condensed or stretched time-sense. The façade, and column placement in the building was set up by dimension analysis which explored the mathematical patterns of minimalist music.
Geneva By-pass -- Acoustics, Dynamic

Architecture as a Translation of Music also discussed design based on acoustics. Footsteps or speech inside a room connects the human with their surrounding sound environment. Attention is shifted from the visual to the aural, making perception of sound more space oriented. Michael Brewster, in the Geneva By-pass, tries to physically improve the motorist’s transit through three subterranean passages by using sound and light to elevate the travel experience. A series of speakers emitting “white noise” subliminally reduces stress for the drivers and reduces sound pressure levels inside the tunnel. A row of lights at eye level move along at the speed limit, subliminally influencing drivers’ speed. These lights stop when there is a traffic back-up or a red light inside the tunnel, alerting the motorist to changes in traffic flow. The by-pass explores an understanding of sound as a means for producing an art of spatial precepts.
Swiss Sound Box -- Acoustics

The Swiss Sound Box by Peter Zumthor is a physical, sensorial piece, highlighting acoustics and form as generative forces for design. The design was for the Swiss Pavilion at the World Exposition in 2000 in Hanover. A total of 40,000 timber beams were used to form the stacked walls that comprise the Sound Box and its flanking service units. Poetic in presentation, the book contains a series of poems, dialogues, and written descriptions of the experiential qualities of the space:

'As if in a forest: I stroll through the forest, the trees stand in regular density, here and there a clearing, a bush, shrubbery, no large paths, no open spaces, perhaps meandering trails. I roam around, I discover, I find my own path. I'm led by curiosity, seduced by a sunspot, by a particular sound.'

-Zumthor

For the music in the Swiss Sound Box, the curator of music along with musicians researched various sounds and conducted sound rehearsals in the Swiss Sound Box during the shell stage. The resulting music complements the space and can be reconfigured during the 153-day performance. The curator composed music specifically for the dulcimer to be played in the space. The music of the Sound Box involves some 350 musicians from around the world. Each of the musicians work three hour shifts. The “basic sound” is played by three accordionists and three dulcimer players, while three improvising musicians play over the basic sound. In addition to the six basic sound musicians, three improvising musicians perform on a daily basis. These musicians react with the sounds and eruptions in the space, engaging with it, denouncing it, commenting on it, and questioning it—all in an attempt to broaden the musical horizon. The idea was to create spatial music with mobile musicians inside a continually changing sound space. Architecture, lightscripts, music, drinking and eating combine to create a total experience for the senses. Throughout the duration of the Expo, the performance undergoes continual change and renewal and adjusts to visitor numbers, the season, and weather conditions. The acoustic properties of the pavilion could not be calculated in advance, but were intuitively felt during construction. A full-scale stack wall was used to test the sound of the space before construction. During this time, they discovered that the basic sound of the dulcimer and the accordion have a structure similar to the structure of the Sound Box.
Methods of Translating Literary Work to Architecture
Cammack Retreat Center
Undergraduate Thesis [Eric S. Risinger]

In this project, Risinger established a method for translating the emotions of literary work into architectural space. The methodology included: Finding a piece of literary work, performing written analysis of the emotions discovered in that work, and spatially interpreting that emotion into model form. The assumption was that powerful literature evokes different emotions, feelings, images, or thoughts. The question was whether or not architecture, like literature, could provide a similar powerful and imaginative experience for the user through contrast, movement, energy, and sensorial qualities. The goal of the thesis was to establish character defining elements and to develop a prototype, or vocabulary, of certain spaces that evoke, in general, some different emotions from the users. This vocabulary consisted of the following terms: form, pattern, rhythm, and ordering systems. According to Risinger, emotion is created in space by providing choices, creating contrasts, and altering one's expectations or preconceived notions about any space they are experiencing.

