

Qualities of Light

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Slowness + Experience

The paper examines a method of working that encourages students to explore the experiential qualities of architecture as they make design decisions. This focus aims to remove the notion many 1st year design students arrive with of architecture as a formal object and encourage them to embrace the idea that architecture is inhabited, occupied, and experienced in reality. The work described is taken on by 1st year students in their second semester who have completed a first design studio focused in abstract representations of space, figure ground studies, ordering systems, and a brief introduction to the human scale. In their second studio, students are engaged in a series of investigations that explore the qualitative aspects of architecture, with a specific focus on the phenomenon of natural light and how it is modified as conditions change and as time passes.

The studio takes on these investigations with the idea that a slowness of process benefits the students and allows for a deeper level of understanding and learning. In Tod Williams and Billie Tsien's essay *On Slowness*, they quote Milan Kundera (1997) who states, 'the degree of slowness is directly proportional to the intensity of memory; the degree of speed is directly proportional to the intensity of forgetting' (p.39). With this in mind, the studio embraces the idea of slowness as a working methodology in lieu of the quick and easy, at least in moments where this method provides a long-term benefit to the students.

While digital modeling of three dimensional spaces allows for fast and accurate understanding of where direct light will and will not strike at any given time, it lacks the potential to communicate the qualitative aspects of light in architecture. The precise question of where the lights falls is less important to these studies than the experiential atmosphere and affect it creates.

A crucial point of these investigations lies in the fact that they demonstrate how light interacts with an actual tangible object. This requires time spent constructing physical artifacts that the light acts upon, as well as patience. As David Heymann states 'models are, in the ratio of time invested to information uncovered, the most efficient means (by far) to uncover, to understand, to know – to design' (p.7). While students often approach constructing these large scale detailed models with a sense of apprehension (in some cases even dread), for most students the eventual reward of discovery and understanding is well worth the time spent cutting, gluing, and assembling.

Quantitative to Qualitative

Within this search for the qualitative aspects of light lies a need for students to have some sense of the quantitative aspects of where natural light comes from and how it operates. In order to fully understand these un-measurable qualities, students are introduced to measurable aspects that allow them to first

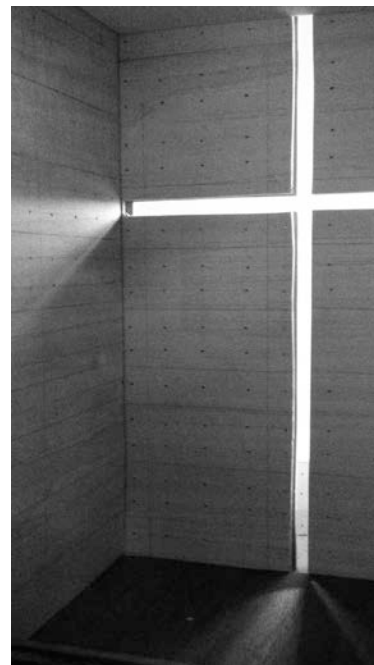


Figure 1 model by cameron williams

understand the sun's position and then provide them with the ability to use this information as a design tool. As Louis Kahn (1968) points out in his speech *Silence and Light*:

'the first really worthwhile discovery of science would be that it recognizes that the unmeasurable, you see, is what they're really fighting to understand, and the measurable is only a servant of the unmeasurable, that everything that man makes must be fundamentally unmeasurable.' (p. 237)

With this in mind, students are introduced to basic measurable information about how the position of the sun varies on a daily and yearly basis and the role that latitude plays in determining these paths and angles so that they can utilize this knowledge in service of understanding how the unmeasurable can be achieved architecturally. This information provides them with a more sophisticated understanding of the sun's location than the general conception most arrive with that the sun rises in the east and sets in the west. The ability to understand how the sun's path changes based on season, time of day, and geographical location provides them with a basic framework they can use to begin looking critically at where natural light is coming from, how it arrives within a space, and how they can expect the light to change over time.



Figure 2 light observations by yessica de la cruz

Observations

In an effort to help students come to terms with this information about the sun's path, they are asked to take a critical look at something familiar. The introductory exercise in the studio asks each student to select a space they inhabit on a daily basis and demonstrate how natural light changes in that space over the course of a day. Upon selecting their space, students make note of where natural light enters. They then record qualities of light within their chosen space through a series of black and white photos taken throughout the day in order to show how the quality of light changes over time.

