Abstract. The work presented is an ongoing design investigation inspired by jazz improvisation. The project is a series of architectural improvisations that spontaneously transpose, manipulate and articulate various links, connections, joints and transitions present in this type of music. The process of improvisation involves an expanding series of analog and digital design techniques developed over many years. Later experiments build on the knowledge of earlier ones. The production is for the pure effect of production.

Keywords. Improvisation; process; action; imagination; creativity.

Self-imposed design communications

Bebop constructions is an ongoing design investigation inspired by jazz improvisation. The project is a series of architectural improvisations that spontaneously transpose, manipulate and articulate various links, connections, joints and transitions present in this type of music. The work begins as a simple underlying structure that grows with compulsion, featuring a series of layers that interact, communicate and supersede each other. The disciplined deployment of primary, secondary and tertiary precincts is articulated within an overall geometrical arrangement. Each construction is a complex work of resultant simplicity derived from an ordered language of constants and variables, articulating the elements of size, shape, treatment, location and orientation.

This process requires a call and response form of self imposed communication. A period of practice precedes an established direction, building on the knowledge gained from previous intuitive takes. After working on several improvisations in a row, previous key moves and patterns start to repeat themselves instinctively as variations within the structure. These improvisations are performed in as many takes as necessary until a high level of dexterity is established. Similar to a masterpiece jazz improvisation, each construction is invented on the spot, based on an underlying vehicle, prior memory, knowledge, mood, feeling and creativity.

Bebop Constructions is a poetic design process driven by actions instead of words. To the designer, these actions are liberating and exhilarating, as the pressure to make quick, on the spot decisions is accomplished. There is a negotiation between individual moves in a construction, and the reconciliation of elements relative to an intrinsic network. Ultimately, it is a search for the logical arrangement and articulation of objects defining spatial structures.
within a structure. The complexity is discernible, always traceable back to its original order. This process never follows a strict recipe or formula. The relationships are constructed, as an accumulative search. The entire process is also the product. The designer can extract from these processes at any time, allowing for an interpretation of space, line, volume and texture translated to any dimension at any scale, as a detail, as a building, or as an urban design.

Bebop Constructions wakes up architectural imagination to experiment, discover, manipulate, interpret and communicate. The site of this investigation is the designer’s mind. The viewer, as client, determines the program. The material is form and light. The function is the psychological demand of spatial experience. The budget is time, passion and commitment to the study of architecture.

Experiments in analog-digital improvisation

The process of improvisation and variation on a theme involves an expanding series of analog and digital design techniques developed over many years including: video, video-capture, animation, photography, photomontage, image manipulation, drawing, modeling and laser controlled fabrication. The context is itself. It grows, refers and communicates within. The production is for the pure effect of production.

One of the difficulties in presenting this body of work is that it tends to look like one step followed exactly after another step. In actuality, there is no linear sequence. Due to limited space, only major experiments and singular examples are shown. The images represent static moments of a dynamic design process.

Analog spatial manipulation device

The analog spatial manipulation device is structured as a volumetric space consisting of changeable vertical planes. The materials used are acetate, sticky-back tapes and foam core. A horizontal plane with slots serves as the supporting base. Simple markings are applied to the planes. One configuration is documented with a video camera. The camera lens acts as a filter for the designer’s intentions, flattening the physical space of the model and changing the scale perception.

Spatial enhancement and interrelated spatial narrative

A frame-by-frame analysis of the videotape reveals several unexpected viewpoints that challenge the model’s space. One spatially provocative frame is selected and captured into digital media. The designer uses image manipulation software to enhance the spatial reading, attempting to improve the inherent qualities that it already conveys. A variety of techniques correct an already mediated reality: blurring and sharpening edges; straightening, curving and extending elements; changing lighting and contrast; and transforming transparencies into translucencies.

The spatially enhanced image is manipulated into an imagined spatial narrative. A series of interrelated spaces is accomplished through repetition and perspective distortion. There is the illusion of moving from one space to another and looking in, and then back out through a semi-transparent screen, which partially reveals the view derived from the original capture.

Construction site captures

External visual material from an anonymous construction site is documented on videotape. Several video frames are digitally captured. Captures that emphasize and isolate captivating spatial viewpoints are examined on screen.

Transparent collage panels

This exercise employs a traditional mechanical (analog) collage process. Sticky-back laser prints of the construction site video captures are cut into fragments and strips, applied to both sides of several transparent Plexiglas panels. Black and white sticky tapes are used as an orthogonal counterpoint to the free form video-graphic information found in the construction site captures.
Analog-digital spatial manipulation device

The collage panels are combined into various arrangements. These are documented on videotape. The captures of the captures are exponentially more complex than the original. They contain not only fragments of the original construction site, but also interpenetrating images of reflected light and shadow caused by the interaction of panels.

Digital crystals and radical reconstructions

The designer constructs a vocabulary of digital crystals directly on the computer screen. A variety of significant fragments, shapes, textures and parts found in any of the video captures are selected, isolated, extracted and cataloged. Each study becomes a potential element that is combined with other studies to make new crystals.

The recaptured video improvisations combine and accrue as an aggregation of digital crystals, overlaid, stretched, compressed, repeated and varied. The play of opacity, transparency, translucency, black, white and levels of gray contribute to a sense of space. An almost material quality poses intriguing architectural possibilities. Digital media pushes the spatial qualities of the original captured image beyond its intrinsic aesthetic and conceptual possibilities. The end product holds a peripheral resemblance to the original video images.

