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Abstract

The practice and study of architecture has often been informed by other arts, in particular this thesis focuses on what jazz music can bring to architecture. Historically, musical ideas have been seen to have both a formal and experiential analogy with built form. By investigating these past approaches that translate musical ideas into an architectural language, this thesis extrapolates the manner in which unique ideas of jazz and blues could be applied to architecture. Three main approaches of Jazz music - rhythm, proportions, and improvisation - are identified and studied. The construction of Jazz music is inherently linked to improvisation which arises from the operations of repetition, contrast, and variation. The thesis uses these approaches and operations to achieve formal, material, and experiential design solutions for a jazz school in Barcelona.
Introduction

Music and architecture run parallel while simultaneously sustaining and nurturing each other’s morphological energy. By divorcing the mind from normal frameworks, the understanding of musical composition can illuminate possibilities at achieving new tectonic composition. The challenge is to levitate both disciplines to an equivalent dimension and discover new dialogues and relationships between two oppositions never observed before.

I intend to study Jazz music. To delve into its practices, structures and ideas and use those to inform a design project that captures the excitement and energy of this music form. Jazz brings a wealth of fresh musical ideas, from rhythms and harmonic colours to dramatic improvisation that can direct a design project. This should guide the project in a way that will leave it carefully composed and still be able to adapt and flex to the needs and desires of its users. By investigating previous approaches to translating musical qualities into built form one can extrapolate how to apply the unique ideas of jazz and blues to architecture. These American musical developments (that is, jazz and blues) can be separated from the European classical tradition by their approaches to rhythm, song structure and improvisation. The most important rhythmic difference is the idea of swing. From a purely technical standpoint swing is a beat that is subdivided into two unequal parts. Swing has also been defined as an intensity that pushes the music forward. The basic American structuring of songs and ideas of improvisation are linked. The form of a song comes from three ideas: repetition, contrast and variation, with the last being the place for improvisation. The American approach to improvisation is to take the basic phrases of the rhythm and melody and change them through repetition. This practice can be seen in the work of most Bebop artists. A basic bebop song can be broken down into the establishment of a theme (or the head) followed by improvisations of the theme and closed with a return to the original theme. Approaches to Jazz composition are identified and then extrapolated into approaches to architectural design. These methods are then applied in the design of a small Jazz school in Barcelona. The location of this school is in the place of a condemned building in the Les Corts area.
Jazz in Spain began with an interest in Dixieland or New Orleans jazz. In that time it evolved into other styles often influenced by visiting Americans. In 1947 Don Byas\(^1\) introduced Tete Montoliu\(^2\) to bebop and later efforts to fuse jazz with flamenco occurred. Catalan and Galician music is also an influence in some regions. Still, jazz in Spain initially suffered from many difficulties. One example being that the cultural, political, and economic climate was unsuitable for the creativity and freedom required of a jazz movement. This predates Francisco Franco's regime to some extent, but his rule placed far more restraints on jazz, due in part to his regime's restrictions and in part due to Spain being isolated on various cultural fronts, preferring an inward-looking, more easily digested form of culture. Thus, a particularly fruitful period for jazz in general, the period spanning the 1940s, 1950s and the early 1960s passed almost unnoticed in Spain. The return to democracy, and the development of the economy, has allowed for there to be an increased jazz scene in the last twenty years

\(^1\) Carlos Wesley "Don" Byas was an American jazz tenor saxophonist, most associated with bebop. He played with Count Basie, Duke Ellington, Art Blakey, and Dizzy Gillespie, among others, and also led his own band.

\(^2\) Tete Montoliu (28 March 1933 – 24 August 1997) was a jazz pianist from Catalonia, Spain. Born blind, he learnt music in Braille at age seven
Intersections of Music and Architecture

The theories and practices of musical composition have an importance to the practice of architecture, one that goes beyond the application of acoustic principles. A building does not have to be built as a place for the performance or composition of music for the art of music to be relevant.

