# Virtual Building Blocks: Applying a Heuristic Device to the Exploration of Type

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Theories on the origin of form in architecture, no matter how compelling, leave in their wake a drift of imitation. For some, this is intended. Certainly the assemblies and patterns of Durand were intended to be followed as procedures to insure good design. By establishing the elements primary to architectural assemblies (porches, stairs, etc.) and the formal relationships for their organization, we were to be guided toward good design. These formulae for design do not however necessarily yield the desired results. There is fair warning throughout history that simply copying or following the procedures is either insufficient or perhaps, more problematically, a cover-up of that which is sought after. Rafael Moneo, for example, criticized the followers of Louis Kahn for merely imitating the language of Kahn's attempted return to origins.[1] Plato warned us long ago to be weary of simply accepting appearances. The imitations (semblances) unlike the products of the skillful craftsman (likenesses) were twice removed from true reality and were therefore mutable—they could not endure because they were not born of understanding.[2] Centuries later Moneo finds that "Architecture is indeed an imitative art, but now imitative of itself, reflects a fragmented and discontinuous reality."[3] This paper is concerned with the question of how we might use our theories on the origin of form in architecture (type) as tools, not models to be imitated, and how by shifting our stance as designers we might recover the usefulness of those theories.

## IS THEORY SUFFICIENT?

Moneo's article "On Typology" provides a broad overview of a history of types, but Moneo leaves us with a rather discouraging word about the probable failure of types to inform architecture today: "Did not the historical awareness of the fact of type in architectural theory forever bar the unity of its practice? Or to put it another way, is not the theoretical recognition of a fact the symptom of its loss?"[4] It is true that in our most conventional process of designing buildings we focus primarily on the operation of reason to guide us to intelligent solutions. This stance of theoretical deliberation has become the privileged role of the architect as reflective practitioner. The disposition to form ordinary experience into causes, concepts and categories has been the vindication of both convention and invention in architectural design. Even the technology we rely upon has grown out of a natural science where the object of study is deliberately de-contextualized into categories in order to discover the "facts" about it. This process of objectification has provided us the benefit of consistent, shared, logical thought. In this way architecture has benefited from theories on type. Theories act as a preserving function in the culture. Do they, as Moneo suggests, also mark a loss?

A change necessarily occurs in both what can be considered and how we can consider it when we shift from this objective consideration of an activity to the everyday skillful involvement in that activity. As we design through reason, framing laws and forming concepts, we do so by removing ourselves from an involvement not only in the making of things (using tools) but even from a kind of thinking about making (planning assemblies). This attitude is now prevailing as we find that practitioners no longer require or even desire an established place on the construction site or in the development of construction techniques. What then has become of the knowledge that architects once relied upon—the knowledge that came from working with tools, and the experience of assembling elements of construction? What we have left of that tradition is preserved in our theoretical models such as our theories of type. As such, what is the nature of their usefulness in the activity of designing?

In order to ground the question, think back to a time when we had a different kind of understanding about making constructions. As children we piled things up, carved things out, found secret hiding places, places that excited our senses and our imaginations. We climbed up trees and into caves. As children, it was natural to pile blocks and dig holes. We did not do it because we were confronted with a problem, or even because we first thought that we needed a pile of blocks or a hole. We just did it because it was our way of being there with the blocks or dirt. And in doing it we expressed ourselves according to our nature. As we became skillful, we found that other possibilities opened up for us as we went

about making and building. Blocks made places for the cat to get into and holes filled up with water when it rained. We discovered usefulness in the nature of the thing.

The skill of the carpenter, like the child, has with it an understanding of usefulness that developed from the involved activity of many particular circumstances of making things. These many circumstances are simply the situations that occur by nature of being in a world filled with magnitudes of little differences. The relatively small differences of various kinds and conditions of woods, tools, even the differences of the carpenter's mood from one situation to another, all contribute to small accommodations or adjustments. This general messiness of life produces situations which operate like the experimental activities of the child and, as with the child, prompt discoveries.

