MUSIC IN ARCHITECTURE / ARCHITECTURE IN MUSIC

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ABSTRACT: The purpose of this exploration is to study the relationships between musical composition and architectural composition and the relationships established in expression through design with musical elements and architectural elements. Central to this exploration is the development of an interactive computer software tool: a fully three-dimensional computer graphics/electronic music interface for architects, artists, musicians, designers, educators and students that allows musicians to create and modify graphic forms and spaces through their musical input and allows designers to compose and play music through the design of their graphic architectural compositions.

In exploring the relationships between musical composition and architectural composition, interdisciplinary connections are explored in terms of both disciplines' design theory, design process and execution (or performance) of pieces in both artistic mediums. This interdisciplinary approach encourages the critical analysis of formal and spatial design qualities in each medium as well as the analysis of individual artists' personal interpretations of others' compositional ideas. It also supports a new method of theoretical design for both disciplines - the music of architecture and the architecture of music.

Although interdisciplinary studies in the design arts have long been discussed, from Goethe's assertion that 'architecture is frozen music' to recent attempts by noted Santa Monica based architects Morphosis to create a "jazz" architecture, there lacks the tools to adequately analyze the common threads linking the musical world and the architectural world. Current micro-computer technologies and processing abilities coupled with the advent of digital musical instruments and music standard Musical Instrument Digital Interface (MIDI) allow this type of study to move forward past the dialogue stage into the arena of sophisticated critical analysis.

The central focus of this project is the development of an interactive computer aided design/analysis software tool: a computer graphics/electronic music interface, designed to create fully three-dimensional graphic forms and spaces from musical input and to compose music through graphic compositions, where the physical dimensions of the graphic objects relate directly to the dimensions of the musical elements, i.e. pitch, volume, duration, tempo, voice, etc. A graphic editor allows the artist to graphically manipulate and change the images of existing 'songs' or sequences interactively while constantly allowing the work to be viewed three-dimensionally from a infinite variety of vantage points.

Views can be abstracted to isolate dimensional qualities in the piece to study models in two-dimensional form (plan, elevation, section, etc.), extruded two-plus-dimensional form (geometric, axonometric, oblique, etc.), three-dimensional form (perspectives) or four dimensional sequences of lesser dimensional static images (animations, walk-throughs, fly-bys, etc.). Although the three dimensional architectural representations are helpful in determining how a design might appear or function once realized, it is difficult to fully recognize spatial, structural and compositional characteristics of an architectural design project until the work is actually built. The use of computer and video animations offers an opportunity to further explore the spatial, formal, structural, compositional and material connections linking these two artistic mediums - explorations that are usually prohibited by the scale and concrete nature of architectural artifacts.

ICMC GLASGOW 1990 PROCEEDINGS
361
Architecturally, compositions are represented by three dimensional images and video animations of sequences of those views. Musically, the program can play graphically composed songs through a variety of MIDI compatible electronic instruments. The interface developed between the two disciplines connects electronic musical instruments through the music industry standard MIDI interface through the computer's serial communications ports, linking to three dimensional computer graphic modeling and animation systems developed at the University of Minnesota's College of Architecture and Landscape Architecture. (Present versions of the software are currently being developed on Apple Macintosh computers supporting performance on up to thirty-two instruments simultaneously - sixteen separate MIDI channels of information through the serial modem port and sixteen channels through the serial printer port.)

The program is also designed to create hardcopy output of graphic images and musical scores providing a permanent visual image to be studied and compared to other works. The artifact of the visual image provide a base by which other works can be compared and contrasted, much in the way present musical scores and architectural drawings provide a consistent representation of the ideas in the work. Three dimensional graphics provide a more thorough representation of the musical work than do present methods. Many have shown the inadequacy of current music analysis tools (primarily the musical score and the human ear) to accurately identify elements in the musical work. A multi-dimensional model, however, allows individual aspects of the music to be isolated and analyzed alone or in context with the rest of the piece.

The advent of a common graphical convention also provides a common method for analysis of a single piece of music, several works by one composer, several works within one musical style, works across several different styles, works across several different mediums (architecture and music, for example), and perhaps most interestingly, a single piece of music as interpreted by several performers or as performed in different voicings. Graphic figures provide a permanent record to allow the analyst to recognize visual elements and patterns within the work, helping us to better understand the composers ideas. A graphical music allows the compilation of visual cues and images we use to mentally constructs spaces we experience in the built environment, a process not unlike the way we listen to music - compiling audio cues to mentally construct an understanding of the song's structures in time. This process allows the listener to move beyond the temporal linear sequence of notes to develop a organization built upon the memory of what has been heard (or seen) and the anticipation or suggestion of what might happen next.

A graphical artifact also allows us to study different individual interpretations of the same composition - what makes each performed piece unique and what ties it to the composer's original ideas. This idea leads to a more specific method of composition - what exactly does the author want - and, a more specific method of what is essential to the composition - what needs to be there, what can be improvised or interpreted, what needs to be executed and in what fashion, etc. The idea of pattern recognition, pattern design, and pattern modification (whether visual or audio) while significant in analysis, is also of central importance in composition, both in our own original works and also in recent developments in determining how to make computer generated compositions and performances appear more 'life-like' and less automated.

The architectural connections to the musical world are more than just a graphical convention of abstracting and representing ideas in different artistic mediums. They share fundamental connections in the creative processes of structural expression and conveyance of ideas as an assemblage of elements in time and space - building musical structures in time and composing architectural structures in space. It is beyond the mere semantic links of the synonymous terminologies of each medium - structure, form, line, point, repetition, rhythm, balance, space, theme (and variation), etc., that these combinations of notes into chords and phrases and of materials into architectural elements and assemblages occur. The connections are beyond the rhetoric of the dialogues employed to discuss and weigh these artistic ideas, but rather are central to the methods and processes we employ in creating works in either medium. These elements (line, point, rhythm, etc.) are the compositional building blocks we assemble to express our thoughts, both consciously and subconsciously, in both mediums.

ICMC GLASGOW 1990 PROCEEDINGS

362
The development of an interdisciplinary design tool poses a unique opportunity to explore the advantages different mediums of expression have on our work. Different people express themselves more effectively in different mediums. Some of the most gifted writers cannot express themselves well outside their craft, while many fine artists have difficulties expressing themselves verbally. Often the strongest artistic inamemae are not solely the product of talent, practice and execution but of a combination of efforts directed through the individual's most appropriate or natural form of expression. This idea goes beyond pure artistic expression, relaing as well to the way our minds work in processing and organizing the information we acquire. An interdisciplinary design tool allows us to look at this pheomena not as a liability or blockage of talents but as an asset in providing the ability to tap into more effective modes of thought and expression. How can we use a musician’s uniquely musical talents to create new works of an architectural nature. How can architects who possess excellent visual and spatial organizational skills but can’t play a musical instrument best utilize their innate talents to compose and play their own musical compositions.

Figure 1. (above) Plan view of a composition for guitar played on a Casio PG-380 Guitar Synthesizer.

Figure 2. (above) Axonometric view of a composition for bass guitar played on a Yamaha KX-48 keyboard controller driving an Emu E-MAX II digital sound processor.

Figures 3 and 4. (below and right) Perspective views of a composition played on a Casio PG-380 Guitar Synthesizer.