

# Beyond The Design Threshold

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When digital technology finally assumes its farreaching potential, it will cross the *Design Threshold*. It will assume its own innate and universal identity, an identity and awareness that plays to the unique capabilities of digital design. While the purpose of this paper is to demonstrate the point of entry at the design threshold, through illustration, the discussion is fundamentally bracketed by historical forces.

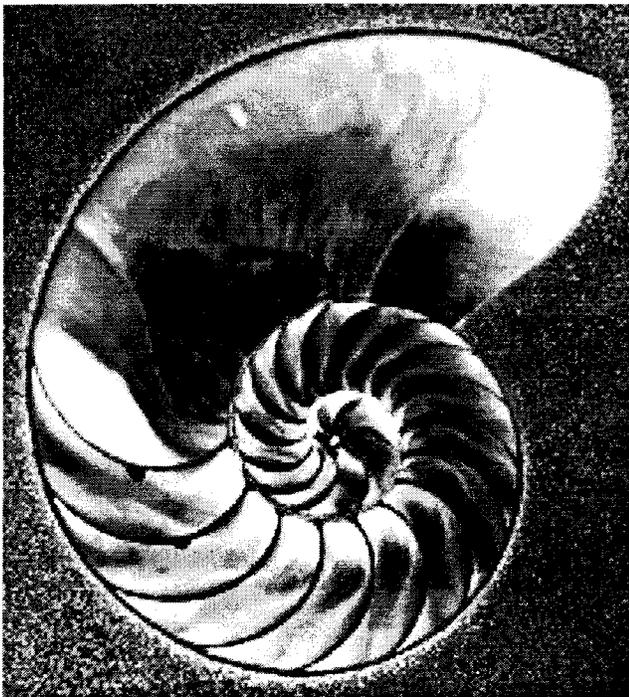


Fig. 1. The essence of beauty and the principles of design are timeless, and immutable. However, the processes necessary for their creation are in a constant state of evolution. The design threshold explores this potential.

## CULTURAL PHENOMENA

At the end of the twentieth century, the durability and direction of the information revolution is difficult to ascertain, particularly with respect to architectural education. Our understanding suffers from a myopic vantage-point, the penalty that history imposes when observations and evaluations overlap. Nevertheless, the promise of

technology has seduced our culture into its digital embrace. While we do not know exactly what we hold—it appears to be of significant value and natural curiosity fuels our interest.

Conventional wisdom suggests that the consequences of the Information Revolution parallel the radical changes born of the Industrial Revolution. Architecturally, this is ironic since today, as then, there is a nagging perception that human creativity is at risk and that individual initiative is endangered by demands for greater productivity and mechanization. In the 1850s, philosopher and critic John Ruskin admonished the Victorian reader “to look at the sumptuous furnishings of his house and to view them not as a triumph of modern progress, but as the expression of industrial slavery.”<sup>1</sup>

In architecture today, there is a widespread perception among practitioners and educators that while the digital revolution has increased productivity, it has done so at the expense of the creative control of the individual. Computers are therefore shunned by conventional designer/architects for potentially “spoiling the design process.”<sup>2</sup> CAD advertising often unknowingly promotes this negative stereotyping. Contrary to its intention, the imagery appears dull, repetitive and conceived in a world of plastic trees and witless cartoon people. It is difficult to imagine a serious designer seduced by this marriage of computer programming and marketing and should then come as no surprise that “most architects still prefer to deal with 2-D blueprints and cardboard mockups.”<sup>3</sup>

This resistance to technology is a reaction against shoddy and uninspired design practices that have trespassed, or perhaps more appropriately blundered, into the exclusivity of the design sanctum—technology not as an inherent evil but as a spoiler. This leaves design as the architect’s last stand, a resistance to the indomitable forces unleashed by the information revolution. Therefore, with design the one notable exception, architectural practice in the 1990’s has undergone a thorough digital transformation.

