Pearson

GCE A Level

Art and Design

Three-dimensional Design Component 1

Leon

Total Mark 81 (67 + 14 PS)

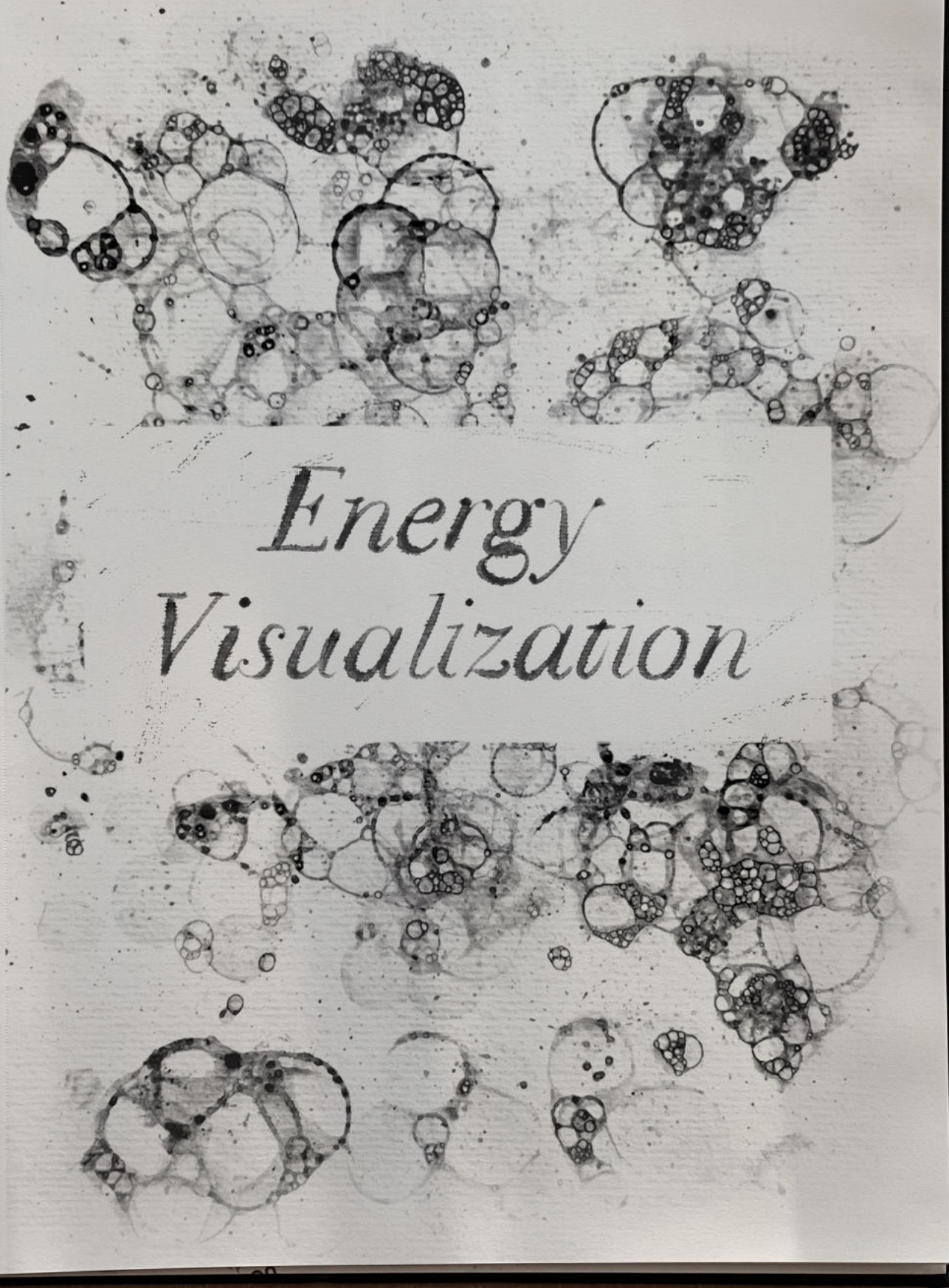
	AO1 Develop	AO2 Explore and Select	AO3 Record	AO4 Realise	Personal Study
Mark	**17**	**17**	**17**	**16**	14
Performance Level	**6**	6	6	6	5
				Total out of 90	**81**

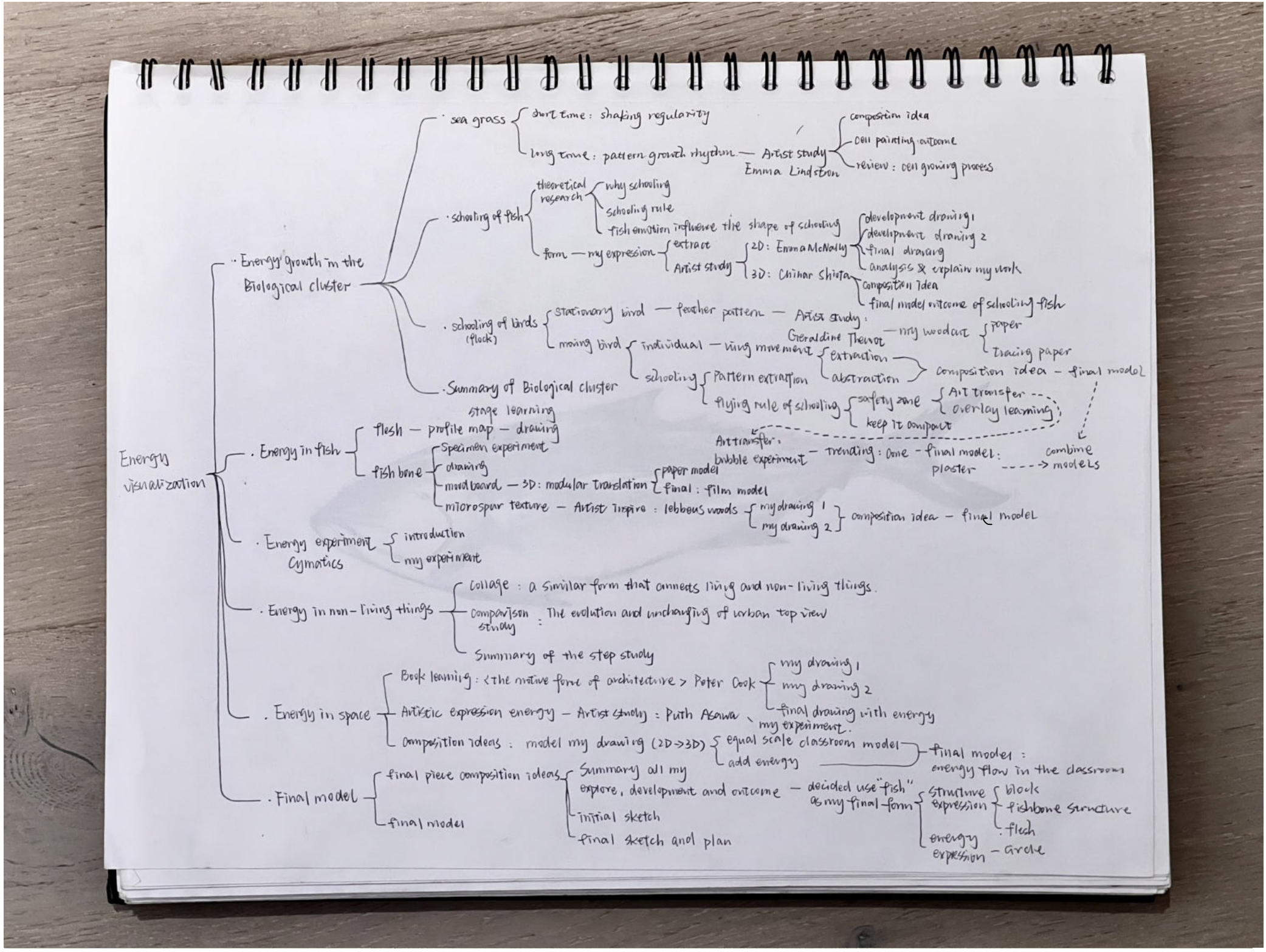
Pearson

Examiner Commentary

There is a self-evident ‘wow’ factor to Leon’s project, which explores movement in nature. His images of shoals of fish and flocks of birds demonstrate genuine discovery, adventurousness, and a fluent control of the formal elements to an exceptional degree of maturity. Leon’s observations of nature in many forms and subsequent experiments with formal and abstracted properties are uniquely skilled and show authoritative control of the formal elements. His contextual research bringing together both eastern and western traditions of thought and is informed and full of insight, whilst also being intuitive and surprising. This is a genuinely inspired project that comfortably reaches into the exceptional Performance Level 6 level of attainment.

Leon’s Personal Study brings together many different strains of thought and ideas, with genuine originality and drive. It promises to be an exceptional piece of writing if ideas were developed with full depth, but suddenly tails off with a minimal conclusion, reaching mid- Performance Level 5.

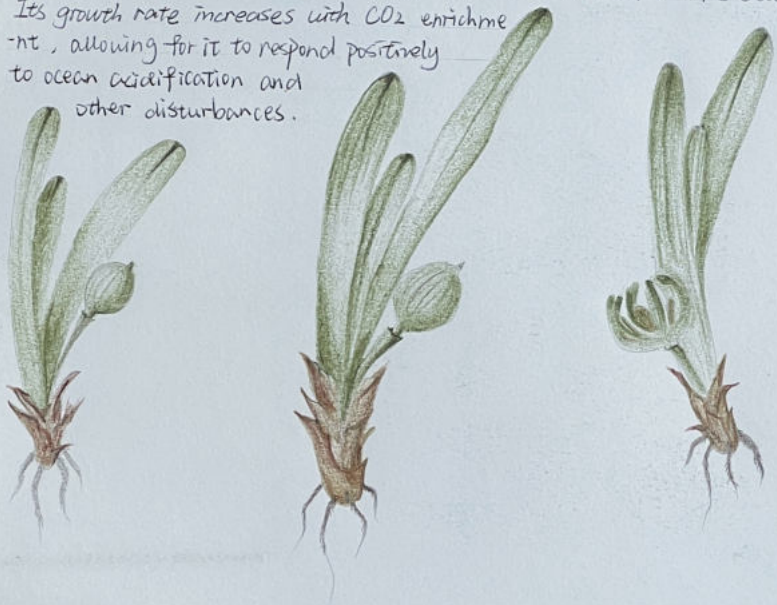

Energy
Visualization


Energy visualization
· Energy growth in the Biological cluster
· sea grass
short time: shaking regularity
long time: pattern growth rhythm — Artist study Emma Lindston
composition idea
cell painting outcome
review: cell growing process
· schooling of fish
theoretical research
why schooling
schooling rule
fish emotion influence the shape of schooling
form — my expression
extract
Artist study
2D: Emma McNally
3D: Chihar Shiota
development drawing 1
development drawing 2
final drawing
analysis & explain my work
composition idea
final model outcome of schooling fish
· schooling of birds (flock)
stationary bird — feather pattern — Artist study: Geraldine Theriot — my woodcut
paper
Tracing paper
moving bird
individual — wing movement
extraction
abstraction
composition idea — final model
schooling
pattern extraction
flying rule of schooling
safety zone
keep it compact
Art transfer
overlay learning
· Summary of Biological cluster
· Energy in fish
stage learning
flesh — profile map — drawing
fish bone
Specimen experiment
drawing
mood board — 3D: modular translation
paper model
final: film model
microspur texture — Artist Inspire: lebbeus woods
my drawing 1
my drawing 2
composition idea — final model
Art transfer: bubble experiment — trending: one — final model: plaster
combine models
· Energy experiment Cymatics
introduction
my experiment
· Energy in non-living things
collage: a similar form that connects living and non-living things.
comparison study: The evolution and unchanging of urban top view
Summary of the step study
· Energy in space
Book learning: <the native form of architecture> Peter Cook
my drawing 1
my drawing 2
final drawing with energy
Artistic expression energy — Artist study: Ruth Asawa
my experiment.
composition ideas: model my drawing (2D→3D)
equal scale classroom model
add energy
final model: energy flow in the classroom
· Final model
final piece composition ideas
Summary all my explore, development and outcome — decided use "fish" as my final form
Structure expression
blocks
fishbone structure
flesh
energy expression — Circle
initial sketch
final sketch and plan
final model

EXPLORE

Thalassia Hemprichii (Ehrb.) Aschers.

Thalassia hemprichii, called Pacific turtlegrass, is a widespread species of seagrass in the genus Thalassia, ~~hempri~~ native to the shores of the Indian Ocean, the red Sea, and the western Pacific Ocean. Its growth rate increases with CO_2 enrichme -nt, allowing for it to respond positively to ocean acidification and other disturbances.



Macro photograph of surface texture of seagrass.

Growth Cycle

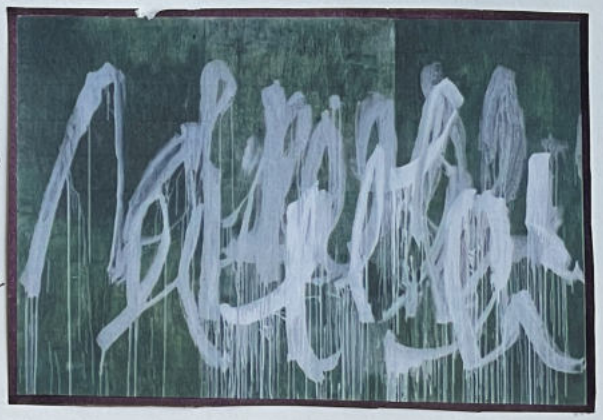
1 month → 2 months → 3 months → 4 months → 5 months → 8 month

Cy Twombly

〈Untitled〉 1986

〈distemper & chalk series〉 1968

Cy Twombly (1928 ~ 2011) developed a gestural vocabulary in which each line and color is infused with energy, spirituality, and meaning. Emerging as a prominent figure in the mid-1950s following extensive travels through Europe and North Africa, he produced works that are ~~ex~~ simultaneously personal and mythological, allowing narrative, language, and inner visions to erupt from his intimate, abstract notations.

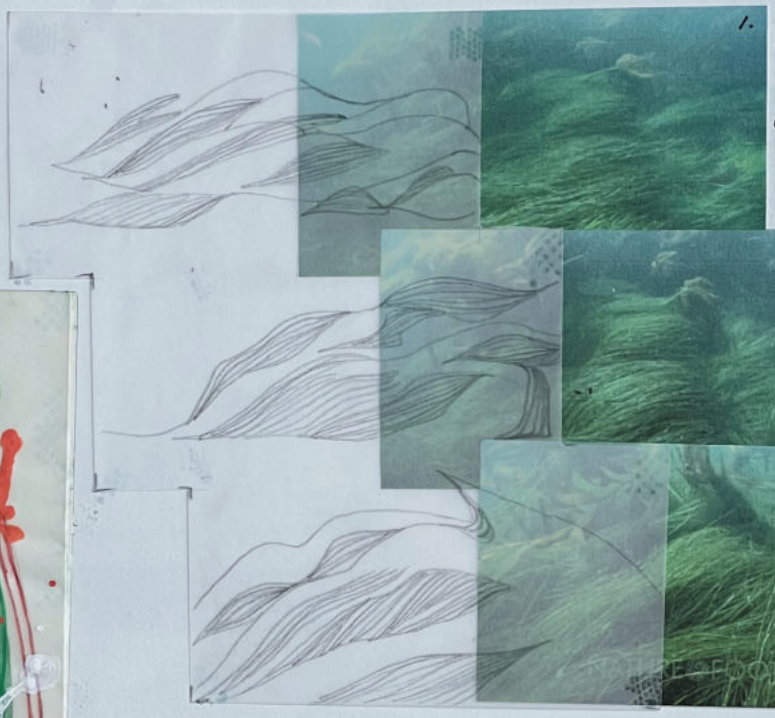


I particularly like the way the author expresses the chaotic flood of existing objects or images that the world offers. The familiarity of these objects is mystified by precise brushstrokes.

〈distemper & chalk series〉 1968

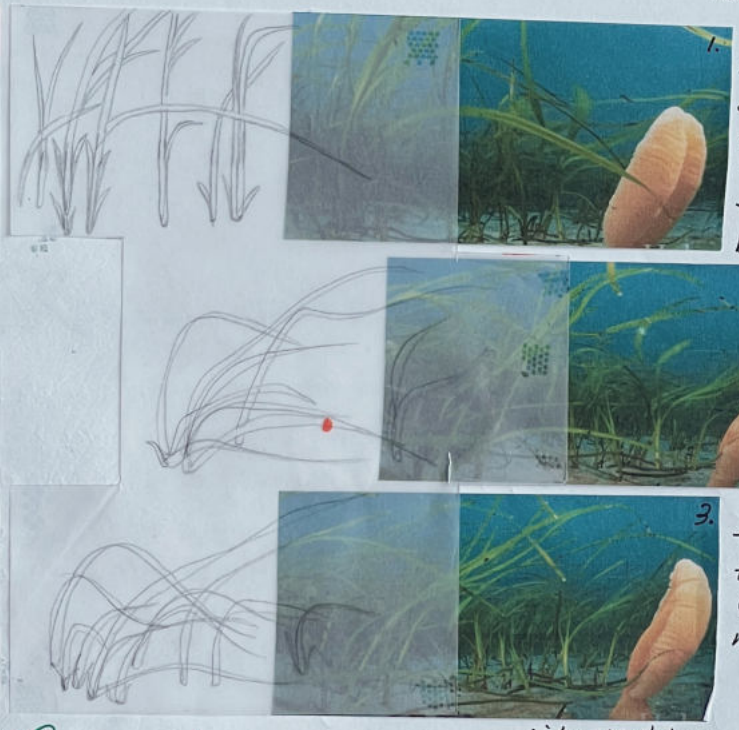
Artist Study · Experiment

Drawing



/A clump of seagrass fluctuates/ The mass of seagrass are pushed by the water waves, creating a continuous ripple. I record their textures and expressed them in the different lines.

video screenshots #1

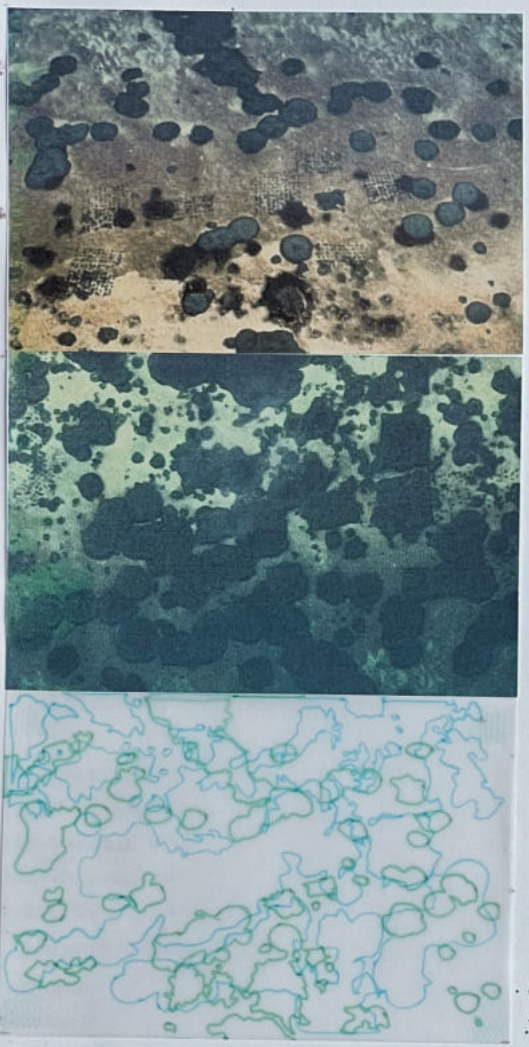


/A few seagrass sway/ I record their swaying gest-ures and tenden-cies. I find them bending from the head and eventuely to the root parts. The roots are hardest, so they alm-ost never undergo too much bending. while the head be-nds most noticeably.

video screenshots #2

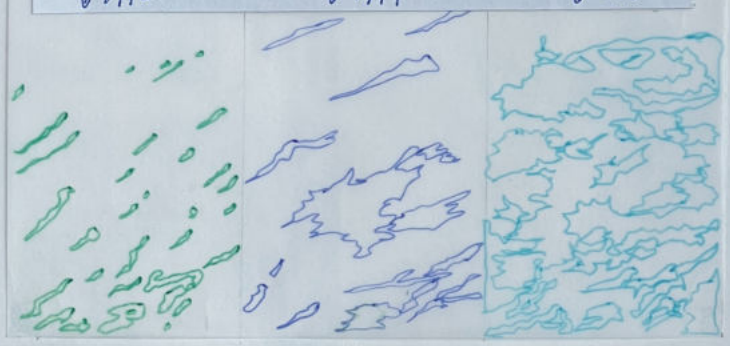
↖Summary of experiment:

"In the process of learning as an artist, I superimposed seagrass paintings of different materials. I controlled the movement of the paint and let the paint flow freely. The patterns presented let me feel the trend of swaying seagrasses, which is a kind of looming feeling."



The amount of seagrass increases over time. Visually, the seagrass increases in coverage and darkens in color. I even can see many layers.

↓ 1972 ↓ 1979 ↓ 2018



Thought Development

The high growth rate of seagrasses made me wonder, for example, why do they grow in such a pattern? Why do they extend according to such rules?

In drawing their boundary, I felt a tendency to grow. At the same time, their growth has a tendency of direction, which seems to be attracted by some kind of energy. This process of each small piece of seagrass extending from a separate individual to a whole area with another small piece of seagrass inspired me. I extracted two different growth patterns of seagrass from various kinds of seagrass, round and long. The growth pattern of round seagrass mounds spreads more evenly from the center of circle outward. The long stripes, on the other hand, clearly have a collective growth direction. I wonder if it is possible to simulate this growth process, rather than just a growth result?

I think of the diffusion of paint, which makes me think of wet painting and fluid painting. They should be able to represent a fluid process well.

series; 100

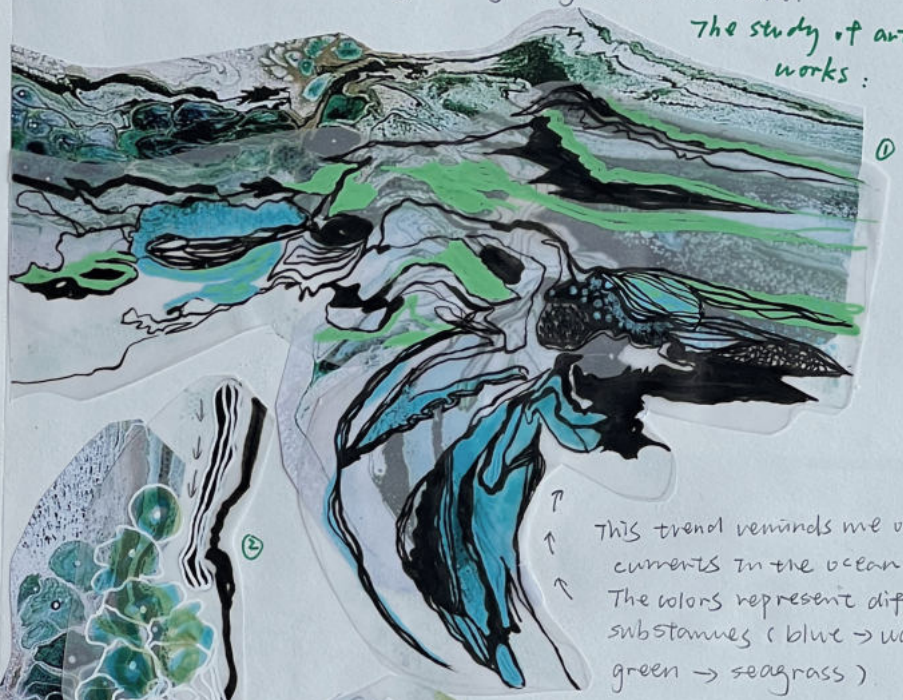
ARTIST STUDY

Emma Lindström

Emma Lindström. Artist born in 1989. Lives and works in Gothenburg, Sweden.
The major theme her pursuming in her work is energy. She wants to somehow make visible the creative energy that operates in the unknow and unseen, but ~~built~~ binds us all together. "By letting go of any preconceptions and through processes when I creat, I allow myself to become a mediator of this life giving force. How it express itself in my work is however a very subjective matter. One viewer might see something resembling the universe as seen through a telescope, and another something that can be found in a lab, under a microscope. No matter what you see through, it's more important what you feel. Because that feeling, I believe, is a response to the energy that radiates from the artwork, part of the same energy that flows through me when I create. What can be seen and felt in my artwork are ultimately just different expression of the same thing, of the same creative energy, and it's this connection I want to convey through my work." She said.

<KAOHILA II> 1.5m * 1.5m

The study of artists' works:



<CALEIIHA IV> 1m*1m

This trend reminds me of currents in the ocean.
The colors represent different substances (blue → water, green → seagrass)

<IVAYIIAH VII> 1.95m * 1.95m

These layers of paint have a tendency toward direction, which is achieved by tilting.

I decided to create this circular pattern to represent the round seagrass.

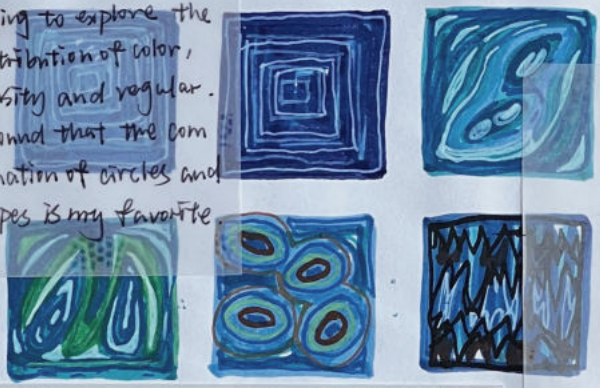
! white color is important

planning to experiment:
① color study
② pattern study
③ tendency design

experiment preparing

In the color experiment, I try to superimposed different colors and covered them with surfric acid paper, trying to find the best color combination to express: the texture and trendency of seagrass, seawater, mud, etc.

I draw some patterns, trying to explore the distribution of color, density and regular. I found that the combination of circles and stripes is my favorite.



<sea grass & mud>

This set of color is extracted from a photo of seagrass, expressing the top view of mud and seagrass mixed together. I want to use it directly translate its graph. so I want to creat circular patterns.

<fresh seagrass>

I use this group of green to express the pure seagrass, and I add the motiveth of the surface of seagrass to try to express its twisting.

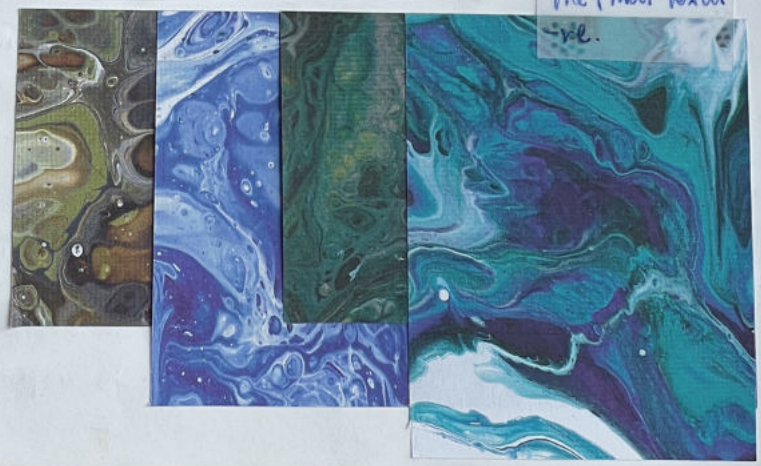
<sea water>

I use this group of blue to express the pure seawater. The color of the rich used to express the depth of water and white part is the waves.

<seagrass & sea water>

I found that the combination of dark blue & grass-green can creert a mysterious vibe (like the seaworld). Especially the green with peak green makes me can't distinguish that it is water or plants.

Screenshot of the final texture.



process

TECHNIQUES 1:

STEP 1: The canvas is first covered with a layer of white fluid paint.

STEP 2: Cut the bottom of a plastic bottle and place it on a drawing board. Pour different colors of paint (pigment mixed with glycerin) into the plastic bottle. Without stirring, lift the plastic bottle and move it.

STEP 3: Repeat STEP 2 for many times to fill the canvas.

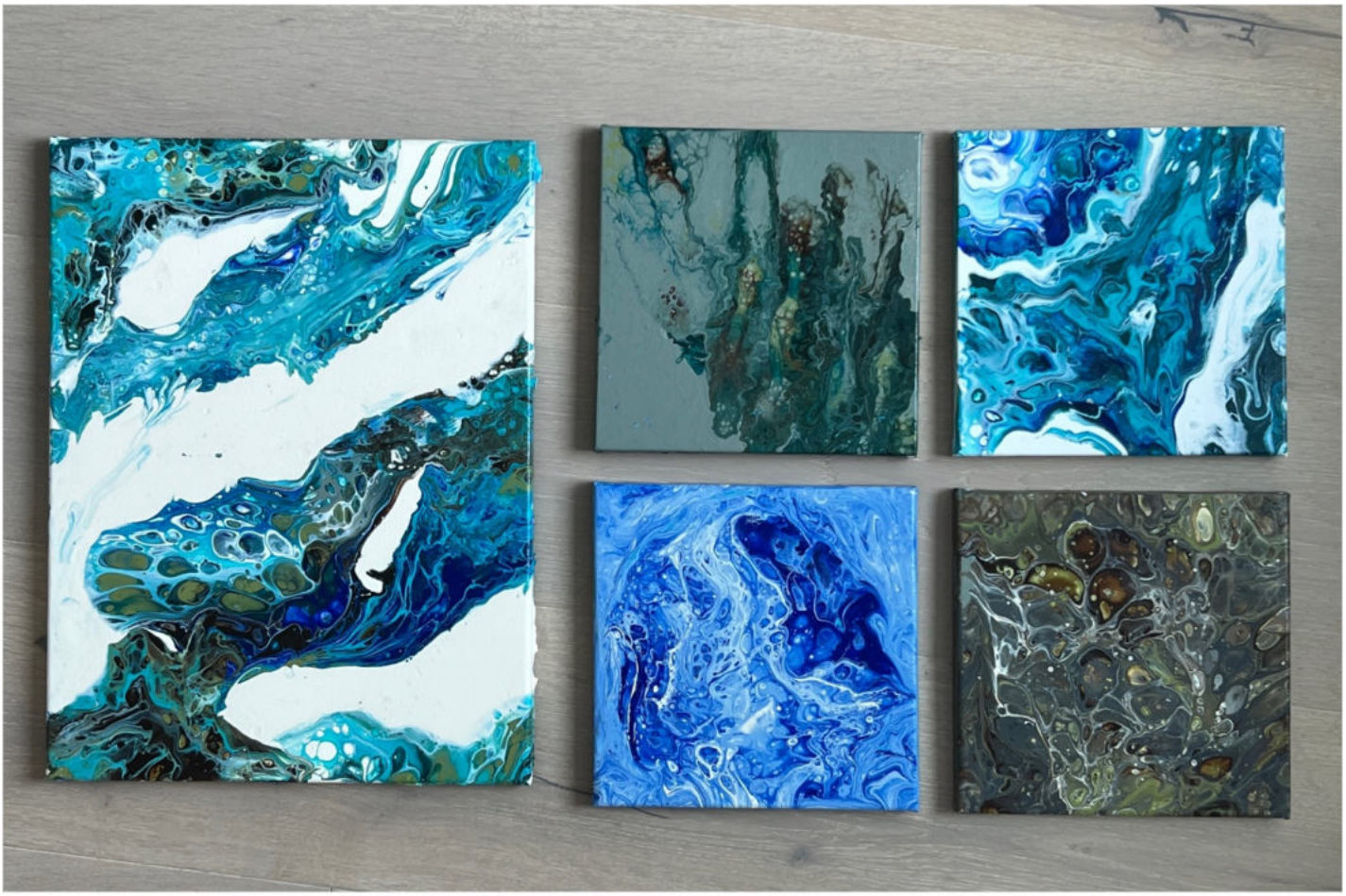
STEP 4: Manually add white paint so that the thickness of the paint is equal.

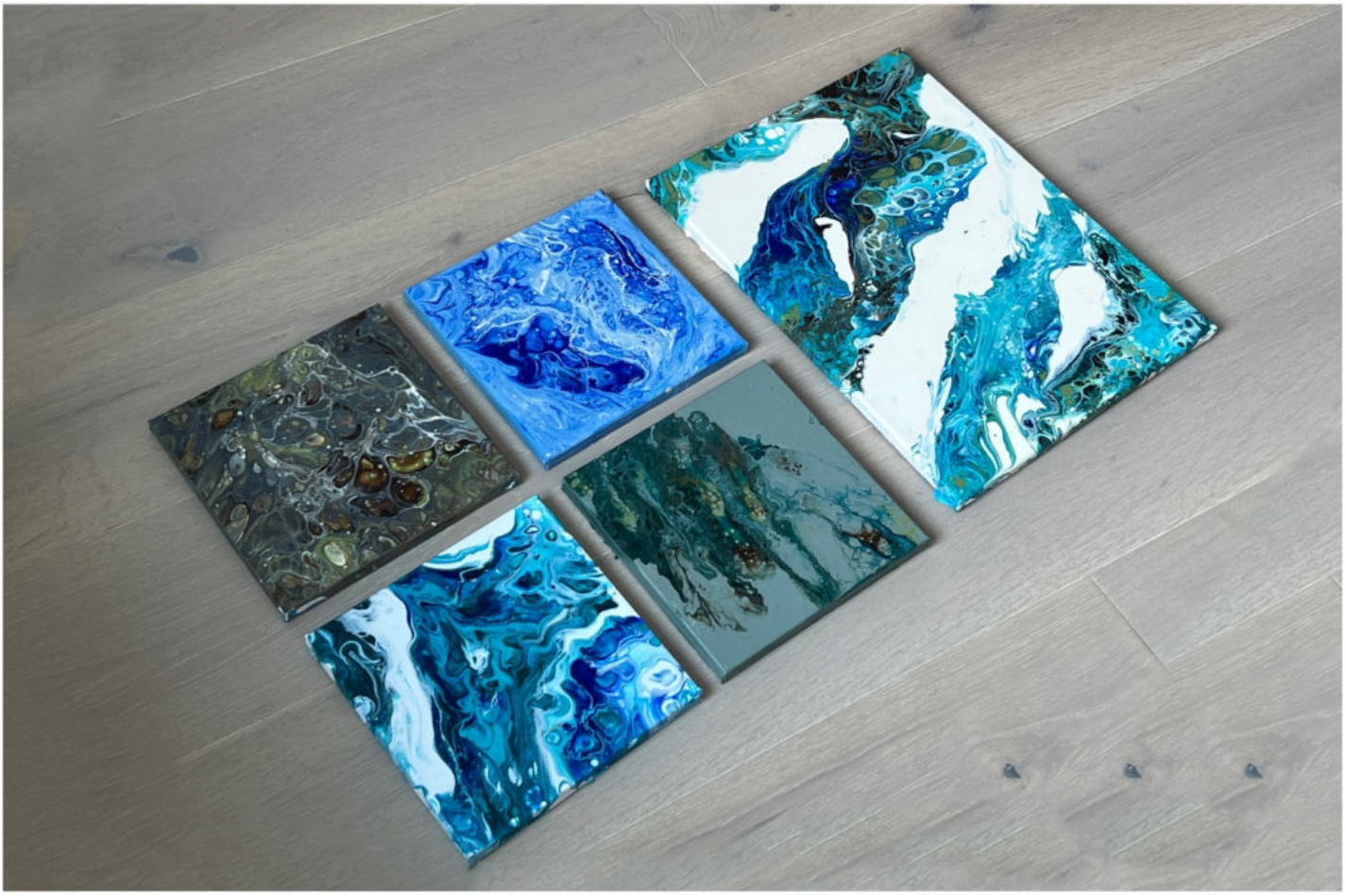
TECHNIQUES 2:

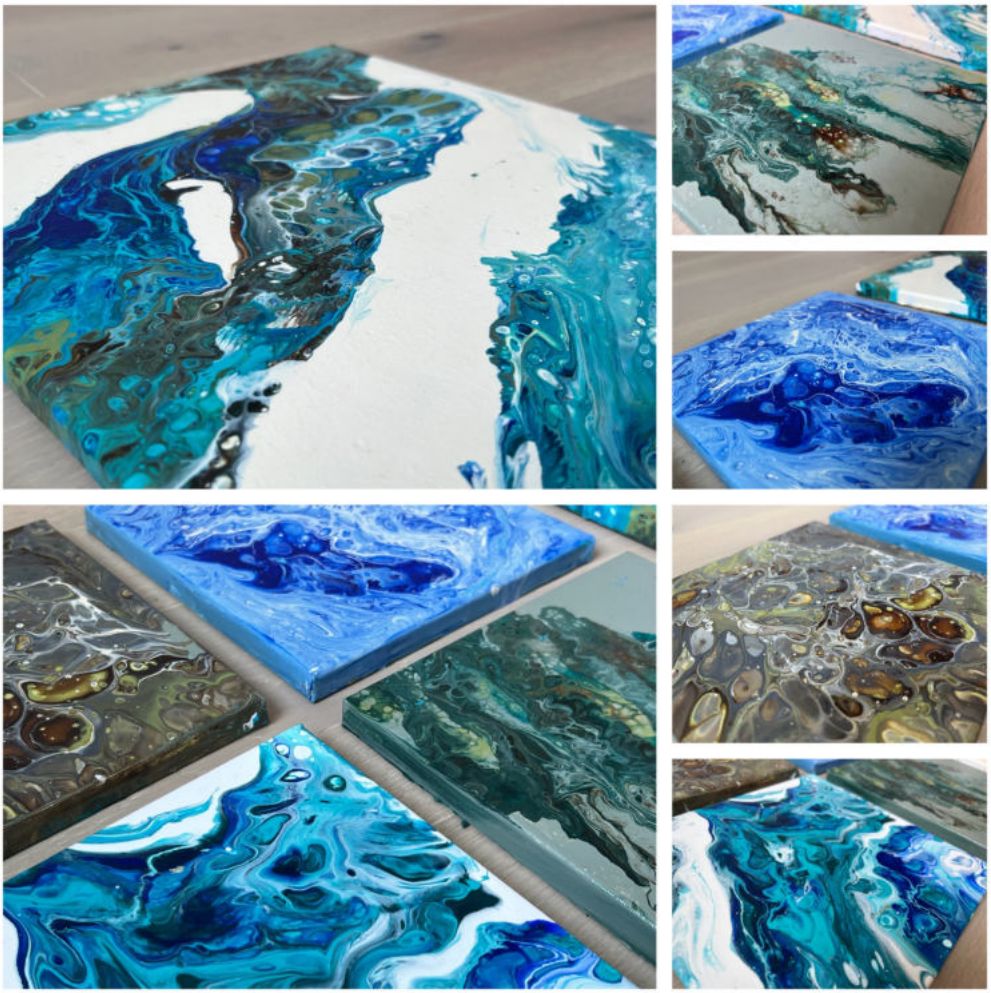
STEP 1: After pouring the different colors directly into the paint, below paint with a hair dryer to make it flow.