As a part of this general messiness we are making discoveries and collecting experiences of architecture: from our childhood of piling things up or warming ourselves by a window, to the echoes of our own footsteps down long marble halls. Yet, no matter how carefully these situations are defined, or how many special cases are considered, there is no amount of reasoning that can account for all that we learn in everyday experience. These experiences can not be sufficiently accessible through the reductionist stance—through theoretical deliberation. What can we do then to make certain that we have access to all that we have acquired? Since we cannot sufficiently recount them we must at least be able to recognize them. Contemporary philosophers will concur that not all knowledge is conceptual or theoretical. Whether we are recollecting some deeply embedded universal (Platonic forms) or simply recognizing things that have become familiar as patterns through ongoing experience, we are reliant upon tapping directly into memory. This sense of familiarity may be the aesthetic that lies at the root of our interest in type. At the bottom of this argument is a need to recognize that type-form would mean nothing to us without our past experiences and that type comes alive in our memory--becomes significant---through the evocative properties of the stuff of our endeavors—of involved activity.

## IS AN INVOLVEMENT WITH THINGS A NECESSARY CONDITION OF USEFULNESS?

As we go about the business of everyday life, things become useful when the properties of the thing become available to the activity or situation in which we are involved. In our everyday conversations, we do not decide what to say first then construct sentences, we just talk as our way of being involved with things.[6] As a carpenter goes about the business of building a table, the hammer and nails and wood become useful within the activity of making the table. Without forming a willful intent about it the carpenter reaches for the hammer, places the nail against the wood and moves in a skillful way. It is the knowledge the carpenter has acquired from the messiness of life that is made available through involvement in the activity. The whole familiar environment of the workshop—all the collected tools and jigs, clamps and benches, even the lumberyard that supplies the woods and finishes, the van to haul it in, everything that has become a part of the business of being a carpenter—holds itself ready to become useful without deliberation. This is the everyday world of the carpenter—that which is essential to being a carpenter.

Prior to the activity of making, the carpenter is discriminating about the selection of tools, about the layout of the workshop, even about the choice of lumberyard. Parents today are very discriminating in the selection of the "right" toys for their children. The right toys hold the greatest promise that the child's play will yield insight into the world. Are we as architects equally discriminating? What is the stuff of the everyday world of a practicing architect? What is our workshop, our wood, our hammering and how do these things become useful to us in the activity of design? It is possible for theory to become useful in production, but only to the theoretician whose business is making theories—not to the architect who is designing. The theories on type, when in the hands of designers, are twice removed from experience and loose their connection to form. As Moneo points out, the types become unnecessarily flattened into compositional devices or schematic arrangements. So we leave our young architects with some theoretical models, some scraps of wood, cardboard and foam core searching for meaning.

It is the proposition of these exercises that if we simply shift our stance to one of involved activity, and use the content of these theories—the stuff prior to type recognition—as tools to experiment with, to explore and interpret, then we continue to build on accumulated wisdom rather than imitate a thinning tradition. The question then becomes one of how the designer interprets towards "significance'—an essential issue in the development of a methodology for the exploration of type. Consider that at the most fundamental level, when we are thrown into situations, our brains act to find patterns. This gestalt formation—ultimately our ongoing interpretation of the involved situation—is always occurring over our past experiences. These experiences, though, like dreams, will vanish without naming—attaching significance. As Moneo suggests, "The very act of naming the architectural object is also a process that from the nature of language is forced to typify."[5] This recognition of something "as" something comes from our accumulated experiences with those sorts of things. In other words, the recognition of the characteristics of a 'wall' are based in a recognition of 'wallness'. At a very primary level this is a recognition of simple forms or shapes. At higher levels of experience it may be the recognition of 'institutional' or 'residential'. This understanding of characteristics is personal and is valued as meaningful if it is able to sustain itself as understanding. Experiencing, interpreting, signifying, and characterizing describes a hermeneutical cycle of understanding which may prove to be a useful model for how we exist in the world when we are simply involved in everyday skillful activity. Then, through the heuristic value of this

kind of involved activity, designers may gain tremendous insight into the essential dynamics of any architectonic system by observing the patterns that show up under a wide range of initial conditions and intentions.