## EDUCATING THE ARCHITECT

At the University of Colorado, computers are not generally engaged in the design studio for creative purposes. While computers are widely used to compose graphic presentations, they see little application in core design/theory applications. There are individual exceptions, but these maverick attempts are handicapped by their isolation from the traditional culture of sequential studio development. A fractured educational model results, one that has at present relegated technology to the niche application of graphic composition.

Compounding this digital identity crisis in the studio is the larger issue of architecture’s identity crisis within the structure of the University. When architecture is pursued as a professional endeavor

at the departmental level it becomes marginalized and isolated within the research university. This occurs because the currency for validation at the individual and departmental levels is published papers, traditional research, and grants—not building design. Significantly, the Ph.D. empowered history, theory and philosophy components, by recognizing this fact, have assumed prominent leadership roles in order to fill the vacuum left by the design culture. This trend of theory-driven design has some concerned “that architecture has been hijacked by theory,”<sup>4</sup> and blame is assessed as the studio focuses on the “purely abstract intellectual architectural project.”<sup>5</sup> Under this tutelage, computers can be conveniently disengaged from design, since structured digital design methodologies are not critical to theoretical propositions.

Even if a common goal of incorporating digital technology into the fabric of architectural education is agreed upon as a necessary development, a common pedagogical strategy is unlikely to emerge any time soon. One opinion is that “A new interconnected computational environment demands the sharing of knowledge and methods. It supports collaborative design and engenders the tools to engage in it. However, to realize the potential benefits of incorporating the computer into design education, an explicit shift from the individual to the collective must occur.”<sup>6</sup> This perception of a pedagogic mandate for ‘collaboration’ raises the questions: Does the migration of power from the individual create subservience to collective interests? Are we simply revisiting Ruskin’s dilemma; is the loss of individuality the price of ‘the triumph of modern progress?’ If the computer inevitably consumes individuality, is architecture doomed to the polite collective response of economic necessity? In the academy, digital technology requires a rethinking of architecture.

## PROFESSIONAL PRACTICE

The professional community responds to the issue of digital technology through the dynamics of profitability, not theory. Certainly, design is a strategic function, but it often exists in a complex and supportive role, subordinate to the efficiency of the business of architecture. In any case, it is a tiny financial component in the overall architectural schematic. In many architectural offices, design has established a unique cache of professional stature, a reward that is jealously guarded and rarely abandoned. Frustration erupts when digital technology proves resistant to mimicry of established design processes. Senior designers can rarely commit the time resources necessary to master digital technology, and lesser attempts demonstrate that design methods are opaque to the technologically illiterate. This has created a situation, with design the noted exception, where professional architecture has undergone a complete digital transformation.

Architectural education has been left in the gaping chasm between the pragmatism of the profession and the requirements of the university. Students can spend years focusing on traditional theory and design, yet the computer illiterates find employment in the profession of architecture difficult to obtain. Conflict is inevitable.

If employment becomes the focus of the student’s existence, with an emphasis on computing, the only guarantee is the prospect of a job in architectural production—a career as a cog in the wheel of office machinery. Many students dread this cultural perception of ‘computer operator,’ a non-designer, toiling away until dreams are a memory and the soul is worn away.<sup>7</sup> On the other hand, if design is the *raison d’être*, there are two likely complications: First, there are rarely the necessary resources to propel a digital design career from within the current university curriculum, (especially a comprehensive approach with professional ambitions). Second, if traditional methods of design are engendered, the intern designer is likely to experience the same complications now frustrating professionals who are attempting to master digital technology.

It is a conundrum of extraordinary proportions. No single strategy is likely to adequately engage the educational, professional and human proportions of this issue. Whatever the sociological concerns, architecture must also exist within the context of its economic viability. Ultimately, theories must be tested in the fluid environment of technological and social change. Of course, mistakes will be made, but they are the necessary burden of progress.