Palladio and the Renaissance

Historically music was thought of as a mathematical science, one that had an exact nature. The idea of harmonies sprung from the process of division. A string that produced a certain tone could divided along exact proportions to create a note that would resonate in harmony with the first note, creating an overlapping of tones that could be considered beautiful both aesthetically and mathematically. These ideas were developed by the ancient Greeks, but brought into importance during the Renaissance. It was during this time that architecture was thought of as an art that needed a mathematical, and therefore scientific, basis to be considered objectively.

Palladio often looked to musical proportions as a means to achieve ideal proportions in his designs. Basic harmonies such as octaves and fifths were applied to room sizing in all three dimensions, and were also often looked to as ornamental guides.

The growth of subjective judgment slowly did away with the Renaissance search for an absolute beauty, but this did not stop the intersection of musical and architectural ideas. It did change them, leading to new investigations and ideas. Of particular importance is the work of Le Corbusier on the Philip’s Pavilion. He investigated both the translation of musical proportions to built form, but also the use of acoustics and sound to generate and convey a sense of space.

Steven Holl took the investigation of a more complex musical idea that of stretto, as a departure point for a house built in Texas. This project focused on using both the compositional and experiential qualities of a particular piece of music as a means to solve the architectural problems presented by the site and client.

Music and Architecture in Theory

Architecture also has had an impact on the development of musical ideas. Early musical forms were created in response to architectural conditions. The shape and material nature of a space defined one essential acoustic aspect: reverberation. In a way the building that the music was written and performed in acted as an instrument amplifying and conveying the sounds to a large audience.

Music and architecture have a relationship to each other that dates back many years. Writer Johann Wolfgang Von Goethe is famous for describing architecture as ‘frozen music’ in the 19th century, but the two practices have been tied together long before that. The architecture of the

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Renaissance is an ideal starting place for examining this relationship because of the amount of documentation available from that time period. Before this intersection of the arts can be examined further one must first examine why these two seemingly dissimilar practices are important to each other.

The experience of architecture consists of more than just the sense of sight and while architecture itself does not produce sound the way the built form reflects sound waves affects one’s understanding of space. While one often forgets to acknowledge the importance of hearing architecture the sense of sound has an important impact on the total understanding of a space. Materials all absorb and reflect sound in different ways, and the form and size of a space impact the way sound waves move and are perceived. A long water-filler tunnel is an excellent example of this. The echoes of moving and splashing water within the space are a distinctive part of the experience. The length and shape of the tunnel are both able to be understood by the way sounds are heard from within the space.

Music and architecture also share similar experiential aspirations. Architectural historian Sir John Summerson\(^\text{5}\) notes in his essay “The Vision of J.M. Gandy” that architecture is an art that is “constantly attempting to realize in solid, stable form those effects which music is able to conjure up in an instant.”\(^\text{6}\) He goes onto to point out that music and architecture even use a similar vocabulary, specifically the use of mass, rhythm, texture and outline, to achieve similar experiential effects such as the colossal.

The design of a space has affected the way musical composition has developed. The best example of this is the Medieval European chants. In this style of music the reverberations generated by the thick stone walls and the particular shape of the churches it was developed and performed in became a key aspect in defining its genre. In the Basilica of Saint Peter the reverberations of sound in the space made it impossible for the priest to address his congregation through the use of a normal speaking voice. A rhythmic manner of speaking in a particular tone had to be adopted so that the words spoken did not overlap into each other, rendering them unintelligible. This was then modified to include harmonies focused around a certain note with an intense reverberation based on the space so that the overlapping of notes and phrases that came from the shape and nature of the space became the key element of the music. In this way the building itself became both an instrument and an amplifier.

**LeCorbusier and the Philips Pavilion**

In 1958 the Philips Company, a producer of electronic speakers, hired le Corbusier to design and build a pavilion for the Brussels World’s Fair. The Philips Company’s goal was to show off the capabilities of their latest speakers and filled the pavilion with three hundred of them. Le Corbusier was initially hired only to design a façade for the pavilion. Not a man to take his work lightly he instead proposed to give the Philips Company an electronic poem with which to showcase their work. He worked with a team of Philips engineers and, most notably, two modern composers: Iannis Xenakis and Edgard Varase.