Emotions In Architecture  The Wall
The wall becomes the narrator of a story
of the summary or prelude to what lies
within and around its boundaries -
Setting the characteristics of the space or setting -
The mood for the space -
Lastly the wall begins to enhance the
user's emotion in the space.
Temple of Jazz – Acoustics

The Temple of Jazz is significant because it uses a large amount of glass for the walls of its performance hall while still maintaining acoustic excellence. It also creates an opportunity for people to see how important jazz music is to our culture. The project, largely organized by the well-known jazz trumpet player, Wynton Marsalis, provides a permanent home for jazz in Manhattan, NY and showcases jazz music to the rest of America. The facility is equipped with ample classroom space and one of the largest recording studios in the city. Because acoustics were so important to the design, the acousticians interviewed several jazz musicians to see what sound characteristics they liked in various halls around the world. The Allen Room with its glass sky-size window boasts acoustic excellence because it uses a large amount of glass, which is normally an acoustician’s nightmare. The glass was successful here because it sits at an angle to discourage late vibrations. Another theater within the facility acts as a box within a box keeping itself free from outside noise or vibration.
New methods of Presentation -- Video

I wanted to explore video as a way of communicating my research to audiences. The French film, *Diva*, is filled with powerful imagery integrating music and space. In a series of sketches, I tried to capture some of the emotions created by the musical spaces. I also watched a film called *Koyaanisqatsi*. With music and imagery alone, this video effectively contrasts the tranquil beauty of nature with the frenzied hum of our modern, urban society. Music and cinematography were used as the primary presentation media throughout my design explorations.* [See DVD].

[top] Assembly line from *Koyaanisqatsi*.  
[top middle] Oil pumps from *Koyaanisqatsi*.  
[middle] Traffic from *Koyaanisqatsi*.  
[bottom] People in subway from *Koyaanisqatsi*.  
[sketches] Stretched environments from "Diva."
Computer Animations Used to Show Translation from Music to Space

In a series of explorations, I have investigated how music and architecture are related. The first series of explorations consisted of models that interpreted musical characteristics and qualities such as rhythm, tempo, melody, and dynamic into an architectural form. Next, computer animations of space similarly interpreted music and spatial quality. In these explorations, I took a specific piece of music from a wide variety of genres and generated written analysis of structure, emotion, dynamics, and flow. I extended the analysis into computer-generated animations of space translated from music.
Rhythm, Syncopation
Layering and patterning of formal elements interpreted from a piece of Chinese music characterized by a syncopated rhythm. [Refer to CD, Track 02].

Texture
Formal computer-generated environment interpreted from heavy metal music characterized by a rough texture through accents and distorted instrumentation. [Refer to CD, Track 03].

Flow
This figure depicts a computer-generated environment interpreted from synthesizer music. The music flowed in wave-like patterns with rising and falling dynamics. This model attempted to emulate that quality through form, movement, and light quality. [Refer to CD, Track 04].
Music of A Space -- Acoustics

Extending my exploration of music and architecture, I played my violin in the George Rogers Clark Memorial in Vincennes, IN and the Masonic Temple (now the Muncie Civic Center) in downtown Muncie, IN to discover “the music of a space” and to see what characteristics of the spaces related to certain moods in music. Formal composition, spatial proportion and materiality in these spaces influenced the type of music I played. In large, monumental, stone structures such as these, I played slow and soulful melodies, corresponding to the sober and timeless architectural environment. These slow melodies also allowed each sustained note to echo and reverberate off the reflective wall surfaces. Acoustical quality of built space was also considered at this time. Some music styles “fit” the architecture, and some did not.
Testing Ideas in an Outdoor Performance Pavilion -- Style, Dynamics, Acoustics

Applying these thoughts to my architectural decision process, I first designed an outdoor performance pavilion, which allowed me to explore how music inspires form, space, and experience. The site for the 100 square foot open-air performance pavilion was located on the south lawn of Bracken Library. Chris Washburn's "Spurier's Dream," a Latin Jazz piece was selected for its perceived complementary relationship to the energy of the site. The design was conceived as a translation of this jazz piece into architectural form and space. The flare of the trombone parts and the converging instrumentation identified a musical quality the architectural decision would attempt to show through form and light quality [Refer to CD, Track 05].
Small Performance Hall -- Dissonance