## THE WORK

Digital design is differentiated from traditional design processes by the inclusion and maintenance of DNA-like linkages where the alteration of individual design components directly and systemically affects the design organism. It is possible to engage these inherent design linkages in endoskeletal circumstances where membrane forms the sheath for structure, or in exoskeletal devices where the shell and membrane are one, or in combinations of the two. The following endoskeletal experiment illustrates the spatial consequences of manipulating the core genetic design element.

Scale, position, orientation, and proportion are the compositional variants in the vocabulary of the digital designer. The ‘brick’ is a single core structural variable from which all vocabulary arises (all ‘bricks’ are inter-linked in the database.) Design is addressable at either the core or compositional levels. The danger to the designer at this point is of overextending the logic of one argument or strategy to the exclusion of others such as: materiality, context or function. The essential pedagogic position is that each design situation is unique; the designer must engage multiple, overlapping, and integrated strategies including those passed down from traditional practice.

## CONCEPT TRANSLATION EXPRESSION

The place of digital origin and awareness is the conceptual phase. Here the ideas evolve, assume substance and a digital strategy is organized. Through terms of translation (digital and other methodologies), ideas are refined through the interplay of visual and functional logic. Finally, place and space find expression in models (real and virtual), drawings and documents. The intended relationship between digital and traditional process is complementary and symbiotic and is addressed in the following topics of ‘threshold’ and ‘threads.’

## BEYOND THE DESIGN THRESHOLD

In order to engage digital process, it is necessary for the designer to identify the point at which digital techniques must be implemented—The Design Threshold. The three experimental projects that follow illustrate variations on ‘linked’ design strategies. The fourth and final project communicates the concept of threads in analysis and design. Characteristics of the design threshold are:

- The digital process becomes integral to the conclusion producing a design that would not have been reasonably anticipated otherwise. In this project, a Dali Painting is the point of departure into the realm of the digital.
- The intention of the designer is substantially and necessarily dependent on the interaction of digital process to accomplish the intended result. The second project’s organic premise is based on principles of self-similarity and the application of the fundamentally significant 1x1x1-design element.
- The complexity of the task exceeds the ability of the designer to accomplish that task by any other reasonable available means. Traditional practice is inverted in the third experiment. Elevations and sections inductively generate form, as opposed to traditional deductive representation.

