Spiritual Tectonics: Exploring Dualities in the Design Studio

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Introduction

Systemic thinking is the process of understanding how systems or components influence one another within a whole. It is a way of thinking that "emphasizes connectedness,"1 enabling the thinker to see beyond discrete elements to the relationships these elements have with each other. The practice of architecture requires a systemic mindset. Even the simplest constructions are composed of myriad integrated systems at the scale of the site, the building, and the detail. While navigating the design process, architects must understand the complex interactions of these systems within a given project.

So, how is systemic thinking introduced in academia? The traditional bifurcation of architectural education does not always provide an integrative philosophy. The separation of the curriculum into design and technical courses is, in many ways, a significant deterrent to the examination of architecture systematically. This deterrent is especially prevalent in lower level courses, which tend to have more focused learning objectives and a far less comprehensive character than upper division and graduate coursework.

The study of architectural tectonics, on the other hand, is a systemic endeavor. From Kenneth Frampton's statement that tectonics is "the formal amplification of the structural presence in relation to the assembly of which it is a part:"2 to Gottfried Semper's claim that the origin of architecture is not construction, but the visible representation of closed space originating from human dress;3 to Karl Botticher's theory of the ontological kernform (work form) and its cladding of the representational kunstform (art form);4 the view of architecture through a tectonic lens depicts the poetic integration of assembly, materiality, representation, space, and environment.

Though the potential for studying architecture as a series of systems exists in any curricular construct, without strategies in place to discuss the dialogue between the systems, systemic thinking cannot occur. Tectonics provides an opportunity to create links between systems that may otherwise be held separate for a novice architecture student. In a recent studio, a group of architecture students was asked to approach design from a tectonic point of view. Through a series of linked studio exercises centered on the design of spiritual space, these students were given the opportunity to systemically explore architectural design. For these individuals, tectonics provided the opportunity for new avenues of insight into the design and construction of the built environment.

Tectonics and Sacred Space

At the beginning of the semester, the students were given a ‘tectonic primer’ that served as a conceptual outline for the class. This primer contained a series of quotes or passages taken from a wide variety of sources and was organized into topical sections (the four elements, the ontological and the representational, the joint, etc.). Although the full gambit of tectonic theories were presented and open for exploration in the studio, the students were asked to specifically consider one particular aspect of architectural tectonics
during their time in the course: the pairing of tectonic assembly and the stereotomic mass.

There are two distinct material procedures in the realm of tectonics. First, the tectonics of frame in which members of varying lengths are conjoined to encompass a spatial field. And, second, the stereotomics of compressive mass in which identical mass units are piled and stacked. These two systems are cosmological opposites (earth vs. sky, solidity vs. dematerialization, dark vs. light, rough vs. smooth) and there are ontological consequences in choosing to build with one over the other. Typically the framework tends toward the aerial and the dematerialization of mass, whereas the mass is telluric, embedding itself ever deeper into the earth.5

Here, Frampton positions the tectonic as dualistic. This same sentiment is echoed by Emilie Townes in “Constructing the Immaterial,” but with respect to the sacred. Townes posts that the power of the sacred “radiates from the center with centrifugal force, but it also returns centripetally.”6 She continues by stating that sacred architecture must recognize its position at this center, “an axis between earth and sky.”7 Duality provides a link between the tectonic assembly of space and the immateriality of the spiritual.

Townes notion of the sacred center is also embedded in Gottfried Semper’s analysis of the Caribbean hut. In this analysis, Semper classifies the four elements of architecture as the framework, the enclosing membrane, the earthwork, and the hearth. This classification system gave significant importance to a non-spatial element - the hearth - which is considered a component of the stereotomic mass. For Semper, the hearth, as a designation, “incorporated in a single element the public and spiritual nexus of the built domain.”8 The hearth is at once material and immaterial. It is the center of place, with its origins in the marking of the earth to signify occupation or settlement.

A third connection between the sacred and the tectonic stems from our ability to develop empathy with static form. Robert Vischer provides the example of a looming cliff face, which stands proudly at attention and seemingly in defiance; its outward projection instills the feeling of a lunging forward, perhaps in curiosity, perhaps in anger.9 The ability to empathize with the physical forms of the world around us comes from our own physical embodiment. We have an innate understanding of gravity and strength, of

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**Fig. 1. Sectional Diagram of Thomcrown Chapel (by author)**
pressure and release." This understanding also allows for architecture to manipulate our empathetic reactions to achieve a heightening of immaterial experience like spirituality.