A later study was a 3-week design of a concert hall for Ball State’s campus which allowed me to study those qualities which add richness to a piece of music and bring them into built space. The site for this design is near the Music Building south of Bracken Library. Mozart’s “Lacrymosa” was used as the musical influence to help generate the architectural design. Rising action, shifting dynamics, and key-changes characterize this music. This piece of music presents an aural journey which starts with a quiet, foreboding interlude. Two violins trade off melody parts and announce the entry of the solemn choral lines. Not far into the piece, the listener feels the dread and heaviness of the impending judgment that awaits death. The entire piece builds to a climax, but the dread gives way to a feeling of awe in the final stanzas where the choir sings the “Amen” in a major key instead of a minor. With its chaotic exterior, the concert hall portrays the idea of anguish derived from Lacrymosa where the listener must experience the pain of the journey before they can appreciate the resolving “Amen” in the auditorium. In the concert hall design, users are forced down narrow, uncomfortable hallways before they reach the auditorium where indirect light from above creates a soft, warm glow. Light quality, form, and circulation were the primary architectural devices manipulated to orchestrate the architectural experience. Secondary issues included materiality and contextual relations. [Refer to CD, Track 06].
You cannot fully appreciate the resolved auditorium space until you have experienced the chaotic preambles of the adjacent, skewed passageways. Similarly, in Mozart’s “Lacrimosa,” one can only appreciate the resolving “Amen” at the end of the piece if they have experienced the preceding musical journey, characterized by the anguish of impending death and judgment.

(Sketches above) Preliminary sections.
[above] View of auditorium—the "Amen" space
A New Design Approach

Dynamics
Variation of intensity builds to a climax in music.
I want to create a strong sense of dynamic build-up in a large-scale design project. This "climax" will be created through manipulation of scale, light, and dynamic viewpoints.

Dissonance/Consonance
Through integration of different ordering systems I want to express a sense of tension in design. Spatial proportion, light quality, and scale are the devices which may be used to create this sense of conflict/resolution.

Rhythm
Devices such as pattern, fenestration, structure, and ornamentation will be manipulated in order to create patterned, recurring alternations of contrasting design elements.

Style
Symmetry, axial relationships, and ornamentation dictate style in design.

Acoustics
Materials and Spatial Proportion can be manipulated to create different acoustical qualities.

The Process of Design
Design exploration began with site analysis consisting of site visits and documentation through photographs, videos, and sketches. Construction of a detailed site model was to be completed early through the use of a laser cutter. Written analysis discussed the devices used to create evocative musical characteristics. The first series of building studies consisted of gestural models communicating an overall idea of form generated from music. Further explorations moved towards computer-generated spaces as well as larger physical models, used to explore lighting inside the building. The heliodon and pen camera were helpful tools allowing me to study light and spatial quality in my physical models. During pin-ups, videos with music were used to present my designs. The video documentation was also used to test, critique, and develop the entire spatial experience, and its relationship to musical experiences [general or specific].
Planning the Program for the Design Exploration

The program of a Museum of Music is fundamentally related to my thesis topic. The ideas of music and architecture may be tested in any building type, but it seemed appropriate to choose a program with music at its core. The museum focuses on the diversity of music. Users may observe trends throughout music history throughout the exhibit spaces. The building contains several exhibition spaces where different artists can perform. The layout of the building was conceived as a journey through a piece of music explored through ideas of changing dynamics, rhythm, dissonance, and style. A concert hall is the focal element of the building. A “musical courtyard” on the outside of museum provides people with a place to enjoy small outdoor exhibitions when the weather is warm.
Program:
The function of this facility is to integrate musical education, with musical performance. As the user enters they may observe young musicians learning to play music. Practice rooms line the corridors and have adjacency to the auditorium. Larger halls for lectures accommodate music theory classes and workshops by musical artists. Patrons are provided with a view into an instrument repair shop allowing them to see how different instruments are constructed. The educational wing also houses recording studios and writing studios for composers. Users may view into these spaces to see the process of creating a musical album. Music galleries display historic instruments and the work of influential artists. Galleries also contain displays of musical artifacts, and memorabilia.