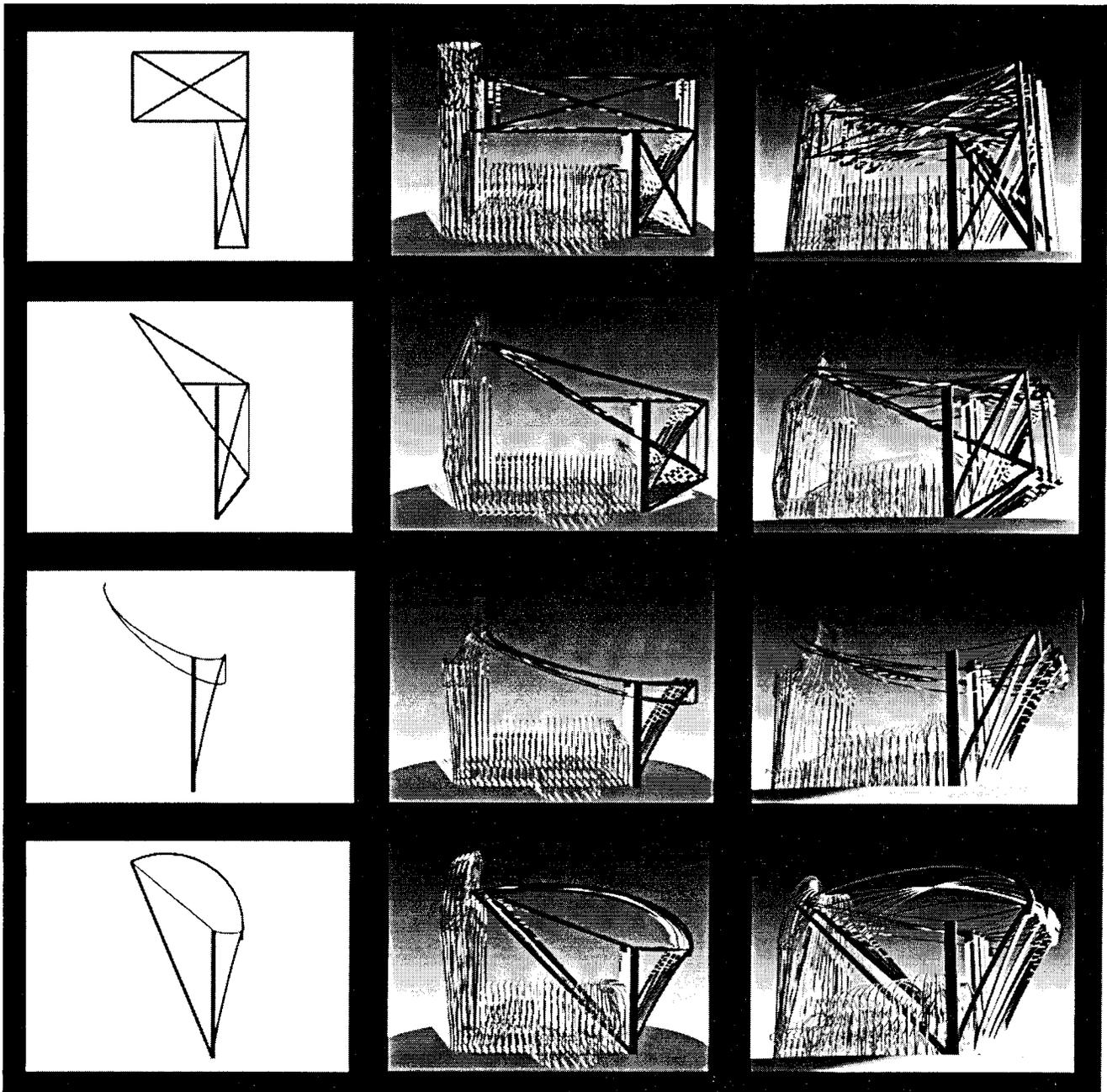


Fig. 2. Robin Morrison

### THREADS, ISSUES BEYOND THE DESIGN THRESHOLD

Ideas that extend as linkages from the Design Threshold to the result are "threads." Threads are the paths of symbolic representation. They move along an unbroken timeline representing elements as diverse as structure, membrane, materials, transparencies and function. Their meaning is often interdisciplinary and characteristically intertwined and interrelated. Each is initiated at the design threshold and may be altered and manipulated along the length of the thread. For instance, a core element (an element of structure) is included at the beginning of the thread. As a function of design, it is used at multiple times and locations as well as at various orientations and scales. Any redesign of core structural elements occurs at the design threshold. This creates systemic changes that alter all in-

stances. However, materiality is governed by another thread while both are continuous until the conclusion.

The concept of design threads cannot be taken to extremes and may require fragmentation, since software may not yet be written to allow a continuous thread. Another issue is that design is symbolic and buildings are real. Historically, symbolic representations are the currency of architectural design. Since threads operate in the symbolic equation of design generation and development, they are not intended to be interchangeable or substitutable for building process. The advantage of the symbolic approach is that diverse influences such as literature, painting and philosophy, and finance may impact design at any point along the thread. This allows competing influences to be evaluated interactively. This proposition is intended to illustrate viability of this concept through an exhibition of present capability.

