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Timbre Architecture: The Glitch is the System

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Timbre Architecture: The Glitch is the System

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A thesis submitted to the Division of Research and Advanced Studies of the University of Cincinnati in partial fulfillment of the requirements for the degree of Master of Architecture.
In the department of Architecture and Interior Design of the college of Design Architecture Art and Planning

Committee Chair: Vincent Sansalone
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1
Abstract

In modern times the architect is confronted with a plethora of choices when it comes to building materials. The influx and integration of advancing technologies into the building materials catalog has caused the architect to begin to look at material selection more closely as it regards to fashion and advancement of technology and less as it regards to efficiency and potential. This is evidenced by the lack of innovation of more traditional building materials and a push towards understanding newer technologies and how they can be integrated into architecture. The focus of this thesis is to look at the potentials of existing materials and to exploit them using an attitude adopted from music.

The potential for a method which mediates between two different mediums is explored in order to invigorate the architects view of more traditional materials. By looking at the common brick as the building element and considering it with an attitude adopted from spectral composition, this thesis proposes a method for the consideration of material which affords a greater degree of potential to be exploited. This attitude manifests itself in the design of a site specific intervention along a nature trail within a national park. The design focuses on a character centered attitude towards standard building elements and uses the manipulation of their form to produce a greater understanding of them as well as drawing out their continued potentials. This approach tests the understanding of the brick by transforming it into something that is understood as not the “standard materials”, but as those materials whose character has been shifted. This approach also informs the architecture as it allows the adjusted identity of these new materials to act as the protagonists for the development and application of themselves, effectively drawing out their inherent potentials.
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As with many of the connections previously considered between various art forms, a connection between music and architecture has been manifested in numerous ways and to varying degrees of ‘success’. Some forms of connections arise out of architecture influencing composition. Such is the case in Medieval European chants and the church spaces in which they were practiced. The legibility of the chants being negatively affected by the reverberation of the sound in that particular space and thus leading to compositional changes increasing that legibility. Some connections have occurred when compositional techniques are used as guides for spatial creation. This being the case in Steven Holl’s ‘Stretto’ House. Where he employs the use of a ‘stretto’ musical technique in a spatial manifestation. He uses this to create spaces that overlap and relate to one another in a manner that creates confusing or uncomfortable separations and experiences between two particular spaces, as is the case of the two pieces of melody in a musical stretto.

These are mostly pragmatic or transference techniques that provide only partial glimpses into what types of connections are possible. It is the goal of this thesis to develop a way of relating spatial conception to musical composition that is neither a cause-effect nor an application of compositional ideas to architectural design. This investigation was undertaken by looking at spectral composition and the specific techniques used to understand, manipulate, and implement sound material into music. Specifically, the close understanding of timbre, the implication of varying only timbres, and the resulting effects to the music resulting from those changes. The knowledge gained from the study of spectral music is then understood as an attitude and transferred to architecture. This attitude is then explored through architectural means and the results are a modified attitude that can then transfer back to music and continue to evolve.
The first step in providing some sense of direction to these investigations is to outline the parameters. These include:

What does it mean to ‘relate’?

What does it mean by the term electronic music?

What does it mean by ‘conceived and subsequently experienced’?
3-1
relate

relate - to give an account of; to show or establish logical or causal connection between

In the case of electronic music and architecture the ‘relation’ becomes an operational material logic and a compositional
type. Specifically the manner of processing separate materials as elements and operating singularly, as well as how these
‘singular’ elements are arranged within a composition, and what those processes and arrangement decisions will produce as the
building/music progresses. Additionally, considerations for the exchange of terminology (common language) as a manner of
describing both architecture and music is considered as a relationship. Finally, effectively noting the parallels of manipulation and
employing methods of thought onto architecture that were solely considered for music.
3.2

electronic music

music - the science or art of ordering tones or sounds in succession, in combination, and in temporal relationships to produce a composition having unity and continuity

http://www.merriam-webster.com/dictionary/music

When the term electronic music is used, most commonly there is tremendous confusion about what exactly it means. In this thesis the definition of electronic music that will be considered is a music that is composed through the use of electronically based instruments and/or computers only. This genre of music is very broad as there is a spectrum of musical sub-genres within this ‘electronic music’ realm that lists greater than 130. This is primarily due to the vast array of ‘electronic’ instruments in use and the tendency of many electronic genres to be only very subtly differentiated into sub-genres. Some of those that most closely relate include electroacoustic, spectral, ambient, sound mass, and intelligent dance music; therefore I will be more specific. The focus is to look at a main genre ‘electroacoustic’ music and a smaller more specialized genre which is most commonly titled ‘spectral’ music. Electroacoustic music is a broad category encompassing many sub genres of music including spectral music. Spectral music, on the other hand, is very focused on timbre (character of a particular sound) and on emphasizing slow and subtle sound manipulation techniques.
Electroacoustic music consists of that music which considers more heavily the interplay and gesture of sonic textures, more often placing less emphasis on traditional concerns of score-based music [those of rhythm, metre, harmony, and melody]. This title effectively acts as a large scale container for many types of music using both electromechanical instruments as well as orchestral instruments and may operate both in and out of the performance theater. Placed as more adherent to a ‘musical equation’ from electroacoustic music, yet still contained within it, is spectral music. This genre produces music that is based primarily on individual experimentation rather than on a set of formal musical techniques. [Butler, 2006] Both of these music types are considered as music for listening and experiencing as they both either continue to challenge our understanding of music or have already strongly impacted our understanding of music rather than relate a narrative or motive.

