An Architecture of Dimensions 2D→3D→4D→Et Cetera, Pt. 3

Tiffany Montañez

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An Architecture of Dimensions
2D»3D»4D»Et Cetera

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From coffee to line weights to just the everyday moral support. Thanks to the following people for helping make this thesis possible:

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Introduction

Architects draw, architects represent, architects communicate concepts, applications, information et cetera, by drawing, modeling and creating hybrids of both. Architecture as a discipline can be viewed as a discipline of communication. Communication happening through the mediums of orthographic drawings, perspective/three dimensional drawings, and digital/physical models. As designers we think, speak, and learn through the methods of drawing and making and repeating the process. Our forms of communication allow for our ideas to be understood by architects, builders, clients, users, et cetera. At the same time, architects have the ability to miscommunicate, and thus, allow the miscommunication to effect the architecture.

When translating between the different dimensional means of representation (2D to 3D to ____) we begin to reveal, exploit, hide and to mislead the viewer into the understanding the drawing and/or model. This in between, this translating, is at the digression of the designer, and thus, will question the architectural potential of the misrepresentation.

Architecture can be understood and misunderstood through the motive force of drawing and representation.
“What comes out is not what always the same as what goes in. Architecture has nevertheless been thought of as an attempt at maximum preservation in which both meaning and likeness are transported from idea through drawing to building with minimum loss.”

— Robin Evans
Translations from Drawing to Building, 1997

“Representation is the architect’s principle experience of a building.”

— Andrea Simitch, Val Warke
The Language of Architecture: 26 Principles Every Architect Should Know, 2014
what happens when we translate between these different drawing types, what is gained, lost, exploited, et cetera?
glossary

The following words will be used multiple times throughout these thesis document. In order to properly communicate said principles, the following definitions will be the significance of these words in context to this project. These are the definitions and rules to the project. This glossary is to avoid any possible miscommunication, or misunderstanding when communicating this thesis.
Glossary

2D: lacking the illusion of depth

2.5D: a hybrid drawing, a three dimensional drawing on a two dimensional plane, a two dimensional drawing on a three dimensional object

3D: having or seeming to have length, width, and depth

4D: relating to or having four dimensions (four-dimensional space-time continuum); especially: consisting of or relating to elements requiring four coordinates to determine them

analog: of or relating to a device or process in which data is represented by physical quantities that change continuously

architecture: Art and technique of designing and building, as distinguished from the skills associated with construction. The practice of architecture emphasizes spatial relationships, orientation, the support of activities to be carried out within a designed environment, and the arrangement and visual rhythm of structural elements, as opposed to the design of structural systems themselves (see civil engineering). Appropriateness, uniqueness, a sensitive and innovative response to functional requirements, and a sense of place within its surrounding physical and social context distinguish a built environment as representative of a culture’s architecture. See also building construction.

communication: information transmitted or conveyed

delineation: to indicate or represent by drawn or painted lines, to clearly show or describe (something)

digital: characterized by electronic and especially computerized technology

dimensions: measure in one direction

discordance: not agreeing; not in harmony

drawing: the act or art of making a picture, image, etc., with a pencil, pen, marker, chalk, etc., but usually not with paint

disparation: illusion about the nature of reality that is the cause of human suffering; the contradiction of truth

error: illusion about the nature of reality that is the cause of human suffering; the contradiction of truth

media: methods of representation at the two/three dimensional level

medium: technique of representation something

manipulation: to change by artful or unfair means so as to serve one’s purpose

perception: awareness of the elements of environment through physical sensation

perspective: the technique or process of representing on a plane or curved surface the spatial relation of objects as they might appear to the eye; specifically: representation in a drawing or painting of parallel lines as converging in order to give the illusion of depth and distance

representation: something (such as a picture or symbol) that stands for something else

thesis: 1. a long piece of writing on a particular subject that is done to earn a degree at a university

visual mechanism: technology or artifact that allows an individual to perceive something in a different way by heightening their already existing senses.

wrongness: the moment or moments when one’s expectation does not meet reality.
As humans, we see, view, and understand spaces and the representation of space via images. It is natural for humans to have a preconceived notion of existing conditions based on expectation, mental record, and previous experience. This thesis explores the dimensional potential in architecture of the mis-representation of space through illusory, mischievous and precocious means. This is an architecture that questions one’s perspective, perception and placement.

