The Architectural Coincidence:

guessing ~~un~~consciously;

gauging unconsciously.

by

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4

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ABSTRACT

Gauging and guessing is a metaphor that represents the duality in the process of architectural design, between logic and intuition, reasoning and chancing, the explicit and the implicit. Throughout history, this duality implies not only different design methodologies but also deeply-rooted design mentalities, the conscious and the unconscious. Gauging is associated with consciousness, representing a will to pursue certain results based on intentional thought processes. Guessing, on the other hand, is associated with unconsciousness, representing an aleatoric chancing to fulfill one's inner possibilities. However, "gauging consciously" and "guessing unconsciously" inevitably happens on a spectrum with two extremes, either limiting or diluting the discipline of architecture.

This thesis investigates the opposite situations of gauging consciously and guessing unconsciously, experimenting with new ways of involving technologies in the design process to look for the possibility of paradigm shifts. In the first phase, the two research projects "Fake Fake-hill" and "Data-Matter to Data" are attempts to examine the notion of gauging unconsciously and guessing consciously respectively. Using naturally-formed rock art and intuitive model-making that engages hands as the prompts in combination with engaging the digital tools, we aim to show the possibility of pursuing a precise design result without the limit of human consciousness, and of pursuing a natural result without the necessity of unconsciousness. In other words, being naturally precise and precisely natural. Based on this research, the second phase of the thesis tested the methodology of combining the two sets of paradoxes with two design proposals, in search of the "architectural coincidence" that remains oscillating in between.

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6

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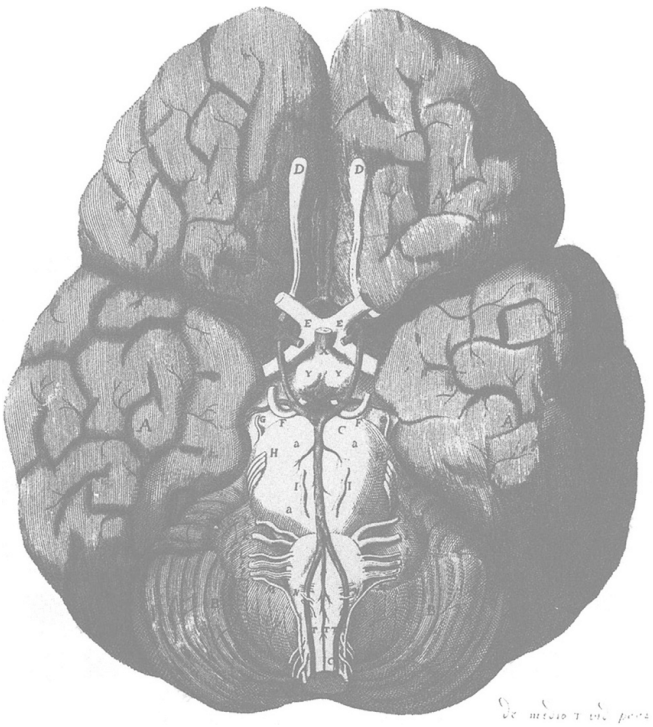


Figure 1. Christopher Wren, The Willis Brain. From Thomas Willis' Cerebri Anatome, 1664.

TABLE OF CONTENTS

01/ COINCIDENCE - GAUGE, GUESS

Figure 2 . Architecture, ou, Art de bien bastir de Marc Vitruve Pollion, autheur romain antique; mis de latin en francoys par Ian Martin, 1547, image from the MET (22.65.1)

“Incident”, “Coincident”, “Coincidence”

Architecture is a coincidence. As we may refer to the definitions of two related terms, ‘incident’ means ‘an event or occurrence,’ [1] and ‘coincident’ means ‘occurring together in space or time’. [2] Firstly, there might be little doubt that many materials and bodies of knowledge somehow come together in both space and time within an architectural work. While more importantly, they occur to be what they are to be rather than as planned. Vitruvius put the origin of design awareness of buildings in a mythical story - an accidental discovery of fire in the woods where people happened to come and began to have conversations. [3] Creating such an occurrence between matter, environments, and society is, to some extent, how architecture could be defined in a general cultural context. Moreover, this thesis would elaborate that the status of designing architecture as a coincidence is coincidental itself, as it requires an implicit mentality rare to occur.

1 . “Incident,” INCIDENT | definition in the Cambridge English Dictionary, accessed January 6, 2023, https://dictionary.cambridge.org/us/dictionary/english/incident.

2 . “Coincident,” COINCIDENT | definition in the Cambridge English Dictionary, accessed January 6, 2023, https://dictionary.cambridge.org/us/dictionary/english/coincident.

3 . Yeoryia Manolopoulou, Architectures of Chance (Farnham: Ashgate, 2013), 16.

“Gauge”, “Guess” and Consciousness

We take ‘guess’ and ‘gauge,’ two everyday practices, to describe how architecture is created as a coincidence. As we may see from the animation(frames attached to this chapter) and its scripts, metaphorically, architectural design is guessing and gauging the image of a rabbit.

In the beginning you have no idea what you are drawing.

It is a guess.

Guessing, again and again,

you may stop by one attempt and declare that's your design;.

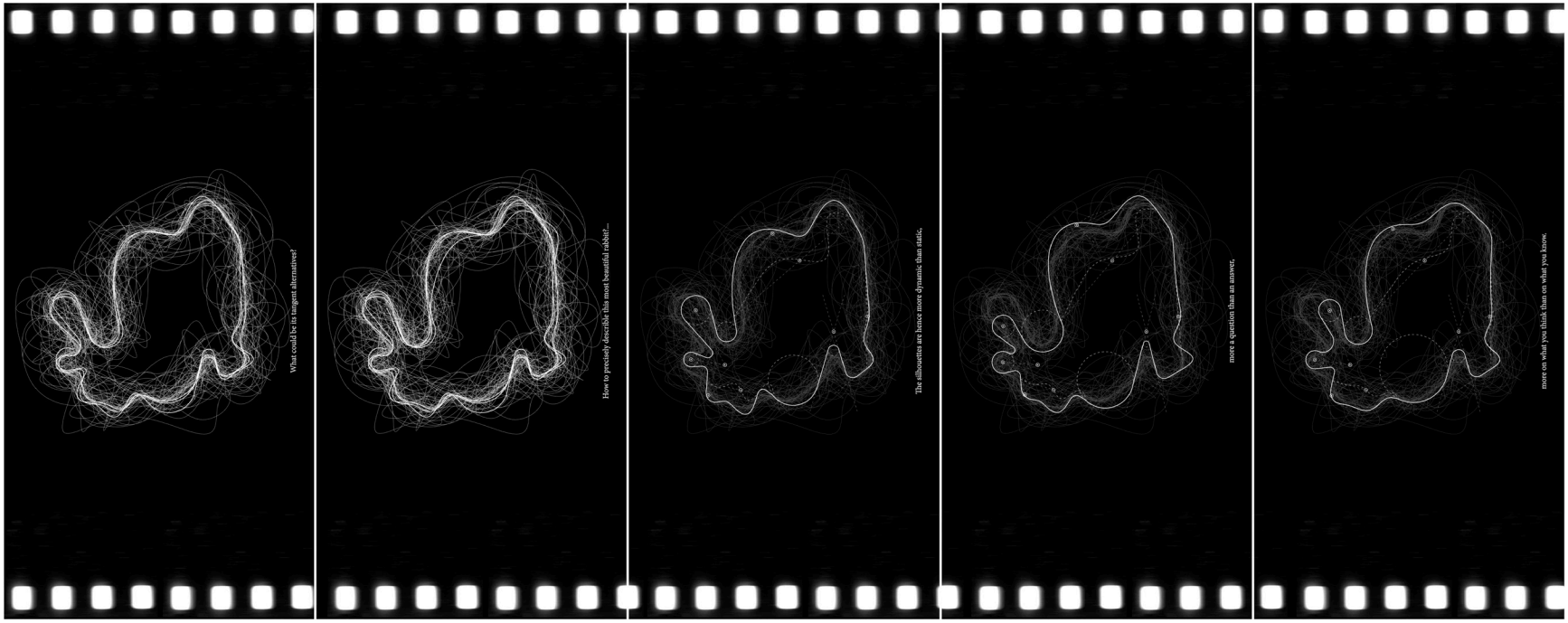
or you may keep doing guessing without being satisfied ever.

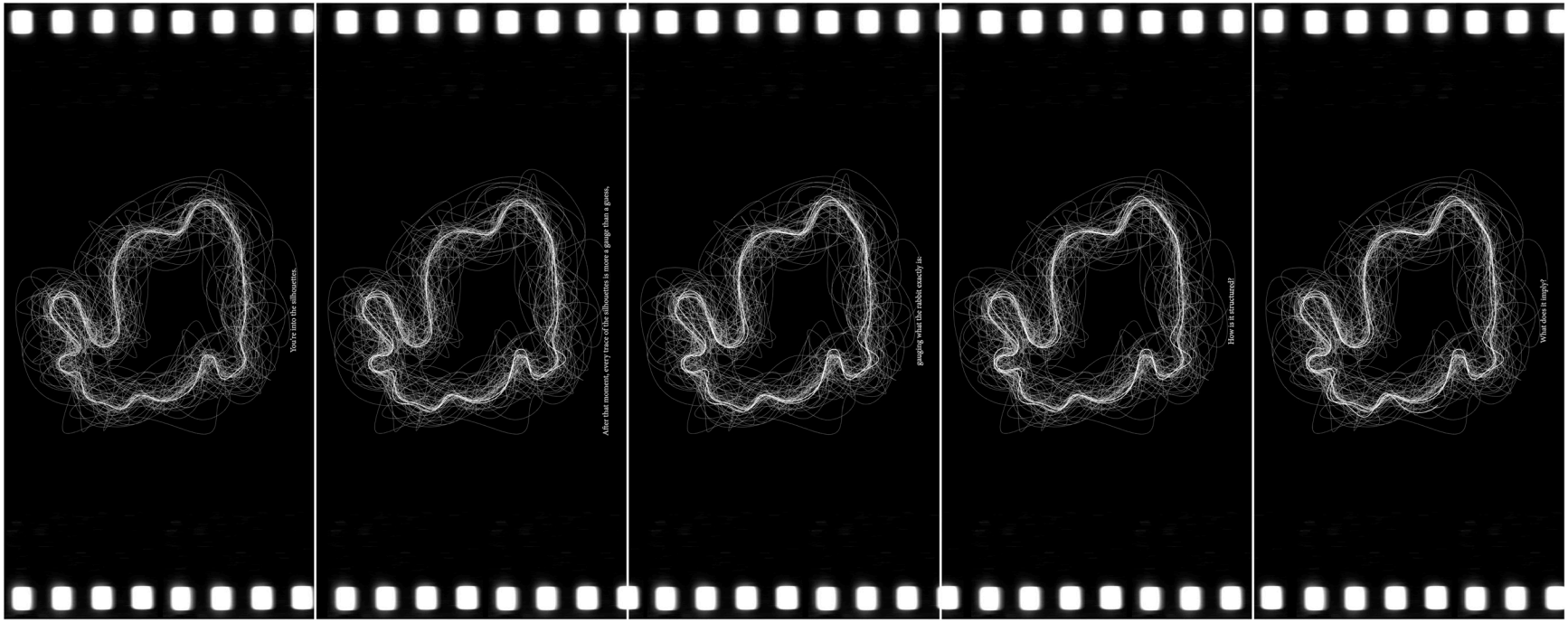
Or...you may see the rabbit.

It is never there until you are conscious of it.

It is the most beautiful rabbit that makes everything just so right.

But even now you don't know what the rabbit exactly is.


What could be its tangent alternative?
How to precisely describe this most beautiful rabbit?...
The silhouettes are hence more dynamic than static,
more a question than an answer,
more on what you think than on what you know.


You're into the silhouettes.
After that moment, every trace of the silhouettes is more a gauge than a guess,
gauging what the rabbit exactly is:
How is it structured?
What does it imply?

It will stay in silhouettes, until
a moment of coincidence
The Architectural Coincidence:
The Architectural Coincidence:
guessing
gauging
consciously;
unconsciously.

[00:00:03:02]
At the beginning you have no idea what you are drawing, it is a guess.

[00:00:11:17]
Guessing again and again, we may stop by one attempt and declare that's your design;

[00:00:21:09]
or you may keep doing guessing without being satisfied ever.

[00:00:27:18]
Or,you may see the rabbit.

[00:00:31:11]
It is never there until you are conscious of it. It is the most beautiful rabbit that makes everything just so right.

[00:00:42:08]
But even now, you don't know what the rabbit exactly is. You're into the silhouettes.

[00:0:50:16]
After that moment, every trace of the silhouettes is more of a gauge than a guess, gauging what the rabbit exactly is:

[00:01:00:05]
How is it structured? What does it imply? What could be its tangent alternatives? How to precisely describe this most beautiful rabbit?...

[00:01:09:11]
The silhouettes are then more dynamic than static, more a question than an answer, more on what you think than on what you know.

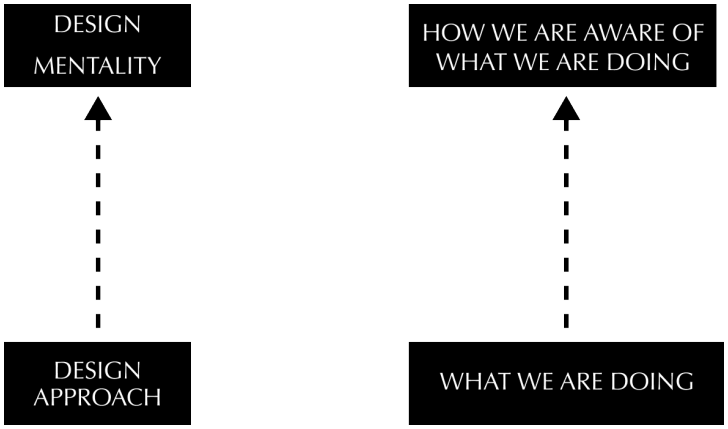
[00:01:19:12]
It will stay in silhouettes, until a moment of coincidence.

Figure 3 . The Silhouettes, videos, black and white, 1′ 40″.

Scan the QR code to view the full video:

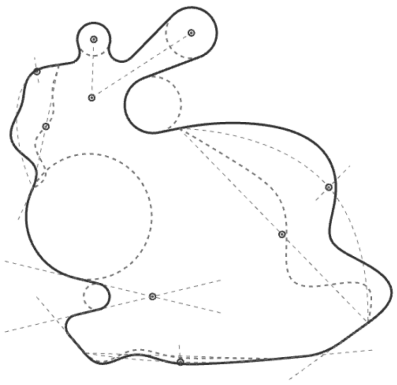
In some cases, architectural design is a 'guess,' as the rabbit does not always emerge as planned. Designers are flowing with all the possibilities that we are uncertain of. In the end, we have to admit that it is a chance. While in some other cases, architectural design is a 'gauge,' as architecture has to meet a certain extent of requirements to relate to the context of the world and even to solve some specific problems. There have been so many alternatives to this dialectical relationship - logic versus intuition, reasoning versus chance, engineering versus art, the determined versus the indetermined, the explicit versus the implicit, and so on. Therefore, not only the outcome of a piece of architecture is a coincidence, as illustrated above, but it is also coincidental to reach the equilibrium point between the two methodological ends while designing architecture. Architecture is, therefore, a coincidence for its complexity in the sense of both materialistic execution and conceptual ideation.

This thesis is meant to critically research the mentality behind the conceptual ideation - how consciousness is operated when 'gauging' and 'guessing' happen. It attempts to shift the discourse from 'what we are doing' to 'how we are aware of what we are doing' to make architectural design reflectable, debatable, and teachable as a discipline.



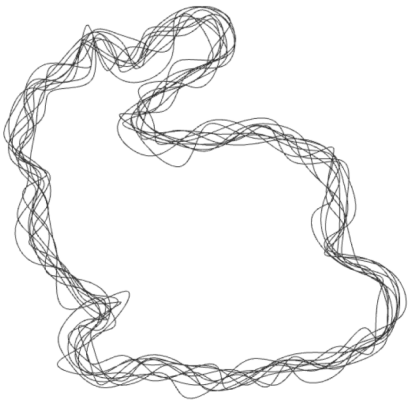
Historically, the approach of 'gauging' has been inevitably associated with the presence of consciousness. Since the invention of the perspective system and Cartesian coordination, there has been a strong consciousness for architects to know what they are doing and to do what they know. [4] Such soberness of knowing has come to prime in

4 Dalibor Vesely, Architecture in the Age of Divided Representation: The Question of Creativity in the Shadow of Production (Cambridge (Mass.): MIT Press, 2006), 281-315.



determined result
/ /
logic
reasoning

“GAUGE”



indetermined result
/ /
intuition
chancing

“GUESS”

Figure 4. To “Gauge” and to “Guess” the Rabbit

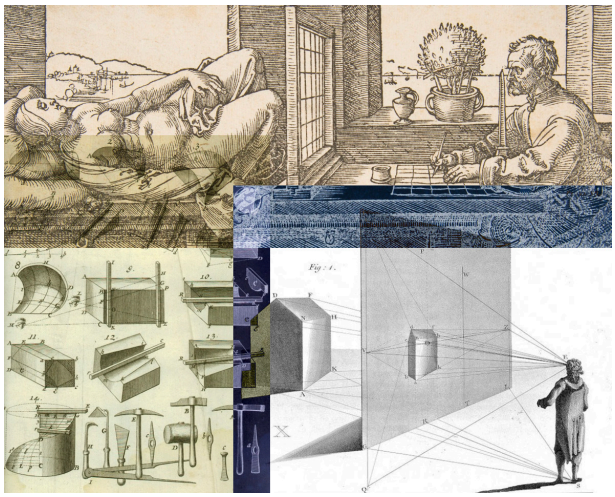


Figure 5. “Consciously Gauging”

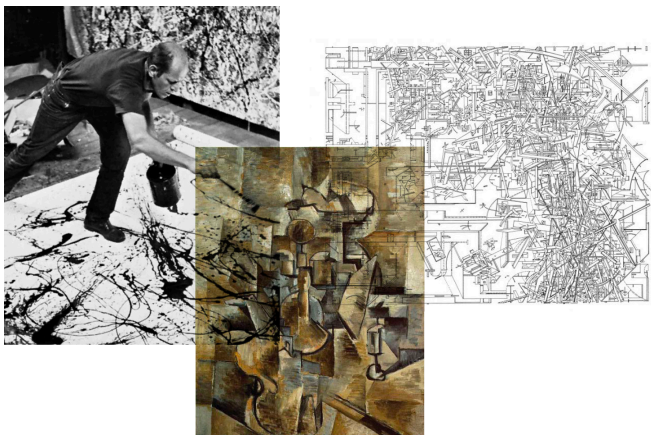


Figure 6. “Unconsciously Guessing”

some modernist architecture, with a strong tendency for control, precision, and instrumentality.

> *“Instrumental thinking tends to impose its hegemony by creating a world it can control. Control of this sort requires not only a special kind of knowledge but also a particular kind of will. And the knowledge that meets the conditions of the will to control is the ‘knowledge of power’. Because it must be subordinated to the will, we can speak here simply of a ‘will to power,’ which as a consequence becomes a ‘will to will’.”* [5]

5 . Vesely, Architecture in th Age of Divided Representation, 284

Vice versa, ‘guessing’ has been associated with the absence of consciousness by a number of artists and de-

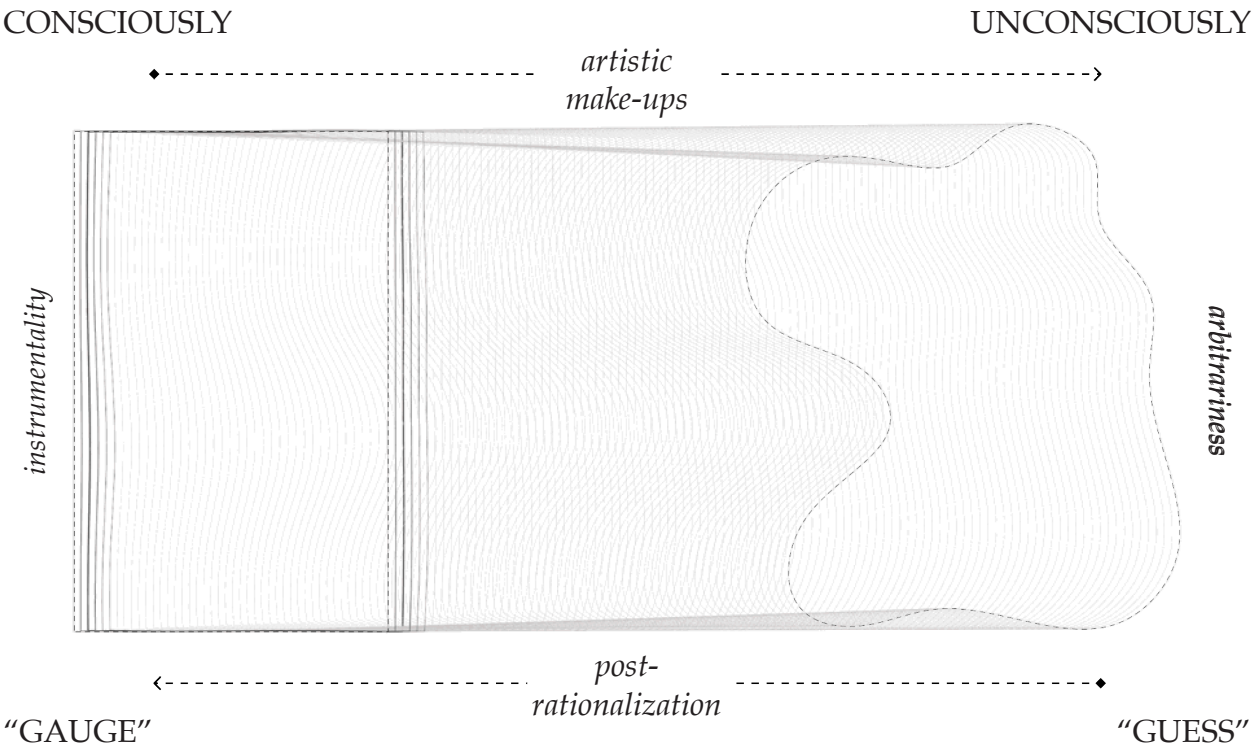


Figure 7. The Spectrum of "Consciously Gauging" and "Unconsciously Guessing"

signers, as they stressed blindness, improvisation, forgetting, and even drunkenness. After all, it is a sort of common sense that once you start to be logical, the power of intuition would get lost very quickly.