Clearly separating itself from all music of a romantic nature is spectral music. This separation happens because it has more concerns with the actual manipulation and construction of a sound timbre and does not necessarily charge itself with infusing an emotional or narrative component into the musical result. This music has most commonly used a score-based approach and combines both tempered acoustic instruments, (common instruments such as piano, clarinet, etc) with electromechanical instruments, (mechanical based instruments such as analog synthesizers, tape machines, computers, etc.) and computer synthesis and processing, and is most often associated with academia and orchestral type performance venues.
Spectral and ambient album covers. From left to right:
What is most important about this music is that it begins to explore the timbre of sounds, both from the acoustic instrument world and from the electro mechanical and computer synthesis world. It is a combination of these two collections of instruments, those of an acoustic nature having a strong and clearly defined timbre and those of an electro mechanical and computer nature which have a more flexible timbre or as is the case of computer sound synthesis, a wide open and precisely controllable timbre which makes this music unique. Because it assumes all sounds and sources to contain equally valid timbres, its central focus is not in the production of sounds but in the shaping of the inherent behavior and character of the sound itself and exploring what effects that has on music. This is essentially the timbre and psychoacoustic properties of self-organization as it relates to sound.
Spectral music compositional diagram and building section diagrams. From top to bottom:
Conceived and Perceived

When we consider music as an experience we don’t typically think of how it was conceived and how it is being perceived. There are several ways to understand music, there is music for recreational fun and music for critical listening. Obviously a focused and interpretive position is required for the latter, as the intention of the music is to provoke thoughts and/or emotions, convey concepts, and provide tangible investigations for reference.

If we consider the comprehension of ‘popular’ music, what is most commonly identified is either the narrative which is being conveyed (if the piece contains lyrical content) and/or the quality of the ‘performance’ of the musician, i.e. how “amazing that guitar solo was”. This is the most common method of musical communication in popular and most commercial music. When you enter the world of sound art, musical composition, and other musical genres that flirt with the boundaries of what is commonly considered music (IDM, spectral, sound mass, ambient, etc) questions about what music really is begin to emerge. You must then begin to reconsider your comprehension methods. When you start to understand that the relationships between the sound elements holds information about the conception of the music and that this information does not always come from the performance/interpretation of the musician or from the successful communication of a narrative, you realize that ‘music’ can contain various forms of information.
Historic brick forms. From left to right:
Neolithic pre-pottery bricks, Roman bricks, Hitch patent prototype bricks [Campbell, 2003]
For example, in IDM (intelligent dance music) the use of a constant beat or rhythm structure is typically used throughout the entire piece to act as a ‘baseline’ or reference. From this reference point the room to create relationships between sounds and to explore the timbral qualities of the sounds is afforded to the composer. This is such a strong premise for electronic music that many of the categories of this type of music use this beat or rhythm structure as, or within, their title; i.e. drum and bass, house, jungle, garage. This does not necessarily prescribe that the beat will be completely continuous and repetitive in its entirety, but it does hold true that it becomes a structure which allows other relationships to occur and for them to be more legible to the listener. This type of relationship makes listening more difficult, if not altogether off putting, because it requires some degree of prescribed acceptance.

However, this type of relationship is not uncommon within the pop music genre, but because of the long history and familiarity of tempered instruments and simple song structures, it is more readily accepted. For example, if you consider a typical rock song, the drum beat and bass line most often take a ‘back seat’ to the lead guitarist and singer. This is done because the emphasis of the music is on the singer relating a narrative and the performative aspects of the lead guitarist expressing the emotional melodic phrases that are supportive of that narrative.
Within electroacoustic music, these relationships are quite different. In this genre, the musical soundscape becomes the entire focus of the work. There is commonly a very minimal (if at all) reference to a rhythmic structure and frequently the music is composed in a non traditional manner i.e. not including sheets of musical notation conveying phrasing, tonal attitudes, key signatures, etc. Comprehension of this music is even more difficult than those discussed above. This holds especially true because the variety of compositional methods and degree of manipulation of sound is usually well beyond the understanding and familiarity of even the above average listener. Spectral music positions itself within the realm of electroacoustic music but does not follow all of its guidelines. Engagement with architecture will also take a more inward and organizational approach. This approach will act on the element within architecture that can affect a timbre of a space. In this case it is the brick.
4

The Singular Element

timbre - the quality given to a sound by its overtones as a: the resonance by which the ear recognizes and identifies a voiced speech sound b: the quality of tone distinctive of a particular singing voice or musical instrument

