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Site Visit Tools

Anthropology of Cyberculture | Spring 2009 | Professor: Lucy Suchman

Abstract

While digital computational tools have improved many aspects of architectural practices, most Indonesian architects have not gained the benefits from these digital tools that have been garnered at the most industrial countries. However, despite of that, architectural productions remain exist and in same case, the outcomes are exceptionally satisfying, in terms of design quality. So, rather than viewing the absence of digital automation as liabilities, the current state of technology in Indonesian architectural practices should be seen as a chance to reconfigure the relation between architects, tools and the design.

Considering many discourses of design tools have been scrutinized in the process of design modeling, documentation, building analysis and fabrication, this ethnographic paper focuses more on site-visit activity. Especially in extending the possibilities that architect's mind and body might contribute in analyzing the site, instead of merely looking at the dichotomy of digital and analog tools. The paper is mainly based on my own experience as a professional architect in Indonesia and as a scholar who are currently studying digital computation tools in Massachusetts Institute of Technology (MIT). From this perspective, in the juxtaposition of manual and automation, the paper illustrates how a different way of using tools in site-visit may highly impacts the way architect think and eventually affects the outcome of the design.

Introduction

Globally, digital computational tools have improved many aspects of architectural practices, including design, construction, and post-occupancy analysis. For example, in the design phase, architects, together with other engineers, can anticipate the cash-flow and schedule of the project through Building Information Modeling (BIM). In corresponding to the surrounding environment, architects can anticipate not only the way the physical environment influences the building by calculating the airflow, humidity and sunlight, but also the way people behave within the design, for instance by simulating the flow of people in transportation building (airport, station), in busy pedestrian intersections, while evacuating during building emergency. In the construction phase, engineers started to use GPS (Global Positioning System) in fitting out building component on the site, 3D scanner to measure the existing building, and robot to fabricate walls, roofs and other elements. In evaluating occupied building, architects use sensors to evaluate users' behavior in regard to their use of space for daily activities as well as use of energy for such activities.

Most Indonesian architects have not gained the benefits from these digital tools that have been garnered at the global scale. For example, computers in Indonesian architectural practices are merely used for drafting and drawing. Whereas many architectural firms in the U.S can produce many design variations within a different design constraints in a small amount of time, most Indonesian firms have to deal with a limited options caused by their technical limitations. However, despite of this inefficiency, architectural productions remain exist and in same case, the deliverables are exceptionally satisfying, in terms of design quality. Several Indonesian architects gain international recognitions with the so-called primitive tools, some even do not use computer whatsoever. In fact, some of the world-class architects (Tadao Ando, I.M.Pei, Kengo Kuma) explicitly stated that they would not depend on computer as their primary design tools. So, rather than viewing the absence of automation as liabilities, I see the current state of technology in Indonesian architectural practices as a chance to contemplate on the dilemmatic questions, such as to which direction should this automation be conveyed and how should we reconfigure the relation between architects, tools and the design outcomes.

This paper proposes that to place the notion of tools in architectural design process appropriately, one should not start by looking at the dichotomy of digital and analog tools. Instead, it should begin by extending all the possibilities that the architect's mind and body

might contribute to design process as a tools. The paper will compare the role of tools in the relationships of mind, body and their 'prosthesis' (analog and digital tools), based on an ethnographic approach. It is based on my own experience as a professional architect in Indonesia, as well as a scholar who are currently studying digital computation tools in Massachusetts Institute of Technology (MIT). During my ten years of practice, I have experienced the evolution of tools from the perspective of a user from using a simple sketchbook and rulers, drafting table to CAD and Building Informational Modeling (BIM), from reading the tape measurer, laser measurer to GPS devices, and from testing the model in the wind tunnel to Computational Fluid Dynamics (CFD) program. While at the MIT, I witness the role of tools from the perspective of the tools' creators, instead of a user. There have been many discourses on the digital/analog tools in architectural practice, both technically and philosophically. Yet, many of them come from the context where the digital practice prolifically blooming, such as the U.S, Western Europe, and many other industrial countries. Standing in this juxtaposition of manual and automation, designing and programming, and between the Indonesian locality and the MIT universality, I hope to depict the relationship between the designer and the tools in a fair manner.