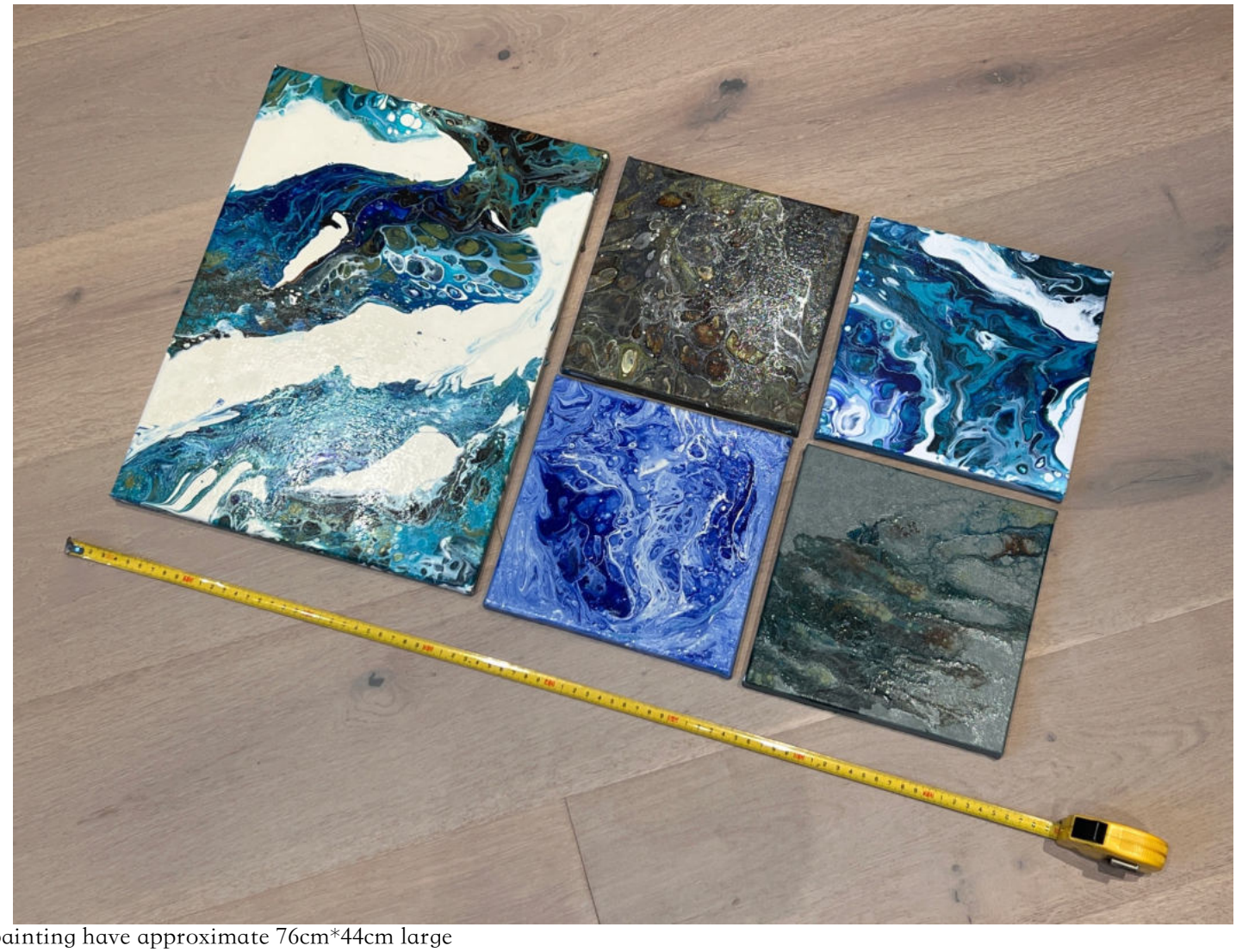
STEP 2: Change the position of the hair dryer so that the paint flows out in different patten.

My feeling: Using a hair dryer is even more difficult to control because of the volume of air. At the same time, sometimes when the wind blows in the other direction, the pattern you (I) just like will be blows in the other direction, the pattern you just like will be blown away. It's possible that the next second you blow a better pattern than the last time. This unknow process fascinates me.









All painting have approximate 76cm*44cm large

Analytical Cell growth

⇒To explore the relationship between the change of cell pattern and the growth of seagrass colonies. I selected the one most similar to the top view of seagrass for analysis.

Cell paintings & seagrass have a highly similar about be summoned by some energy to form a pattern.

⇒<Drawing process explanation>:

Here I used acrylic markers and watercolor pen to depict how the cell patterns grow. During the painting process, I realized that it is better to base the watercolor on the backside and then ~~prove the edge~~ stroked on the front.

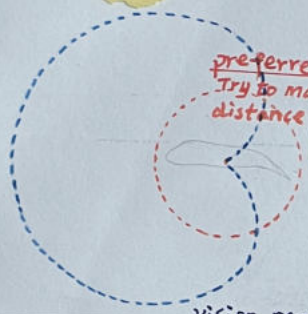
I recorded it by video, and started to find the regularity...

⇒<My discovery>:

Here, I recorded how the cells spread during the painting process according to the changes in time. I have taken the more classic part of it. They do not only happen to extend evenly on the axis of center of circle, some of them change their shape, some fuse into one, but their wrapping relationship must not disappear. For example, no matter how big the green cell is, the brown pigment will always wrap around them.

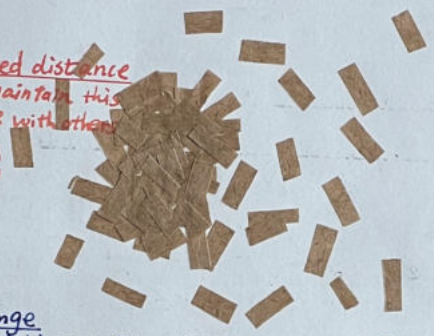
Schooling fish

EXPLORE

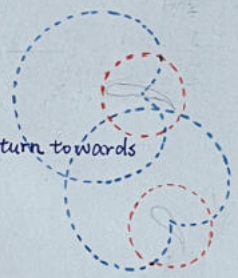


preferred distance
Try to maintain this distance with others

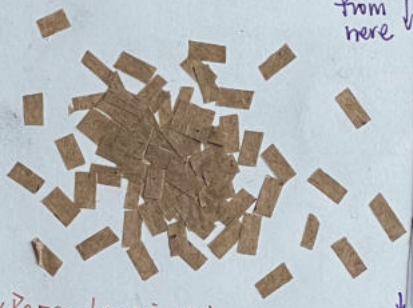
vision range
Can seen neighbors inside this area

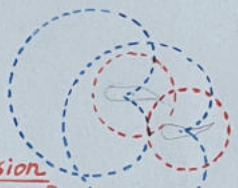


open from here ↓



Detected!
separate & turn towards other

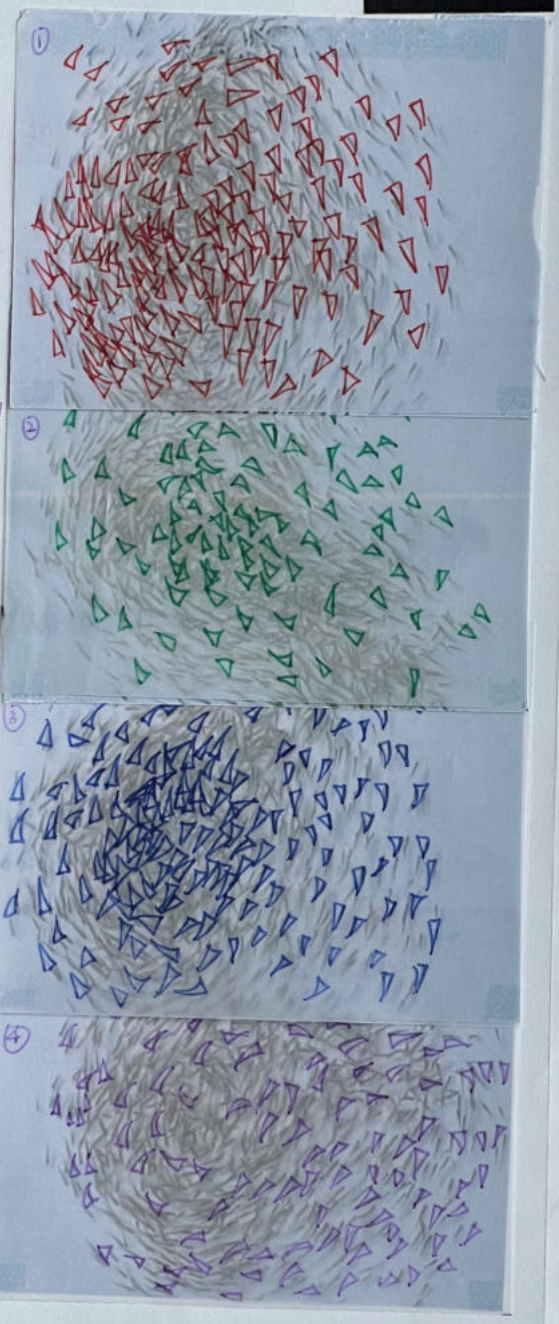


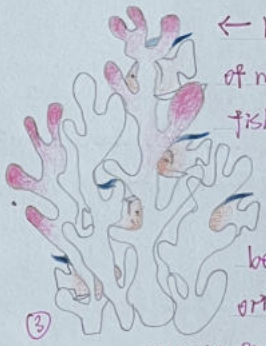


Repulsion
decelerate & turn away.

<Paper Learning>:
I used some small pieces of paper to simulate fish. Stacking them together to simulate school of fish. This is not like (not the same process) as directly tracing them. I start with one fish on white paper and stack them one on top of the other to render the final form. I create a school of fish by choosing a position for an individual fish. I can understand them in a deeper way.

Trace the schooling fish
find their density and trends →





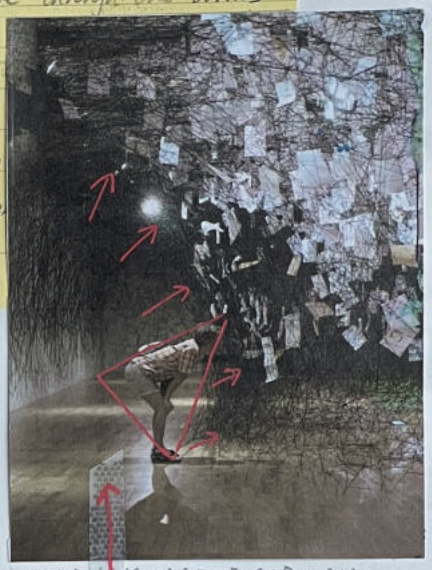
← Here I summarise the pattern of movement in small schools of fish: they all tend to observe the external environment (water wave, enemies...) but each collective displacement originates with one fish, which reacts first and several others follow him.

ARTIST STUDY

Chihar Shiota

〈 THE LANGUAGE OF GOD 〉 2020

Chihar Shiota born in Osaka, Japan (1972). Confronting fudamental human concerns such as life, death and relation-ship, Shiota explores human existence through out various demensions by creating an existence in the absence either in her large-scale thread installations that include a variety of common objects and memorab-ilia or through her drawings, sculptures, photography and videos.



〈 THE LANGUAGE OF GOD 〉 2020

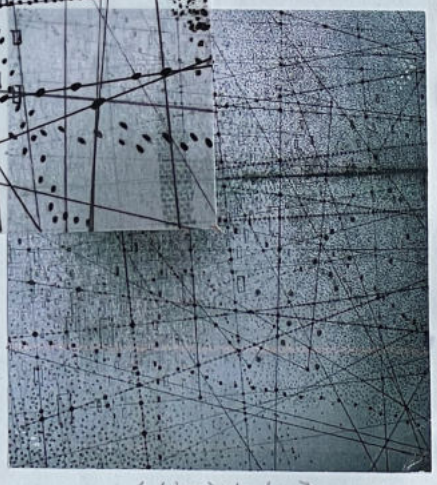
〈 THE LOCKED ROOM 〉 2016

Black parts have a tendency to avoid.

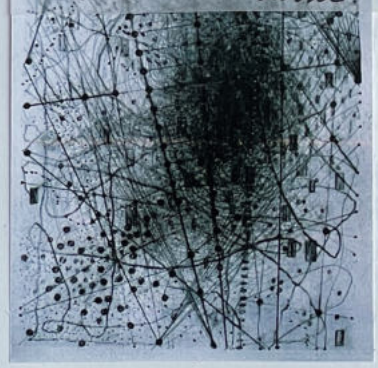
Emma McNally

Emma McNally is a British artist who was born in 1969. Her work is an artistic cartography of imaginary nodes, network topologies, noise patterns, musical notations.

Traces and scatters shape an imaginary, poetic confluence of scientific advances in genetics, neuroscience, physics, molecular biology, computer systems, and sociology.



〈 Untitled 〉 Drawing



〈 Untitled 〉 Drawing

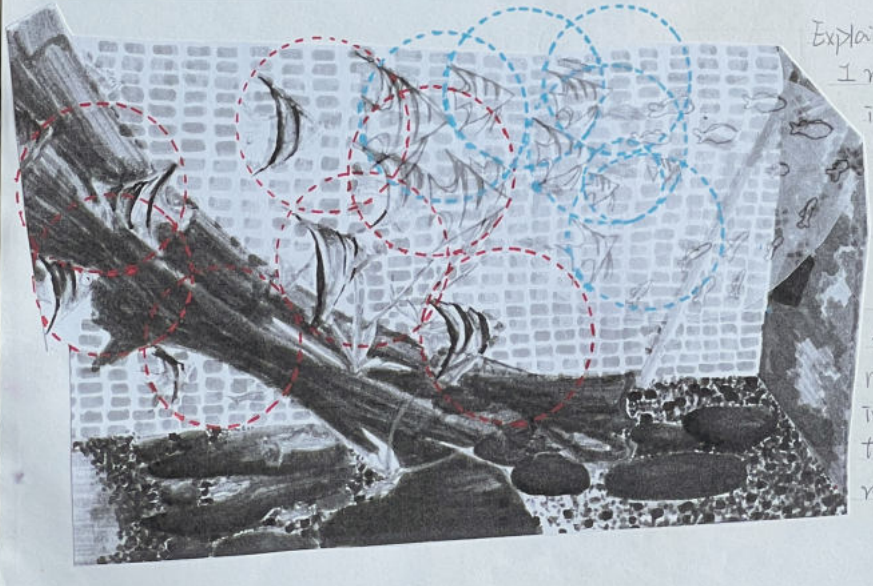
Why do schools of fish swim in harmony?

- There are front and back rows of fish. As the school swims, the fish in the front and back rows change their direction at regular intervals.
- Because the fish can swim with less effort. When the fish swim forward, the fish in the front row drive the current and the fish behind them can easily swim forward with the current without expending too much energy in their bodies, amidst the current driven by the fish in the front row. The fish in the latter rows all swim forward easily under the impact of the current generated by the fish in the front row. This is the intelligence of the fish.

How do schools of fish swim harmony?

Each individual fish just follow two basic rules:

- Stay close, but not too close to your neighbor
- Keep swimming



Explaination of my drawing:

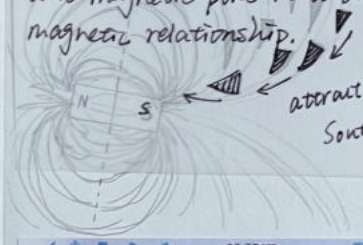
I recorded a group of fish swimming in a school, which include three different species. I superimposed their movement and used different colored circles to represent the extent of their territories. For me, the circles are non-directional shapes, so they represent a snapshot of a moment without any tendency to move in the next second. In this second, the fish's decision is fixed and I record it.

"1. Reaction to the hand." EXPLORE

After my time with fish, I have found that they react differently to my hands. For example, These two kinds of fish were attracted to my hand and they swam towards to me.

And this school of fish avoided my hand as if they had seen a terrible enemy. They changed their original path and kept to a specific distance from my hand.

This relationship between the fish and my hand reminds me of a magnet. We are like objects with their own magnetic poles in a different magnetic relationship.



attracted by South pole.

"2. Fish can have different 'moods'." EXPLORE

"LAZY":

The fish swim very slowly, they were orderly and no one fell out of line. They were relax with the ~~the~~ safe environment.

"NORMAL":

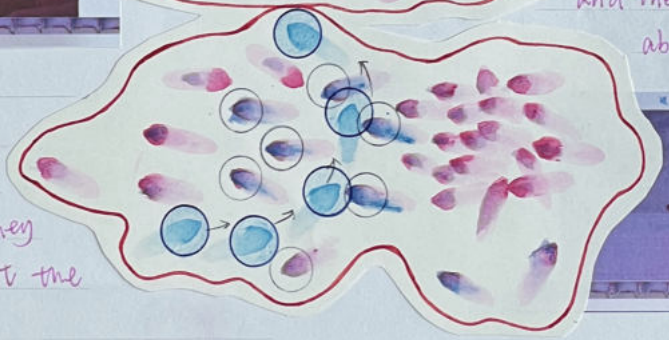
They swam relatively slow, with a few fish dropping out.

"EXCITED":

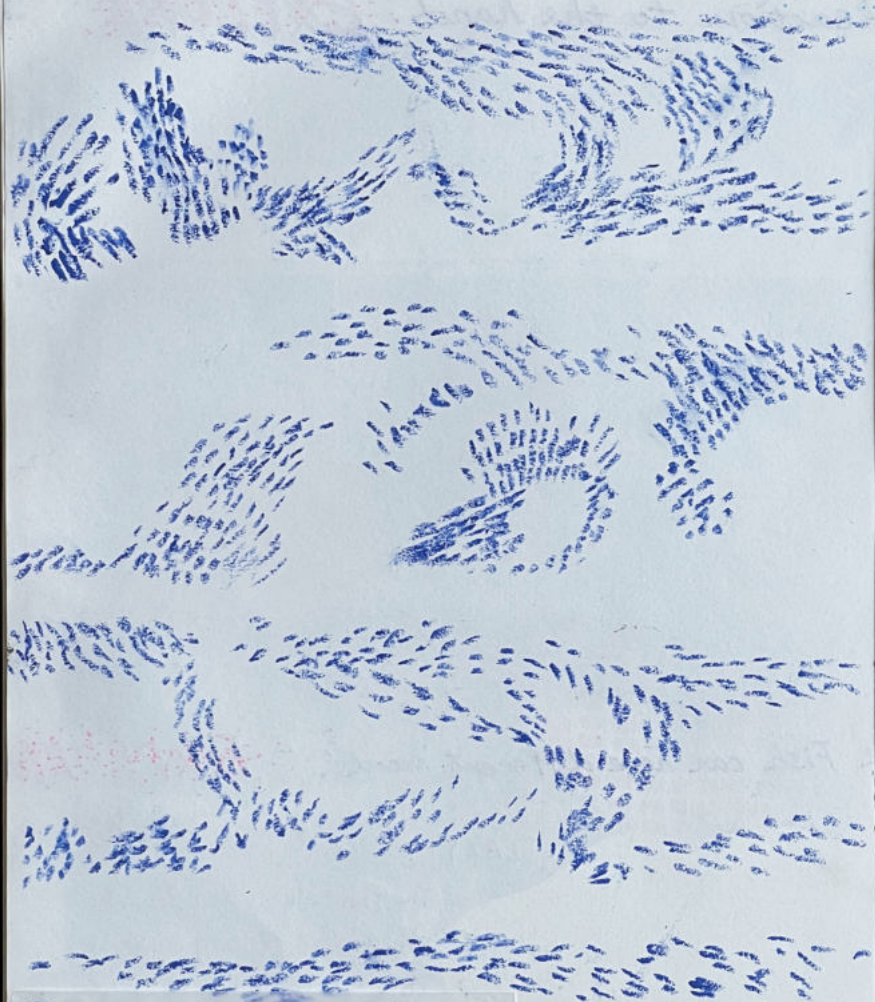
The fish became faster, the schools become denser and they become nervous about their surroundings.

"NERVOUS":

The fish became extremely fast and some of them are particularly nervous, so they swam around and disrupt the regular line (team).

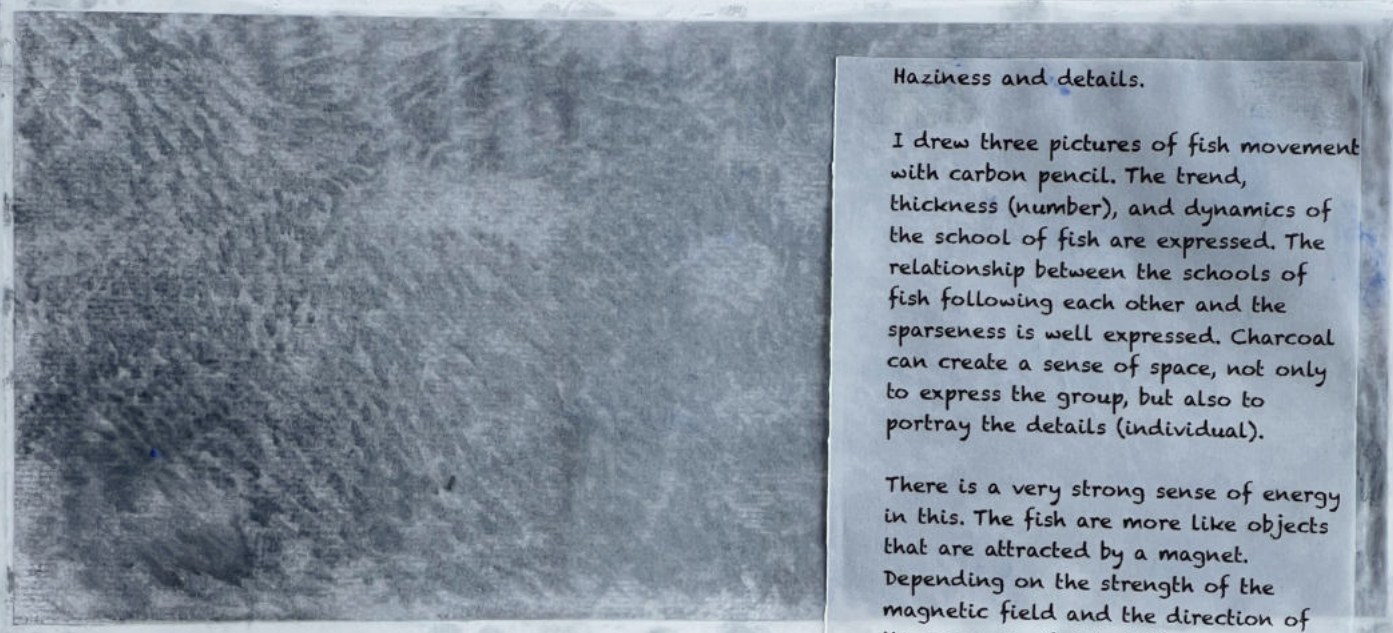


EXPLORE



Inspired by this video:

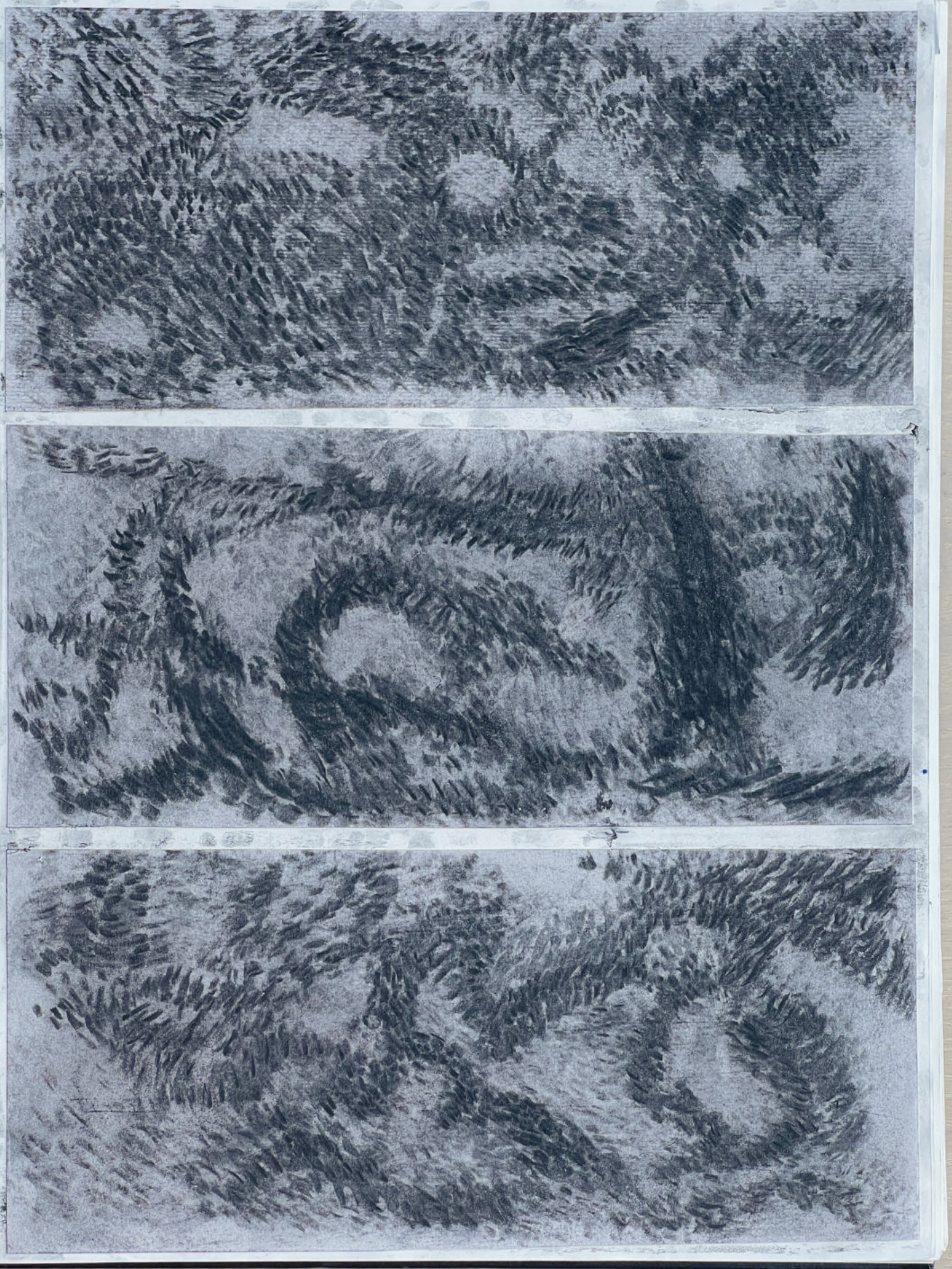
This is a group of fish in motion that I really like. The fish in the paricture are trapped in a rectangular tank but still swim in a cluster. Therefore they are very dense, with fish in different directions stacked on top of each other, creating a special pattern. The group of fish on the left side collectively stick to the glass and swim upstream. We can clearly see their heads are round in shape. The group of ~~shi~~ fish on the right swam collectively to the left, and I could clearly see the side of the body. They swim quickly throughout the tank, showing a very strong vitality, as if brewing a great ever ~~a~~nd as if controlled by a great ener~~y~~.



Haziness and details.

I drew three pictures of fish movement with carbon pencil. The trend, thickness (number), and dynamics of the school of fish are expressed. The relationship between the schools of fish following each other and the sparseness is well expressed. Charcoal can create a sense of space, not only to express the group, but also to portray the details (individual).

There is a very strong sense of energy in this. The fish are more like objects that are attracted by a magnet. Depending on the strength of the magnetic field and the direction of the magnetic field, different looks are displayed.



Explain my work

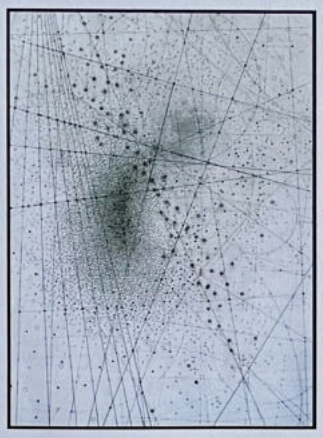
This page serves as a developmental process for the artist to learn.

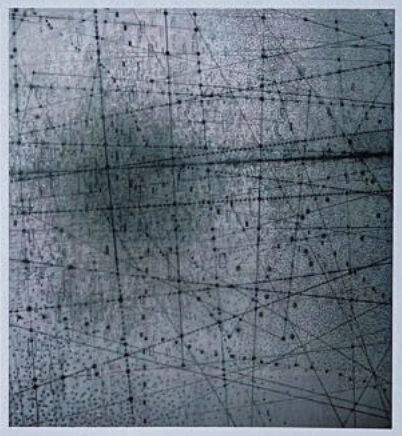
Part I: Extraction of information from the diagram. The main trend of the school of fish is represented by me in a rectangle. The rectangle can express the sense of direction and trend. The dotted line then expresses the bathtub. Because the sense of boundary of the bathtub brings me a sense that I can I can get away from it.

Part II: Translating the atmosphere of the diagram. In the previous step, I discovered the "magnetic information" of the fish through observation. I thought: What would the energy field (magnetic field) around the fish be like? I wanted to express this hazy, uncertain feeling. I chose oil stick because it can express the color and haze. I extended the heads and tails of some fish trends, using charcoal to express the extension and oil stick to express the envelope of energy. Finally, I also added some monotypes, which are small specks. The small spots are expressing the miniature of the school of fish.

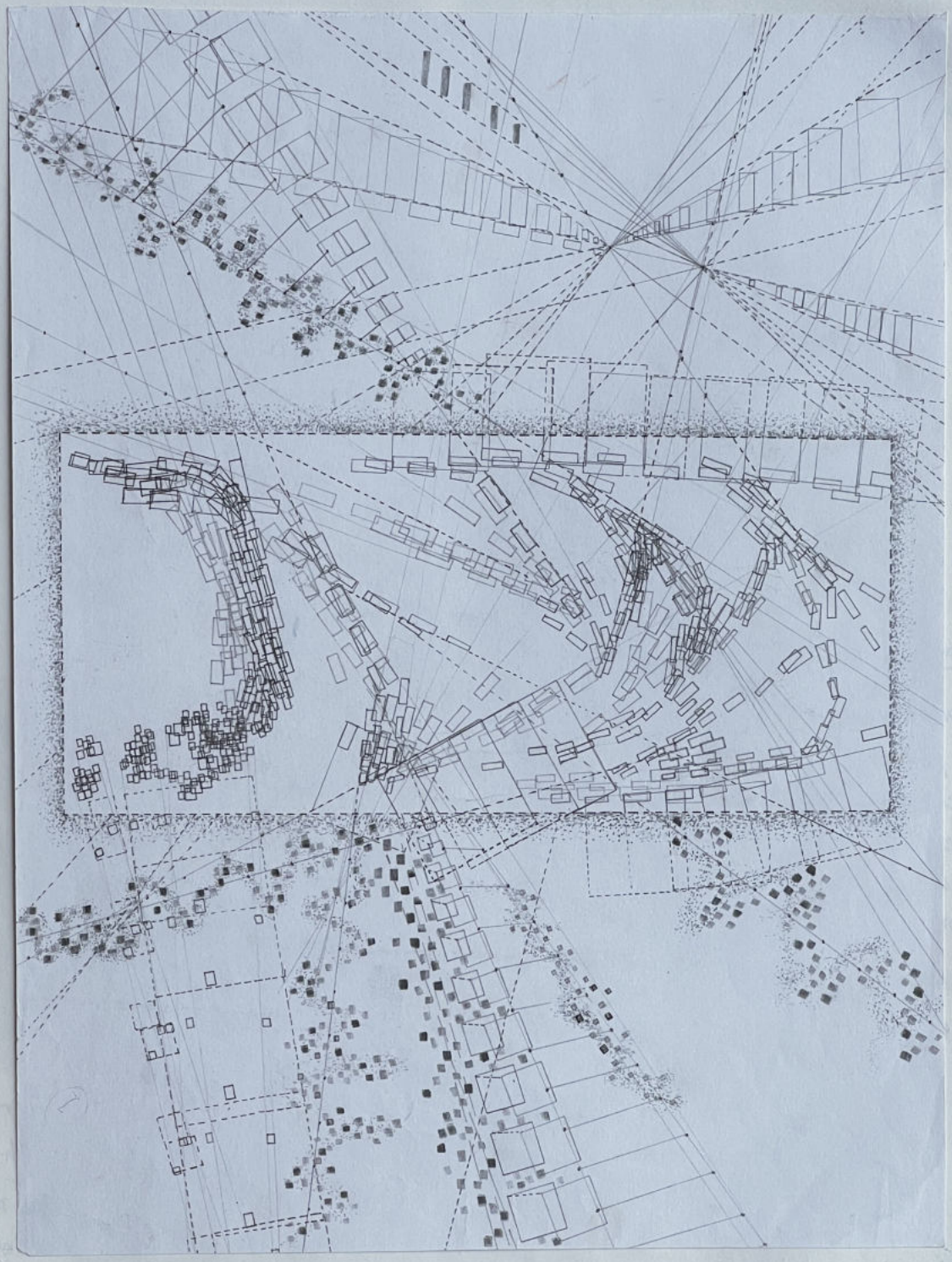
Part III: Learning the artist's expression technique. After the abstract treatment in the first two steps, I made my feelings more clear. I tried to express the energy field of the school of fish with lines like an artist. I used solid lines for the extension of the school of fish, dashed lines for the trend of the school of fish, and two lines connected with horizontal lines for the area enclosed by the school of fish, etc.

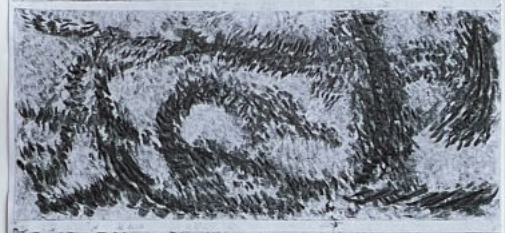
Artist Emma NcNally's work expresses energy fields. She uses a lot of lines and points to create three-dimensional spaces, using seemingly chaotic elements to express a strong logic. Some of her works have a sense of spatial overlap, that is, they use straight lines of multiple latitudes to build three-dimensional but uneven spaces. The inclusion of nodes in them represents a sense of scale, like the scale on a straightedge. She sometimes uses the same elements to express different content, which is controlled by changing the size of the elements and the intensity of the colors.

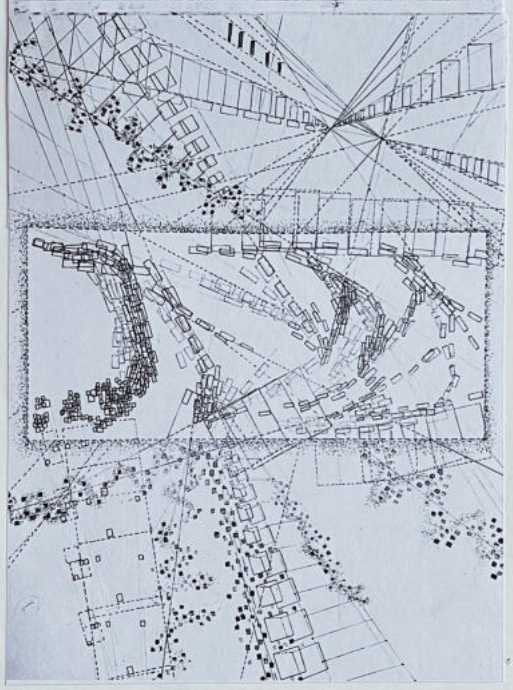




FINAL DRAWING OF SCHOOLING FISH

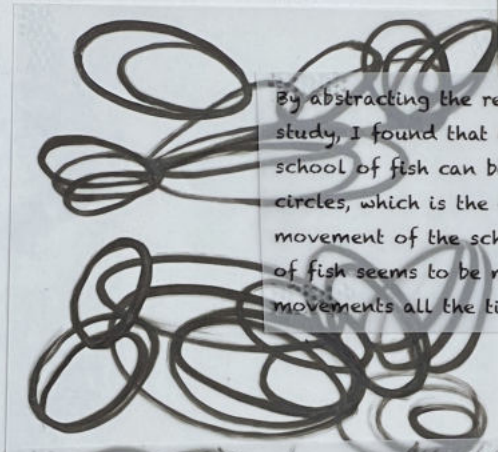






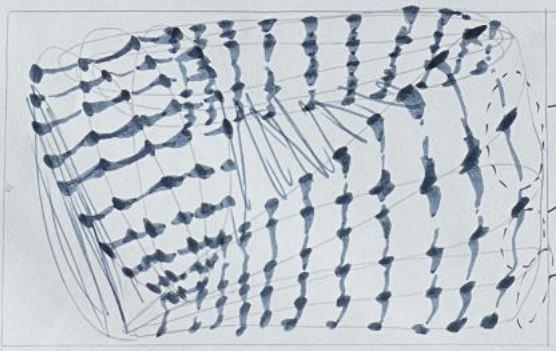
COMPOSITION IDEAS

By abstracting the results of my previous study, I found that the movement of the school of fish can be reduced to some circles, which is the framework of the movement of the school of fish. The school of fish seems to be making swirling movements all the time.



process recording :

I finally decided to use wire to express the frame of the fish movement, and a black hot melt glue gun to express each fish. Because I found that the hot melt glue gun has the characteristic of pulling wire, I wanted to use the pulled wire to express the energy between the fish, or to express the relationship between them. After making the big frame, I added some small units to fill up the inside of the model, hoping that the fish would be more abundant.



*My sketch.

→ the small unit is the individual fish.

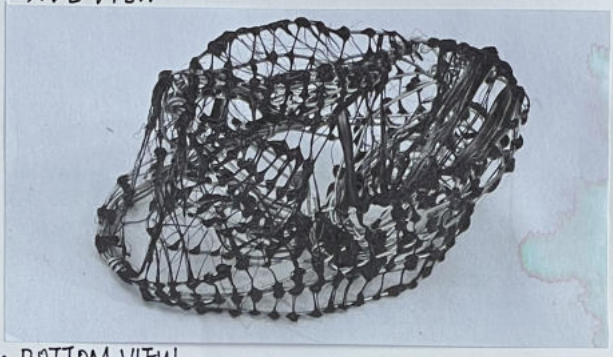
→ the relationship between the fish.

→ the main structure of school of fish.

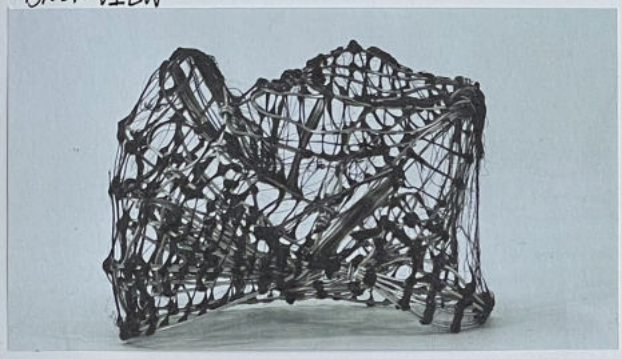
MODEL - SCHOOL OF FISH

· FRONT VIEW

· SIDE VIEW ·



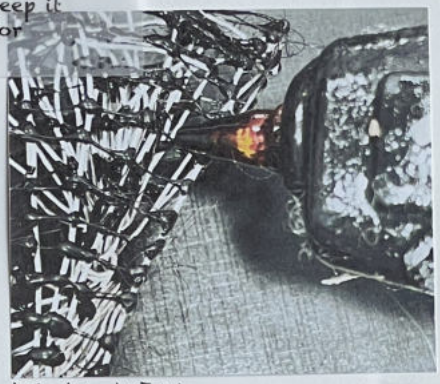
· BACK VIEW



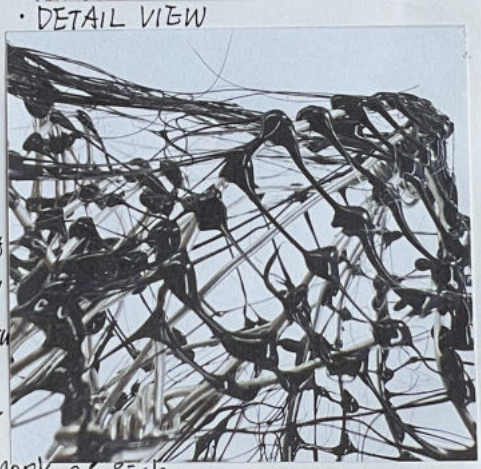
· BOTTOM VIEW

My summary:
In the conception of this model, I first translated a piece of material I collected, and then made the plane output of the first part into a solid model. Such repeated abstraction and transformation process made me have a deeper understanding of a picture.

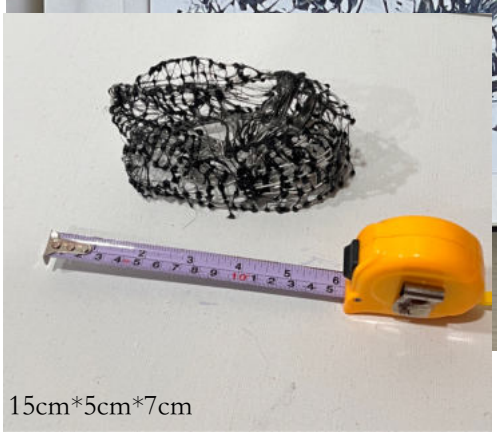
The hot melt glue gun was heated and cooled repeatedly to keep it at the easiest temperature for drawing.



· DETAIL VIEW



Explanation of the photo:
pulling the exposure to the maximum while taking photo allowed the wire part to disappear. so only the fish were left in the picture. This is highly similar to real photo of schools of fish.