1) A general term for the distinguishable ‘characteristics’ of a tone
2) The quality of tone distinctive of a particular singing voice or musical instrument
3) Describes all of the aspects of a musical sound that do not consider a sound’s pitch, loudness, or length
4) Determined by the harmonic content and the dynamic characteristics such as vibrato and attack-decay envelope of a sound

Spectral music operates on the premise of understanding music in three distinct ways. First, spectral music is most concerned with the reinterpretation of sound as a material. Second, it has a focus which emphasizes ‘smooth time’, or the larger scale of time, and a slow sonic progression through that time. This time is most commonly the entire length of the piece. Lastly, spectral composition focuses on attaining an overall singular sound character [timbre] for the musical piece and emphasizes the experience of building, decomposing, or changing that sound. Meaning various sound parts, made up of different timbres, or parts of timbre, come together to form a sound mass of a particular singular distinct timbre, and it is the behavior of that timbre is the focus.
Various existing shaped bricks. From left to right, top row then bottom row: Bullnose, capping bricks, cant, cow nose, dog-leg, frog. (Campbell, 2003).
Understanding timbre is critical to understanding the importance of the singular sound element within music. Within spectral music the focus on the timbral properties of a sound are so important that it becomes the sole focus of the ‘music’. “The liberation of timbre from a supportive role to a fundamental structural level is one of the most important features of twentieth-century music.” (Emmerson pg197) As Tod Machover so boldly states, the idea that timbre can become a driving factor in understanding what music is, displays a shift in musical thinking. It is not only important that an aspect of sound can be explored but that the act of exploration can become an influence on the overall ‘musical quality’, so important that it can become a structural consideration for the composition. This is the essence of spectral music of which the further investigations will directly inform architectural thinking.

Referring to ‘smooth time’ Tristan Murail states, “Smooth time does not necessarily mean stasis or the absence of movement or change, but rather that there are no sharp breaks, and that the form is not sections. Smooth time is based instead on a continuous form, on continuous processes, and on movements coming from within the sound itself.” (Murail, 2005). Meaning that the understanding of time is thought of through a larger, slower moving scale, encompassing the entire musical piece rather than the piece being broken into sections with varying expressions of time. Also, as described previously, the movement comes from within the sound itself (being those components of timbre which control the sonic complexity and inherent dynamics) and not from collections of melodies or pitch/tonal based variations.
Paper studies made from printed screens of personal musical scores produced in various DAW software. Varying techniques of singular material manipulations to inform potential space based on compositional organization. Paper print outs mounted on chipboard.
In reference to an overall sound character, spectral music emphasizes the creation and transformation of sound timbre as equal to the motives, phrases, and the familiar arrival, climax, cadence formal tools of tonal music. What is different about spectral music is the idea that a singular timbre is the overall goal of the piece. From a compositional aspect, the creation of a particular timbre is similar to the idea of creating a brick, but not just any brick, rather a brick which clearly defines the brick of the imagination exactly as the designer imagines it to be except still maintaining its identity as a brick.
Office DA: installation piece “Fabricating Coincidences” MOMA New York
single material construction (Jones, Moraes, Read, 2005)
Existing brick studies. Development of brick relationships to itself, self-organizing systems, and limitations of connections. Modular brick.
Existing brick studies. Development of brick relationships to itself, self-organizing systems, and limitations of connections. Modular brick.
5 Experience of Elements

What is of most significance is that even though spectral music uses complex systems to understand the timbre of sounds, timbre is essentially a relatively simple relationship of basic parts and parameters being organized in a very specific manner and it is the subtleties of that arrangement which creates particular sounds (complex, thin, inharmonic, dissonant, etc). This means that at the heart of even the most complex sounds are basic pieces acting simply to shape the character of that sound. It is this relationship where architecture is provided an opportunity to engage.

ROEWUarchitecture participated in a fellowship at Ohio State University in 2004-05 and conducted a design-research project titled “What a Brick Wants to Become”. This project was a study on the possibilities of self-organization within architecture and materials. “The question for us was, can its interpretation as an architectural metaphor [self-organization] or as a model for solving engineering problems be expanded to the process of generating spatial effects through material means?” (Architectural Association, 2005). What ROEWUarchitecture was interested in was finding a way for materials to inform the user of how and in what ways that material could inform the architect as to its use. This train of thought is parallel to that which is considered in spectral music. Spectral composers began to understand the structure [and self-organization] of a particular sound timbre and then began investigating how different structures using the same pieces of timbre could change and shape the timbre.
Brick outline and surface drawing. Experience diagram of brick wall system from previous studies. Digital photo and photoshop. Pencil on vellum.
Specifically, the material, whether that be a sound or a piece of sheet metal, is considered to have inherent qualities that inform how it can be organized or how it can arrange itself in relation to itself. Not necessarily only from an efficiency stand point, but rather from a natural phenomenological approach. In music, for example, if a C0 piano note (the lowest on the piano) is struck and its harmonic complexity analyzed (see figure next page), what is shown are the partials [pieces of the harmonic complexity] that are most powerful and most subdued. This, for music, is a way to understand that particular sound material, which was previously not possible. It is a method for grasping some of the phenomenological aspects of that particular sound and a way to reference and inform the application of that particular sound. This type of analysis was only made possible through great advances in computer technologies and processing, specifically those applied to understanding sound spectra through FFT [Fast Fourier Transform algorithm] analysis.