Considering many thoughts and discourses on the role of digital tools in form-finding, design visualization, building analysis and fabrication, my ethnographic paper focuses more on a relatively neglected area of the discussion on architectural tools, which is the site visit. The paper aims to investigate the way tools on site visit activity may affect the way architect thinks, and also on the way the dialogue between the body and its prosthesis may eventually shape the design outcome.

Visiting

“My inspiration came from the land, ... and, of course, from Paul Klee . . . and the poetics of his paintings.” –Renzo Piano (architect, Pritzker prize laureate)

I start investigating the architect–tools relationship in site-visit, not only because it is the first step in the design inquiry, but mostly because despite of its significant role, site-visit is the most excluded part in the automation of the design process. Although site-visit establishes the framework for the design process, there is currently no specific tool available to analyze the context, either in analog or in digital version. Most of the tools aim at form-finding, visualization and analyzing purpose. Here, it is necessary to differentiate between site surveying tools and site visiting tools. Site surveying tools refer more to the recording activities with general purpose, such as building bridge, road, dam and other kinds of engineering projects. Site-visit tools aim to reading the site instead of merely recording it. Elizabeth Meyer (2005) diversifies a different type of reading the site in Site Citations: “[1] Site as Framework: Site is not an empty canvas, but an articulated field, or a textile with recognizable warp and woof; [2] Site as Figure: the land’s surface could be read as both a continuous undulating surface and an articulated field or figures that could be named and delineated; [3] Site as Fragment: The process of adding value into the site based on geological or ecological feature.”¹ Meyers’s citation grounds the way site should be regarded as an inseparable part of the design.

Architects may visit the site after knowing the content of the design (function, budget, capacity and users’ needs). For some of them, visiting the site is about envisioning how to fit the design content into the existing context: for others, it is about accommodating the context with the building.² Yet for most architects, like Renzo Piano, architecture is about the marriage between the content and the context. By means of context, it is not only understood as the tangible aspects of the site (wind speed, temperature, sunlight direction) but also the intangible aspects of it (social, culture, history). In one of his interview, Piano mention the significance of

¹ Meyer’s essay aims to the purpose of articulating site for landscape design. Yet, I regard the translation of organic context into more concrete definition parallel to the way architect treat their form and shape. Burns, Carol J; Kahn, Andrea (ed) *Site Matter: Design Concepts, Histories and Strategies*, Routledge, New York and London, 2005

² For Jean Nouvel (Pritzker Lauerate 2008), site visit is an adventure to contextualize the new design. <http://www.charlierose.com/view/interview/9117>

visiting the site when designing the Nasher Sculpture Center in Texas.³ He spent a day, from morning until evening, just walking and wandering around the site, understanding the surrounding environment and defining how to respect them. The design result eloquently shows his respect to the neighboring building, Louis Kahn's Kimbell Art Gallery⁴

I did the same activities in Indonesia. To depict the interplay of tools in my site visit, I distinguished the ways of 'visiting' in two phrases:

[1] I visit the context, record the surrounding environment, and envision my intention in there.

[2] I 'browse' the context, 'save as' the surrounding environment, and 'upload' my intention in 'there'.

In the first phrasing, I physically come to the site, whereas in the second one, I am represented by my agent: electronic devices, literature or advance internet features such as Google Earth. Here, the concept 'visiting' contains recursive verbs (save-open, visit-leave, upload-download), in which, there is a different tool for each verb. Visiting becomes this complex verb caused by the tension between tangible and intangible aspects that underlie a particular context. In addition to Meyers Site Citation and Piano's consideration to the surrounding building, visiting Indonesian context does not merely mean reconfiguring the landscape features or creating dialogue to existing building. Within Indonesian diverse social community, visiting also mean engaging in dialogues with the local people; observing their behavior, and reading the reference about the local significance of the place (history, art, and culture). In this context, visiting is more about connecting human to human instead of building to the site. Accordingly, the term 'tools' could not be referred only to the dichotomy of analog or digital devices such as sketch pad, tape measure or digital camera. Instead, Visiting Tools should be expressed in the relationship between architect's body and their prosthesis, in which both can play equally as a tool. For the first way of visiting above, I prioritize this ethnographic approach to the role of my body in understanding the site while I physically there.

³ Charlie Rose : Pritzker Prize, <http://www.youtube.com/watch?v=uppP9LxCuV0>

⁴ One can be easily relates the way Kahn divide the space of the gallery into a series of parallel rectangular boxes to Piano's Nasher gallery. In fact, Kimbell-Gallery's Composition also reflected in another building in the neighborhood, Tadao Ando's Fortworth Art Museum.

