





material illumination

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Material Illumination

A thesis presented in partial fulfillment of the requirements for the degree Master of Industrial Design in the Department of Industrial Design of the Rhode Island School of Design, Providence, Rhode Island.

By

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2022

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*Thank you to Kate Dannessa and Maria Alexia Platia for
lighting the process path before me.*

*Thank you to Zahra Tyebjee and Mandy Lee for literally being
the collaborators (and friends) of my dreams.*

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at RISD Glass, for your careful observation of my work and your
care for me.*

*And to Mark Johnston - when words cannot adequately express
those things we know, we make things.
I'll see you in the shop.*

Abstract

Design exists as a field within the domain of material, accompanied by art, engineering, and craft. Working in material allows the designer to develop material fluency, a language that is composed of matter in space. Material can be used to communicate - it can also be used to think. By engaging the body and its senses in the act of making one can connect the space around the body to the space of the mind, allowing ideas to exist in objects and thinking to happen through interaction with material. Through the documentation of a process of making in wood, glass, and light, I explore how the ways we think are inextricably tied to our sensory experiences of, within, and as a part of the material world.

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the object of an idea

My fingertips hold the blue handle of the chisel as firmly as fingertips can, balancing the tool on its sharpest edge that's placed precisely on the seam of these two ash pieces, only temporarily glued together. I reach slowly over to the mallet sitting upright on the table beside me, the wooden handle soft from so much use, having touched so many other hands. I raise the tapered rubber end of the mallet up in front of my eyes, and bring it down,

THONK

onto the blue chisel handle

THONK

slowly at first

THONK

THONK

until the pieces start to split

THONK

THONK

THONK

THONK RIP THUNK

As the pieces come apart the handles of my tools reverberate through my fingertips and suddenly

I APPEAR.

I am at a quiet desk, softly worn like the handle of the mallet that's sitting upright beneath a very yellow desk light, the chisel laying in front of it. The brass lampshade is embossed with some writing that I lean in to read -

FOR USE IN THE LIBRARY OF IDEAS - STATE OF MIND

To my left there are other desks and other people. Some of them are just holding objects - some of them have glue and are waiting for it to dry, seeing if something will stick. Some of them have a microscope and are tediously mapping the fractals and veins of these tiny fragments. Some of them are trying to force a square peg into a round hole. I find one who is working on a puzzle box; she's so focused she must have been there for hours. Maybe she thinks there's something inside - maybe she just likes the puzzle.

I glance to my right and find a tall bookcase filled with all kinds of objects — I walk over to the case and scan the shelves, my eyes following the maze of heights and arrangements. A clanking noise breaks my attention - a door opening, a gust of wind, and quiet again as it closes. It’s coming from a corridor to my right, labeled with a sign - ‘OVERSIZED COLLECTIONS’. I turn to grab my mallet and chisel and hurry down the hallway until I find the large metal doors that must have been the cause of the noise. I reach for the handle - it is extremely cold. I brace myself as I turn it, putting more energy into making sure the door doesn’t swing into me than into actually opening it, walk through - the building falls away and above me is a chilly, cloudless, bright blue sky.

I pull the door closed behind me as cool gusts of air swirl, and in front of me... something so large, I can’t even see how big it actually is. It’s many times my height and as long as... I don’t know what, but I can’t see where it ends. I start walking to my left and in the distance I can just make out a few people, bundled up in wind breakers and scarves - behind them are large chunks of what used to be a part of this thing; they may be working together but it’s impossible to hear them with the wind rushing past my ears. I notice the tops of my hands starting to get cold and remember that I have my mallet in my right, and my chisel in my left. Turning towards the thing I approach it, scanning, looking for a place where the end of my chisel could fit. As I get closer I see a hairline crack at the level of my chin - I place my chisel and

PING

PING

PING

PING

PING

PING

PING

THUNK

I reach down to pick up this dense, dark material, brittle and opaque - it just

fits in the palm of my hand. I put it in my pocket as I head back towards the metal doors, relieved as I walk into the warmth and silence. Pausing for a moment I pull the thing out, turning it around slowly, flipping it upside down, holding it close to my nose, between my eyes, holding it out far. I know that this is just one tiny piece of something much, much, much bigger - this is the only way I could even begin to get my hands on it.