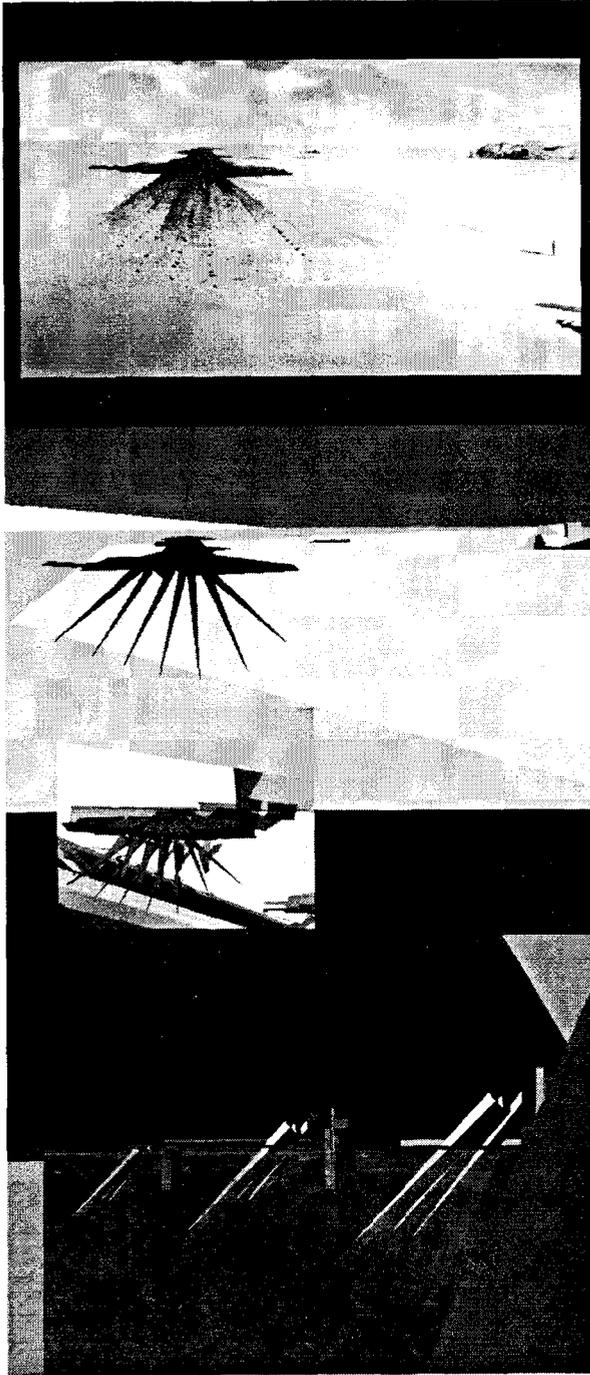


Fig. 3. Salvador Dali's paintings go beyond what we see on the palette. Each one tells a story that leads us into the brush strokes. At first glance Geological Justice appears to be a serene landscape portrait. Upon further examination it reveals that there is unimagined amounts of activity occurring below these "translucent" bodies of water. No matter how familiar we may be certain processes are only revealed through time. Such instances as when the water recedes farther than usual and shows us her belly. When the water parts two things occur. Images, unfamiliar to us, appear and those elements that sit undisturbed collapse with the water's movement. This interpretation is intended to be that point in time when these occurrences are taking place. The period when we are introduced to the "creatures below" and the sky falls into the sea. -- Alan Westman, ARCH6410.

The painting was interpreted and re-represented by two 2-Dimensional blocks. These two blocks are recombined, substituted for 3-Dimensional components and finally textured. Blocks and textures are continuous 'threads.'