## THE STANCE

Students in a beginning computer course were asked to play with various sets of building blocks as a way to develop strategies for movement and assembly in virtual reality.' This was a way of immersing the designer in an activity which might simulate the activity of making and, hence, facilitate understanding through involvement in a kind of discourse with the materials or systems capable of producing type—the stuff of theories. Students used the graphic capabilities of the computer not as a computation tool for either describing or solving problems but as a workstation (sandbox/workshop) for the involved activity of making constructions (playing1 working) within a simulated universe.

Students were asked to assume that the blocks under investigation were developed according to various theories on the origin of form which will become more transparent when type is emergent—generated through the involved activity of making assemblies. The experiment relies upon the assumption that the experience of architectural form is an ongoing perceptual gestalt. More specifically, that the recognition of type–interpretation–is primarily a visual gestalt that can be simulated in the virtual environment. Although the visual field may consist of groups of distinct objects, certain parts of the field of view will naturally cohere and form units.[8] Since the experience of an architectural form cannot be predicted by the manner in which the individual objects are experienced, it is appropriate for this exercise to regard type as an emergent property. In other words, if these things (the blocks) act to evoke memory (the gestalt of interpretation), the involved activity of making assemblies (circular rather than deliberate) will produce familiar looking stuff—significance (type).

## THE STUFF OF THE ENDEAVOR

Three different sets of blocks were used in the exercise: the Bauspiel ein Schiff Blocks, Modulon Blocks, and the more familiar architectural Building Blocks.[9] The Bauspiel Blocks are cut from a slender rectangular mass including pieces with both concave and convex curves, several small cubes and triangular pieces, an assortment of rectangular blocks, and a cylinder that was cut from a cube. The Modulon Blocks are made from successive cuts into a cube. The pieces are all rectangular and range from rather blocky to very thin and planar. The set, Building Blocks, is developed from familiar shapes found in buildings: triangular pieces that might be pediments, columns of different proportions, and various block-like and wall-like masses and planes. This set is more like a collection of building parts.

Each set has a lineage to some theory on the origins of form. And each adds yet another set of clues to unravel the mystery of type. The Bauspiel Blocks have shapes that look as though they were formed through an activity of construction. The blocks that carry the most information are curved pieces which look either carved, cut or bent. The activity of making leaves a print on the material —an appeal to memory. Although the pieces were cut from a single block like a jigsaw puzzle—ready to be rejoined as a unity—there is a familiarity in the parts so indistinct that it seems to work prior to deliberation. The Modulon Blocks have a similar origin as the Bauspiel. They too are cut from a single block. However, they carry a very different appeal. Theirs is a system of organization–a geometrical system that informs every width, every height, every thickness. Each cut is proportioned by the golden mean. All the pieces are orthogonal, no bends or curves, no shape other than rectangular mass--the first of which resulted from the first cut into the cube. The collection contains seven different masses which can be arranged to form many different proportions according to the harmonic principle. The pieces of the Building Blocks set do not originate from a single block, nor do they have a system of proportions to guide the cuts. They are, however, very recognizable, although ambiguous, as building components. The other two sets are not.