The result of this analysis gave composers insight into how that particular instrument organizes its sound and how that sound is constructed from the natural phenomenon of frequency complexity and amplitude envelope. What this table shows are the partials comprising the singular ‘whole’ C0 sound and their individual amplitudes. Partialis individual frequencies which are active within a singular sound and their corresponding amplitude [intensity or amount presence of those frequencies] helps to determine what the character of that sound is. Listed in the partials chart [see below] are all of the numbers which represent parts [or partials] of the C0 sound produced by the piano. What is interesting in the table is that there are 50 (and actually more, up to 118 not shown) parts which go into creating the singular ‘whole’ C0 piano sound. Additionally, there are partials that have much greater amplitudes than others [ranging from 0 through 1.0]. Meaning, that the complexity of this singular ‘whole’ sound is determined not only by the various parts/partials that make it up, but also by a infinite number of amplitude variations given to each part/partial. This is only one aspect of timbre considered through a predetermined instrument, the piano.
Example of chart displaying harmonic content. (Murial, 1984)

<table>
<thead>
<tr>
<th></th>
<th>0.000000</th>
<th>22.</th>
<th>0.187619</th>
<th>42.</th>
<th>0.119517</th>
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<tr>
<td>1.</td>
<td>0.283176</td>
<td>23.</td>
<td>0.314130</td>
<td>43.</td>
<td>0.120805</td>
</tr>
<tr>
<td>2.</td>
<td>0.501411</td>
<td>24.</td>
<td>0.016412</td>
<td>44.</td>
<td>0.025497</td>
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<tr>
<td>3.</td>
<td>0.544941</td>
<td>25.</td>
<td>0.048377</td>
<td>45.</td>
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<td>4.</td>
<td>0.543653</td>
<td>26.</td>
<td>0.053839</td>
<td>46.</td>
<td>0.019840</td>
</tr>
<tr>
<td>5.</td>
<td>0.964906</td>
<td>27.</td>
<td>0.345389</td>
<td>47.</td>
<td>0.029756</td>
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<td>6.</td>
<td>0.089356</td>
<td>28.</td>
<td>0.340021</td>
<td>48.</td>
<td>0.006626</td>
</tr>
<tr>
<td>7.</td>
<td>0.234125</td>
<td>29.</td>
<td>0.483649</td>
<td>49.</td>
<td>0.010768</td>
</tr>
<tr>
<td>8.</td>
<td>0.410792</td>
<td>30.</td>
<td>0.285539</td>
<td>50.</td>
<td>0.024480</td>
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<tr>
<td>9.</td>
<td>0.869808</td>
<td>31.</td>
<td>0.052427</td>
<td></td>
<td></td>
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<tr>
<td>10.</td>
<td>0.702620</td>
<td>32.</td>
<td>0.006994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>0.703479</td>
<td>33.</td>
<td>0.056200</td>
<td></td>
<td></td>
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<tr>
<td>12.</td>
<td>0.313799</td>
<td>34.</td>
<td>0.081938</td>
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<td>13.</td>
<td>0.275385</td>
<td>35.</td>
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<td>0.112802</td>
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<td>15.</td>
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<td>0.196270</td>
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<td>16.</td>
<td>0.194220</td>
<td>38.</td>
<td>0.106190</td>
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<td>17.</td>
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<td>39.</td>
<td>0.043469</td>
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</tr>
<tr>
<td>18.</td>
<td>0.260476</td>
<td>40.</td>
<td>0.013191</td>
<td></td>
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</tr>
<tr>
<td>19.</td>
<td>0.690779</td>
<td>41.</td>
<td>0.031904</td>
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</table>
Amplitude envelope is another parameter effecting timbre. In the first diagram the top portion displays visual representations of the amount of time it took a sound to rise to full amplitude, how long the full amplitude took to decay, whether or not the amplitude was sustained, and how much time the sound took to effectively end. This is commonly referred to as the attack-decay-sustain-release envelope of the sound (see figure next page). What this information communicates about the sound is what kind of temporal behavior a particular sound has. Some distinctions which are most clear in the previous figures are those between instruments of a percussive nature and instruments of a stringed nature. As in the snare drum you can see how quickly it raises to full amplitude (immediately), how short the decay and sustain times are (very short), and how quickly the sound releases/ends (very rapidly towards no sound.