Le Corbusier and Xenakis had a history of working together towards the synthesis of musical and architectural ideas. They co-operated on the monastery of La Tourette, using Le Corbusier’s modular proportioning system as the basis for spacing of mullions along the glass planes that

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\(^{5}\) Sir John Newenham Summerson CH CBE (25 November 1904 – 10 November 1992) was one of the leading British architectural historians of the 20th century

\(^{6}\) Summerson, 111
faced the nearby fields. The goal of this was to create a spacing that could be described as musical. Xenakis’ role in the Philips Pavilion was focused on the exterior shell of the building. His task focused on translating the sketches and abstract ideas of Le Corbusier (mainly dealing with geometry and proportions) into a buildable, architectural form. The end result, a curved, hyperbolic not only fulfills the mathematical ideals of Le Corbusier, but also evokes the glissandi of Xenakis’ 1953-54 composition Metastasis.

Steven Holl and the Stretto House

The Stretto House, a project by Steven Holl located in Dallas, TX, exemplifies a modern approach to marrying the ideas of architecture and music. While there is more to the project than just this aspect the ideas of music played an important part in the development and implementation of the design. Even the name of the house comes from the musical term stretto. Stretto is most commonly used in the fugue and in this context it refers to the theme of the piece being repeated and overlapped by different voices. The decision to explore this musical idea as a mode of design occurred during the initial sketching phase. This phase explored some of the vernacular materials of Texan architecture, specifically metal roofs and concrete blocks. This combined with the need to create shade and producing this via overlapping led to the exploration of the overlapping that occurs in stretto.

Holl narrowed the study of stretto to one particular piece of music, Bela Bartok’s Music for Strings, Percussion and Celeste. The feature of this work is the distinct separation between heavy and light by carefully dividing the percussion and string sections. Holl literally took the basic composition of the music and composed his building in the same way. Bartok’s work is divided into 4 movements and its most compelling feature is the aforementioned division of instruments into two modes. Holl designed his structure to have four distinct spatial sections and focused the work on two distinct elements: masonry, which mimicked the heavy role of the percussion, and curved metal, which played of the light nature of the string section.

The result is an overlapping and intersection of several elements. The curved metal roofs overlap with the heavy masonry structure, referred to as spatial dams. The different planes of the building, roof, floor and wall, pull space from each other to continue the overlapping effect. The materials of the building follow suit, as do the actual design drawings. The orthogonal plan of the main house drawing stands in contrast to the curvilinear section while the drawings for the guest house reverse this pattern, mimicking the inversions found in Bartok’s composition.

It should be noted that while Renaissance ideas of proportion and beauty cannot be applied to this design, proportion did play a role. The “flowing spatial sequence” of the interior is designed in accordance with the proportions governed by the Golden Section ratio of 1:1.618. Bartok’s compositions were also proportioned to the Golden Section, a piece of information Holl was well aware of when choosing the composer as an influence. The difference is that in this case an absolute, mathematical beauty is not the goal, instead it is to have a cohesive idea that can organize and guide the experiential qualities of the space. Holl himself notes that “the concept that drives a design like the Stretto House disappears completely in the phenomena of the physical reality and yet intuitively the abundance of the idea may be felt.”

By combining the ideas of music and architecture Holl was able to create an analogue between the two practices. By treating music as something that has a materiality, one gained from its instrumentation, he was able to synthesize it with architecture through his use of light and
space. The equation that Holl himself writes to explain this is “material multiplied by sound and divided by time equals material multiplied by light and divided by space.” The key to the success of this lies in the distinction that both architecture and music have a material aspect, and this common factor allows parallels to be drawn.