Flight of the starlings

EXPLORE

Explaination of my work:

I used woodblock prints to depict the plumage pattern of the starlings. I started within individual birds and try to find commonalities between individual and collective. I noticed that white spots looked similiar to the flock...

Géraldine Theurot

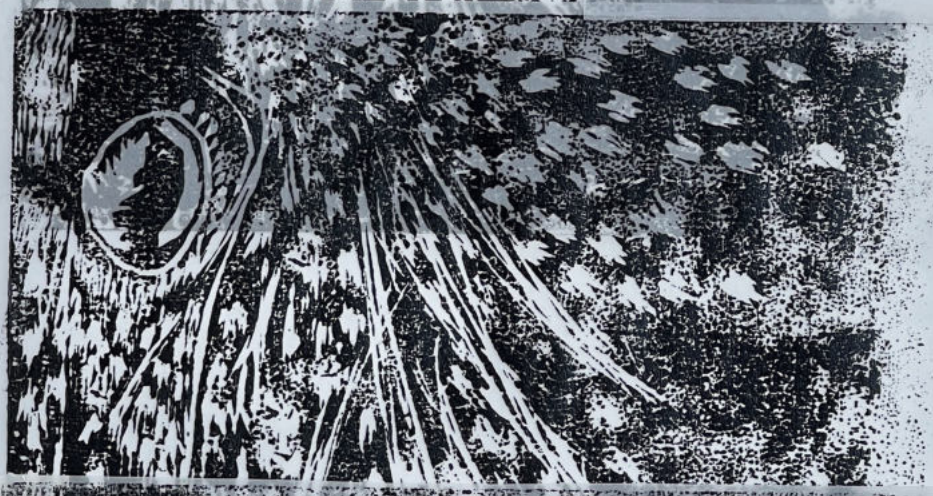
She was born in Besançon (Dubourg) in 1972. Working for oil paint engraving create. She believes that the artist cannot be reduced to a single facet. She does not believe that creativity is static. She wants her freedom as an artist, regardless of what people think, and she refuses to be a slave to habit and a single technique. This painting inspired me and I thought I could express the pattern of the bird's feathers by carving it.

<Linocut, oil paint engraving>
2015

DEVELOPMENT

I make prints on sulfuric acid paper and adjust the amount of printing ink. The pattern of the flock of birds was deepended by the pattern of printing ink. With the change of density and depth of the pattern, it was as if I saw the flight of the flocks of birds. I was interested in the development of this step.

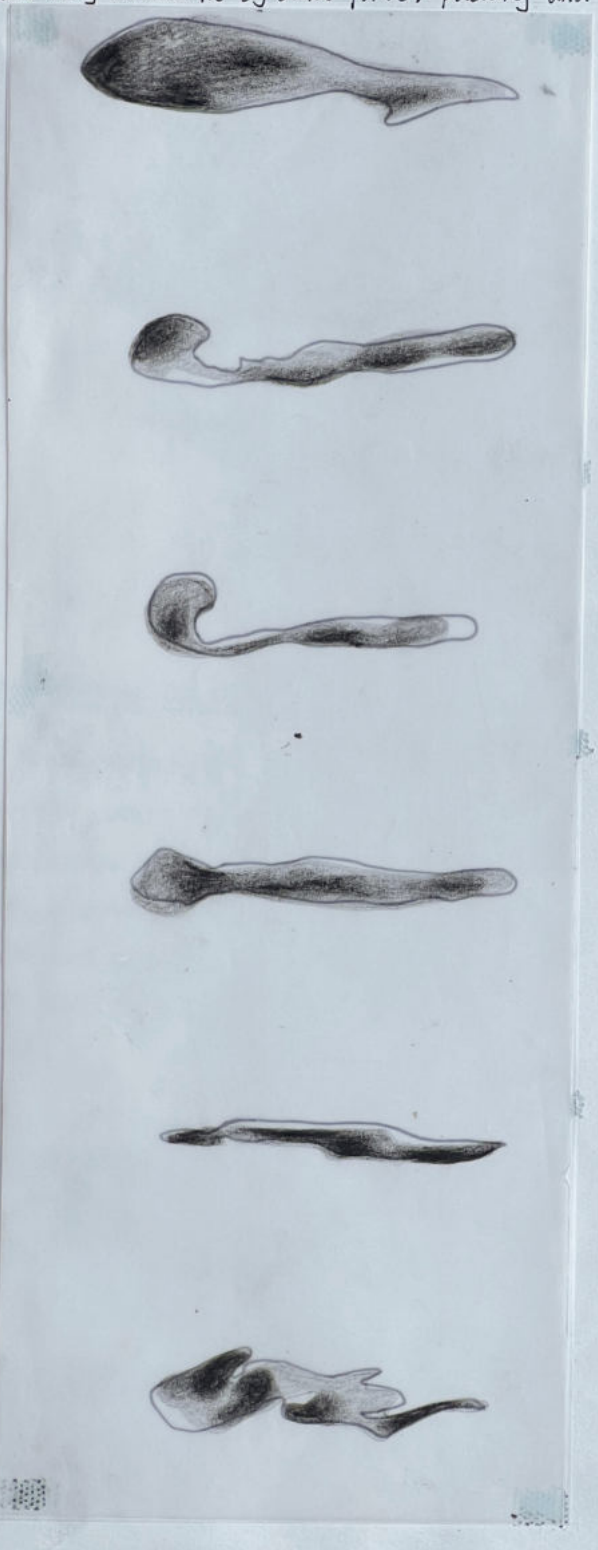
<Explaination of my work...>



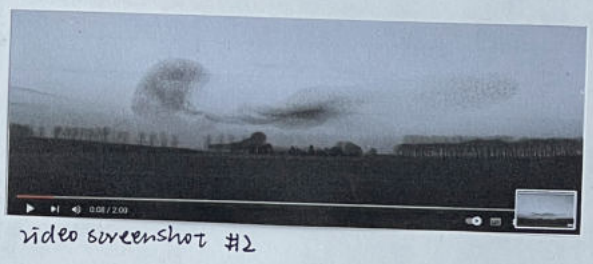
EXPLORE

STUDY OF BIRD FLOCK PATTERNS (macro)

I have organized a video of schooling starlings, intercepting a series of continuous movements. I focused on the edges of the flock and the changes in density. They (their pattern) look like they are being drawn in by some force, pushing and pulling.



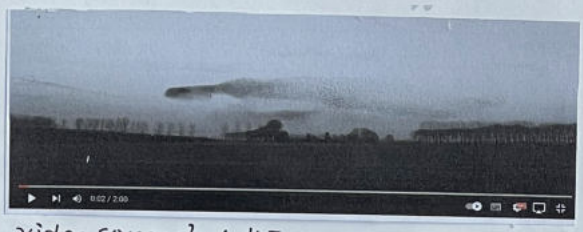
video screenshot #1



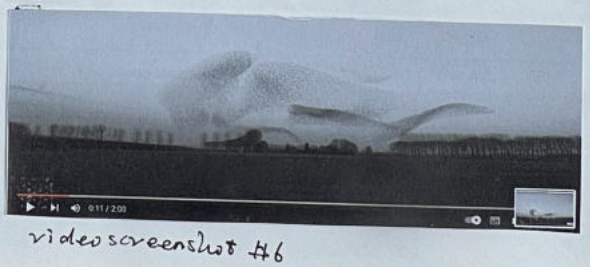
video screenshot #2

video screenshot #3

video screenshot #4



video screenshot #5



video screenshot #6

DEVELOPMENT

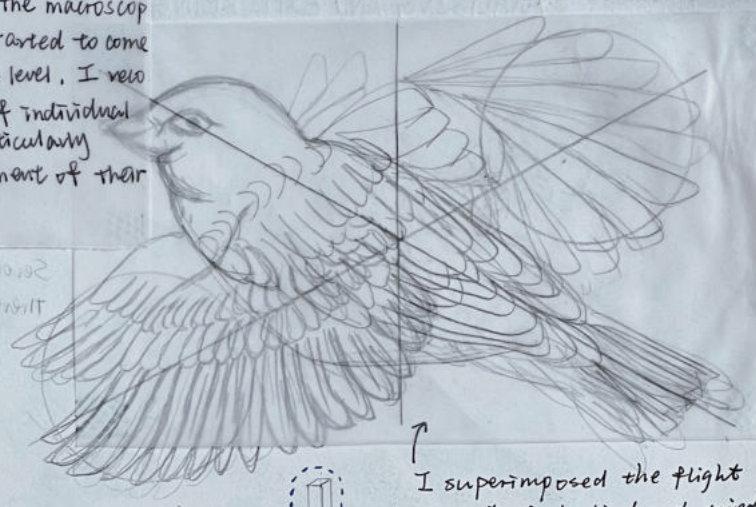
I drew this picture by pencil. A figurative piece. it is a study of density, of the relationship between near & larger and far, and even helps me to understand the flock of birds more deeply. Also, this is preparatory material for more creative work: for further explorat. of backgrounds etc.

EXPLORE

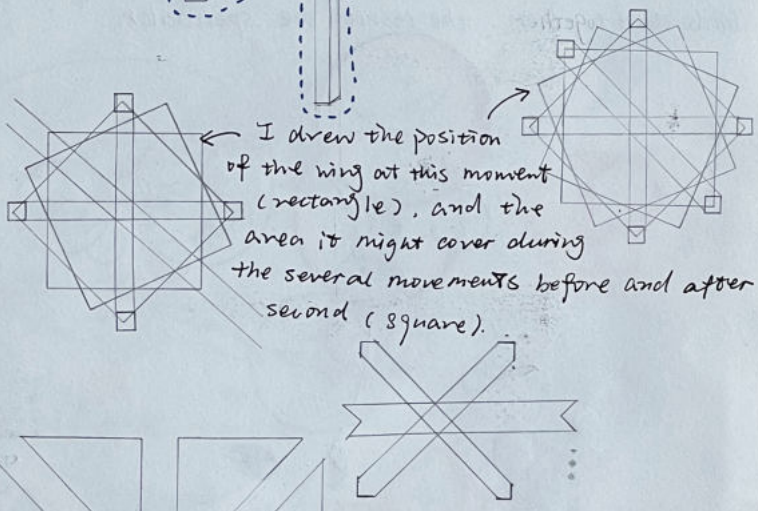
Explanation:

After exploring the macroscop-ic direction, I started to come to the microscopic level. I reco-rded the flight of individual birds, and I particularly observed the movement of their wings.

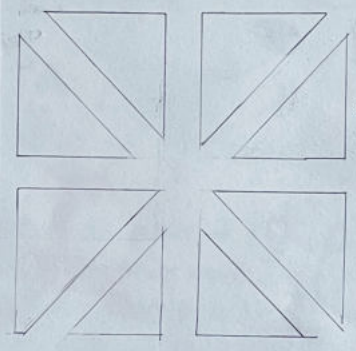
WING TRAJECTORY (micro)



I superimposed the flight movement of the bird and tried to simplify it. It was intuitive to me that this could be replaced by three axes.



I drew the position of the wing at this moment (rectangle), and the area it might cover during the several movements before and after second (square).



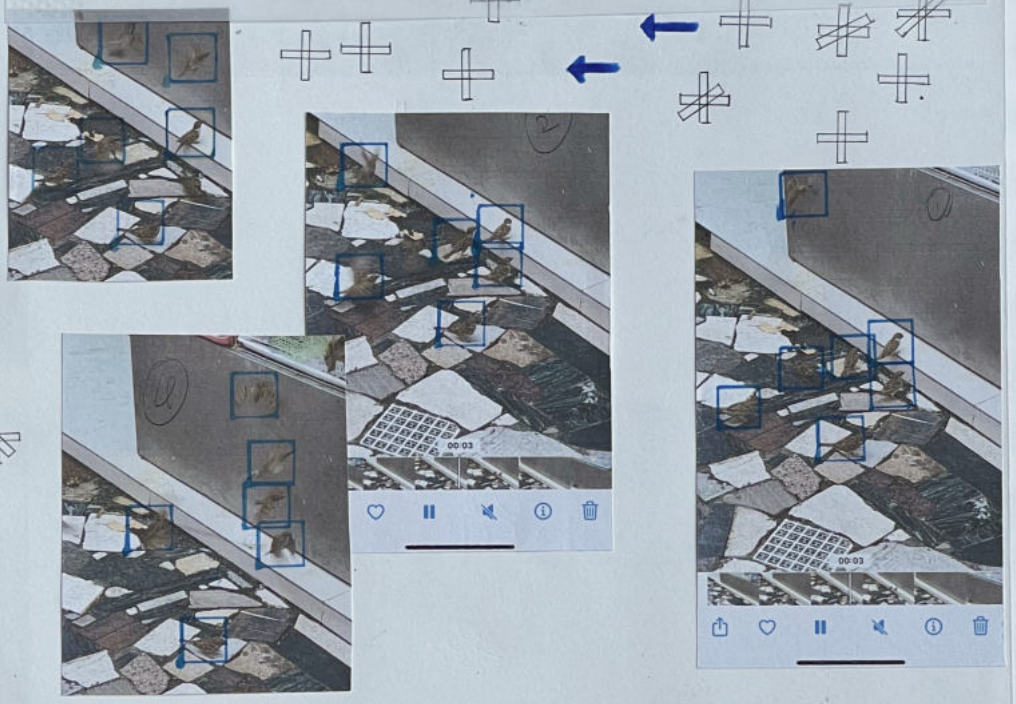
I try to find the negative shape of the axes. Because I wanted to know what was happening in the space beyond the bird's swinging motion.

After exploring this page, I feel that three axes would be a good unit to manipulate and make. I decided to model with suitable materials and sizes, and to increase the number to achieve the effect of a flock of birds. I tried to simplify one bird and give the flock a new look.

My take-aways and further plans

DEVELOPMENT

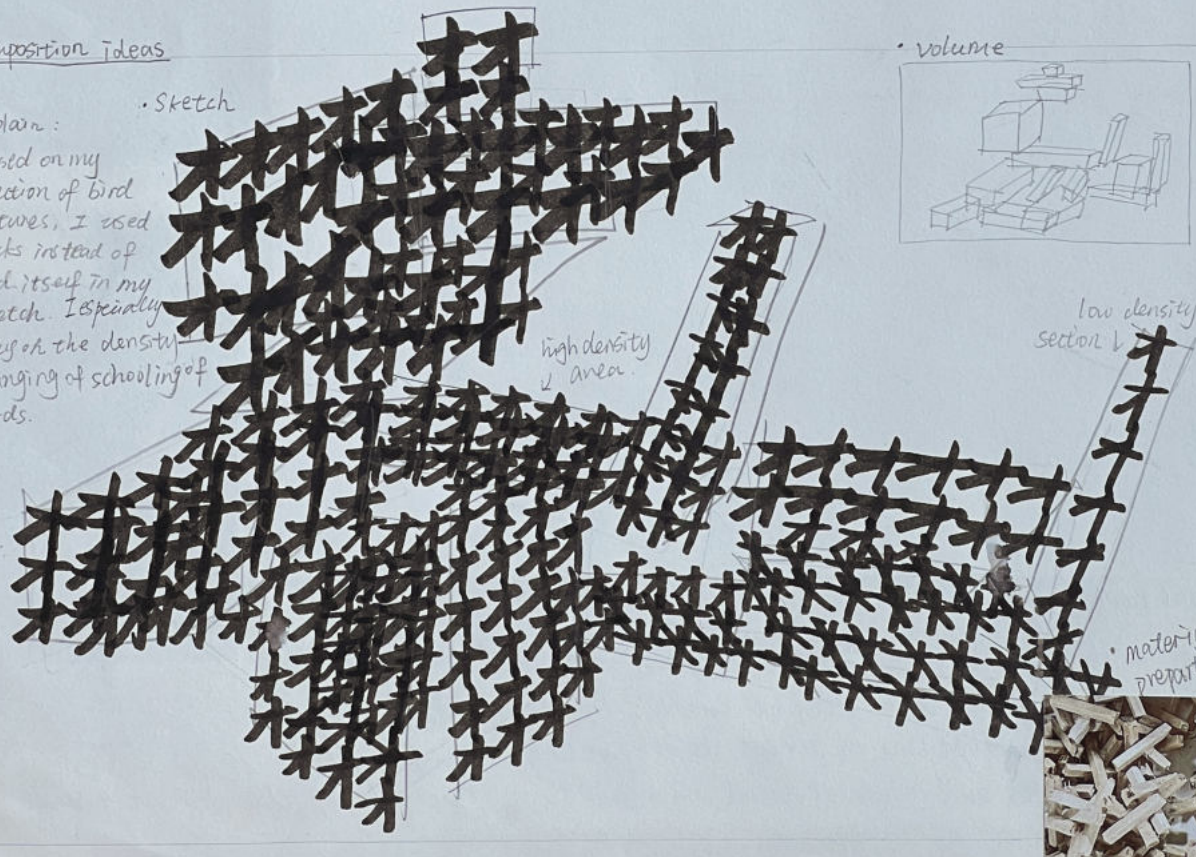
I extracted screenshots from a video of a flock of birds in flight and used the axes to create a series of sketches instead of the birds themselves. What I paid extra attention to in them was the spacing between the birds, and their position in relation to each other. As well, I used a third axis to represent the bird's wings, making the axes completely replace the bird as much as possible to convey the bird's information.



Composition ideas

• Sketch

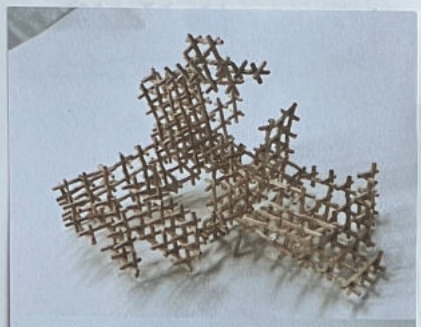
explain:
Based on my collection of bird pictures, I used sticks instead of bird itself in my sketch. Especially focus on the density changing of schooling of birds.

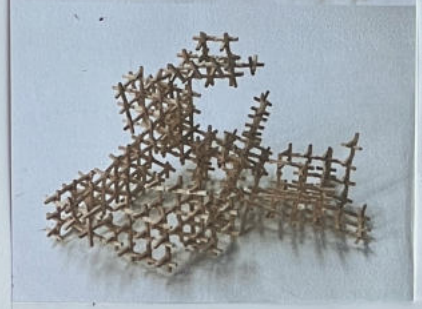


• volume

• material preparation:

MODEL - BIRD FLOCK

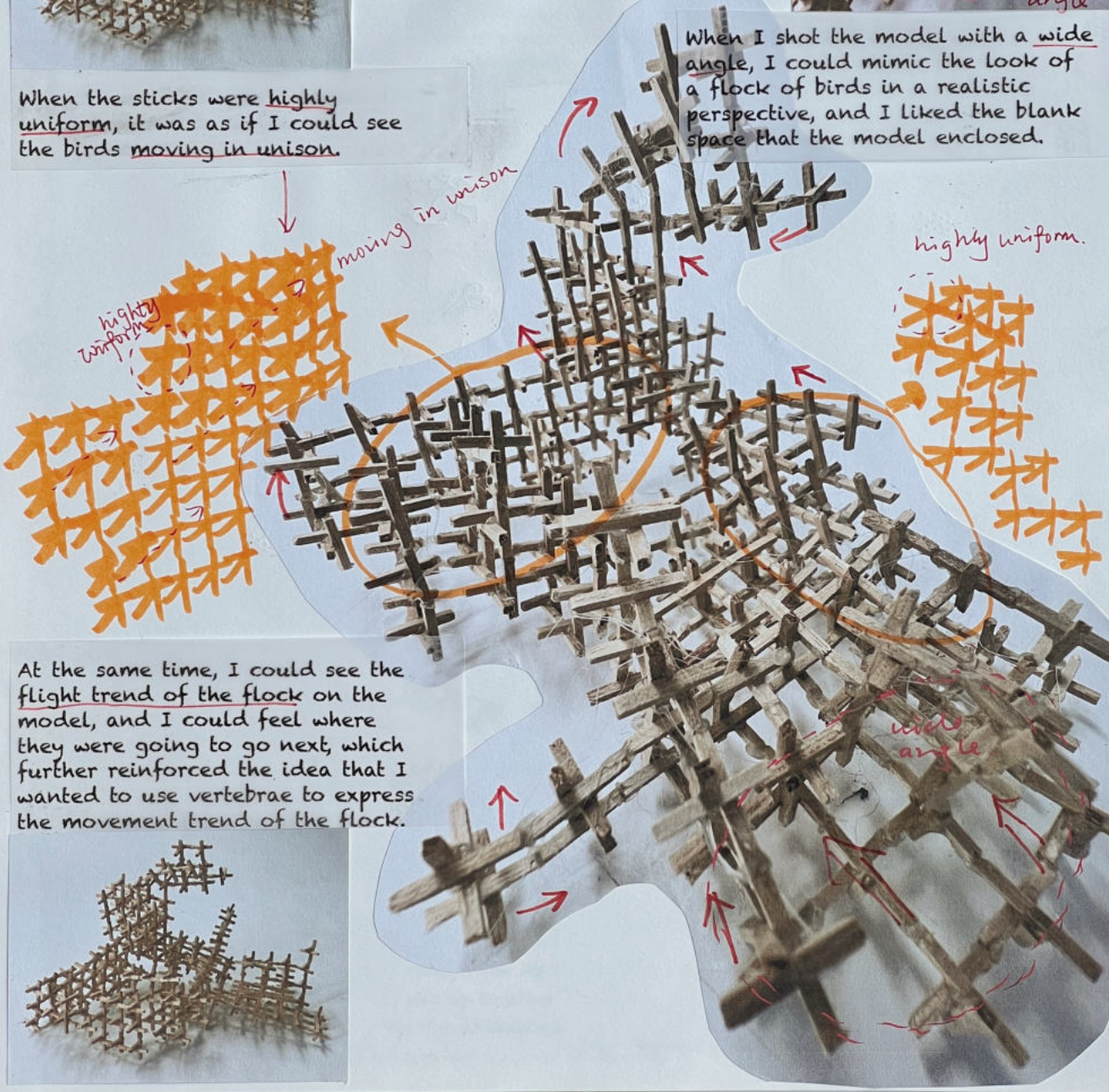




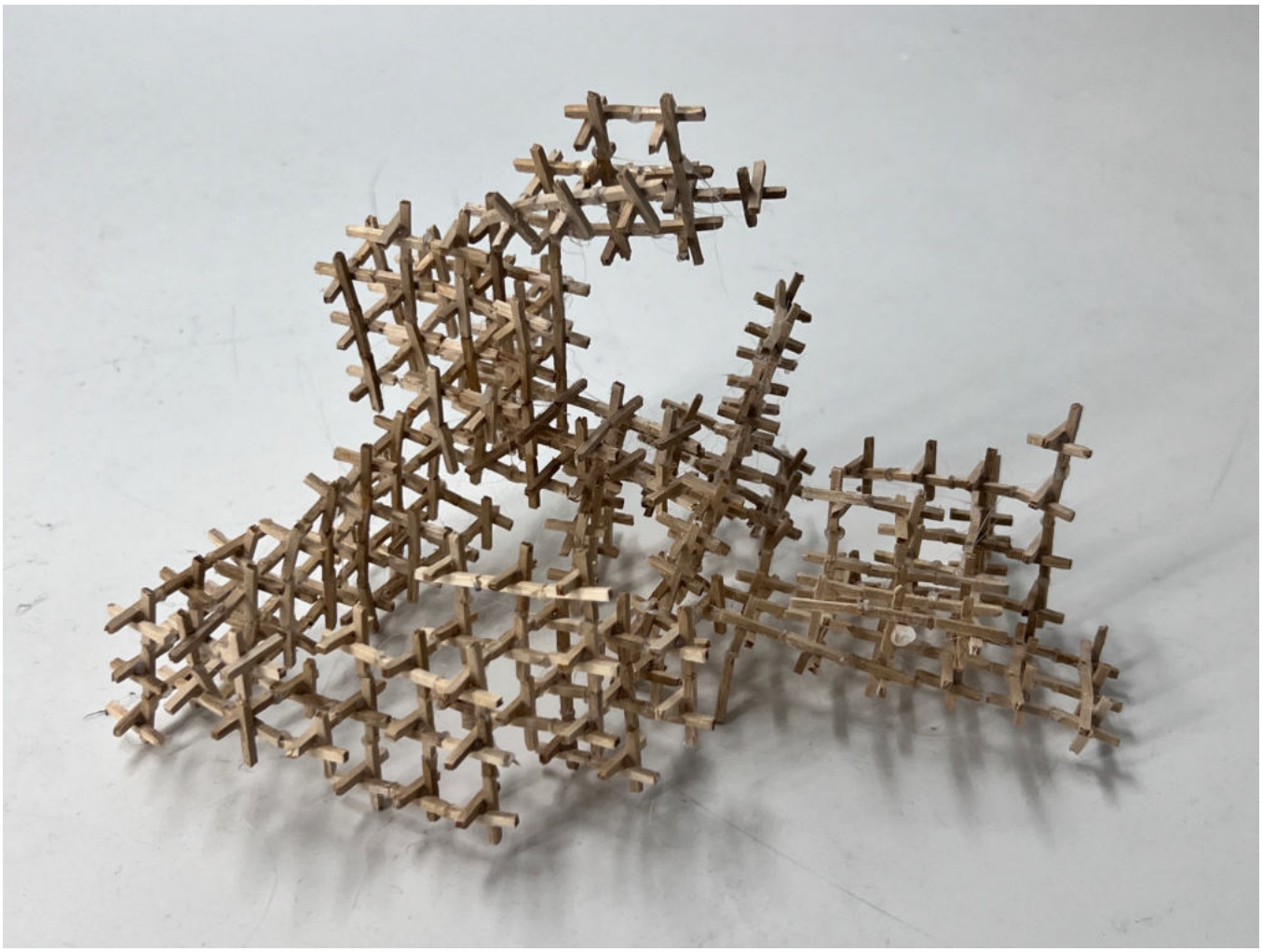
I chose to use wooden sticks to express the movement of the bird because it can express the relationship of the three axes very clearly. At the same time, I found that when arranging these sticks together in a regular manner, they can be seen in different sparse relationships through different angles, just like people see the flight movements of the birds.

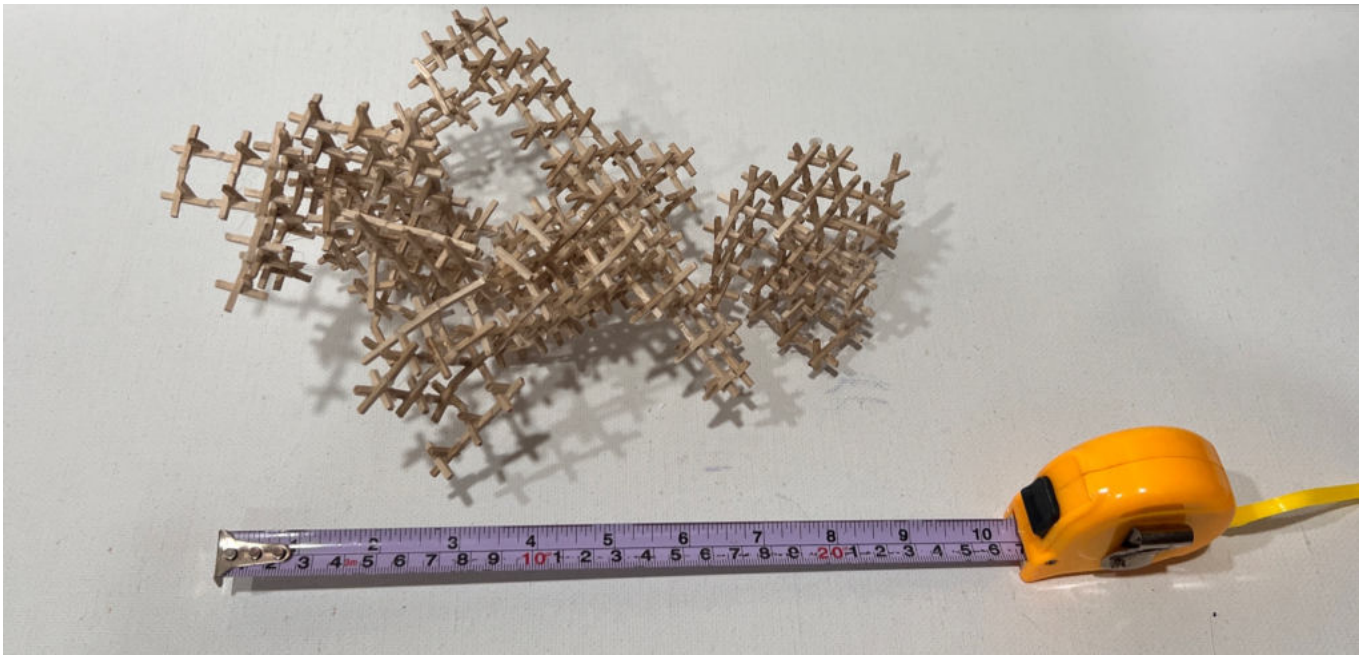
When the sticks were highly uniform, it was as if I could see the birds moving in unison.

When I shot the model with a wide angle, I could mimic the look of a flock of birds in a realistic perspective, and I liked the blank space that the model enclosed.



At the same time, I could see the flight trend of the flock on the model, and I could feel where they were going to go next, which further reinforced the idea that I wanted to use vertebrae to express the movement trend of the flock.

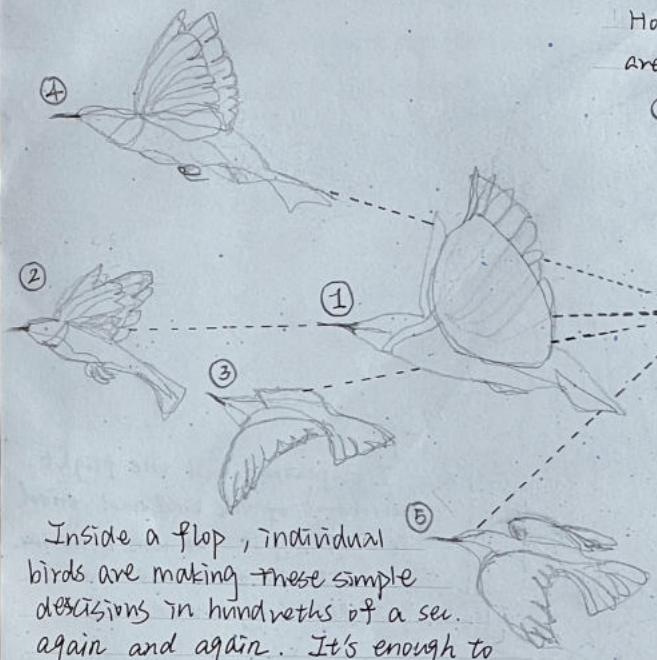




27cm * 7cm* 15cm

EXPLORE

ANALYSING AND EXPLOREING THE FLIGHT RULES



How they thigh is all to do what their seven closest neighbors are up to. As the flock moves, those seven might change.

But the principle stays the same. Every starling in the flock is following three simple rules:

Firstly, as you fly, steer towards each other.

Secondly, if any of your seven neighbors turn, then you turn.

Finally, don't crowd each other.

Amazingly, that's all there is to it.

Inside a flop, individual birds are making these simple decisions in hundreths of a sec. again and again. It's enough to confuse a predator and when half a million birds do it together, the results are spectacular.

Explanation:
using circle...

I drew this picture based on the rules of bird flight. I think that each bird has its own field, just like a school of fish. There field are represented by me in circles (spheres in 3D perspective)

As the same time, I was intrigued with the use of spheres instead of birds in flight (itself). I am curious about the effect they produce when superimposed

Bubble Development

Experiment

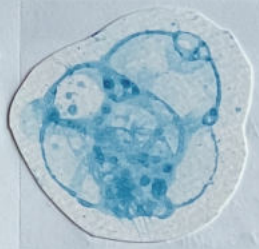
I have tried different papers. The water color paper is more coarse in pattern because it absorbs water well and is not delicate enough to have a crystal clear feel.

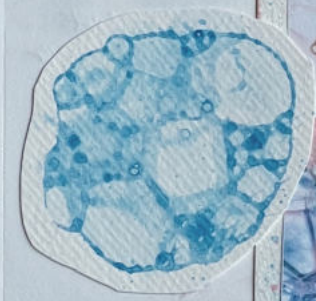
<color paper>

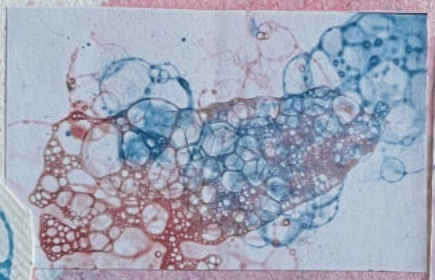
Take care in the process of draining a small number of times. Too much liquid will cause it to dry very slowly and the grain will disappear and paste into a lump. <method>

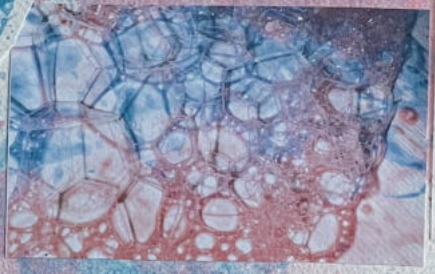
Patterns on sulphuric acid paper dry slowly, the paper wrinkles and it does not record the detailed grain. acid

<Sulphuric paper>









I repeatedly adjust the ratio of the bubble solution, mix it with acrylic paint, blow out fine bubbles and print them on the paper in different ways (pressing or placing them on the paper.) Wait for it to dry completely.

process explanation.

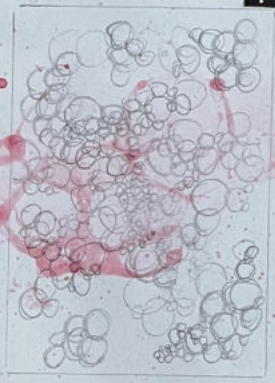
I tried different colors of acrylic, and the orange-red had more of a sense of danger of the domain being violated. <Color trying>

all of my work:

PLAN BEFORE DRAW:

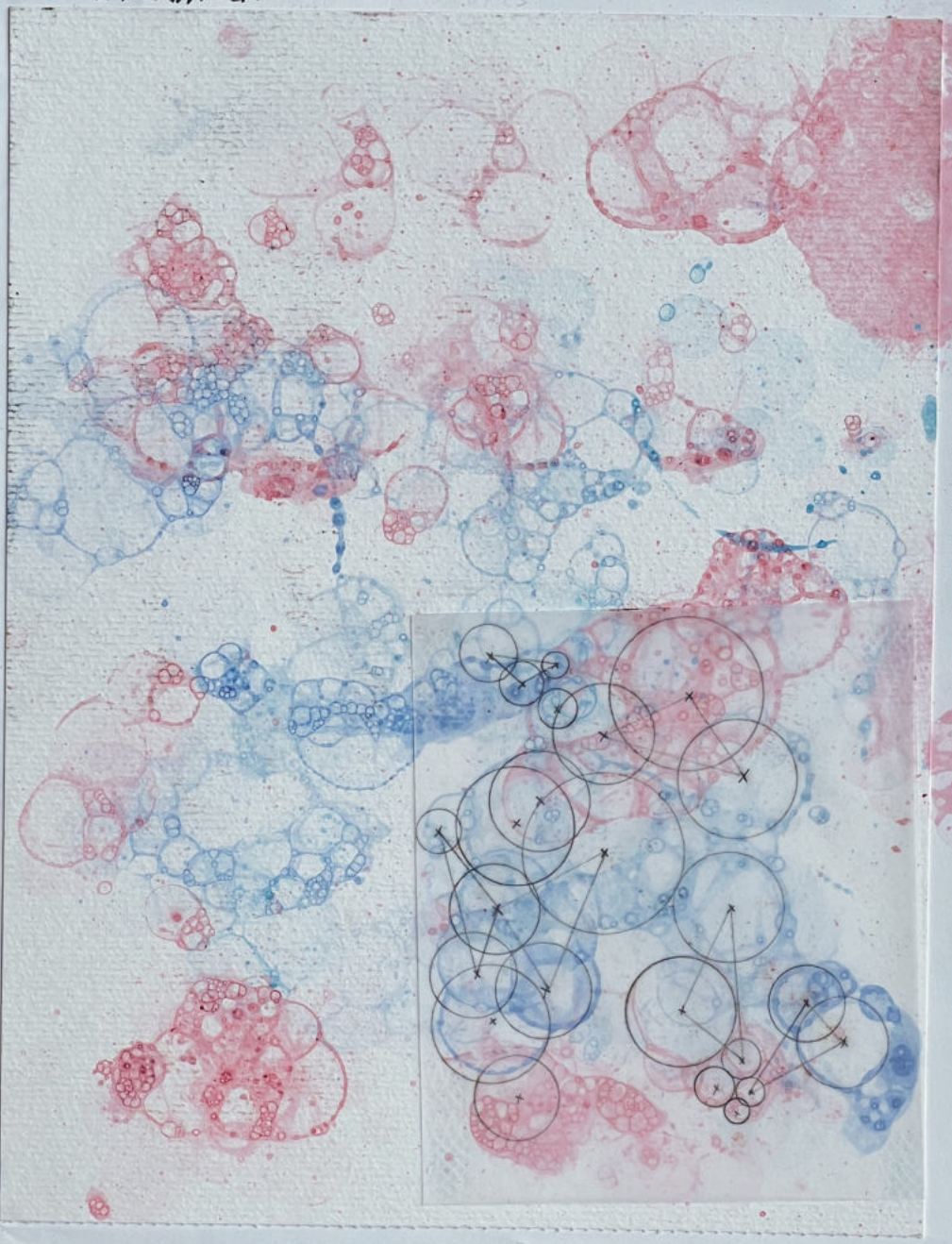
I decided to use these two colors to make the bubble pattern. I planned to arrange the two colors in a staggered way (as shown on the left). I purposely made the amount of the two colors the same.

FINAL BUBBLE CREATION



I plan the bubble density change. I think there's a difference between birds that are far away and birds that are near, and I use larger bubbles for birds that are near, and smaller bubbles for birds that are small.

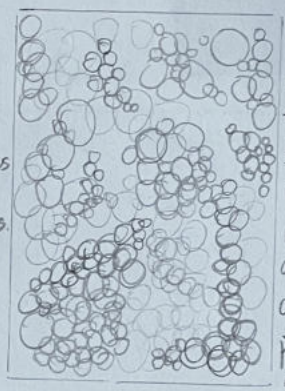
FINAL DRAWING:



Secondary translation pattern. The triangle is the body of the bird, the circle is the safe zone of the bird.

