Materiality and Scale: Enclosure, Fashion Theater, and Para-sites

Weiling He

Texas A&M University

Abstract

Materiality is a quality or state of being material. It reveals itself in construction and perception. Construction determines how materials allow themselves to be put together. Perception relates to how the human body recognizes materials and what it recognizes about materials. Meanwhile, our construction and perception in space relies on the body. As a relative measurement and reference, the body establishes a spatial scale through which materiality can be understood. This paper will use scale as a framework to discuss construction and perception of materiality. Three beginning design projects, Enclosure, Fashion Theater, and Para-sites, will serve as case studies for investigating and clarifying detailed dynamic between scale and materiality.

Three Projects

These projects, *Enclosure*, *Fashion Theater*, and *Para-sites*, are from beginning design studios in different years. They all start with a material constraint but in different scale and contexts. *Enclosure* (Figure 1) uses only one manila folder, with nothing added or subtracted, to define spatial depths. No site is considered for this project so that it becomes an abstract construction of form and material. *Fashion Theater* (Figure 2) uses off-the-shelf objects, such as hinges and umbrella structures, to construct movable pieces that extend bodily movements. The Body is both a site for the design and a force that transforms the design. In essence, the design itself becomes prosthetic. This project also collaborated with a VIZ studio who worked on sound and digital projection. The collaboration resulted in a fashion show that engaged the performance of these movements. *Para-sites* (Figure 3) are assemblies of disposable mundane objects, such as milk jugs and water bottles, to invigorate an existing space and events within the space. The site is an interstitial space between buildings. Because of these locations, natural light conditions are often dramatic; the viewer's perspectives are usually framed by the surrounding building boundaries.

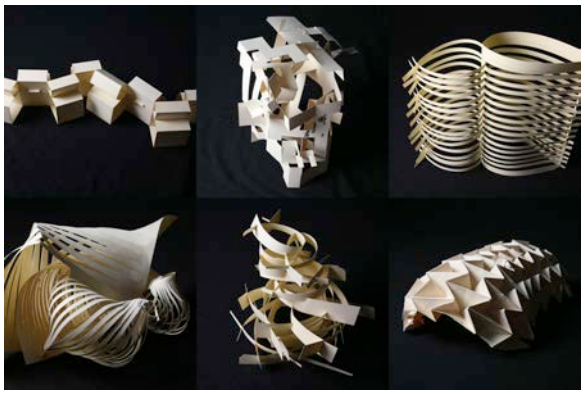

Figure 1. *Enclosure*

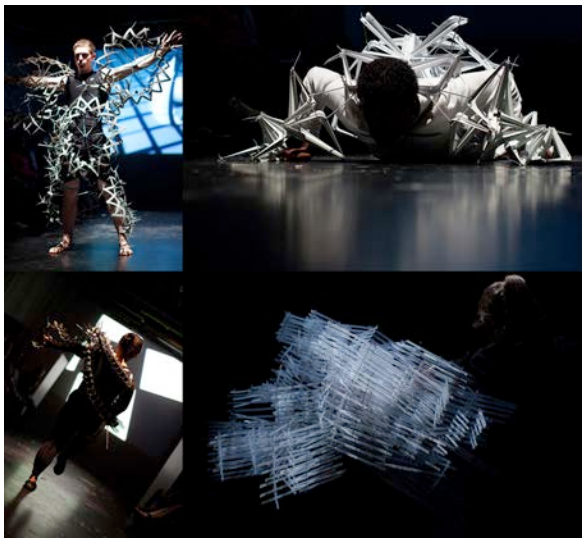

Figure 2. *Fashion Theater* (picture credit: Glen Vigus)

Figure 3. *Para-sites*

Materials in these three projects are intentionally dissociated from both their existing and potential figurative meanings. At the beginning of each project, materials are removed from their original usage context so that their formal and physical properties – size, form, depth, perforation, texture, translucency, flexibility, etc. – become more apparent. This process of object de-familiarization to create material familiarization helps students differentiate material meaning from other meanings assigned to objects. Further, each project constructs spaces that address scale and effect instead of any resemblance to figures or ideas. These constraints facilitate students' grasp of materiality, which frees them to manipulate materials in their immediacy.

