Musical Beginnings: Musings on Teaching with Music in the Fundamental Design Studio

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Introduction

The beginning design student, like any other, is confronted with a world riddled with a multiplicity of physical, sociological, and psychological conditions that can thwart efforts to objectify contextual design determinants. Given the complexity of the twenty-first century environment, students should perhaps be given a non-building type of environment to hone their analytic abilities prior to taking on such a proliferation of perceptual stimuli. Physical environments such as urban settings that typically make up the sites for early design problems are simply too complex for students to first learn to perceive their surroundings in an objective manner. Too many preconceived notions of what constitute such environments cloud their ability to analyze such a place. Perhaps an alternative subject exists for students to learn how to discern and organize layers of information into an accurate set of perceptual understandings.

While architectural design remains a predominantly visual field of study, our perception of the world involves a myriad of other interconnecting sensory experiences. Tactility and texture can be inferred visually, as can conditions of moistness and dryness. As influential in the design of the built environment as they are, taste, smell, and sound are not easy to graphically communicate. More often than not, the aural experience of the world is left out of the design equation. Unlike the visual arts to which there is little resistance to the use of aural perception in the conception of space, there is can be skepticism regarding attempts to bridge between the aural and visual in architecture.

The educator has a responsibility to embark with the student on a scholarly journey of investigation and discovery, while providing the guidance and encouragement to ask questions and explore new ways of knowing the surrounding world. It is critical that the student and educator together expand intellect, process, and intuition, and learn to hone perceptual tools by questioning givens, doubting constraints, and challenging assumptions.

As complex and holistic of a tradition that it is, the discipline of architecture can be made more accessible to students if not clientele through analogies drawn from more familiar subjects such as art, music, cinema etc. Every one has had some relationship with music in their lives, whether lullaby, adolescent love song, or piano lessons. If this medium for expressing and remembering ideas and feelings can be tapped to convey both the intricacies of materiality and the broad cultural scope of architecture, we could better engage the students' minds and create young designers more prone to thinking outside the box.

As musical education has been proven scientifically to improve the cognitive development of students in other disciplines, the potential for improving perceptual and conceptual abilities in the creative arts is limitless. Looking to vernacular musical forms, one can gain insight into the cultural structure of a place perhaps more thoroughly than if one were to only consider the architectural vernacular. Parallels at the level of structural members, ornamentation, scale, color, texture, layering, narrative, and context can be directly drawn between music and architecture. Further understanding these overlaps will foster a more enlightened view of the human condition, and what it means to practice architecture today.[1]

Integration

The use of music in fundamental design studios is beneficial to introduce and encourage different ways of knowing the built and natural world. Perception of the relationships between parts is a skill essential to the practice of either architecture or musicianship. In regards to the perception of any given architectural problem, the practitioner must understand how multiple layers of context (each highly complex) connect with programmatic, budgetary, code, zoning, and structural requirements and come together to form a complete picture. Similarly, a composer must be able to bring together the various instrument parts (roughly seventeen in a modern orchestra), musical genre, raison d'être, etc. to form a complete composition.

Starting with a beginning student's first design studio and into more advanced architectural studios, music has been integral as a conduit between students' perceptual and cognitive experiences prior to architecture school and the complexities of mastering as holistic a discipline as architecture. This pedagogy attempts to both expand upon the student's prior life experiences and to demonstrate basic design and interpretive skills without the necessity to jump directly to buildings. It is the fundamental understanding of formal relationships (as can be found in music), connections, layering, hierarchies and space-time that one must start with in an architectural education. Perhaps a non-building based curriculum such as this can introduce the tenants of architectural design and help design a highly effective methodology of perception and conception without the aforementioned jump.

In 1994, while co-teaching a beginning architectural design course with Max Underwood, I began experimenting with using music to introduce basic tenants of analysis and design. This research has continued ever since, each time evolving and encompassing new methods of research and analysis so that now after several years of experimenting with the cross-disciplinary introduction to architecture, comparisons can be drawn between each strategy. There are four general contextual analysis categories that can describe the evolution of the work. Each category involves a similar sequence of immersion, analysis, notation, and abstraction, but the specific aim of the studies varies with each execution yielding different results. In all of the examples, there are some inevitable consistencies due to the level of the design studio, and the somewhat subjective nature of musical interpretation. However, enough difference lies in the musical genres, the types of analysis, and the subsequent design projects to discuss the body of work in definable categories.

Strategy One: Cultural Context

Traditional Irish music as it has been played for hundreds of years is utilitarian music for the people and by the people.[2] Traditionally tunes were transferred from generation to generation by ear, shared and learned by playing them in groups called "seisiuns."[3] Thus, the identity of a specific tune's author was lost over the years, and the music was allowed to evolve and grow each time it was changed. One of the primary attractions to utilizing this particular genre of music is that it is free of the whims and designs of any singular voice found in most other musical forms such as classical composition. What this means is that in essence the music can be understood WYSIWYG,[5] it's inherent structure understood for just what it is without the necessity for comprehending a composer's grander intentions.