The Body

The modest example in Architecture and You, (Caudill; Pena; Kenno, 1978) illustrates how people encounter space in chronological order: from physical experience, emotional experience to intellectual experience. Imagine, in the rainy day, a woman get off from a taxi, start looking for a spot for shelter and eventually gets covered under a canopy of a building for a more comfortable situation. Her body says “I like it here.” She then starts looking around and finds that she likes the building. Her sensuous experience says “I like the shape, the texture, and the colors.” Later on, her intellectual being –supposed she has knowledge in design-- explain why she likes it: “The choice of color makes the room looks warmer, and that little accent balance the dominant composition of the wall.”⁵ This illustration perfectly fit to the way my responsive body immediately takes a lead in experiencing the site.

Body as the sensor

My responsive body instantly evaluates the physical conditions as the body becomes my first tool on the site. My skin acts as the thermometer, barometer and humidity measurer that evaluate the local climate. My eyes measure the sunlight exposure, depth of field, dimension, color and other elements in my sight. In comparison to this Aristotle’s five-senses (sight,smell,taste,touch,hear), Kent Bloomer and Charles Moore, in their books Body, Memory and Architecture (p.33), add other useful senses definition: *basic-orienting* and *haptic sense*, which are based on J.J.Gibsons’s proposal, a psychologist focusing on visual perceptions. *Basic orientation* refers to our postural sense of up and down which, because of its dependence on gravity, establishes our knowledge of the ground plane. The *haptic sense* is the sense of touch reconsidered to include the entire body rather than merely the instrument of touch, such as the hands.⁶ Gibsons’ senses explain how my body orients itself in responding to my preferred spatial quality of the space. On a sloped site, I try to stand on a more flat surface. On a coastal site, I tend to orient myself facing to the sea. When the wind blows too hard, I slightly bend my torso and cross my hand to hug my body. Gibson’s *basic-orienting* sense is perhaps the most influential tool in deciding the basic orientation of the building, while other senses may

⁵ Caudill, William Pena and Paul Kennon. *Architecture and You: How to Experience and Enjoy Buildings*. Watson-Guptil: New York, 1978

⁶ Bloomer, Kent, Charles Moore and Robert Yudell. *Body, Memory and Architecture*. New Haven and London: Yale University Press, 1977.

contribute to the more detail parts of the design. For instance, the way I react when the sun exposure is too bright (wearing a sunglass, narrowing my sight or wearing a hat) will reflect on the way I design the opening (doors and/or windows).

Body as the ruler

In addition to the climate condition, my visual perception can also measure the dimension of the site by using my own body or an existing site element as the ruler. For example, I can have my own height (180 cm) as the basic unit, and using it as a module to measure the dimension of the site. Or since I have the knowledge of the average doors height (2 m) and floor to floor height (2,7 - 3 m for single storey and 3 to 4 m for multi-storey), I can use that element from the existing building next to the site as my own units instead of using international system units (metric and feet). In fact, the use of anthropometric system in calculating the site is more compatible with the context of Indonesian local culture. Julian Davison, in his text on Introduction to Balinese architecture, illustrates the way Balinese people use the hands and legs of the house owner as the basic units. For example, the dimensions of the house column diameter are based on those of the palm and the hand. They multiply the length of the owner's foot by eight and a half to define the distances between the columns in the housing compound.⁷ The indigenous unit in this tailor-made house will generate design that is more convenient to the owner instead of using the standardized dimension based on international architectural standard.⁸

Body as the social medium

In relation to the social context, my body mediates my communication with the local people and their social systems. Amos Rapoport, in his House, Form and Culture, state the role of social issue between human and its nature. Rapoport argues that placing the building on site is mainly influenced by the social factors (family or clan structure); relation to their food resources; attitudes to nature; the needs of sacred orientation; and the symbolism of landscape features.⁹ Social visiting to the non-physical context requires my soft-skill ability to be installed

⁷ The undagi (the local architect-builder) record all this measurement on a bamboo stick for the use of the house builders. Davison, Julian. *Introduction to Balinese Architecture*. Singapore: Periplus Asian architecture, 2003.

⁸ Some references on human dimension such as, Architect Data (Neuferts), created in military systems where the proportion has been predefined by the entry requirement.