> *..[Art] is skill and knowledge that complement nature, a completion and fulfillment of nature's inner possibilities, or an imitation of nature. Imitation is a creative process that contains a large residumm of mystery, of which the Greeks were very much aware: they call it 'chance'.* [6]

To some extent, contemporary architectural design has been bouncing between consciously gauging and unconsciously guessing: on the one hand, we try to escape from the instrumentality of modernism, which limits the potential of discipline; but on the other hand, architecture inherently cannot go to the extreme of arbitrariness which dilutes our discipline. [7] Therefore, artistic make-up and post-rationalizations are happening very often nowadays

6 . Vesely, Architecture in the Age of Divided Representation, 287

7 . Gail Day. "The Project of Autonomy: Politics and Architecture Within and Against Capitalism, Pier Vittorio Aureli, New York: The Temple Hoyne Buell Center for the Study of American Architecture at Columbia University and Princeton Architectural Press, 2008." Historical materialism : research in critical Marxist theory 18, no. 4 (2010): 219–236.

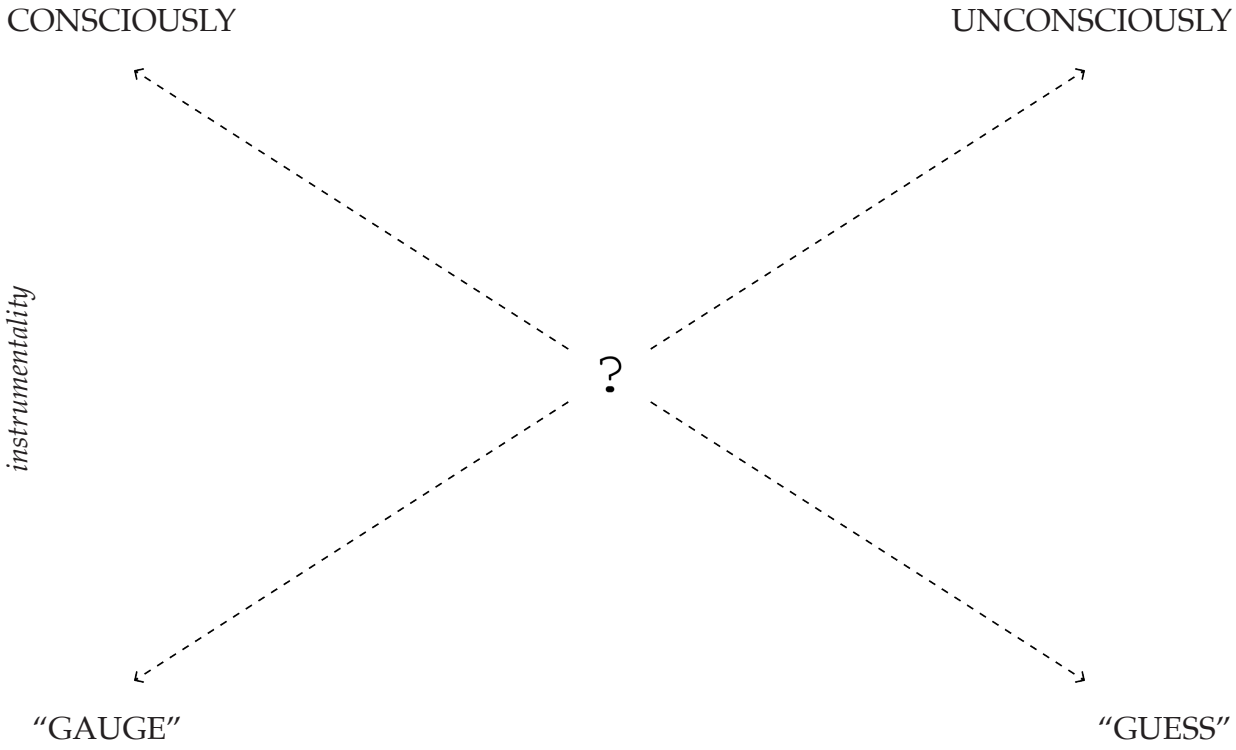


Figure 8. The Alternative Cross

to remain the dynamic in-between.

However, if our hypothesis that architecture is a coincidence makes sense, the platonic term 'architecture' probably should not be safely sliding on the spectrum as there is little sense of multiple bodies occurring together within that in-between area or line segment. Instead, a coincidence is always associated with another primitive geometry, a point occurring at the diagonal lines connecting two unusual phrases - 'gauging unconsciously', and 'guessing consciously.'

This point is placed at the center of a semiotic square. Read from the horizontal dimension, it is supposed to represent a proposition between instrumentality and arbitrariness; from the vertical dimension, it coordinates knowing and thinking, the determined and the indetermined. The following chapters will delve into the possibility of such a new paradigm via exploring 'gauging unconsciously' and 'guessing consciously.'

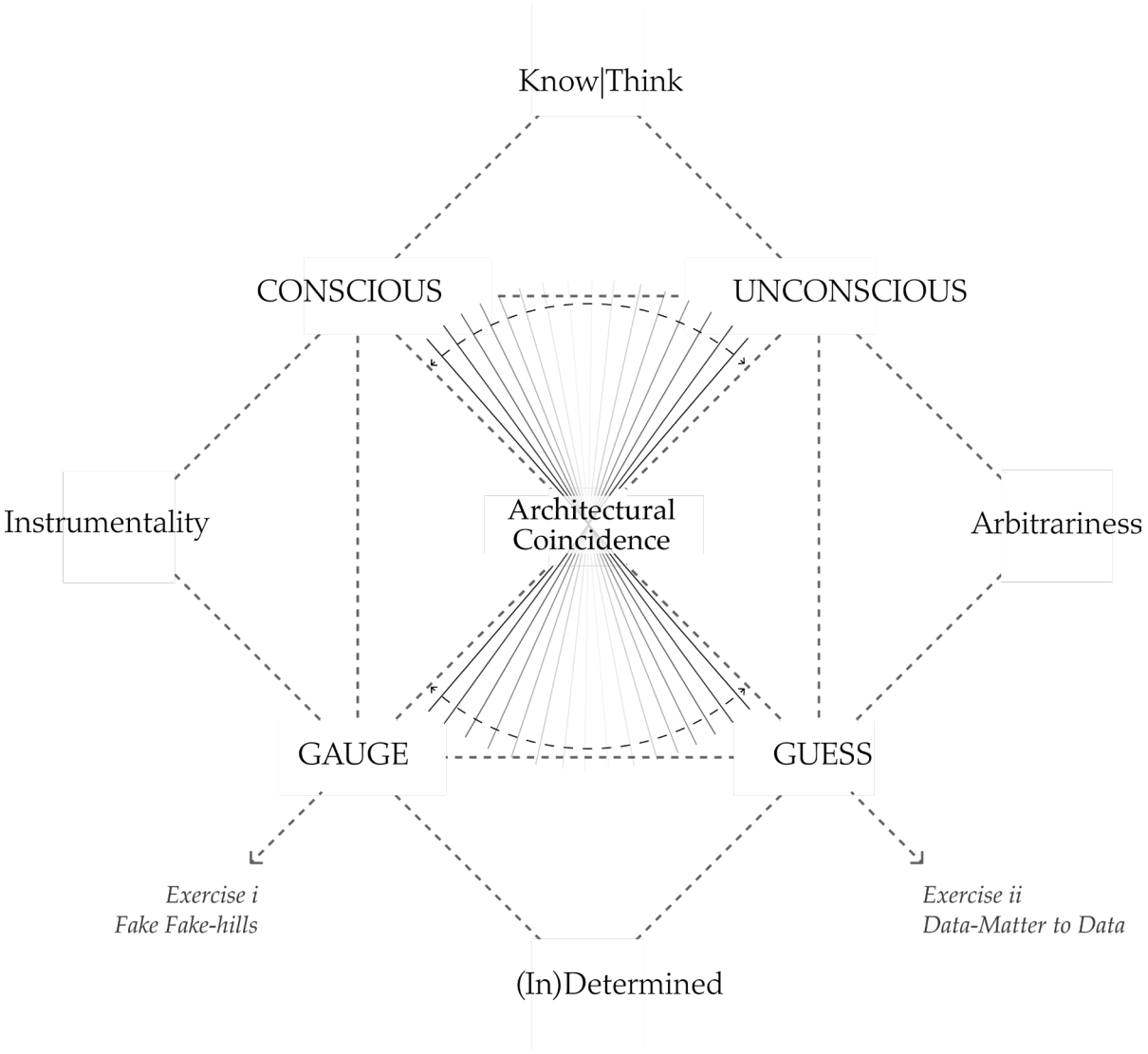
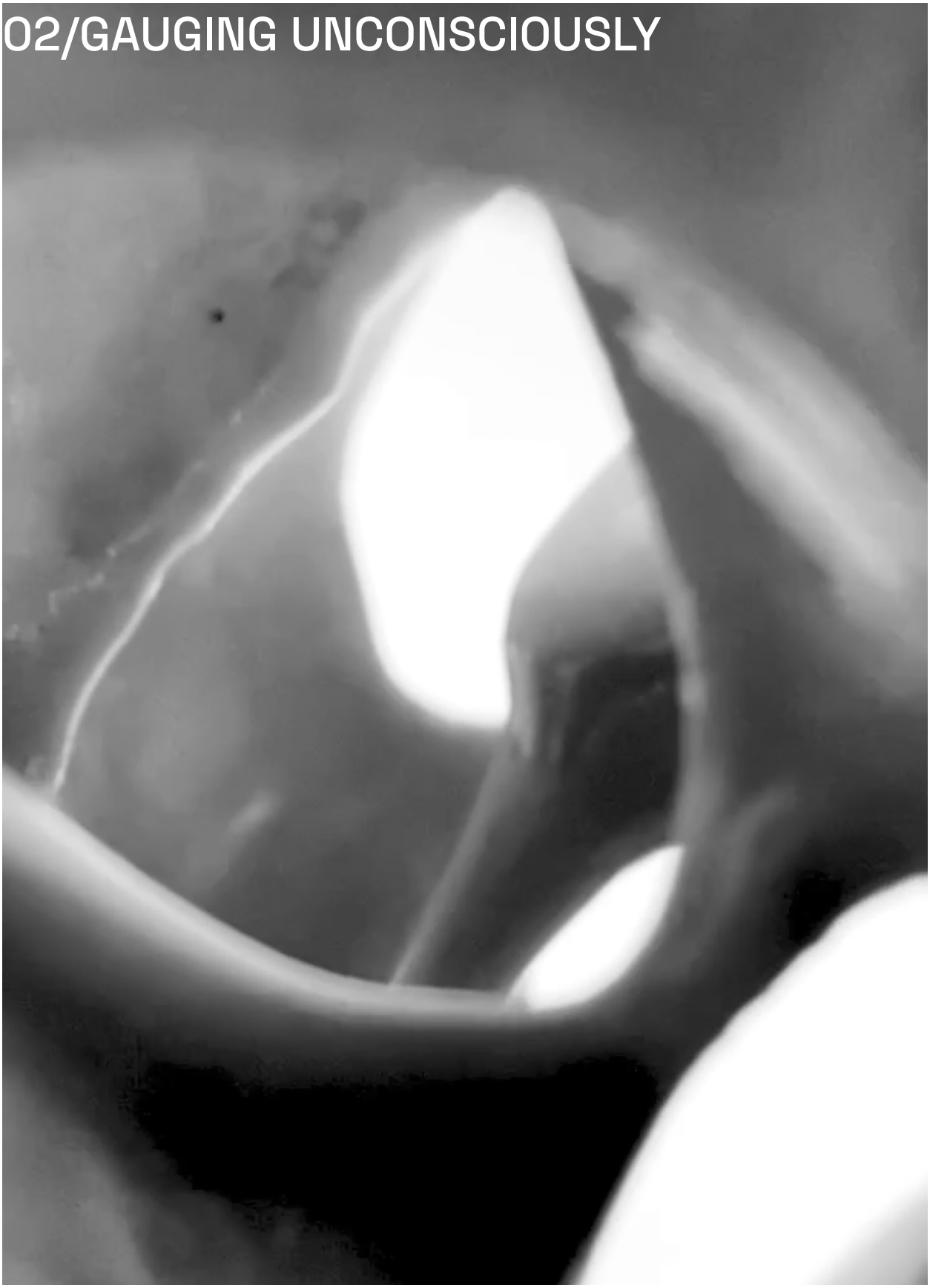


Figure 9. The Oscilliating Diagram of "Unconsciously Gauging" and "Consciously Guessing"

02/GAUGING UNCONSCIOUSLY



Thinking versus Knowing

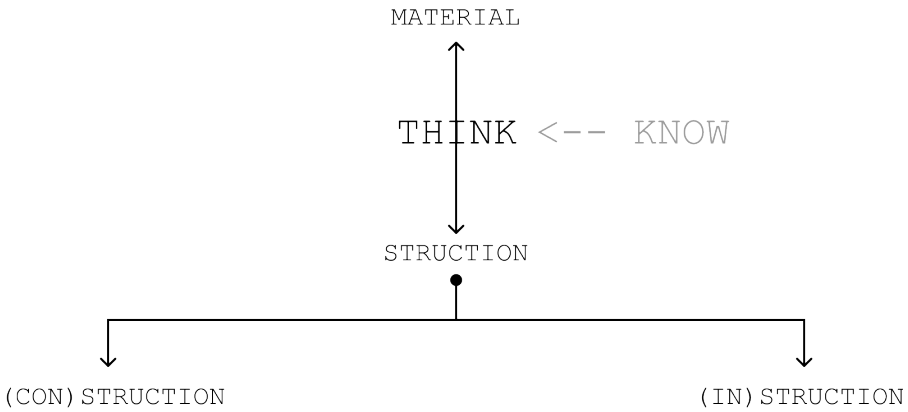


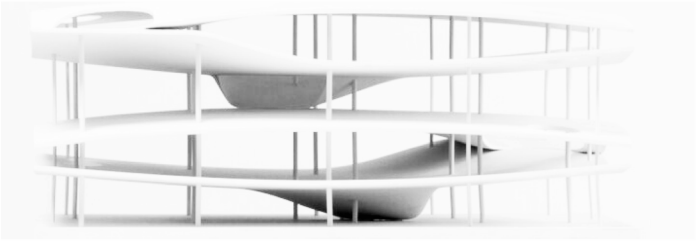
Figure 10. The Struction Diagram

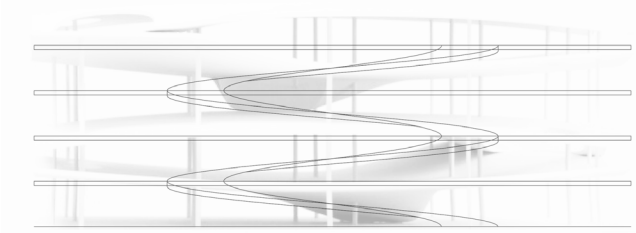
> *"Thinking is not conscious; rather, it is an automatic process following a struction and the materials on which the struction is to operate."* [8]

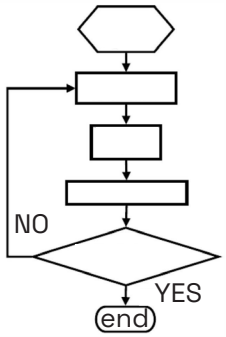
In the book The Origin of Consciousness in the Breakdown of the Bicameral Mind, Julian Jaynes suggested that thinking, unlike knowing, is not conscious; instead, it is an automatic process following a well-constructed agent for instructions. That is what he defined as 'struction' to operate thinking. [9] Gauging unconsciously is related to this concept as it requires the precision of logical operations such as thinking. Meanwhile, it needs to go over the limitation of consciousness - what we know. So architecturally, this phrase may indicate some scenarios designers can think of but cannot know in advance.

8 Julian Jaynes, The Origin of Consciousness in the Breakdown of the Bicameral Mind (Boston: Houghton Mifflin, 2003), 39.

9 Jaynes, The Origin of Consciousness, 31-40.



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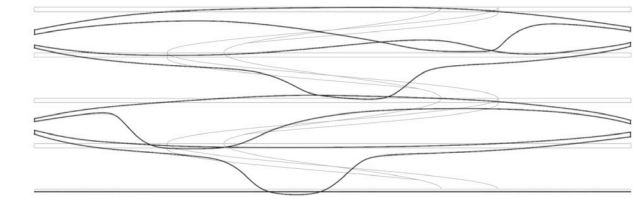

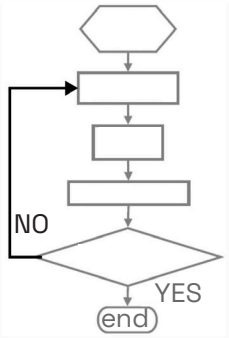
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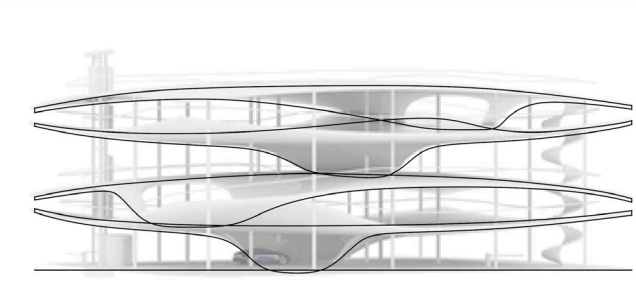

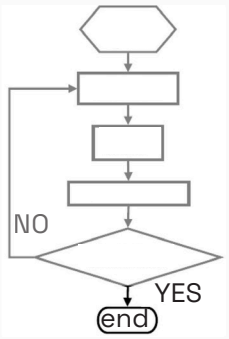
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LEFT:
Figure 11. The Automatic Loop Diagram of Bahrain Carpark by Christian Kerez. Original image from https://www.kerez.ch/

The car park project recently done in Bahrain by Christian Kerez provides such a possibility. It proposed a situation where the car ramp and the warped floor slabs merge perfectly to serve the function and the form. [10] If you predetermine the slabs, you may not be able to extract a feasible ramp, while if you predetermine the ramp, you may not develop the integral slabs. Therefore this architectural result would not be known until it turns out to be what it is. The precise moment where everything coincides has to be achieved by an automatic testing loop. This method can be reflected in testing multiple models in traditional architectural practice. At the same time, in the newer field of digital design, it is closely related to optimization, which is a loop of functions. [11]

10 . "Christian Kerez," Christian Kerez, accessed January 9, 2023, https://www.kerez.ch/.

11 . Branko Kolarevic, Performative Architecture: Beyond Instrumentality ; Emerged out of the Symposium on "Performative Architecture" Held at the University of Pennsylvania in October 2003 (New York: Spon Press, 2010), 121-130.