These photos are printed in black and white in order to focus on the light and shadow and shared with all of the students in the studio. In the discussion of these photos, students identify details about how the location of the sun impacts the condition of the light within that space. By looking critically at side-by-side images of this familiar space, students start to understand and appreciate details about how the amount of light and the direction from which it comes alter environmental conditions. Subtle elements that they would otherwise take for granted become more evident when viewed adjacent to each other, and they begin to understand how the movement of the sun (and in some cases the presence of clouds) transform the quality of a space as time passes.

Concrete Objects

In order to further build their understanding of the phenomena of light, students record and study how light engages with a series of 'concrete objects'. These objects include reconstructions of precedents, abstractions from those precedents, and eventually surfaces and spaces designed by the students. In each case, the students are asked to consider what they construct not as a model, but as a

representation of a possible reality. This mentality borrows from a methodology of Peter Zumthor (2006) where there are 'actually, no models at all in the conventional sense, but concrete objects, three-dimensional works on a specific scale' (p.66). Over the course of the studio, several 'concrete objects' are created, and the emphasis is placed not on the object itself, but on the quality of light it creates.

Precedents

The first of these studies involves a series of precedent studies focused on how light enters into a sacred space, how that light contributes to an atmosphere, and how it changes over time. Students are asked to identify a specific moment within the precedent and then reconstruct this moment at a scale that allows them to view and understand the interior of the space.

While the question of natural light has always been a focus of the precedent studies handled in the studio, the way of addressing this issue has changed drastically in order to make the experience of light much more tangible. In early studios focused on precedent, light was a topic of discussion and studied primarily through photographs, but it was evident that students only gained a superficial sense of how natural light operates and how it changes over time in that space. In response to this, the studio has changed its approach to precedent models from small-scale artifacts focused on form, massing, and context to larger scale artifacts that allow the students to look inside and view the interior of the space.

In these investigations, students construct large-scale physical models that emphasize materiality, texture, thickness, color, and fenestration so that the artifacts re-create conditions analogous to those of the actual building. The scale allows the students to peer inside and observe how the light qualities change throughout the course of the day and document the conditions inside with a series of photographs taken hourly. These photographs demonstrate the directions from which light enters the building and how the changing position of the sun over time affects the quality of light within. Once complete, the models of the precedents are placed outside in direct sunlight, rotated relative to where true north is and in some cases tilted to account for extremes in latitude in order to replicate the conditions of the actual building. As in the observation photos discussed above, the ability to look critically at images taken at different moments side by side provides the students with a truer sense of how the atmosphere of an interior changes with the passage of time. Specific spaces become illuminated while others become hidden in the shadows, providing the students with a sense of the temporality of architecture.

This sense of how light changes over time in the model is important as it serves as a counterpoint to professional photographs of the spaces that are readily available in books, magazines, and the internet. While often striking, those professional photographs present a momentary condition for a given space (shot when the natural light is ideal or augmenting a space with artificial light to provide an otherwise unattainable condition). While these images are extremely helpful in that they provide a thorough

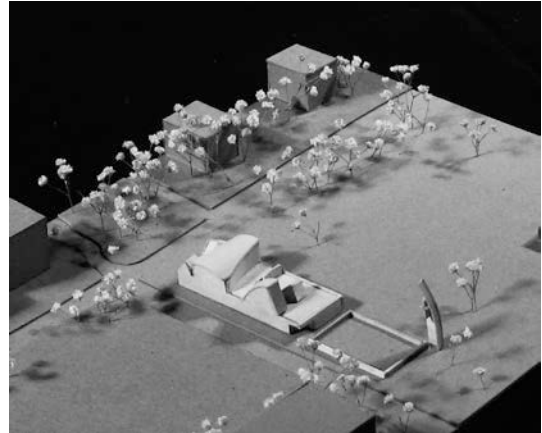


Figure 3 2012 model focused on interior by eberth arteaga



Figure 4 2018 model focused on interior by anderson yauripoma

documentation, they only serve to address 'what' the light is doing inside the building. Other questions such as 'when' and 'how' require further investigation.