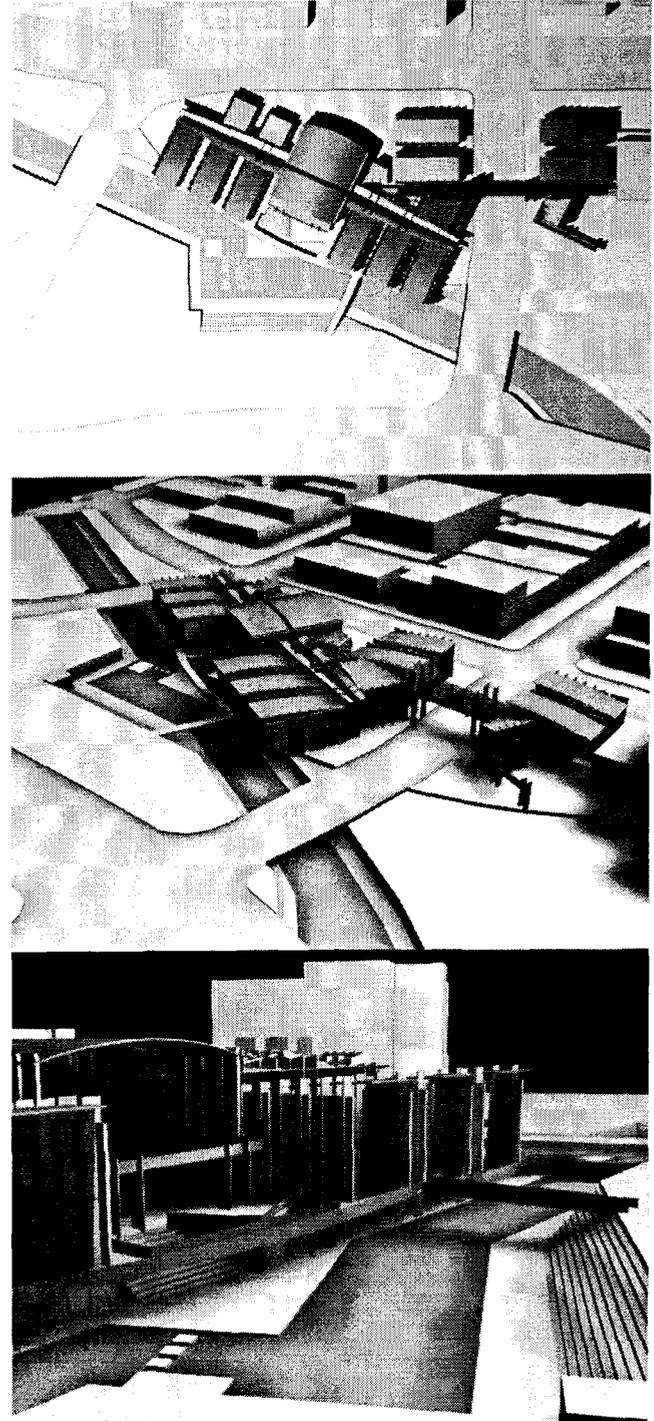


Fig. 4. The objective of this project is to express the grid system of lower downtown which signifies the development trace of historic Denver. A proposed unit is designed to fit this grid system and can be easily constructed by an industrial process. Cheery Creek is the main characteristic on the site so that all the openings of studios are facing it. A more interesting relationship between students and faculty is expected through the arrangement of program. -- Ta-Yuan Lee, ARCH6641.

The fundamental design component is a 1x1x1 unit cube. This unit is of extraordinary significance since it is capable of creating any scaled derivative as a 'thread.' There is a single core unit used to create all spaces within this design. The redesign of one replaces all. In this case, after the design was satisfactory, the thread was broken in order to resolve the intersecting buildings and passageways.