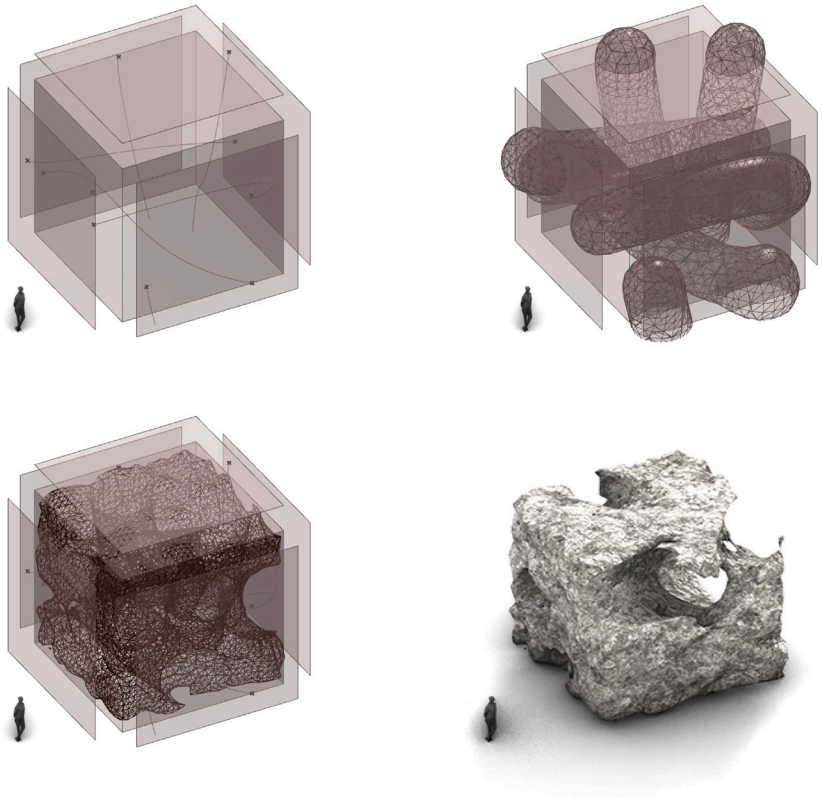
Research i: Fake Fake-hills

The concept of designing a scenario that can be thought of but not known in advance may be a useful way to understand the process of "gauging unconsciously." This idea serves as the inspiration for the first research project of this thesis: "Fake Fake-hills." The term "Fake-hill", the literal translation for "Jiashan", refers to the ancient Chinese art of appreciating rocks. Those rocks are formed naturally by erosion, then quarried and selected by humans. They represent a rigorous aesthetics system but none of them was designed by any conscious mind. The research project titled "Fake Fake-hills" seeks to investigate the collaboration between human perception and the unconscious forces of nature. [12]

To begin, a simple geometrical framework was implement-

12 Haotian Wu, "Fake Fake-Hills: A Multi-Objective Method for Jiashan Optimization", n.d.

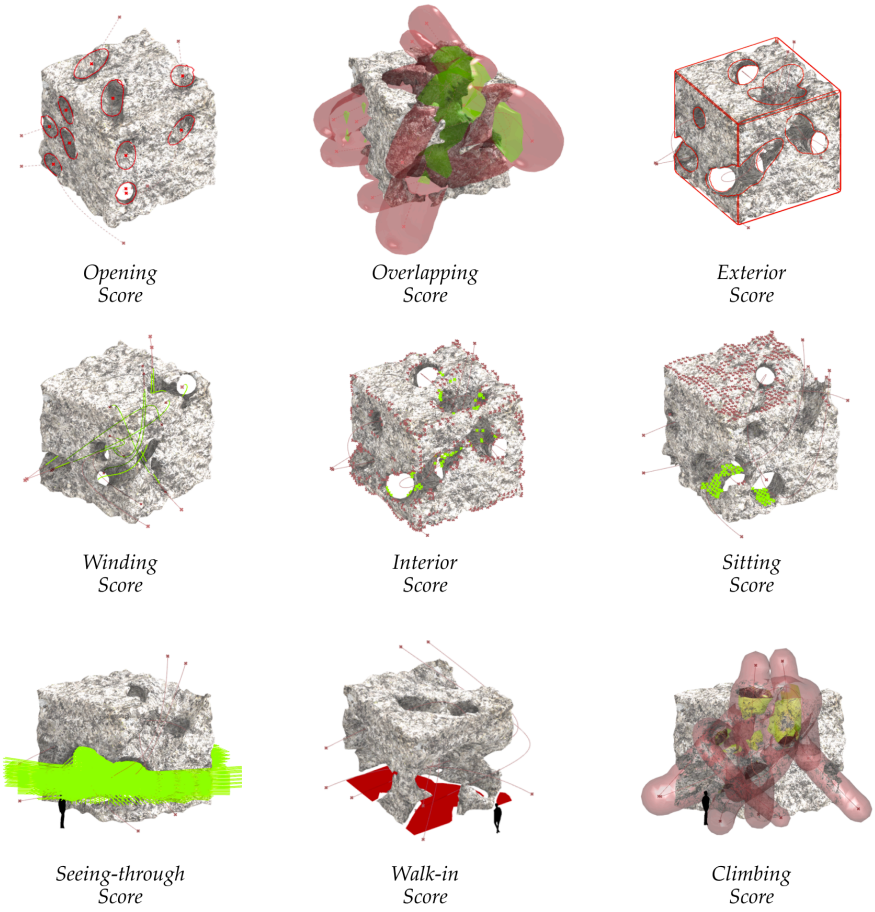
LEFT:
Figure 12. Fake Fake-hills Model Photo



TOP:
Figure 13. The Method to Fake a "Fake-hills"

ed to simulate the form of "Fake-hills." Two random points were placed on each face of a cube and connected to the corresponding points on the opposite face. These connections produced arbitrary curves, which were used to create piping geometries based on two randomly chosen radius values. The resulting "Fake-hill" was generated through a random and automated process, similar to the way in which water shapes rocks in nature. [11] All inputs in this process were randomly assigned in order to maintain an unconscious status.

The process of "gauging unconsciously," or "struction," occurred while data for each "Fake-hill" was collected and analyzed. These digitally-formed geometries possess inherent characteristics, such as the volume of interior subtraction, the length of the outline, the number of holes on the surface, and the ratio of lines penetrating at a certain height. These quantitative features provided the uncon-



TOP:
Figure 14. The Multi-objective Parameters

scious construction of form with a set of criteria for evaluation.

More specifically, we referenced the four most renowned principles in the culture of Jiashan: SHOU (thinness), LOU (perforation), TOU (transparency), and ZHOU (wrinkling). [13] These principles were translated into quantitative characteristics that could be evaluated by algorithms. SHOU, or thinness, was reflected in the length of the exterior outline of each rock; LOU, or perforation, in the volume of overlapped pipes; TOU, or transparency, in the volume of subtraction; and ZHOU, or wrinkling, in the length of angular edges.

Similar to how the slab and ramp must work together in a carpark project by Christian Kerez, SHOU, LOU, TOU, and

13 . Z. Feng et al., "Environmental Data-Driven Performance-Based Topological Optimisation for Morphology Evolution of Artificial Taihu Stone," CDRF 2021: Proceedings of the 2021 DigitalFUTURES, 2021, pp. 117-128.

The "Thinness"

shòu

瘦

The "Perforations"

lòu

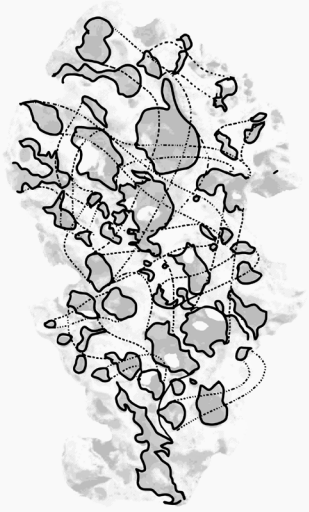
漏

The "Wrinkling"

zhòu

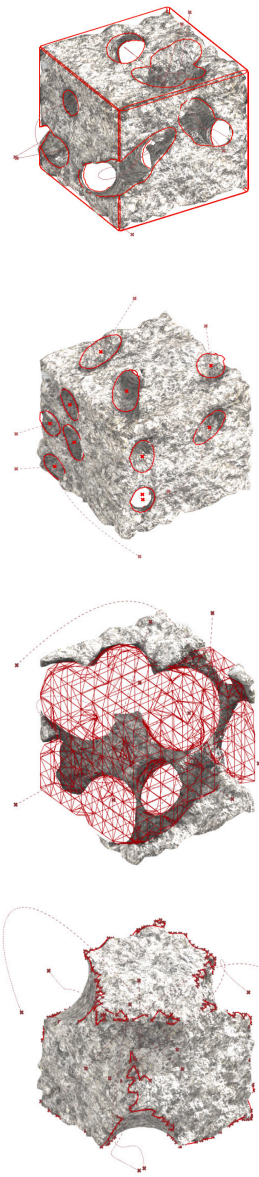
皱

The "Transparency"



tòu

透



LEFT:
Figure 15. The Four Principles, "SHOU", "LOU", "TOU" "ZHOU"

RIGHT:
Figure 16. The Four Principles transferred to geometric parameters

ZHOU must also be fulfilled simultaneously to create a "Fake-hill." This holistic beauty represents the potential of "gauging unconsciously." If we focus solely on one category, such as SHOU or thinness, the result becomes predictable and fails to accurately represent a "Fake-hill." However, if all four categories are performing well, the outcome can only be thought of but not known in advance. This result was achieved through the use of multi-objective optimization, an algorithm that loops through the process of formal generation and performance evaluation until all objectives are met, allowing for gauging to occur without conscious intervention. [14]

14 . Nathan C Brown and Caitlin T Mueller, "Design Variable Analysis and Generation for Performance-Based Parametric Modeling in Architecture," International Journal of Architectural Computing 17, no. 1 (2018): pp. 36-52.

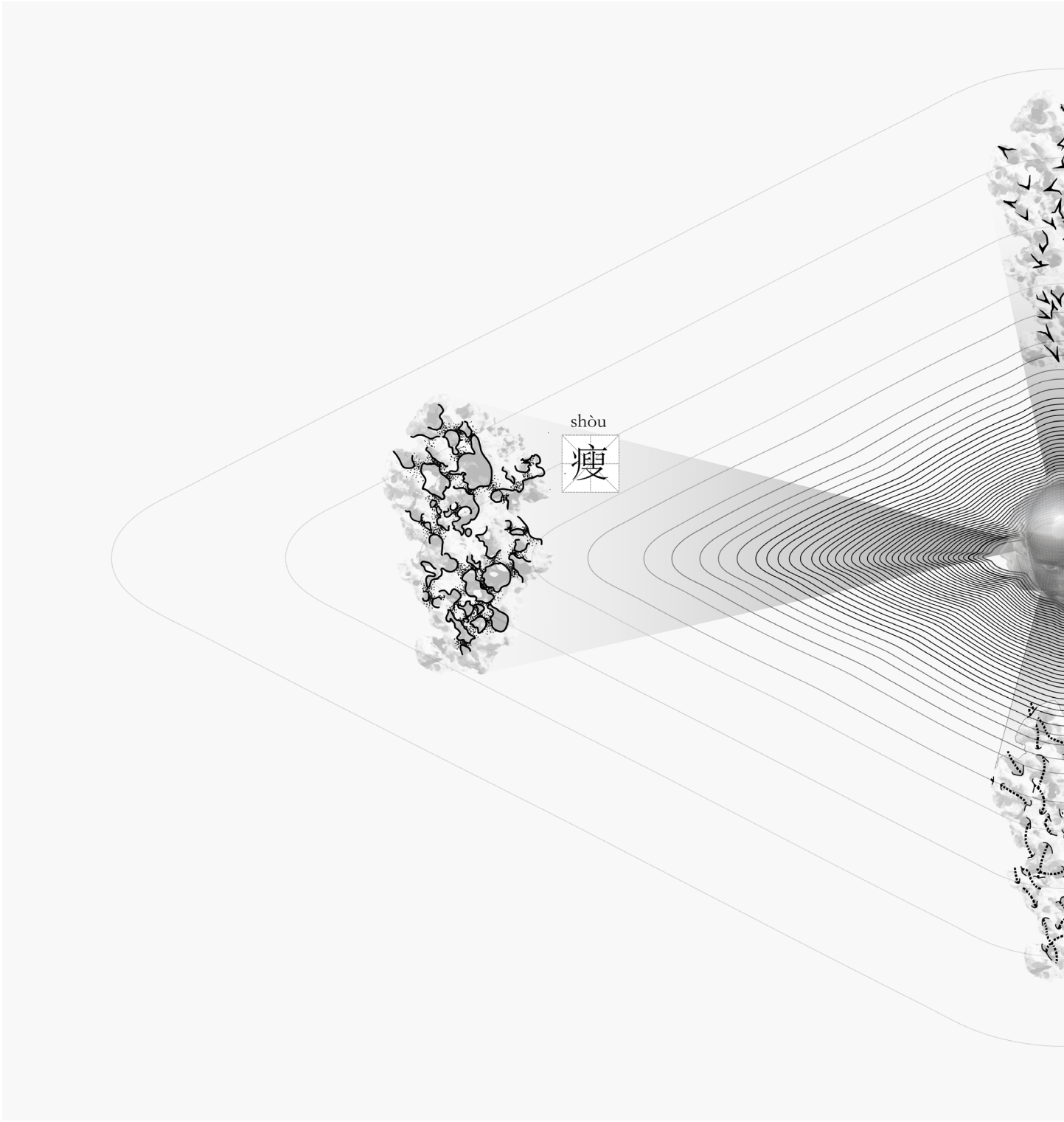
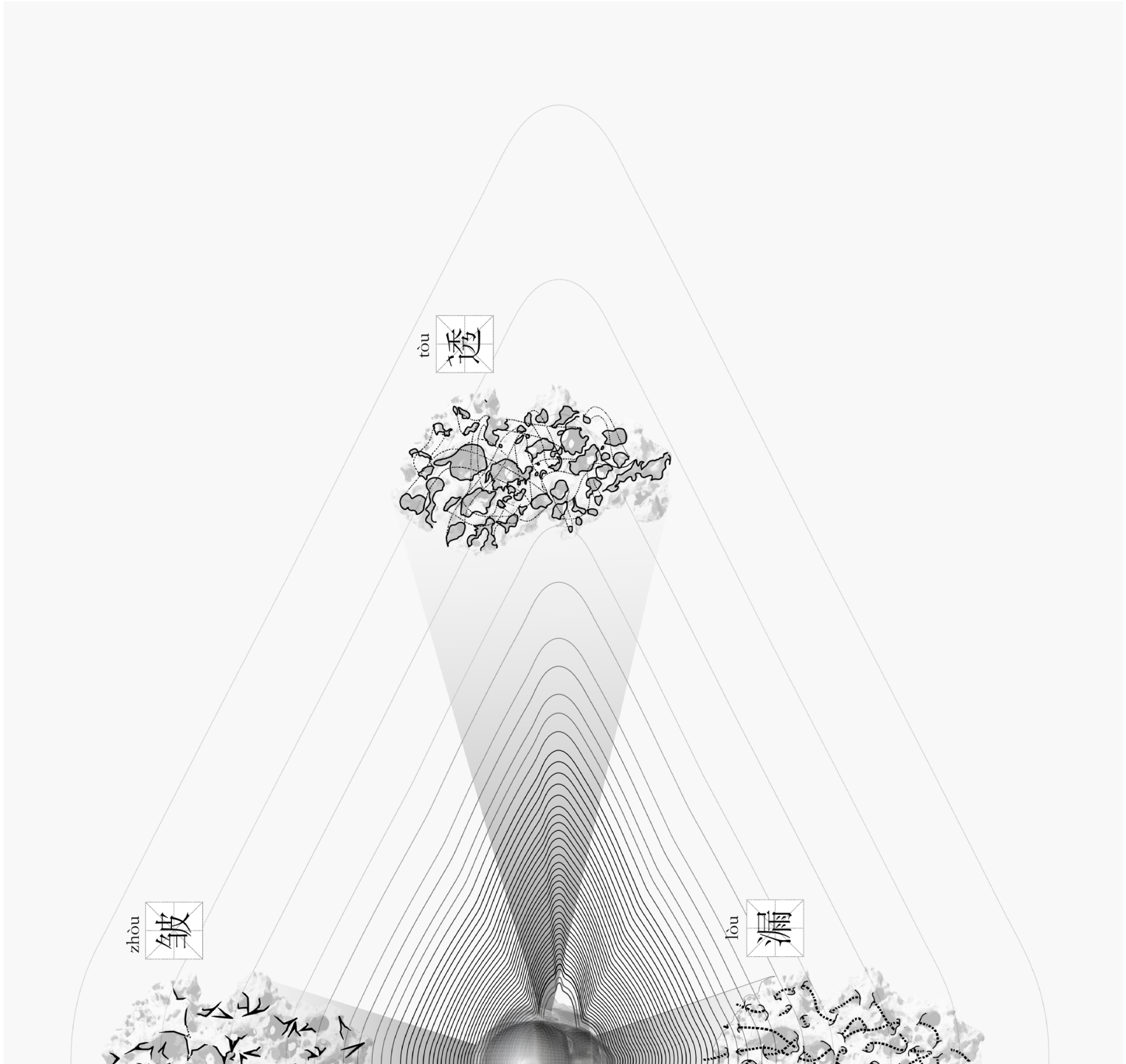


Figure 17. The Hollistic Overview of the Four Principles


tòu
透
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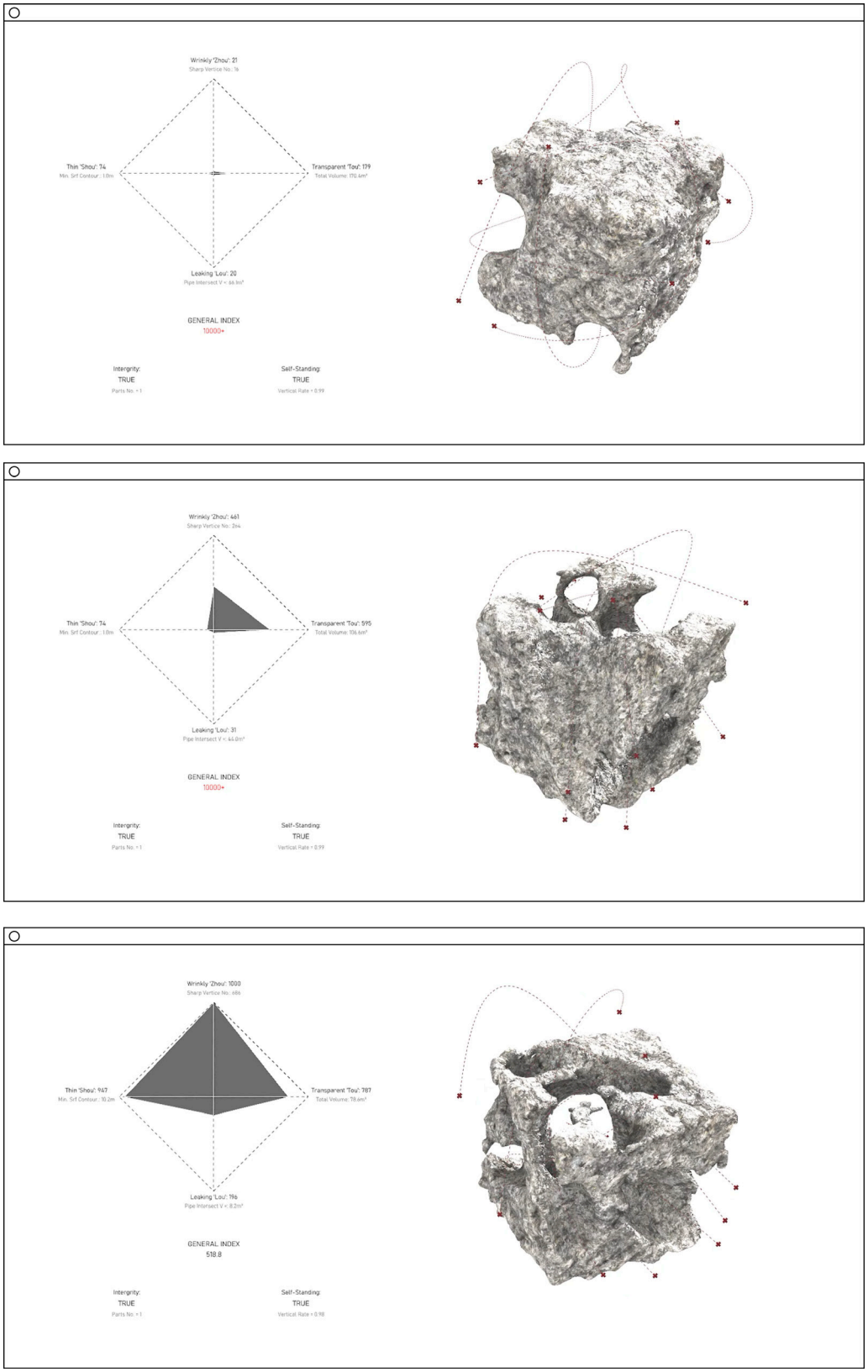


Figure 18. The Optimization Process of a "Fake Fake-hill". Text in Diagram(from top to down, from left to right) Wrinkly 'Zhou'; Sharp Veritice No; Thin 'Shou'; Min. Srf Contour; Transparent 'Tou' ;Total Volumn; Leaking 'Lou'; Pipe Intersection V; General Index; Intergrity True/False; Patts No; Self-standing; True/False; Vertical Rate;