One large performance space, and two smaller performance spaces allow patrons to enjoy local and world-renowned musicians’ performances. The main auditorium seats approximately 600 people. The practice rooms lining the auditorium have openings looking into the main hall.
[left] Preliminary sketch of program superimposed on site.
Blue represents the Gallery wing.
Gray represents the Educational wing.
Green represents the Main hall.
General Description of Site

The site for the museum of music is located in downtown Indianapolis, directly north of the State Capitol Building. Indiana Avenue comes into the northeast corner of the site at a diagonal to the rest of the city grid.

The Indiana Avenue Cultural District encompasses the most historically rich commercial district for Indianapolis’ African American Community. This community was an active Mecca in the Midwest for skilled craftsmen, professionals and entrepreneurs from the 1800s through the 1940s. Several avenue jazz clubs served as a training ground for aspiring local musicians.

The site offers a preview of its thriving past and a connection to the city’s present and future. Indiana Avenue, is a diagonal gateway to downtown Indianapolis, IUPUI, the city’s life sciences initiative and a collection of major medical campuses. Adjacent to the city’s Canal, the district offers easy access to some of the city’s finest cultural venues. Music is still a unifying theme of the area with festivals, live performances and jazz themed public art.

To its south, the site is bordered by the historic capitol building. This building acts as the conductor of this city quadrants. The stone exterior creates a sense of monumentality. The symmetrical arrangement of the building volumes and window placement make up a harmonic composition. With symmetry and monumental stonework, the building possesses a quiet authority over its neighbors. The tall buildings nearby reflect the capitol on their glass facades. Next door, the Indiana Government Center complements the statehouse with its stone facades, uniform colonnade, and corner towers. Its placement in the center of the city block elevates the capitol’s stature as an essential piece of the city.
[top] Site traffic patterns.
[bottom] Access routes to site
[sketch] Statehouse observations.
Developing an edge or bracket with a rhythmic character along the street.

Developing an arm, which extends off of the axis from the Statehouse. This diagram is a study of how to extend some of the experiential and stylistic characteristics into the site for the museum.

Juxtaposition of edge volumes along the street creates different rhythmic patterns. Response to axis shown as well.
(figure right) RHYTHM along the street edge.

(figure right) Formal studies of site orientation extending the AXIS from the Statehouse.

(figure right) Studying how outdoor space terminates the formal AXIS of the Statehouse.
Music Creates an Understanding of Site -- Style

The first part of the musical site analysis was to study the parking lot north of the Capitol to see how it is influenced by the Statehouse. The basic tasks behind this study were to observe the Capitol Building and select a piece of music related to the capitol. Then, that music was used to understand the statehouse and extend these experiential qualities into the adjacent site for the museum.

The piece of music chosen was a Baroque tune by Jean Philipe Rameau from Dardanuë called Tambourins III. This piece of music is characterized by strong rhythm with crashing cymbals and an even tempo regulated by the bass lines. A bright and patriotic mood is set by the balanced mix of shrill flute, clearly articulated violin and strong brass. The marching quality to the song relates nicely to the symmetrical placement of the capitol on the site. The crisp articulation of each violin note relates to the fine ornamentation of the column capitals and beautifully detailed stained glass skylights in the rotunda. The columned passages inside are strong cues to the cross-axial arrangement of the plan and seem to march from the interior of the building out into the grass mall to the south of the site. The north/south axis created by the ordered composition of the Statehouse carries into the site for the museum of music [Refer to CD, Track 07].