My concentration breaks at the sound of voices to my right, deeper down the corridor. Walking over I make my own footsteps as silent as possible, trying to make out what the voices are saying. They sound intense, but not terse, focused in the midst of dialogue...

“No no no, epistēmê is the Greek word most often translated as knowledge, while technê is translated as either craft or art.”¹

“Yes, but what you haven’t acknowledged is that these translations harbor some of our contemporary assumptions about the relation between theory and practice.¹ In traditional craftsmanship, the skilled worker created alone a piece of fine, careful work, from start to finish. This industrial model placed workers on manufacturing lines, making them responsible for disjointed tasks.² It’s the split that has led to the separation of ‘having ideas’ from ‘making objects’.³”

I finally find the threshold the voices are coming from - an ornate door twice my height, made entirely of some dark walnut species, is cracked open just enough to draw a beam of daylight along the hallway. I hold back dusty sneezes as I peak through the opening, gaining glimpses of a room with overstuffed leather reading chairs and emerald velvet curtains. A woman in a pristine lab coat begins to speak...

“You know, this split has also led to the idea that there exists some sort of mental attribute known as ‘creativity’ that precedes or can be divorced from a knowledge of how to make things.⁵ The labour of supplying the basics of daily life was never simply physical work – manual tasks require intricate thought processes, so our brains are hardwired to respond positively to physical exertion by rewarding us with deep satisfaction when our labours produce tangible results. The areas of the brain associated with reward, emotion, movement and higher reasoning are connected, after all.²”

“Yes, thank you doctor.” I shift my body to find the voice I recognized from earlier - a woman in a waxed canvas apron continues to respond...

“Making is both the means through which the craftsperson explores their idea and an end in itself. It is through the doing of making-things that we

¹Adapted from Parry, Richard. “Episteme and Technê.” *Stanford Encyclopedia of Philosophy*. March 27, 2020. Accessed October 27, 2021. <https://plato.stanford.edu/entries/episteme-technê/>.

²Adapted from Davidson, Rosemary, and Arzu Tahsin. *Craftfulness: Mend Yourself by Making Things*. London: Quercus, 2019. *Electronic*.

⁵Adapted from Gauntlett, David. *Making Is Connecting: The Social Power of Creativity, from Craft and Knitting to Digital Everything*. Cambridge, UK: Polity Press, 2018.

develop a sense of ourselves as purposeful and inventive, and participating in the world. The heart of creativity lies in the process of making, not in the product of that making.³”

The doctor interjects; “You know I’ve never asked, how is it that you even go about starting this process?”

The aproned woman takes a deep breath before responding. “Sometimes I have a vision of the object to be created and the path by which to bring it into being, sometimes I have a vision of the object to be created and a technique that brings only its approximation into being, and other times still I have no prior vision and simply have to trust myself in the act of creating. In any case, it is the object that exists in order to bring about my action, not the other way around.⁴”

I was enamored with the discussion, but the layer of dust that must have been collecting on this door frame for decades was becoming too much to bare. I quickly and quietly backed down the hallway just in time to catch a triplet of sneezes into my elbow.

I suddenly remembered that I used to hate being dusty. As a kid the only dusty place I ever went to was a hill behind this small cabin my family and I would visit every summer. Back when the trees were small you could peer just over their tops to see the glittery water of Lake Almanor, a short 5 minute drive down the hill. If you walked around the porch that wrapped to the back of the house, and time traveled about 1.5 decades into the past, you would see me and my brother and occasionally some family-friends-kids playing in the dry dusty yard. Shade from tall evergreens danced over the natural sandbox throughout the day.