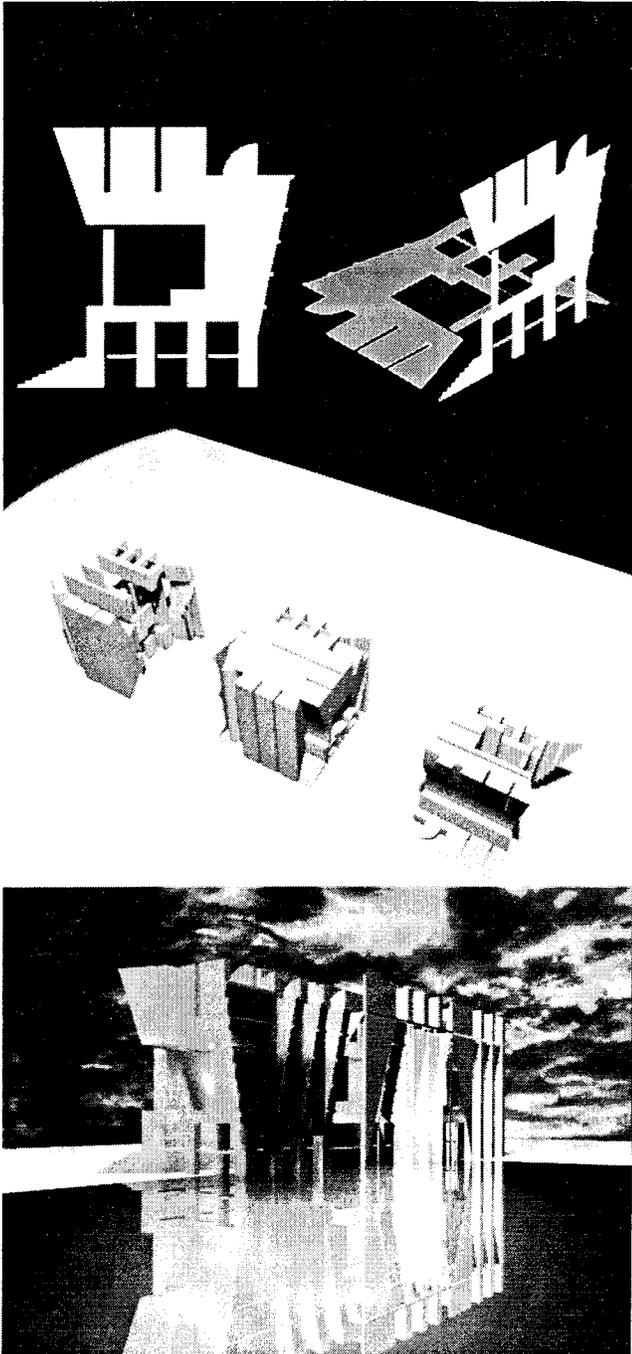


Fig. 5. Derivatives of Projected Planes. This assignment was a demonstration of the experimental concept of using variations of the single projected plane. I applied the materials to the selected faces. I used this building form for the projection in plan and elevation. I choose this form for my design because it contains the building characteristics that I wanted in the elevation. (In the middle picture there are three projection derivatives) The form on the left illustrates intersection, the form in the middle illustrates union and the form on the right illustrates the subtraction of the plan from the elevation. -Sira Sirivanta. ARCH6641

Here, the complexity of the task exceeds the ability of the designer to accomplish the task by any other reasonably available means. The complexity of the results of these three processes is often compelling because of the application of self similar projections. Since complexity leads to the unexpected, many discussion centered around design justification and the resulting description of Kristofor Zehm -- 'Post Intentionalism.'