These idealized images also reinforce the misconception that the end game in architectural design is to



Figure 5 interior of model showing how light changes over the course of the day by anderson yauripoma

create a picture worthy of publication in a two dimensional format (or capable of maximizing "likes" on social media) as opposed to designing a sensual space with the actual inhabitants in mind. As Juhani Pallasmaa (2012) points out, 'instead of being a situational bodily encounter, architecture has become an art of the printed image fixed by the hurried of the camera' (p.33). The studio aims to counter this trend of prioritizing picturesque forms and instill in young students the idea that architecture is meant to be experienced in person instead of something viewed in two dimensions.

The act of observing how the light changes (more so than the photographs themselves) helps the studio to appreciate the precedents less as unique formal objects and more as habitable spaces where the atmosphere changes in response to external conditions. This method of examining precedents aims to expand the studio's understanding and appreciation of architecture beyond the formal to include the experiential as well.

In *Thinking Architecture*, Zumthor (2006) states, 'We carry images of works of architecture by which we have been influenced around with us. We can re-invoke these images in our mind's eye and re-examine them' (p.67) At the completion of these studies, students have spent a great deal of time with their precedents. The process of constructing the models and the time taken to observe and record the interior conditions require attention and patience on the part of the students. This approach to the study of precedents provides students with a deeper, more lasting 'image' of these works of architecture than swiftly flipping a page or clicking a screen allows, an image students can carry with them as they advance in their design education and prepare to move into the profession.

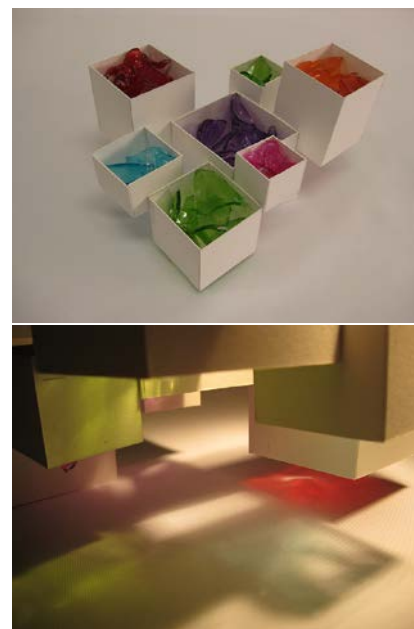


Figure 6 abstraction of st. ignatius chapel by veronica aguirre, vanessa melendez, and oswald nixon

Abstractions + Extractions

As part of a bridge between the study of the precedents and the design of their own spaces, students are asked to create an artifact that modifies light in a similar way to that of the building they have studied. In this artifact, all formal connections to the precedent are disregarded and emphasis is placed, not on the shape of the artifact itself, but solely on how the artifact modifies the light that passes through it. In doing so, the hope is that students will begin to disregard the form of the object they are designing and allow that form to emerge from the need to affect the light. The shape of the artifact becomes a secondary concern to the quality of the light that passes through it.

The other side of this bridge occurs as students complete their work with the precedents and transition into designing a small sacred space in a remote location. Upon collecting their observations from the precedent studies and abstractions, students have gained a better understanding of how light behaves. The initial step in this process is similar to the precedent abstraction discussed above. In this step, students are allowed to make reference to any of the precedents studied within the studio as they construct a surface that filters light. In addition to the need for this surface to modify the light in some way, students are also given the constraints that the wall must have thickness and that it must be visually solid when faced perpendicularly. As in the abstractions, students are asked to disregard the form of the surface and focus solely on what it does to the light.

From Surface to Space

Each student in the studio creates multiple iterations of these surfaces. Each surface study is tested against a light source and then revised or a new direction is taken on, until the student finds a quality of light they are satisfied with advancing. The most effective of these studies typically eschew complex geometric patterns in favor of simple, rhythmic, and repetitive openings that focuses on light more than shape.

These surface studies then carry through into the design of a sacred space that emphasizes the presence (or absence) of light and how its qualities affect the experience of the space. As in the precedent models, students construct large-scale study models that communicate the quality of light within the space with their chosen surface studies serving as part of the exterior. As these models take shape, students photograph the interior and digitally place images of people within the space in order to supply it with a sense of scale.