(top) Aerial view of site from north
(midlle) View of dome in Capitol rotunda.
(middle) View of Capitol from south.
(bottom) View of interior of Capitol.
[top] Diagram of axis from Capitol
[middle] Revised view of site with extended grass mall to the north.
[bottom] Sketch with axial extension
Site Design -- Rhythm

After gaining a more complete understanding of the capitol and its relationship with the adjacent parking lot, another Baroque melody by Jean Philippe Rameau called "Air frais gai" was chosen. It relates closely with the music of the capitol, but contains a more lively quality, relating to the activity of the street. This piece of music is characterized by its steady rhythm, and quick tempo. Accents fall on every other beat throughout the entire song. The even repetition of the accents throughout relates to the even pedestrian and vehicular traffic patterns near the site. The idea was to capture the energy of some urban courtyard space and express that in the design for the outdoor spaces surrounding the musical facility. The instrumentation is primarily composed of violins playing the melody, with bass added. The terminus to the capitol's axis becomes the lively urban edge along New York Street and stretches along the peripheral edges of the site. Music should be the unifying theme of these edges with outdoor festivals, live performances, and public art. The volume along the northern edge of the site receives and acknowledges the axis of the capitol. By moving this embracing bracket to the north, it further elevates the stature of the Statehouse. It also allows the northeast corner of the site near Indiana Avenue to become a focal element for the site, and a gateway from the diagonal street [Refer to C.D. Track 08].
[top left] Diagram of terminus to Statehouse axis and edges.
[bottom left] Sketch of early design solution.
[top right] Diagram of terminus to Indiana Ave.
[bottom right] Example of a focal element for Indiana Avenue.
[bottom] Image from north depicting conceptual scheme.
Rhythm Connects Building to Context

The previous site study exposed qualities of order, pattern and repetition on the surrounding street facades and massing. The next step was to select a piece of music with inherent properties of order, pattern, and repetition. The idea of this exploration was to learn from the music and install those musical qualities in the architecture. The artist chosen for this exploration is Godsmack in "Awake". This piece of music is characterized by its strong rhythm. There is a repeated pattern in the beats to which the music adheres. This regimented music was used to define the design process and the design of space. The study involved extracting rhythmic patterns within the musical piece and applying them to architecture. The following series of study models uses the idea of a four beat stanza filled with eighth notes played in different intervals to create a regimented, rhythmic sound. The exterior skin complements the music first through its tight ordering system. [Refer to CD, Track 09]

[Top] View of Indiana Government Center
[Middle] Rhythm
[Bottom] Rhythm and repetition
[Sets of sketches left] View of structure southwest of the site
[above] Abstractions of bar code.
Two orthogonal edges enclose a more fluid interior space which will ultimately act as the performance space. The orthogonal edges respond to the colonnade found in the neighboring government center and parking garage. The strict order along the street sets a framework for the space inside. The pattern of the beats in the music has also been used as a framework for the columns and fenestration on the street facades. Because the first beat in the measure is accented, the volume on the south side is taller, which gives the elevation composition more hierarchy. The different layers of the facade represent the different layers of rhythm played over one another. The windows on one particular layer do not have to line up with the windows of another layer. By letting some windows and volumes slide past one another the building expresses a deep layering of rhythms as perceived in the music.
Development of the Edge - Rhythm

I wanted the flow of the exterior to be broken up and to be read as a series of orthogonal volumes. A light-colored stone, relating to the Statehouse, acts as primary material for the exterior shell. Metal columns relate to the sporadic rhythm of Godsmack's "Awake." Horizontal mullions and window lines counteract the vertical emphasis of the repeating columns. A covered walkway leading to the main entrance of the building extends behind the rows of rhythmically ordered columns along the edge pieces, which provides outdoor musicians with a covered area to perform.

(top) "Edge" created along Capitol Avenue, enclosing auditorium behind.
(top middle) Model depicts layering of facades.
(bottom middle) Breaking up the edge into elements corresponding to the bass lines of the music.
(bottom) Addition of fenestration detail with the sculpted auditorium behind.
[Top] Large volumes broken up with layers sliding in front.
[Middle] Model shows rhythmic elements making up layered facade.
[Bottom] Penetration follows the rhythmic pattern of the music, adding another rhythmic element to the composition.
design of interior
[shaping the experience]
The mechanized quality of the "exterior skin music" did not generate a dynamic interior space. By using the new Mozart piece, which combines order with a more fluid melody, a transition is created from the strictly ordered façade into a more fluid, experiential space. The development of the interior spaces later influenced the design of the auditorium.