Conclusions

To summarize, the practice of architecture and the practice of music have intersected and impacted each other in a variety of ways throughout their histories. These instances can be divided into two distinct categories. The first category involves architecture taking proportional and compositional principles directly from musical theory. Palladio’s villas fit into this category as many of the proportions that guided the design were taken from their era’s understanding of music and the nature of sound. The second category involves architecture learning from the experiential qualities of music and trying to replicate them in built form. Not all practices fit nicely into these two divisions, but a simplification must occur for the sake of conciseness in this particular discussion.

Historically this development of communication between the arts has focused on the classical tradition of music. Recently there have been few studies that undertake the unique contributions of other musical practices, such as more modern blues-derived traditions, namely rock and roll or jazz. This thesis will consider one of the most significant American contributions to the practice of music - that of Jazz. Jazz developed from a variety of sources, blues, swing, etc, in the early twentieth century. It can be separated from the classical tradition by three means: Its tonal ideas, its rhythmic ideas and its treatment of improvisation.
What is Jazz?

Jazz is a distinctly American musical art form. It developed from a variety of musical practices that were common at the end of the 1800s and early 1900s. Ragtime, gospel and blues all helped lay a foundation for what would become jazz. Jazz is characterized by its rhythms and melodic methods as well as the integral nature of improvisation to its development and performance. It takes many of its tonal and rhythmic ideas from the blues tradition, incorporating swung and syncopated rhythms as well as blues notes and blues scales. These are not always repeated verbatim in jazz, and have been modified over the course of its development. This thesis will focus mostly on Jazz recorded since the late 1940s. This is largely due to the increased volume of recorded performances available because of the development of quality recording technology. Between then and now there have been a variety of jazz styles developed and practiced, most notably bebop, free jazz, fusion and modal jazz. While these all have their own distinct elements they are also tied together by their common roots and practices that identify all of these first and foremost as jazz. These are tonal ideas, rhythmic ideas, and improvisational ideas. They will be investigated in depth.
Tonal ideas in Jazz

Jazz compositions are based on the tonal ideas of scales and chords. Chords themselves are based on scales, so the basic scalar ideas of jazz will be investigated first. The traditional western major scale is a series of seven notes. The scale starts with root note (which defines the key of the scale) and is completed by the 6 notes in between the root and its octave. The C major scale consists of notes C,D,E,F,G,A and B. Written like this it means little, but when shown on the keys of a piano the distances between the notes begin to be seen.

These distances become fully understood when the scale is listen to. The distances can be classified using the idea of a tone (T) as a measuring device. The distance between the notes C and D is one tone. The distance between the notes E and F is half the distance of a tone, a semitone (t). So the major scale can be broken into a series of distances, specifically: Tone, Tone, Semitone, Tone, Tone, and Tone. It should be noted that this leaves a semitone between the final note of the scale and the octave of the root. By dividing the scale into these distances it allows it to be transposed into different keys. Note that while the C major scale and the E major scale are made up of mostly different notes, they still carry a similar sound. The scalar ideas that inform the practice of jazz are based on a reduction of this major scale. The notes F and B are removed from the full scale to create a short scale made up of the notes C, D, E, G, A. That is, Tone, Tone, (1.5) Tone, Tone, (1.5) Tone. The introduction of larger distances changes the nature of the scale. From this basic scale extra notes are added to it that don’t fit conveniently into either the major or minor domain. These are commonly referred to as blue notes. The two most common additions are the dominant seventh note and the flatted third note. These extra notes are the basis for the overall tonal appearances of most jazz music.

These changes in scale affect changes in the jazz treatment of chords. Along with the common major chord you have the major-7 chord, with the blue note changing the sound of the chord. In its treatment of chord progressions as a way to codify songs these chords make a significant contribution. The chords themselves are developed as a combination of notes within a scale. Continuing to use the basic C major scale the C major chord is constructed from the following tones of the scale: Root, Third and fifth.

To better understand these ideas as they can apply to architecture it is necessary to take them out of the realm of sound and present them in a visual manner. There will be two different ways to look at these presented: understanding tones as the distance between notes in a scale or chord and understanding tones through the proportional distances between notes. To investigate the distance between notes there is on common unit of measure: the tone. For the purposes of this paper it will be represented as: With this as the basis for measurement the major scale can be represented as such:
And the complete blues scale represented as such:

This exercise serves to illustrate the negative space in between notes and serves as the basis for the proportional model of demonstrating the distance between tones. First a line is drawn to an arbitrary length. This will represent the idea of a tone.