This musical form was previously called "utilitarian", which is not an entirely sufficient description. "Traditional music comprises two broad categories; instrumental music, which is

Fig. 1. Diagrams of Irish Traditional Air Sliabh na Mban. Top notation taken from playing of fiddler Kevin Donleavy, bottom notation transcribed by student Pete DePasquale from the playing of piper Liam O'Flynn.

mostly dance music (reels, jigs, hornpipes, polkas, etc.), and the song tradition, which is mostly unaccompanied solo singing but has come to include the transposition of Sean nos or old style singing to solo instrumental tunes called "Airs". 5 The functionality of dance music is somewhat obvious, serving to provide a musical basis for community gatherings in traditional Irish culture, the dance. The primary purposes of the song and air tradition are to tell stories, to educate, or to commemorate. Thus the "programmatic" requirements of each type of music group is fairly clear, and can be further specified within each category. Within the dance music genre alone, reels, which are the predominant type of tune, are dances for couples, jigs are dances for individuals, polkas are Germanic dances for couples, and hornpipes are technical showpieces for male solo dancers.

The raison d'être of many musical forms tells quite a bit about the cultural values of a people or area. What stories are passed down from generation to generation, what tunes from what region are played, and what types of instruments are traditionally used demonstrate historically what economic, political, and technological values exist at very specific places and times. Dance music prevalently brought people together to share political, social, and familial experiences, and inevitably those experiences made their way into the tunes (tune names) and songs of the time. Young designers learn that meaning can be hidden in every aspect of any analysis, whether it is site-related, programmatic, historical, or cultural. Exposure to the subtle way in which cultural values shape the world is imperative in the education of those who will one day help create the physical environment.

Vernacular Musical Form

Irish music is a melodic musical form with little harmony if any.[6] Tunes are composed as sequences of individual tones (notes) with varying distances between and different time values. The melodic form can be abstractly thought of as a single line of notes, similar to just the right hand of a piano piece without chords. All players even in large ensembles play or attempt to play the same sequential set of tones (notes). The different ranges of various instruments including in what pitch and octave they are played add depth to the tunes.

Tunes transcribed or orally passed between players are mere bare bones of that tune, allowing for much variation from person to person and performance to performance. Every musician will play a specific tune differently, expressing the music in their own uniquely interpretive way.10Divergent applications of ornamentation and harmony allow for the music to change every time it is performed, while the melodic structure itself remains constant. Similarly, any architectural problem can produce an endless stream of solutions with equal clarity. Variation and interpretation (both encouraging individual creativity on the part of the student) can then be grasped fully, and the benefit of multiple solutions illustrated quite clearly.

Very often a constant underlay of tone is present, called a drone. This constancy is also present in various other musical forms, including not coincidentally northern Indian and Middle

Eastern music (origins of the bagpipe). The Drone provides a tonic wavelength into and out of which other tone's wavelengths converge. It is created either by a dedicated drone pipe of the bagpipes, by continually bowing a string on a fiddle, or by holding a key on the accordion. The drone can be seen as a groundplane or context against which the melody takes place.

This particular musical form is ancient, highly structured but constantly evolving, anonymous but uniquely named by its different practitioners over generations, and tightly comprised but with sometimes very elaborate ornamentation. Irish music and similar musical forms are melodic, diatonic, highly rhythmic, with an accompanying drone but with little if any harmonics.[7]

Students draw upon their analysis into cultural heritage in order to program and design an Institute of Traditional Music. The way that traditional music is collected, archived, and taught is different than other musical forms, so the programmatic and conceptual considerations of an institute of this sort need to be addressed accordingly. The understanding that music in traditional Irish culture served as a primary means of bringing people together, to momentarily forget troubles and chores, and to celebrate life can help students create projects that address a large urban agenda such as creating public place. In general, an understanding of how the cultural context, program, and form are intricately woven together better informs the work of design students.

Strategy Two: The Conceptual Context

Roughly coincidental with the emergence of Pop Art in the early 1960's, four young musical composers began to receive attention for their work with what would be called American Minimal Music.[8] This loosely affiliated "school" included La Monte Young, Terry Riley, Steve Reich, and Philip Glass. Arthur Shonberg described musical composition as being typically divided into three general areas: harmony, counterpoint, and form.[9] Musical minimalism reduces composition to essential elements in a non-hierarchical, non-linear structure. This is similar to the aims of minimal (visual) art that evolved concurrently to minimal music, radically shedding the excesses of the previous generation of painters and sculptors.

Minimal art describes abstract, geometric painting and sculpture executed in the United States in the 1960's. Its predominant organizing principles include the right angle, the square, and the cube, rendered with a minimum of incident or compositional maneuvering. Historically a reaction to what young artists saw as the autobiographical, gestural excesses of Abstract Expressionism, Minimal art, at the same time, pursues the formal innovation of Abstract Expressionism, particularly as laid out by the painting of Jackson Pollock and Barnett Newman.[10]