## THE SITUATION

The design activity took the shape of a "Semiotics Game" developed by Juan Bonta.[10] Each student was given the three

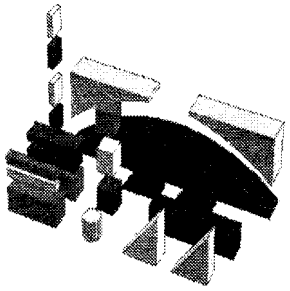

Fig. 1 Bauspiel Blocks

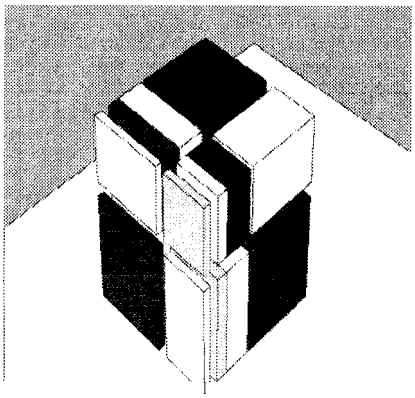

Fig. 2 Modular Blocks

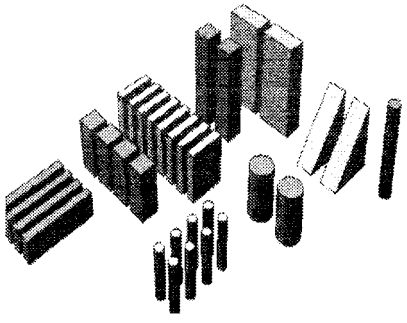

Fig. 3 Building Blocks

sets of blocks and asked to select a building type from a list of six types: supermarket, religious, bank, industrial, residential, and apartment building. Different building types would be tried for each different set of blocks. The blocks could not be altered in any way other than color. The colors included transparency which made it possible to create openings with the blocks. The process of designing emerged while shifting through multiple views (six saved views, at least one of which must be an interior view). It was possible, however, to duplicate any blocks already in the set. The dream of every child with a set of blocks is to have an endless supply—we did.

After the three building types had been produced from the three sets of blocks, the students selected the one example which they felt had been the most successful. This model was then brought to the screen with its cast of saved views but no identifying labels. Each computer station had a pile of scorecards listing the building types. The first card was filled out by the designer noting the intended building type. The students then did a musical-chairs rotation through all of the computer models, viewing the models through a cast of saved views, and scoring each project with their thoughtful guesses about the building type. The critics did the same. The scores were tallied after everyone had scored all the projects. These scores were then compared to the intentions of the designer.

Because staging the experiment involves the virtual environment of a computer, there are certain characteristics in the simulation that will not be found in the physical models of the original blocks. Also, there were certain limitations imposed on the experiment which were, in part, arbitrary, but which do influence the interpretation. First, blocks could be added at will, thereby altering the purity of form that was distinguished by the specific number and type of pieces defining the original mass. However, the size and shape of the individual pieces could not be altered-thereby the original construction of the system was maintained. Second, there is no texture, no weight, no material qualities except the visual clues of shape and color in the virtual world. Students were permitted to change the color of the blocks with an understanding that color may evoke certain non-specific material properties. Also, in order to evoke some sympathy for scale in this scale-less environment, the designer was asked to hypothesize the overall scale of the model by adding entourage from a library of virtual objects at sizes that seemed appropriate. Perhaps most telling, gravity was not an issue for the virtual models. It was up to the designer to establish whether or not pieces connected or simply implied connections. None of this was possible in the original blocks.

## THE OUTCOME

Student interest in the experiment was at first minimal, and even that was somewhat disguised by the anxiety of working in the virtual environment for the first time. Once the project was initiated, however, the students admitted being compelled to discover the interesting assemblies that were arising from the design activity. The properties of these assemblies became part of an array of factors involved in the ongoing interpretation. Implied patterns or processes showed up in the course of the evolving situation. The students occasionally discovered properties of assemblies (things became useful) that stimulated a change in direction, even a change in the suggested building type (type recognition). No one was required to adhere to any initial or pre-conceived ideas about which building or blocks would be best suited to each other. It was not uncommon to experiment with the block sets for some time (discovering usefulness—becoming skillful) before committing to a specific building type. Students who had the idea or concept first (held on to the stance of theoretical deliberation) and then tried to get the blocks to work for them, had the toughest time, the greatest frustration and the least success.