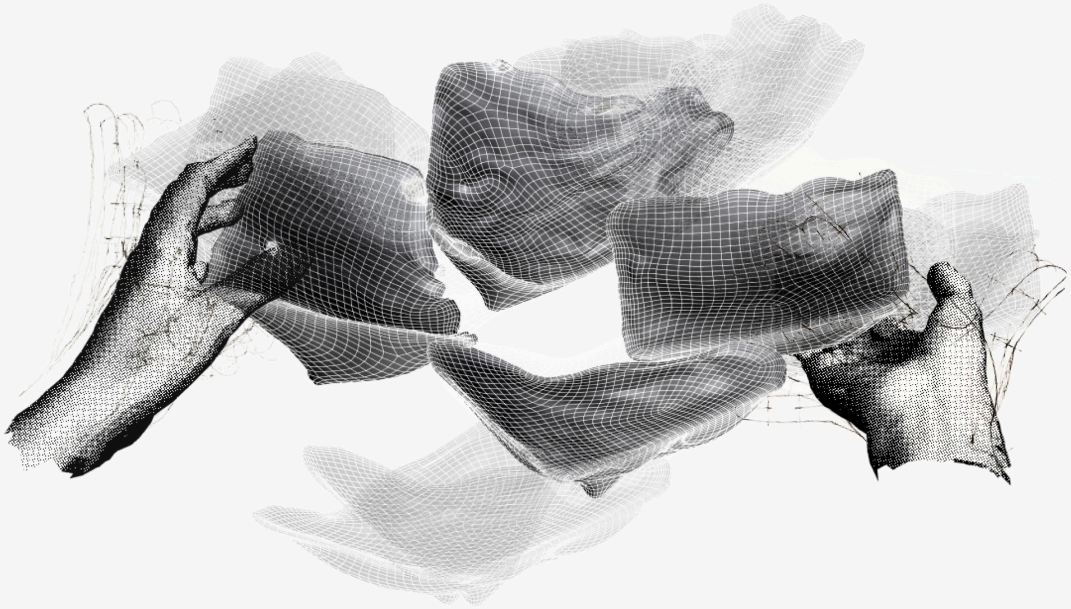
Wrinkly 'Zhou': 1000
Sharp Vertice No.: 967
Thin 'Shou': 1000
Min. Srf Contour.: 11.8m
Transparent 'Tou': 788
Total Volume: 78.6m³
Leaking 'Lou': 859
Pipe Intersect V: < 2.2m³
GENERAL INDEX
69.2
Intergrity:
TRUE
Parts No. = 1
Self-Standing:
TRUE
Vertical Rate = 0.98

Wrinkly 'Zhou': 1000
Sharp Vertice No.: 973
Thin 'Shou': 1000
Min. Srf Contour.: 11.7m
Transparent 'Tou': 789
Total Volume: 78.5m³
Leaking 'Lou': 1000
Pipe Intersect V: < 1.9m³
GENERAL INDEX
59.0
Intergrity:
TRUE
Parts No. = 1
Self-Standing:
TRUE
Vertical Rate = 0.98

Wrinkly 'Zhou': 1000
Sharp Vertice No.: 1009
Thin 'Shou': 1000
Min. Srf Contour.: 11.8m
Transparent 'Tou': 788
Total Volume: 78.5m³
Leaking 'Lou': 1000
Pipe Intersect V: < 1.8m³
GENERAL INDEX
57.1
Intergrity:
TRUE
Parts No. = 1
Self-Standing:
TRUE
Vertical Rate = 0.98

Figure 19. 3D printed Models

03/GUESSING CONSCIOUSLY



‘The Sphere in the Dark Room’

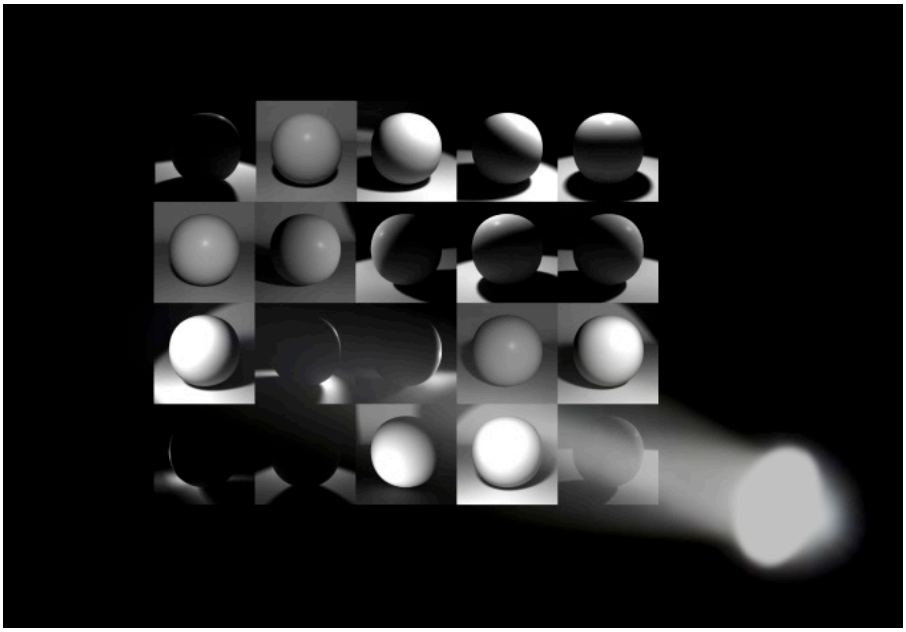


Figure 20. To look for a sphere with no light shed on it in a dark room

Guessing consciously is likewise a paradox well captured by Julian Jayne’s metaphor. It is like using a flashlight in the darkroom to look for a sphere with no light shed on it. However, once the sphere is within the cone of your flashlight, there is light lit on it - once the consciousness is turned on, somehow, you cannot be guessing anymore.[15]

15 . Jaynes, The Origin of Consciousness, 61.

As mentioned in the previous chapter, guessing has been recognized as one approach by those more artistic designers. The exploration of ‘guessing consciously’ has been influenced by the Madrid-based architecture firm Ensamble Studio whose director Antón García Abril, is the advisor of this thesis. The intuitive play of physical models drives their projects. Nevertheless, in the meantime, the potential of architecture is embedded in this process

of guessing. During a chat with Antón García Abril about whether their approach is 'guessing' or 'unconscious,' he described the design as 'vomit' that is spontaneous without much burden of being conscious. However, the other side of this metaphor is a consistently good 'diet' of architecture that ensures the moment of creating would be on track. As Juhani Plasma suggested, experienced designers, tend to think that using hands to create is not random. Rather, they have accumulated an awareness by making and know how to communicate with what they make every time. [16] Both talk about a 'meta-consciousness' acquired by either talent or long-term practice.

16 . Juhani Pallasmaa, The Thinking Hand: Existential and Embodied Wisdom in Architecture (Chichester: Wiley, 2011), 107-111.

Research ii: Data-Matter to Data

In his pedagogy "Matter to Data," Antón García Abril seeks to examine the concept of "meta-consciousness" through a process of intuitively playing with physical materials and models, followed by the use of 3D scanning to quick-

ly understand the architectural potential of each model. [17] Through this process, two key aspects emerged as essential in approaching "guessing consciously." The first is iteration, which in technical terms refers to the repetition of a mathematical or computational procedure applied to the result of a previous application in an effort to obtain progressively closer approximations to a solution. In the realm of architectural practice, the creation of multiple models allows for the development of a framework or "meta-consciousness," whereas the creation of just one model may be considered a "blind guess." [18] The second key aspect is feedback, which in "Matter to Data" is provided through the use of 3D scanning to quickly gather more information about the physical models. The ability to immediately analyze architecture from various views, scales, and lighting conditions through the use of physical models is crucial in bridging the gap between guessing and consciousness.

17 . "The Tent: Ensamble-Studio," Ensamble Studio, accessed January 9, 2023, https://www.ensamble.info/the-tent.

18 . "The Tent: Ensamble-Studio," Ensamble Studio, accessed January 9, 2023, https://www.ensamble.info/the-tent.

Figure 21. "The Tent" , Ensamble Studio, accessed January 9, 2023, https://www.ensamble.info/the-tent.

In this thesis, we propose the second research project, "Data-Matter to Data," which builds upon the methodology of Antón García Abril. The aim of this research is to create a digital model-making space that streamlines iterations

and feedback. We have chosen to utilize a smartphone, a widely available and intuitive device, as the interface for this process. The goal is to replicate the experience of physical model-making while providing the added benefit of a faster iteration speed. Additionally, the use of multiple views and a digital pin-up board allows for a heightened level of computer-aided consciousness and immediate feedback on the models being created.

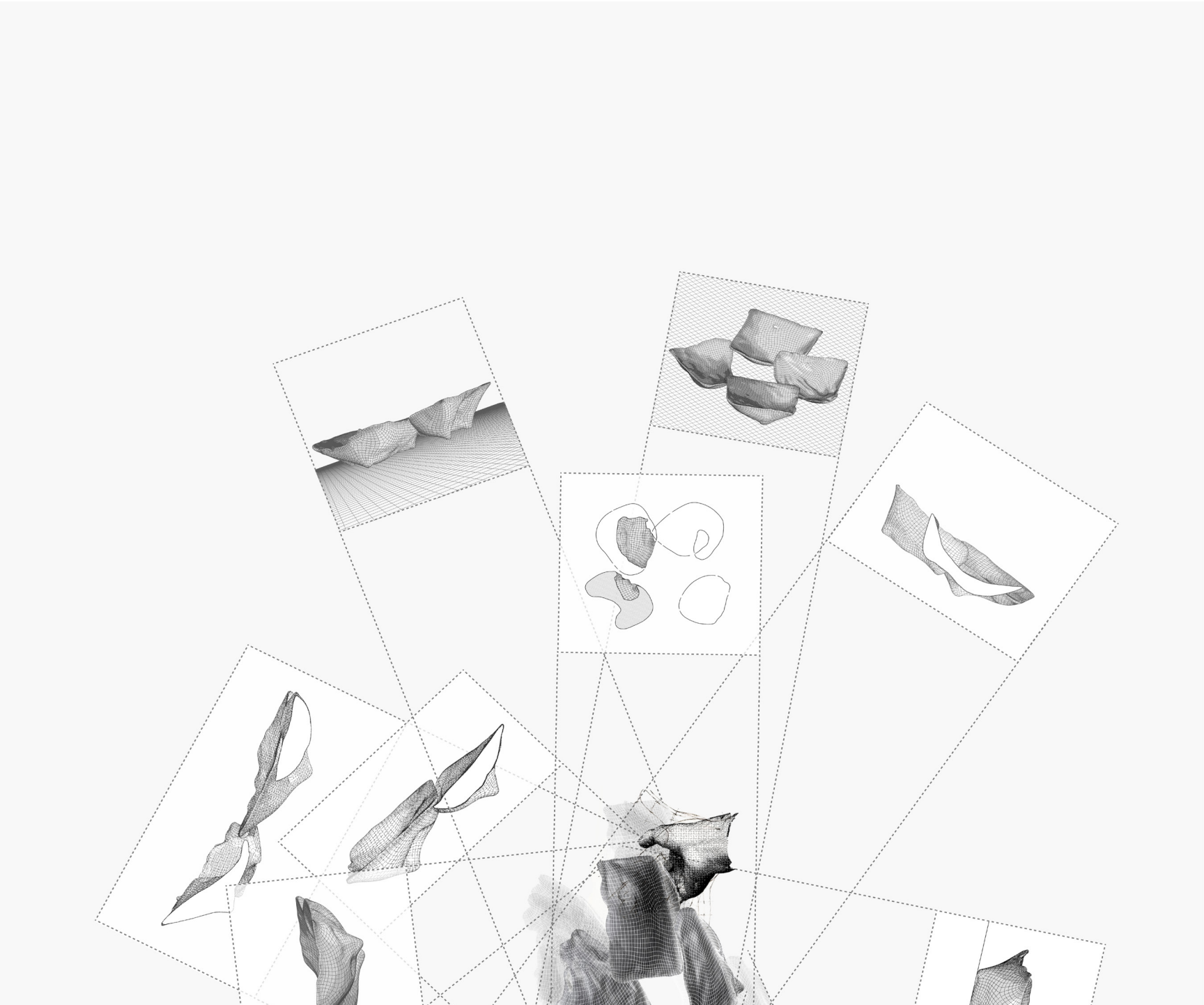
In our research, we have examined a variety of techniques such as HTC Vive, Oculus, and Fologram, ultimately implementing a workflow using Fologram and Rhino Grasshopper due to their accessibility and compatibility. We have also studied films by Eames' office, such as "House of Science" (1962), which utilized simultaneous projections on seven screens to provide a composite depiction of 20th century scientific advancements. These works have served as significant precedents for both the hand-driven digital modeling and the use of multiple views in our project. [19] (Fig. 20) In the end, the final representation of the project was shown with a quad-screen installation with the screen recording of the model-making process. (Fig.21)

19 . Kelsey Rose, "Five Decades in Five Weeks, 1960s," Eames Office, October 5, 2021, https://www.eamesoffice.com/connections/eamesdecades1960s/.

Figure 22. "House of Science" , Eames' Office, 1962

Figure 23. Multi-screen Setup for the model-making process

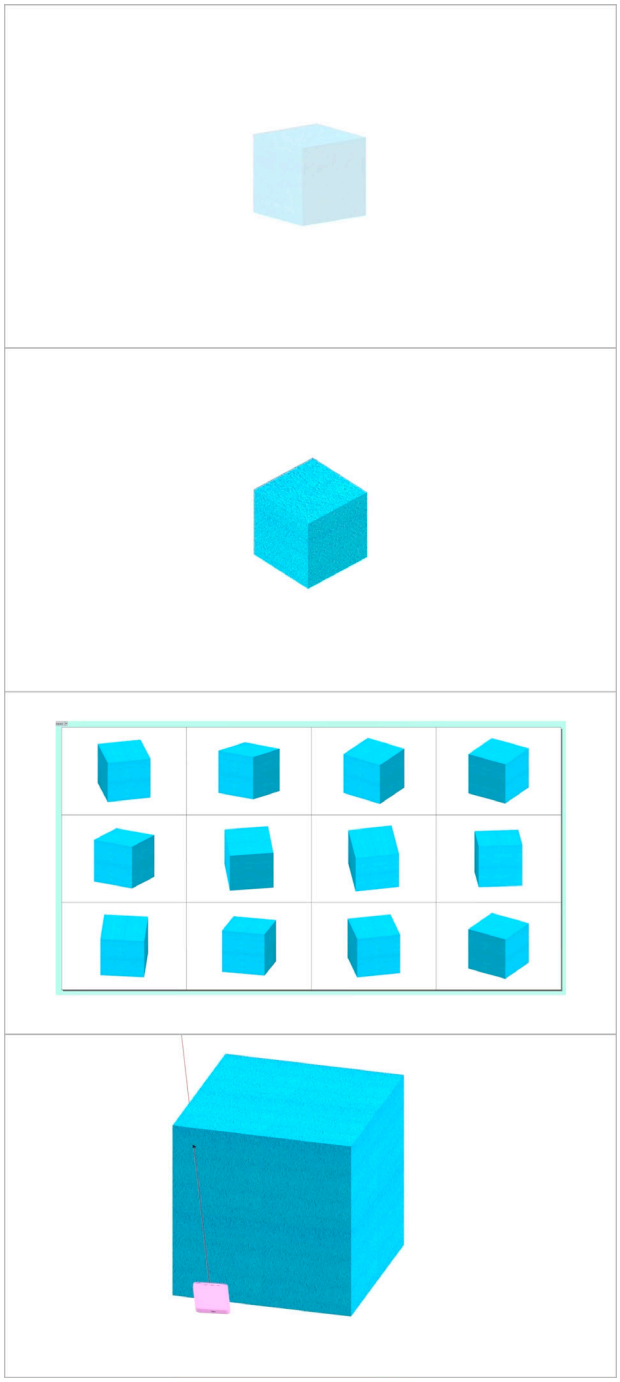
Figure 24. The “Mega-consciousness”

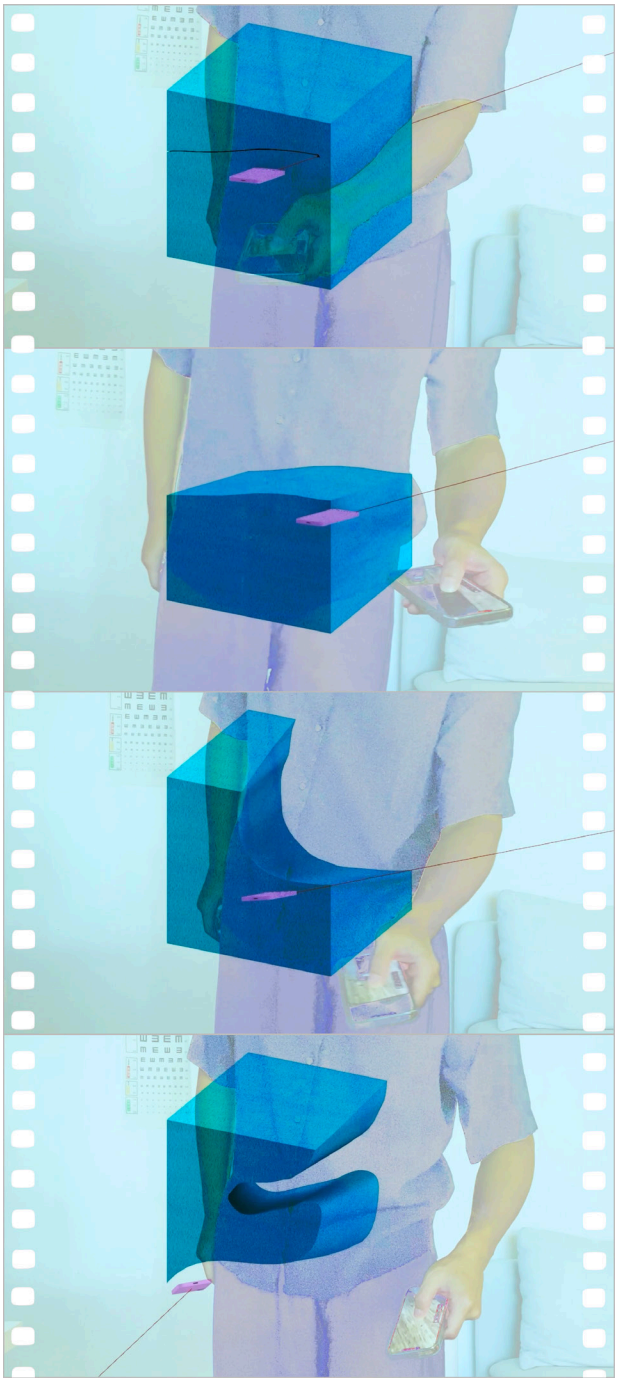


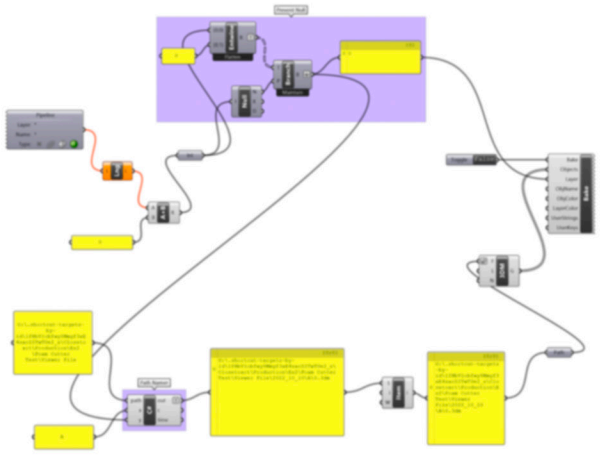
LEFT:
Figure 25. “The Foam-not-yet-carved” , video, color, sound, 2’18” https://vimeo.com/786427620, continues on next page

RIGHT
Figure 26. GH script for the pin-up board.

Scan the QR code to view the full video:







a. The Foam-not-yet-carved

[00:00:04:14]
Here is a piece of blue foam, not yet carved

[00:00:10:05]
That holds the form of every thought you can have

[00:00:18:08]
And now you got the tool

[00:00:22:04]
What are you going to do with it?