⁹ Rapoport, Amos. *House, Form and Culture*. Englewood Cliffs, N.J: Prentice-Hall, 1969.

in me as a tool, such as the local language as the currency for my social exchange and knowledge of the local norm for the setting-up of my social interface. Otherwise, I will need another body (the local guide) as my social medium. Considering that site may be composed by a particular social system, this social visit is highly critical to capture the meta-data hidden within the animation of such system. Robert Sommer, in his book Social Space, distinguishes different dimension of this meta-data such as personal space and territory based on several behavior observation. The four and a half tatami's room in traditional Japanese house refers to the personal space in engaging intimate scale to the room.¹⁰ In addition, the longer I stay on the context, the more the hidden dimensions are revealed. In my own experience visiting Sundanese dwelling in West Java, I sense the meta-division of gendered space in the house. Kitchen belongs to the woman and is always placed at the back of the house, the most private one. Terrace, which is more public, is the place mainly for man.¹¹ Similar to an actor using his/her body as their character's container, I can sense this hidden context by using my body as the social medium, which means embodying other people's minds and emotions and recording the way that meta-dimension circumscribes my body.

Body as the simulator

All these inquiries, by using my body as a sensor, a ruler and a social medium, then guide me to define my design approach. Although these senses and references do not indicate a specific unit's scale, such as meter/feet or Celsius/Fahrenheit; they lead my mind to reach a certain level of standard in the emotional scale: whether the site is satisfying or disappointing, arrogant or easy going. As Julian Davison noted that in many Indonesian societies, the human body provides a metaphorical model for representing the divisions of space within the house, it is inevitable for me to consider my presence on the site as analogous to the presence of my design.¹² The attitude of my responsive-body, my anthropometric reference and my social character will reflect the attitude of my design approach afterward. For Amos Rapoport, this man-nature relationship will be an important aspect of design creation and the relation to landscape is the first aspect which needs to be considered. Furthermore, Rapoport classifies this relationship within three types of attitudes: First, I can be religious and cosmological, regarding

¹⁰ More on this topic see Sommer on Social Design and Oscar Newman on Defensible Space

¹¹ Muslimin, Rizal. *Physical Development Pattern of Cipta Rasa village, West Java*, Undergraduate Thesis, Bandung: 1998

¹² Davison, *Introduction to Balinese Architecture*, 7.

the environment as dominant and myself as less than nature; second, I might regard my self as responsible for nature and establish a mutual symbiotic relationship with nature; or third, I can be more exploitative and act as the creator of the new environment.¹³ In addition to Rapoport's types of responding to nature, Bloomer and Moore associate the role of body-feeling to the directional preference, for instance, the use of verticality reference in expressions such as Feeling 'Up' and Feeling 'Down'. Furthermore, Bloomer-Moore extends the way our body orients to its space.¹⁴ Orienting Upwards may imply praising, striving, and feeling superior, whereas downward may indicate being humble, feeling depressed or expressing condolence. Facing front is the orientation toward mobility representing strength and virtue, while back has private and earthy implication. When we get close to something really tall, we feel shrunk, whereas when we orient to a vista (sea, scenery), we feel our body expanded. Daniel Libeskind's Jewish Museum in Berlin is a good example in articulating Gibson's body-sense¹⁵. Inside the ground floor of the museum, the presence of my basic orienting system becomes more dramatic than before. In order to simulate the chaotic experience and suffering of Jewish communities during the Nazi's occupations, he distorts the visitors' basic-orientation by tilting the floor plane in certain degree so that people could not walk straight easily. In simulating the camp concentration, he builds a dark and a very high ceilinged chamber (the Holocaust Void) without any lighting except for a small hole at the top which connect the inside to the outside. Inside that dark chamber, I am instantaneously facing upward, looking at the hole as the only light sources in the room. This gesture is effective to help me understand how it feels being inside a concentration camp.

While Libeskind's museum connects body-movement with history, basic-orientation sense in some Indonesian culture is more secluded within both their concept of divinity and their respect to the surrounding environment. Davison illustrates Balinese orientation system based on *Nawa-Sanga*, in which they use the Tripartite Universe (the underworld, the world of human, and the heavens abode) to place the building on the site. For Balinese, the mountain (*kaja*) is identified as the abode of the gods and therefore, they should put the temple –the

¹³ Rapoport is use the term 'I-Thou' and 'I-It'. The first two approaches are 'Thou' as the relation is personal, and nature is to be worked *with*, whereas 'It' referred to the third approach as 'it' to be working *on*, exploited and used.. Rapoport, *House, Form and Culture*, 8.