PLAN BEFORE DRAW:

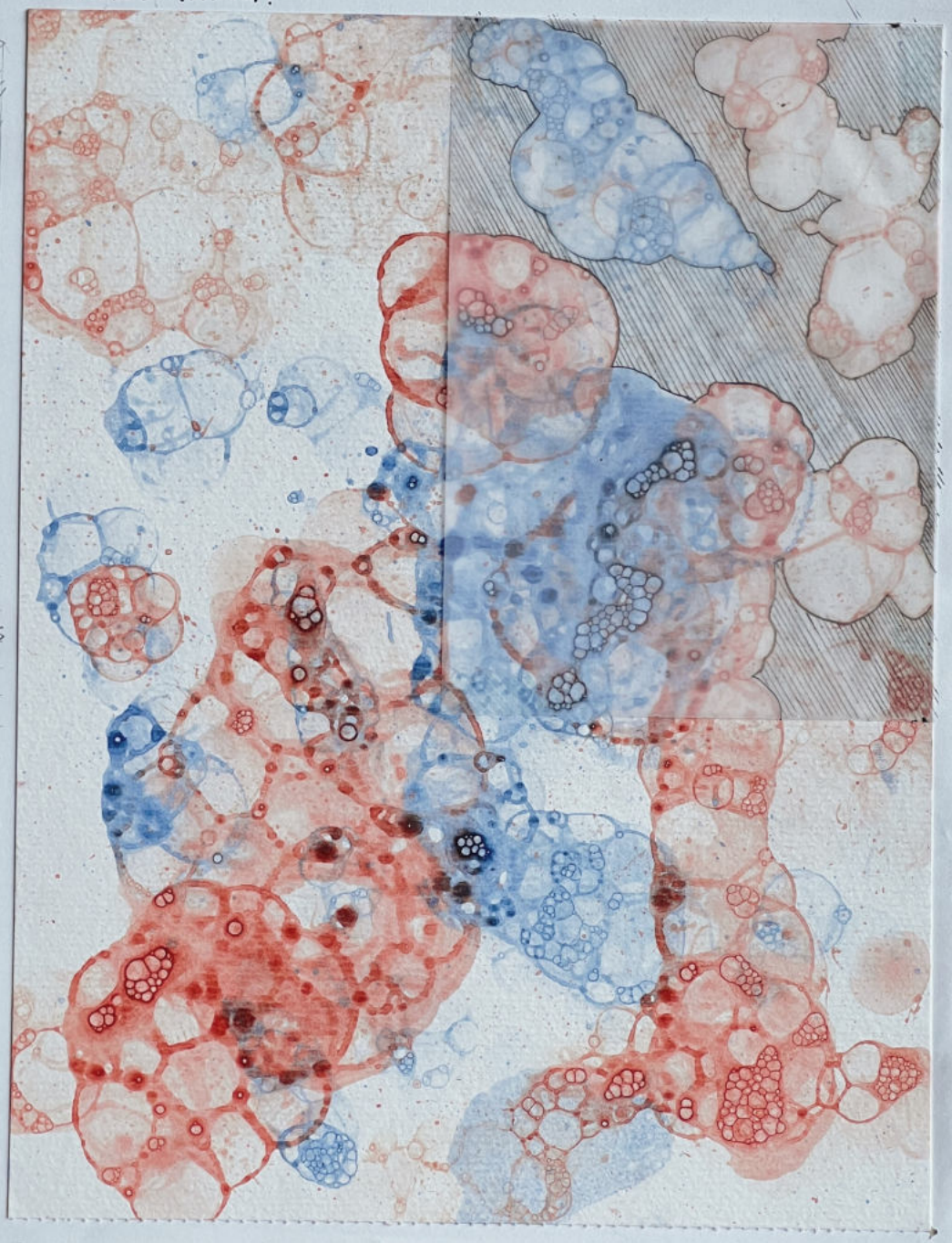
I tried different colors. I used stronger lines to show the dangerous relationship between individual bird and groups.



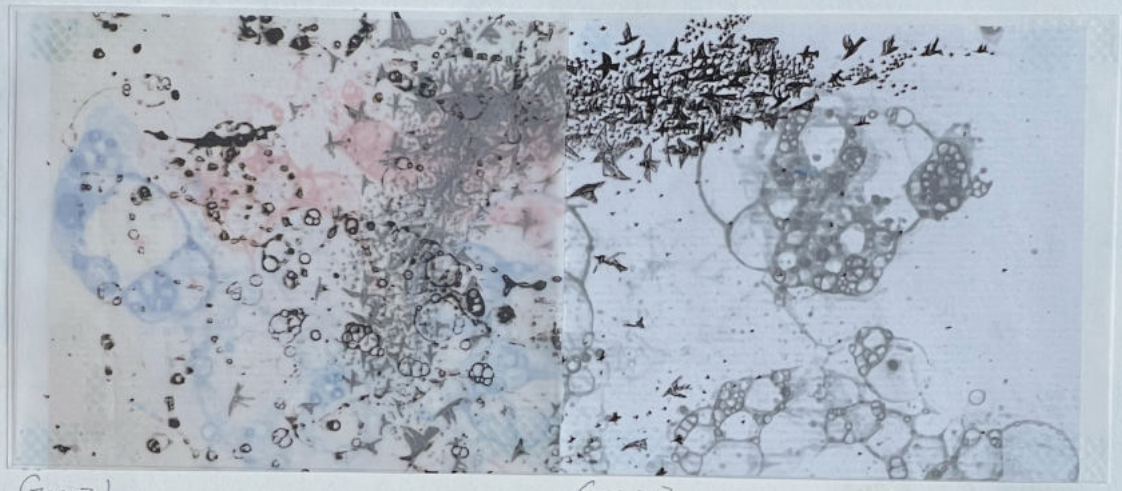
I use more and bigger bubbles to show the birds that closer to me. Denser bubbles means a huge amount of birds. Weaker bubbles in this picture is decided in a lighter color in the final one. Stronger bubbles are presented in darker color as well

FINAL DRAWING:

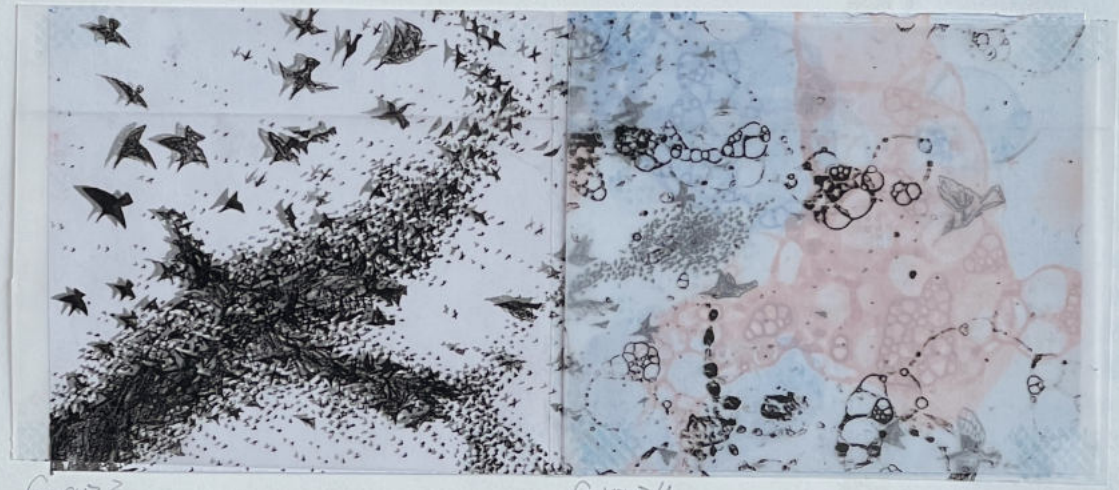
I painted the bubble in reverse. I outlined the bubbles and filled them with slashes. I was interested in this new perspective. And that inspired me to make solid dioramas of these Spaces



EXPERIMENT OF OVERLAP



Group 1 Group 2

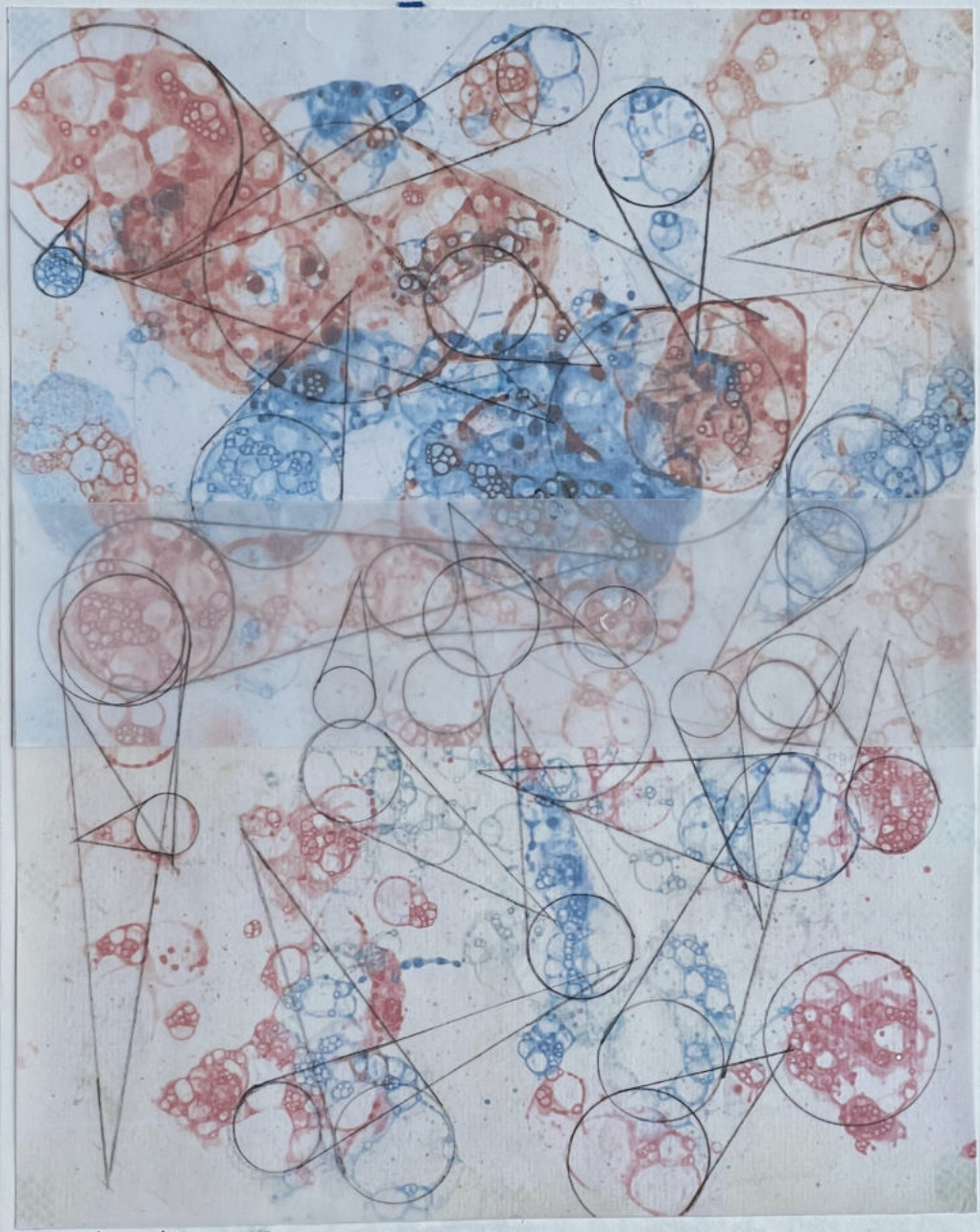


Group 3 Group 4

Group 5 Group 6

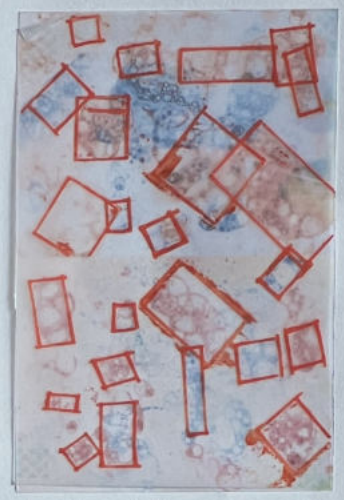
DEVELOPMENT

I think bubbles cannot show a trend of birds. So I take some experiments, to try different shapes. I chose some groups of bubbles that close to circle and extend them.



<Final work>

Cone is the perfect one I chose. The angle at top could perfectly show the trend. I found some group of bubbles can be replaced by perfect circle, and use straight line to present its tangent line. Therefore, each small flock has its own movement trend. I want to use this part of the harvest to make a 3D development.



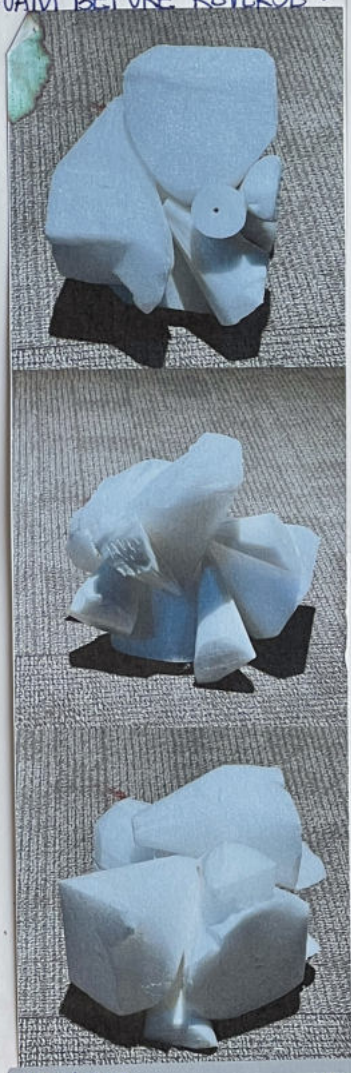
<Experiment 1>
weak relationship about circle/curve.

<Experiment 2>
Too irregular

<Experiment 3>
no trend

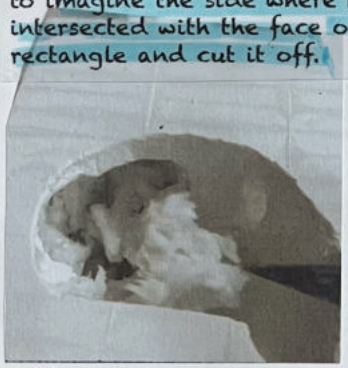
DEVELOPMENT

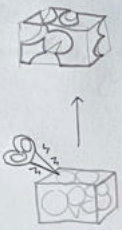
FOAM BEFORE REVERSE :



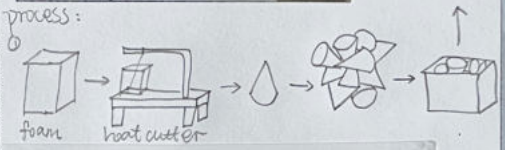
EXPLANATION OF PROCESS :

I cut the foam for the vertebrae with a heat cutter. This step was done by making a shaft for the rectangular foam to rotate on, adjusting the wire of the thermal cutter to be slanted and rotating the rectangular foam 365 degrees after placing it on. By adjusting the tilt angle of the poem of the hot cutting machine, different vertebrae can be cut. After that, according to the words I had scratched before, I intersected these vertebrae standing together and cut off some parts where they intersected to improve the area and volume of the foam connection. I needed to put the foam I glued into a square or rectangular box, so I also needed to imagine the side where he intersected with the face of the rectangle and cut it off.





process :

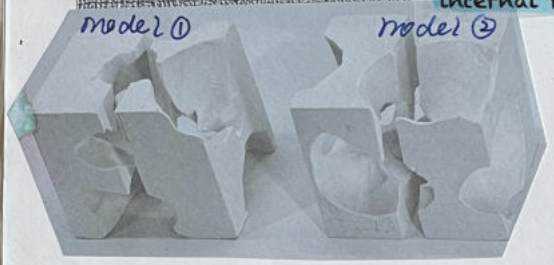


I split three of the models, in order to be able to see their internal relationships

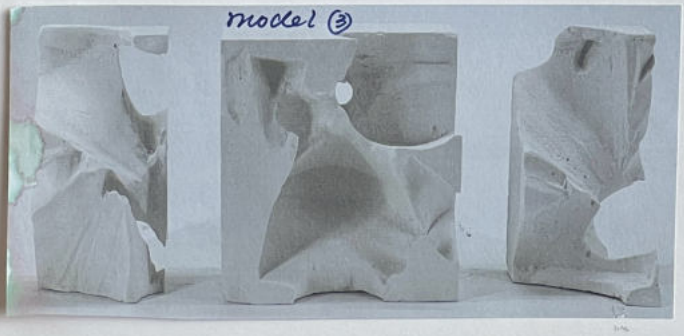
FOAM BEFORE REVERSE :

model ①

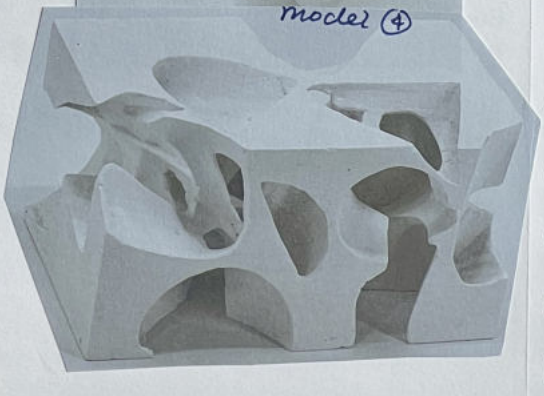
model ②

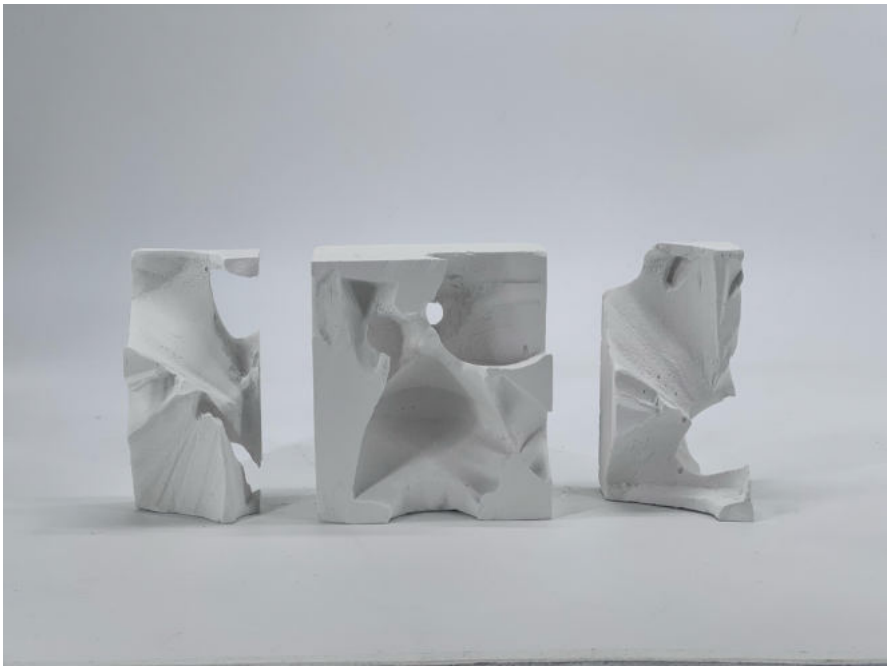


model ③



model ④

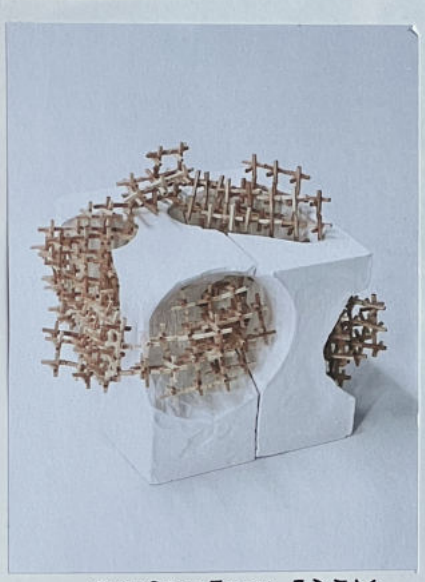


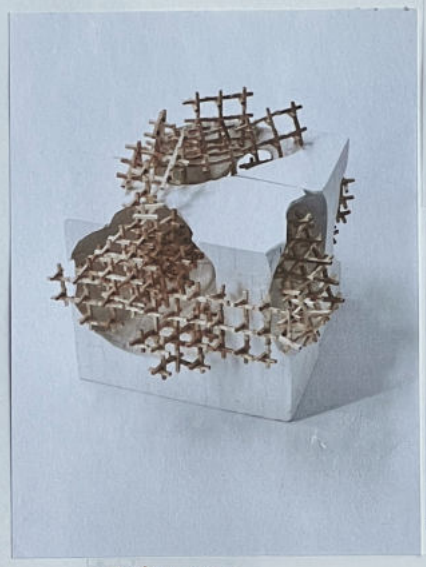


16cm*16cm*16cm

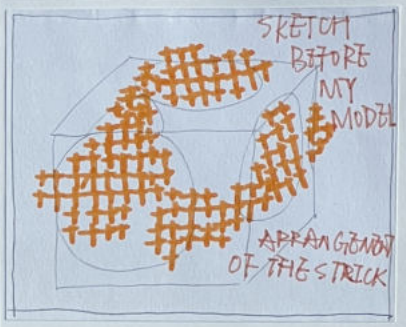
30cm*16cm *16cm

FINAL MODEL OF FLOCK

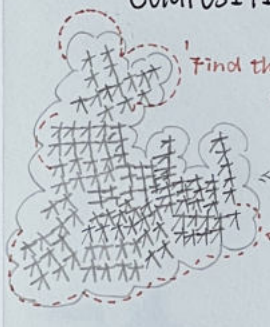




EXPLANATION:
I took the previous model and developed it further. Now I want to add cones to the flock of birds to express not only their safety zones with each other, but also their tendency to move. The plaster model is depicting the edges of the flock.

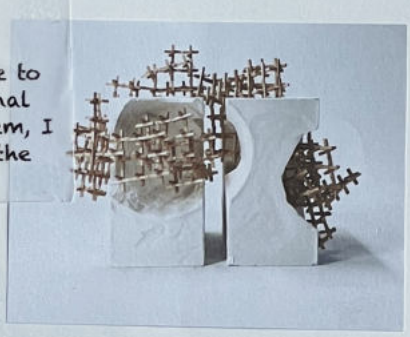


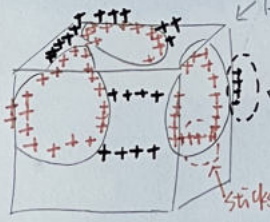
COMPOSITION IDEAS:



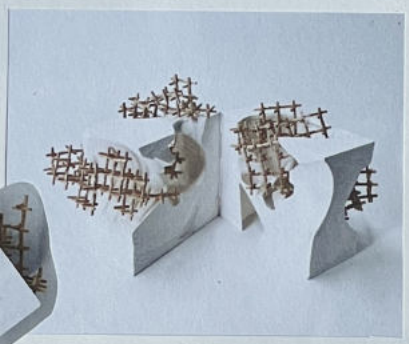
'Find the radius that best expresses the safe zone (self-area) of the individual bird.

EXPLANATION:
I also tried to split the model down the middle to be able to see the internal relationship between them, I really like this step of the display





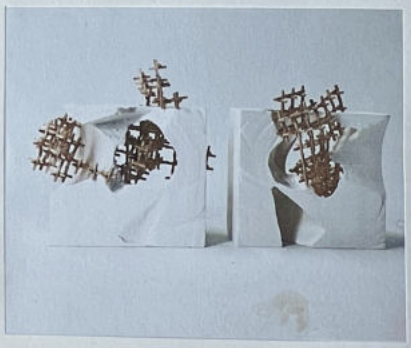
'I've found that the most logical way to make a model is for me to fill in the blank areas of the plaster model directly with sticks.

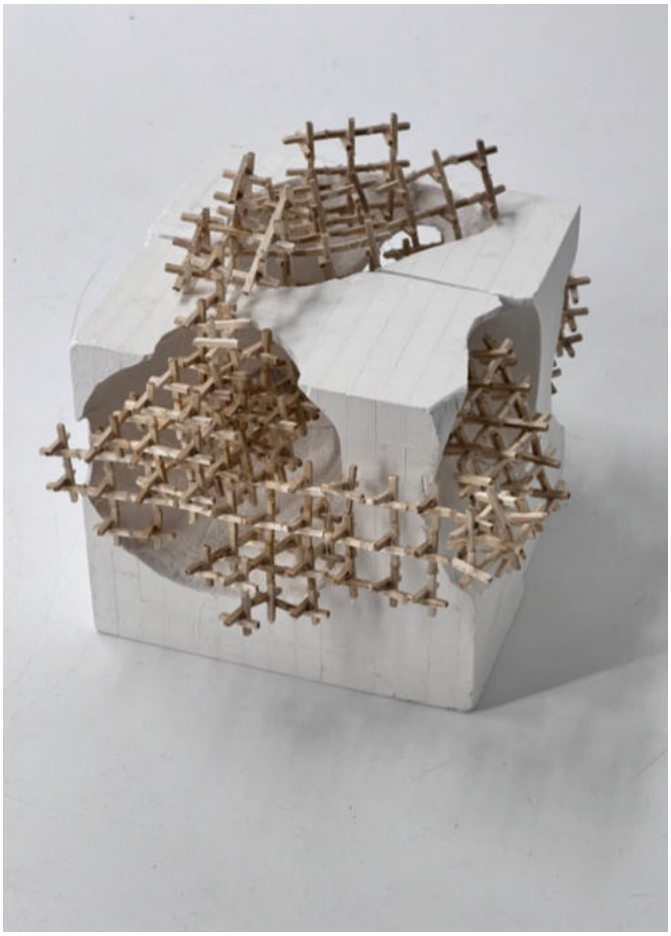


* Only draw the edge of the stick in this sketch.

Summary:

Many of my findings are combined in this model. How to express complex limbs with simplified lines, how to repeat unit combinations to create collective learning to express reverse space, how to express movement trends, how to use different materials and combine them. One of the most extraordinary discoveries was the definition of the birds' own safety zone. This is their requirement for spacing between each other and the area where each bird radiates energy from its inner core outward. Countless piles of energy pile up together to form a powerful web of energy. Such energy drives their movement, so the energy has a tendency. Such energy drives their movement.





16cm*16cm*16cm

summary:

In my research studies of animal clusters, I was most impressed by the clusters of fish.

They nicely encapsulate the rules possessed in most cluster animals, such as the spacing between each other and the way the group operates. And unlike other cluster animals fish, tend to follow a more specific direction of movement, for example they often stay in place and create eddies rather than just moving forward or up or down. What seems fascinating to me about fish is the greater variety of movement patterns and purpose of movement. They have a stronger centripetal force, just as fish do not have a leader fish.

Also the output in the fish section inspired me a lot. There is a strong sense of haziness in the creation of carbon pencil drawings of fish. This haze reminds me of many natural phenomena that exist in nature, such as typhoons, tornadoes, and tsunamis, all of which contain great energy from the earth, and I can just see traces of this in the fish, like a perspective of seeing the big in the small. Then I had to translate this haze again in a concrete and clear way. This is a training in art technique. In the model, I also express the result of the creation of countless fish. The effect each fish has on the other, the energetic connection between them, and what they collectively create.

explore:

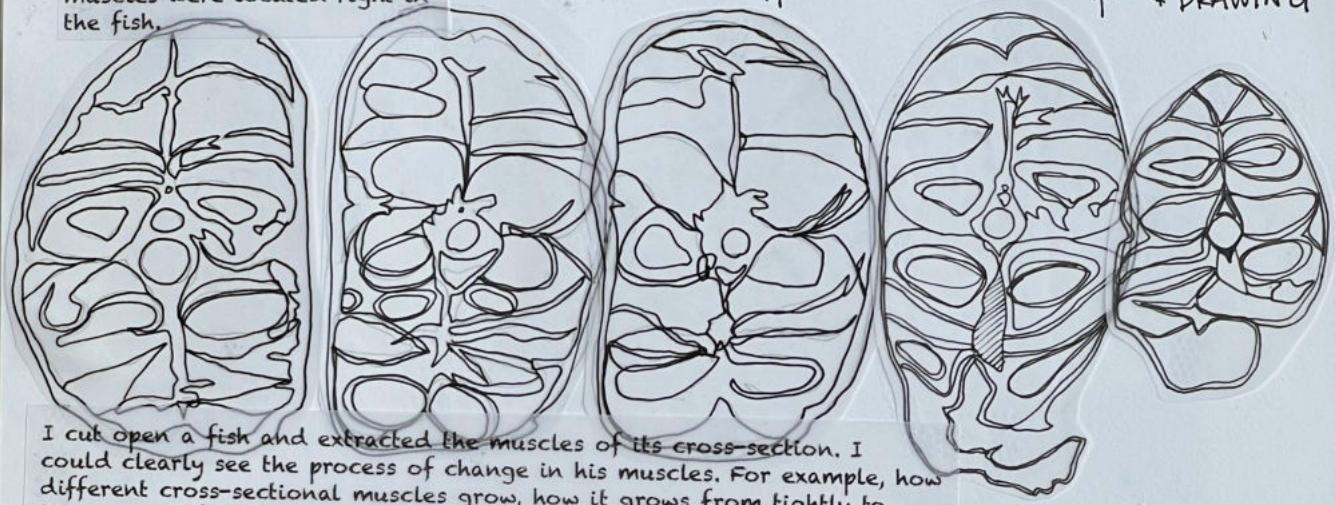
This inspired me to delve into the secrets in a fish. Could I also find similarities to a group of fish in one fish? Or through my study of individual fish, could I gain a deeper understanding of clusters and energy?

In the next part, I will switch my perspective from macro to micro, looking at a single fish.

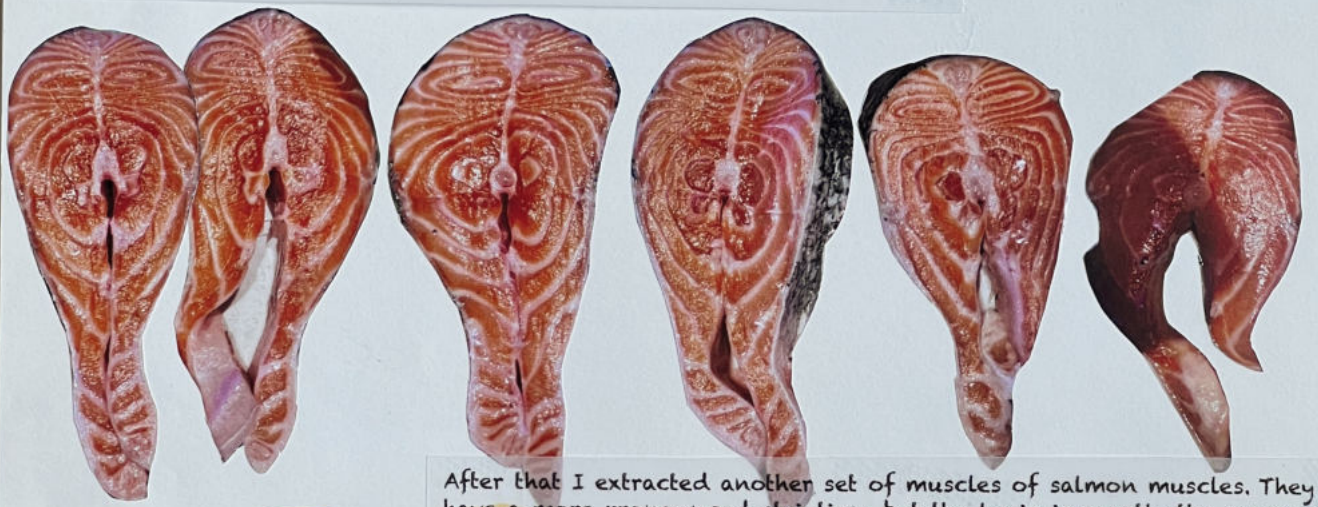
EXPLORE

Here I tried to find out where the cross-sections of these muscles were located right in the fish.

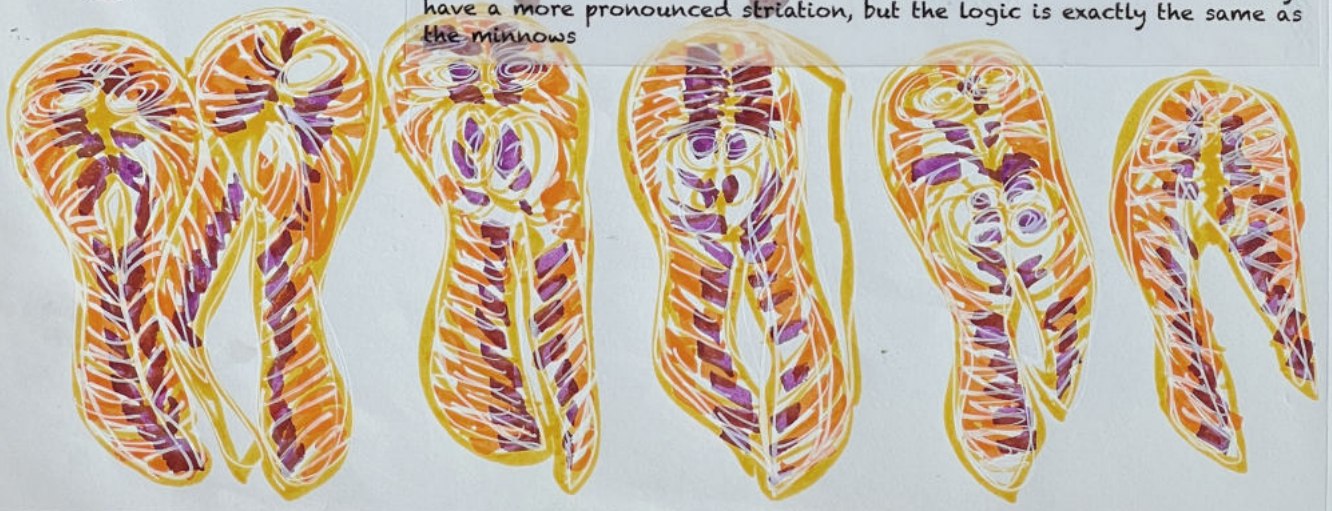
↑↑ * DRAWING



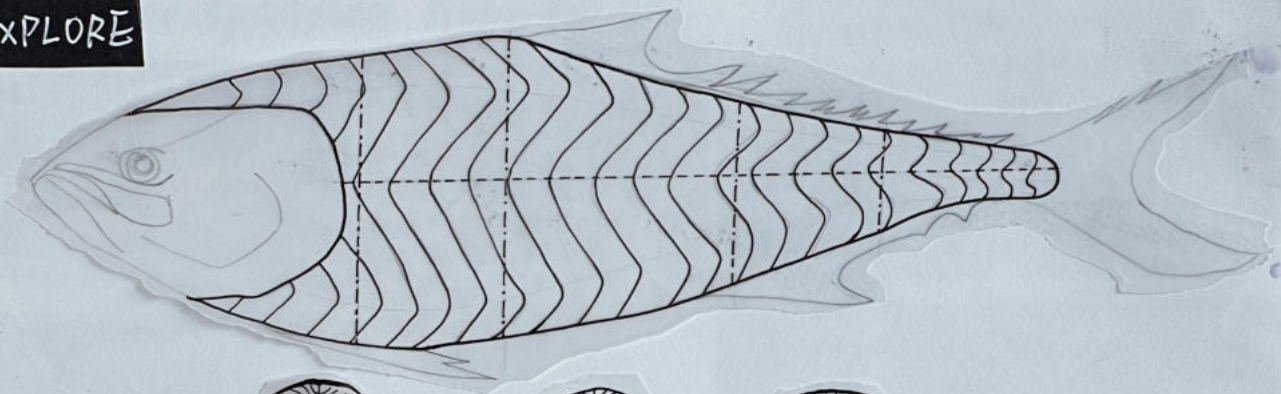
I cut open a fish and extracted the muscles of its cross-section. I could clearly see the process of change in his muscles. For example, how different cross-sectional muscles grow, how it grows from tightly to loosely and finally to tightly again.



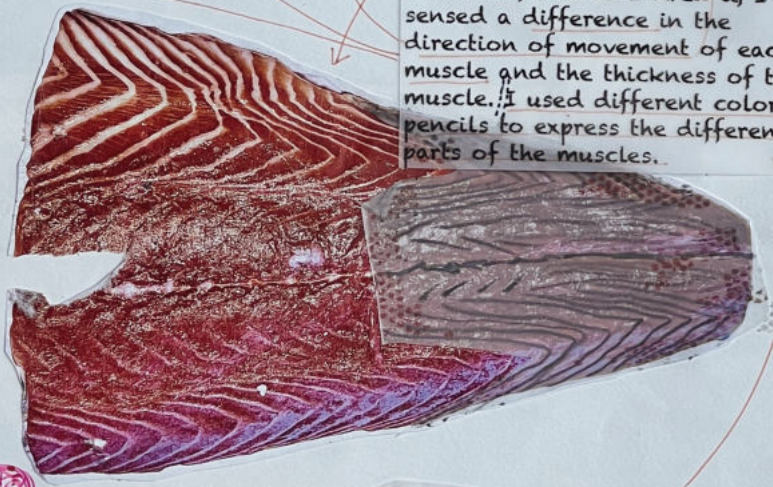
After that I extracted another set of muscles of salmon muscles. They have a more pronounced striation, but the logic is exactly the same as the minnows



EXPLORE



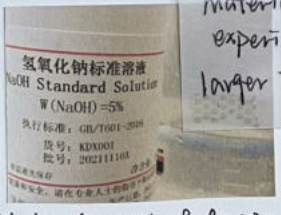
This thus inspired me to explore another angular section of the fish. I got a vertical section of a salmon, and as I drew it, I sensed a difference in the direction of movement of each muscle and the thickness of the muscle. I used different colored pencils to express the different parts of the muscles.



Fish Bone Specimen Experiment

page 1 ~ 4: Fix the fins and steam the golden pompret.

page 5 ~ 6: picking meat



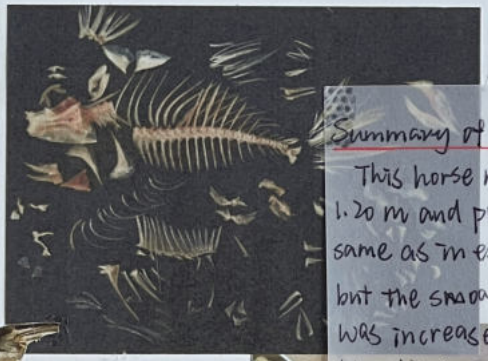
Page 7 ~ 8: Soaking in NaOH to removal of fascia.