The experiment generated great energy during the design phase and also during the judging and discussion. Observations and opinions flowed. Several observations were shared by almost all of the students. It was a matter of consensus that pieces from one set could not be mixed into another set without appearing out of place. A column from the Building Blocks would be "odd" or "special" if placed in either of the other two sets. The small cubes from the Bauspiel set appeared out of place in the other sets even though some

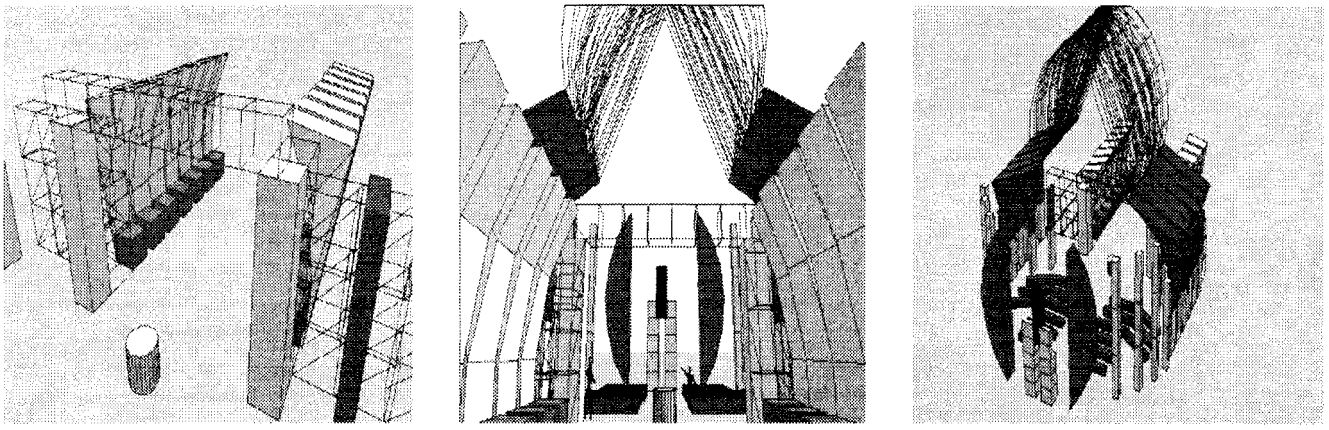

Fig. 4 Three views of a project using the Bauspiel blocks, described by the designer as a church.

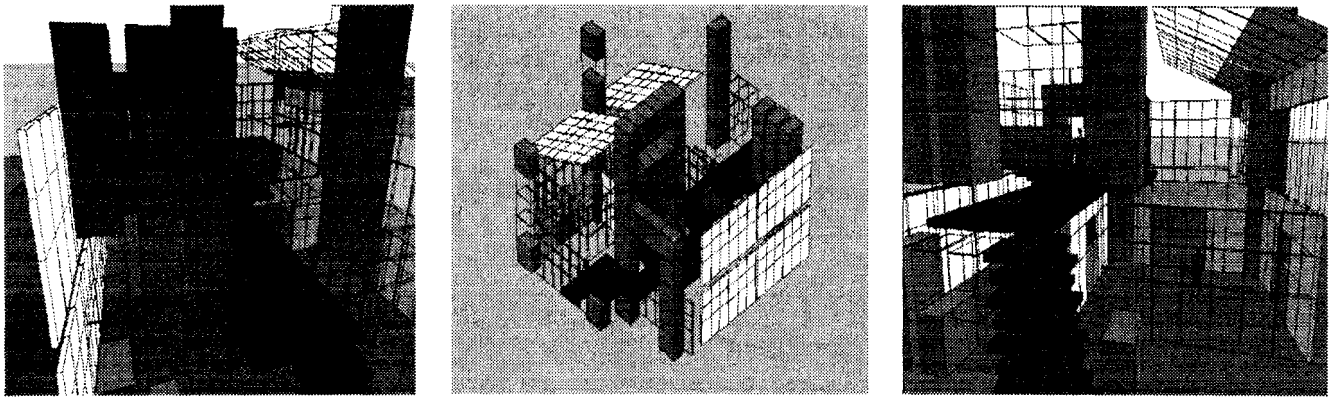

Fig. 5 Three views of a project using the Modulon blocks, described by the designer as a residence.

students saw similarities between sets, especially in terms of order and shape. Modulon blocks simply lost their value as a proportioning system when removed from the system.