Reacting largely to the previous generation of academic composers and one of the abstract musical forms, Serialism, these young composers created work based on concepts rather than melodies. Ideas such as pattern fields, steady-state tonal-
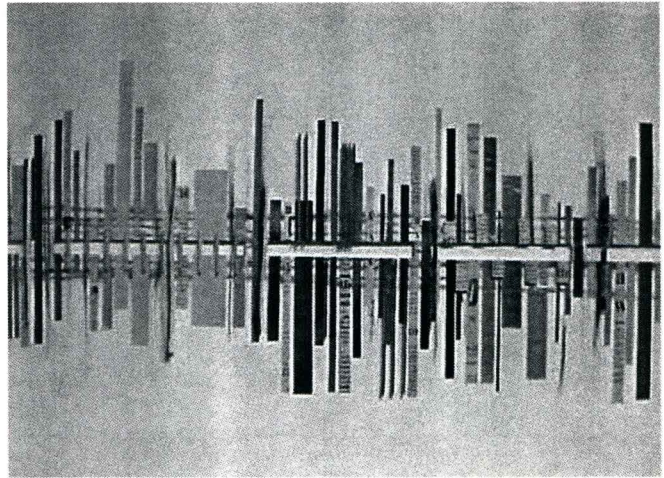

Fig. 2. *Notation invented by student of Drumming*

ity, phase-shifting, and additive arithmetical rhythm were the respective foundations for the musical minimalists throughout their careers.

Process

Students selected a composition from four American Minimalist composers to analyze and explore. The goal of the research was to excavate from the music the composer's parti or conceptual framework. Students primarily worked through listening to the music rather than through viewing the written score (if one existed) in order to formulate their own conceptual notation. At times, however, further clarity was gained by studying the written work as well, especially with the chance operations of John Cage.

Students began by experiencing the music sonically, initially limiting their perceptions of the compositions to recordings instead of printed media. This allows for students to develop their own notational technique to describe their experience
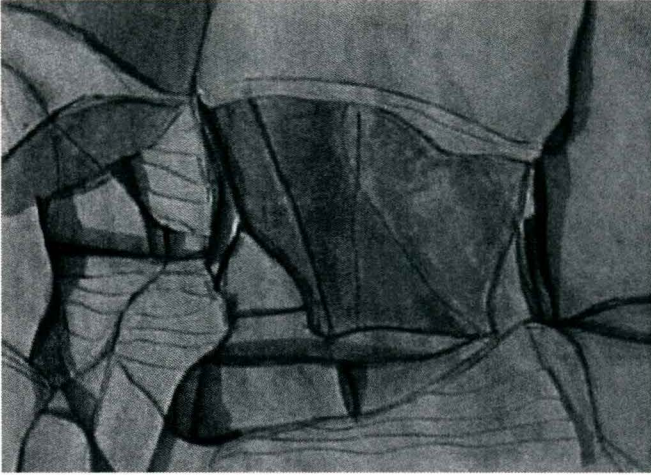
Fig. 3 *Model of Drumming*
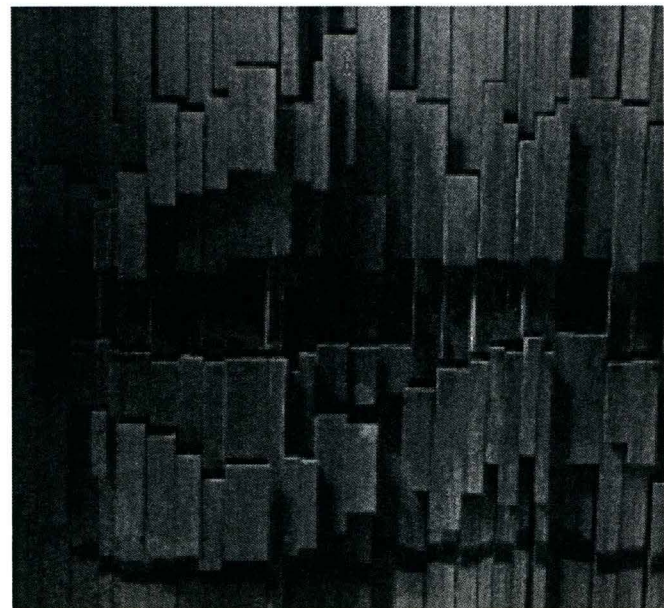
Fig. 4. View of project A Place for Composing for John Cage

of the music in lieu of adopting that of the composer (see figure 2). In essence, the students learn to sketch what they hear similar to how they would sketch what they see, honing their holistic perceptual and analytic abilities.

After producing a two-dimensional representation/recording of the studied composition, students study the written score to further understand the conceptual basis for the work. Oftentimes the language or notation does not resemble the typical staff notation of traditionally-based western musical composition. This is due to the experimental nature of abstract musical forms that challenge the established structure of western music and call for a different mode of conveyance between composer and musician. Students learn to rethink how they record and convey their designs in this manner, possibly even devising new representational techniques of their own.

The next step of the process is to construct three-dimensional abstractions based on their prior notations and re-examinations of the music sonically. These models are not necessarily intended to just be extrusions of the students' drawings, but are allowed to evolve and transform as the concepts behind the music take physical form (see figure 3).