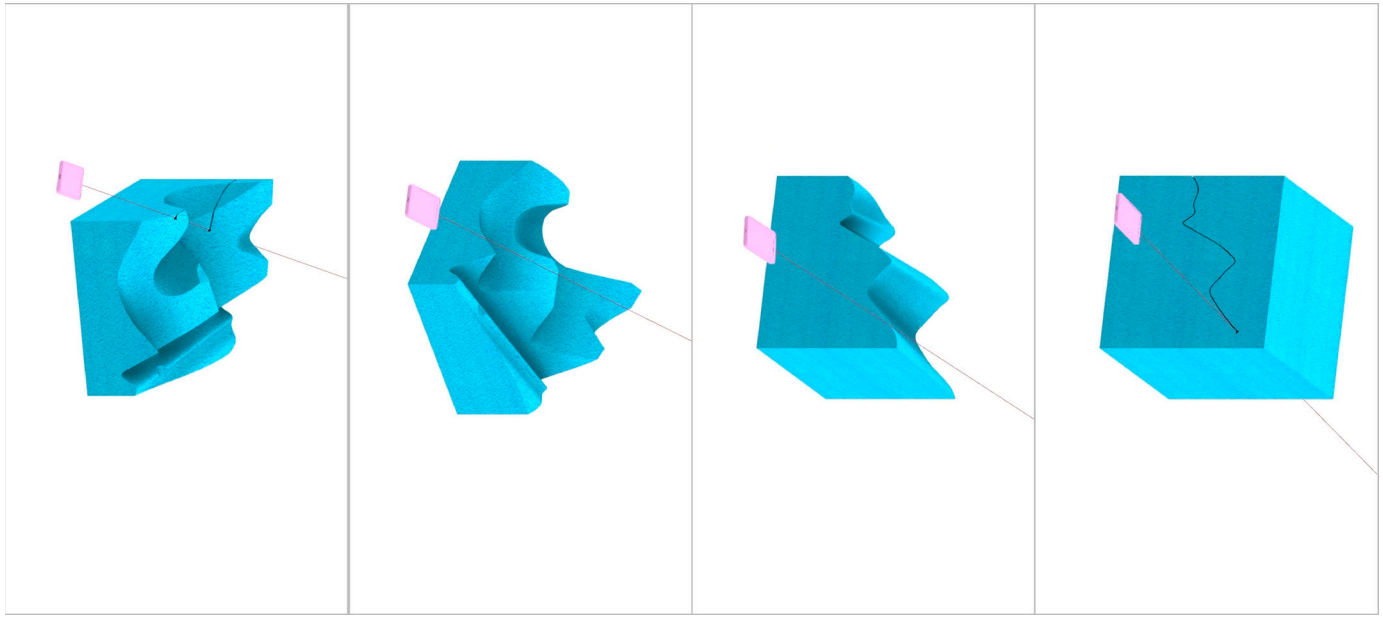
[00:00:27:01]
A straight line

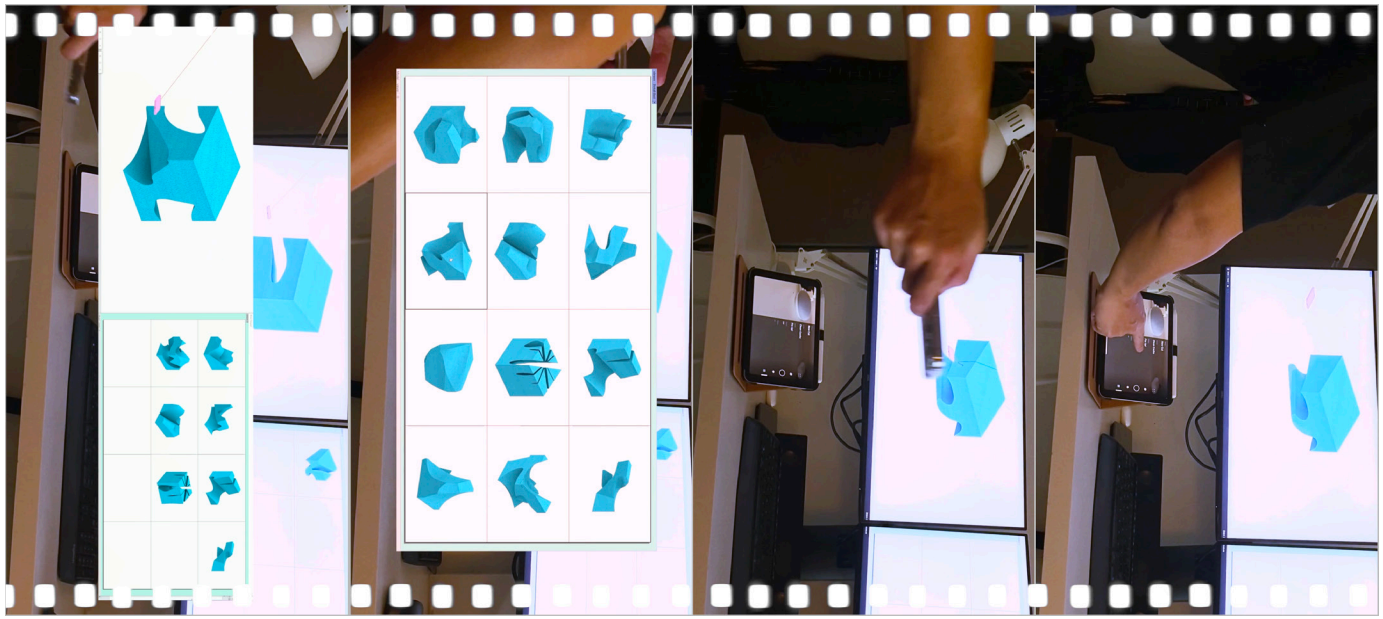
[00:00:31:09]
A soft curve

[00:00:35:11]
Or maybe something uncertain.

[00:00:43:17]
The foam will be as honest as it can to take in every movement of your body.

[00:00:55:19]
/music continues





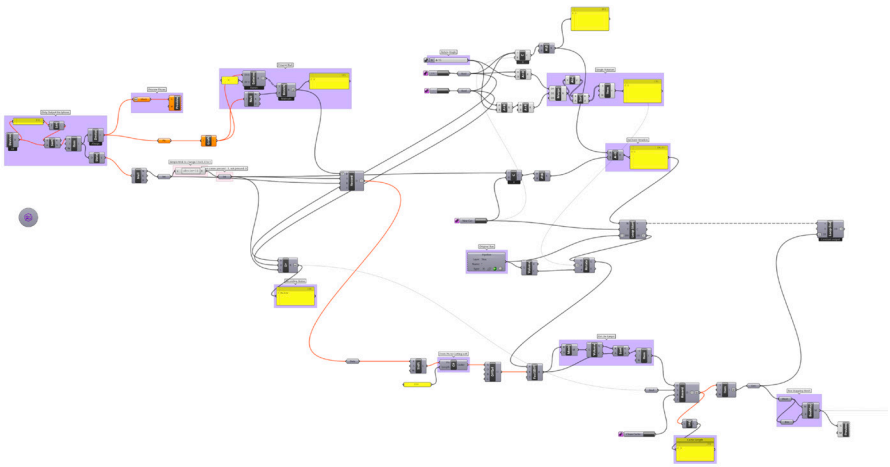


Figure 27. GH script for the digital foam cutter

This project is trying to simulate a foam cutter, or more precisely saying, the constellation of foam, foam cutter, and the act of the operator.

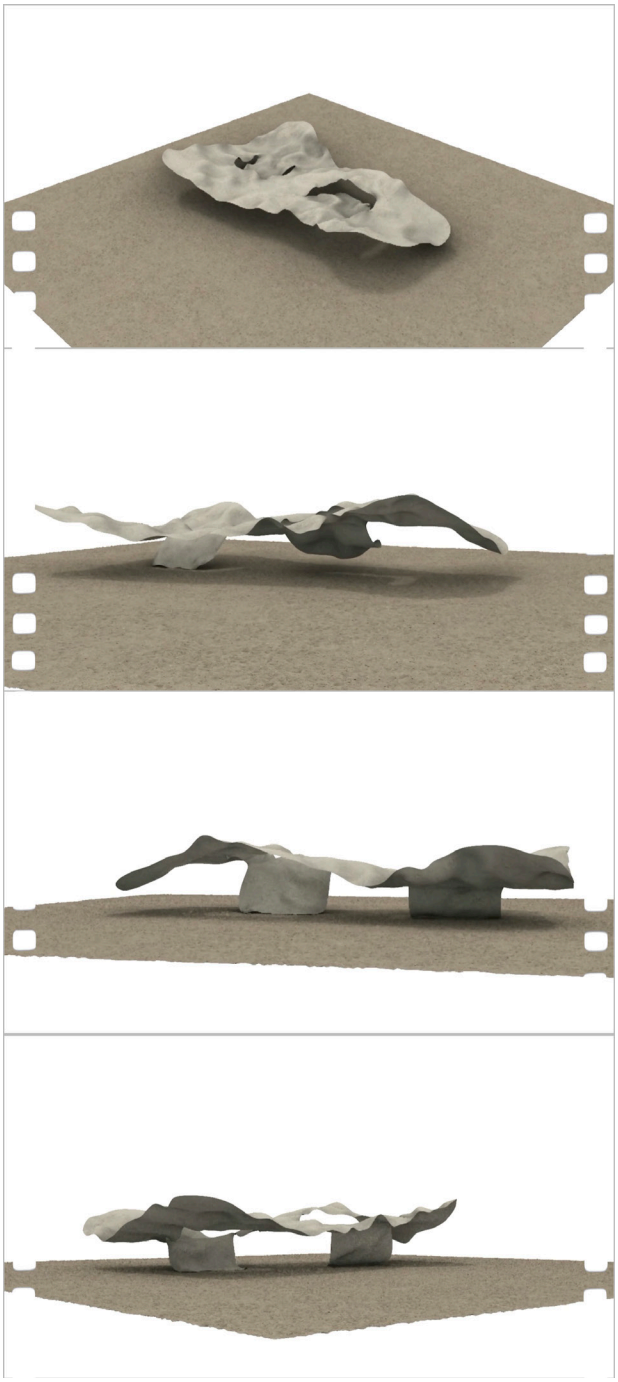
By recording the motion on one device, the script generates the cutting traces and uses a boolean difference function to simulate the cutting-foam action; while with the second device, it is allowed to rotate the foam in-progress at different angles; but most importantly, when you feel like a specific design iteration, it can be saved to another model space, which is called the 'pin-up board'. On the 'pin-up' board, you could spend a second on checking your previous iterations, and go back to create more. This is realized by setting up a data flow between two Rhino files.

This computational process in reality was very slow due to the burden of recording Fologram traces and Boolean calculation. So we developed a script with two recorders to clean the cache from the first recorder every time one single cutting is completed. We also applied a loop function to make every cutting and rotation would be recorded on one single iteration, before we choose to restart a new design.

Figure 28. “The Cloth-not-yet-sliced” , video, color, sound, 2’32” https://vimeo.com/786427857, continues on next page

Scan the QR code to view the full video:

b. The Cloth-not-yet-sliced



[00:00:05:10]
Here is a surface

[00:00:08:13]
in the digital space

[00:00:17:04]
but it can also be, a piece of cloth

[00:00:21:17]
the digital matter

[00:00:23:18]
with the data of the texture

[00:00:41:09]
now let's cut through it

[00:00:47:05]
and let it stands

[00:00:52:05]
revealing the data of the gravity

[00:01:03:19]
/music continues

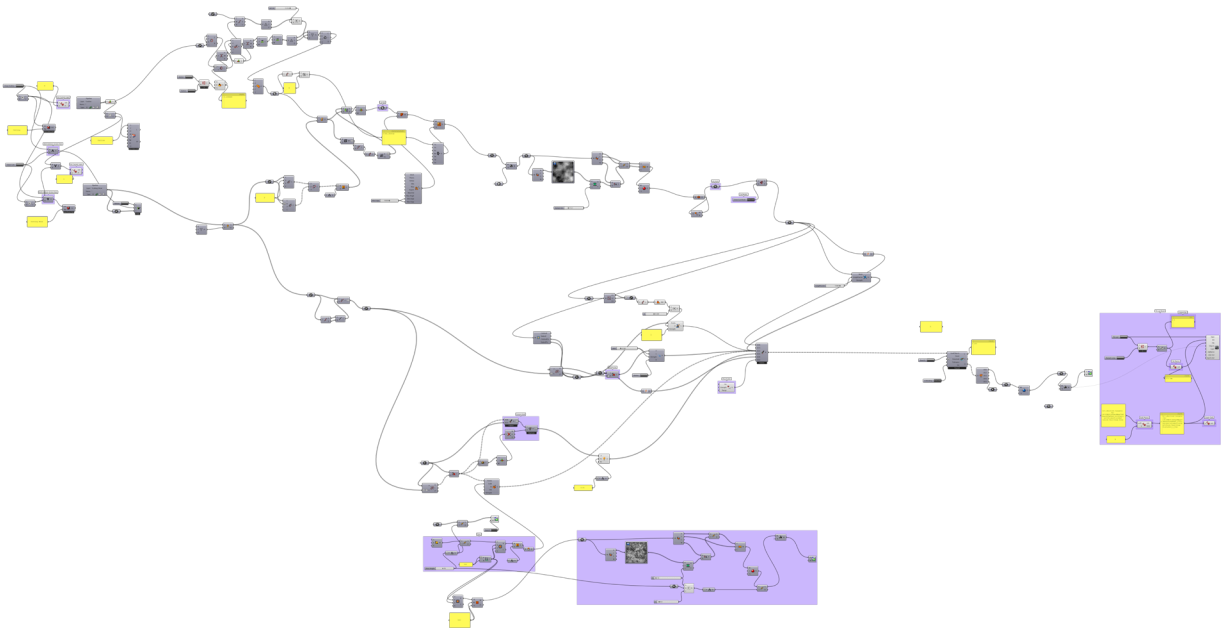


Figure 29. GH script for the cloth

Figure 30. The Cloth Simulation

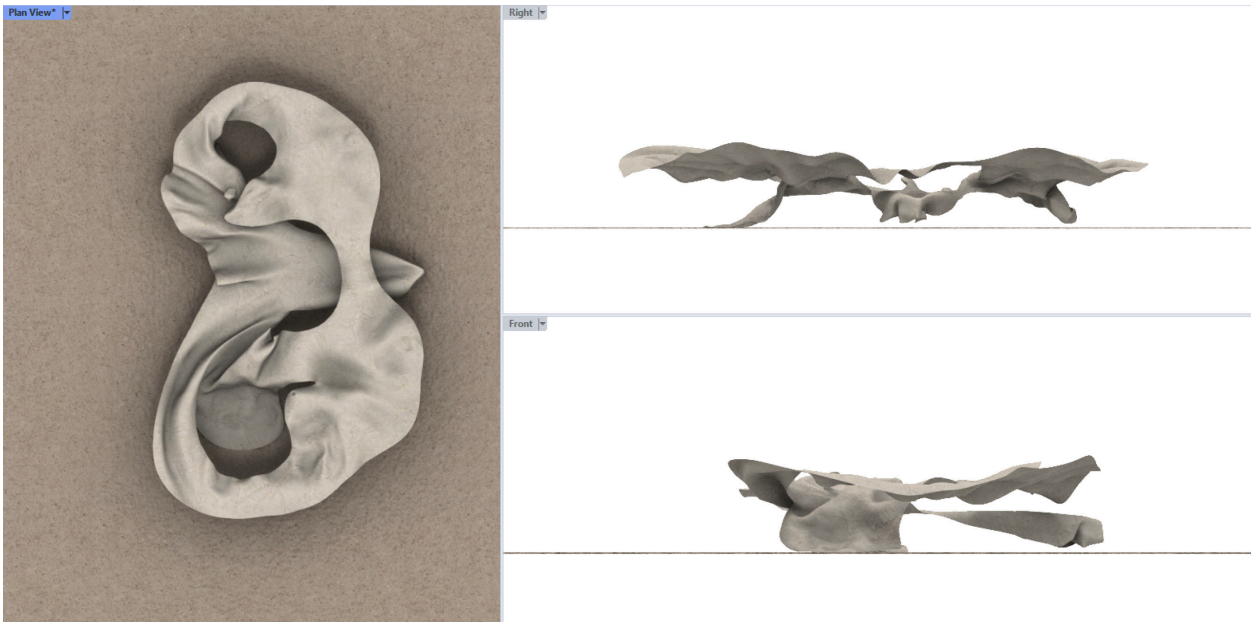


Figure 31. Dropping and Dragging the Surface

Figure 32. PIN-UP BOARD

04/ARCHITECTURAL COINCIDENCE

Figure 33. Interstella (Paramount Pictures & Warner Bros. Pictures, 2014).

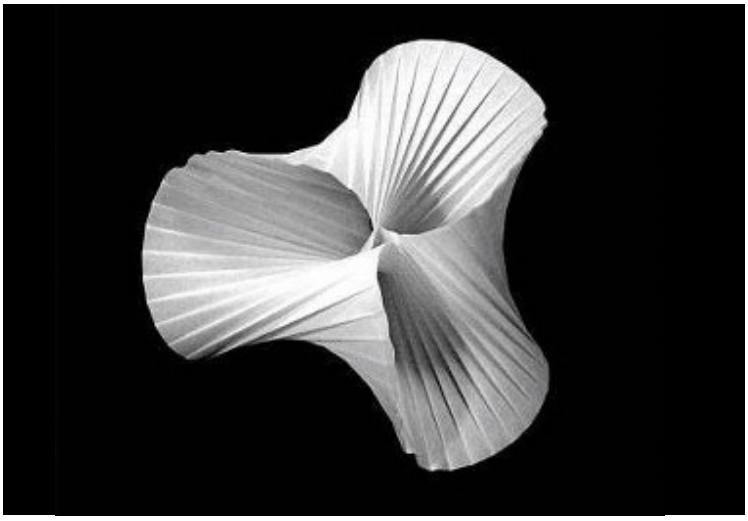


Figure 34. Jorge Luis Borges, El Aleph (Nueva York: Vintage Español, 2012), Cover.

“The Cross”

The results of our previous two research projects have led us to propose a potential design methodology, which we have diagrammed to illustrate the concept of guessing consciously and gauging unconsciously. The first research project, “Fake Fake-hills,” examined the use of cutting-edge optimization techniques to achieve design outcomes that surpass the limits of human consciousness, or gauging unconsciously. This is distinct from many contemporary generative design methods, which often produce unexpected results through the use of cliche seeds or arbitrary judgment. [20] The second research project, “Data-Matter to Data,” complements this approach by providing a means to quickly iterate and reflect on intuitive creations in search of a design seed that is worthy of further exploration, or guessing consciously.

20 . Asterios Agkathidis, Generative Design: Form-Finding Techniques in Architecture (London: Laurence King Publishing, 2016), 35-52.

In the following chapter, we will demonstrate how we applied this tentative methodology to two design projects. This method began with guessing consciously, using a workflow of digital model-making to harness the power of intuition, and then moved on to gauging unconsciously, utilizing parametric modeling and optimization to refine and solidify the final design outcome. While it is possible to approach the design process from the opposite direction, moving from gauging unconsciously to guessing consciously, this tangential approach was not pursued in the remainder of our thesis.

Ultimately, the concept of guessing consciously and gauging unconsciously is meant to be comprehensive, encompassing a cyclical movement between the two extremes. At the center of this oscillation lies architectural coincidence, a point that is as unattainable as the singularity in “Intestella” and as infinite as the “Aleph” described by Jorge Luis Borges. Our two design projects represent an attempt to approach this cross point, which we believe to be a crucial aspect of design.

Coincidence i: Spring Wire & Spiral Stair

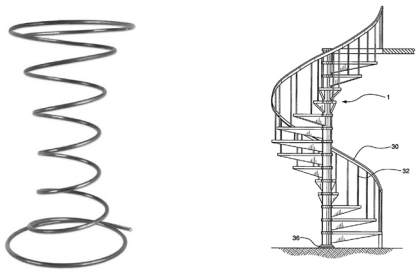


Figure 35. The Spring Wire & spiral stair

The initial phase of this project was focused on the development of a spiral staircase that would represent a typological innovation through the use of a unique methodology. To stimulate our creative process, we began by exploring the potential of spring wire as a material. This particular medium was selected due to its inherent curvature, which is ideally suited to the construction of spiral staircases, as well as its interactive nature, which offers a vast array of possibilities for form and circulation.

Utilizing the “Data-Matter to Data” workflow, we utilized digital technology to program the material properties of the spring wire, enabling us to easily manipulate and test various designs in a virtual space. By drawing curves in the

Figure 36. Coincidence I: The Spring Wire & Spiral Stair, video, black and white, 8’01” https://vimeo.com/786430083

Scan the QR code to view the full video:

air with a smartphone, we were able to quickly generate a wide range of staircases with different material characteristics, such as elasticity and tenacity, and adjust the gradient of the stairs as needed for further testing. Additionally, we were able to stretch and deform the wire in order to experiment with different forms and configurations, continually refining and improving our designs through this process.