The facility is characterized by multiple entries rather than singular, forced entry points as found in the Statehouse. In this way, the Music Museum acts as a sieve allowing users to move in and out of the facility at various points along its different facades. Along the inner edge of the linear building volume, the layers of the façade peel away from one another as they come in contact with the auditorium.

(figo) View of atrium: space generated from the strict ordered exterior music.
(middle) Further development of atrium with music of the exterior.
(bottom) Another view of atrium taken from the middle scheme.

(skeches below) Development of curvilinear element integrated into the rectilinear system. Note the multiple entrances into the auditorium spaces from the south.
Atrium Design -- Dissonance

After introducing a new ordering system into the established orthogonal grid of the exterior, I began carving out the interior floor plates with curvilinear geometries. A skylight penetrates the roof plane above the main staircase, bringing light into the interior from above. Opening the floor plates allowed natural light to penetrate deep into the lower levels of the building exposing remnants of the orthogonal structure, which further filter the light entering the space. Similarly, the music contains points where the melody is cut away, exposing the underlying rhythm. A gently spiraling staircase connects the floor plates, relating to the flow and melody of the music.
The vertical circulation volume is one focus of the elliptical form enclosing the auditorium space. Walls unravel from this central focus and define the interior space. Balconies overlook the main atrium giving a theatrical feel to the interior environment. People on the stairs appear as performers to the people in the balconies. The atrium is a modern interpretation of the classical Statehouse, with the atrium corresponding to the Statehouse rotunda.

(top) Diagram of intersecting ordering systems. (middle) View of atrium with remnants of structure exposed. (bottom) Plan. Note how the curved atrium interrupts the orthogonal grid of the edge.
Receiving the axis and shaping the performance space — Style, Dissonance

The transition from an orthogonal ordering system to a more curvilinear system is seen on the exterior as the edge volume collides with the ellipsoidal volume of the auditorium. Shells of each volume begin to peel away as the two building parts come together. This collision reflects the differences in the two musical pieces interpreted throughout the building composition (transition from regimented music to fluid melody). At the center of this collision of volumes, the ellipsoidal form of the auditorium breaks, subtly acknowledging the north/south axis of the Statehouse.

[top] Diagram depicts area of focus.
[top middle] Well bends and splits to acknowledge axis from Statehouse.
[middle] Subtle bend in wall terminates axis.
[bottom middle] Model of broken and bent wall as an axial response.
[bottom] Pulling the landscape into the termination of axis from the Statehouse.
The layered composition of the façade also defines the outdoor performance space. A glass curtainwall serves as a backdrop to the stage. At night this curtainwall is lit and acts as a beacon to the site. Users may exit the auditorium and filter out into the outdoor amphitheatre space. The spiraling landscape carries into the grass area north of the Statehouse and serves as a connector between the two buildings.

[top] Intersection of different materials and curvilinear planes with performance stage terminates axis.
[bottom] Landscape pulled up into the building with peeling facades to strengthen axial relationship to the Capitol.
Entering the Auditorium -- Dynamic Build-up

I wanted to create points of mystery and discovery within the facility to strengthen the visual impact of the performance space. I selected a piece of music possessing a building quality or "rising dynamic," which I then used as a generative tool for the design of the hallway leading into the auditorium. The entry to the auditorium was interpreted from a Choral piece of music from the Matrix soundtrack called "The Power Plant." The minor key, mixed with indiscernible lyrics and the "ahh" feeling create a sense of tension and anticipation in the music. As studied before in the design of the small performance space the concept here is that before one can fully appreciate the resolved auditorium, they must first experience the tight, curved pathway leading to the edge of the balcony in the main hall. [Refer to CD, Track 11].
The symmetrical, ovular shape of the auditorium with its flowing, curvilinear geometries resolves the two competing ordering systems in the building [rhythm and flow]. Dim light, spatial scale, and obstructed views created by curved walls contribute to this feeling of anticipation within the passage. Inside the auditorium, materiality [natural wood], curvilinear forms, symmetrical order, structure, and light quality are the devices used to resolve the conflict and end the climax appropriately.
In Summary [Four Musical Qualities Translated to Architecture]

Rhythm
Contextual forces influenced the selection of a rhythmic piece. This piece of music was translated into architecture through formal relationships, pattern, structure, and fenestration.