¹⁴ Bloomer, Moore, Yudell, *Body, Memory and Architecture* 7.

¹⁵ Libeskind uses the term 'between the lines' for his design concept. More about Jewish museum design concept, visit the website <http://www.daniel-libeskind.com/projects/show-all/jewish-museum-berlin/>

sacred place-- closest to and facing the mountain, whereas the sea (*kelod*) is considered as the home of the demons and malevolent spirits and therefore, that's where the entrance should be put.¹⁶

Within over 200 million people, Indonesia is considered as the most diverse country in the world with more than 740 ethnic groups and 583 languages. Each ethnic group may have a different orientation method. So clearly, in its role as the simulator and social medium for such context, my simulator-body may also act as the carrier of belief system.

The Prosthesis

In the previous part, I have celebrated the way my body can independently retrieve environmental and social data without the assistance of external tools. Yet, this notion of body independency could mislead me in sharing my perspective of comparing the body to the other tools as I might undermine the tools or even consider them no longer necessary. To avoid this biased view, I switch my celebration to the external tool side and use the term "prosthesis" as the body assistance in visiting activities. The term "prosthesis" refers to 'an artificial device to replace or augment a missing or impaired part of the body'¹⁷. The way Vivian Sobchack praises her prosthetic leg in her essay, Beating The Meat, parallels to my expectation in using this external tools. Sobchack wants her prosthetic leg to accommodate her, rather than she incorporates the prosthesis. She also wants to have a more transparent prosthesis that she doesn't even feel wearing it. In considering the role of tools as prosthesis, Sobchack warn that in the (inter)face of the new technological revolution and its transformation of every aspect of our culture (including our bodies), we have to recognize and make explicit the deep and dangerous ambivalence that informs the reversible relations that we, as lived-bodies, have with our tools and their function of allowing us to transcend the limitations of our bodies¹⁸. This warning is essential in the case of how architects need to handle their tools in design process.

¹⁶ For the Balinese, everything has its correct place in the world, with the gods being placed on high, the malevolent spirits being positioned in the lowest regions, and mankind sandwiched between the two. Davison, *Introduction to Balinese Architecture*, 7.

¹⁷ Merriam-Webster Online Dictionary. <http://www.merriam-webster.com>

¹⁸ Sobchack, Vivian, "Beating the Meat/Surviving the Text or How to Get Out of this Century Alive," *Body and Society* no. 1(1995): 205-214.

For that reason, in visiting the site, I demarcate two distinctive domains between the confirmatory prosthesis for my lived-body and the body avatar prosthesis for the techno-bodies.

Prosthesis as the Body Confirmation

People wear glasses not because they can not see at all, but because they want to sharpen the blurry image they see at a comfortable distance. They can still refocus their sight without the glasses by moving the object forward or outward. From my previous visiting activity, all the data that I gain with my body as tools are uncertain: blurred map, blurred picture, a vibrant data. So, in order to get a more precise dimension, I consider tools such as tape measure, aerial photograph, and GPS device as my prostheses in focusing the image. Without such confirmation, my design dimension will be imprecisely fit into the site.

Prosthesis becomes even more essential in a limited situation where precise dimension are highly demanded, such as a small lot in a very densely populated city, a renovation project to an old building, or a stiff slope land on the hilly contour. Consequently, the level of confirmatory tool is proportional to dimensional preciseness in design. The higher the demand for preciseness in design, the more reliable confirmation prosthesis is needed. My high rise building projects demand more confirmatory prosthesis, such as seismic survey devices, in assessing the physical context rather than a single two-storey house project. Complex functions such as hospital require more confirmatory prosthesis in accommodating complex activities. In addition, large scale project, such as urban design project, will need a physical model of a specific urban tissue to confirm my body-ruler about the scale of the site.