These are two important aspects of timbre as it relates to sound. Timbre can be thought of as pertaining to the existence of many simple but separate elements that come together to create the phenomenon that is the sound and the inherent temporal qualities that allow a listener to discern the sound as from a particular genre of instrument (ie percussive, stringed, wind) As any singular sound, or material, can be made up of individual chemical, physical, and atomic elements, it is not those that are of interest to the spectral composer, rather what specific signature that a particular sound has and how these two ways of understanding sound act to define that signature. For this example, it is not the piano string nor the piano’s resonating chamber, nor the key and hammer action that are of interest to the composer, but instead it is the sound that is produced and those properties that phenomenologically ‘piece’ together the sound which are of interest.
Experience studies of ice scraper and known brick. Section cuts represents partials/harmonic content. Pencil on vellum.
Experience studies of ice scraper physical sectioning into partial/harmonic content. Rearrangement of partials to reconsider known ice scraper. Plastic ice scraper in plaster.
Envelope studies of ice scraper using moulding. Plastic ice scraper in plaster.
Envelope studies of brick using various moulding techniques. Modular brick, plaster, wax, and wire.
6
Process and Difference

**Common general processes of composing electronic music**
- non-adherence to conventional harmonic frameworks (even if western musical traditional equipment is used, ie keyboards with limited tempered intervals)
- harmonic strictures are ignored with a focus on timbral manipulation
- instability of a sound is explored
- use of a sound as a single element to produce an entire composition
- looping of sounds to provide working feedback
- working in an improvisatory fashion of construction
- overdubbing successive layers of sounds for testing potentials of sound character
- working to develop a temporal framework (process of dictating how the summing of the parts will unfold)
- the final structure of the piece is tested against intentions
- manipulations (filtering, processing, etc) of the sound are applied to help guide final arrangement
An important aspect as to how these lines of this musical thinking can be brought into architecture must consider two specific components. First, what exactly is the relationship between one sound and another, or what is the difference between them. Second, how does the sound change over time, or what is the process for manipulation of that sound. Because instrumental sounds have predetermined timbre properties that arise from more minute parts of a sonic experience, a consideration for how a differentiation between one sound and another must be developed.

The topic of difference investigated here is one based on timbre and the understanding of the spectral analysis of sounds. If the timbre of a sound is made up of essential separate sonic bits and the temporal delivery [experience through the attack-decay-sustain-release envelope] of those sonic pieces, than architecture too must consider, within its own realm of materials, that each material is also comprised of material bits and inherent temporal properties that afford the material its own unique experience. In the case of the brick, these are relatively finite. A bricks ADSR envelope is fairly easy to define. It is of a known dimension, it is of a familiar shape [or envelope], and it has a particular scale. The material bits and that make a brick a brick are those qualities which further define our concept of a brick. It is solid, it has a fair amount of mass, it has strength in its compression direction, and it is most commonly dry and rough to the touch. These help to define the bricks harmonic complexity. All of these characteristics are predetermined as in any existing acoustic instrument.
Initial surface studies using varying brick timbres. Computer rendering.
Studies using singular brick timbre to inform brick construction and space creation. Computer rendering.
Initial brick envelope studies. Effects of envelope shifts in brick shape and potentials for space creation. Computer rendering.
What must also be considered here is the idea of difference between one brick of a particular ‘kind’ and another brick of the same particular ‘kind’. Difference, as seen through Giles Deleuze, was the switch of the metaphysical relationships between identity and difference which meant that difference was not in fact drawn from individual identities but rather that identities are the result of difference. Essentially arguing that the idea of identity does not come before difference occurs meant that, for Deleuze, the only way to confront reality was to grasp things exactly as they are in their natural state of being. What Deleuze goes on to describe is that pure difference is "the virtual", or those conditions of actual experience, rather than the concept of an ideal experience measured against the actual experience. Meaning that only through a real ‘system’ of differing relationships can actual space, time, and experiences exist. Or more simply stated, “...what we see in the world are not imperfect realizations of unattainable abstract ideals but rather the intricate results of the continual interaction of physical material and virtual intensities.” [Architectural Association, 2005] Within architecture this is not as finite for the brick as was previously stated.
Because the manner in which most architects have approached the brick, it has yet to be searched further for its potential “virtual intensities”. “Two strategies normally prevail in materialist practice; the first ignores difference in favor of imposed ideals; the second tends to equalize difference to determine form.” [Architectural Association, 2005] An example of how the brick is effectively made equal to itself is in Louis Kahn’s later architectural works (see above). His designs essentially homogenize the brick and set it up as an imperfect realization of the ideal brick, therefore allowing him to impose form on it and in no way allowing the brick to inform onto him what the architecture could be. A less idealized, yet still primarily concerned with form, can be seen in the practice of architect Eladio Dieste. In his works the approach to using the brick was more engineering influenced and his intentions were to primarily stretch the structural possibilities (and those of reinforced mortar) of the brick to create a more effective space to material relationship. While this provided some amazing advancements in the applications of brick, it still did not engage in understanding and developing a change in the timbre of the brick, it merely stretched the given definition of timbre for brick through structural means.
Eladio Dieste. Church of the Christ Worker. [Anderson, 2004]
The goal for this architectural investigation is parallel to those of ROEWUarchitecture’s research project. It is through the drawing out of varying “virtual intensities” of the brick and that brick within collections of bricks, that the architect stands to gain a greater understanding of what it means to use the brick. Through understanding these concepts as they parallel spectral composition’s concerns for “virtual intensities” of sound, this investigation hopes to achieve a greater understanding for material as it relates to itself, to its own experience, and to its contextual use, be that a musical composition or an architectural construction.
For spectral composers this philosophy holds true as well. For in their pursuits of understanding a particular sonic timbre, it is not their ultimate goal to attain some ideal timbre, but rather it is their intention to continually test these “virtual intensities” against the material, ever searching for some greater sense of timbre in the process. This is the same pursuit in the architectural investigation. It is the goal to interact with the virtual and the material in a manner that affords a better understanding of the phenomena that is the brick in architecture and not what would be the ideal brick.