Sometimes we played with the lizards that lived in a pile of boulders, chasing them, gently placing them in plastic pails with grass houses for a few minutes, then releasing them back to their boulder home. Sometimes my bother would arrange little green army men very intricately next to one another, marching in line behind the house. They have survived many winters. I would often daydream. I created vast and complex worlds that existed as a transparent layer over the one we played in.

We would come back into the house when my mom called us for dinner. She would be waiting at the door to clean off our little feet and hands, making sure we didn’t leave trails of ochre footprints on the carpet. That’s when I would notice the gritty dirt between the soles of my feet and the surfaces of my flip flops.

The play was fun - the dust was not - but nowadays I’m quite used to the dust. When I walk into the woodshop I’ll head directly to the back corner of the space, secure a face mask to my forehead to protect my eyes, and button up every button of my denim shirt to prevent wood chips from finding my skin. As pieces spin and I begin to shape them fine layers of dust will settle from the tips of my fingers up my forearms to the rolled sleeves of my denim shirt...

“Hello.”

I’m startled back to the hard tiles beneath my feet, no longer alone in the corridor. I turn around and see the woman in the waxed canvas apron. She asks,

“Are you lost?”

“Just in my thoughts,” I respond.

She grins. “Happens to me all the time, how does a cup of coffee sound?”

I’m surprised by the offer, but manage to respond, “That sounds perfect.”

I follow her down the hallway to a pair of cafe chairs nestled in an alcove, framing a circular table with two steaming cups of coffee waiting for us. Mine already has the perfect mixed ratio of cream and sugar.

After settling in her seat she asks, “So what do you do?”

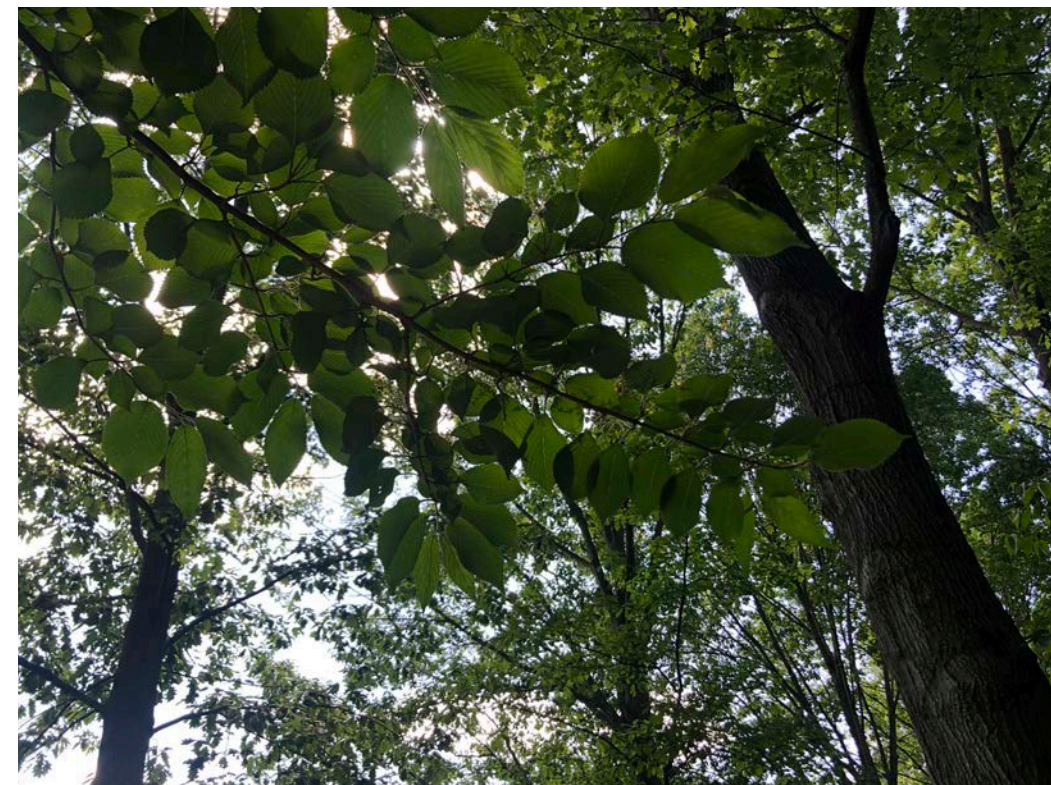
I want to tell her that I immerse myself in materials, that I get lost in experiments done in dusty shop corners, jumping feet-first into a disorienting frenzy of action, that it’s only when I come up for air that I see the volume of things I have created. Sometimes it’s in those moments that I will see new opportunities in a piece, but often it’s when I’m not looking for them that the opportunities present themselves to me - walking by a turning I left haphazardly on a table, with the sun shining through the windows at just-before-dusk, drawing a shadow’s edge onto a curve I had before thought mundane. I walk past quickly then stop. Back up. Turn around. Stare. Reach into my back pocket for my phone, taking photos from many angles, remembering what it is I’ve noticed in this little infinite moment.