Prosthesis as the Body Avatar

Having a prosthetic leg doesn't only mean to replace the leg to be able to walk again, but also to run faster.¹⁹ Many architects rejoice the initiation of Google Earth in 2005, including myself because the idea of visiting the site virtually makes a significant difference in terms of time and cost. In this case, representing my physical body as the virtual avatar does not only mean to by pass the procedure of transports and places my body on the site, but also redefine the tools that my body provides (sensor, ruler and simulator). In using the Google Earth, I can instantly measure the site by using the ruler with any unit that I want, and instantly evaluate its

¹⁹ Athlete, actor and activist Aimee Mullins who use prosthetic legs once provoke controversial issue caused by her prosthetic legs in marathon competitions. http://www.ted.com/index.php/talks/aimee_mullins_on_running.html

distance to the surrounding object as well. I can turn on and off multilayer system that overlay the aerial photograph. For instance, I can turn on the climate feature to inform me about the temperature, humidity, wind speed and even cloud animation of the site during the day. Street view is available for me to virtually walk along the surrounding neighborhood. Moreover, I can virtually place my digital design onto the site in the Google Earth and see how it relates to the existing condition.²⁰ For instance, I can check whether my design will block or be blocked the view to or from other building.

Prosthesis as the Desire Simulator

In my physical presence, my responsive-body creates delineations of how I should elaborate the site with my design. My sensor will warn me when my desire tries to push me design a certain space which is not comfortable to my sensors. Here in this body-avatar, the absence of my body-sensor makes it hard for me hard to feel the physical quality of the site. My desires for more aesthetic, more convenience, more power and more fantasy will create my own version of the site, a simulacrum, and ignore the error detectors from my sensors. This is my desire speaking: My ignorance of the scale, climate, social and surrounding nature could be both my weakness and my virtue. I may no longer be sensitive to the scale but my out-of-scale building may contribute to a new radical approach for the context; I may ignore the climate, but I can redefine the new roof and opening for that context. In fact, as my desire continues, I can test my new alien building using the Computational Fluid Dynamics (CFD) program to represent my body sensor in order to evaluate micro-climate constraints within my design. For instance, CFD can simulate how the wind behaves toward my design to see which room will be warm or cold, or simulate how the sunlight penetrates the building to indicate which rooms have little light. Furthermore, today Agent Based Modeling program can even represent the behavior of my body and my psychological response to the site. For example, I can be a digital Balinese by assigning the '*Nawa Sanga*' rules into my body-avatar, so that the avatar will behave correspondingly toward the surrounding environment such as the mountain and the sea.

²⁰ In some cities such as New York City and Boston, Google Earth has a feature of 3D building to visual the scale of the city. However, most of the cities in the world don't have this feature yet. The only way to simulate the surrounding environment is by creating the surrounding building manually within our site.

Mind as the Prosthesis for Prosthesis

However, the issue in this architect-tools-site relationship is less about fewer constraints means more creativity, or about more constraint proposes more contextual design. Instead, it is more to the questions of how I read the site, both virtually and physically. Agent Based Modeling may convey the rule of cosmological orientation but not my belief as a transcendental matter.

In reporting ethnographic research on how the protein crystallographer --person who studies the arrangement of protein molecule structure-- deals with the physical and digital model of protein molecule, Molecular Embodiments and the Body-work of Modeling in Protein Crystallography, Natasha Myers brings the problem of how such abstract matter are really hard to be represented both by the physical and digital representation. Beside the question of imagining the atomic scale of the molecules into the scale that is compatible with human, the model also lacks the representative feature of how the molecules related to each other and to the network of the human anatomy. The crystallographer, then needs to embody themselves into those molecules models and at the same time creates those molecules in their head.²¹ In using the scaled model as the site representation, both physical and digital, Myers's study reflects the most important, yet most neglected aspect in site representation: that model, both physical and digital, can represent the form but not the systems (social system, basic orientation system, haptic system and belief system). Consequently, to simulate the system of the site, I have to incorporate my mind to that particular prosthesis (the model) as the body avatar, while at the same time placing the prosthesis inside my mind. Embodying my mind into the model, and vice versa, enables me to revisit the meta-system of the site.

At this stage, I have reached the point where both my prosthesis and my body are assisting each other, by having the model-in-the-screen, the model-in-the-hand, and the-model-in-the-head. To avoid misperception caused by being far from the physical site, I revisit a different type of embodiment between my body-avatar and my physical body in two domains: between point and line and between plane and volume.

²¹ The crystallographer uses their hand and body gesture envisioning themselves manipulating the protein structure. Myers, Natasha, "Molecular Embodiments and the Body-work of Modeling in Protein Crystallography," *Social Studies of Science* no. 38 (2008): 163-199.