Fig. 5. View of tectonic music model
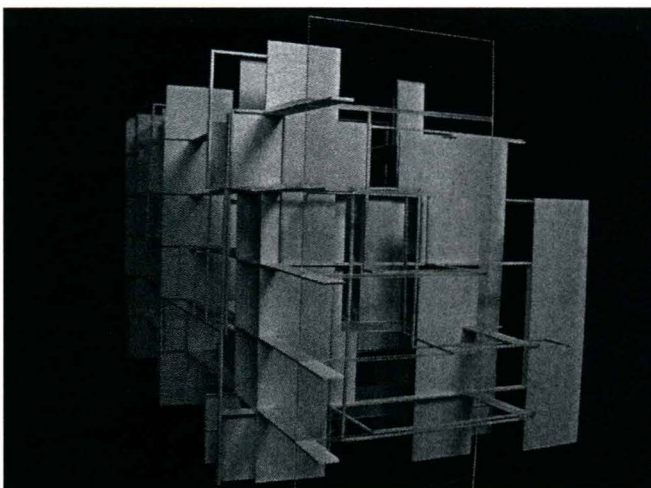
What is important is that the conceptual structure of the music be apparent in the abstractions, and form a basis for an architectural project that follows the analysis and transformation phase.

Students follow their analysis with the design for a small exterior space, A Place for Composing. They are limited to an earthen palette of materials (crunchy gravel, swaying reeds, hard stone, dusty earth, etc.) and are charged with not removing from nor bringing to the site any earth, only moving what is excavated. Projects are encouraged to dwell between the realms of landscape architecture and architecture, and to examine or challenge the notion of ground-plane as datum.

The user of each student's project is the composer that they studied, and their designs are to retain a conceptual basis consistent with that of the composer. Rather than being allowed to build projects from their drawings and models, students are pushed to reinvent their previous analyses, hopefully moving closer to a more skillful translation of the music into spatial form (see fig. 4). Any drawings of models that result from the design process are required to reinvent typical design media into an instrument of conveyance more appropriate to the subject of musical minimalism.

The remainder of the semester is devoted to architectural building projects that are devoted to the concepts explored in the musical analysis. The projects are pushed beyond the level of the diagram as opposed to the first part of the semester, and become fully developed buildings with tectonic, programmatic, and spatial resolution. The programmatic nature of the projects, the [Philip] Glass Institute and the Baltimore Concert Hall, allow for the evolution of minimalist concepts into more mature, architectural strategies.

The entire design studio reportedly benefited greatly from this process-based methodology, especially in regards to their perceptual and analytic abilities. Being forced to use graphic means to translate non-visual experience allows students to develop a means by which to synthesize multi-sensory input in new and meaningful ways. Using architecture as the end product of the process, students were able to test their research with a tangible end result. Students learn that a conceptual basis can be maintained through a design process rather than being forgotten along the way, and that design concepts can be found in places beyond just the world of architecture.

Strategy Three: The Tectonic Context

The study of the making of musical instruments and the traditions within which the instruments are used can elucidate greatly beneficial lessons about fundamental design concepts. Notions of interiority versus exteriority of instrument space, circulation, sequence, and thresholds can all be explored through an analysis of instruments as artifacts, but this is only scratching the surface of what is possible.

Again, using the fundamental design studio, an analysis and design methodology was developed to explore notions of space and creation beyond the usual brackets of architectural

Fig. 6 Uilleann pipemaker Nick Whitmer and students in his workshop in Virginia.

pedagogy. In this methodology, students selected an instrument from a list of possibilities and sought out its origins, cultural meaning, use, tonal range, and craft. Drawing upon the talents and generosity of regional artisans and instrument makers, the studio visited flute makers, drum makers, mandolin makers, and even bagpipe makers in order to get a first hand understanding of the tradition of making and playing musical instruments. Craftspeople such as the famous pipemaker Nick Whitmer, shown in figure 6, walk students through the treating and aging of materials, the process of creating acoustically perfect interior spaces (bores, resonators, sound chambers, cavities, etc.) the ergonomics of exterior conditions (keys, fretboards, valves, etc.) and the body of the instrument that allows for the interiority and exteriority to have a dialogue, thus producing sound.

Instrument typologies were selected based on three basic conditions of making interior space:

1.   Bored and turned instruments such as most woodwinds (flutes, recorders, whistles, clarinets, oboes, pipes, etc.) These instruments are turned on a lath and space is carved from the wood. Space is extracted from solid, and apertures are punched as individual openings.

2.   Stretched and framed instruments such as most percussion instruments (drums, bodhrans, etc.) Space is made by stretching skins over a taut frame that is usually made by bending a flat material into a ring. Ideas about the nature of material, translucency versus opacity, thinness versus thickness, and rhythm are typically issues that are explored.

3.   Surfaced and assembled instruments such as most string instruments (violin/fiddle, guitar, mandolin, harp, etc.) Space is created by assembling a thin shell, attached sometimes onto an armature or frame for stability. Issues of lamination, thinness of material, and connections are among many others for exploration.

Process

Students begin their analysis by first creating a stereotonic analog to the instrument of their study. Resulting analogs range from actual playing whistles and flute-type instruments,

to stringed resonating chambers, to more abstract items that don't actually play. Scale drawings are produced in plan, section, elevation, and axonometric, and details indicative of the instrument are studied and sketched. Every effort is made to simultaneously understand the instruments as artifacts and as tectonic creations with architectural meaning.