Inside Out Evaluation

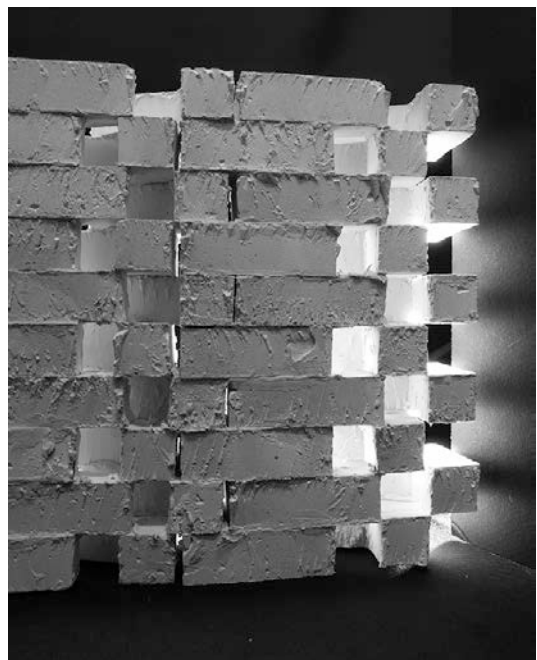
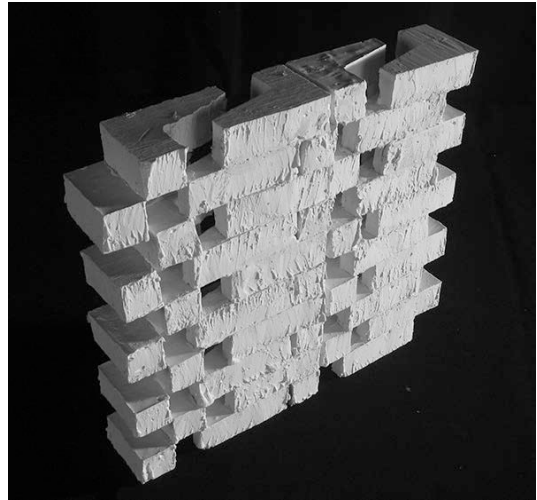
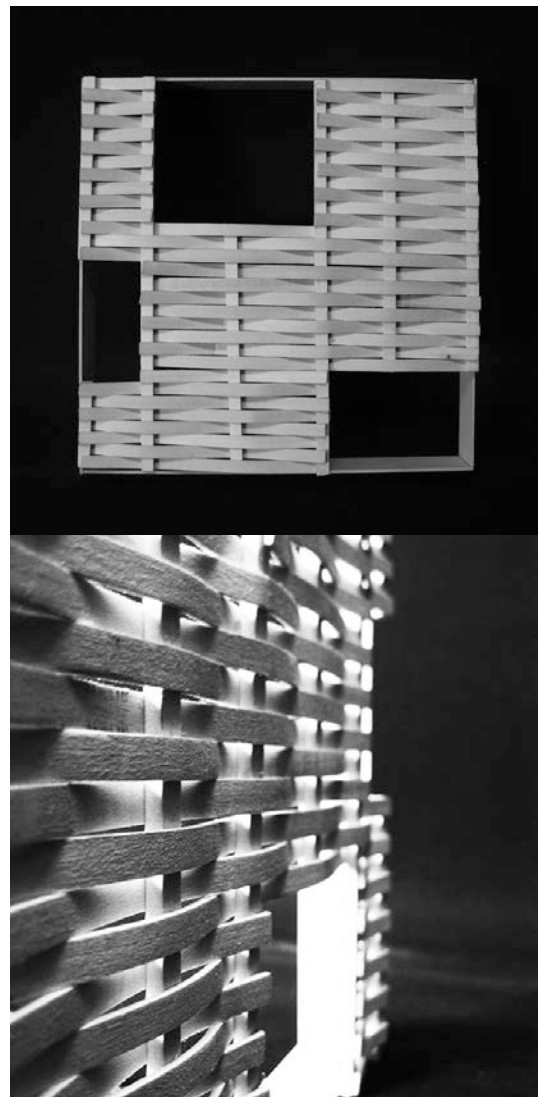


Figure 7 wall study by sean benson

Instead of making design decisions based on external form, students make choices based on how the light that enters affects the experiential qualities of the space within. Adjustments are made to the surface and proportion of the spaces in order to modify these conditions. The scale of the models seems to change the point of view from which students evaluate the quality of their design work.