This effect is evident in a plethora of sacred structures, including Fay Jones’ Thorncrown Chapel. The transparency of Thorncrown Chapel draws your eyes first through and out to the forest. But, upon entering the structure, your gaze turns upwards towards the sky and the heavens, guided by the rising slender columns and eventually trapped within the latticed canopy suspended overhead (Figure 1). As Daniel Willis has claimed, “Not since the roof vaults of the Gothic cathedrals had an interior architecture so willfully drawn our imaginations skyward.” An analysis of this project reveals a significant intersection of the tectonic and the spiritual; and it is with this analysis that the studio commenced.

The Studio

This third year studio was structured as a series of five interlinked problems, each building on and connected to those preceding it. The problems were choreographed with the hopes of providing a meaningful learning experience for the students. As they progressed through the series, the students were asked to work at different scales (the site, the building, the section, the detail) and in different mediums (sketching, modeling, digital drawing and production, full scale construction), encouraging a varied working perspective in addressing issues of tectonics, constructability, spirituality, and context (the primary focus of this semester’s studio sequence).

Each problem also began with a reading related to its topic. These essays ranged from Frampton’s “Botticher, Semper, and the Tectonic: Core Form and Art Form,” to Juhani Pallasmaa’s The Eyes of the Skin, to Moshe Safdie’s “The Architecture of Memory: Seeking the Sacred.” For each reading the students wrote a 300+ word statement illuminating the author’s critical idea(s) that could be used in the development of the problem. These writing samples were then discussed in a student-led dialogue about the reading.

The first problem provided the foundation for the studio. In this problem, each student selected a case study project (via lottery) from a provided lot. Each case study was a small, but meaningful chapel or other religious structure (referred to from this point as chapels). They encompassed a variety of different religions and were scattered across the globe; some were well known and others somewhat obscure. Instead of choosing from of a written list, the students were presented with an image of the primary spiritual space (sanctuary) of each chapel. After a quick examination, the case studies were chosen based on the images. The students were then given time to do preliminary research, having until the end of the first class period to keep their selection or exchange it for one of the remaining unclaimed images.

In this problem, the students were responsible for a thorough analysis of the case study chapel, but with a focus on the expression of the tectonic and stereotomic. The analysis work was accomplished through diagramming, but the students were also responsible for creating original drawings of the space (plan and section) and building a model of a critical section of the work (Figure 2).

In the second problem, the students were asked to design a device which would, at a minimum, allow a visitor to pause and rest while at their case study chapel. This intervention could be located anywhere in or around the chapel, but had to respond directly to the tectonic conditions and other characteristics of the building they found through their analysis in problem 1. Most of the students, not surprisingly, interpreted this assignment as a bench or chair with the notable exceptions of a lectern and a portable, rolling mat for sitting on a grassy slope outside the sanctuary.
This problem shifted the scale of investigation from that of the building in the first problem to that of the detail in this problem. The impact of ‘zooming in’ was magnified by the requirements for presentation: the designed interventions were required to be built at full scale (Figure 3). Having to not only resolve the design of the whole, but fully construct it required an attention to detail that promoted a more thorough examination of the assembly and detail of the case study project. Contextually, the students also not only needed to consider the existing building as a context for inspiration, but they also had to consider their own bodily interaction with the piece as a driver of the tectonic assembly of the whole. Despite a lack of precision craft skills, the class admirably took on the challenge of problem 2 and most of the students were able to design and build interventions that appropriately inhabited the case study chapels.

The transition from problem 2 to problem 3 was the least structured in the course. In problem 3, the students were told that the governing board of their case study chapel had decided to establish a new chapel, temple, synagogue, etc. in the town of Carbondale, IL. For this exercise, each student had been fictitiously hired by this group to locate a new site for the facility within the city limits of Carbondale. For the first half of the problem, the students were divided into groups, each analyzing the region through the lens of the sacred, infrastructure, socio-political, or environmental context. Then, in the second half of the problem, each student selected a particular site in Carbondale that would best suit the needs of the client as interpreted from the earlier analysis of the case study project. Once again, the scale of investigation changed as well as the perspective on the project.

With a site selected, the class moved on to problem 4. This problem brought together all of the elements from the first three problems, had the longest working timeframe, and served as the course’s apex. On the chosen site, each student was required to design a small religious building; a rudimentary program was provided to build upon. Inspiration for the design of this place was to be drawn from the analysis of the case study project in problem 1, from the construction of the intervention in problem 2, and from the context of the site chosen in problem 3. The problem statement posed several questions to the students: What is the purpose of a chapel? What is the narrative of the place? How does the
tectonic expression of the building reflect its purpose? And, how is it contextually driven?