After conducting research into how the instruments are played and the type of music with which they are associated, students prepare to design a studio or workshop for an instrument maker. Students gain an understanding of the basic spatial needs in the making of instruments from their workshop visits, and though they are not responsible for the exact hardware needs due to the fundamental level of the studio, they are able to make projects specific to each maker based on how material is stored, processed, manipulated, and assembled.[11]

Projects are sited into rhythmic, urban contexts so students can sequentially and tectonically continue their musical interpretation with the structuring of their workshops. Sequentially, many students are able to diagram their sites as a piece of music and knit their projects into this structure.[12] Projects take on the rhythmic and tectonic qualities of the instruments to be made within them. A space for the making of drums, for example, is enclosed by walls of stretched animal hide, a space for the making of flutes is carved into the side of a building with punched apertures to the outside, the space for the making of guitars is enclosed by planes of wood secured to a frame and is reached via a ramped metered sequence resembling the divisions of a fretboard.

Strategy Four: The Spatial Context

The fourth methodology has been implemented a few times, each time slightly differently, but the goal each time has consistently been to create a spatial, sequential abstraction of music that can be experienced as a piece of architecture. Passing through the end designs, one understands the music in spatial rather than aural terms. Ideally, one would also consider acoustical design strategies along with spatial ones, so

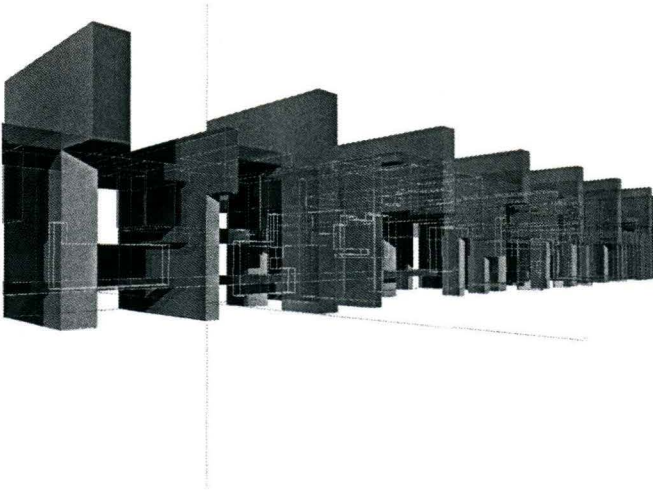Fig. 7. View of workshop for guitar maker
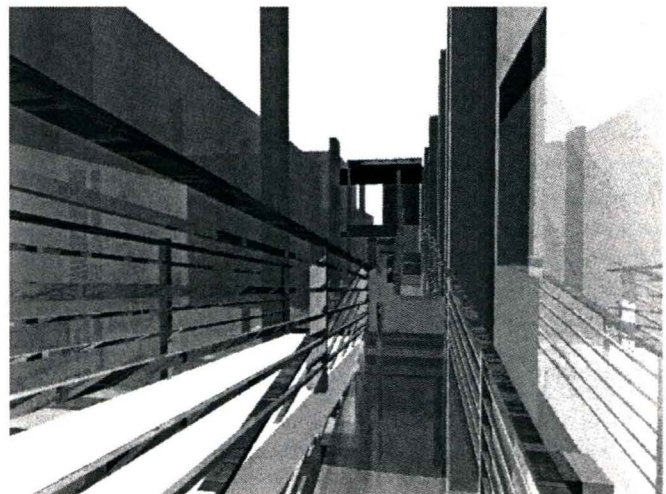
Fig. 8. Digital model of Irish traditional music

that the sound of different parts of a musical space could be designed to relate to other aspects of the music-to-architecture translation. Perhaps a space deriving from a frenetic musical passage could not only be visually punctuated accordingly, but also sound equally frenetic with multiple overlapping echoes created by hard, reflective surfaces. This later phenomenological intention has yet to be fully developed given the fundamental level of the studios in which the project has been pursued, however, it would make an interesting addition to the project at a more advanced level of study.

This project involves a three-step translation from analysis, to abstraction, and finally design. The process begins with the analysis of the students' choice from a list of western musical traditions contributing to an American musical form. The genres used in the study include Irish traditional, Cuban, American jazz, rock and roll, and European classical.[13] A constructed list of translating terms allows for first a drawing and then a model of the particular tune to be created. Using the quarter note or quaver as the primary structural meter of the tune, we equate a standard construction module of 48 inches. Any material or structure system at this fundamental educational level will be divisible by this module. Of course, it can also be broken into three modules of 16 inches, four modules of 12 inches, two modules of 24 inches, and so forth.