Some patterns emerged in the nature of how pieces were assembled. The Building Blocks tended to remain very object-like even as the constructions became more complex. The scale of the pieces varied the least in models made from the Building Blocks. Also, it was difficult for the students to explore variations in scale probably because the pieces were easily and readily identified as building elements. Students had the most difficulty with interior space using the Building Blocks and the most facility with interior space using the Bauspiel Blocks. The Bauspiel Blocks were least likely to be used as massing models, and were most often used in complex assemblies that became building units in their own right —often with significant gestural qualities. Certain moves and assemblies were priviledged by the computer application such as duplication, rotation, and minoring of pieces or assemblies. However, because the dimensioning systems were internal to the systems, it was not possible to use grid coordinates furnished by the computer application with any of the block sets if the pieces were to touch each other. Instead, the blocks themselves had to be used to reference the moves. Modulon Blocks, in spite of this, produced constructions more closed than the other sets. The Modulon models were almost always orthogonal and were most likely to have pieces touching.

The exercise revealed that each set has an inherent capacity to behave in particular ways. This tendency was shared by all three sets. In fact, each set carried with it quite different capacities to produce order. Each carries in it, like a messenger, the origins or the source of the system (the first cut, the motivation of the next cut mediated by the first). The differences lie in the nature of the blocks and how they inform assemblage.

## CONCLUSION

With each new project a designer sets forth an inquiry which propels/ compels involvement in design—the making of assemblies. Yet, somewhere, somehow, we have overlooked the value of skillful involvement as we rush into defining the project as a problem. From there problem solving becomes synonymous with designing. Whether we recognize it or not, the experiences of life--from our childhood activities on to our professional life—provide the starting point for each new project. We carry with us this knowledge of "being in the world"—it settles into us as common sense. Can we, should we, overlook the kind of experiences that produce this sense when we engage in our professional activities of designing buildings? Or do we need to find a way to make this inquiry a part of our everyday activities?

The literature on type seems to prod us toward under-

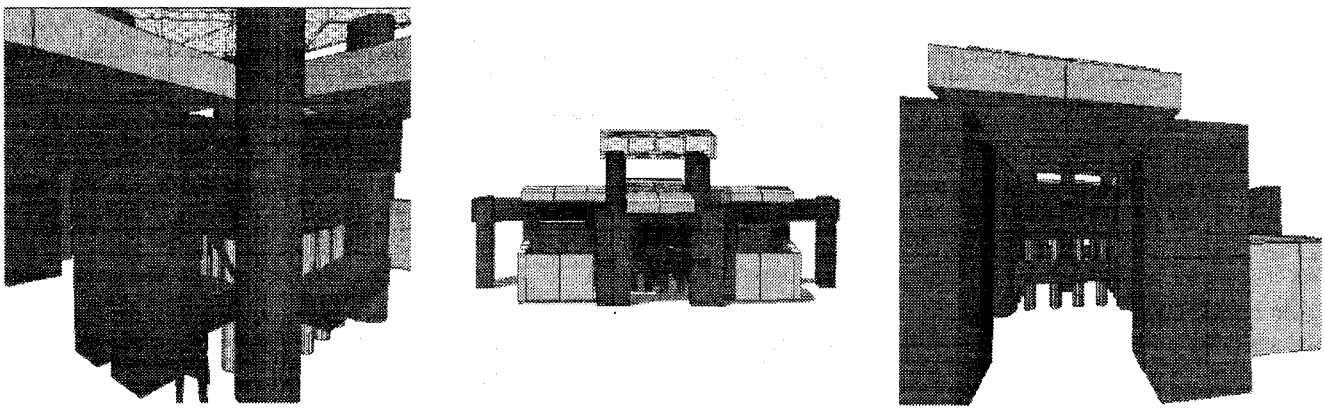

Fig. *6* Three views of a project using the Building blocks, described by the designer as a church