This line is then doubled in length to represent the octave.

Then a new line is drawn for every note on the scale in between these octaves based on the idea that if the octave of the first note is twice the length of the original line, then every semitone will be an additional 8.33% of the starting line.

These basic lines can be used to generate several different basic systems of proportioning.
The Palladian practice of applying basic harmonic ideas to basic room proportions is a starting point with what can be achieved by translating tonal ideas into the practice of architecture. Renaissance thinkers placed so much importance on the translation of audible proportions to the visual arts partly because they viewed musical composition as a mathematical science. The study of music was thought of as a mathematical art whereas architecture was thought of as a liberal art. So in an attempt to give architecture a firm system or method of design it had to be given a mathematical basis. This belief was found in the thinking of many notable architects and artists throughout history, from Brunelleschi to Leonardo da Vinci. Da Vinci was well known for saying that music and painting are sisters, and that both are used to convey harmonies. He differentiated between the two by saying that music achieved this through the use of chords and painting through the use of proportions. Palladio noted within his own illustrations ideal proportions for room dimensions and other architectural devices. The numbers within the ratios are carefully chosen and are the result of his attempt to fulfil Vitruvian principles. The principle
in question has to do with achieving an ideal design. The artists of the Renaissance believed that it was possible to obtain an absolute beauty by following the proportional principles found in nature. In the practice of architecture this was achieved by allowing specific geometries to define certain forms. Then these forms would act as modules that would then define and govern the development of the entire structure.\(^7\) Palladio even stated that it was possible to achieve a harmonic building through the use of proportional principles and that it would then be possible to explain and evaluate the success of the building using the terms of musical theory.\(^8\) The development of Palladio’s designs also mirrored the development of the musical theory of his time. The proportions found in his later buildings were dependent on the new harmonic ideas that broke away from the rigid confines of Pythagorean consonances. He added new consonances, and therefore ratios, to the musical spectrum, most notably the third and the sixth. One particular method of diving an ideal proportion lay in Pythagorean harmonic theories. This theory revolved around a particular scale and was familiar to the artists and architects of the Renaissance. Leone Battista Alberti had taken this scale and noted that musical theory is important to the practice of architecture because the numbers that are responsible for pleasing harmonies are also able to evoke delight from the eyes and mind of man. Palladio took this idea and often used this harmonic scale as a proportioning system in his buildings. He focused on the relationship found between four strings with lengths in a ratio of 6:8:9:12. When these strings were placed under equal amounts of tension and then vibrated they produced wavelengths of consonant tones, most importantly an octave, fourth and fifth. These proportion are most obviously noted in his plans published in the Quattro Libri.\(^9\)

The importance of harmonic proportions to the work of Palladio has been questioned recently. Some scholars have pointed out that neither Palladio nor Vitruvius actually explained why following these proportions created better spaces, and Palladio did not write extensively about harmonic ideas. Deborah Howard and Malcolm Longair investigated and analyzed all of the measured plans found in Palladio’s Quattro Libri and came to the conclusion that he used certain proportions based on personal preference and practicality.\(^{10}\) This is partly due to a misunderstanding of the nature of Renaissance thought. Palladio, as is true with most humanist of his time, saw the proportions of space and sound as closely related.

To him all the arts and sciences were part of the same universal, harmonic system. These ideas were taken as standards and it was common practice to use them in practice.\(^{21}\)

R.M. Schindler applied musical proportions to his design of the How House much in the way Palladio and other Renaissance architects did. Not only are the overall proportions of the house designed according to harmonic proportions, but so is the detailed design of the bedroom.