Because architecture is concerned with the physical material world and music is concerned with the auditory material world, the attributes in which define the timbre of a brick and the timbre of a note must be different. What is important is an approach to understanding that there are facets of a brick which are understood as we have used them through time and that those are inherent to the brick and yet still may not been fully understood. Unlike music, there is no new technology that will allow architects to analyze the brick and realize that its inherent timbre properties are something other than what we have already considered, but what architects do have is the human interaction and intimate use and exploration of a brick which can allow for its timbre to be reconsidered.
The topic of process is something that must be considered and reinterpreted between music and architecture. Tristan Murail states, “The kinds of processes used in this music [spectral] are distinct from many formal processes found in other types of music, in that they function on a perceptible levels. They are not underlying mathematical structures, but permeate all levels of the piece and are an important aspect of the perceived musical movement and evolution.” (Fineburg, 2000) As is the case with music, timbre can be controlled and manipulated through both acoustic instruments and through computer synthesis methods. The level of control allotted to the composer is almost infinitely expansive while in the architecture material world it is less expansive. If we consider that a sound may be produced using any pitch [tempered or other], almost any amplitude, any number of partials, and any type of attack-decay envelope, the possibilities of its manipulation over time [processing] are endless. This is important because it means that a sound will always be a sound regardless of its timbre and its processing. Whether it is crowd noise or a very soft oboe, a sound is always a sound. Within architecture, any combination of materials, brought together with varying properties, and in varying organizations each with distinct characteristics processed over time will not ultimately create a brick. The brick is considered parallel to an acoustic instrument in this musical sense. Its existence is predetermined, its timbre has been refined over thousands of years, and its character is well established. What is the goal of architecture then for the brick, as it is in spectral music with acoustic instruments, is to pull out and use the timbre contained in the brick in a manner that allows architects to see different aspects of that timbre.
The ability to control a sound's minute changes over time is what spectral composers stake their works on. It is the gradual and changing timbre of a sound that either builds, decomposes, or merges over time which produces the essence of a spectral piece. This processing can be related to architecture through the brick in the sense that the shape, size, and relation to other bricks within its surface (wall, floor, ceiling, etc) can be changed subtly over the length of a space. This can not only inform provide surface manifestations but this surface can begin to become more. It is in these subtle changes where process can begin to speak of the changing timbre of the brick. Just as spectral composers can use these changes as replacements for some of the standard formal qualities of a more romantic approach to music such as the arrival, climax, and cadence format which is typical, so too can architects begin to interpret these small changes in the brick to be as potentially powerful as earlier considerations. Using these techniques means that the essence of music does not have to be dramatically changed, but rather, the material from which the composers are applying their concepts and techniques has simply moved to act upon the sound rather than being applied to tonal movement and motive organizations. In architecture this is parallel. To allow the architect to look inward and begin to effect changes to the most basic building elements and to test those changes against a non-predicted form over their collective bodies (walls, ceilings, floors), is to allow them to see again what potential these elements have.
This manner of ‘processing’ is important in the translation of musical thinking into architectural thinking. While this thesis intends to investigate material propensity, it does not purpose to reinvent the atomic structure of the brick, rather to use the brick in a manner that allows principals of architecture to operate on it and its timbre character. This in turn will create gestural experiences within a material assembly informed by the material itself, rather than through a formal language forced upon the material and on the larger building scale. For example, Louis Kahn used brick in a manner opposite from this approach. “In Louis Kahn’s buildings, bricks can be seen as homogenous, interchangeable elements, each a more or less imperfect embodiment of the ideal brick . . . This is entirely consistent with an idealist understanding of the material world, in which objects or species we encounter are but approximate embodiments of transcendental ideals. Within this model matter is homogenized and form is imposed from above.” (Roe, 2005) To be more specific, this is not about the detailing of an assembly, nor is it about the structure of the assembly [although that must be a consideration] but it is about the understanding of a material and how that material can act upon itself and to what extent that more inward focus of manipulation can have an effect on architecture.
Louis Kahn. Ahmadabad Institute of Management. [Image Gallery University of California, San Diego, 1974]
ROEWU architecture. Student studies at the Ohio State University. [Architectural Association, 2005]
ROEWUarchitecture. Student studies at the Ohio State University. (Architectural Association, 2005)
PLYarchitecture is another group of architects thinking in a similar manner as the spectral composers. Their emphasis is on the digital processes and how this can influence fabrication techniques used in creating architectural materials. In this way, they begin to think about architecture that is an exploration of materials and investigations into the manner in which materials are constructed. Most importantly, their projects continually exhibit a sense of process and change over the use of the material. Similar to the spectral composers who use material processes and changes over time to emphasize exactly what the sound material is, PLYarchitecture’s projects express what these materials are and experiments in what they could become.