Style
A Baroque piece of music captured the qualities of the Statehouse. In order to depict the Statehouse and analyze its relationship with the site for the museum, the piece of music was to be tightly ordered, with a moderate tempo. The north/south axis created by the ordered composition of the Statehouse carries into the site for the museum.
Dissonance
The exterior is shaped by contextual forces relating to a regimented style of music. In order to create a more experiential interior, a different style of music was selected. More fluid and dynamic in nature, this piece of music was translated into space using such architectural devices as form, light quality, texture, and structure.

Dynamic
The Matrix soundtrack builds suspense and creates anticipation. The passage to the auditorium takes on a similar quality. Through the use of spatial proportion, materiality, scale, and light quality, this same mood is felt as one enters the auditorium from the tight, adjacent passageway.
Reflections

Architecture can be translated from music. However, music can also be interpreted from architecture. The intended path for my thesis was to take a piece of music, analyze it to discover evocative musical qualities, and instill those qualities into built space. This prescribed method was not always the one I used to design. Sometimes even later musical selections had influence on the development of the design.

In the beginning, I was interested in how music can evoke certain emotions and I wanted to learn how to instill these same emotions into architectural space. However, these early, loose translations of space from music proved to be very subjective. Without some sort of framework or methodology that could be used to test my ideas, it was difficult to justify my research. From this thesis, I learned that by establishing a strict methodology, I was better able to focus on, and critique my own work.

As I progressed, I narrowed my focus, analyzing different musical selections to discover their inherent qualities of rhythm, dynamic, dissonance, style and acoustics. By identifying a set of criteria for which to evaluate music it simplified the process of applying these specific characteristics to architecture. Using common architectural devices such as structure, scale, lighting, views, formal relationships, spatial proportion, and materiality, I was able to clearly develop a unique architectural language from each piece of music I studied.

I found that I had more success working with small-scale design projects like the projects shown in the research section of this book. When I moved into the final, large scale project, I fell back into the conventional method of design. Somewhat overwhelmed by the demands of the complex program, I often became diverted from my established “musical-inspired” design methodology. Because my concentration was on the “experience” of space, it may have been more beneficial to have spent less time focusing on the site plan and more time studying experience of the space on a personal level through sections and perspectives.

In conclusion, I learned that there is a set of architectural devices, which can be manipulated in order to convey ideas and create dynamic spaces in architecture. After identifying the musical characteristics of a specific piece of music which work to create an evocative work, my design explorations were then guided by the methodical application of these ideas using the prescribed architectural devices. There is a symbiotic relationship between music and architecture. Music is a powerful generative tool for design. Music can be seen: Architecture can be heard.
Divas. Video


Koyaanisqatsi. Video


Zuk, Radoslav. A Music Lesson. Essay


Music on Compact Disc:

Track 1 - The Gunfighter [Album: "Angels in the Architecture"] Artist: Unknown
Track 2 - Jackdaws Playing Over the Water [Album: Chinese Music of the Han] Artist: Unknown
Track 3 - Dead and Broken [Album: Faceless] Artist: Godsmack
Track 4 - Lonesome Journey [Album: Amazing Grace, A Fiddler's Touch] Artist: Liesl Schoenberger
Track 5 - Spurrier's Dream [Album: Nyworri, Nights] Artist: Christopher Washburn
Track 6 - L'Acrylmosa [Album: Amadeus Soundtrack] Artist: Mozart
Track 7 - Tambourins lll [Album: Dardanus: Suite] Artist: Jean-Philippe Rameau
Track 8 - Air ibes ga [Album: Dardanus: Suite] Artist: Jean-Philippe Rameau
Track 9 - Awake [Album: Awake] Artist: Godsmack
Track 10 - Serenade No. 13 for Strings [Album: The Best of Mozart] Artist: Mozart
Track 11 - The Powerplant [Album: The Matrix; the Original Score] Artist: Don Davis