This intentional and productive miscommunication of architecture happens through the creation of the drawing and model simultaneously with strategic but not comprehensive alignments to create an expected image in the mind of the viewer and an unexpected conditions spatially. By manipulating between the different dimensional means of representation (2D to 3D) fresh relationships between the drawing, the image, and the model are revealed and exploited. This translation is at the digression of the designer and investigates the architectural potential of controlling the illusory in representation. Ultimately, the manipulation or confusion of the image has the ability to affect the experience of the built environment, creating a more amusing, exploratory and engaged interaction with architecture through its fourth dimension.
Experience is a significant part of the interaction that occurs between the user and the architecture. Understanding how space and its many components such as placement, light, color, scale, perspective and much more effects our bodies is crucial for the understanding the translation between space, and human. The following diagrams represent the different visual and sensorial cues that occur with our bodies when visualizing a space.
Things that can happen when two eyes look at things.

Fusion

Suppression

Diplopia

Rivalry

Horoptor: The horoptor is an implied surface that is created at the intersection where the objects lie in your perception. If you are looking/focusing at any zone before the horoptor, a crossed disparity is generated. When looking/focusing beyond the horoptor, an uncrossed disparity is generated and the object along the horoptor becomes unfocused and blurry.
Things that can happen when two eyes look at things.

**Fusion**

- Suppression
- Diplopia
- Rivalry

**Fixation Point 1**

- Fixation Point 2

**Uncrossed**

- Crossed

**Horoptor**

**Binocular Disparity:** Binocular disparity is defined as the “difference in the location of a feature between the right eye’s and left eye’s image.” This diagram shows if you have two objects of different distances from your eyes, how they would be perceived from each eye. For example, place your two index fingers in front of you, at different distances. If you close your left eye and look at your two fingers with your right eye, the image would be different than if you had done it with your left eye. We constantly see two images at a time, but our brains create one cohesive image.
Things that can occur when two eyes look at two different things:

- **Fusion**: There’s four things that can happen when both your eyes are looking at something. **Fusion**, when your eyes begin to overlap the two things it’s viewing. **Diplopia**, when your eyes begin to create a doubling of what you’re viewing. **Suppression**, when your eye isolates one thing over the other, blurring the object that your eye is not focusing on. And last, **Rivalry** vision in which each eye is focusing on its respective thing.
pictorial cues + perception:
The following are some of the pictorial cues and understandings that allow us to have familiar ground when viewing something. Scale, placement, lighting, and color are all different characteristics that allow us to comprehend and familiarize ourselves with what we are viewing.

Which coin is closer? Which is furthest away?

Epstein (1965) Familiar Size Experiment

Occlusion
Shading
Illumination
Shading/Color

Linear Perspective

Atmospheric Perspective

Contour + Texture
prec ed ents

Architecture as a product can be seen as a product of copy/paste, paraphrasing and relying on precedents to be innovative within the design process. The following precedents will be focused on two things: architecture of a privileged view, and space generated through the motive force of perception.