The three projects illustrate a series of investigations around scale that affects both construction and perception of materials. Each project, starting with objects of similar scale, transforms those objects to a different scale and thereby different effects: a scale that is too small to physically allow the body into its interiority, a prosthetic scale that partially encloses the body, and an inhabitable scale that houses the whole body. Changing properties of the units and structures among the units, students alter the materials by cutting, slicing, bending, compressing, folding, and inserting; enriching individual units with exposed sectional quality or reiterated interiority. Through layering and repeating, the scale of the new construction expands three-dimensionally. Components multiply in variation and repetition, and give rise to ephemeral effects latent in the original material, such as shades and shadows, translucency, and even minute sound.

Scale

The three projects demand a further investigation of materiality with regard to scale. As an important architectural parameter, scale lays the foundation of establishing the relationship between the human body and space. Illustrating the difference between using the body as a proportional device and as a dimensional device, it is important to compare the following three cases: *Vitruvian Man* by Leonardo Da Vinci (1452-1519), a church floor plan and a cornice by Francesco di Giorgio Martini (1439-1501), and Modulor drawings by Le Corbusier (1887-1965).

Drawn around 1490, *Vitruvian Man* (Figure 4) illustrates correlations of ideal human proportions. This drawing is based on Book III of the ancient Roman architect Vitruvius' treatise, *De Architectura*, in which classic orders of architecture attribute human figure as the principle source of proportion. Accompanying the drawing are texts using human height and palm dimensions as denominators for measurements of other body parts. Although Da Vinci claims these measurements are in Vitruvius's buildings, the drawing itself does not illustrate such mapping. Therefore, *Vitruvian Man* as a drawing only depicts a proportional system in and of a human body. The claims of such proportional relationship to architecture and the universe remain as a thought.

Figure 4. *The Vitruvian Man* by Leonardo Da Vinci

The Trattato di Architettura of Francesco di Giorgio Martini was written and re-written between 1445 and 1495. Although earlier than the making of the *Vitruvian Man*, some drawings in this treatise illustrate the relationship between human proportion and architecture that *Vitruvian Man* does not. For example, in a church floor plan, a standing human figure overlaps the parti of the space (Figure 5). Key points of human figure determine key corners on the floor plan. Similar mapping happens in an elevation of a building and an elevation of cornice detail. Such mapping literally transcribes human figure proportion to the design of specific architectural aspects.

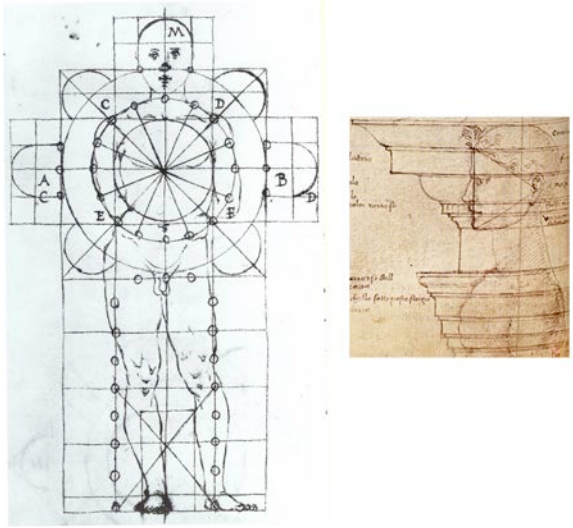

Figure 5. Drawings from *The Trattato di Architettura* by Francesco di Giorgio Martini

Le Corbusier's *Modulor* representation drawings were done in 1943 with reference to Vitruvius, Da Vinci's *Vitruvian Man*, and the work of Alberti. In *Modulor*, segments of human proportions are made applicable to architectural and mechanical dimensions, such as seat, door and ceiling heights. In other words, the human body not only sees the proportions of architecture but also measures them against his/her own dimensions (Figure 6). Therefore, *Modulor* demonstrates human scale in space that is beyond a ratio of a human figure to a spatial proportion but the actual dimensions of a human figure in space.