Page 9 ~ 11: Sorting the fish bone (cleaning)

Page 12 ~ 13: Soaking in Ethanol to removal of grease.

page 14 ~ 15 (final): arrange fish bone. (can add a step about soaking in H_2O_2 to bleach).

experiment 2:



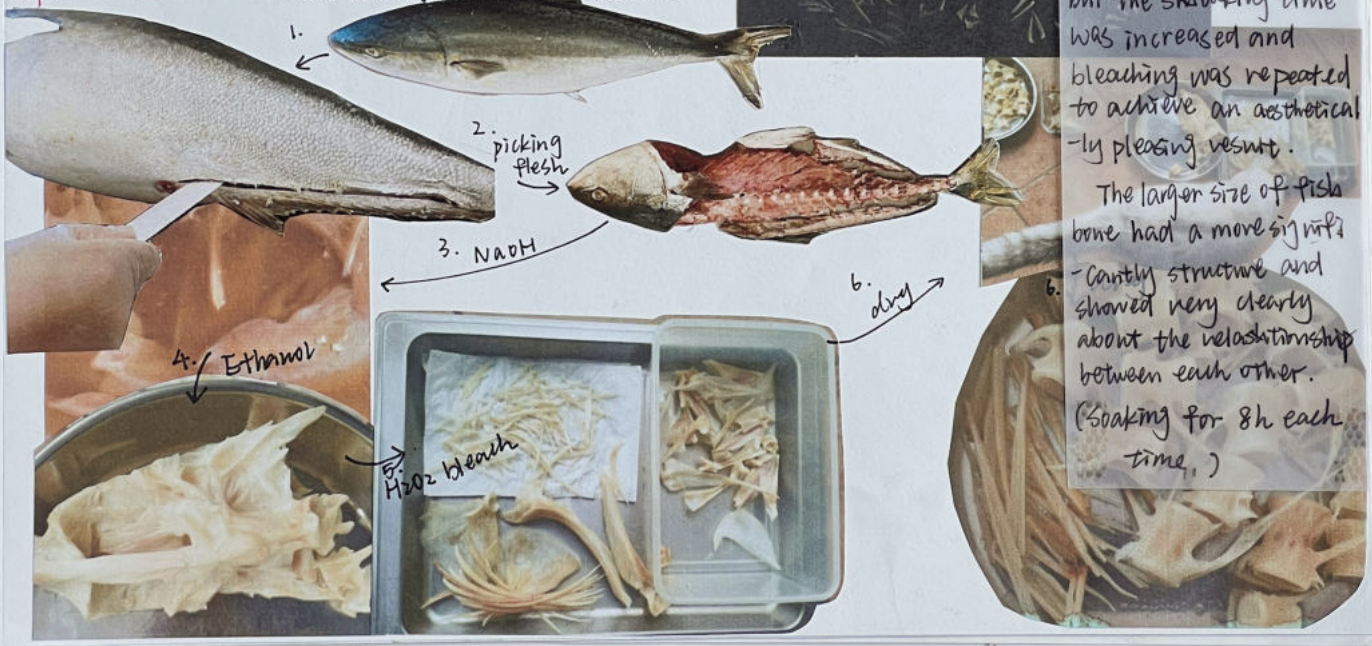
Summary of experiment 1:

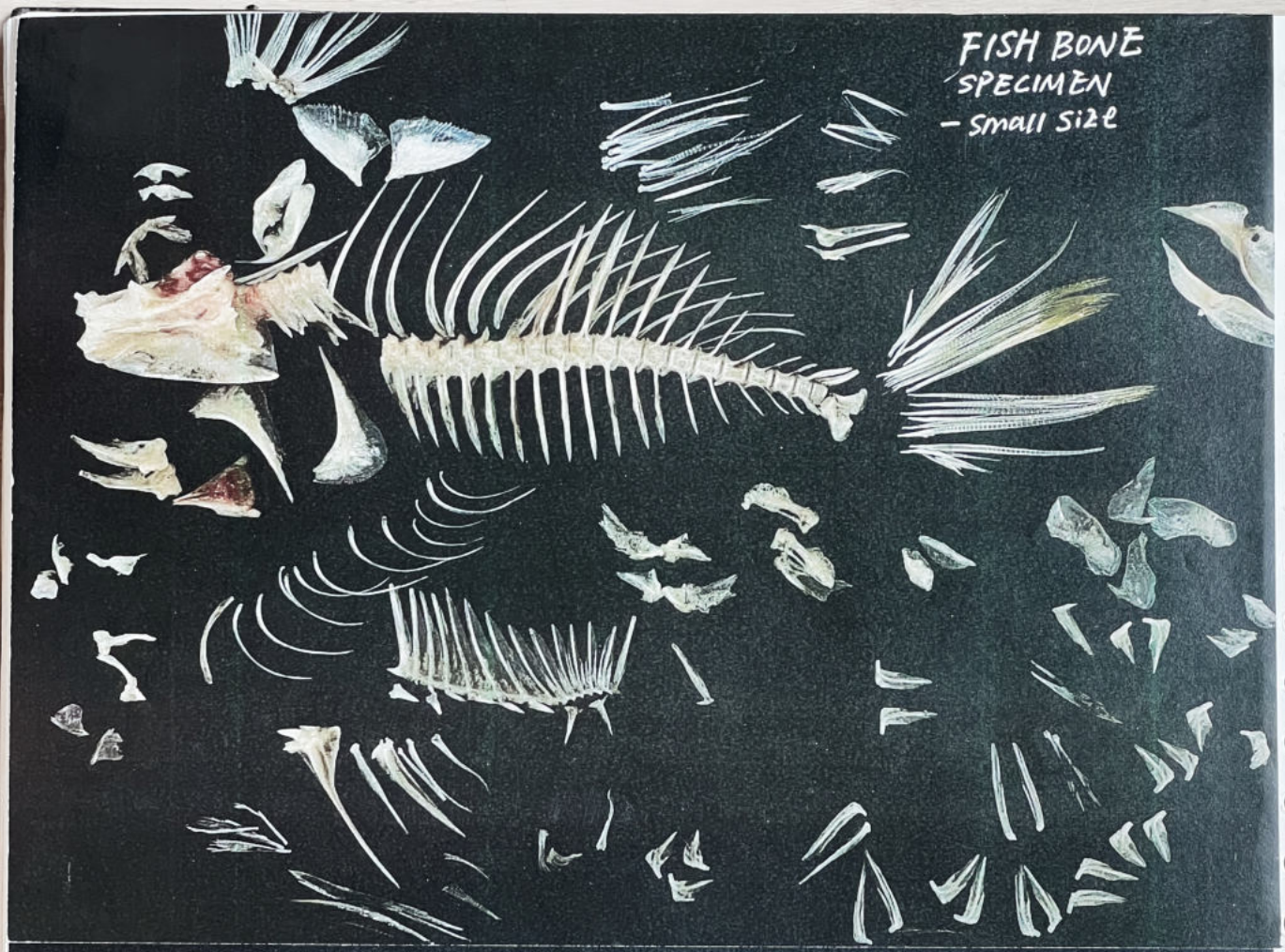
I used smaller sized fish for the first attempt so as to save time and cost. The more difficult part of the process was maintaining the integrity of the fish bones: they can become corroded over the head during the soaking process. And I prepared more material for experiment 2 because in experiment 1, the material was larger than my demand of plan.

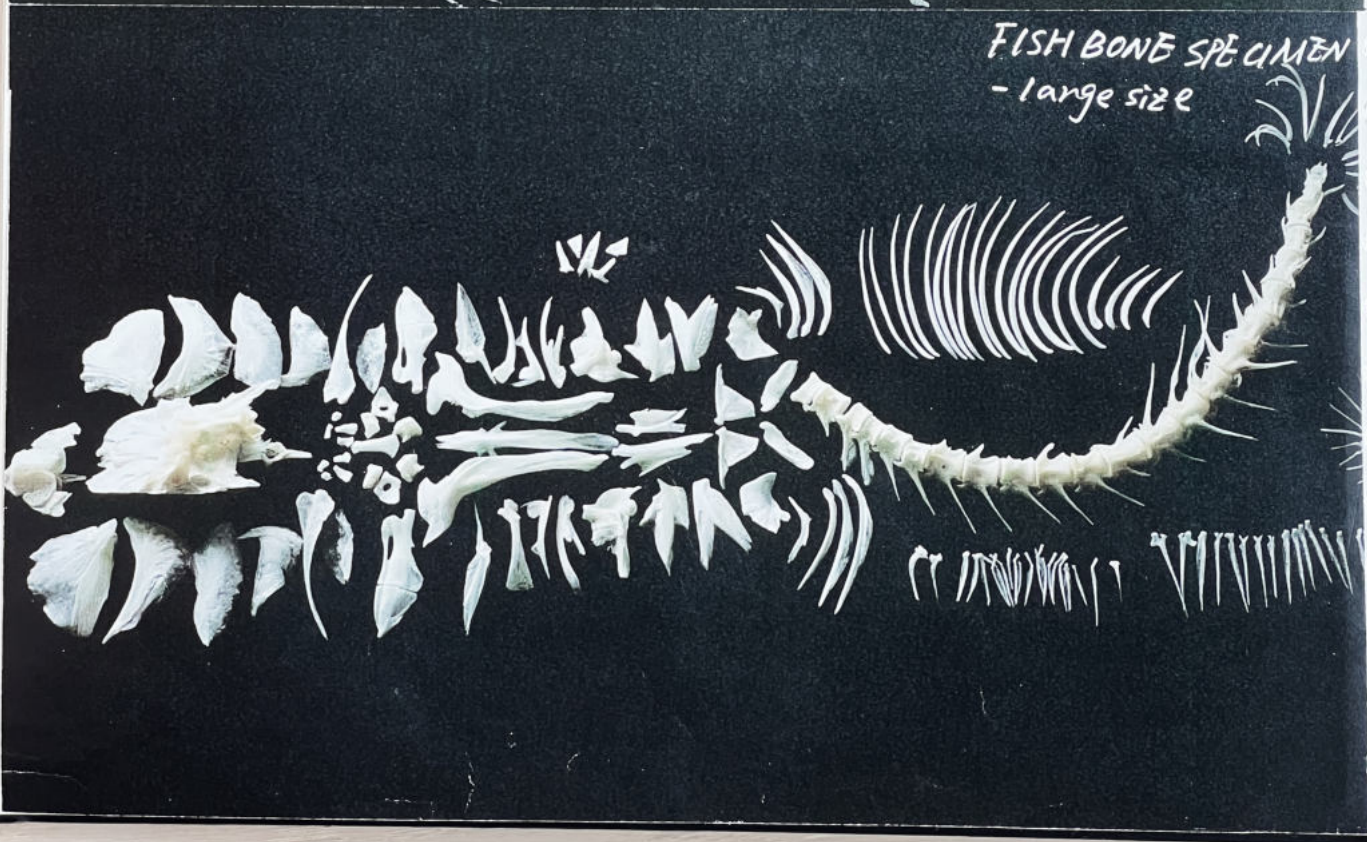
Summary of experiment 2:

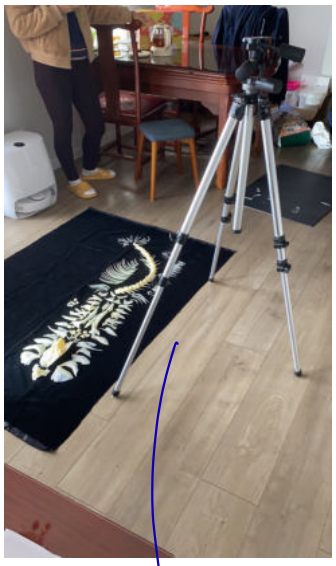
This horse mackerel is 1.20 m and produce was same as in experiment 1, but the soaking time was increased and bleaching was repeated to achieve an aesthetically pleasing result.

The larger size of fish bone had a more significantly structure and showed very clearly about the relashionship between each other. (Soaking for 8h each time.)

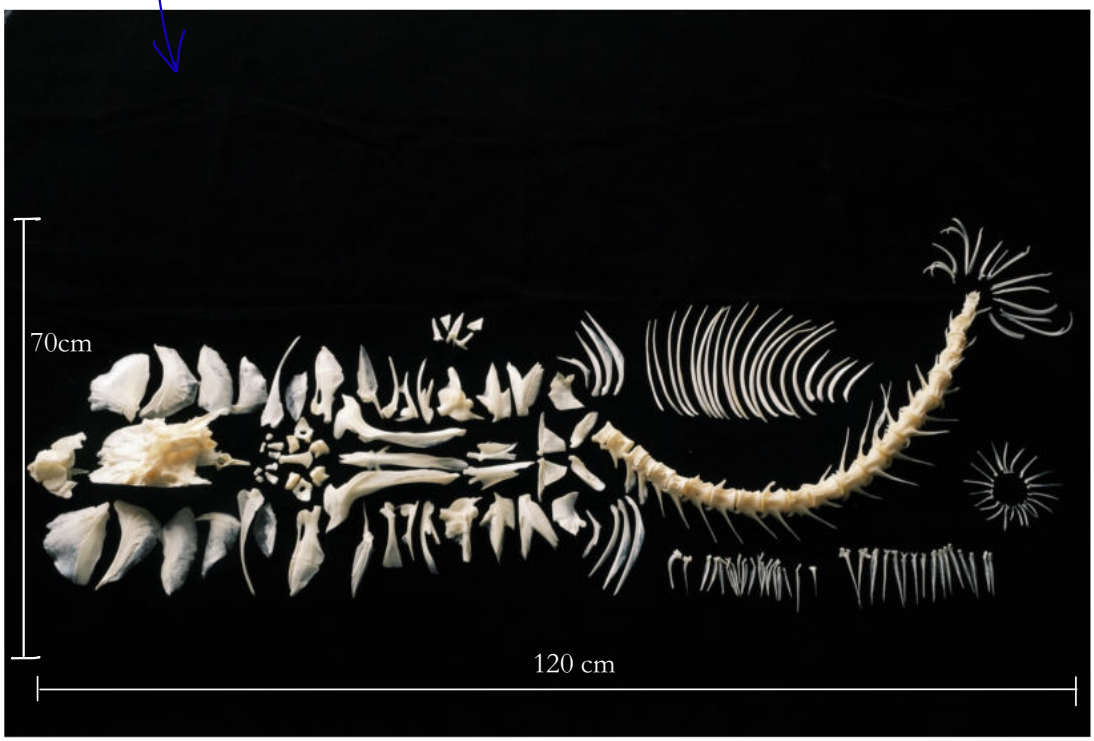



FISH BONE
SPECIMEN
- small size

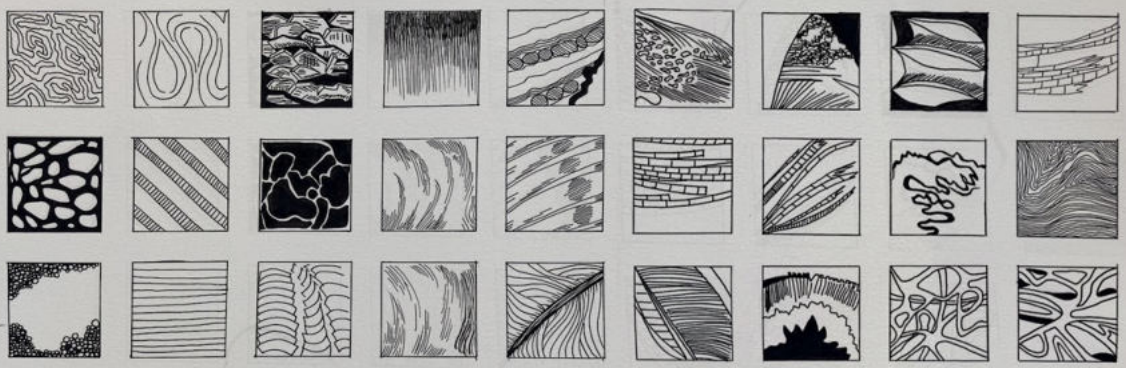

FISH BONE SPECIMEN
- large size

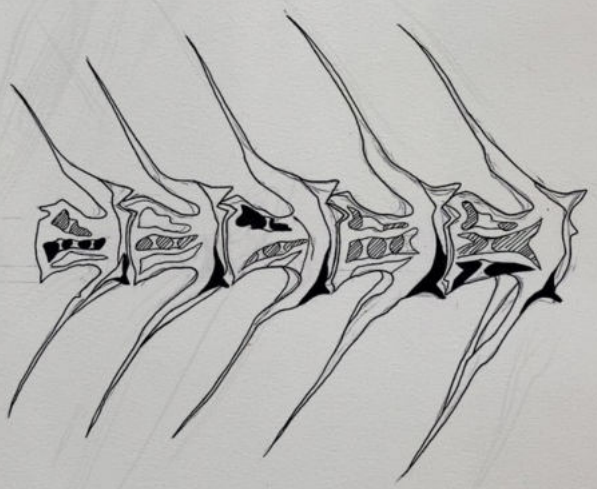


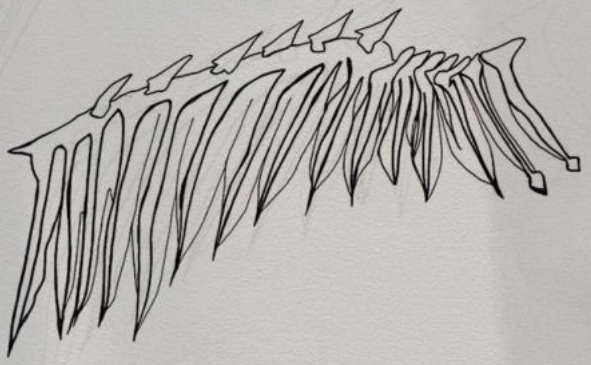

30cm
45cm

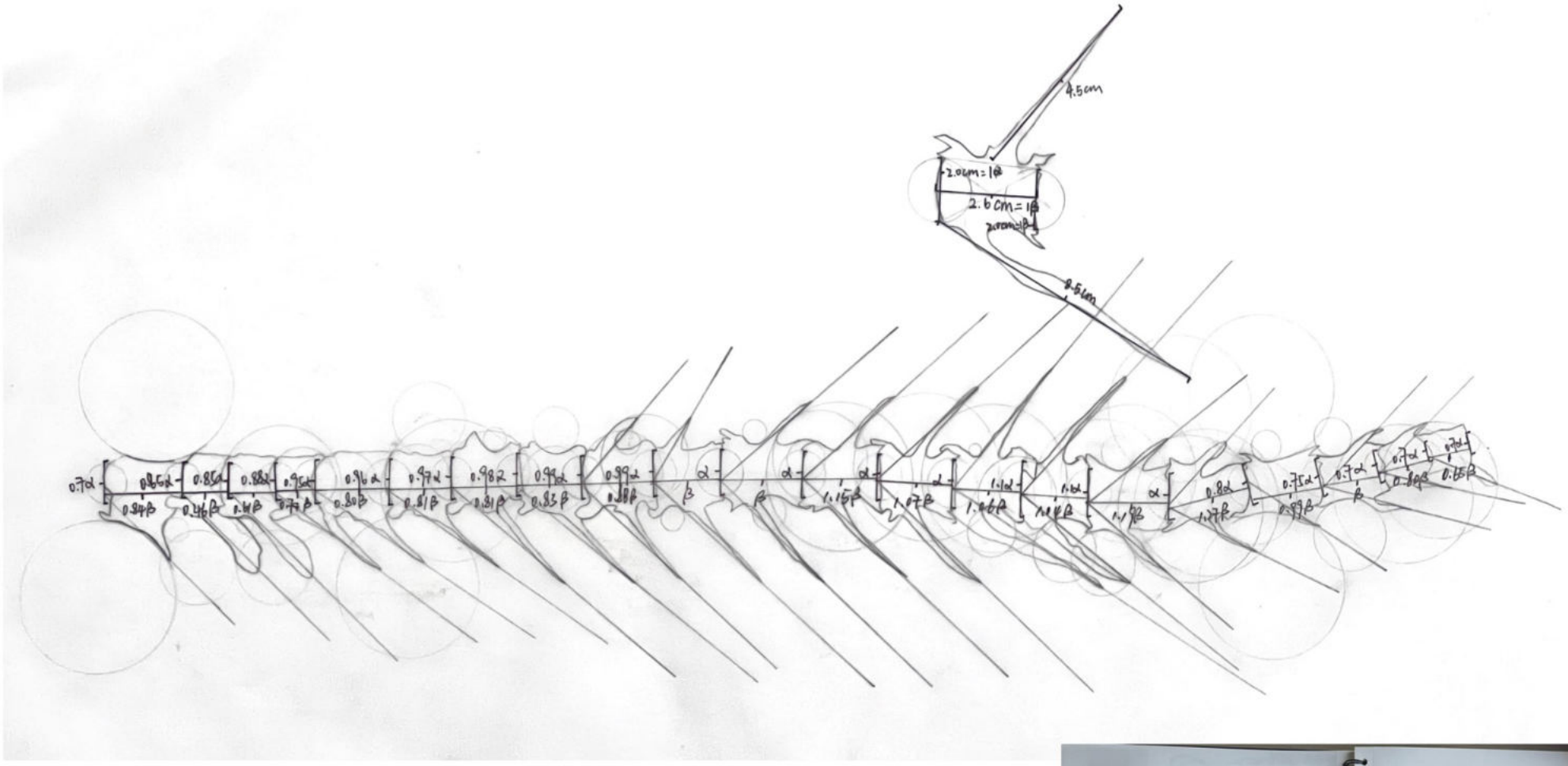

70cm
120 cm

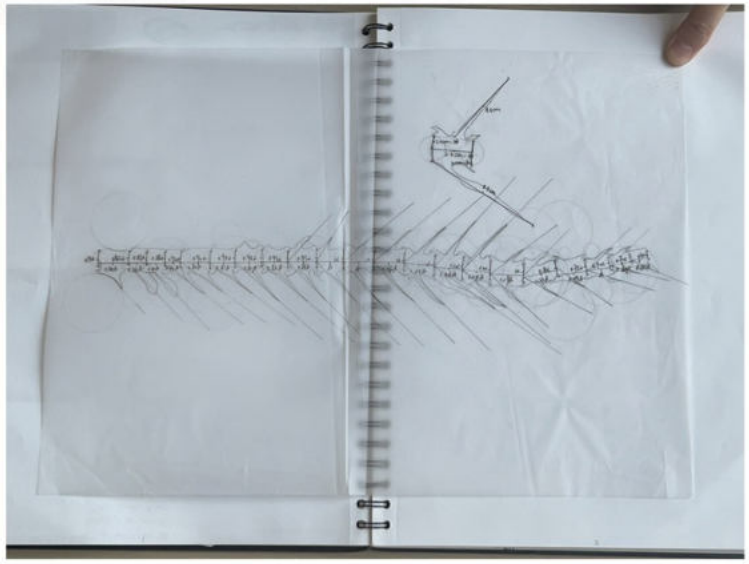
DEVELOPMENT

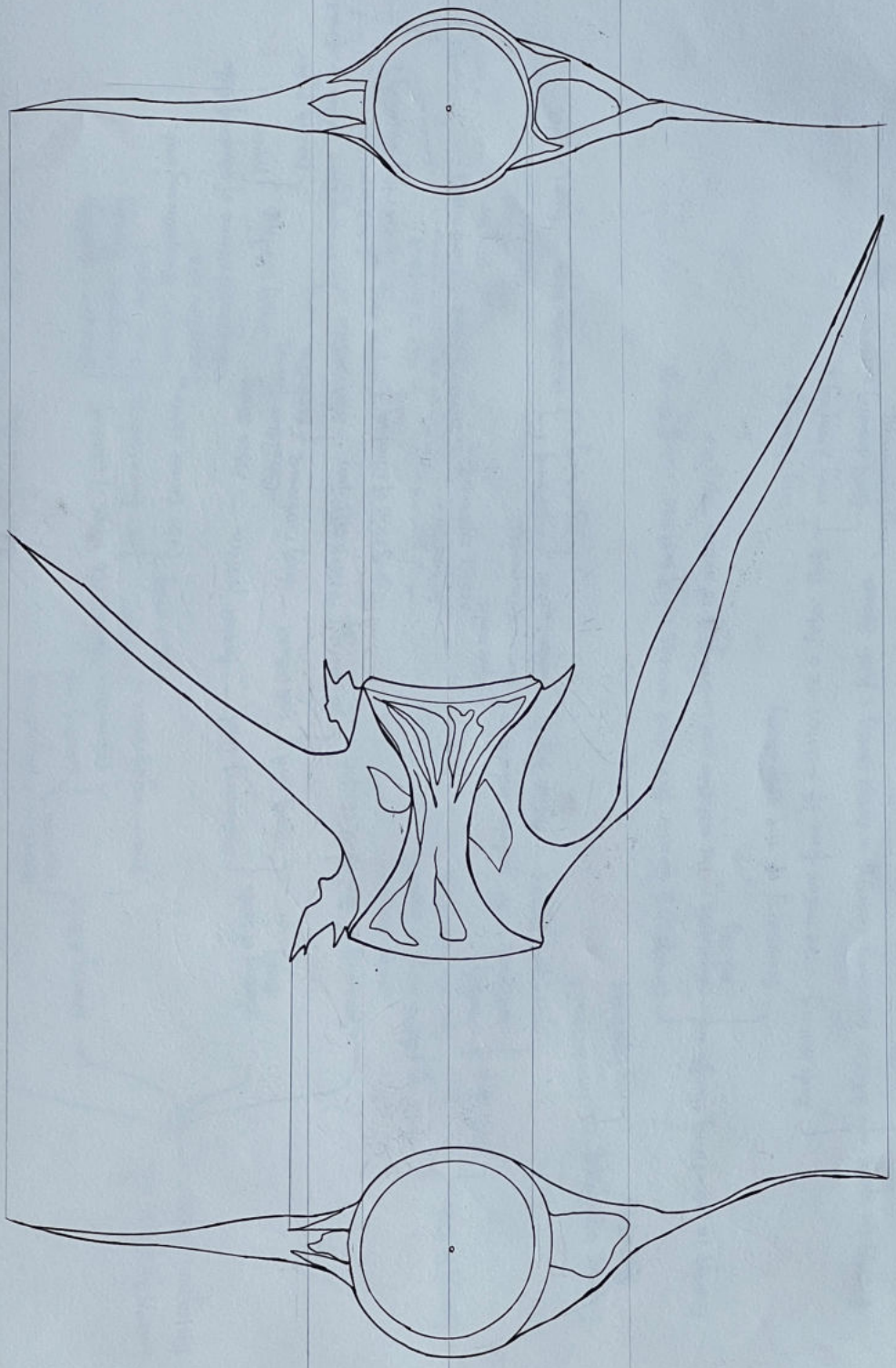




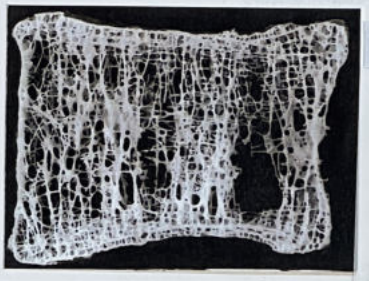



4.5cm
2.0cm=1β
2.6cm=1β
2.0cm=1β
8.5cm





EXPLORE



INSPIRATION

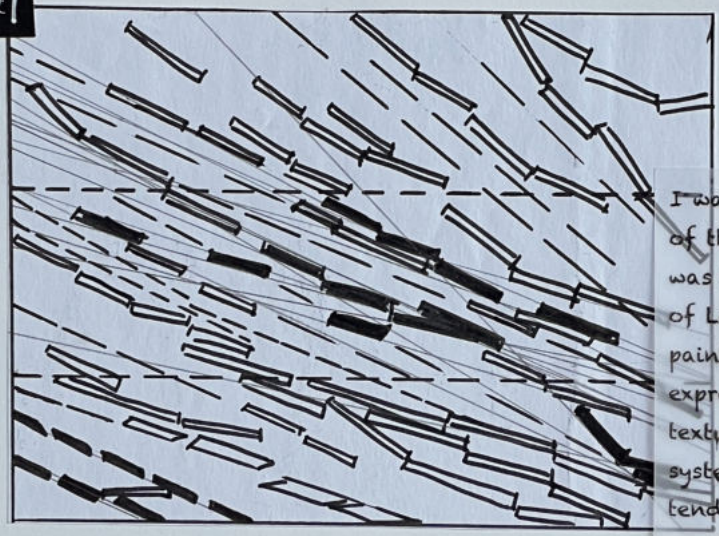
I was attracted by the microscopic pictures of bones in some medical textbooks and science news, microscopic bone fibers that create very special spaces and musculature that cannot be observed with the naked eye. I wanted to take a set of such images for my fish bones as well.

MY FEELING

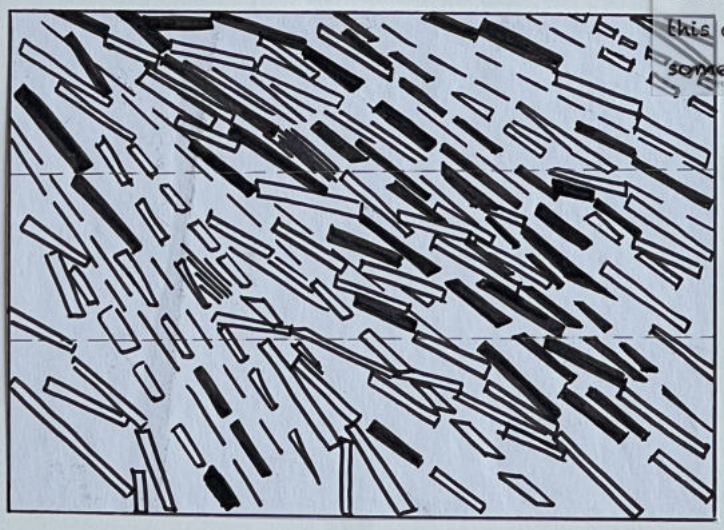
It occurred to me that I wanted to look at the fish from a more specific perspective because I wanted to have a deep enough understanding, and after the architect's inspiration, it occurred to me that I could use a macro camera to photograph the surface texture of the fish bones as a further development of the fish bone specimen. I did get a very rich content in this step, I zoomed in very much behind the fish bone and my perspective was completely transformed, I no longer saw the shape of the fish bone, but the rich texture of its surface with a sense of trend. They reminded me of many things, such as icebergs and the surface of the moon.

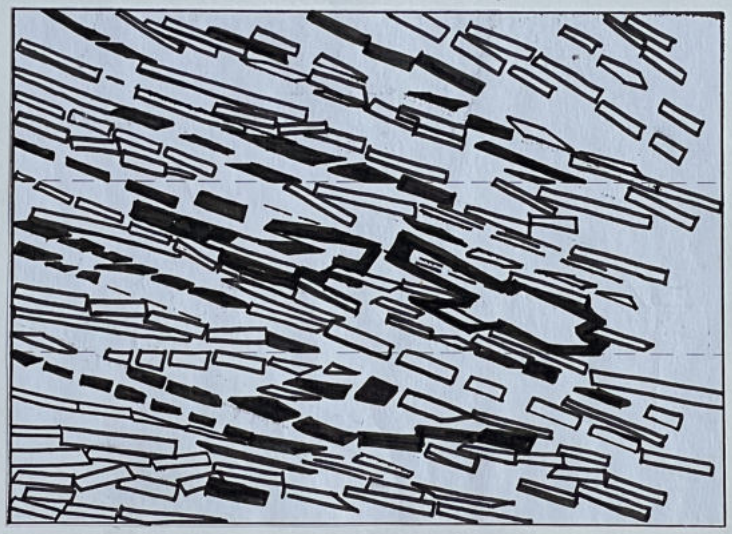
MY FISHBONE MACRO PIC

DEVELOPMENT



I wanted to draw the texture of the fish bones in a way. I was inspired by the paintings of Lebbeus Woods. In his paintings, he uses blocks to express a seemingly chaotic texture, but then creates a system with a sense of overall tendency. I think this is similar to what I feel when I look at fish bones, so I use this as inspiration to create some paintings.

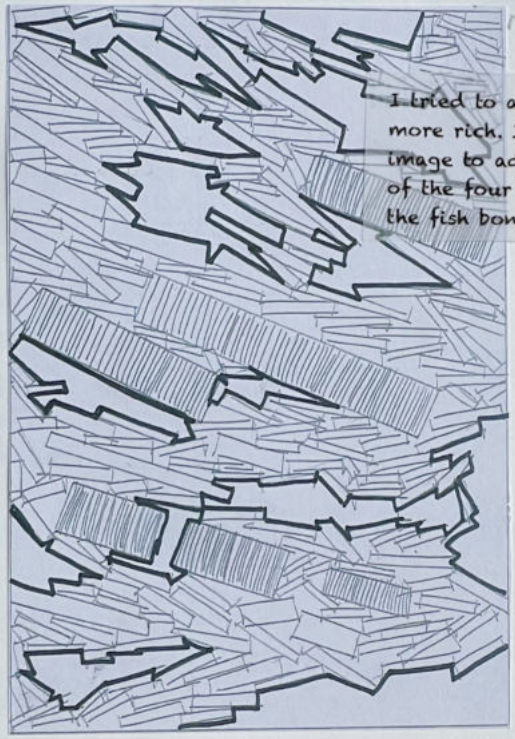


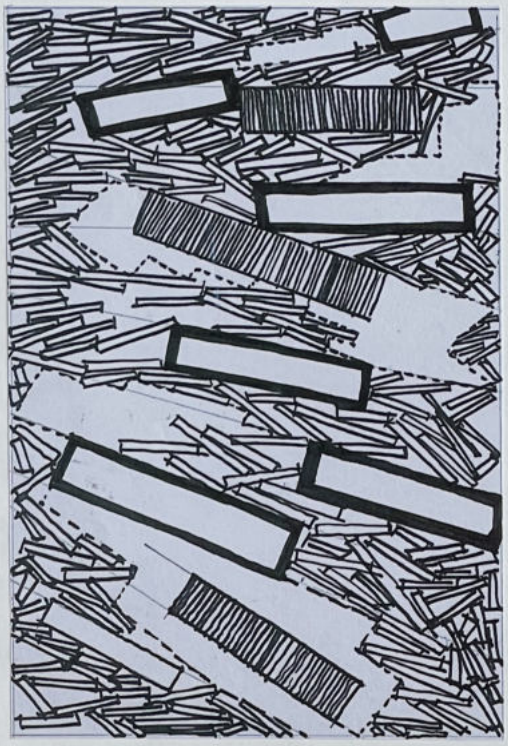


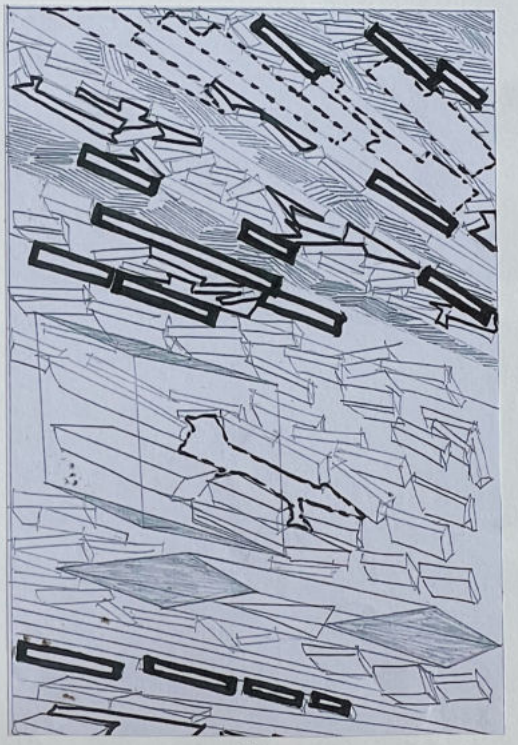
DEVELOPMENT

model

I tried to add new body blocks to make the image more rich. I used a richer medium than the previous image to adjust the color intensity of the image. Each of the four images focuses on a different element of the fish bone.







MOODBOARD

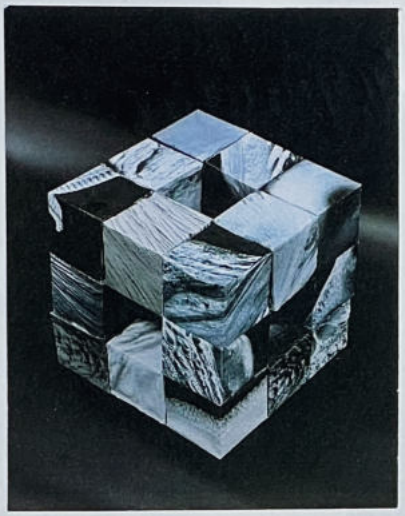
Record my inspiration

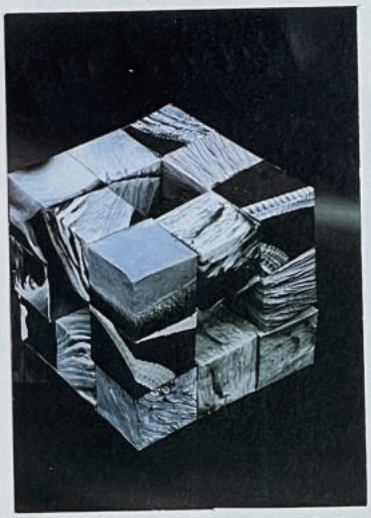
"Schools of fish & Block"

In fact, when I observe the surface texture of fish bones, I can often associate it with the tendency of fish movement. I can see through these mechanisms as if the fish are swimming through these gaps, and there is a feeling of fluttering. Immediately afterwards, because of the paintings I created, I felt even more like these schools of fish were coming towards me like some small rectangles.

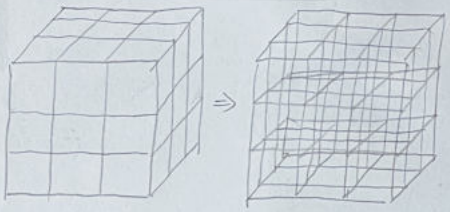
It was as if I could see the evolution of the fish in miniature, one scene in front of my eyes. My thought process was just like this collage ..... Finally, because I was influenced by the artist, I tried to make a model of this feeling I had.

DEVELOPMENT



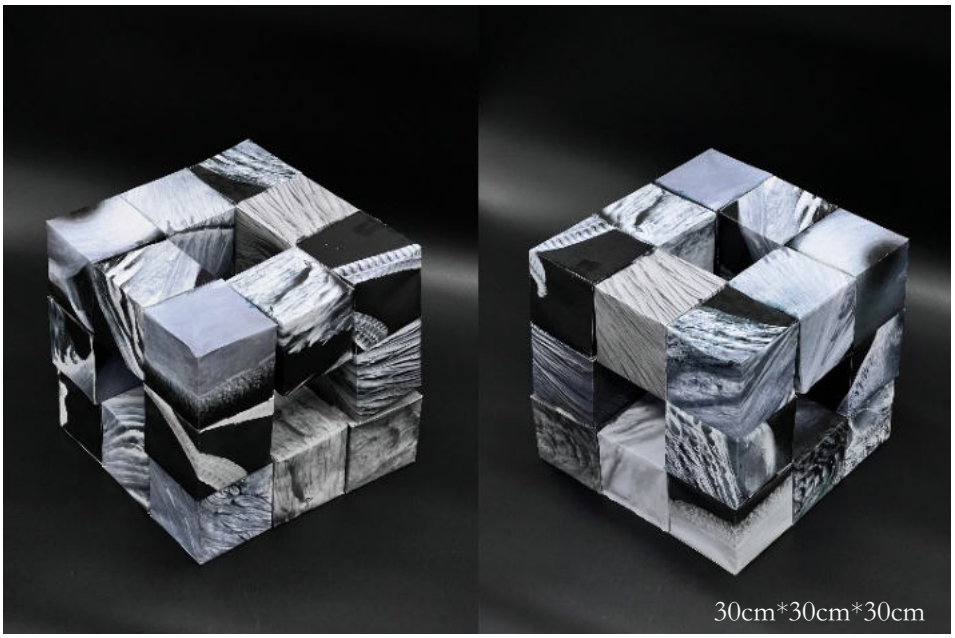


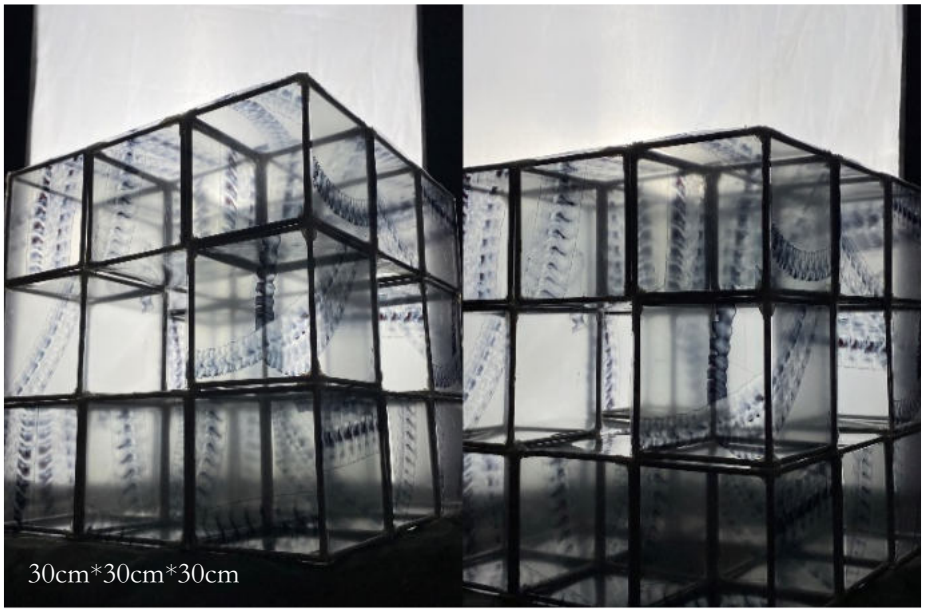
Because the mechanism is very disorderly, I want to try to add my own control to these disorderly incentives. This control had to be a regular rule, which reminded me of the square with its equilateral nature, making me think of it as a very orderly unit. In order to be able to see the space inside, I hollowed out the middle of this 3x3 square block.



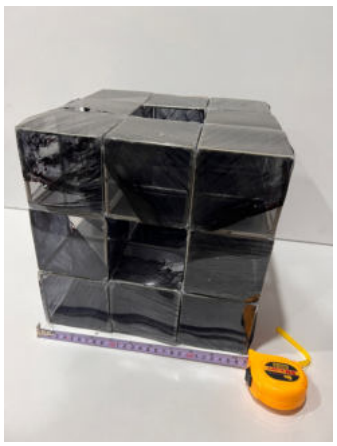
To enhance this sense of life in miniature, I replaced all the square blocks with film, and adjusted the transparency of the film and the lighting from behind while shooting. This way I could more clearly feel a sense of superimposed miniature.

Here I tried, two different mechanisms. One is a strip and one is a spread.