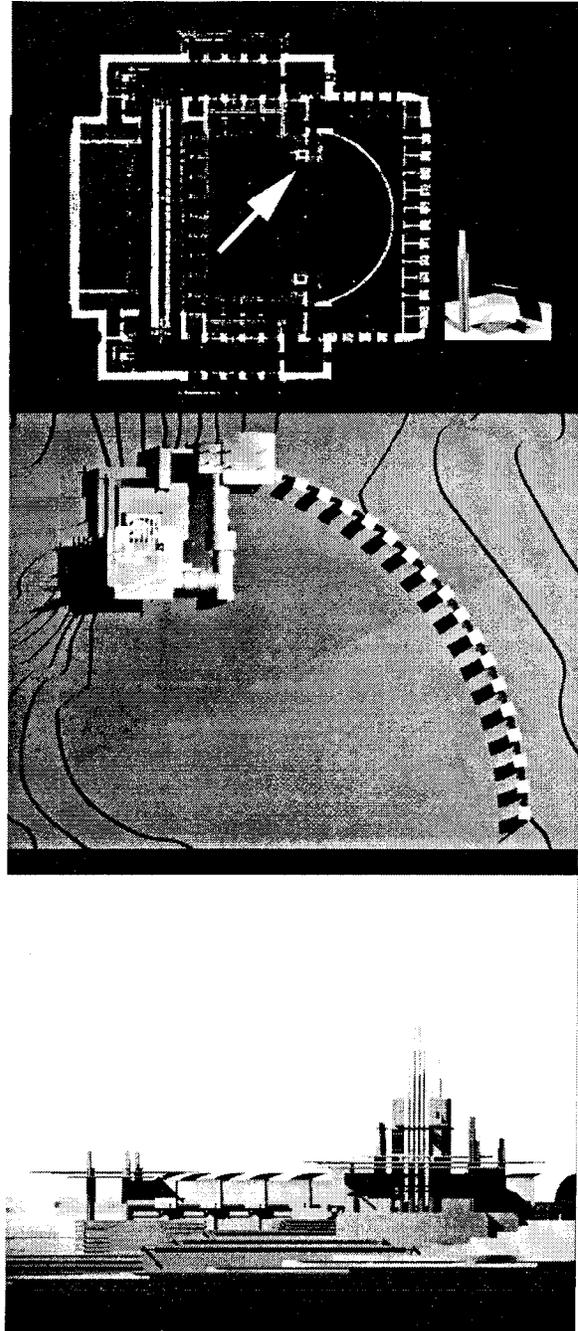


Fig. 6. DNA and Space. Space is often a derivative of a fundamental repetitive code. At every scale, micro to macro, the universe as we understand it is composed of self-repeating and self-generating structure: the crystal as the beginning of geological repetition; DNA as the code of life. This was the third in a series of projects in which we examined the importance of this precept to the process by which we, as organisms, design space and form. The idea was to mimic the design mechanisms of the world.

I was given the plan of a Frank Lloyd Wright building without any other information. From this plan I chose two architectural elements and then decomposed them into two constituent parts, a 1x1 square and arc. I then recomposed the two components using the two parts and considered them in 3 dimensions. This resulted in various 3D reconstructions of the components that I could then use to craft an alternate version of Frank Lloyd Wright's building.-- Clay Aaron Colvig. ARCH6640

The two components are derived from the place at the arrow and are reflected in plan and in all design decisions. The threads are continuous.

## INDIVIDUALITY, DISCARDED AT THE DESIGN THRESHOLD?

In the opening paragraph, I noted that The Design Threshold was a discussion bracketed by historical forces. Undoubtedly, business will prosper in the digital revolution and the University will persevere, but is individuality at risk? When all other issues subside, this issue will persist. The computer and the Internet have the potential to completely reorder the relationship between the individual, the architect and society. The concept of threshold and threads is intended to provide an understanding of one potential scenario in our digital future, one in which the individual is not a "cog in the wheel of commerce," but an individual designer with a name.

### REFERENCES

Beyond the Design Threshold is adapted from Robert Flanagan, The Design Threshold., 1998 SIGRADI Conference, Mar Del Plata,

Argentina. The focus has been expanded to reflect and reinforce the concept of DNA-like linkages and to introduce the concept of 'threads.'

- 1 Steven Coote, William Morris: His Life and Work, (New York: Smithmark Publishers, 1995), p .19.
- 2 Peter Coy with Robert D. Hof, "3-D Computing", Business Week (McGraw-Hill, September 4, 1995) pp. 70-77.
- 3 Ibid., p. 73 .
- 4 Neil Leach, "Fractures and Breaks," in Martin Pearce and Maggie Toy, ed., Educating Architects (New York: St. Martin's Press, 1995), p. 26.
- 5 Ibid., p. 26.
- 6 Joseph Press, "Soul Searching: Reflections from the Ivory Tower," Journal of Architectural Education Volume 51, Number 4 (May 1998), pp. 235-36.
- 7 Steven Coote, William Morris: His Life and Work, (New York: Smithmark Publishers, 1995), p .18.