0D versus 1D

In measuring the dimension the boundary on site, I use my body as a ruler to trace the periphery. I pull the tape measurer or holding a GPS device and walk from corner to corner to record the point coordinates in a series of ways. In a more detail element (such as in renovation project) I expand both my hand to stretch a line to draw the as-built drawing.²² On the other hand, my body avatar measures the object in parallel way. 3D scanner, currently the fastest way to record building dimension, takes a snapshot of an object in the same principles as bats use sonar 'to see' an object. The laser beam, as sonar, records all the points coordinates that inhabit the surface, and redevelops it in 3D digital image.²³ So instead of tracing the line, my body avatar draws by multiplying themselves into a millions avatar, touch all each point on the surface, record the coordinate and report the coordinate to the scanner at once. Whereas my physical body records the site by starting one point for each corner, creating a line and then connecting each line to create a plane. Consequently, the absence of my body-trace means I lost my movement experience on the site. For Robert Yudell, this means the lost of the dialogue with my site as he states: we make places that are an expression of our haptic experiences even as these experiences are generated by the place we have already created. Our bodies and our movements are in constant dialogues with our environment.²⁴

2D versus 3D

Different modes of inhabitations also mean different kind of visual experience. In explaining the world of the fourth dimension (4D), Carl Sagan, a physician and a TV host, discreetly shows how hard it is to think the existence of a different dimension, while living in a specific dimension. He lays a set of two-dimensional geometrical shapes: square, triangles, circle, made from papers, to represent the world of two-dimension (2D), and an apple to

²² As-Built Drawing refers to drawing of the existing building. It use as a basic reference to add or subtract element from the site. In other case, as-built drawing is use to measure the deviance (dimensional different) from construction drawing and the built construction. The smaller the deviance means the more accurate the contractor/builder works.

²³ In practice, the picture processing consist of several level: [1]point clouds: Initial data retrieval is collected through 3D scans; [2] object initialization: Structural detail, which represents the components and their mutual relationships, is created by fetching or matching points with geometries like mesh or various shapes of primitives. [3] Attribute designation: Initialized geometry objects are mapped with images or textures to illustrate surface attributes. Shih, Naai-Jung; (The Application Of A 3D Scanner In The Representation Of Building Construction Site)

²⁴ Yudell, furthermore, give an example of the spatiality of movement. For instance, the dance and the space animate one another as partners. While moving in space, the dancer continuously aware of their sense of body center with the pull of gravity. -Bloomer, Moore, Yudell, *Body, Memory and Architecture* 7.

represent the three-dimensional (3D) object that wants to chat with the member of 2D. The 2D member can not see the overall image of the apple since when entering the 2D world; the apple (as Sagan cut the apple slices by slices) has to be projected into a set of lines. In the same way, although being on the site allowed me to sense the three dimensional quality of the surrounding object, there is an enormous gap between my 180 cm height to the more than 1.000 or even 10.000 m² area of the site. It makes me feel like a square trying to understand the apple. This is where my body-avatar, the Google Earth, can effectively help me understand the surrounding site by flying and zooming into it. On the other side, I also need to be sure that my privilege of being able to fly does not undermine my 180 cm height body experiences.

Design Is How We Read the Site

In The Mediated Sensorium²⁵, Caroline Jones states how the human sensorium is now becoming more mediated than before. In the past, our ears need only an air or water to mediate the sound wave. For Jones, that condition has been amplified, shielded, channeled, prothesized, simulated, stimulated, irritated today by various sound amplifier. Moreover, Jones argues that the ways we mediate our selves reflect the way we think. Clearly, this ethnographic paper confirms Jones argument that the different use of tools in site visit can highly impact the way architects think and eventually shape the outcome of the design.

For a further research, I suggest to those who interested in architect-tools reconfiguration, to continue exploring more inquiries on the design and fabrication phase. For instance, how should we emphasize the juxtaposition of the mind and its prosthesis on the design process and fabrication assembly? Or to be more specific, how the prosthesis decodes the abstract ideas from our mind to the analog or digital media, and then, encodes the construction rules to fabricate the design? Reconfiguring this architect-tool-object relationship in the design process would hopefully make the architect more confident in handling the tools and conversely, would make the tools more meaningful to the architect as well.

²⁵ Jones, A. Caroline: *Sensorium: embodied experience, technology, and contemporary art*, MIT Press, 2006, Cambridge

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