*all images in this section are not one of my own*
Francesco Borromini: Palazzo Spada’s Corridor (1652-3)

Borromini utilize the manipulation of the section and the scale of certain elements to create a corridor that appears to be at least 35 meters when in reality it is about 9 meters deep.
Scamozzi’s stage set was the first practical introduction of perspective views into Renaissance theatre. A set of seven extraordinarily realistic trompe-l’œil false perspectives provide the illusion of long street views, while actually the sets recede only a few meters.
At the end of the nave of the Chiesa di Santa Maria presso San Satiro in Milan, IT, you are given the illusion of a space that is about 10 meters deep. In reality it is less than a meter deep, as shown in the plan, and the implied space is painted on.
Jan Beutener: The Room (1975)

Seen through a peephole the illusion of the “correct view” (top image) and as the spectator walks around the perimeter of the space the space begins to reveal and distort the various pieces that make up the room.
Norman Kelley’s Wrong Chairs purposefully disrupt the notion of “correctness” through the iconic Windsor chair. In each chair there is a privileged view in which everything meets the expectations of what chair look like, however when removing yourself from the “right” standing point the chair “wrongs” itself and exploits error in the design.
Alexis Facca: Anamorphosis Infinity Triangle (2010)

French artist Alexis Facca created a series of anamorphic graffiti throughout various locations. Once they are viewed from a particular location, the graphic and/or image is revealed. In this case, it is the infinity triangle.
Through the use of LED lights, mirrors and these balloon-like structures, Yayoi Kusama creates multiple spaces that question and challenge the perception of the user. It creates this sense of infinite space and an immersive environment one enters.
James Turrell: Various Projects

Turrell is famous for his use of light to recreate a space. The images above are examples of different ways that Turrell activates our pictorial perception cues through the use of light.
Almost all of the work completed by Georges Rousse is through the medium of anamorphosis and creating hyper-flat space and images within extremely deep spaces. The principle of anamorphism and anamorphics is that the position of the viewer is extremely important. Placing yourself off the proper position can give you a misreading of the graphic.
projects

All projects will exist in multiple dimensions. Utilizing the different dimensions will allow you to thoroughly explore and analyze your projects. Projects are products of research, technique and concepts developed through the semester.

The projects will focus on the following objectives:

- **To explore** architectural concepts and conditions that underlie in the making of drawings and representation of architecture.
- **To examine** images, conceptual strategies and precedents that have been employed in other works of art and architecture.
- **To investigate** technique and the capacity of representation to create and navigate architecture and architectural explorations.
- **To understand** the importance of representation and dimensionality when communicating ideas to other viewers.
- **To study** art, architecture, and techniques and how it contributes to the making of space and architecture.
- **To develop** analytical and critical-thinking skills that can be effectively employed when studying architecture.
- **To build** an argument towards the effect of different methods of representation and their effect on interpretation.
project statements

Everything wants to be three-dimensional. Everything can exist in space. What does it mean to be 3D? At what capacity is architecture just 3D? At what capacity is architecture 2D? How do we translate between the two dimensions? What mediums determine dimensionality?

Project 001: We will study works of art, particularly paintings and prints and begin to create the space that the image exist in. The goal is to replicate the image through your choosing of representation and spatializing the painting/print. This is a two week project and it is expected to explore the different options through: Plans, Sections, Elevations, Renderings, 3D Models, Physical Models, Collages, Mix Media or any choice of medium one feels acceptable to reach this goal.

The Privileged View. What does it mean for the view to be privilege? How many privileged views are there? What are the discordant views? What capacity can we manipulate and replicate? How does architecture navigate the way you view space? What means of representation are more suitable for privileged views? What is the privileged representation method?

Project 1.5: We will use the artifacts from Project 001 to represent the views that do not replicate the original image. This exercise should inform, mislead, exploit parts of the image that are speculated and analyzed about the image that are not known from first glance. This project can be artifacts of technique, analysis, or effects. This is a two week project and it is expected to explore the different options through: Plans, Sections, Elevations, Renderings, Animations, 3D Models, Physical Models, Collages, Mix Media or any choice of medium one feels acceptable to reach this goal.

What is the mechanism that corrects, confuses, translates concepts through drawings? What scale is the mechanism? How is architecture the mechanism? How do we make the mechanism? Is the mechanism analog? Is it digital? What dimension does the mechanism exist in?