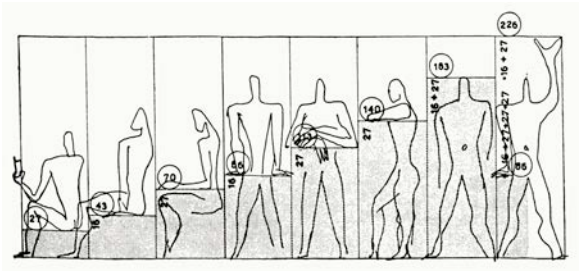

Figure 6. Drawings from *Modulor* by Le Corbusier

Compared to Da Vinci's *Vitruvius Man* and Francesco di Giorgio's drawings of church and cornice, Le Corbusier's *Modulor* representation is the only one that takes into account both human body proportion and dimension. However, human body in space is more than just being a static reference of measurements. It constructs space around itself and perceives the space by moving around and sensing it. Scale is embodied. In the three projects, scale affects both the construction and perception of materiality.

Construction

In construction, the size of tools and human hands determine the smallest size limit of the final product even if the material itself can be extremely fine. For example, a piece of clay sculpture can only be so small before it loses its resolution in details because neither tools nor human hands can scope out or pile up fine enough clay bits to the sculpture. On the other end of the spectrum, how large the final product can be depends on not only how far and deep human and tools can access to but also largely materials' loadbearing characteristics. Increasing the size of overall construction posts questions on how to connect material units together as well as the overall loadbearing characteristics resulting from adding together these joints and the assemblage of material units. That may be why humans have not built a skyscraper taller than 829.8 m (2,722 ft) in four years after the Burj Khalifa in Dubai was built.

Because of varied scales, the three beginning design projects require different tools and attention to physical loads and forces. The dimension of a manila folder, 12.7 inches by 10.4 inches, limits the scale of *Enclosure* to an object handled by hands and maybe on a desk. Students use an xacto knife as the transformation tool. Their fingers push, pull, and fold scored

edges. The thinnest strip that they can make is determined by the resulting strength of the paper stock. To achieve certain level of visual interest, details are proportionally determined by the actual size of the folder. *Enclosure* operates at the scale of two hands. Structural integrity is achieved by folding. No joints are needed. The folded creases add structural strength to the originally flat paper stock. Therefore, in most cases, structural issues are not pressing except when a cantilever is made too far for the strength of the paper stock, or the structure's center of gravity is off balance.

Contrastingly, *Fashion Theater* is operated at the scale of a full body. Materials used are basic units and the joints among them. Their tectonics allows ranges of movements so that the final design can be worn on a body. Unit and joint sizes as well as their placement are results of the desired movements. Visually, they achieve a desired proportion to the size of the body. Unit and joint sizes may also be determined by construction productivity so that extremely small sizes and overly intricate connections are avoided. The loads within *Fashion Theater* are more complex than *Enclosure* in that not only the weight is heavier but also forces derived from the body's movements add stress to the structure.

Situated in a building scale, the constructing units of the *Para-site* projects are bigger than the other two, such as a center-sliced milk jug, a diagonally sliced and rolled egg carton, and a full dry-clean hanger. Most students use zip ties as joints because of their availability and economy. As a partly unresolved design problem, most projects treat the aggregated surface uniformly. Joints and units remain the same where the overall structure bears more weight than others, which causes slight deformation of those areas and hence a natural variation of form. Besides gravity, *Para-site* projects are subject to wind load and rain weight. Strategies to address these natural forces are triangulating tie-off points to stabilize the structure; creating openings on the overall surface to decrease the sail effect; and creating holes on units to allow rain drainage.