standing type not so much as a generator of form but as a recognition of patterns among elements that we have come to understand as architectural. The theories, as such, are insufficient for the activity of designing. Contained within the theories on type, however, are the specifications of those elements which carry the properties capable of producing typical patterns. Those elements may be physical or metaphysical and their intrinsic qualities may be mathematical or embedded by the means of production (natural or manufactured). The reality for the practicing architect is that they build with materials/assemblies that are already embedded with certain properties—the origins of form. The richness of the architectural object produced then is not so much a matter of understanding type as it is understanding the "production" of recognizable form from those elements. Hugo Haring proposed that "Life is not given to the work by fashioning the object, the building, according to a viewpoint alien to it, but by awakening, fostering, and cultivating the essential form enclosed within it."[6] If, in the end, buildings are just buildings, then we may be at a loss to say how this matters. If, however, we need architecture to be like poetry or a play, and touch us, then it too must speak the unspoken. Relationships among the elements of architecture, like characters in a play, are unfolding, laying open even greater mysteries as they touch our hearts and minds.

## NOTES

[1] Rafael Moneo, "On Typology," Oppositions 13 (1978): 23-45.

[2] Plato, Sophist 235a-236c for the argument on two species of image-making; and the Republic 602b1-4: "Yet still he will nonetheless imitate, though in every case he does not know in what way the thing is bad or good. But, as it seems, the thing he will imitate will be the thing that appears beautiful to the ignorant multitude."

[3] Moneo, "On Typology."

[4] ibid.

[5] ibid.

[6] For a discussion of Heidegger's account of natural language see Hubert L. Dreyfus, Being-in-the-World: A Commentary on Heidegger's Being and Time, Division I. (Cambridge, Mass: MIT Press. 1992).

[7] This is a required class usually taken concurrently with the second or third semester of the architectural design studio. The work shown is a two week exercise from one class of 18 students. Access to the computers is unfortunately limited so finding applications that are easy to learn and quick to use is a very high priority. This exercise is the students' first experience in modeling in virtual space and has the primary pedagogical objective of developing skill in the manipulation of objects in 3-D space through game-like strategies. The virtual objects are toy block sets that have been previously constructed in the 3-D virtual environment using the surface modeling application *UpFront.*

[8] The concept of holism is integral to Gestalt theory. Parts of the manifold of sensations making the experience (a field of some sort) will interact and, in doing so, lose their individuality and produce a whole-quality or configuration that is different than the sum of its parts. In this characterization of the mental process, the brain spontaneously achieves organization into objects on backgrounds and configures the components of these objects into whole qualities such as unique shape and form. For more on Gestalt theory see Frederick Perls, Ralph Hefferline, Paul Goodman, Gestalt Therapy (New York: Julian Press. 1951)

[9] The Bauspiel ein Schiff Blocks were designed by Alma Buscher, a furniture designer who taught at the Bauhaus. She was well-known for her children's furniture and toys. (See Hans Wingler, *The* Bauhaus). Both the Bauspiel Blocks and the Modular blocks are manufactured by Kurt Naef (Spielzeug, CH 4314 Zeiningen). The set, Building Blocks, were developed by Paul Tesar and his students at North Carolina State University following a workshop with Juan Pablo Bonta at an ASCA Cranbrook Teachers' Seminar.

[10] The "Semiotics Game" was developed by students at Ball State under the instruction of Juan Bonta as described in Juan Pablo Bonta, Architecture and its Interpretation. (New York: Rizzoli International Publications. 1979) 227-228.

[11] Hugo Haring, "The house as an organic structure", 1932, in Programs and Manifestoes on 20th-Century Architecture edited by Ulrich Conrad (Cambridge, Mass: MIT Press. 1993).