30cm*30cm*30cm

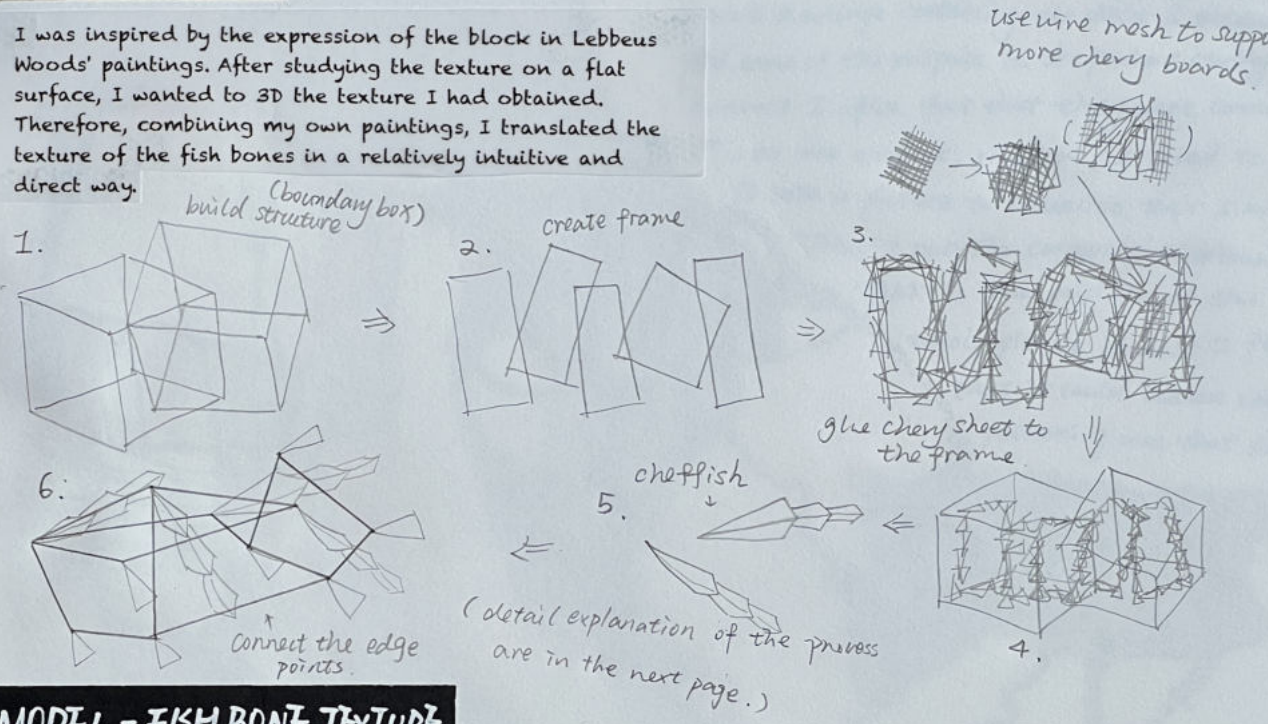

30cm*30cm*30cm


30cm*30cm*30cm



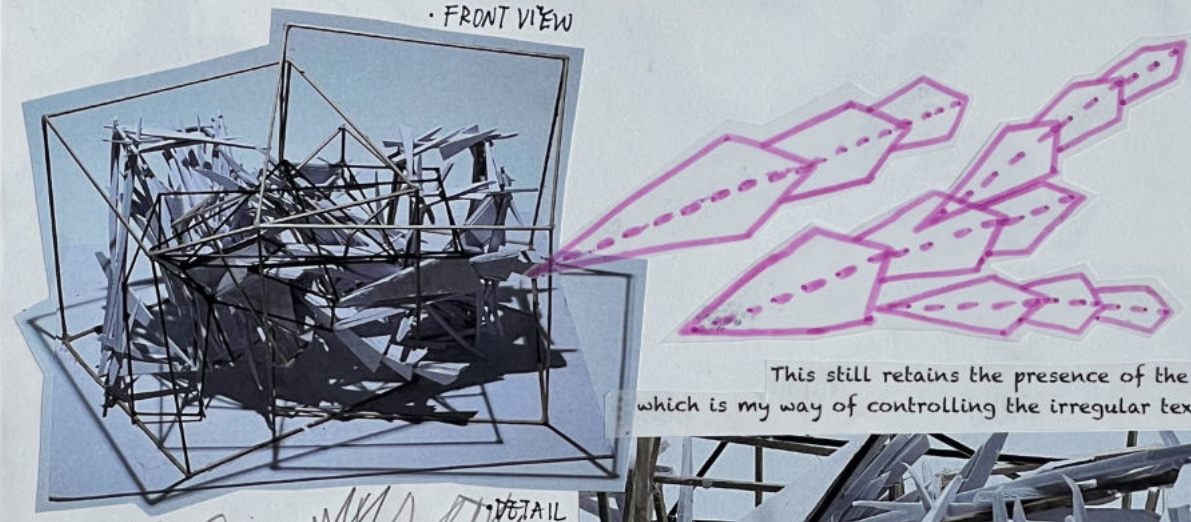
COMPOSITION IDEAS

I was inspired by the expression of the block in Lebbeus Woods' paintings. After studying the texture on a flat surface, I wanted to 3D the texture I had obtained. Therefore, combining my own paintings, I translated the texture of the fish bones in a relatively intuitive and direct way.



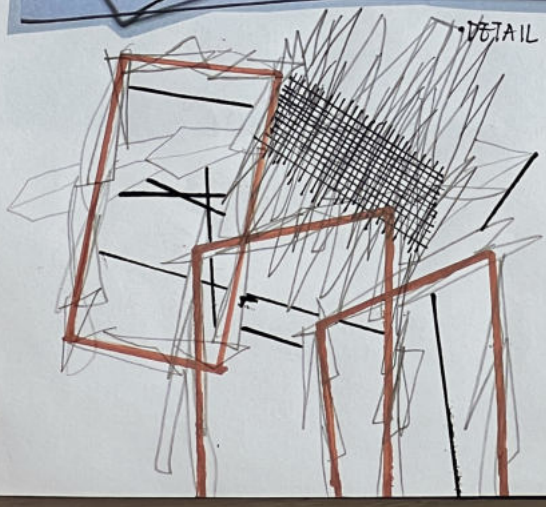
MODEL - FISH BONE TEXTURE

· FRONT VIEW



This still retains the presence of the square, which is my way of controlling the irregular texture.

· DETAIL

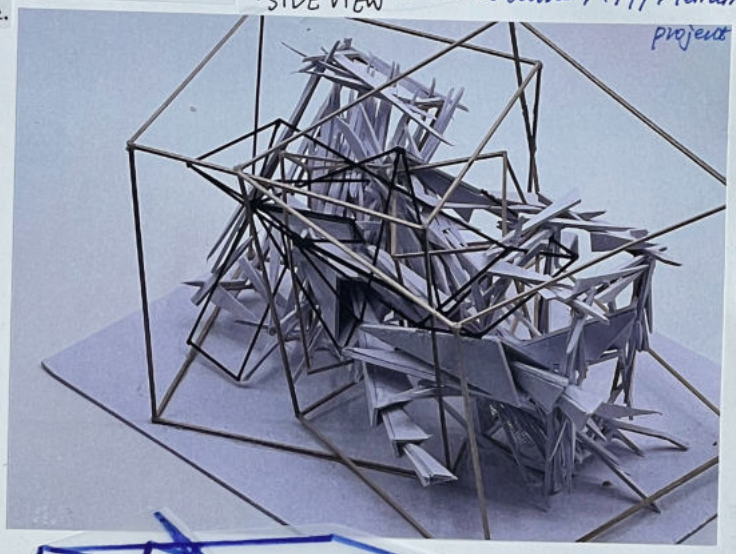


I was highly inspired by this model. The method of him to express texture inspired me a lot. →

< Lebbeus Woods, 1999, Terrain project >

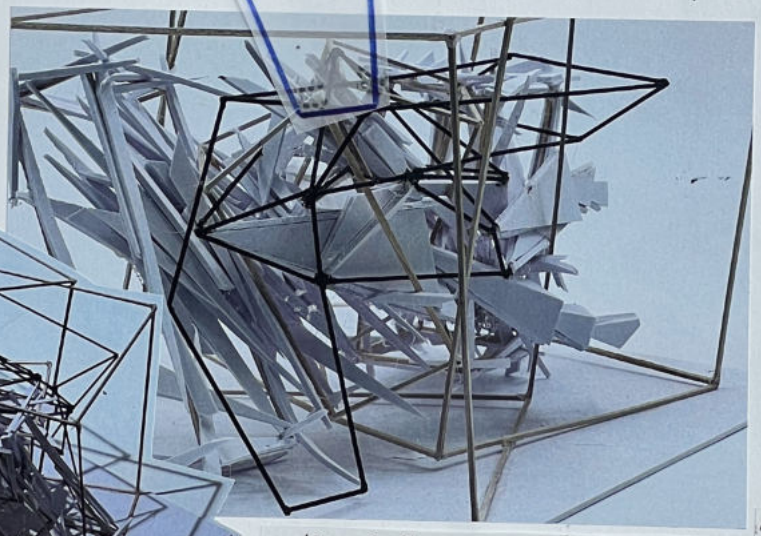
After most of the fragmented texture was created, I added some trigonal cones. They can be seen as fish, or as arrows. They are guiding and act as a guide to the overall movement trend of the texture.

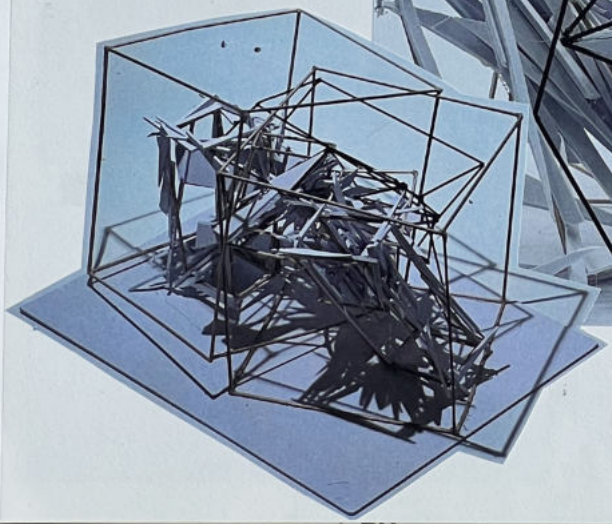
·SIDE VIEW



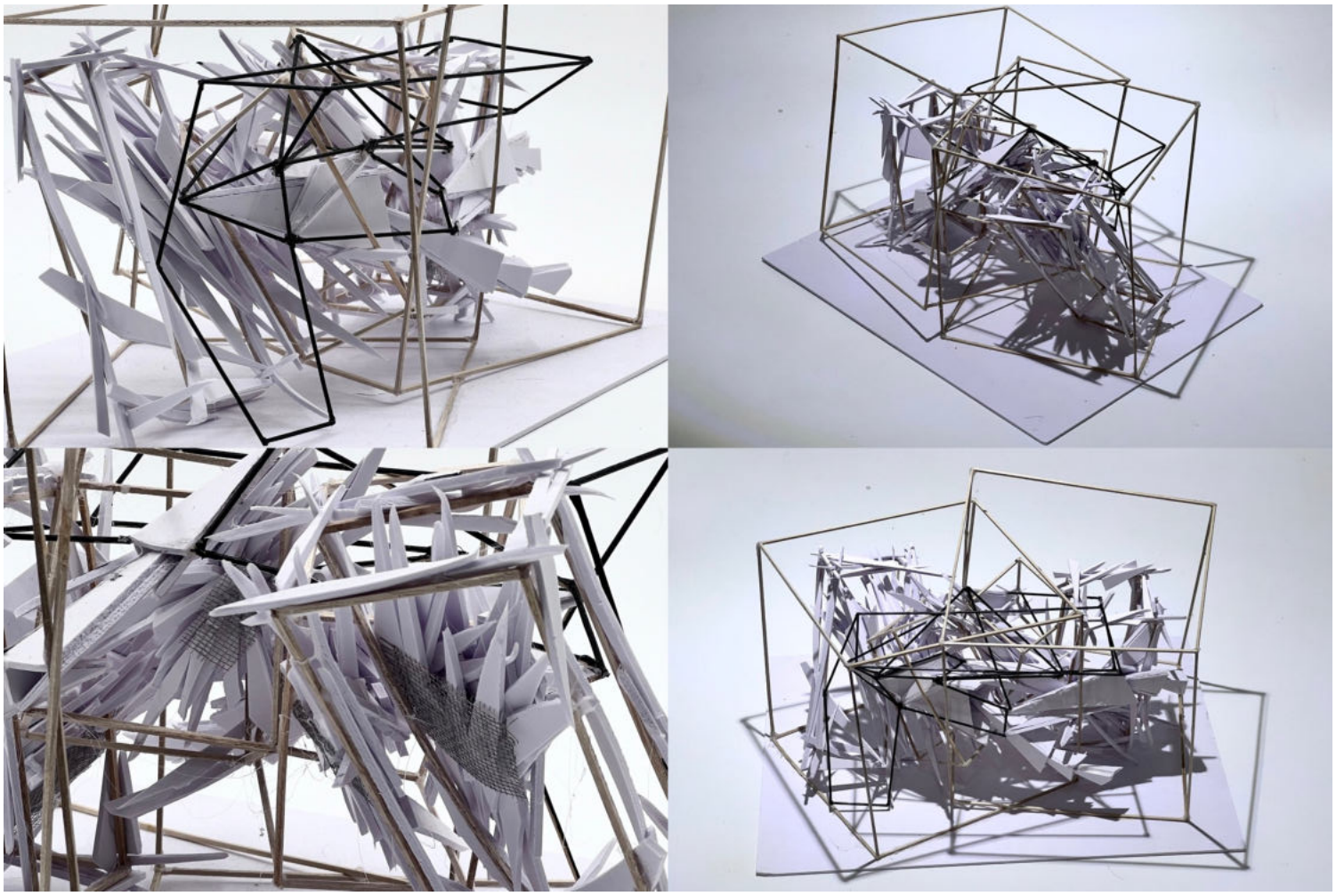
·SIDE VIEW

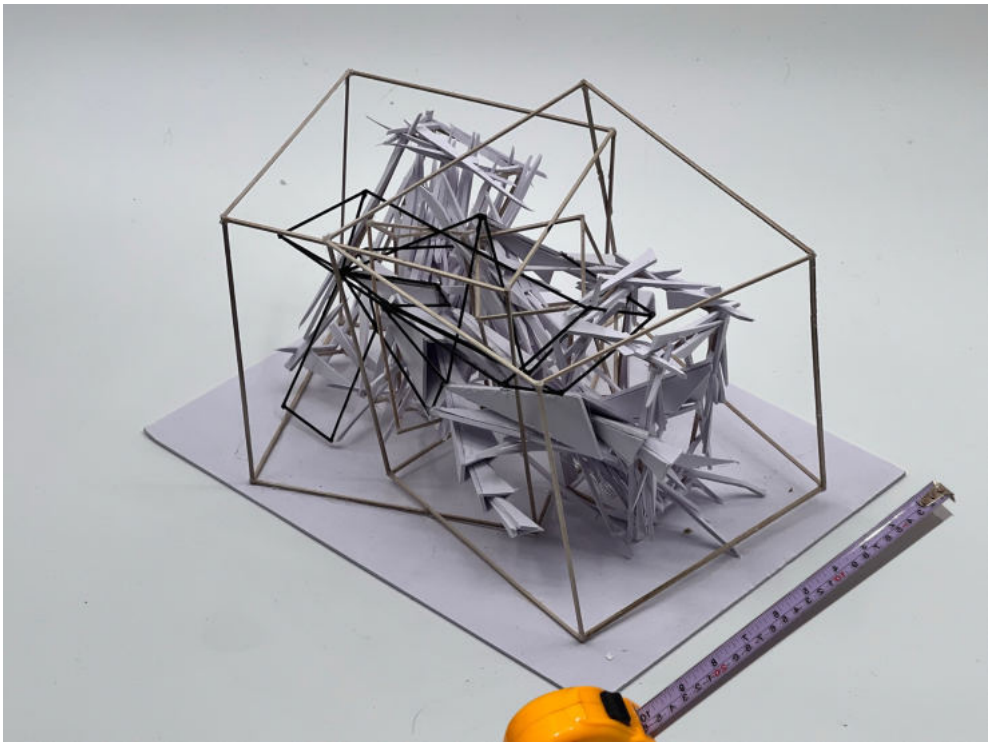
BLACK LINE STRUCTURE





And the black lines in them connect the end points of the different arrows. This is my attempt to add another layer of logic on top of the mechanism, which is a small attempt. Because in the process of making it I had a thought: can the logic embedded in the texture be reflected?



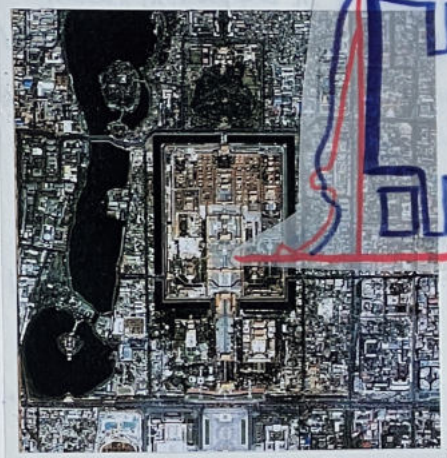


45cm*27cm*20 cm

COLLAGE

I made a collage containing the cities I observed and some of the outputs in the previous study. Because I often felt that they were connected or, on the surface, similar, I tried to put it into a picture to visualize their similarities. I put the cymatics experiment right in the middle of the whole picture because I found that it could connect whose patterning was that similar.

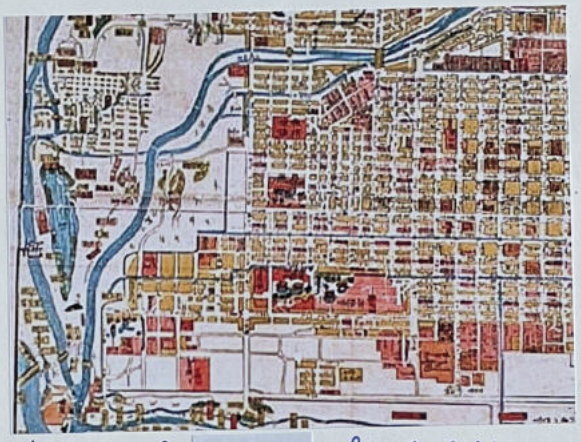
EXPLORE



< Beijing, Skyscrapercity Forum >

< Map 1914 Beijing, Etsy.com >

I found a series of top views of the city and found a comparison of top views of the same location between two different eras. Despite the passage of time, high speed of technological development and changing natural environment, the layout of each city seems to still follow its own pattern.

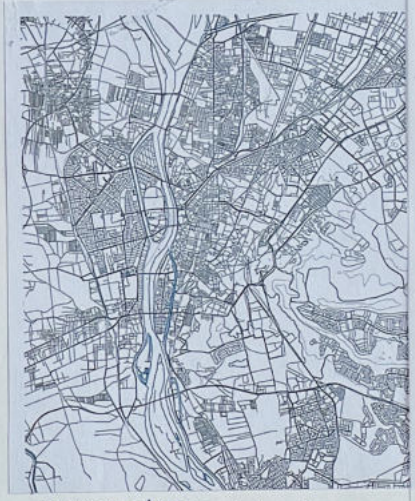


< Japanese Pictorial map of Kyoto, 1864 >

Takehara, Kobe university of British Columbia.

< TOKYO MAPCITY AT NIGHT, oloMAP Studio >

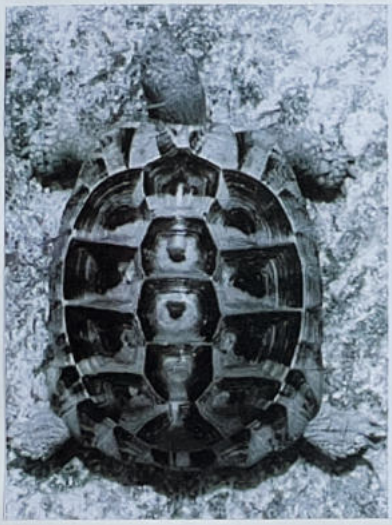
< MAP OF ANCIENT EGYPT, EGYPT museum >

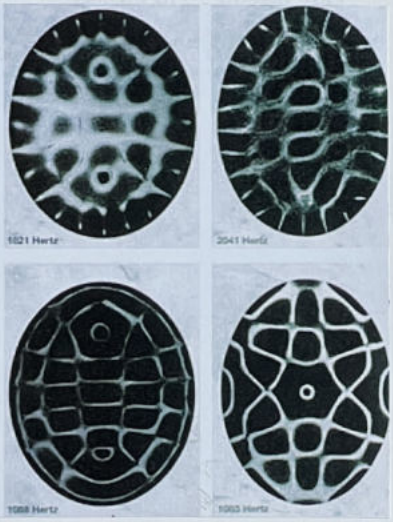


< CAIRO, EGYPT, Res-tko.pl >

Additional notes (reflections after doing the Cymatics experiment):
Humans, animals, rivers, mountains, buildings and a series of other things that exist on the surface of the earth and are visible to our naked eyes are like the sand on the iron plate in the experiment. And the energy contained in each city is basically fixed. So no matter how time changes, no matter how humans change the city, the appearance of the city from the top view remains the same (the density of buildings, the regularity of their arrangement). A different city has a different energy, just like a different Hertz on an iron plate, and each city has a very different top view.

EXPLORE <Cymatics>

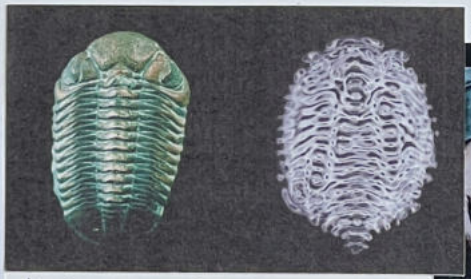




Cymatics is the study of visible sound and vibration. The phenomenon is visualized through various materials: powder on rigid surfaces, fluids, liquid paste and also digital imaging techniques. I'm most fascinated by the very simple analog experiments.

Ernst Chladni used a violin bow along the edge of a metal plate to reveal the so-called *Chladni patterns*. Today of course we use more sophisticated tone generators, the rest stays the same. In the last century, Hans Jenny coined the term *Cymatics*. He was the kind of Renaissance man: physician, fine artist, pianist, philosopher, historian, and empirical researcher. The second and third video attached is by him.

Today there are a lot of people carrying on the torch with great experiments. For example Alexander Lauterwasser (most of the pictures after the videos are from

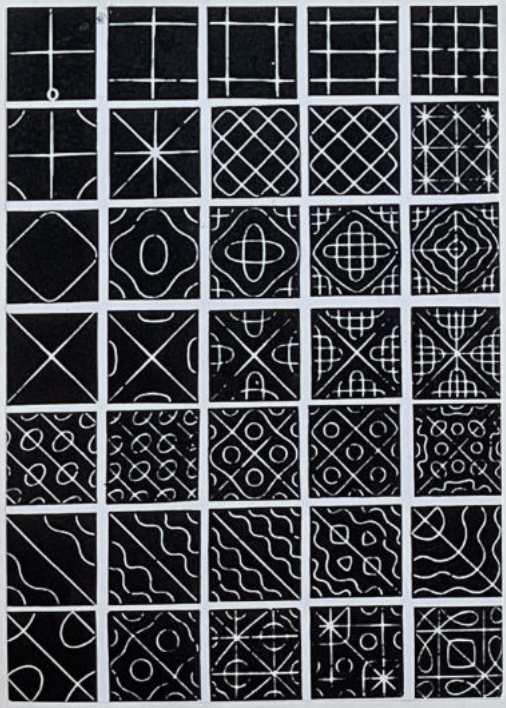


SEVERAL CYMATICS:

Cymatics also shows us what is happening to the water in our bodies when the cells are exposed to different frequencies. This implies that with certain frequencies, coupled with love and intention (as we can also see in Dr. Emoto's work, showing how energies such as music and love affect the molecular structure of water), we can restore harmony and therefore the health and function of living organisms.

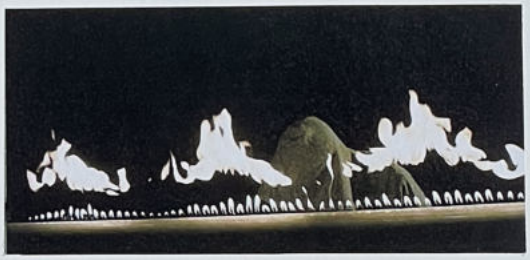
※. The higher the Hz is, more complex the pattern is.

LOWER HZ



HIGHER HZ

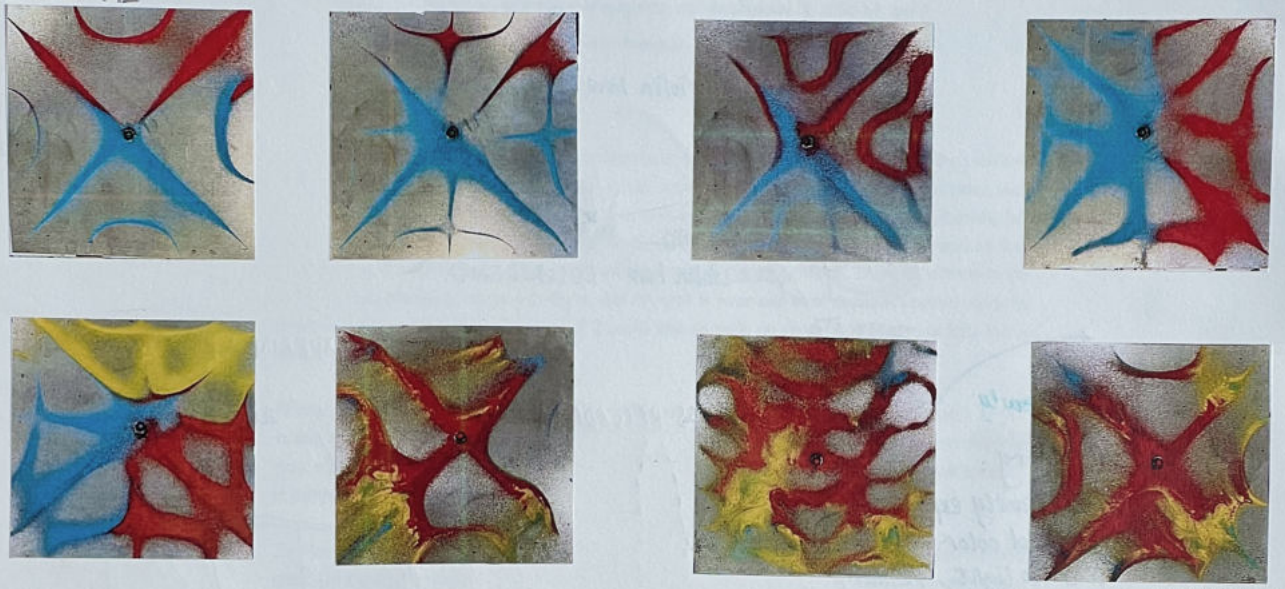
The apparatus employed can be simple, such as the ancient Chinese spouting bowl, or Chinese singing fountain, in which copper handles are rubbed and cause the copper bottom elements to vibrate. Other examples are a Chladni Plate or advanced technologies such as the CymaScope, a laboratory instrument that makes visible in water the inherent geometries within sound and music.



EXPERIMENTS

Here, I just tried different color of sand to perform cymatics experiments.

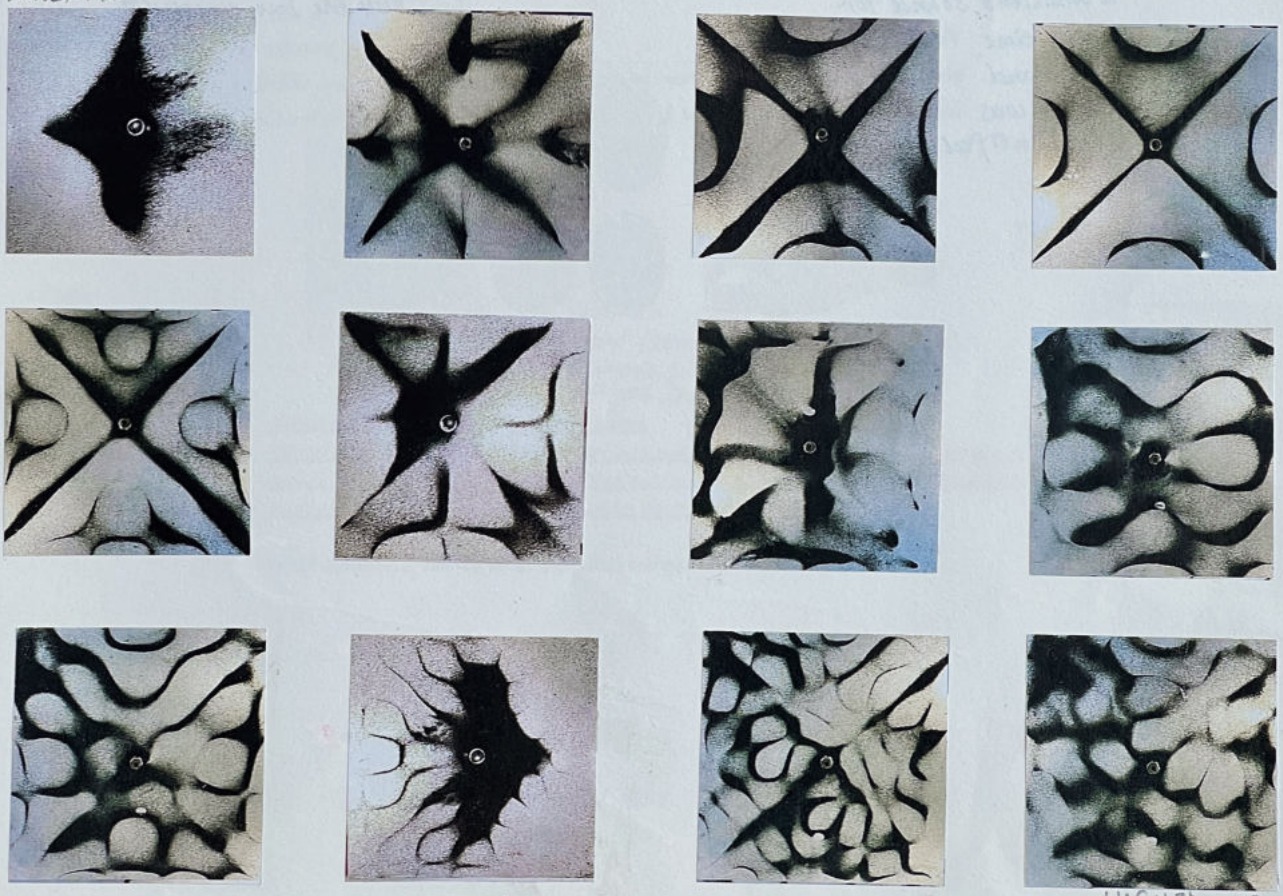
LOWER HZ



HIGHER HZ

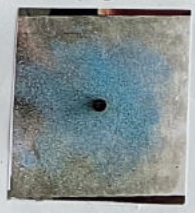
The black sand created a different vibe with colorful sand.

LOWER HZ



HIGHER HZ

EARLY EXPERIMENT: (PRACTICE)





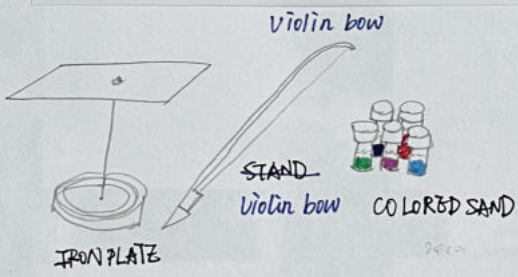



Summary:
In my early experiments, the sand color chosen was too light, resulting in poor experiment results. At that time, I could not maintain a consistent sound for a long time, so the sand pattern was not beautiful.

PRACTICE EXPERIMENT

PREPARE MATERIAL:

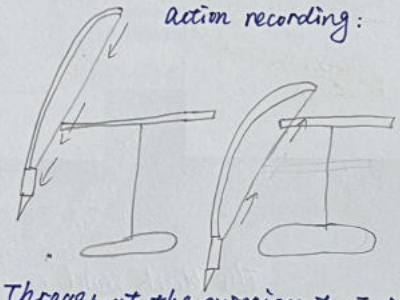
The tools I needed to prepare were a violin bow, an iron plate, ~~a stand~~ and colored sand.



EXPERIMENT SETTING

MY PROCESS RECORDING:

Action recording:

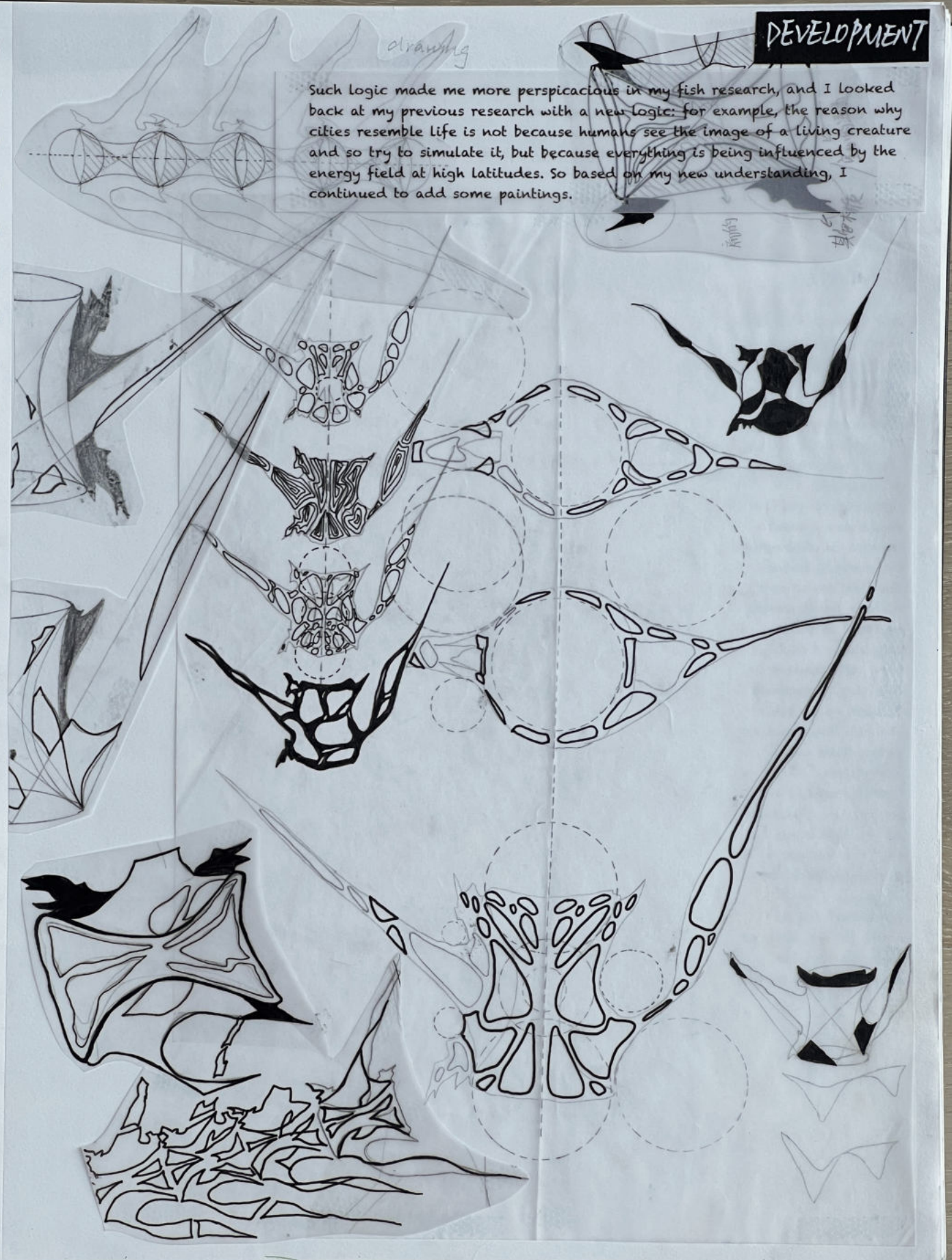


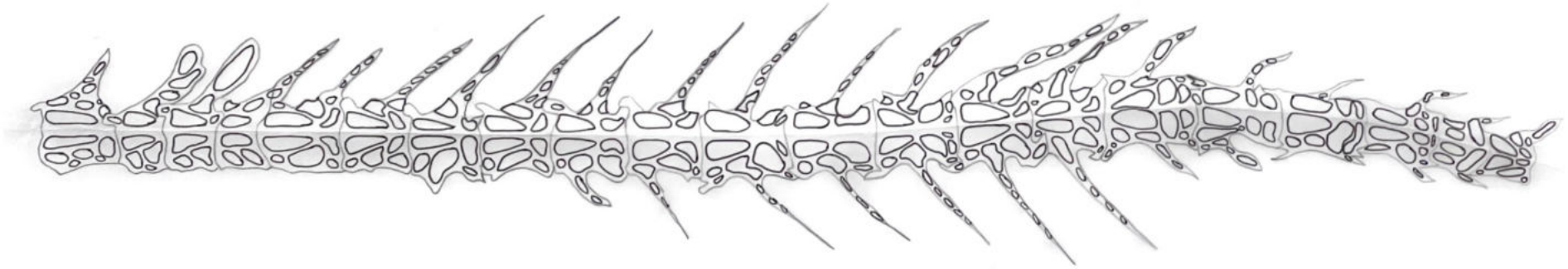
Throughout the experiment, I had to pull the bow repeatedly.

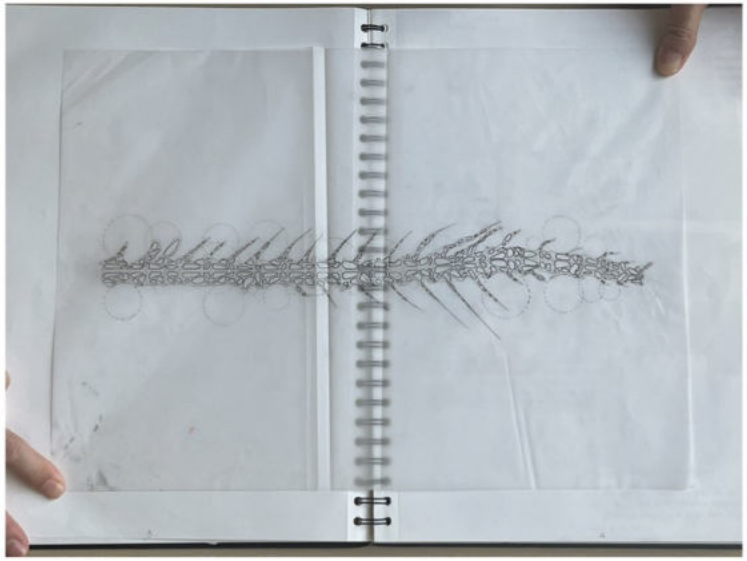
The most important thing is that I need to learn and practice how to use different strengths to make the iron plate have different Hertzian vibrations. It took me a long time to master how to make a steady high Hertz vibration.

DEVELOPMENT

Such logic made me more perspicacious in my fish research, and I looked back at my previous research with a new logic: for example, the reason why cities resemble life is not because humans see the image of a living creature and so try to simulate it, but because everything is being influenced by the energy field at high latitudes. So based on my new understanding, I continued to add some paintings.





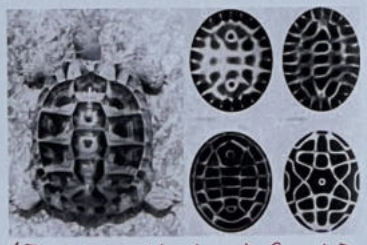


explore:

Whether in macro and micro studies, whether in the study of animal clusters animal monoliths or cities, energy seems to be everywhere. I can see traces of energy in many of my studies, and he reminds me of it repeatedly. I wish there was a way for me to look at energy squarely, for me to see it visually. It was the energy itself, not his spidery traces. So in my perusal of the word energy, I inadvertently discovered an experiment: cymatics, which I found seemed to be able to study energy in its purest form, and to test it over and over again in various ways to prove its existence. I thought that if I could also do such an experiment, it would help me a lot in developing my ideas.

After further researching the principle of this experiment, I found that it was not difficult to implement, but the creators in the web used a richer and more sophisticated way to express this experiment artistically. the underlying logic of cymatics is very simple, and I can operate it completely.

In the whole exploration of Cymatics, what inspired me most was this picture: the tortoise shell. He made me realize that everything I observed in Cymatics, it is controlled by energy. This way there are many similarities that can be 'answered. For example, the similarity between the myriad of animal clusters and the musculature of individual animal bones in nature. Or even the creation of human beings who think they have nothing to do with nature: the layout of cities and the terraces. More details down to the cracks of walls and the indentations of tires. This innumerable high degree of similarity is not due to chance, but to an identical energy.