This problem asked the students to work both at the scale of the site and of the building with the students producing traditional scaled drawings and models of their work. The primary difficulty for the group centered on interpretation. Most of these students had never relied so heavily on the study of an existing project in their past courses. In this studio they were cautioned early and often to not copy the existing architecture, but to be inspired by the lessons it had to teach. This line of thinking proved to be a struggle for some of the students. Many, however, were able to use the lessons of the case study project to inspire their own designs; the student’s work built on central tectonic and religious themes, massing strategies, lighting qualities, relationships to the context, and circulation patterns (amongst many others) (Figures 4 and 5).

Problem 5 continued the design of the project started in problem 4, but zoomed back in to more closely examine a small part of it. First, each student was required to select a specific section of his or her project in which the tectonic and experiential qualities of the design could be felt the strongest (for instance, a prominent corner of the building) (Figure 6). The objective was then to figure out how to build this small piece of the previously schematically designed project. Using the critique from the review of problem 4, the students were encouraged to continue designing this area of the building, albeit in relative isolation from the whole, in order to more carefully examine the relationship between design and construction.

After this section was developed the students chose a detail from within that area and built it at full scale. The detail was required to express the aesthetic and tectonic qualities of the whole and contain the intersection of multiple systems. Once again, the shift in scale inward to the section and to the detail provided the opportunity for a more insightful learning experience for the class. Unlike problem 2 in which the students built a fully realized, free-
standing piece, in problem 5 they were creating a very small part of a larger whole (Figure 7). The contextual relationship between part and whole, expressed thoughtfully in the problem’s key reading from Marco Frascari, provided the terminal learning experience for the course. This problem provided the capstone for the semester’s experience, illuminating the connectivity illuminated through the examination of architecture through a tectonic lens (Figure 8).

Reflections

This course was a first attempt at thoroughly integrating tectonic investigation into the pedagogical construct of a design studio. The hope now is to build on the lessons learned here in future courses and further this early success. In general, the student response to this avenue of learning was excellent. On the course evaluations, the students rated the educational experience and overall quality of the course as 4.84 out of 5.0 (96.8%). The statistical data was reinforced with written responses that praised the rigorous nature of the course, the linked problems that provided continuity through the semester, and the integration of theory and practicality in the design of the work.

Each student in the class found moments of success with the interpretation and translation of tectonic constructs. For many of the students, these connections were most successfully made in the transition between the case study analysis and the intervention problems (1 and 2). This transition was conceptually accessible and, coupled with the student’s eagerness to build at full scale, provided a clear high point in the semester. Where thinking and making intersected engagement peaked, enhancing the dialogue about the work in the process.

There were, however, many challenges throughout the semester. The most significant of those was the translation of the case study to the problem 4 chapel. This studio marked the first time that the majority of the group had been asked to design with such a strong relationship to both a theoretical construct and a case study project. Problem 4 was the most complex problem of the semester and had a relatively tight timeframe. Although many of the students performed satisfactory on the project, the translation of the tectonic analysis of the case study projects was lacking in many situations. This deficiency could be alleviated in the future with a longer timeframe, which will require a restructuring of the other four projects. More time to contemplate the core ideas will allow for more significant connections between the theoretical ideas and the work.

Although unrelated to the tectonic analysis directly, the site selections made in problem 3 proved to be the weakest point of the course. The area from which to make the selections was too large and resulted in the selection of sites with little to no meaningful context from which to draw a response. In some ways problem 3 also acted as a fissure in the semester, disjointing the early problems from the later ones. This problem was already somewhat unconnected from the rest of the set. A more tightly controlled selection process should assist in providing a better conduit between the early problems and those that come later in the semester and in reconnecting it to the pedagogical objectives of the course.
"Sacred architecture...helps people find meaning in the everyday experiences of their sufferings and joys, of their defeats and triumphs." But, how does it do this? That is the question this group of students was asked to explore for sixteen weeks. Through the lens of the tectonic, the students took on the challenge of understanding the relationships between the varieties of elements that make up the practice of architecture. Tectonics depends on the fundamental aspects of the world: gravity, the structure of the materials we use, and the ways in which we put these materials together. The learning experience in this class sought to build upon the nature of tectonics and help students understand the way we put architecture together and its impact on our experience of space. Through this process, the students were afforded the opportunity to not just understand the project type and theoretical model, but also the myriad contributors needed to create architecture with substance and, perhaps, soul.
Notes:


5 Frampton, “Rappel a L’Ordre,” 521-522.


7 Townes, “Constructing the Immaterial,” 79.

8 Frampton, “Botticher, Semper and the Tectonic,” 144.