Upon viewing the interior of the space they have created, the students seem to realize that the complexity they initially sought already exists within the space they have created, and they tend to be generally less concerned with the outward shape of their design. At least to a degree, the notion of architecture as a formal object viewed externally becomes eroded as the students consider experience and inhabitation as the primary drivers in the evaluation of their designs. It is the hope of the studio that by instilling an understanding of how light contributes to the experiential qualities of architecture early in their design education, students will continue to value the experiential as a criteria for design decisions as they advance in their education and into the profession.



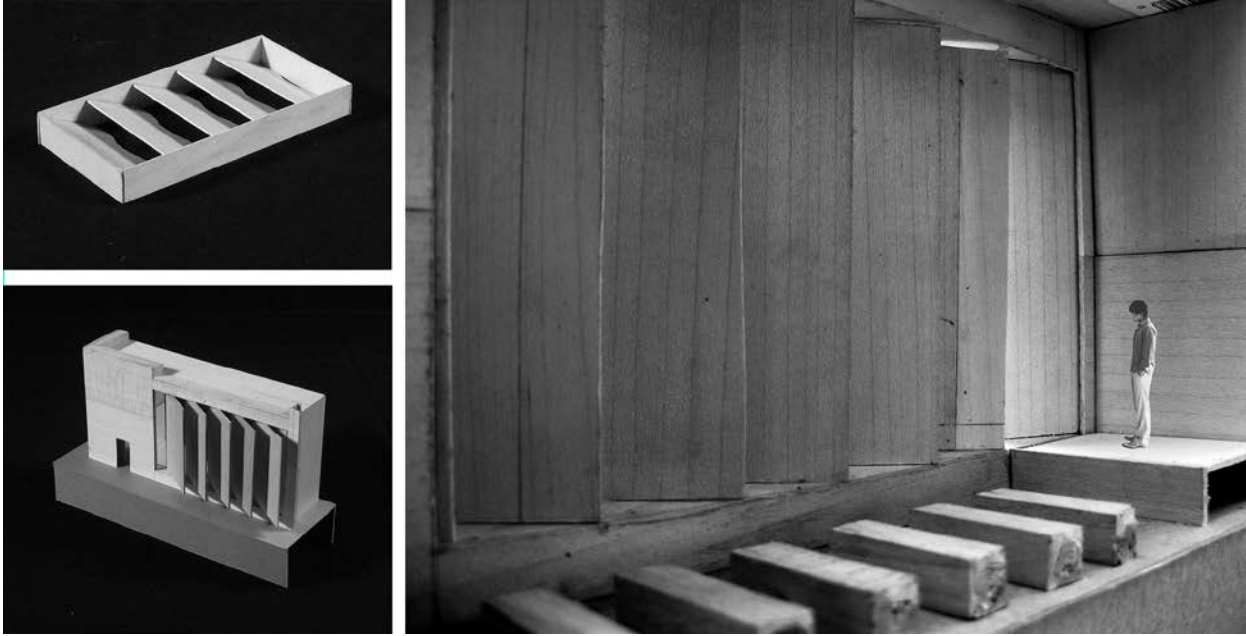


Figure 8 wall study and section model by Steven Bain

References

1. Heymann, D. (2012). Why Studio?. In: Dezinski, J., Jones, G., Taganas, A., & Wong, J. (eds.) ISSUE:008. Austin: The Whitley Group, p. 7.
2. Kahn, L. (1968,1969). Silence and Light. In: R. Twombly, ed., Louis Kahn: essential texts, 1st ed. New York: W. W. Norton & Company, Inc., p. 237.
3. Kundera, M. (1997) Slowness: A Novel. New York: Harper Collins, p. 39.
4. wall study and section model by christoper mores
5. Pallasmaa, J. (2012) The Eyes of the Skin. Chichester: Wiley, p. 33.
6. Zumthor, P. (2006) Thinking Architecture. 2nd expanded ed. Basel: Birkhäuser, p. 66+67

Bibliography

1. Holl, S., Pallasmaa, J. & Pérez-Gómez, A. (2008) Questions of Perception: Phenomenology of Architecture. San Francisco: William Stout Publishers.
2. Tanizaki, J. (1977) In Praise of Shadows. New Haven: Leete's Island Books.
3. Williams, T. & Tsien B. (1999) On Slowness. TOD WILLIAMS BILLIE TSIEN Architects | Partners.
4. Available from: <http://twbta.com/3031> [Accessed 9th April 2018].