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This method of taking the mathematical (and therefore tonal) ideas of music and applying them to design was developed significantly by composer, engineer and designer Iannis Xenakis. In his essay on “Free Stochastic Music” he begins to talk about the construction of a composition and how the scale can be used to imply a hierarchy of tones. Continuing on this thought he equates melodic ideas as linear process and chords as simultaneous events. This basic dichotomy allows one to look at music graphically from two different perspectives. Xenakis applied the melodic ideas specifically when developing the design for the Phillips Pavilion for Le Corbusier. At this point he had composed a piece called Metastasis in which several glissandi play a significant role in the melodic theme. These sections of slides smooth transitions between pitches can be seen here:
Figure 2 Metastasis string glissandi score

Figure 3 Metastasis string glissandi graphs
From these basic curves the exterior for the pavilion was if this method can lead to “an intimate connection” between architecture and music, then it is one that should be explored more fully.

The tonal ideas in these examples dwell in the realm of the classical tradition of music. The familiar harmonic ideas that define that practice of music are taken and used to generate forms and guide design decisions. I intend to take the melodic ideas found in the jazz tradition and use them as form generators and guides in the tradition of these works. As an exercise in this I will demonstrate how the main theme of John Coltrane’s “Blue Train” can be used in this manner.

The song comes from Coltrane’s 1957 album of the same name and is simple in structure. It opens with its main theme, which is repeated and then followed by a series of solos and then closes on the same opening theme. This opening theme will be the focus of this exercise. The first measure contains the first statement of the theme.

This theme is then transposed exactly up a perfect fifth,

Which can be proportionally designated as a 3:2 proportion. It is then dropped back to the original pitch, repeated and then there is a variation of the theme for emphasis. The head closes with a repetition of the original motif before it is followed by a series of solos.

The entire first melodic statement can be represented based on proportions from this first move. By changing the length based on the tonal distances between the notes in the theme:
In concordance with the score, this theme is then repeated in a higher range. By taking the established length of the note E-flat from the original theme, which is the note the repeated part starts on, we can generate a second version of the theme in the same way as the first.

Figure 6 Representation of John Coltrane “Blue Train” theme

These can then allow for a variety of graphic applications.

Figure 7 Representation of John Coltrane “Blue Train” theme variation
CHAPTER 3: RHYTHM

Rhythm in Jazz

The inclusive nature of jazz means that it has been influenced by many types of music. The rhythmic roots of jazz were principally West African, but it was also strongly influenced by other African-based styles; namely, Afro-Cuban, West Indian calypso and the Brazilian-African blend. The forging of these rhythms with regional influences gave birth to what is regarded as the swing rhythm. One feature of jazz rhythm is the emphasis on a continuous pulse. In jazz the importance of a continuum is paramount, and words like 'swing' and 'groove' are often used when describing this aspect of the music. This continuum has undergone many transformations in forty years, ranging from the solid quarter-note feel of Jimmy Cobb and Paul Chambers with Miles Davis, to the polyphonic freedom and rhythmic displacement demonstrated by Scott LaFaro and Paul Motian in the Bill Evans Trio, to the freer non-metric approaches taken by free jazz groups. In its short life jazz has developed a unique rhythmic language. As jazz evolved through the fifties, the rhythm became freer and less stated, with more interaction taking place between the melody instruments and the rhythm section. An interesting development occurred early in the sixties with techniques of displacement, counterpoint, polyrhythm and metric modulation replacing the previous roles of strict timekeeping and metric subdivision. Essentially the drums became more interactive, and as a parallel development to chromaticism in harmony, polyrhythms and other complex rhythmic techniques occurred more frequently. One of the characteristics of jazz rhythm is the way in which syncopation and subtle accents are used to create the rhythm known as Swing. Swing also refers to an early era of jazz, but in this context it refers to the underlying rhythmic feel that forms the basis of most jazz. To illustrate the complexity of the swing feel it is necessary to examine the relationship between downbeats and off-beats.