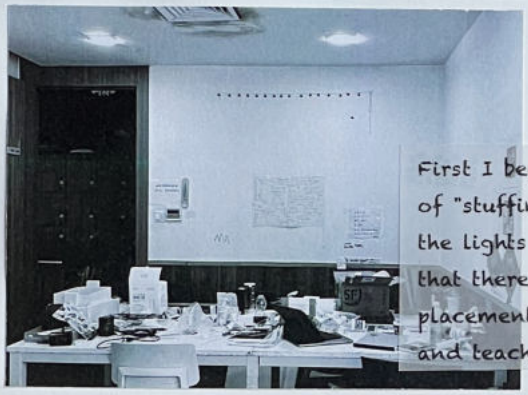
〈Tortoise beside Cymatic Sound Patterns. 〈my work〉
2015, 23 September, Twiglet〉
(twigletruth.wordpress.com)

This is my summary of the discovery of energy:
Energy exists and propagates in its own way, and energy makes matter change form as it passes through. I originally thought that energy flows with patten, I later realized that energy is active and it is the form of matter that is passive.

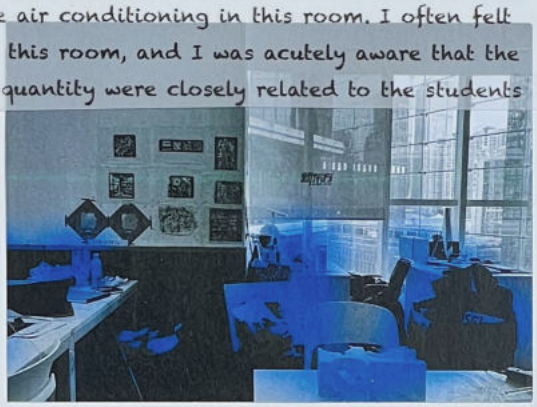
After Cymatics, I wanted to further study energy itself.

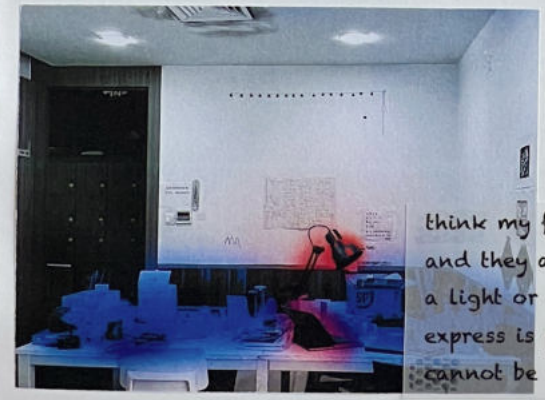
EXPLORE

I wanted to explore the energy in space, so I picked the place I knew best, r classroom.



First I began to think about how I felt in this classroom. I often feel a kind of "stuffiness" in here. I think it has something to do with the arrangement of the lights and the position of the air conditioning in this room. I often felt that there was a lot of clutter in this room, and I was acutely aware that the placement of the clutter and its quantity were closely related to the students and teachers.





At the same time human behavior is influenced by this clutter. I think my feelings in these people's classrooms are controlled by all of this, and they are not the same as a physical injury: for example, if I am shaken by a light or if I cut my hand with a pair of scissors. The feeling I really want to express is psychological, or outside of the object itself. It is something that cannot be seen with the naked eye, but can be felt.

Therefore, to further specify my feelings, I set up my own system in the classroom. I think that the energy of an object can be used as a classification according to whether he is charged or not, so I define the uncharged clutter who has blue energy while the charged clutter carries red energy. In this step of preprocessing, it was as if I had a clearer perception of what I was feeling: that is, these objects, they do have energy surrounding them that is not visible to my naked eye.

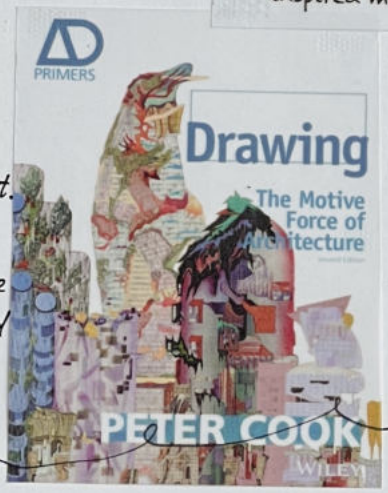
BOOK Study:

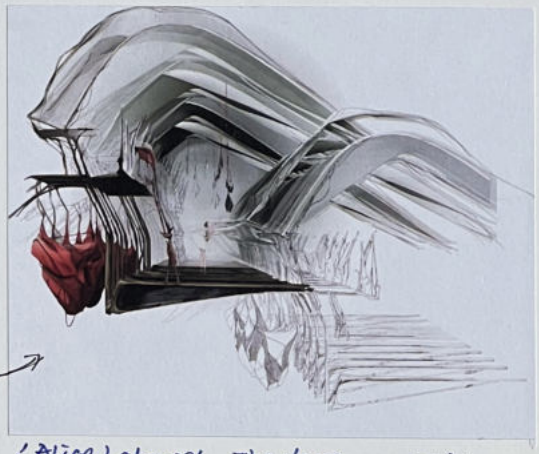
< the motive force of architecture >

peter cook

I studied a book by Peter Coop about how architects reprsent concept and many of the drawings in this book inspired me a lot and totally encouraged my imagination.

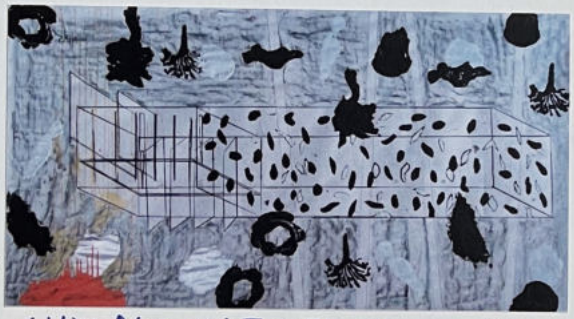
This illustration shows the many ways a space can exist. There may be four spaces in this picture, only one can be seen by the naked eye, and the other three are the feelings of the author.



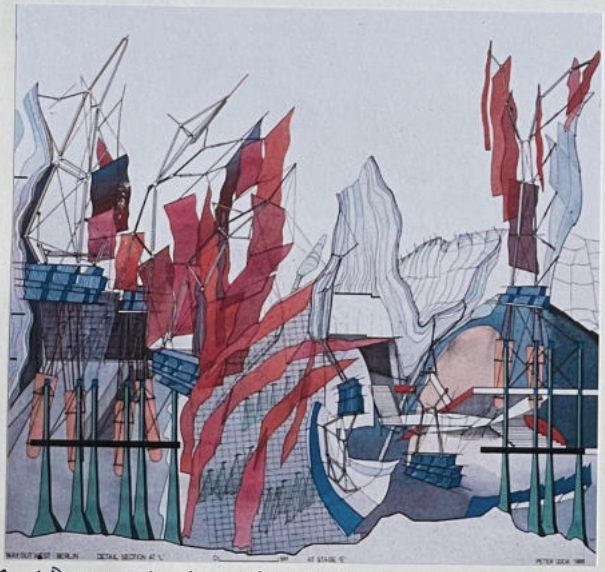


< Alice Lakourel , The classroom, 2013 >

First of all, I learned how to classify the information that the eye sees in the brain and then express it in an artistic way. I learned how to change colors and shapes to create different, yet harmonious content in the same picture.



< Will Alsop and Tim Thornton, 2006 >
Museum at Glenwood Powerhouse



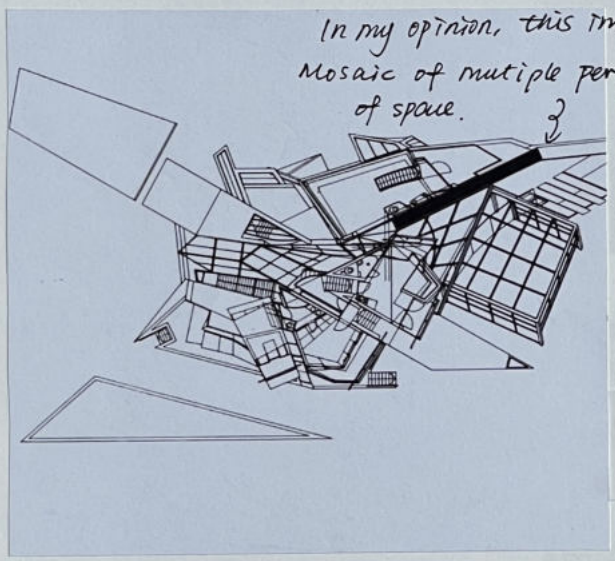
< Peter Cook , Way Out West - Berlin , 1988 >
60 x 75cm

It seems to me that there is a projective relationship between the object inside the rectangle and the object outside the rectangle.

This image inspired me to fly the furniture in to the room itself into the sky to add content to floor and ceiling.

< Peter Cook , Way Out West-Berlin, 1988 60x60cm >

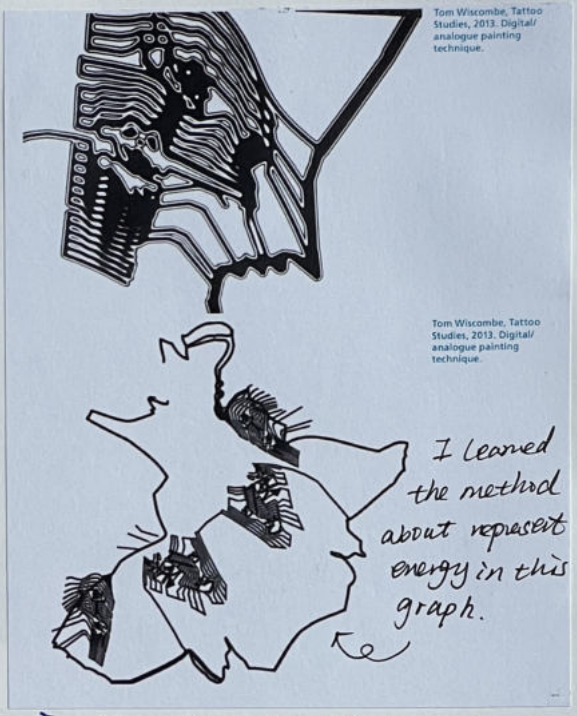
Secondly, expressing both flatness and three-dimensionality in one picture is one of the very important takeaways from this book for me. Such seemingly disordered space can precisely map out the impression of space in people's minds better. Human feeling is inherently complex, and it should not be limited by too many rules in real life. After I get in touch with a piece of paper, I am the master of this paper, I can do whatever I want on this paper, I can create more boldly. I should not be restricted too much, as long as I can express my feelings.



In my opinion, this image is a Mosaic of mutiple perspectives of space.

〈Günther Domenig, Stonehouse, 1985〉

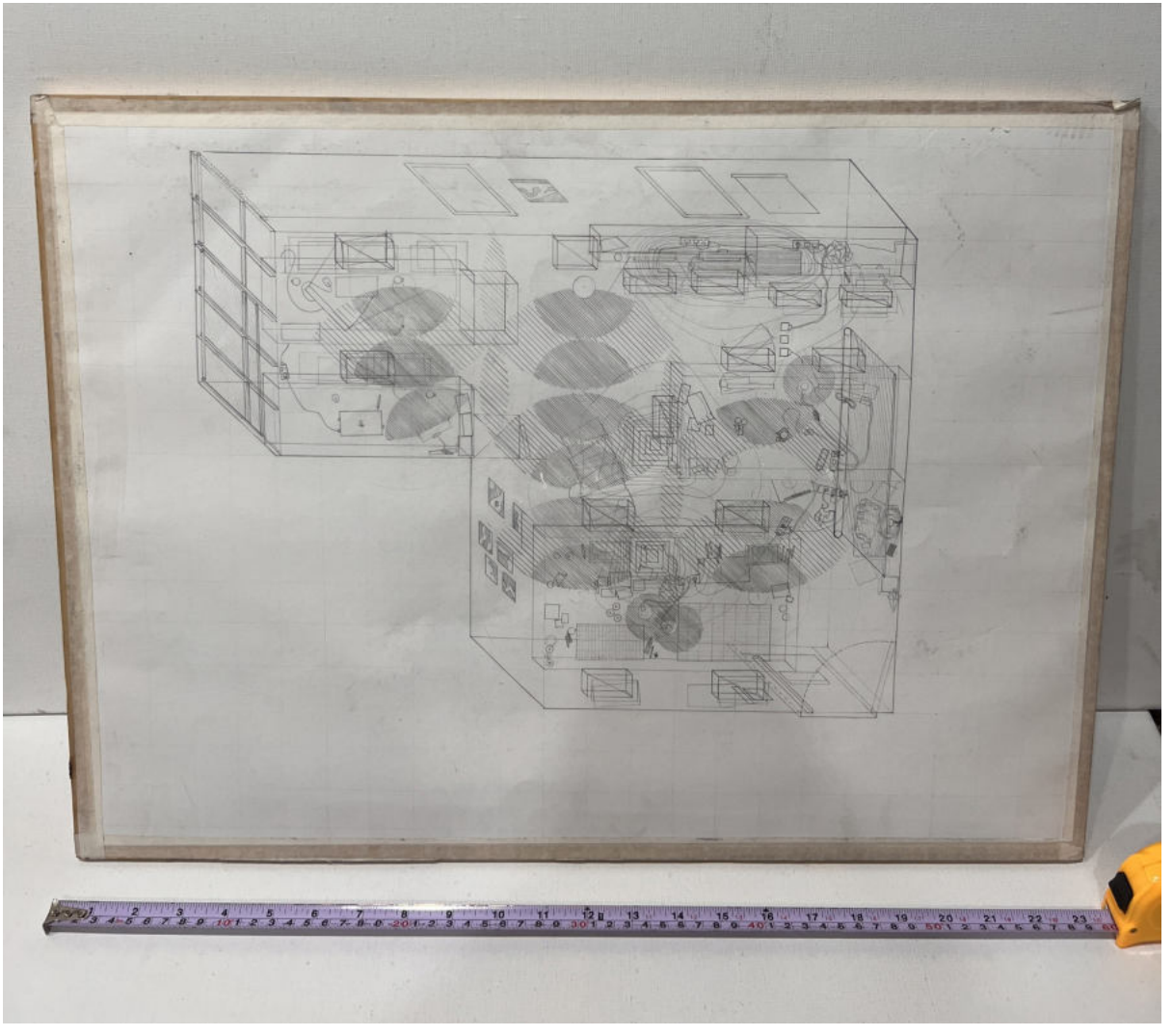
In this image, I realized that the top view was probably the best way to express all the information in a space, and that I could add different logic by stacking different pieces of paper.



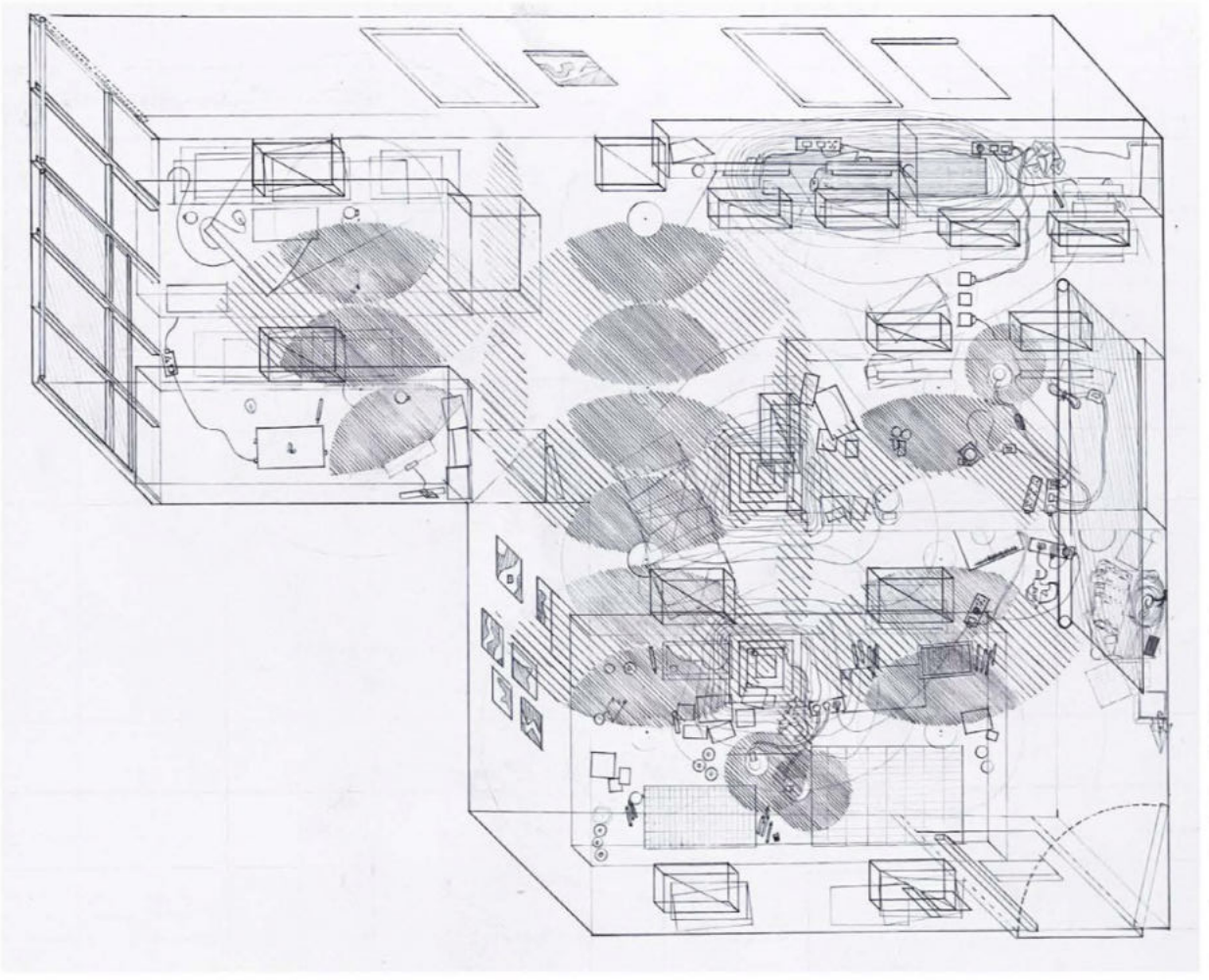
〈Tom Wiscombe, Tattoo Studies. 2013〉

In the end, the expression of energy in this book is very diverse and I can find almost everything I want to use here.

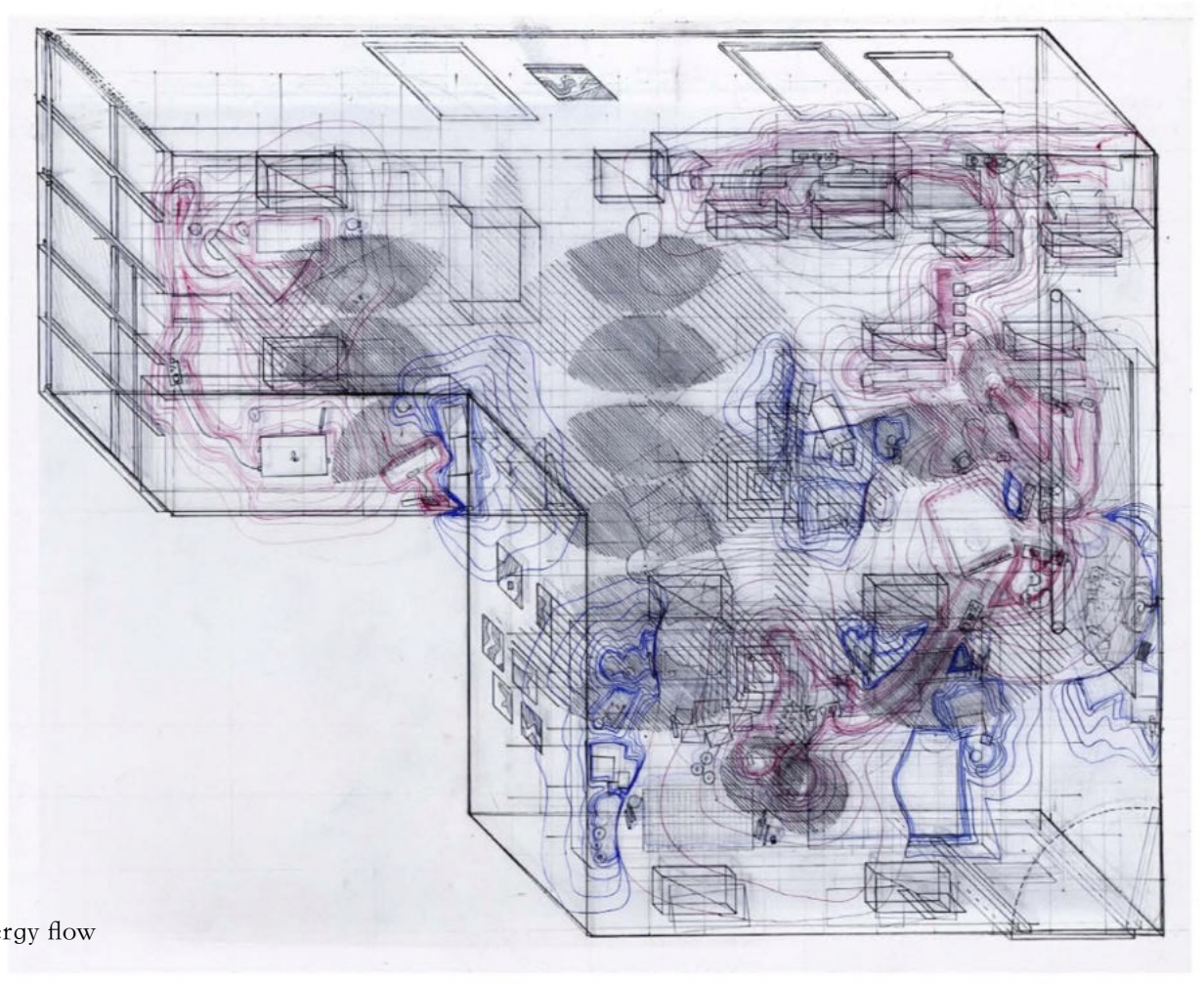
〈Christine Hawley, Shadow House, 1980〉
48×65.5cm



classroom
A2 size drawing



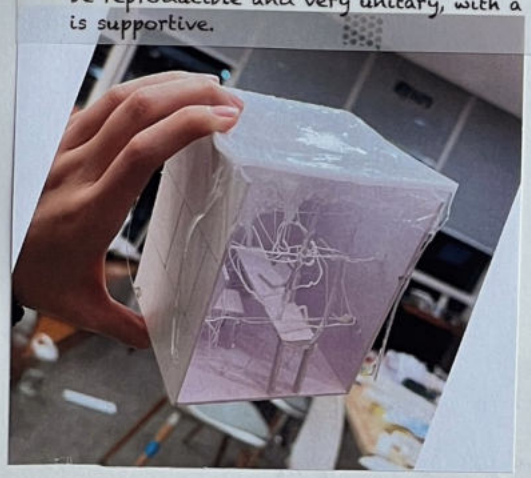
classroom
A2 size drawing

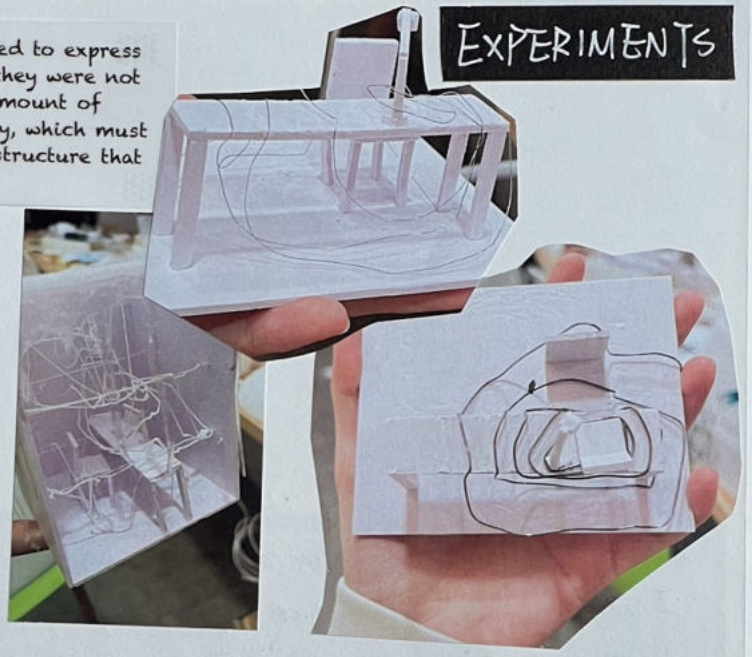


classroom with energy flow
A2 size drawing

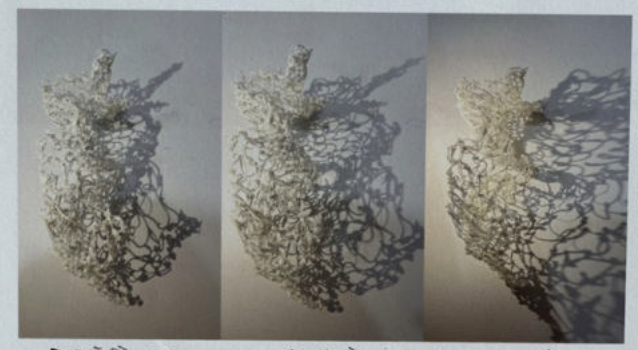
EXPERIMENTS

I conducted a series of experiments I tried to express energy with dripping wire, but invariably they were not enough to support a system with a huge amount of energy. So I started to look for a new way, which must be reproducible and very unitary, with a structure that is supportive.



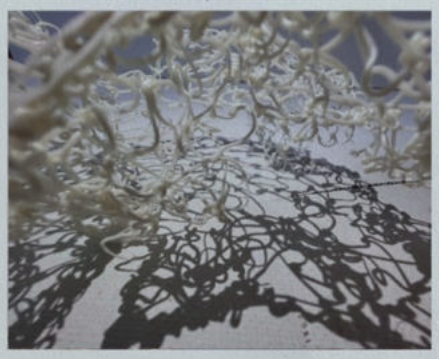


AFTER ARTIST STUDY

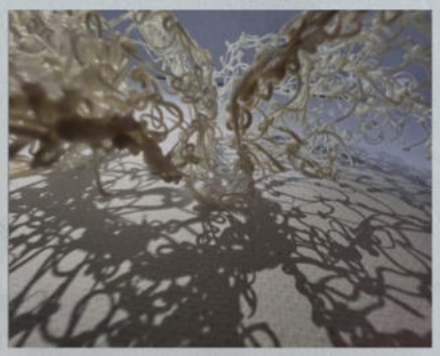


position1 position2 position3

This is the product of my learning as the artistist, and I discovered that by changing the position of the light source, it can also emit special shadows



I chosed 3D printing pen instead of the artist's wire. because I think it is easier to manipulate, and the 3D printing material after solidification is supportive.



Sculpture

Ruth Asawa

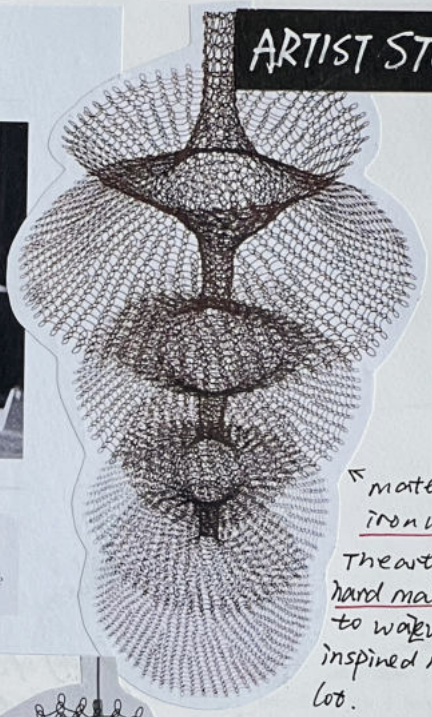
ARTIST STUDY

Photo by Allen Nomura

"Her concept:

"My curiosity was aroused by the idea of giving structural form to the images in my drawings. These forms come from observing plants, the spiral shell of a snail, seeing light through insect wings, watching spiders repair their webs in the early morning, and seeing the sun through the droplets of water suspended from the tips of pine needles while watering my garden." "

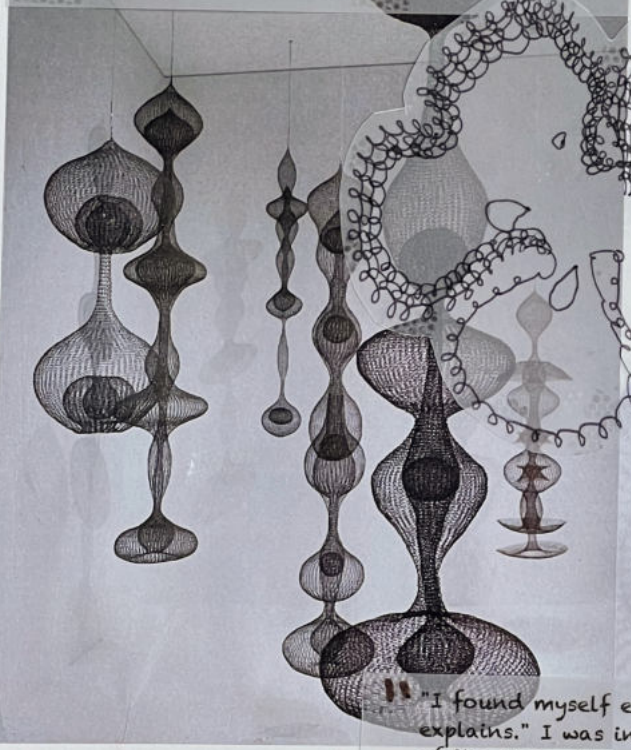
" Her sculptures defy conventional definitions of material and form, and Asawa is particularly known for her airy, transparent wire sculptures, which often hang from the roofs of art museums in the shape of lightweight knots of netting, but are actually hand-woven from heavy materials such as long copper, brass and iron wire. The iconic wire sculptures were inspired by a trip to rural Mexico, where Asawa learned the local art of handcrafted metal weaving. "



material: iron wire. The artist uses hard materials to weave which inspired me a lot.

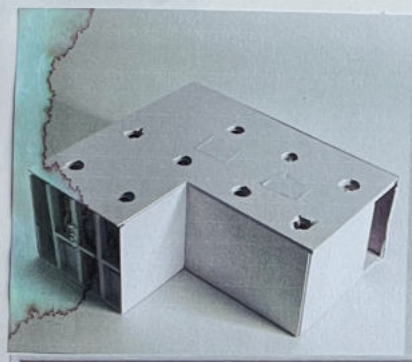
Each of its units is simple and repeatable.

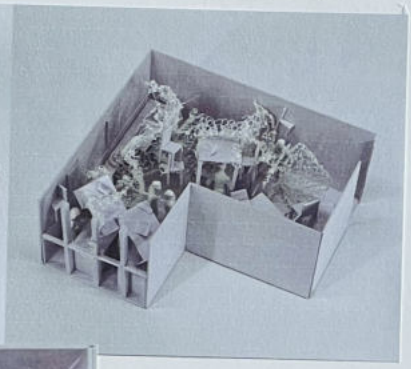
I noticed that the shadow of the braided fabric was also captured when the picture was taken. Depending on the direction of the light, different shapes of shadow can be created.



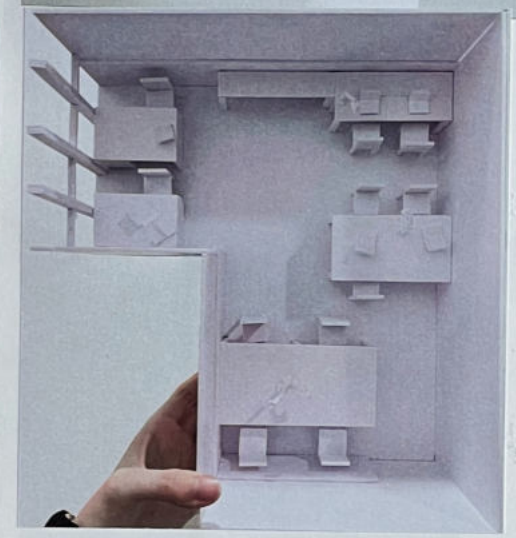
" "I found myself experimenting with wire," Asawa explains." I was interested in the ecological sensuality of the line, which surrounds the three-dimensional space ..... I realized I could make shapes of metal wire that intersected, expanded and contracted because of all the possibilities the thread could have. " "

MODEL

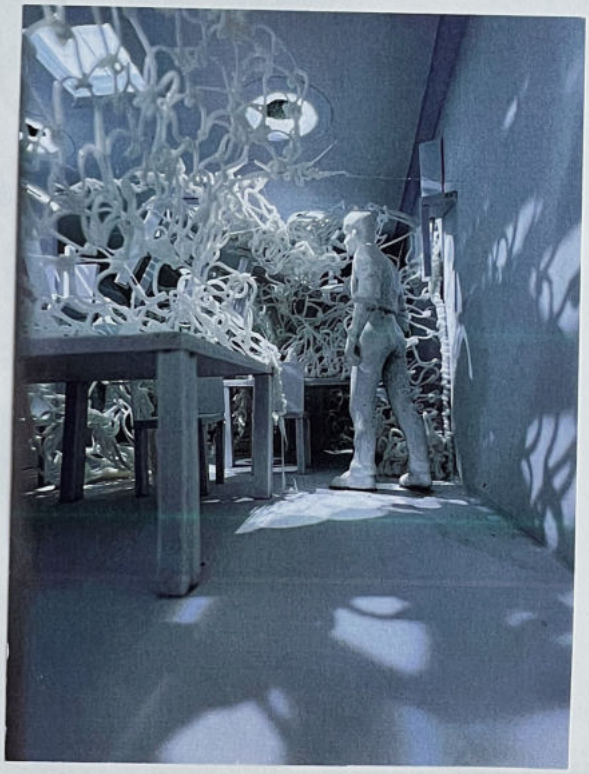


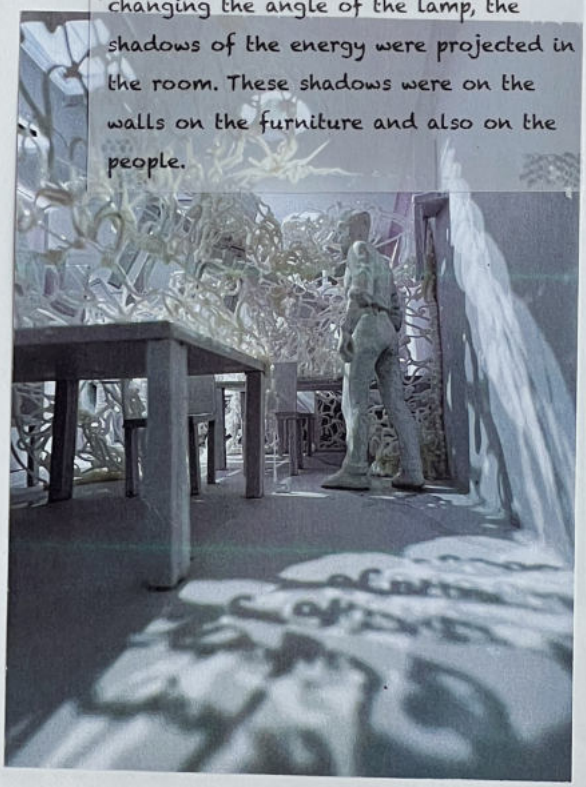


I made an isometric model of the room, including every piece of furniture in it. I created light holes that I wanted to mimic as much as possible the light-transmitting parts of the classroom. Then I combined the energy of these objects with the learning of the weave, which envelops the energy that the objects carry. These energies filled the whole room.



Next I turned on the lights. The lamp shone down through the hole and by changing the angle of the lamp, the shadows of the energy were projected in the room. These shadows were on the walls on the furniture and also on the people.





DEVELOPMENT

• Lighting direction 1.

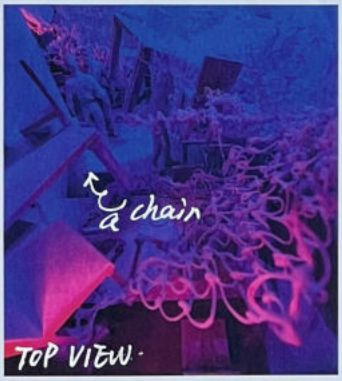
• Lighting direction 2.

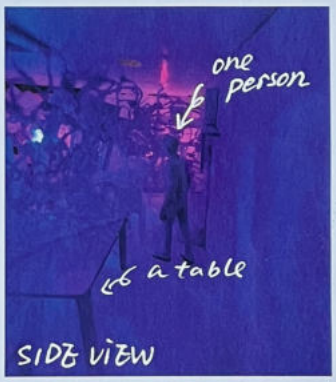
• Lighting direction 3.

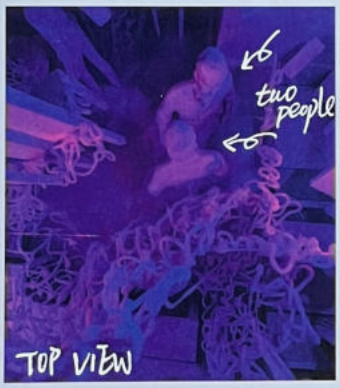
In these pictures, I'm constantly changing the angle of light input. In these image, I was strongly realized that light changes how a person feeling in a room, that light changes the area, direction, amount and size that energy covers.

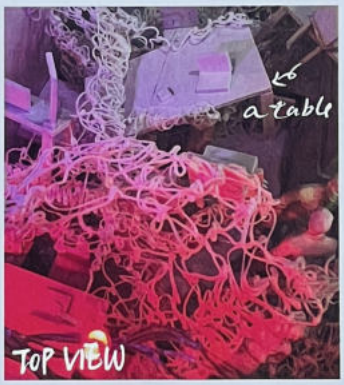
Then, I used different colors of LED lights to express different energies. They enveloped a strong sense of atmosphere. Unlike white lights, which have more of a crisp feel to them. The richness of colored lights, on the other hand, makes this space more crowded and more relevant to what I can feel in this space.