Vector tracings

A somewhat literal tracing procedure translates the bit-mapped information of an underlying source image into vectors. The most important elements of the source are rapidly traced into discrete shapes that are separated by a compositional gap or joint. The drawing is a collection of disparate hybrid shapes, curves, angles, squares and rectangles. Elements can nest within elements. Elements can overlap elements.

Extension-line network and chromatic improvisations

A second series of tracings requires a rigorous process of realignment and editing. Every orthogonal element generates an extension line in both the horizontal and vertical directions. The progressive development of extension lines emphasizes an evolving internal structural reference system. This complex network of extension lines is the regulatory guide for discovering cross-precinct alignments. The incessant manipulation and articulation of elements suggests the addition or removal of elements or extension lines. Ultimately, numerous variations of the extension line drawings are generated before arriving at a refined structure.

The underlying extension-line vehicle is played as a series of chromatic improvisations. Selected elements and regions are filled with different colors. Each color (red, blue, black and gray) represents subliminal systems, sometimes metaphoric, other times organizational. The drawings are articulated as solid and void; figure and field; thick and thin; and open and closed. These studies have a sense of depth because of the strength of line weights and different densities of added or subtracted color. Complex relationships are read among individual elements representing reciprocal notions of plan and section. Each chromatic improvisation implies an equivocal depth as a gateway to three-dimensionality. These rhythmic improvisations entice the eye to search for multiple trajectories.
**Improvised physical relief model**

A physical relief model is projected from sets of interrelated chromatic improvisations. The designer can make decisions more effectively by viewing and testing a physical model with the hands and eyes as opposed to “virtual” manipulation within a computer screen. The designer looks at and in between to make instantaneous decisions as he improvises depths and thicknesses. The production of the improvisational relief model is a reductive process. There is an ambiguity between the resultant models and the generating drawings.

![Figure 9. Physical relief study model projected from a chromatic improvisation, Schema B](image)

**Cinematic improvisation**

Initially, the designer wanted to perform a live demonstration of how the chromatic improvisations are actually created. To the designer, these actions are liberating and exhilarating, as the pressure to make on the spot decisions is accomplished. As a representation of this effect, the designer records live actions from the computer screen. This video footage is sped up, edited and combined with the master take of the jazz performance “Leap Frog” by Charlie Parker and Dizzy Gillespie. Through illusory animation and time compression, this cinematic improvisation attempts to represent what is occurring in the mind of the designer as he creates these works.

![Figure 10. Image from the Bebop Spaces Video Take 2, November 2002](image)

**Digital relief and digital spatial manipulation device**

The digital relief is a transitional study between two-dimensional and three-dimensional worlds. It starts as a direct model of the physical relief model. An expanded digital model proposes transverse-sectional improvisations and other spatial possibilities. Once three-dimensional digital objects are created, their locations, number, and scale are reconsidered. The digital spatial manipulation device is constructed from combinations of relief elements that are duplicated and freely arranged in space. Deformations are applied to strategic locations. Several configurations are explored. In this experiment, design is the interpretive arrangement and composition of objects in digital space.

![Figure 11. Digital relief models (normative and expanded) and digital spatial manipulation device](image)

**Digital paintings**

This experiment explores the expressive qualities of solid, void, light, shade and shadow for each digital spatial manipulation device. Views seek the sequential possibilities of framing graphic space. Each view represents a potential spatial narrative: an outside to an inside to an outside; a compressed series of spaces within spaces; and multiple frames open or partially open to other views beyond. Some model configurations may not have a distinct inside. In this case the designer finds dramatic viewpoints from the outside looking up, down or through the structure. The images exude the spirit of the source radical reconstruction.

![Figure 12. Digital paintings.](image)
Laser-constructed visions - current and future trajectories

In the summer of 2007, two relief constructions were built with a laser cutter and a human assistant. Many significant discoveries were made during the process of construction. To the designer, they suggest major implications for future works, but are difficult at this point to communicate to others. They are still being evaluated.

This experiment constructs on the foundation of the previous improvisational works. It directly follows the major moves of the physically constructed relief studies and its set of interrelated extension-line network and digital chromatic improvisations. The scale of the original is doubled. The new scale opens up opportunities for space, detail and articulation.

The laser-constructed vision is a three-dimensional multi-tracked drawing. Each track (layer) must interact with layers below and above. The extension-line network drawing is printed several times. Each print serves as a design configuration worksheet for each laser cut. The sheets are spread out on tables so that the designer can work on all of the layouts simultaneously. The designer uses colored pens to fill in solids, studying the potential relationships between layers. The configurations are reconstructed in a digital vector file. The information in these digital drawings produces the laser cuts and a working three-dimensional virtual model of the design.

This experiment involves careful observation, measurement, alignment, calibration, negotiation, adjustment, refinement and redefinition. The designer must coordinate an analog-digital process while learning to work with both human and machine assistants. The designer directs the design and the assistants through the digital drawings and virtual model. Hand and eye coordination drives decisions, but in the ultra-precise sphere of digitally controlled production. The constructed physical result tests the virtual model. The designer has a direct feel and control of the design through the fluidity of digital making. The designer cannot escape the architectural implications and possibilities. The designer reads multi-directional interpretations and engages analog-digital call and response as an experiential inhabitation.

References


Acknowledgements

Kentaro Tsubaki, video capture collage and Justin Mecklin, laser cutter modeling.