Project 002: We will study existing analog and digital mechanisms and technology that correct, confuse, and have a cognitive effect on how we view something. Examples of mechanisms are: Stereoscopes, Wheatstone Viewers, Immersive Rooms, et cetera. Depending on the mechanism, we will produce the appropriate images or artifacts needed to effectively use the mechanism. Scale will too, be determined based off the mechanism i.e Holmes Viewer as the mechanism and Stereogram scaled at approximately 6”x4”x1”

This is a three to four week project and it is expected to explore the different options through: Renderings, 3D Models, Physical Models, Collages, Photography, Cinema, Mix Media or any choice of medium one feels acceptable to reach this goal.

How do we use the lessons from Project 001, 1.5, and 002 to generate an installation that questions the principles of gained from these projects? What scale is the exploration? Is it an installation? It is a traditional project? How does it effect the discourse of architecture?

Project 003: This project is a hybrid of both Project 001 and Project 002. Using the mechanism chosen in Project 002, we will begin to use this mechanism to recreate the mechanism at the scale of the human body. In this project, a Wheatstone Viewer will be used and scaled to the human body. Understanding that a Wheatstone Viewer needs a stereogram. The painted replicated in Project 001 will serve as the content of the viewer. It is expected to be installed around Slocum Hall.

This is a five week project and it is expected to explore the different outputs through: Renderings, 3D Models, Fabrication physical Models, Collages, Photography, Mix Media or any choice of medium one feels acceptable to reach this goal.

How do we apply the principles of discordance, miscommunication and illusions in creating occupiable spaces? What the the occupied space? How is it an exterior and interior condition? How is miscommunication functional.

Project 004: Understanding the relationship between the image, the perspective and space, this project acts as a test bed for designing the relationship between these different manifestations derived from the image. With the understanding of libraries and this connotation of grandness attached to them, this projects acts as a exploration of achieving grandness within small means. With a site in the Lower East Side in New York City, the building is situated within a 60’x70’ footprint.

This is a ten week project and it is expected to explore the different outputs through: Renderings, 3D Models, Fabrication Physical Models, Collages, Photography, Mix Media or any choice of medium one feels acceptable to reach this goal. Please note, all drawings and means of representation of this project must be completed in a way that achieves the following: Represents the Privileged View Represents the Discordant View Questions the placement of the viewer when looking at the drawings Accurately Represent the Space.
Diego Velázquez’s Las Meninas is one of the most studied works of art in the world. It represents far more than the individuals in the scene, including a series of inconsistencies and paradoxes. The painting itself can be analyzed as placing the viewer in an immersive environment and allowing them to be one of the contributing characters in the scene. This painting has been studied, replicated, three dimensionalized, et cetera, by numerous people since 1656, and this is a contribution to these studies.

The following is a series of architectural drawings used in constructing the space that is portrayed in Velázquez’s Las Meninas.
Sophie Matisse’s “missing people paintings” began as a joke because she wanted to paint but felt intimidated by the illustrious name she inherited from her great-grandfather, Henri Matisse. So she replicated Leonardo da Vinci’s masterpiece, the Mona Lisa, leaving out the central figure as if she had momentarily stepped away (Be Back in 5 Minutes, 1997). Besides drawing attention to strength of the original backgrounds and compositions, the works have their own merit. Matisse’s version of Diego Velázquez’s Las Meninas (2001, for example, convinced one critic that “It would be odd to imagine Velázquez painting an empty room like this, but that’s a fairly haunting piece.” More recently, Matisse has been making brightly colored gouaches of interlocking geometric shapes. (Artsy.Net)

Las Meninas is known that the mirror in the painting is key to understanding and misreading what is happening. This Mise en abyme effect (describing the visual experience of standing between two mirrors, seeing an infinite reproduction of one’s image, but the phrase has several other meanings in the realm of the creative arts and literary theory.) (Wikipedia)
Las Meninas is a series of 58 paintings that Pablo Picasso painted in 1957 by performing a comprehensive analysis, reinterpreting and recreating several times Las Meninas by Diego Velázquez. The suite is fully preserved at the Museu Picasso in Barcelona and is the only complete series of the artist that remains together. This is a very extensive survey work which consists of 45 performances of the original picture, nine scenes of a dove, three landscapes and a portrait of Jacqueline. “If someone want to copy Las Meninas, entirely in good faith, for example, upon reaching a certain point and if that one was me, I would say... what if you put them a little more to the right or left? I’ll try to do it my way, forgetting about Velázquez. The test would surely bring me to modify or change the light because of having changed the position of a character. So, little by little, that would be a detestable Meninas for a traditional painter, but would be my Meninas.”