The most difficult term to equate between music and architecture is the essential building block of each. What is architecture in its most primary form but the shaping of space? This is of course a flagrantly broad assertion, but for the purposes of fundamental design education it works. The same question when posed regarding music has to achieve an answer of sound. In fact, many music teachers use space as a metaphor for how to play. Anne Santoro, a former Carnegie Hall performer (clarinet) states that she was taught to play expressively in spatial terms. Certain passages of pieces would require her to fill a vertical space, as in a cathedral. Other times, she was encouraged to play to one side or the other in a more horizontal manner. While it may be impossible to understand this technique fully, suffice it to say that the connection between the spatial and the aural is not com-

pletely novel.[14]

Students are first asked to discern the space occupied by the tune, following the melody line as it climbs and descends in section, first documenting the space created by the melody, and then the detailed relationships within the melody. The relative distance between each tone corresponds to a similar sectional change as the tune is drawn to scale. Legato and staccato describe a connected transition from tone to tone and a separated transition respectively. The idea of these tonal connections and the practice of ornamentation occurring between and separating tones can be ascribed then as how each element on the page relates to others.

The tempo or time of the tune is measured using the 48" construction module as a basis for a structural grid to be drawn. As described before, specific types of tunes have very specific timing. This corresponds to the number of notes or beats that will occur in equal divisions of the tune. For example, the double jigs that students worked with have a time signature of 6/8, meaning there are six eighth note beats to each measure of the tune. Variations within this occur allowing for quarter notes to take the place of two eighth notes (commonly called quavers), or dotted quavers taking the place of three eighth notes, and so forth. This adds variation to the tune, and in the case of a double jig, an emphasis to certain parts of each measure of music. How each note or tone then aligns to the structural grid then creates different conditions of overlap and synchronicity. Translated architecturally, relationships between the spatial unfolding of the music can express the structural grid, or deviate from it accordingly.

Further structural characteristics beyond simply the melody and tempo must also transform in order for sufficient complexity to be achieved. While relatively infrequent in traditional Irish music, harmony affords the possibility of further layering to occur, whether it is spatial or formal. As the melodic translation results in spatial articulation, as harmony is fundamentally a secondary or tertiary melodic layer, then it too should translate as spatiality. Depending on the relative tonic relationship between the melody and the harmony at specific points, the harmonic spatial layer can occur parallel to, oblique to, tangential, or within the primary melodic spatiality. Whether the melodic tone and the harmonic tones are in or out of phase can determine whether there is a volumetric connection between the two (or more) spatial constructions. This process can continue to encompass as many layers of translation as desired, and can be taken to as small a detailed level as appropriate to the level of students involved.

After every additional aspect of the students' observations is conveyed to paper, the tune must again be analyzed in order to extrude or interpret the drawing into the third dimension. The diagrammatic tunes are then given volumetric sustenance and built as abstract armatures of limited materiality. Students are encouraged to not uniformly extrude the tune from the paper as a base, but instead to work simultaneously with negative and positive heights for elements. Similarly, elements on the paper are allowed to remain as additive elements in the

built armature, or as voided elements, as long as there is consistency to the logic. One method of determining what is additive and subtractive is the defining of a datum extracted from the music itself. For example, the particular tone that separates two octaves can serve as the datum, placing the lower octave below this level and the second octave above. Tones in phase with the background drone can be treated as either additive or subtractive, while tones out of phase can be treated as the other. Students learn an invaluable lesson of prioritizing systems, and use it consistently throughout the development of a project.

Students are asked to decide how to attach the various layers of their constructions to one another, using rules that they have developed in drawing the relative relationships between notes and notes, notes and the beat, between the melody and any harmony, etc. One method for attachment utilizes the notion of melodic ornamentation, "extra" notes added to a tune in order to separate two like notes when playing legato style, to express or draw attention to a specific passage, or to add a texture to the music unique to traditional Irish music. In many cases, a highly evocative tectonic is developed that can serve as a basis for the next step of the translation.

The tune armatures are then recreated on the computer, allowing for space to be sculpted within the material solids. Using form Z as our digital modeler, students constructed their armatures digitally, ascribing material thickness to each element. What was treated as a solid element in the physically built armature now becomes volumetric with membrane thickness. Since passage through the constructions is now possible, an architectural procession can be mapped through the projects, and space can be hierarchically gradated from public to private, thus continuing to ascribe specificity to the spaces and allowing for further "inhabitation." Using the walk-through capabilities of the program, students can now study how spaces connect and flow into and through one another, and can continue to design the details of thresholds between disparate layers.

In the end, one can virtually occupy the tune as one would occupy a building, but without the imposition of preconceived ideas of windows, doors, stairs, etc. This allows for the design to remain in an abstract, conceptual stage and encourages the avoidance of "default" architectural (or building) elements being imported into the project. The transformation from concept to physical manifestation also allows for relationships between seemingly disparate elements of a design problem to be discovered and exploited positively. Unfamiliar subject matter in a project's determinants can be made comprehensible through this process, enriching the students' collection of design determinants. Complexity and contradiction can be understood and commandeered within any contextuality, further opening up the possibilities for new avenues of architectural investigation. The translations are intended to operate experientially and compositionally in the students' designs.

Conclusions

One of the most rewarding assignments has been for a real-time drawing exercise while listening to music of the students' choice. Based on an idea that was shared with me at a conference,[15] students sat on the ground with newsprint and large messy drawing utensils (charcoal, crayons, markers, paint brushes, etc.) with their headphones on, and simply expressed what they were listening to with no rules. They later pinned up their creations and tried to figure out what type of music each piece was describing. The resulting discussion told more about each student's personality, life experiences, unique talents, and particularly their own special needs in the class than any other exercise I have ever assigned. It was an absolute joy to watch the students sit there and draw without concern for achieving the correct answer, without concern for what others were doing, without worrying about their grade.