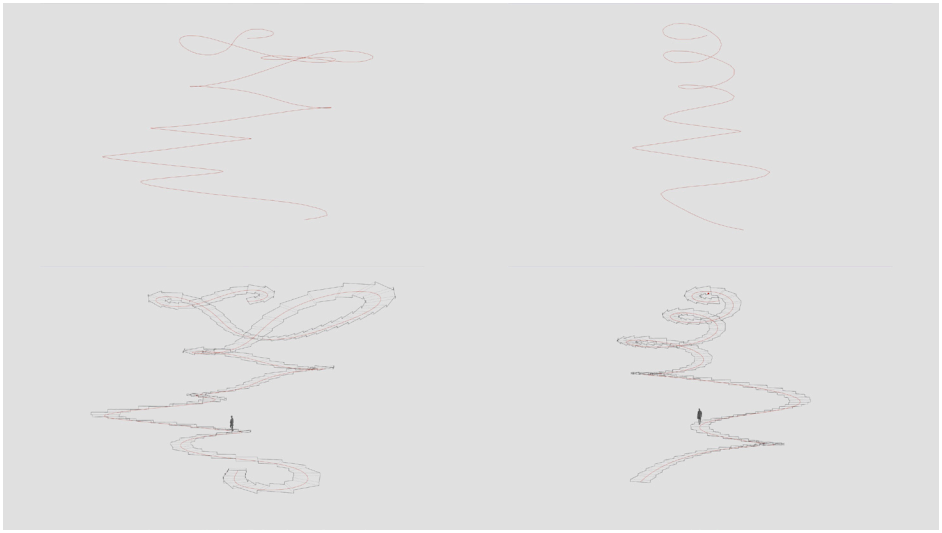


Figure 37. "Drawing" the stairs (scan the qr code to view the full animation)

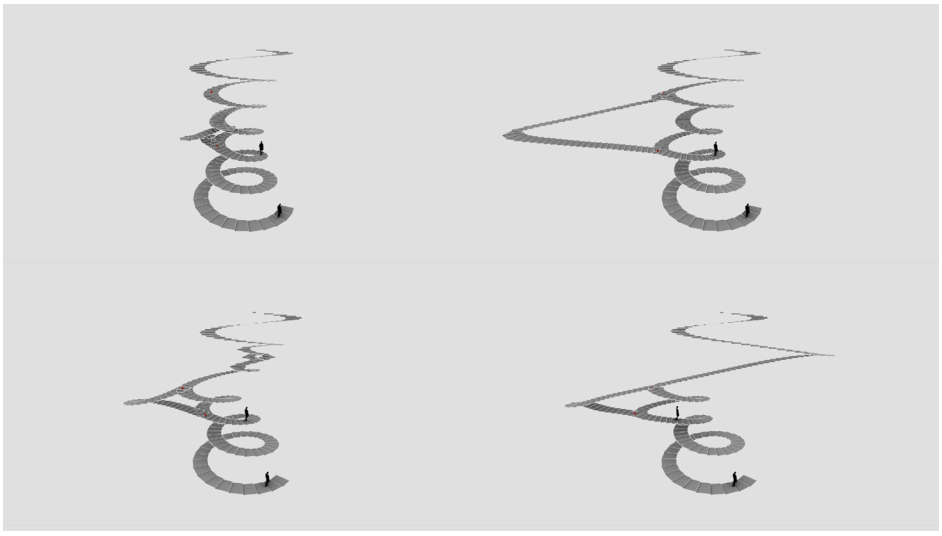


Figure 38. "Stretching" the stairs (scan the qr code to view the full animation)

RIGHT:

Figure 39. Coincidence I Model Photo

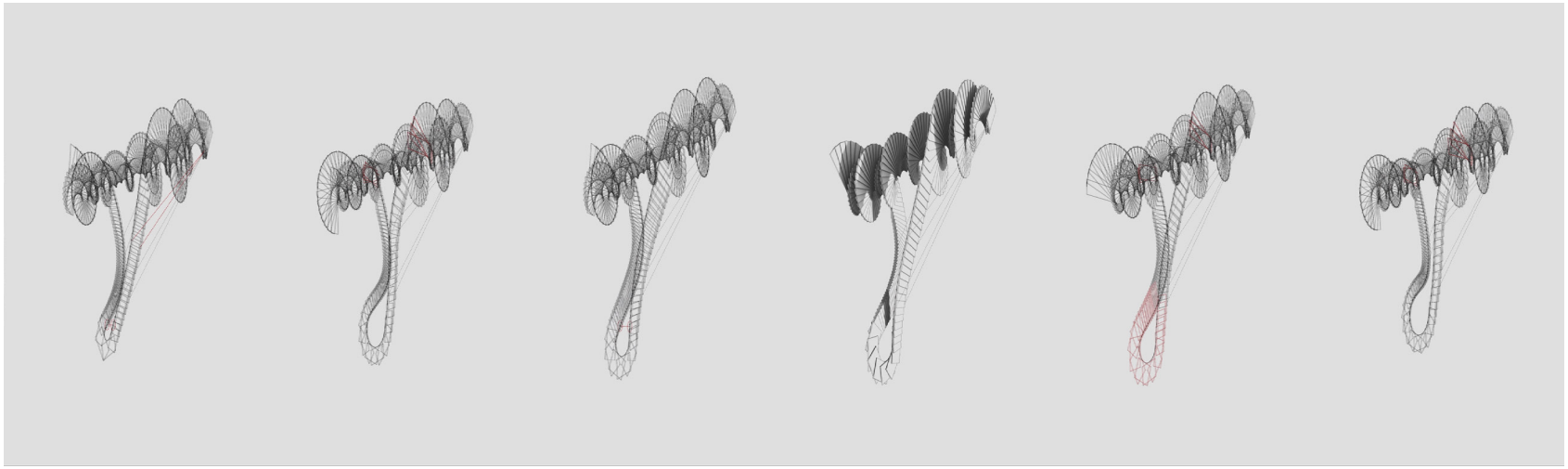
Throughout this design process, we found that the use of digital technology and the ability to record and review our progress on a digital pin-up board facilitated both efficiency

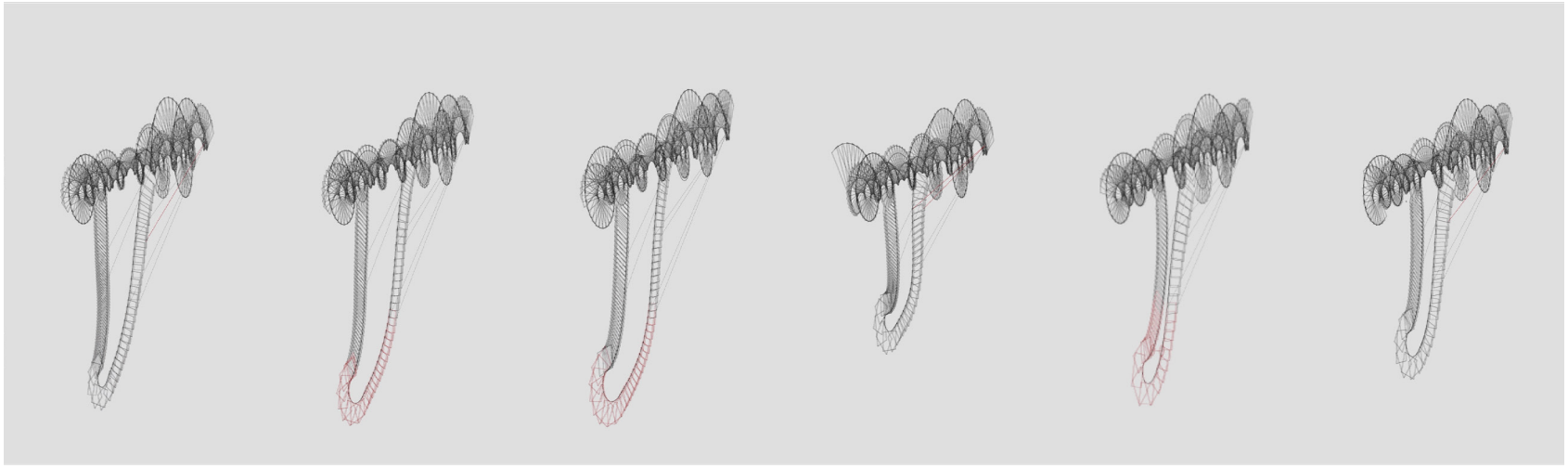
and creativity. The process of sketching in the air, continuously iterating and experimenting, allowed us to uncover the ideal design, or “rabbit,” as we referred to it. This moment of inspiration occurred when we overlapped two identical wires and stretched one of them, resulting in a design that featured one wire detouring and converging with the other while maintaining a smooth gradient.

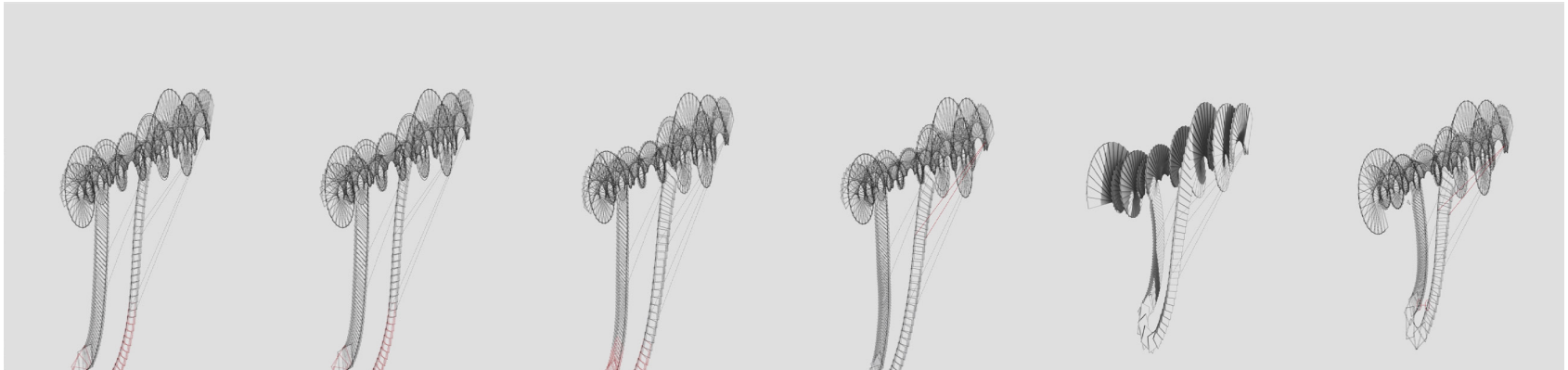
Figure 40. Stairs attached to a landscape (scan the qr code to view the full animation)

From this point, our design process shifted from a more conscious, deliberative approach to a more intuitive, unconscious mode of creation. In order to further refine our design and explore the potential for architectural coincidence, we created a parametric model that simulated the motion of stretched spring wire. This model, which was driven by an optimization algorithm, allowed us to fine-tune every detail of the design, from the size of each step and the length of the overhang to the angle of the pitched main body and the number of turns in the staircase, all in the pursuit of realizing the perfect coincidental moment.

Figure 41. The multiply view during “drawing” and “stretching” (scan the qr code to view the full animation)







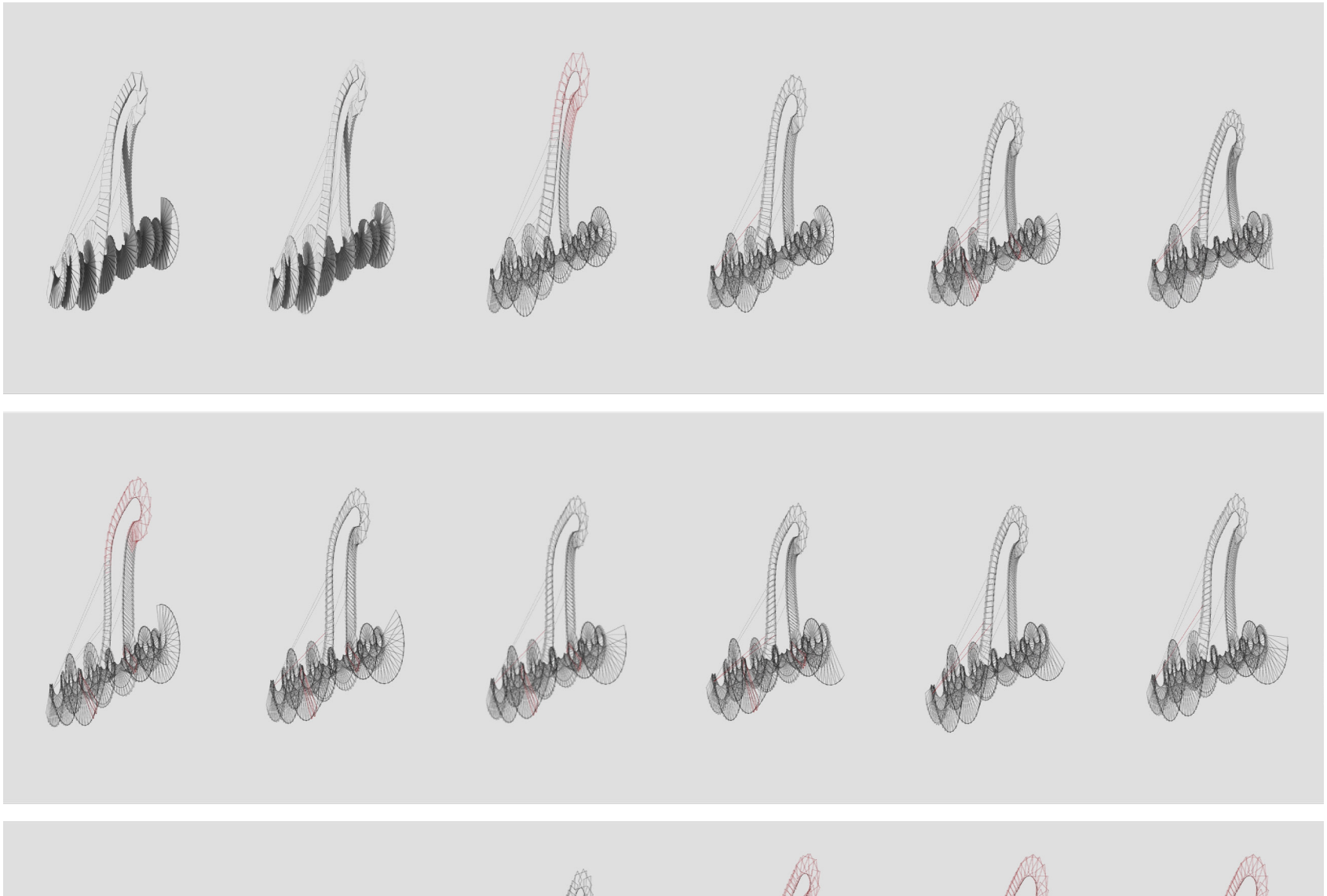


Figure 42. Optimi-
zation process of the
final form (scan the
qr code to view the
full animation)

Figure 43. Coincidence I Model Photo

Figure 44. Coincidence I Model Photo

Figure 45. Coincidence I Model Photo

Figure 46. Coincidence I Model Photo

Figure 47. Coincidence I Model Photo

Figure 48. Coincidence I Model Photo

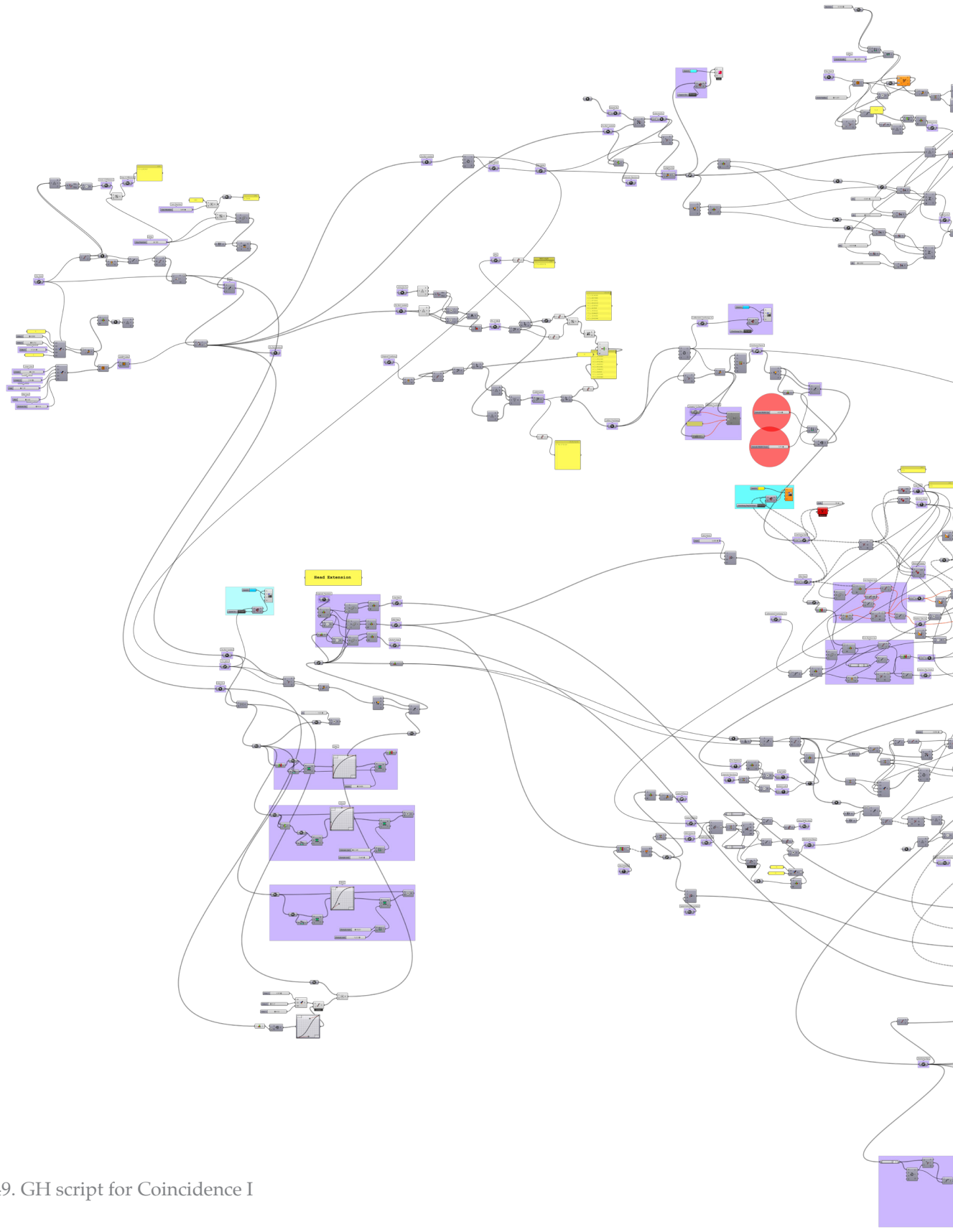
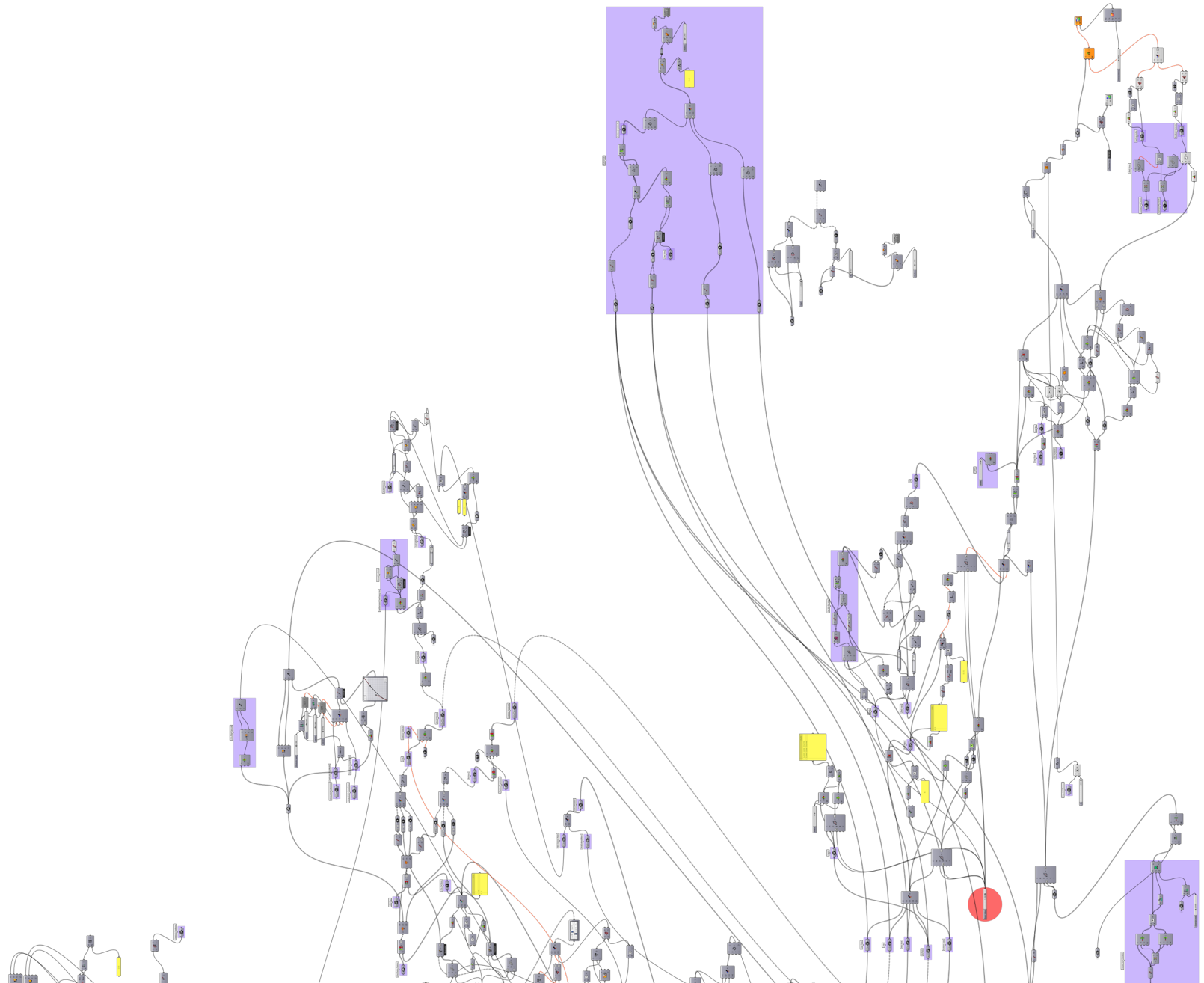
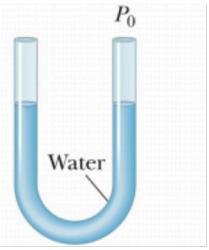


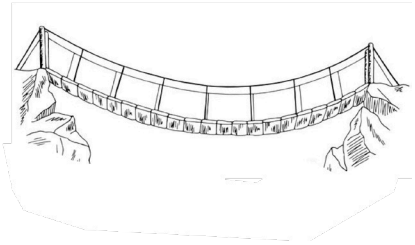
Figure 49. GH script for Coincidence I



Coincidence ii: U-shape Tube & Tunnel

Figure 50. The U-shape Tube & Catenary Structure





The second project began with the task of designing a tunnel inspired by U-shaped tubes. The rough concept for this tunnel, which was intended to facilitate separation rather than connection and to provide a means of approaching rather than reaching, had already been developed prior to the thesis. However, we sought to use the methodology to complete the design and create a poetic moment that would require extensive testing to achieve, including the adjustment of factors such as the height of the water, the angle of the draping, and the composition of the various elements in order to form a holistic design – an architectural coincidence.