In the project they designed for the Mies Van Der Rohe Plaza, in Detroit Michigan, the architects chose to use a singular rectangular paving stone that was broken down into five slightly different shapes that still maintained the same character of the original paving stone but with a slight pulling to create an asymmetrical shape. This manipulation gained added complexity by adjusting thickness and adding grooves for the correct drainage. This slight adjustment of the rectangular shape begins to inform the plaza surface and adds the spatial benefit of opening space for planting beds. This is an example of how they have allowed the material and the idea of a very simple element to begin to inform the possibilities for architecture.
7-1  
Site  

**State:** Florida  
**County:** Alachua  
**City:** in close proximity to Gainesville  
**Context:** Paynes Prairie (freshwater marsh/wet prairie)  
**Location:** Trail head at Northern edge of prairie, positioned directly connected to state highway 441 and entering directly into the prairie with no surrounding buildings
Florida Soils map. Alachua County map with city of Gainesville highlighted and Paynes Prairie shown in red.
Maps GNU General Public License http://data.labins.org/2003/
Running north to south this is a soil section through the Northern portion of the state of Florida. Shows the proximity of the prairie to the aquifer system of Florida. Note the vertical exaggeration.

Maps GNU General Public License http://data.labins.org/2003/
Site photos taken at three different locations. From left to right: Sinkhole area (NE prairie in close proximity to prairie edge), wet prairie area (N prairie), grasses area (central prairie).
Proposed area of consideration for trail and architectural interventions. Photoshop.
Maps GNU General Public License http://data.labins.org/2003/
Overall site and proposed trail connecting to existing trail. Specific locations for architectural interventions shown in gray. Photoshop.
Maps GNU General Public License http://data.labins.org/2003/
In dealing with site, the decision to position a interventions distinctly within the natural landscape was taken so as to allow the perception of the architecture to be stronger and more importantly to allow the site to be better understood through an experiential revealing of site specific characterisics. Additionally, the existence of the interventions will be as, if not less, intrusive as existing trails, boardwalks, and observation towers.

As this site is seemingly simple in visual character, wet prairies can contain some of the most diverse plant species and this expresses how seemingly atonal landscapes have many inherent properties of character. Additionally, because of its unique geological and geographical location, this wet prairie has an inherent temporal experience as well. This landscape effectively acts as a collection basin for precipitation and water runoff from higher surrounding forested uplands. Because of this act the site is constantly in a slow moving state of flux. In the dryer Winter months the prairie is draining its water through a sinkhole on its North Eastern edge appropriately titled the "Alachua Sink". In the Spring and Summer months all the precipitation effectively fills up the prairie and the additional slower moving runoff also adds to its water content. This happens on a larger scale of time from most sites and requires, as does spectral music, a much greater understanding of specific materials to appreciate its complexity.
In looking at site several techniques previously discussed, several have been applied in trying to understand what it is that gives this site its particular character [or timbre]. This happens on the larger scale and will continue into the smaller scale as the details of the siting of the interventions are shown. For now the application of harmonic complexity, or as described previously, partials manipulation has been applied attempting to discover exactly what it is about the arrangement of the physical materials within the site that give it its timbre [see above]. Adjustments to that timbre help to reveal what can be considered as important to the sites timbre and what changes an architectural intervention may cause to the sites timbre.

As an addition to the existing research, a study of landscape artists with distinct considerations for landscape specific work, and architects using self-organizing systems and/or module based approaches was undertaken. Shown in the next pages are works from landscape artists which propose an attitude to interacting in varying landscapes with a greater degree of insertion and disturbance. The degree of insertion of the architectural interventions into the landscape was taken to a level necessary in order to convey the experience of the prairie. The program for the interventions dictates the degree of insertion and disturbance. Each responding to the program of the experience sought and engaging the site to reveal that experience.
Mary Miss. Set construction for the film *Blind* (1977). (Miss, 1997)
Richard Fleischner. Long Wharf proposal (1975), Boston, Massachusetts. (Davies, 1977)
7-2
Design Intent

The intent of the architectural design is to manifest an attitude toward building materials that emphasizes the inherent properties of that building material and allows those properties to take an active role toward informing design. To accomplish this, the design uses well known building elements in a way that allows them to be understood as containing continued potential. The use of a singular building element (ie common brick, dimensioned lumber, etc) is used to emphasize the overall attitude toward material and material character. Each building material within the building materials catalog already contains a very specific character and the intent is to allow the architect to begin to shift their thinking about the building element. This shift moves from an attitude where the architect informs the building material, to one where the building material informs the architect. To move away from designing a building element, and toward accepting a known building element as a given and then exploring all of the possibilities of that building material.