The patterns of sounds of various lengths are classified as beats, tempos and meters. Beats are the building blocks of a rhythm, and can be recognized as series of sounds that divide time into regular recurring units. The beats of a piece are organized by the meter into regular recurring patterns. The most common meters are duple or quadruple meters in which the beats are organized into groups of two or four. The idea of swing is essential to the idea of Jazz. At its base swing consists of dividing a beat into two unequal parts. One side carries more weight and is more emphasized than the others. Listen to the audio samples for a swing beat on its own, and then in conjunction with an entire drumbeat.
Rhythm in Architecture

While using a proportioning system as a way to seek absolute beauty may be obsolete, the use of one to achieve a synthesis of architecture and music is a viable option. In his 1946 essay “Reference Frames in Space” R.M. Schindler selects the idea of rhythm as part of a language that architecture and music share. He points out that rhythm is understood as a relationship of spaces and that it is much more than simple repetition. He theorizes that the way to create a rhythm in built form is by carefully spacing parts and pieces of a building in a way that spaces them in a rhythmic manner. The rhythm then can be experienced spatially, whether it is a simple repeating rhythm or a more complex assembly of several rhythms. He implies that the rhythms cannot be truly planned out in the form of two-dimensional drawings. 

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Figure 8 R.M. Schindler’s proportioning system

Figure 9 Paul Klee’s personal notes on rhythm

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By taking the basic swing idea of jazz and adding it to the established tonal ideas the final basis for the proportioning system is obtained.

Figure 10 Blues scale rhythm module

Figure 11 Blues scale rhythm module graph
CHAPTER 4: Improvisation

Improvisation can be clearly seen when put into contrast with the idea of composition. The term composition itself is one that crosses the boundary in between music and architecture. It even carries a similar definition as both buildings and works of music are composed, that is to say that the details and method of construction are worked out in great (almost exact depth) before the actual construction (performance in the world of music) occurs.

Composition in its purest form involves planning out the final work in complete detail. In a music composition this involves planning when every note would be played by what instrument, the rhythm and pace of the piece and also the volumes and weights for each note and phrase. Pure composition in architecture comes through exact planning of every aspect of a building down to the manufacturer and model of each building component and how it should be constructed.

The most common analogy exploring the differences between composition and improvisation is that of conversation.

A planned out written work that is recited word for word is a composition, whereas a dialogue held in a language made up on the fly would be improvisation. In reality pure improvisation and pure composition never actually occur, especially in the realm of music.

A good example of this is a symphony. The music that will be played is separated into different parts for different instruments and then written down. This defines not only what will be played but also what voice will be making what notes. This is an important consideration since the sounds of different instruments can have a dramatic impact on the mood and tone of the piece. Imagine one of Bach’s Partita’s for a violin played on, say, a tuba. The results will be significantly different. Once the composer’s vision of the finished symphony is transcribed into musical notation, this work is then taken to a conductor. The conductor assembles the correct amount of musicians necessary to play the piece, choosing who will be playing what. This is where the work begins to shift away from a total composition and into the realm of an interpreted composition.

Once the conductor has assembled his musicians he then directs them by guiding the tempo and dynamics of the piece. Given that these performances often occur after the original composer has passed away the conductor must interpret many aspects of the work. These interpretations are guided by the conductor’s understanding of the composer’s intentions and also any other performance of the piece he has heard.

This is, of course, a simplification of what occurs in the performance of a symphony but it is important to note that in this context the individuals actually making the sounds are not adding their own interpretations of the work to the mix. They are merely following the directions of another.
Jazz Improvisations

The role of the individual musicians within a performance is one of the ways where Jazz improvisation differs from performance of composed pieces.

Creation of a jazz song is not something devoid of composition, and various jazz composers and performers use or don’t use composition in different ways. Jazz improvisation is like a conversation is made up of thoughts and ideas on the spot but in a common structure. The tonal and rhythmic ideas serve to form the basic language, and there are several standard song structures that form a framework in which improvisation occurs. Harmonic frameworks are composed to set the limits for the piece. The rhythm instruments almost always create this framework in a jazz ensemble. This usually involves the bass player laying down the overall tonality of the piece by walking up and down the notes of the scales of the chords that form the song. Since this framework consists of a series of chords over time the drums provide the rhythm which propels the framework.