Figure 51. Iterations making

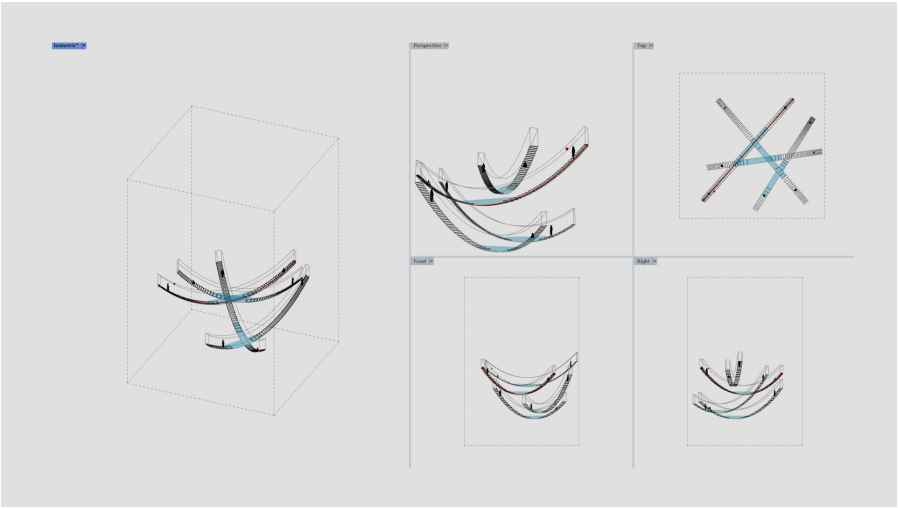
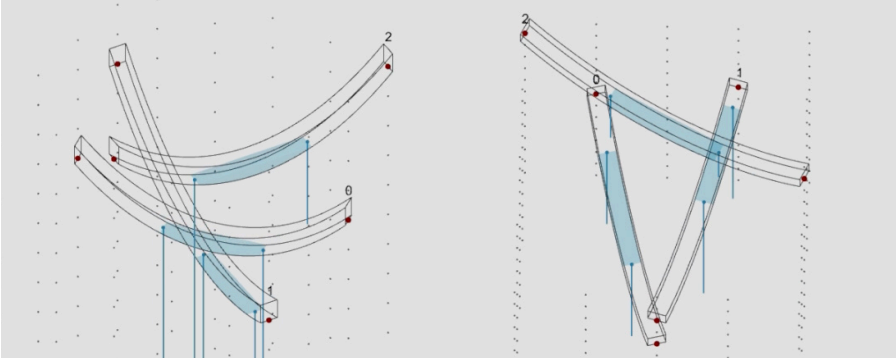


Figure 52. Coincidence II: The U-shape Tube & Tunnel, video, black and white, 6'36" https://vimeo.com/786430546

Scan the QR code to view the full video:

Figure 53. Adjusting the height of the watr ,the angle of the draping with a snap-to-grid system



As with the first project, we utilized digital model-making techniques to intuitively play with materiality. By drawing lines in the air with a smartphone, we were able to drape them into U-shaped tunnels and adjust the degree of draping and water height as needed. We also experimented with the relationships between each pipe, exploring ways in which they might overlap vertically, form an assembly, and inspire more complex circulation. It was important to consider that multiple pipes would be part of a system in which any single element could impact the overall design, and we tested the function of "nudging" the ends of each pipe to fit within a structural grid for the sake of architectural feasibility.

Throughout this process, we worked to shift our design process from one of conscious guessing to unconscious gauging. After a series of tests, recordings, and reflections, the "rabbit" – the ideal design – finally emerged in the form of a scenario in which the water in each pipe created a moment of separation, while the overflow of water from the pipes above was received by those below with the suitable composition and size. This created a reciprocal system in which rainwater collected from the top would pass through each pipe before merging into a single flow towards a pond at the bottom. However, when we manually tested this possibility, it took a significant amount of time and luck to achieve a successful case, with many others failing.

To improve our chances of success, we developed an automatic loop that would achieve the desired scenario by indexing every possibility on each floor to determine if

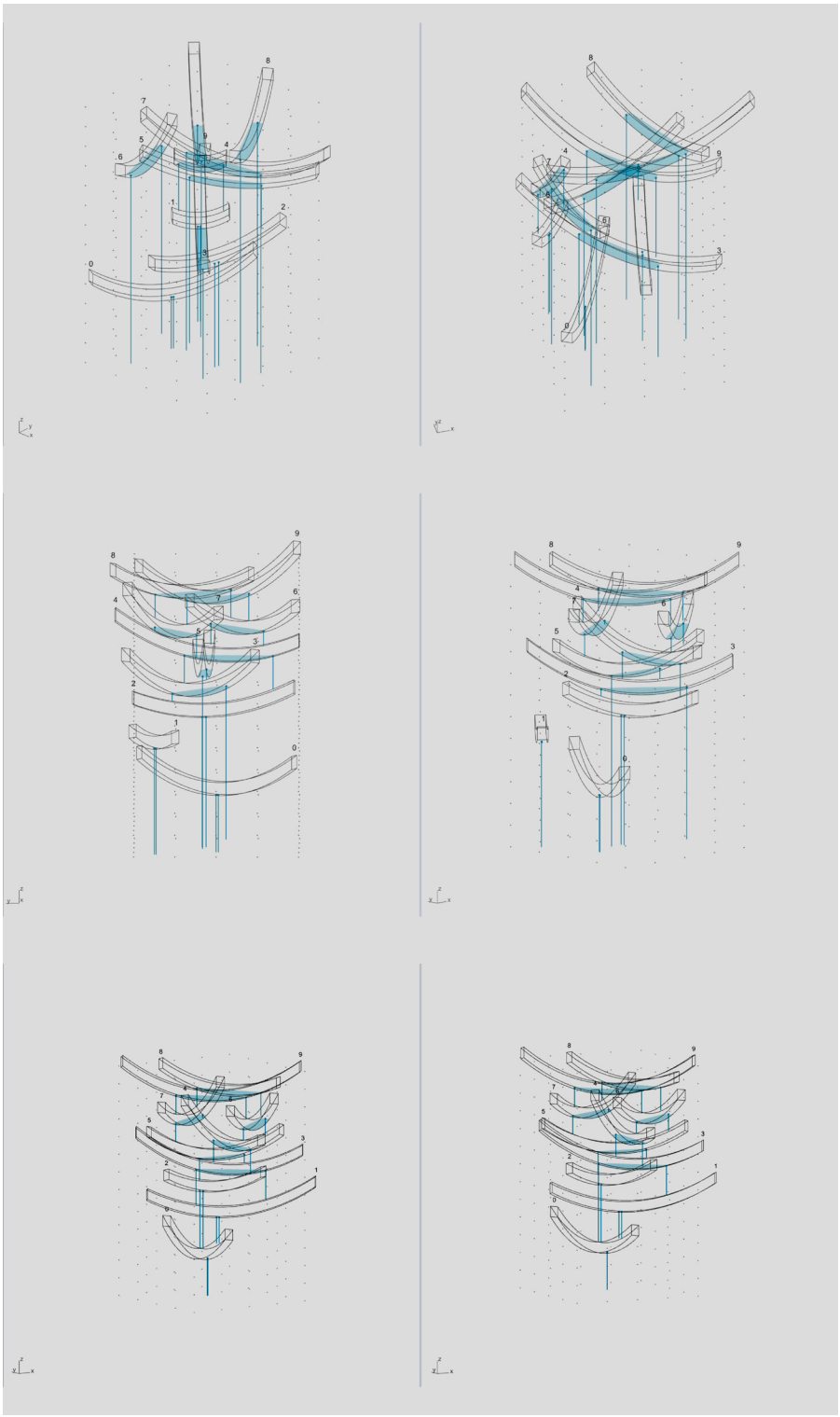
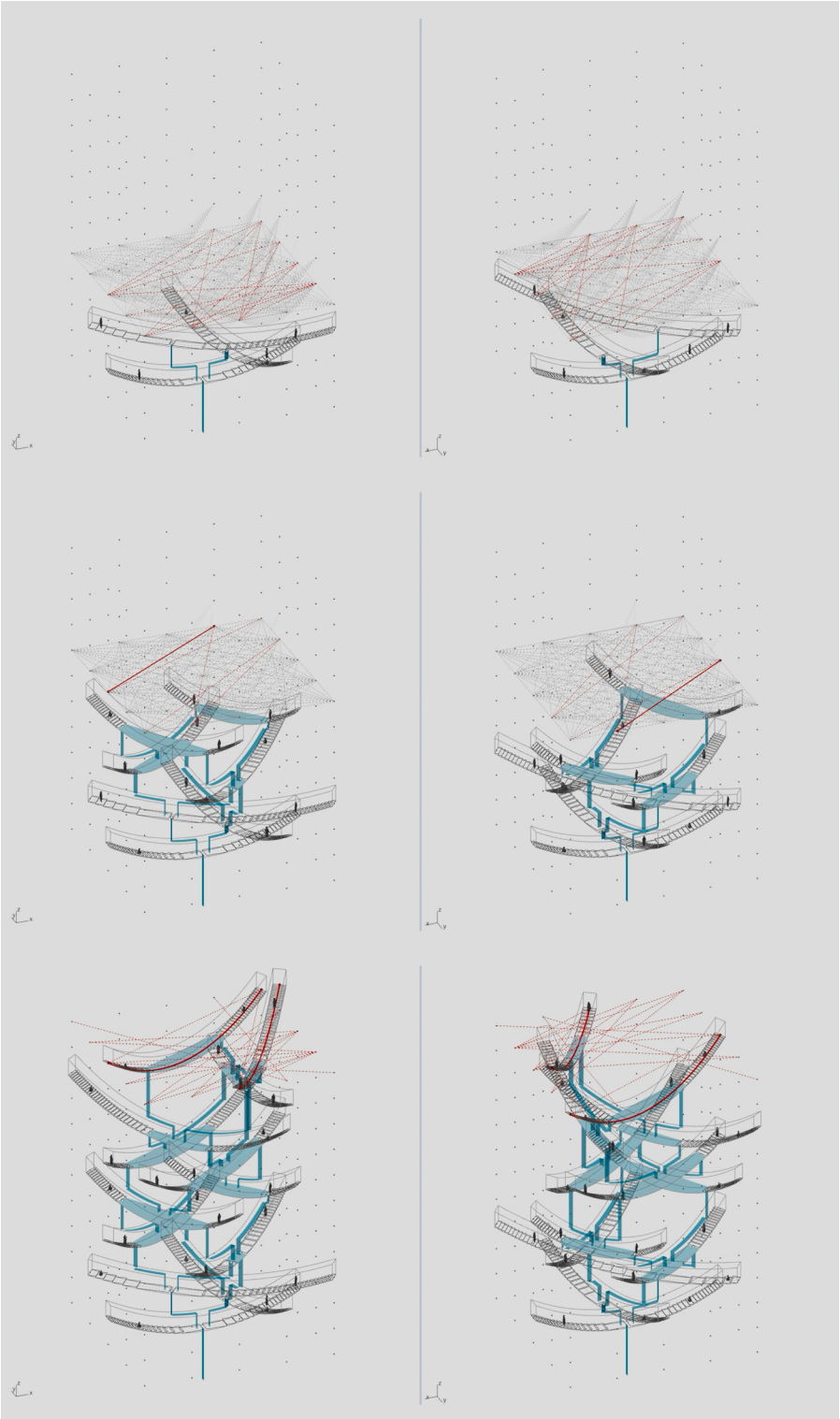


Figure 54. Manually moving the tubes (scan the qr code to view the full animation)

they fit within the system. Most of the time, there would be no suitable pipes on a given floor, and the loop would start over until all pipes were in the proper geometries and locations. This rare situation allowed us to efficiently

and effectively refine our design, ultimately resulting in a structure that not only demonstrated a high level of aesthetic appeal but also adhered to the necessary structural requirements.

Figure 55. The automatic loop reaching the final design (scan the qr code to view the full animation)



RIGHT:

Figure 56. Coincidence II Model Photo

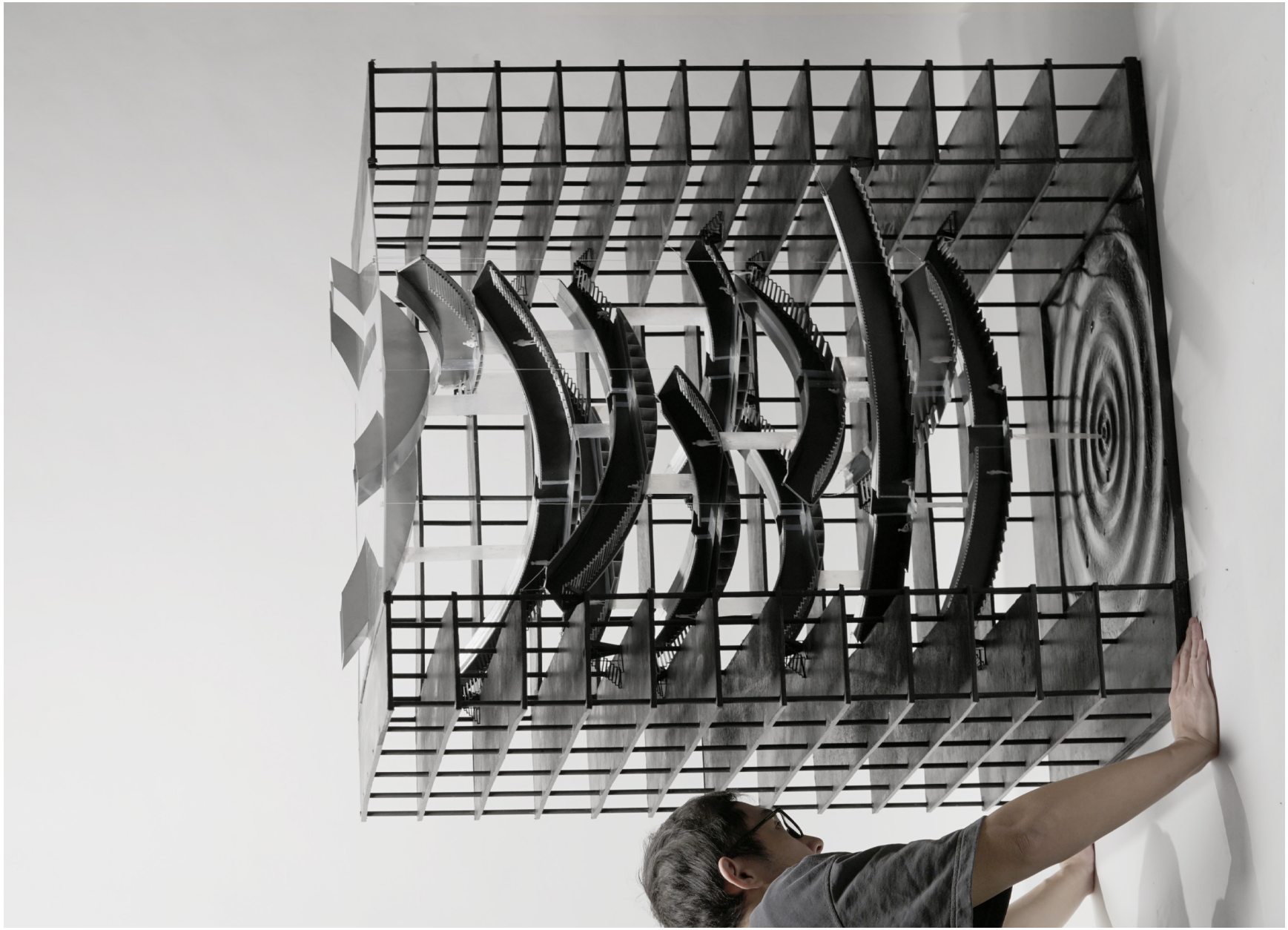


Figure 57. Coincidence II Model Photo

Figure 58. Coincidence - II Model Photo

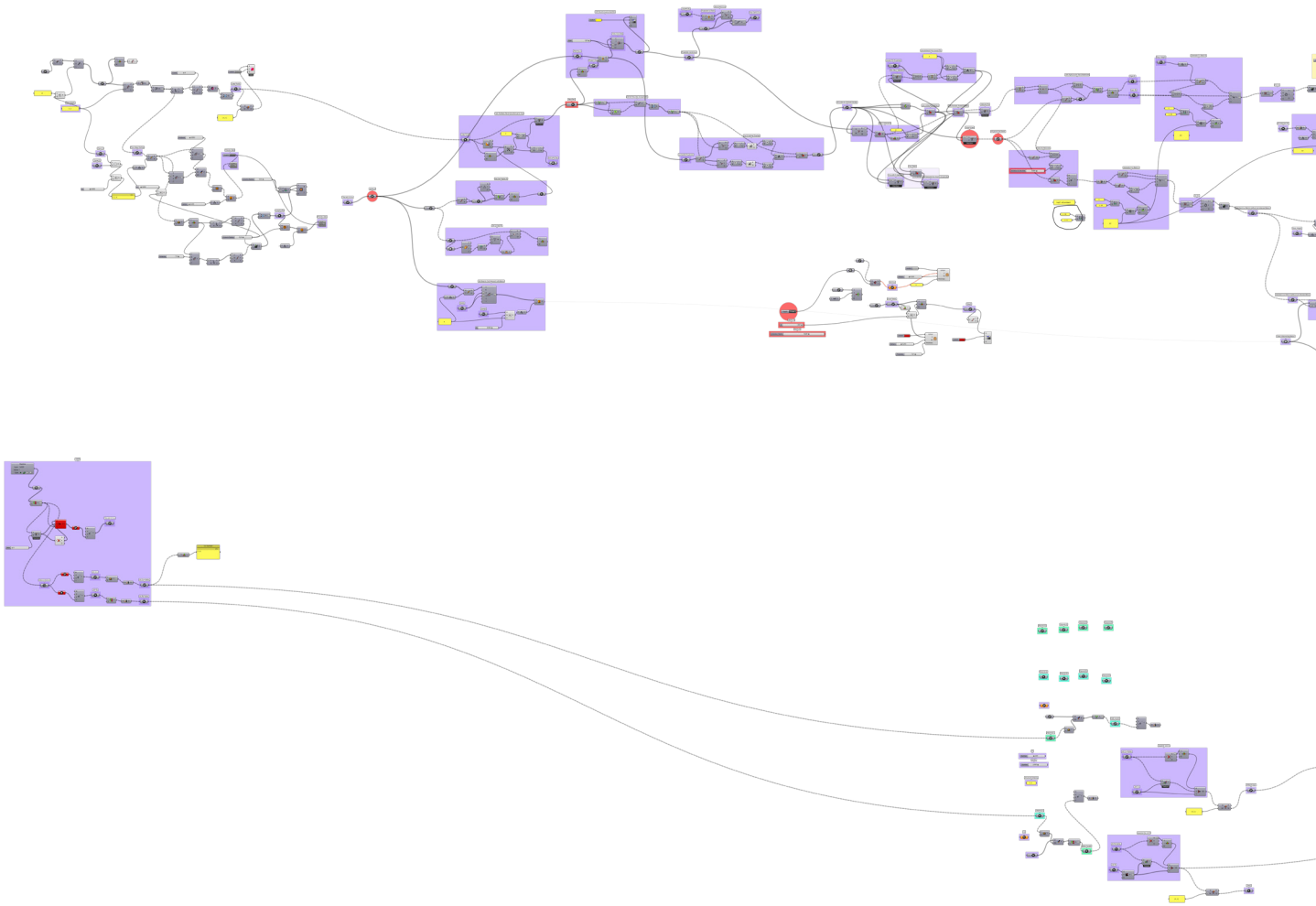
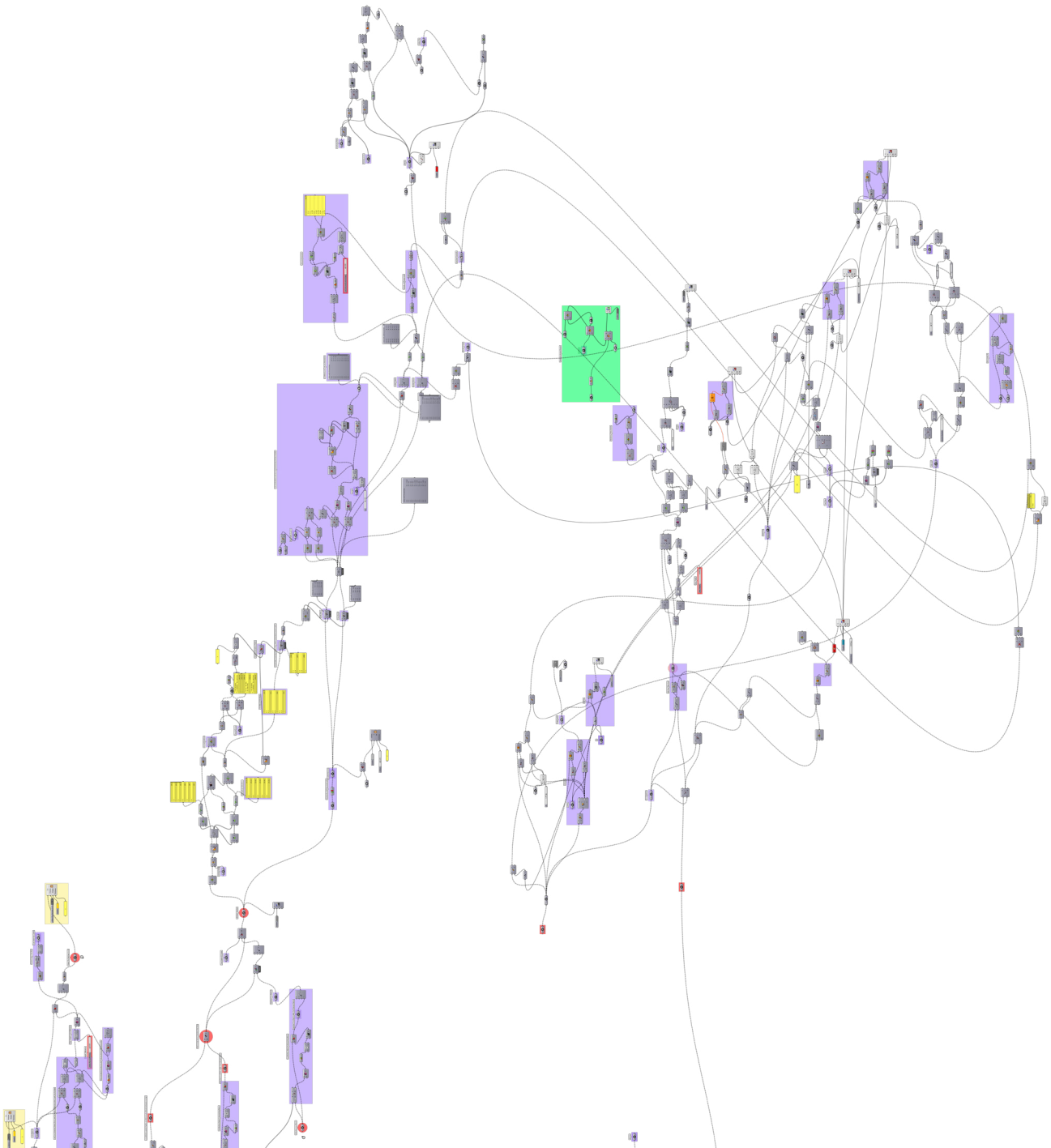