The scale of *Enclosure* is derived from a straightforward material constraint in the design requirement. The varied scales of the other two projects are results of design decisions. The determining factors may be the scale of site and economy of making. External conditions, such as gravity and wind load, affects internal conditions, such as structural stability and integrity. As a result, materials demand specific transformations: details are added and variations appear.

Perception

Materiality is more than a static quality. It stimulates human senses in a spatial framework. Hence, materiality evokes experiences of the human body in space. Meanwhile, spatial experiences usually are associated with recognition of materiality, as the opening paragraph of *Thinking Architecture* describes the touch on a door nob brings certain moods and smells; the sound of gravel under the feet; the soft gleam of the waxed oak stairs. These recognitions arise when Zumthor moves through space as he goes into his aunt's garden; walks along the dark corridor and enters the kitchen. [1]

In the three beginning design projects, the visual and the tactile are the two main senses involved to experience materiality. Interestingly, *Enclosure*, the project that is at a scale to be held in hands may be the least tactile among the three. Because of its small scale relative to the body, *Enclosure* presents its exterior to the viewer and limits touch to happen on its outer surface. The material of paper stock is even and its edges are clean, which creates a plain tactile feel. For this reason objects made from manila folders invite a perception as geometry rather than material.

In *Fashion Theater,* material attaches to the performing body while presenting itself to the viewer from a distance. The viewer cannot touch the prosthetic objects. Their tactility is registered in the performer's body and can only be imagined by the viewer. For instance, a metal spine with spikes wrapped around the performer's body may evoke the imagination of coldness and piercing pain. Moreover, stage light and the background of digital projection play an important role in presenting the materiality of these prosthetic objects. Responding to light, reflected or shining through, materials exemplify glossiness, shininess, transparency, translucency, smoothness, etc. The distance between the stage and the viewer frames these visual images.

Para-sites is at a building scale so that it allows the viewer to establish various spatial relationships with it: interior versus exterior, far away versus close up, eye level versus extreme angles. These spatial relationships allow *Para-sites*

to reveal different aspects of materiality. To take the milk jug piece as an example, one side of the surface is consistently made of the exterior of milk jugs; the other side the interior. From a distance, these two sides may appear similar but a piece of translucent soft white material. When the viewer gets closer, he/she starts to see one smooth side and the other with more articulation of depth. In a further close-up view, the viewer is able to see sectional quality on the side exposing the interior of milk jugs. He/she may even choose to touch the installation and feel the hard edges and the smooth surfaces of milk jugs as well as the spikes of zip-ties. The distance between the viewer and the installation allows the viewer to experience it at different scales and hence different resolutions. The viewer's body moves in space so that the experience of materiality becomes a sequence.

Further, *Para-sites* installations are in an outdoor space where natural light affects the environment. Light changes with time, creating an ephemeral phenomenon with the appearance of materials. Some installations are set within the range of direct sunlight so that shades and shadows emphasize their geometry and depth. Some installations are set in areas only with indirect light so that a softer glow of brightness gradually transform into darkness. Looking up, maybe the sky appears brighter so that the installation shows its dark profile. Looking through some materials are translucent so that at times itself appears to be glowing. What makes this experience of light and material interesting is the moving body within the space. The perspective in space changes—so does the perception of materials.

Conclusion

The discussion of the three projects of varied scale leads us to realize that materiality is in fact spatial. In space, materials present themselves in varied resolutions to the viewer; the body initiates conditions and relationships to experience materials. The characteristics of materials reveal, conceal, and transform. Both the actual size of the design and the body's relative distance and position to it determines how materiality is perceived. Ultimately, scale draws materiality to its base physicality: gravity, natural forces, tectonics, and construction processes. Ultimately, the three projects help students develop logic and sensibility towards materiality. While the scale of the project changes, natural law persists. Students are led to recognize a constant negotiation between design intent and what the material allows.

Notes:

[1] Zumthor, Peter. *Thinking Architecture*. Birkhauser: Basel Boston Berlin, 2006. p 7.