This tonal structure is both an end unto itself and a framework for melodic improvisation. It can serve as a datum over which the improvisational variations are observed.

Some jazz artists have pushed the boundaries of improvisation closer to the realm of pure improvisation in which the harmonic framework is improvised at the same time the melody is, but this thesis will focus on the practice of improvisation as it is used to add life to a composition.

One of the methods of improvisation is that of variations. Earlier we had looked at a small section of the John Coltrane work “Blue Train”. This is an excellent place to start to explore the ideas of theme and variation. In this section there are two distinct variations on an established theme. The theme is stated first and opens the work itself. This theme is then transposed into a higher register that is in harmony with the original theme. It is recognizable as similar to the original but it is also distinctly different.

This is followed by a variation in the same range as the opening theme.

This establishes the “head” of the piece. This composed section with composed variations is used as bookends for the improvisation. What follows are melodic ideas improvised as abstractions of the head. What follows are two different takes of the same piece, from the same session with the same performers. Notice the two distinctly different works are also still noticeably variations on each other.

Variations had been explored in the classical practice. The most striking example of this is Bach’s Goldberg Variations. These series of short pieces for harpsichord were based on a common melody of the time. Bach took that melody and the underlying bass-line that defined the harmony and put them through a series of exercises in which he modified the tempo and rhythm and style of the piece as well as the melody to create a new set of compositions. This is not a far cry from what occurs in Jazz, but there are some important differences to note. Bach’s works were compositions, written pieces of music to be followed as exactly as possible. In jazz the variation occurs at moments that are planned within a composition, and it happens spontaneously. The performer draws from the direction of the song and their underlying understanding of music to create a variation on the spot. It is also important to note that they must be able to respond to the harmonic framework changing underneath their feet. The rhythm sections often change harmonies and notes slightly within the same grand scheme and the soloist must take note of this and respond to it accordingly.
The Miles Davis album “Bitches Brew” is an example of how composition and improvisation can work together towards common goals. Davis and his band recorded the music found on the album in a series of long live performances. They would start with an established musical idea and then improvise on it for long periods of time leaving in all the mistakes, wrong notes and missteps. Davis would lead the action through words and signals, directing the music as it was being played. These tapes were then handed to the recording engineer, who assembled the long series of improvisations into exact compositions.

The practices of improvisation and composition do not have to be separate; in fact the practice of Jazz indicates that the two should work in conjunction with each other.

![Figure 12 Georges Vantongerloo variation process](image)

12 Jarrett, in Fischlin, 344-345
Many architects use an established design or stylistic vocabulary. This can range from series of built forms using a common collection of parts to using a proportioning system that allows for repetition and variation within a harmonizing framework. I explore this in several different projects.

Frank Lloyd Wright’s Usonian house projects make use of this idea. While they never claim to be pursuing improvisational goals, they can shed light on how a grid system can be sued as a framework for variations. Wright used a simple grid, which he referred to as a “unit system”, as a means to organize and explain an entire house. One purpose of this was to allow for maximum prefabrication and easy assembly, but it also functioned as a basis for growth and change. The projects were based on a kit of parts system and could be varied to suit the individual requirements of the clients, all while maintaining a similar language and idea. This can be seen in the following images – note the similar grid system and the variety of results.

Schindler also made use of a system with allowed to him to create a series of variations within a standardized setting. It was based on a 4’ module and was easily divided into sections to allow for maximum freedom. Some examples of this idea in action follow. The most well documented use of a proportioning system is Le Corbusier’s Modular. He describes his system as one that “governs lengths, surfaces and volumes...lending itself to an infinity of combinations.” This system grows proportionally and can applied to any size of project or idea. This opens it up to variation quite easily and in his first Modular essay Le Corbusier partakes in the following “panel exercise” exemplifying this.
Figure 14 LeCorbusier’s Modular panel exercises

Figure 15 R.M Schindler’s How House proportioning variations