Musical projects offer limitless potential at many different academic levels, from fundamental studios to graduate studios. As complex as music can be treated or as gestural, it most certainly challenges the students' abilities of perception and analysis in ways that are profoundly applicable in the design of the built environment. Not only do students simply enjoy working with a familiar, not-necessarily-architectural-subject like their favorite music, the studios have always produced very exciting and innovative work from the musical translations. By learning the basics of composition, layering, meter and rhythm, structure, and so on without a jump to building design, fundamental design students develop more adept abstract reasoning skills. This is largely due to the fact that they are required to use visual means to record aural subjects, and translate these recordings into spatial creations. Learning to move between the senses in this manner, particularly with as dynamic subject as musical composition, fosters in a student the ability to think beyond the box.

In architectural projects following such a musical translation, students tend to be able to use means of perception and conception with which they were previously not so facile or familiar. Manipulating the section of a project along a sequential path becomes more of a natural process, and inventing new methods of connecting materials to frame becomes the norm. I believe that if a fundamental design instructor is willing to push their preconceived notions of music, and are willing to take a chance with a studio project's expectations (many wonderful surprises can emerge), virtually any curriculum can benefit from such a methodology.

Notes:

1   The practices of architecture and construction bear many similarities to the practices of composition and musicianship. Not only aligned as creative disciplines, the manner in which each profession operates is remarkably similar. The manner in which information is formulated, translated, and interpreted is only one of these professional similarities. Even the training and apprenticing commonly practiced or required of each is arguably consistent with one another. However professionally similar the practices may be, inherent to this study is a more extensive understanding of the structural ties that can bridge the boundary between what most would consider very different occupations.

The most striking and useful professional similarity lies in the methodology by which compositional intentions are conveyed from inception to completion. Simply stated, there is an intermediary stage from composition to construction and performance in the form of a document that outlines how ideas are to be made manifest. Either a set of construction documents or a score is necessary to outline the main intentions or rules of a composition. This either can be seen as a communicative recording or approximation of how the composer/architect anticipates his or her intentions to be constructed. This forms the basis for a dialogue between allied practitioners, architect and builder (contractor), or composer and musician (conductor).

In most of these relationships the ways and means of construction or performance are assumed the responsibility of the contractor or conductor, thus the dialogue carried forth by the transcription of intent leaves much room for expression and embellishment. The exact relationship and sequencing between various trades or instrumentations is determined by the contractor or conductor, allowing for and encouraging the expertise of each trade to improve upon the framework set forth in the construction documents or score. In the case of either architecture/construction or music, virtuosity of manifestation is essential to the timeless success of any project, as historic masterpieces of either discipline will demonstrate.

Virtuosity is encouraged and desired in the arts, including the practice of architecture or musicianship. Both disciplines use the model of practice as the primary vehicle to attain professional maturity. In the design studio (educational and professional), design projects are worked and reworked continually until a well-resolved solution is achieved (sometimes culminating in construction in the professional workplace). The education of an architect is based on much iteration of this process until an adequate mastery is attained, but only after much repetition of projects assigned in school, in internships, and over a period of time in practice often assumed to span decades. Many have been quoted to have hit their stride as practitioners in their late forties to sixties, and some continue to improve/practice into their nineties (i.e. Phillip Johnson).

One finds that the education of a musician requires a similarly repetitive model of continual practice and refinement often culminating in performance. Here as well, many are quoted as not achieving mastery until moderately late in life (i.e. Seamus Ennis, the famous Irish uilleann piper is quoted as saying it takes 21 years to become a piper: seven years learning, seven years practice, and seven years performing). As in the discipline of architecture, students of the pipes traditionally begin their instruction with an instrument maker in their area. As proficiency was gradually gained, the student would serve as an apprentice to the maker, helping out in the shop. Mastery of the instrument coincided with the mastery of the craft; the apprenticeship often culminating with the production of the student's own instrument. This model has existed for hundreds of years.

2 Manuscripts dating back to 1171 during the reign of Henry II document the existence of Irish musical form similar to what is presently known as traditional Irish music. Further evidence demonstrates that it is relatively unchanged since the dark ages.

"The attention of this people to musical instruments I find worthy of commendation, in which their skill is beyond comparison superior to that of any nation I have seen, for in these modulation is not slow and solemn, as in the instruments of Britain, to which we are accustomed but the sounds are rapid and precipitate, yet at the same time sweet and pleasing…delight with so much delicacy, and soothe so softly that the excellence of their art seems to lie in concealing it… Flaherty, Bernard, Trip to Sligo,

Purcell Print, Boyle, Co. Roscommon, 1990, page 1.

3 The term "sesiun" is the Irish term referring to a frequent gathering of musicians. The English term "session" as in "jam session" very likely is based on this word.

4 WYSIWYG is the computer anagram for "what you see is what you get" referring to a variety of software relying on intuitively based graphic tools to input data rather than the input of data in text or code form.