—Picasso, 1950

Philippe Comar was the “first” to document Las Meninas through the medium of a model. It allows the viewer to breakdown the space that is being created and the layers in which the rooms exist. It is clear of the “Las Meninas Room” that the painting is taking place, but Comar beings to abstract the spaces beyond the door. The figures are merely cut out stilts, for the greater investigation lies within spatializing the painting.

Dali, like Picasso highly studied Las Meninas. Some of his studies reflect and represent his surrealist style, however, some of his “sketch paintings” show a lot of data of the painting. The version above is an example of just representing the diagram of placement of the image.
Throughout his career, Istvan Orosz has always been drawn to tricks of perspective and optical illusions, and has incorporated many illusionistic concepts into his graphic works and illustrations. He often uses pictures with hidden meanings that elicit a perceptual 'switch' between the alternative interpretations, paradoxical or impossible structures, and undecidable figures, while following traditional printing techniques such as woodcutting and etching. He also tries to renew the technique of anamorphosis (geometrically distorted images that appears normal only when viewed from the correct angle or with the aid of curved mirrors).

Cinematographer and visual artist Eve Sussman recreated Las Meninas in her 2004, 89 Seconds at Alcázar. The 10-minute video is a re-imagined, moving meditation on Las Meninas. It envisions the moments leading up to and following the painting’s iconic, transient scene. It provides the 4 dimensional interpretation that none of the other studies I’ve found do.
It seems that the mirror is the pivotal point of analyzing the painting. The mirror reflects the King and Queen and is brightly illuminated to A, focus on it, and B, to convince us that the mirror is not where it actually is. The diagram below shows that the mirror is actually removed from the back wall and is simply another figure in the space.
Key: Numbers According to Dali’s Interpretation of Figure Placement

1. The dwarf Italian, Nicolas Pertusato
2. Dog
3. The dwarf German, Maria Barbola
4. Doña Isabel de Velasco
5. Doña María Agustina Sarmiento de Sotomayor
6. Doña Marcela de Ulloa
7. Diego Velázquez
8. Infanta Margarita Teresa de España
9. Unidentified bodyguard
10. King Philip IV
11. Queen Mariana
In this second portion to the first project we will defamiliarize the viewer from the original painting by Diego Velázquez. The goal of this exercise is to use our pictorial cues and moments of familiarization to guide the viewer through the speculated space of Las Meninas. This is NOT a replication for this is all speculated, this is the discordance.

The discordance will be explored through different forms of discordance: positional, formal, and spatial. Each of these will provide different, but the same Las Meninas.
positional discordance
formal discordance
spatial discordance
Mechanisms and technology, both digital and analog have given humans the ability to heighten their experiences by the manipulation of their senses, and further, one’s perception. It allows us to reach experiences that cannot be portrayed with our bodies alone.

The following are examples of different mechanisms that heighten, distort, correct, exploit different visual sense through the means of mechanisms.
Any stereoscopic image is called stereogram.

A stereogram is a pair of stereoscopic pictures or images composed of two images taken from the standing point 2.5 inches from each other providing a three-dimensional depiction when viewed with a stereoscope.