Within this thesis, the exploration of building materials happens with two distinct building materials and with two distinct site interaction methodologies. The common brick is used because of its clarity of character and simplistic construction method. Because the brick does not require hardware or framing and supports itself, the character of the brick becomes very apparent and there are no architectural distractions that occur. When experiencing the brick the use of mortar typically becomes uniform and the emphasis moves to either the surface variations (as in most common applications) or thickness variations. In this application, both of these variations are focused on along with the spatial implications they have. Due to the nature of brick construction [its greatest strength being in compression and arranged with a balanced center of gravity], the application of the brick is used to engage within the landscape. The brick acts not only as multiple surfaces [floor, wall, bench] but also as foundation and anchor for itself. The brick based interventions are meant to become part of the landscape and effectively change with the landscape, showing wear, becoming submerged, grown over, etc.
5 distinct brick timbres used for each intervention. Computer rendering.
Early application of different brick timbres to flush out potential wall typologies. Computer rendering.
Intervention study using singular brick timbre to create various enclosure, seating, and space. Computer rendering.
“Grass” Intervention study. Brick paths interwoven into different grass species. Initial attempts at integrating brick into site. Computer rendering.
2 different brick timbres modelled physically. Plaster.
1 brick timbre half scale study walls. Progression studies. Plaster dry stacking.
This site poses a difficult question in how architecture should interact with it. Through the use of program, the architecture will take two distinct approaches to engaging with the landscape. The first will be an intervention approach. This approach engages with the landscape as minimally as possible while effectively enacting a portion of the landscape through its interference in order to draw out a specific aspect of the site. This method is meant to purposely engage the architecture within the landscape so that the architecture becomes (over time) a part of the landscape. The second approach is one of surface insertion. This approach is one that is almost temporary in nature and allows an easier method for installation, reposition, and removal. This method allows the architecture to become a delicate framework for which the landscape dictates its most appropriate placement. This approach manifests itself in a boardwalk system which navigates the trail and is constructed between the interventions.

The first intervention encountered along the trail is the “layers” intervention. This intervention deals specifically with the soil of the site and expresses the simplicity of the soil system as well as portraying a surficial relationship to the underlying aquifer system of the prairie. In this intervention, the soil is held back by the bricks in order to capture and present the three shallow layers of soil that make up the majority of the prairie. The first space in this intervention outlines the topmost soil of the prairie. This captured soil is simply the same soil that is on the surface in the rest of the prairie but outlined by the intervention. The next space of the intervention holds back this first layer of soil to a depth of 6” and exposes the sand and clay mixture of the first layer of the surface of the prairie. This layer acts as a growth zone for the prairie grasses and as the initial filter for water moving through the soil into the aquifer system below. The next space holds back the soil to a depth of 12” to expose the actual limestone which is the point of entry for water into the Florida aquifer. The intent of this intervention is to expose these 3 shallow layers of the prairie so that the visitor can quickly grasp exactly how delicate the surface of the prairie is and what its relationship is to the aquifer system.
“Layers” intervention. Three spaces capturing the few shallow layers that are the prairie surface. Computer rendering.
1/2 scale moulded bricks to develop "layers" intervention details. Plaster dry stacking.
1/2 scale moulded bricks develop spatial potentials of “layers” intervention. Plaster dry stacking.
The second type of architecture constructed within the prairie is that of the boardwalk along the proposed trail. This boardwalk applies the same attitude toward a specific building material but adopts an alternative way of interacting with the site. As the program of a boardwalk dictates, it does not necessarily have to interact with the site intimately. In this instance the boardwalk addresses two issues. The first issue is safety. Even though there are several existing trails that venture into the central portions of the prairie many of them do not provide a sense of security as it regards to wildlife. Within the prairie there are many larger animals including horses, buffalo, and alligator. The alligators cause a degree of risk. This boardwalk proposes to raise the visitor up off the prairie floor effectively providing a spatial and semi-physical buffer to animals. As this boardwalk will exist and disappear at different moments, in its existence it will provide safe areas of refuge from potential dangerous animal encounters. The second issue is accessibility. Because the landscape is constantly changing, the prairie floor will sometimes be fully submerged and sometimes completely dry, accessibility can sometimes be limited. These boardwalk constructions will be placed in areas of frequent inaccessibility. This additional access extends the experience of the prairie into all of the various conditions of its existence.

Within this intervention, the use of a typical building material is reconsidered. Dimensioned lumber measuring 4” X 4” X 60” is used to create all elements of the boardwalk. Additionally, in the shaping of the dimensioned lumber, the lumber itself provides the majority of the joinery and connections. This further consideration of allowing the building material to inform the design shows an ability to maximize potentials using minimal alterations to the known building element.
Boardwalk studies using singular wood element with singular timbre. Derived from typical dimensioned lumber measuring 2” X 8” X 48”. Computer rendering.
Further study using timbre of lumber to influence both overall form and joinery. Using typical dimensioned lumber measuring 4" X 4" X 60". Computer rendering.
Initial boardwalk design using singular dimensioned lumber timber. Showing single angle adjustment flexibility in structure, surface and spatial enclosure. Computer rendering.
8

Bibliography

Art and Music


Architecture
Music and Architecture

Phenomenology and Theory