5 Carson, Ciaran, Irish Traditional Music, The Appletree Press, Ltd., Belfast, Northern Ireland. Page 5. This small but prolific guide to Irish Traditional Music focused not only on the instruments and structure of the music, but also on the historical and sociological meaning of it.

6 There is very little harmony (tonic combinations that share converging and proportional wavelengths resulting in a pleasing sound) with most Irish musical traditions. Most practitioners in fact discourage harmonic accompaniment, although some rare instruments actually can accompany themselves (melodeon, accordions, uilleann pipes). Over hundreds of years, Irish piping tradition, for example, has developed a bagpipe that allows for a melody to be played with the hands, harmonic chords to be played with the wrists, and a constant drone to be played via a complex system of reeds, valves, and pipes. As in most Irish music, the melody is the focus of the piper, but at times the piper can in essence accompany him or herself. This can be performed with the wrist keys to create harmonic chords, a second melody, or a "vamping" contrapuntal rhythm of tones in synchropation with the primary melodic structure of the tune. Thus a simple melodic structure can become quite rich with complexity and contradiction the more a tune is explored. Vamping refers to the utilization of harmonic chords or single notes in a rhythmic manner to add texture or momentum to a tune, specifically by an accordion player or a piper. Finbar Furey is famous for this technique which he acquired from the playing of Johnny Doran, Patsy Touhey, and Seamus Ennis. When asked why he played as fast (referring to both the chanter and vamping) he often replied "Because I can."

7 This diatonic structure, which predates much of western music, (most likely rooted in early Chinese and Greek vernacular musical forms11) is straightforward enough for students to easily understand the tonic relationship between notes without the necessity of introducing a lot of musical theory. There are usually only two octaves of possible notes in any given tune, with a maximum of 15 diatonic tones or notes with only two standard semi-tone variations (characteristic of either the key of D or G). This rigid structure limits the otherwise great expressive nature that such musical studies can posses, and requires that precision and constant modules of construction be utilized. This sort of restraint would otherwise be a difficult concept to convey to students, particularly those beginning their architectural education.

8 Composers and authors Michael Nyman and Wim Mertens wrote seminal books that first grouped the four composers Young, Riley, Reich, and Glass together as a school. Experimental Music: Cage and Beyond, written in 1974, and American Minimal Music, written in 1980, discuss the similar initial compositional aesthetics of the four composers and their reaction to academic music called Serialism (by composers such as Pierre Boulez, Kharlheinz Stockhausen, and Milton Babbitt), and the Indeterminacy of John Cage. Though the first couple of decades of the minimalist composers' work had a similar conceptual basis, each began to evolve into very disparate, diverse musical forms.

9 Martin, Elizabeth, "Y-Condition", Pamphlet Architecture 16, Princeton Architectural Press, 1994. Page 17.

10 Frances Colpitt, Minimal Art: The Critical Perspective (Ann Arbor: UMI Research Press, 1990), p. 23.

[11] For example, Nick Whitmer the pipemaker must store long blocks of rare woods in a stacked, criss-crossing grid to maximize exposure to wood as it settles and cures. It is cut into specific sizes based on dimensions of pipes, turned on a lathe, and drilled on a drillpress. Human movement through space in these processes as well as the serial nature of wood storage has certain architectural implications when compared to the bending of wood and stretching of skin in the making of frame drums.

[12] This is not to say that in this methodology students are made to perform urban/site analysis with musical staff notation. Staff notation is not descriptive of qualities of music as much a language all of its own. As with students working with minimal music, a notation is derived by the students that portrays the urban context as layers of structure (rhythm, harmony, melody-space, scale, consonance, dissonance, counterpoint, etc.) that are analogous to basic musical characteristics.

[13] The assortment of musical selections has included:

The European (classical) -

Tchaikovsky's Dance of the Sugar Plum Fairy and the Waltz of the Flowers, Bach's Air on a G String, Mozart's Overture: The Marriage of Figaro, and Eine Klein Nachtmusic: Minuetto Allegretto;

The Latin -

Israel Lopez's Pueblo Nuevo danzon, and Bueno Vista Social Club danzon ;

The Irish -

Leg of the Duck jig, Kid on the Mountain slip jig, Frieze Breeches jig, Sliabh na Mban air

The American (Jazz) -

John Coltrane's Blue Train

Wynton Marsalis's Caravan

Glenn Miller's In the Mood

The Depraved -

AC/DC's Back in Black

The Modern -

Phillip Glass's Einstein on a Beach

[14] Anne Santoro was a student of mine in the summer of 2000. She is a classically trained and award winning clarinet player. Her symphony orchestra was asked to play Carnegie Hall prior to her coming to the University of Virginia. Because of her tremendous musicianship and scholarship (Anne is an Echols Scholar, majoring in both religions studies and architecture) we have been able to share ideas about the integration of music and architecture. It was this integration in fact that has encouraged Anne to transfer to the school to architecture upon completion of her religious studies degree.

[15] I believe this project was shared with me and encouraged by Frances Bronet of Rensselaer Polytechnic Institute. If I am incorrect in crediting her in lieu of anyone else, I offer both my apologies for the error and my profound thanks for the idea.

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