A stereoscope is a device for viewing a stereoscopic pair of separate images, depicting left-eye and right-eye views of the same scene, as a single three-dimensional image.
parts of a holmes viewer

- stereogram
- focus and adjustment of the stereogram
- correction lens
- area for viewing, viewer’s perception
Stereographs were mostly for the “arm chair traveler” meant to give an immersive experience to those unable to travel the world. It would allow you to see India, Italy, or China at the comfort of your living room. Popular at the turn of the century this mode of photography had died out as a way of documenting, however, the technique and fundamentals of the technique is highly used with VR and 3D imaging. The “OG” of 3D viewing, these photos (when viewed through a viewer) would manipulate your perception and provide an opportunity to question your understanding of the image.

David Broda and Colleen Woolpert, two Syracuse-based stereo photographers gave me insight on the photo process, as well as some images from a recent exhibition they put on at the SALT Quarters Art Residency. It was an exhibition that displayed all of David’s photo through the portable stereo viewers Colleen invented and was in the process of getting patented. All the photos were created with 600 Polaroid film during the 80s and using a jig David created to get the images to be exactly 2.5 inches apart. Visiting both these artist gave me a better understanding of vision and images and the process of photography to that mostly exploited the way our eyes really saw.
An important part of understanding stereoscopes is understanding what it does to one’s perception. Our eyes by nature are about 2½ inches separated. This means that our eyes are always seeing two images, one image of the right eye, one of the left eye.

We are constantly seeing in perspective. We never truly see anything in a pure three-dimensional form. We always view things in parallax, which is the apparent displacement of an observed object due to a change in the position of the observer. Stereoscopes remove this parallax to give you the illusion of seeing in a pure three dimensions.
Installations as a whole come at a variety of scales. These scales however, and usually in relationship to the human body. Considering this tone of the studio as one that used both illusions and drawings to effect production of architecture my interest within this project lied within creating an installation that would be extremely intimate. And installation of perception. Perception is something that is never truly represented, because it is varies depending on the individual.

With this in mind, a study of stereoscopy and stereoscopic viewers began as the technique of this installation. Stereoscopy (also called stereoscopics or 3D imaging) by definition, is a technique for creating or enhancing the illusion of depth in an image by means of stereopsis for binocular vision.

Any stereoscopic image is called stereogram.

A stereogram is a pair of stereoscopic pictures or images composed of two images taken from the standing point 2.5 inches from each other providing a three-dimensional depiction when viewed with a stereoscope.

A stereoscope is a device for viewing a stereoscopic pair of separate images, depicting left-eye and right-eye views of the same scene, as a single three-dimensional image.

Stereoscopes have the ability to create immersive environments without digital means. Stereoscopic viewers were most popular during the 1850-1930s. Before the accessibility to travel to nearly anywhere in the world, people would purchase stereogram card sets to be able to experience the world at the comfort of their homes.

In this installation, the Wheatstone Viewer (1838) was used as a means to create this immersive environment. In order to make a viewer, you must have two images oriented at a 45 degree angle, and your stereogram located perpendicular to the user of the viewer. Because mirrors no specific focal depth, this type of viewer has an infinite boundary, making it easy to scale the viewer larger than the size of just the eyes, to the scale of the entire body.

Diego Velázquez’s Las Meninas is one of the most studied works of art in the world. It represents far more than the individuals in the scene, including a series of inconsistencies and paradoxes. The painting itself can be analyzed as placing the viewer in an immersive environment and allowing them to be one of the contributing characters in the scene. Using the mechanism of the Wheatstone Viewer and the already existing nature of Velázquez’s Las Meninas, this installation is not only a contribution to the painting’s studies, but also an opportunity to create an occupiable drawing.

Please note that this study was completed for a visiting critic studio hosted by Thomas Kelley of Norman Kelley.
“how many times can I three-dimensionalize las meninas through analog means?”
how can the mechanism serve as a means of correction?
Understanding the relationship between the image, the perspective and space, this project acts as a test bed for designing the relationship between these different manifestations derived from the image. With the understanding of libraries and this connotation of grandness attached to them, this project acts as an exploration of achieving grandness within small means. With a site in the Lower East Side in New York City, the building is situated within a 60’x70’ footprint.