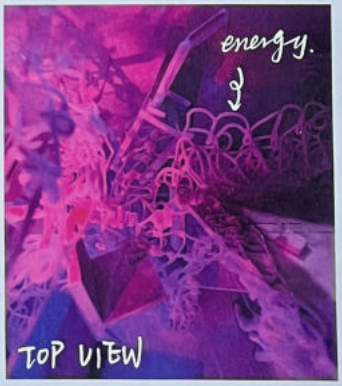
• detail view

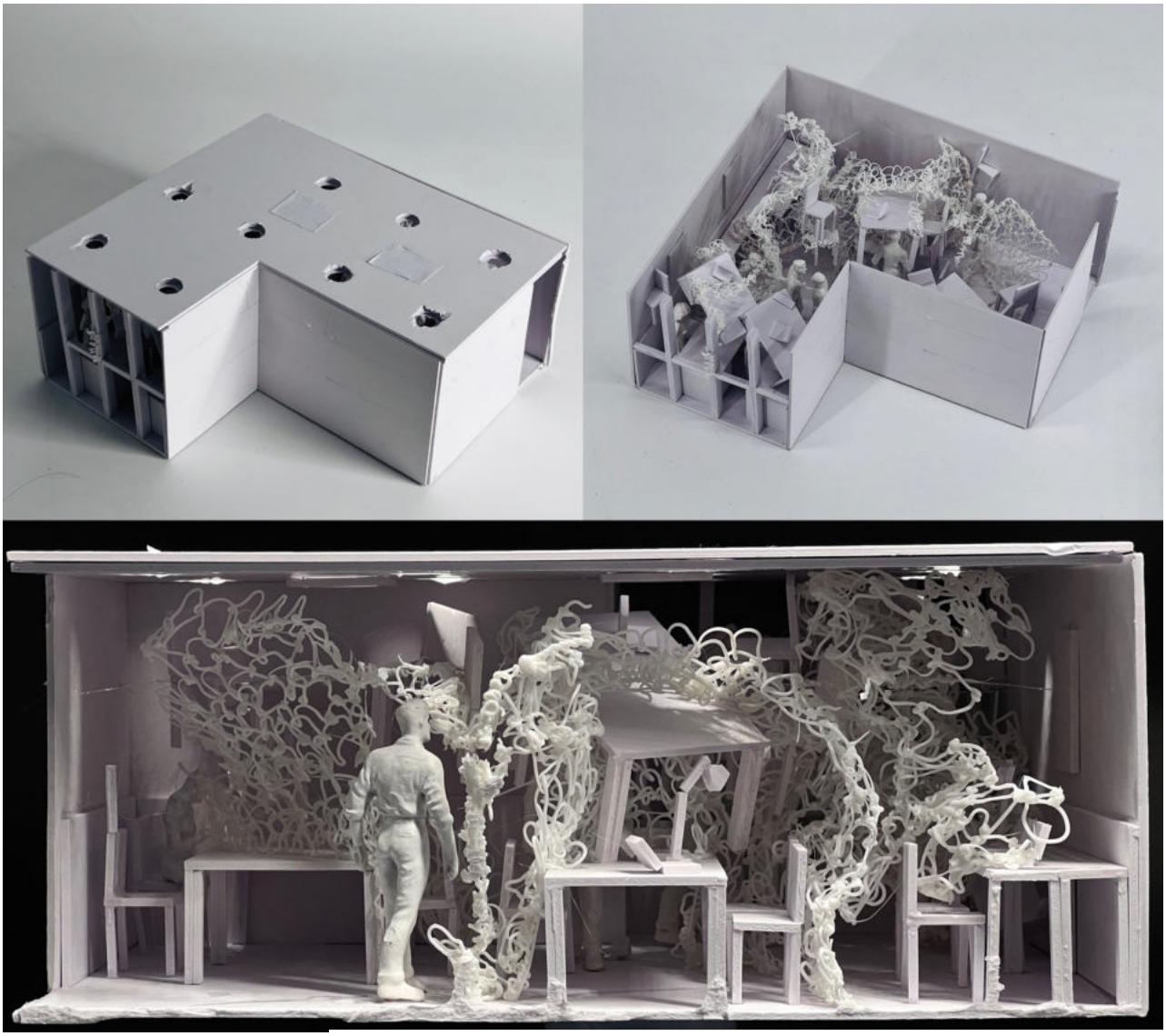


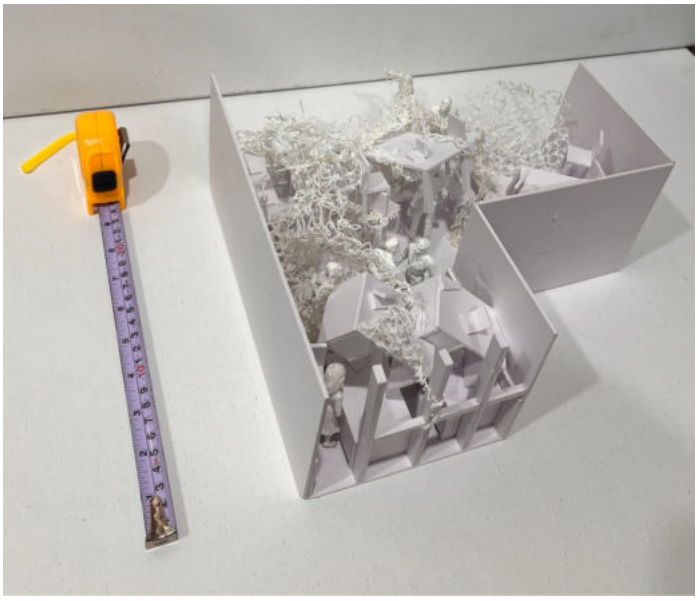








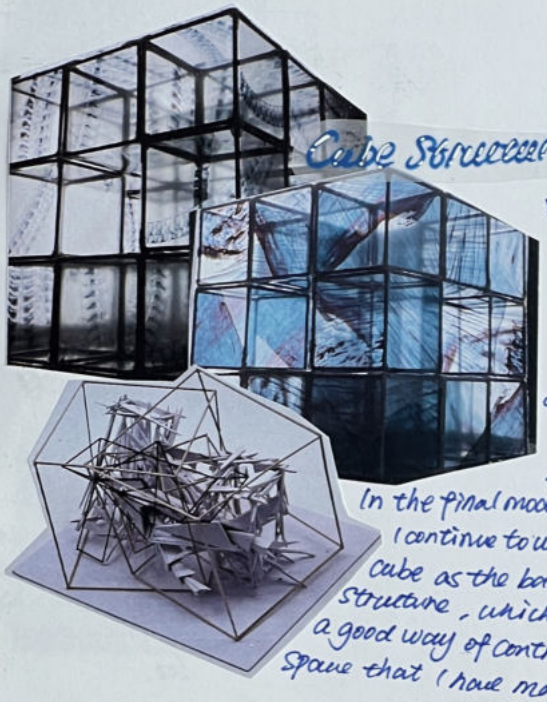




30cm* 25 cm* 10cm

FINAL PIECE COMPOSITION IDEAS

I summarized the outputs at almost all stages and categorized them in a simple way. I wanted this final output to have both the monolithic and the cluster epitomized in it. And energy was to be interspersed in the structure and occupy a visible part.



Cube Structure

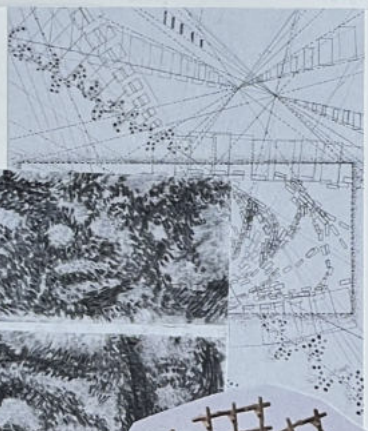
In the final model, I continue to use cube as the basic structure, which is a good way of controlling space that I have mastered.

Fish bone structure

In my final model, the findings of fish bone structure were captured, and the ~~face~~ "surface" expressed in this drawing was also added.

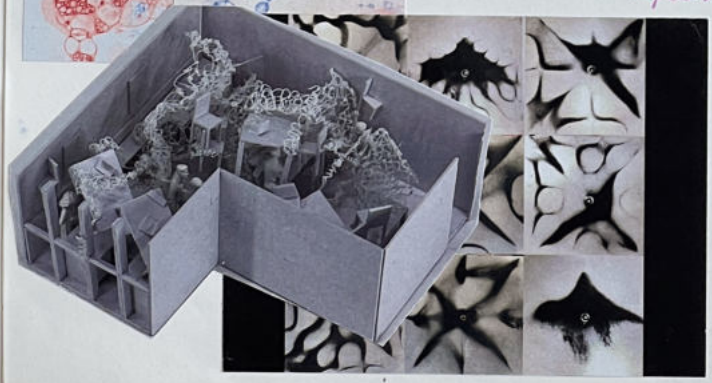
I found that in most of my output I expressed the energy in a circular texture. This is evident in a number of ways, including painting, 3D printing. Therefore I think the circle is the best vehicle for me to express energy at this stage. I hope to do development in this section because I want to find a material that is the easiest to create a lot of circular structures. I think I might be able to continue to get new inspiration from creatures. (I done this part in later page).

Circle Structure

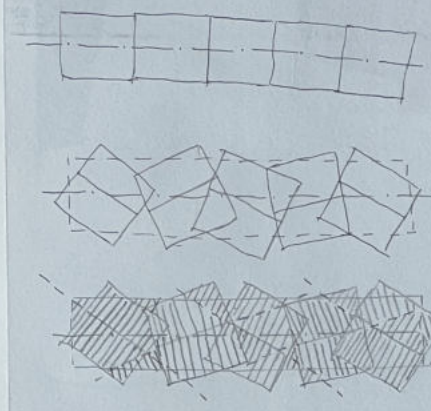


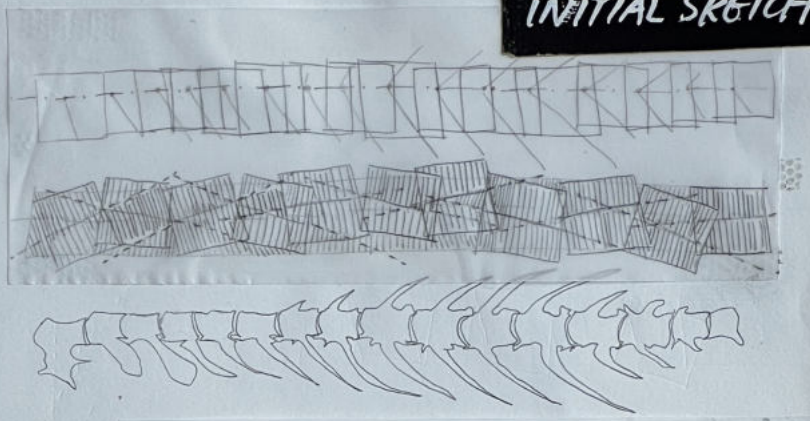
I extracted the rhythmic and repetitive units from the animal schooling and used them in my final model.

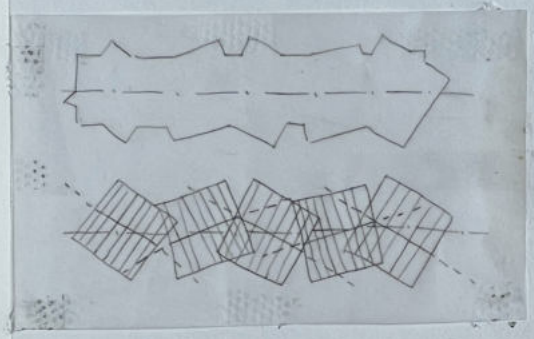
Schooling of animal



INITIAL SKETCH







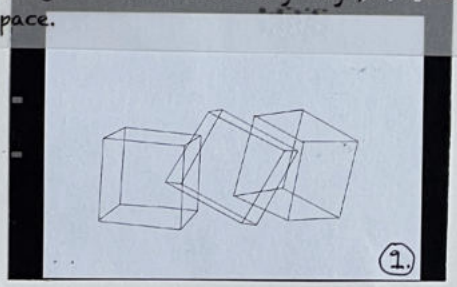
Based on my particular study of fish, I decided to use fish as the monolith for my final output. Because I already had a relatively good ability to create space in the fish's body. And I think the rhythm of the structure of the fish bones themselves is also a strong way to express the rules of clustering. In addition to the structure of the bones, I also wanted to see the tendency of a fish to swim in this model, so I may choose to add larger "faces" to the fish to amplify the "twist".

FINAL SKETCH

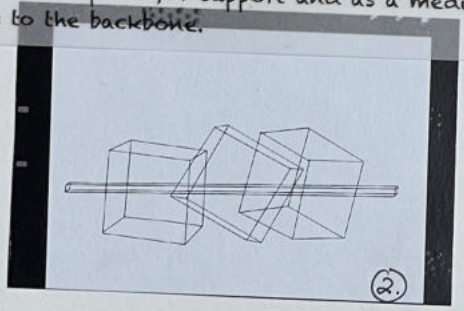
I created a series of sketches to develop my final output.

※ This page tells the structure of how I will make the final model.

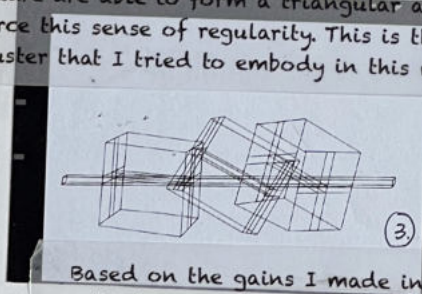
I started by creating three squares, just as I did at the beginning of most of the fish models. This was what I thought would be an easy way for me to manipulate space.

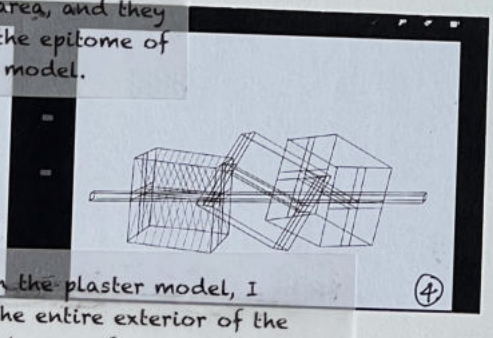


Then I created a shaft, which in my opinion is the central spine of the fish. I added cross-shaped sticks to two sides of each square for support and as a medium to link them to the backbone.

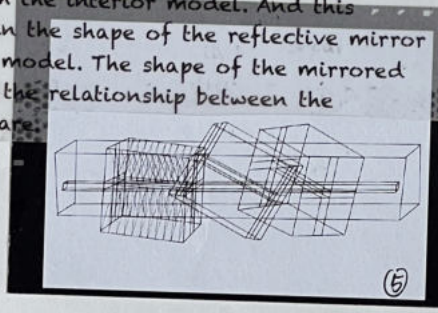


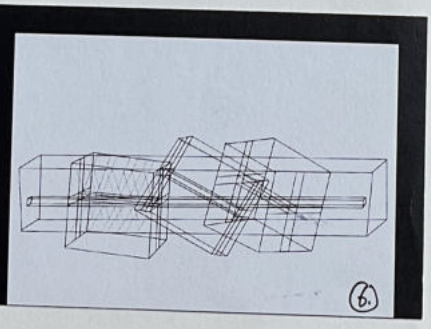
Then I started to add spines to the fish. The arrangement of the spines followed a fixed logic and rule, so that they could present a comfortable rhythm. The spines connected to the drum and to the support of the square are able to form a triangular area, and they reinforce this sense of regularity. This is the epitome of the cluster that I tried to embody in this model.



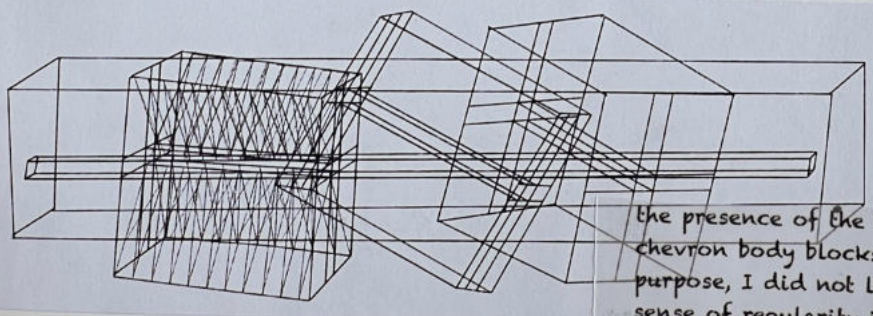


Based on the gains I made in the plaster model, I added another rectangle to the entire exterior of the model, and this large rectangle is performing an intercept behavior with the interior model. And this behavior is reflected in the shape of the reflective mirror paper I added to the model. The shape of the mirrored paper changes due to the relationship between the rectangle and the square.





FINAL MODEL STRUCTURE SKETCH:

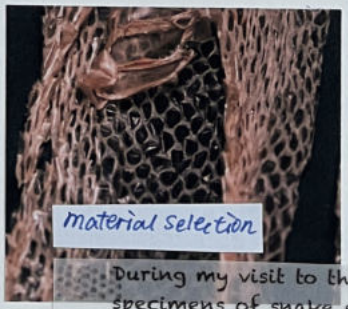


(The details in two cubes are omitted).

Finally, in order to reinforce the presence of the Internship again, I also added white chevron body blocks to the model (other than this purpose, I did not like this attempt, which weakened the sense of regularity in the model itself)

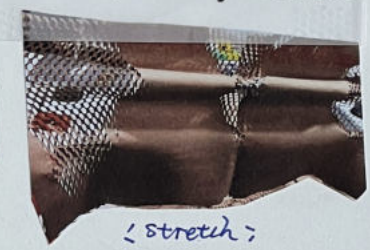
* This page tells the energy of how I will make the final model.

(my work recording)



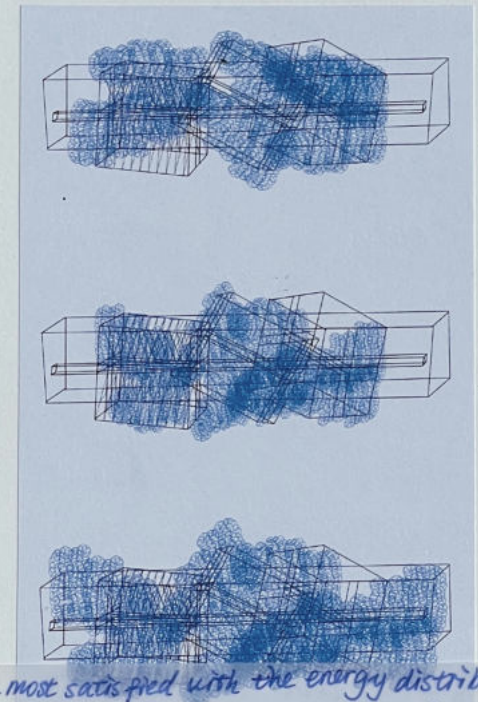
Material selection

During my visit to the zoo, I accidentally found specimens of snake skins and I found that these materials are round, easily extendable and able to create different densities, and I wanted to find a material that could almost exactly mimic snake skins. So I found honeycomb paper, a material that I could stretch to create different densities, and they could also be unstretched.



(stretch)

Energy attachment sketch:

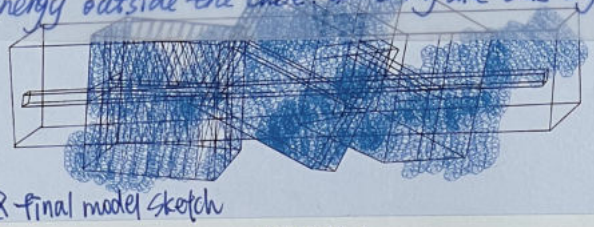


SKETCH 1. Relatively low density energy is attached to the cube, and they can grow freely on the cube without being cut.

SKETCH 2. And here I just compressing the energy from the previous picture, making the density of energy even higher. So there are more cube structures exposed to the outside.

SKETCH 3. Here, I have greatly increased the amount of energy, allowing them to grow freely throughout the amount.

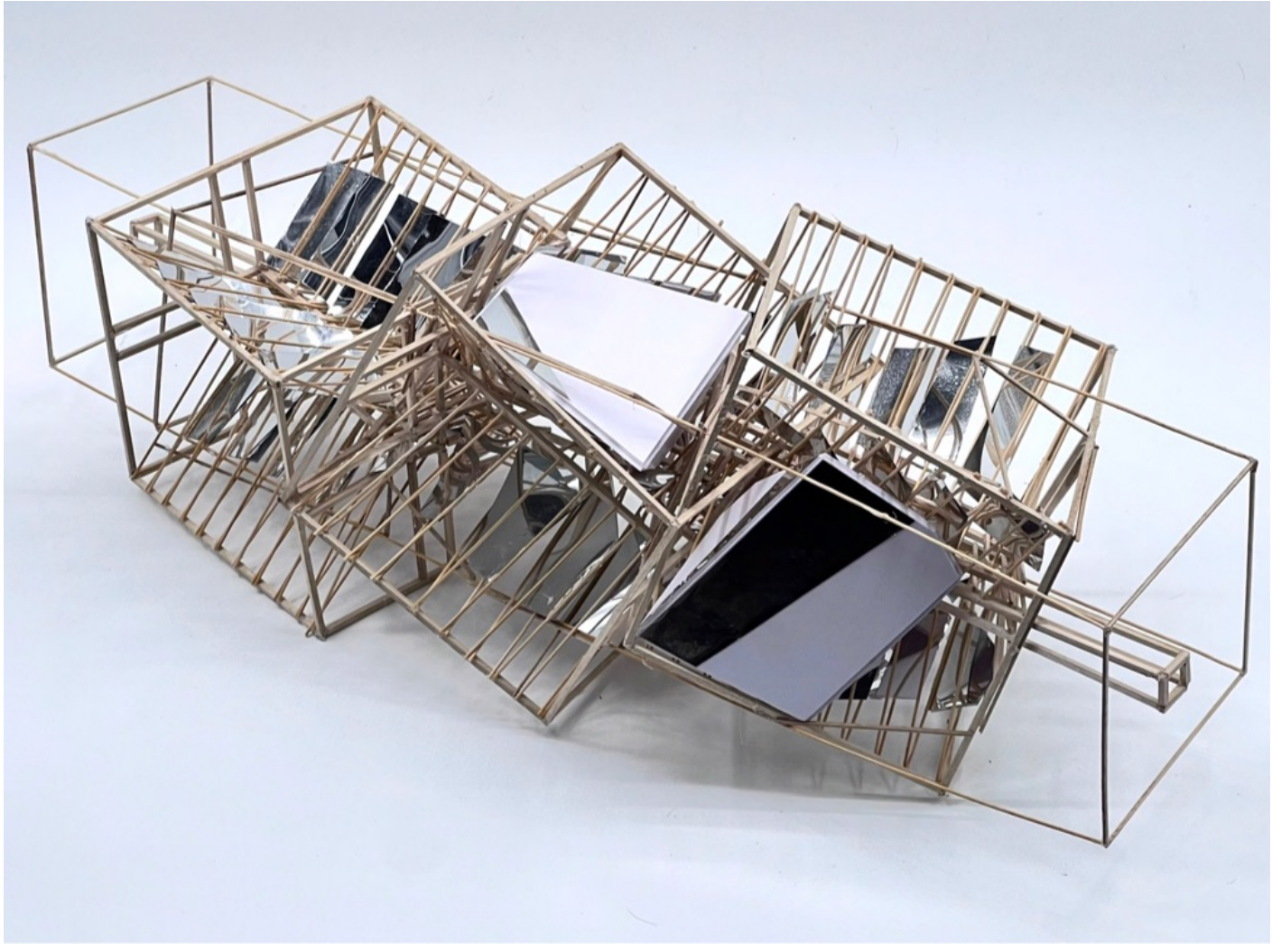
I am most satisfied with the energy distribution in the last attached figure. Their density is just right, and a part of the cube structure can expose to the outside. Meanwhile, I cut out a part of the energy outside the cube. I really like this trying

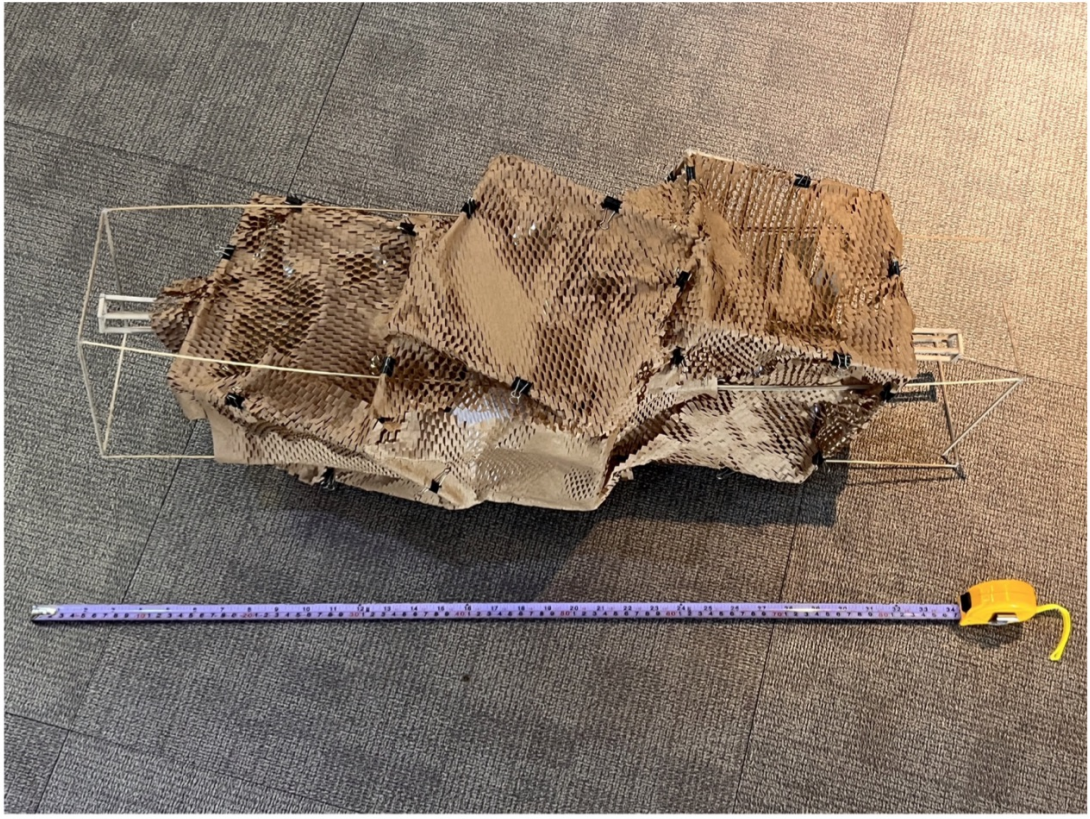


* final model sketch

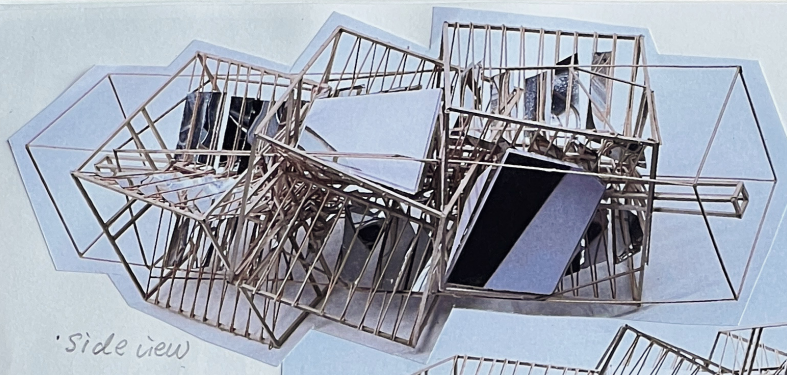
SKETCH 4.

Then I started to add energy to the outside of the fish's body, i.e. adding honeycomb paper. I pulled the honeycomb paper to different levels and then attached it to the square. Part of the honeycomb paper was attached to the outline of the square, which is the energy close to the organism. And some of it was left with some space between it and the organism, which is the energy surrounding the organism. I left part of the area without honeycomb paper, so that I could see the internal structure of the model, and also increase the richness of the model.





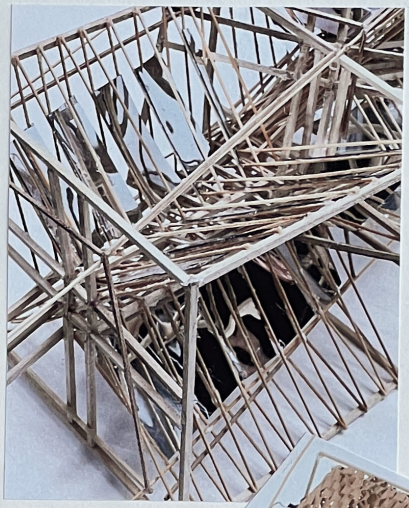
88cm*25 cm*25cm



· Side view

Structure

· Front view



· detail

· rear view

· front view

Final Model






Detail


Shadow Pattern

· detail

· side view (with light)


· detail

Spatialization energy field

—form analyzing the way architects and artists formalize energy

Original Intention

I have observed numerous patterns in nature, which appear to be consistent rules amidst its chaotic essence. These laws manifest across various scales, encompassing both microscopic and macroscopic realms, as well as encompassing living and non-living entities. The presence of these patterns curious me, leading to questions such as: Why do these patterns exist? What creates these patterns?

Forms and rules in architecture, cities, nature

I have made a deeper study of this:

From the perspective of architecture, the expression of architects follows two sets of rules. The first rule is that architects combine form, logic, the use of functionality, and other aspects of form through geometric optimization algorithms. For example, Philippe Block's 3D-printed floor system (*Figure 1.1*) aims to fully utilize the geometric flexibility of the additive manufacturing process to achieve structural optimization, functional integration, and economically viable building components. Another example is the CCTV building by Rem Koolhaas (*Figure 1.2*), which is densely paved with squares on the surface. These squares are the products of generative art.

The second rule is for architects to express the shape of the phenomenon through simulation. For instance, architect Lebbeus Woods collaborated with Christoph Kumpusch on "System Wien" (*Figure 1.3*), which explores how drawings and models represent energy relationships in space and how they can be interfered with.

From an urban agglomeration point of view, as shown in *Figure 1.4*, these buildings were affected by sunlight and wind directions. This form indicates the energy in nature.

In nature, starlings have their clustering logic. The birds need to maintain a fixed distance from their other eight neighbors. Moreover, when a neighbor changes direction, they also change direction. Therefore, on a macroscopic level, starlings exhibit a highly flexible pattern (*Figure 1.5*).

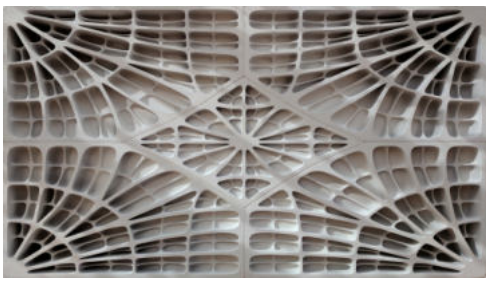


Figure1.1: 3D-printed floor system, Philippe Block, 2017

Figure1.2: Beijing headquarters for CCTV, Rem Koolhaas, 2004

Figure1.3: System Wien, Lebbeus woods and Christoph Kumpusch, 2006

Figure1.4: Old Town /Medina of Fès, Georg Gerster, 1982

Figure1.5: Starling performance，Menahem Kahana，2018

The study of cymatics

Through my research, I found that Cymatics experiments helped me understand generative arts and algorithms and explained how energy controls forms in nature. In my study, I simulated the Chladni image. The relationship between sound and image is like the transition of state between energy and form. Sound is also a wave. It is a kind of energy. Cymatics studies visible sound and vibration, and several physicists and artists have tried to visualize sound waves. Ernst Chladni used a violin bow to render the so-called Chladni patterns along the edge of a metal plate. As the pitch of the vibration changes and the frequency of the sound changes, the sand on the iron plate takes on a different pattern. The lower the pitch, the lower the frequency, the simpler the pattern. The higher the pitch, the higher the frequency, the more complex the pattern.

Throughout my exploration of Cymatics, what inspired me most was this picture: the turtle's shell (*Figure 2.1*). It made me realize that all the patterns I observed are controlled by energy. This observation is because when the iron disk vibrates at a specific value, it is almost identical to the turtle shell pattern. When the iron disc is not vibrating, the sand stays on the disc evenly or randomly without rules. Such similarity correlates with the patterning and sound energy in the creature, and the sound energy organizes the matter and changes its form. Also, I conducted experiments with Cymatics (*Figure 2.2*) and found similarities between Cymatics images and organisms in rich illustrations. For example, the macro photos of fish bones I took were similar to Cymatics patterns.

This answers my question: the high similarity between the turtle shell and the Cymatics image made me realize that everything I observed in the texture is controlled by energy. Energy exists and propagates in its form (sound energy, wind energy, light energy, etc.) and makes matter change its shape as it passes through. Energy is active in changing matter, while the form of matter is passive and generative

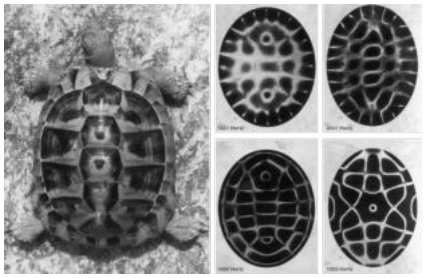


Figure2.1: Picture of Tortoise beside Cymatic Sound Patterns, on Journey of Curiosity

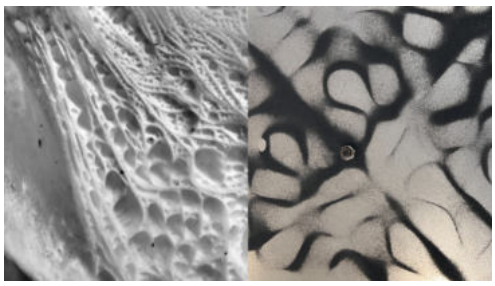


Figure2.2:
left graph: Macro photo of fish bone, own work, 2022
right graph: Cymatics pattern in my experiment, own work, 2023

The study of energy exists in biological clusters and city

Thus, many similarities can be observed.

Energy exists in biological clusters. Biological clusters consist of individual organisms that follow the collective rules of operation, creating a visible cluster picture. The fish form a rich, complex drawing depending on the different energies determining whether and how to change their form. Such clusters shift in response to changes in the outside world. For example, when facing an enemy attack, the fish change their shape to avoid the invasion of the enemy.

The rules of Cymatics and Chladni patterns can be applied more widely in cities (*Figure 3.1*). Humans, animals, rivers, mountains, buildings, and a series of other visible entities on the Earth's surface are akin to the sand on an iron plate in an experiment. The amount of energy contained in each city is essentially fixed. Therefore, regardless of how time changes or how humans alter the city, the appearance of the city from a top view remains the same, including the density of buildings and the regularity of their arrangement. Different cities have different energies, similar to the different frequencies (hertz) on the iron plate, resulting in distinct top views for each city.

The reason cities resemble living things is not merely because we perceive the image of a living thing and attempt to simulate it, but because the energy field at high latitudes influences everything.

In my study of cities, I have made an additional small discovery about "the expression of energy through architecture." People intentionally modify the layout of nature within cities by combining power and energy. The layout inside the Forbidden City (*Figure 3.2*) differs from the layout outside the Forbidden City. The structure of the Imperial Palace is as follows: the center is spacious, and the room density is low. As it narrows outward, the thickness of the rooms increases. This is because the center of the Forbidden City possesses the highest power, corresponding to the most vital energy in people's minds. Consequently, the builders constructed the Forbidden City with unique size, axis, layout, and other structures. However, the area outside the city is not influenced by such power and, thus, presents a distinctly different layout.

Figure3.1: Energy in city collage, Own work, 2023

Figure3.2: Comparison of Beijing in 1914 and recent years

Two directions of "energy theory" creations by the artists and architects

As I explored further, I discovered that energy theory is widely used in art and architecture. Although individual artists and architects create different forms, the content of the creation is related. Therefore, I grouped the designs of the artists and architects I studied into two directions.

First direction

The first type of creation is the abstract expression of energy forms, including the visualization, reproduction, and translation of energy.

Antony Gormley's work (*Figure 5.1*) directly explores the relationship between humans and external space and how human energy coexists with external power. He abstracts energy in various ways, changing the form of energy visualization and embodiment. He explores energy output and reception from different perspectives. At the same time, Antony Gormley focuses on expressing the sense of boundary of energy carried by the human body. He explains: "In these dematerialized works, the bodies are free, lost in space, weightless, and without internal determination. They appear as emergent zones: you cannot be sure whether the body zone or the zone by the matrix produces the bubble matrix." (Antony Gormley, 2007)

Strapworks (*Figure 5.2*) furthered Gormley's interest in liberating separate blocks into their own spaces to create perceptual shifts where forms oscillate from contraction to openness perpetually - a perceptual and emotional transformation.

After learning from Antony Gormley, I realized that expressing the relationship between visible and invisible space is a step towards exploring energy. In my study, I focus on the fish's backbone (*Figure 5.3*), diffusing layers of structure and energy outward. I focused on the fish's internal space and external energy and expressed the energy characteristics of the fish by emphasizing the unique sense of bone rhythm. (The energy of the fish covers the structure of the fish)

Artist Emma McNally explores the space between the virtual and the real by observing the complex systems of the invisible and the visible in drawings, capturing the rhythms of the world in graphite on carbon paper (*Figure 5.4*). By combining her interests in science, technology, philosophy, and music, McNally's drawings overlap the virtual realm and the physical world, encompassing more perception than the visible world and her understanding of the elusive space. She attempts to control chaos and responds to the development of the drawings.

In my study, I organized the school of fish system (*Figure 5.5*). I am trying to get a feel for how a shoal of fish would extend if it were out of the tank. I spread the shoal's rays and density, creating the shoal's energy field.

Her bold expression of the invisible energy field deeply encouraged and inspired me, and the techniques she used are worth learning from. First, the definition of the hidden energy field is comprehensive. So many different kinds of energy can be collected that even elements not precisely identified as energy can be recorded. Secondly, the ways of translating and expressing them are prosperous. The artist uses many lines and points to create three-dimensional space, describing strong logic with seemingly chaotic elements. Lines of multiple latitudes are used to build three-dimensional but uneven spaces. Including nodes in them represents a sense of scale, like the scale on a straightedge. She sometimes uses the same elements to express different contents, which is controlled by changing the elements' size and the intensity of colors.

The book "The Motive Force of Architecture" is about how architects represent concepts, with many architects drawing on the translation of the invisible perception of space. They set up their systems in space, using different forms to express the relationship between energy and objects. These forms are rich in content and can be categorized into several similar expressions. Therefore, I concluded that each person perceives energy differently based on their individual differences, and as a result, each person translates the energy forms differently.

For example, in the project "The Hidden Orchestra" (*Figure 5.6*), architect Alice Labourel tries to translate subjective experience into objective reality. She expresses the invisible space in the building, which she perceives based on her own experience, even though it may not be an accurate perception. This project recreates the so-called reality from the perceived reality.

In my studies, I explore the invisible flow of energy in space (*Figure 6.1*). Like Alice Labourel, I set up my system in the area. I have plotted the distribution of power in the classroom and, simultaneously, explored the relationship of each object to the energy of other things and the relationship of energy to space, similar to sculptor Antony Gormley's work. I transformed my painting into a model and made the classroom into a geometric model (*Figure 6.2*), visually translating the energy using Antony Gormley's technique as a reference. I utilized light and shadow to further superimpose energy. Additionally, I optimized the fish bone structure model (*Figure 6.3*) by incorporating honeycomb paper on the surface to represent the energy density, with varying densities symbolizing different energy levels.

"System Wien" (*Figure 6.4*) is a project by Lebbeus Woods in collaboration with Christoph Kumpusch. This project has a transparent process for collecting information about energy and translating it. Christoph Kumpusch collects and organizes energy distribution in cities, encompassing everything on the streets of Vienna, viewing it all as the energy of control. The visual language used to express this understanding consists of lines constructed in two, three, and four dimensions, which we refer to as vectors. Similar to other constructive elements used to build cities, these vectors serve as systematic elements for organizing mechanical, cognitive, and emotional energy.

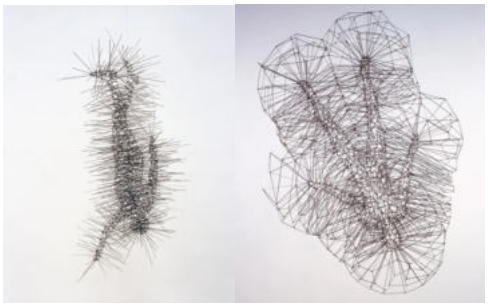


Figure5.1: Open ExpansionWorks, Antony Gormley, 2007-08

Figure5.2: Strapworks, AntonyGormley, 2021

Figure5.3: Fishbone structure model.Own work.2023

Figure5.4: Choral Fields, Emma McNally, 2014

Figure5.5: Field of schooling of fish, Own work, 2023

Figure5.6: The Classroom, Alice Labourel, 2013

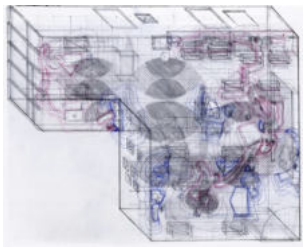


Figure6.1: Energy flow in a classroom painting, Own work,2023

Figure6.2: Energy flow in a classroom model, Own work,2023

Figure6.3: Fishbone structure andenergy model, Ownwork, 2023

Figure6.4: System Wien, Lebbeus woods andChristoph Kumpusch, 2006

Second direction

The second type of creation designs responses based on energy changes: it distributes the occurrence of various things through rational planning. The creator does not design the result but plans it.

Zaha Hadid's "Cyber-Urban Metaverse City" (*Figure 6.5*) represents this kind of form. Instead of sculpting the structure of the space, the architect sets a set of rules to form the space. In her design, she divided the land into different zones, and then the architect defined the height of the buildings, the width of the streets, the area of the greenery, and so on. The Metaverse has become a trend in architecture. Digitization is the logic underlying every inch of land.

Figure6.5: "Cyber-Urban"Metaverse City, Zaha Hadid

Conclusion: The ability to find and express energy is important

In general, I believe that there are limitless ways to discover and express energy. This is because, although energy can be concretized through continuous exploration and summarization, each person's experience is unique. Concretizing the perception of energy allows for a better expression of one's experience with complex systems, thereby enhancing sensitivity to perception and the ability to articulate it.

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