Figure 59. GH script for Coincidence I



05/APPENDIX

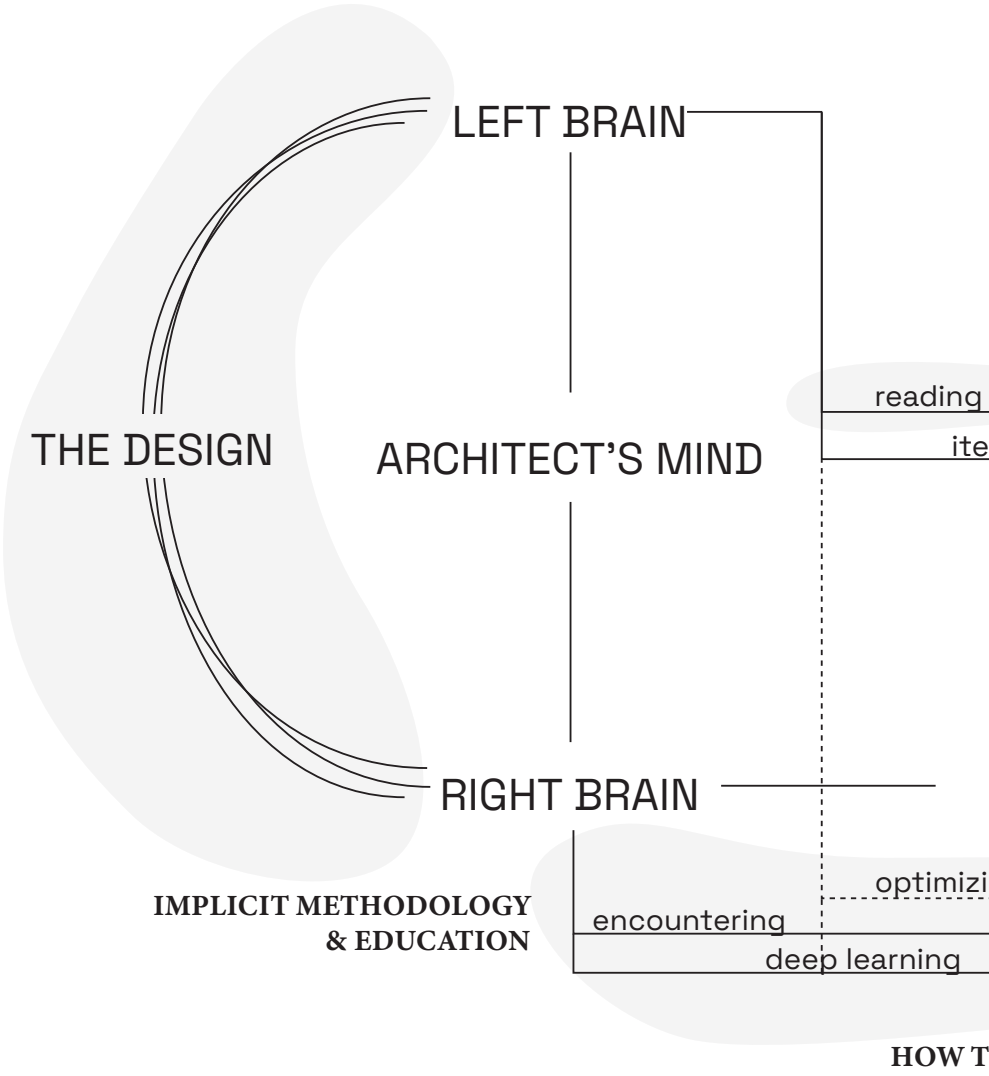
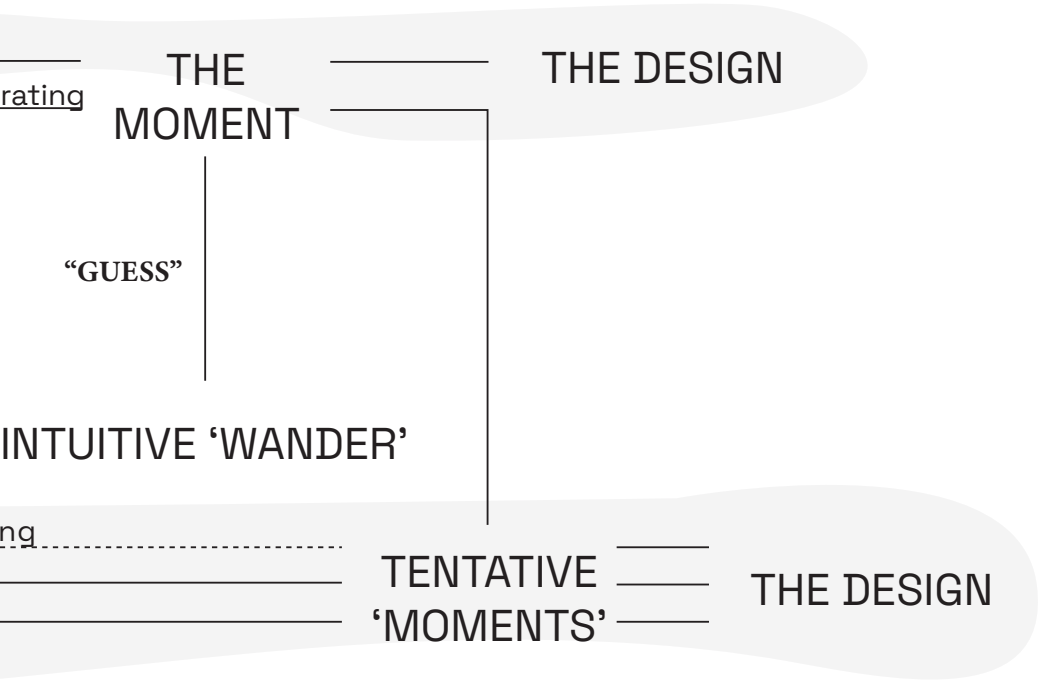


Figure 60. Early Architect's Mind Diagram

SPECIOUS METHODOLOGY



O BETTER 'GUESS'?

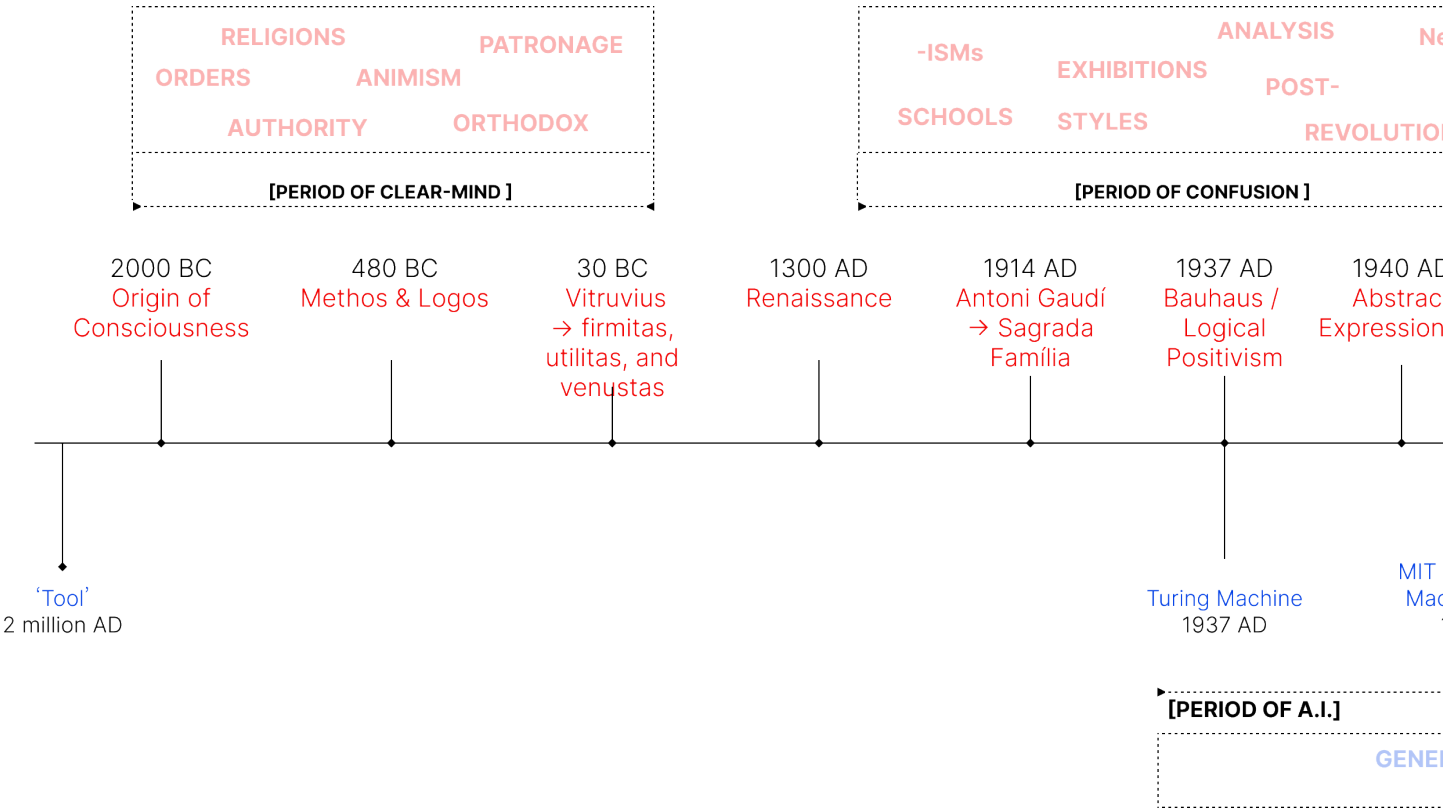


Figure 61. Early Paradigm Shift Timeline Mapping

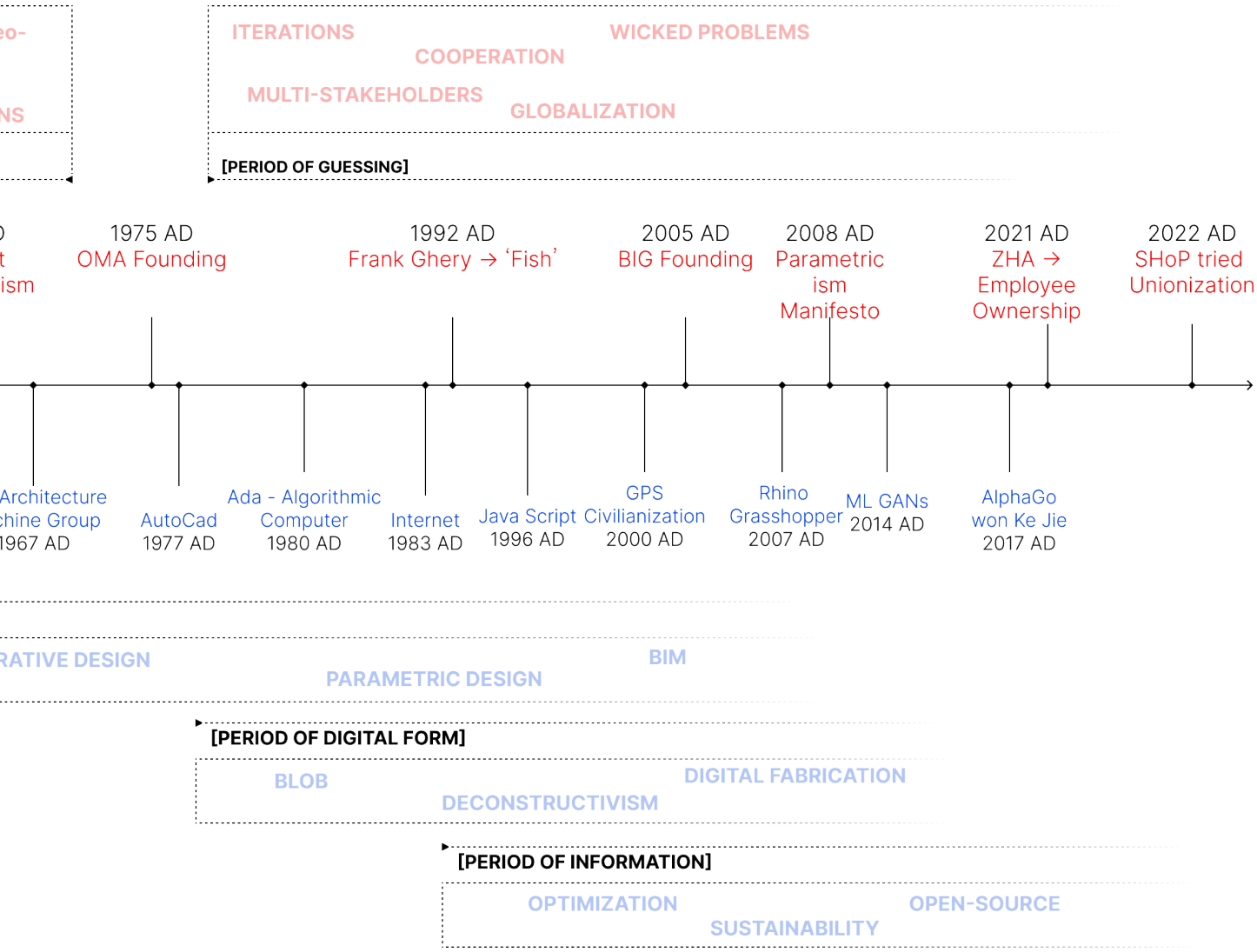

ITERATIONS
WICKED PROBLEMS
COOPERATION
MULTI-STAKEHOLDERS
GLOBALIZATION
[PERIOD OF GUESSING]
1975 AD
OMA Founding
1992 AD
Frank Ghery → 'Fish'
2005 AD
BIG Founding
2008 AD
Parametric ism Manifesto
2021 AD
ZHA → Employee Ownership
2022 AD
SHoP tried Unionization
Architecture
1967 AD
AutoCad
1977 AD
Ada - Algorithmic Computer
1980 AD
Internet
1983 AD
Java Script
1996 AD
GPS Civilianization
2000 AD
Rhino Grasshopper
2007 AD
ML GANs
2014 AD
AlphaGo won Ke Jie
2017 AD
PARAMETRIC DESIGN
BIM
[PERIOD OF DIGITAL FORM]
BLOB
DIGITAL FABRICATION
DECONSTRUCTIVISM
[PERIOD OF INFORMATION]
OPTIMIZATION
OPEN-SOURCE
SUSTAINABILITY

Figure 62. Final Presentation

Figure 63. Final Presentation

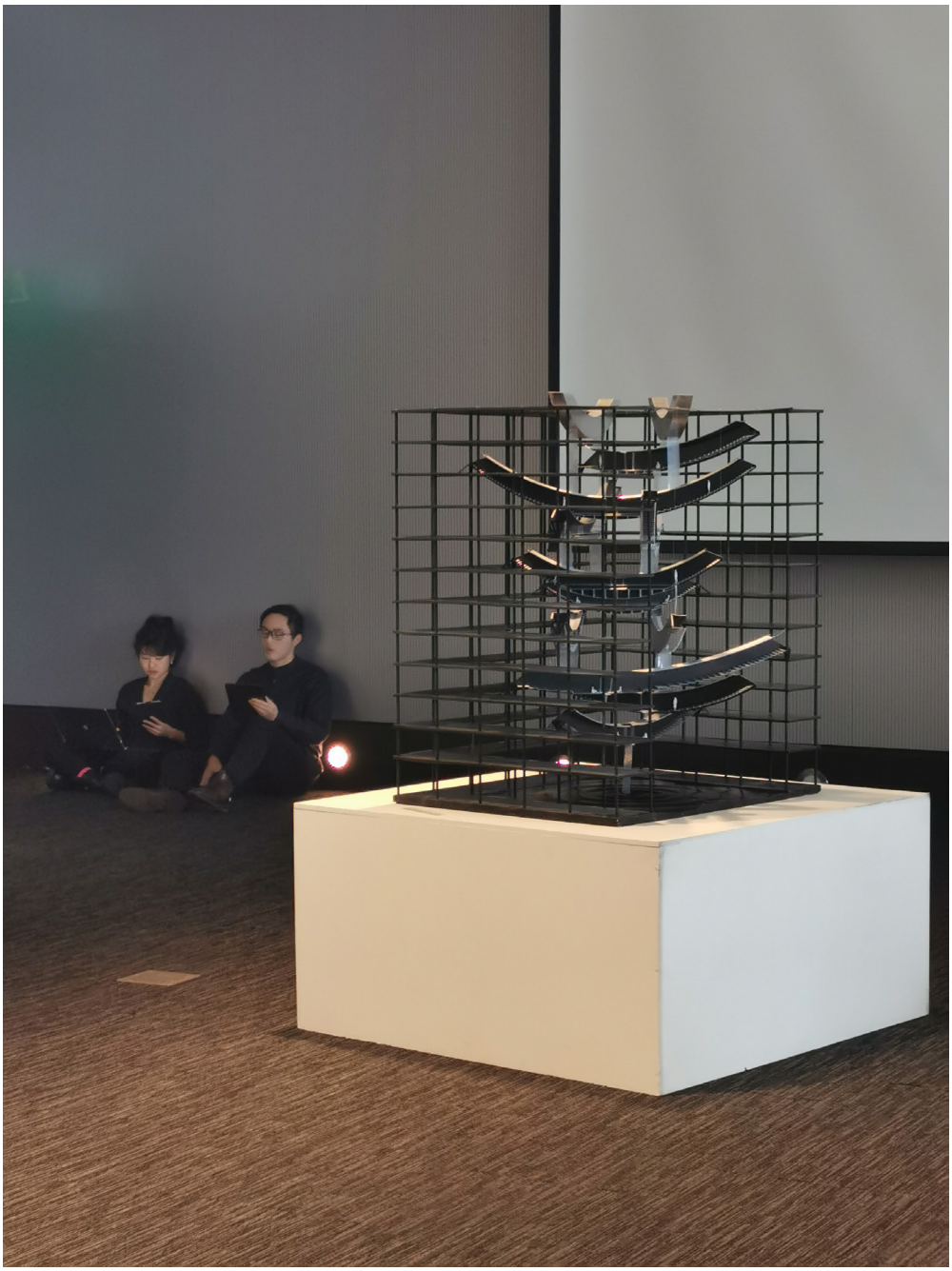


Figure 64. Final Presentation

Figure List:

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