I want to tell her all of these things, but a fear that my earnestness and enthusiasm will scare her off stops me, so instead I respond,

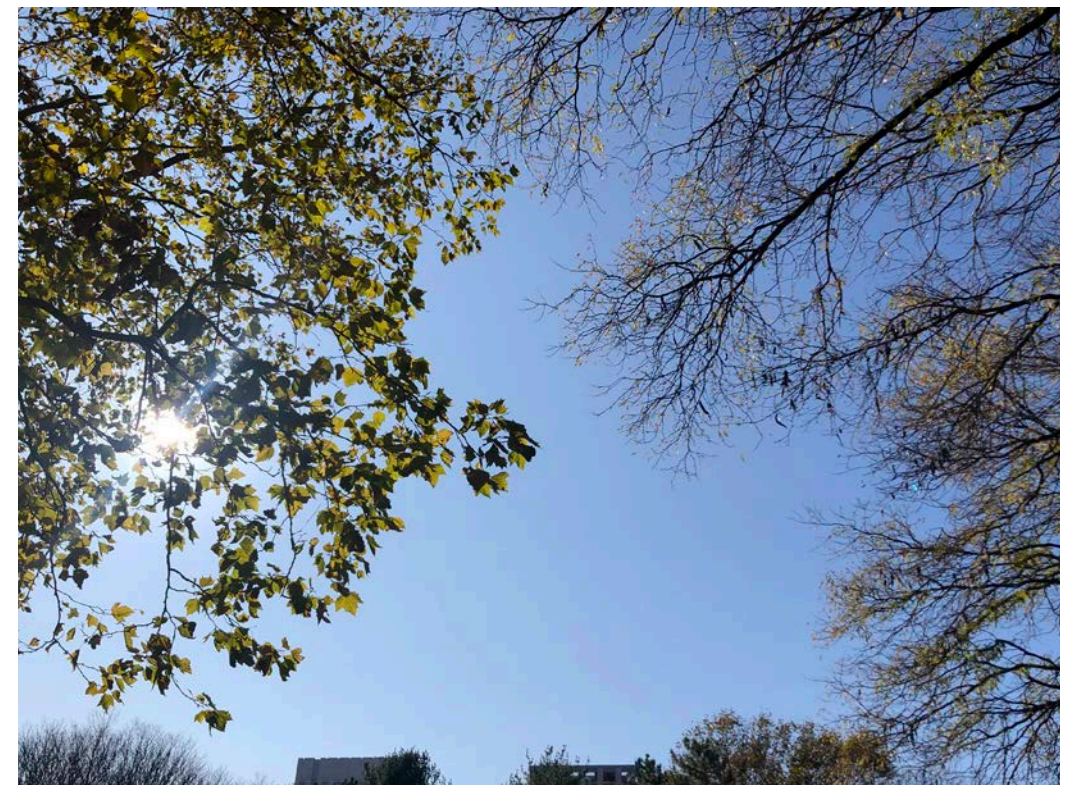
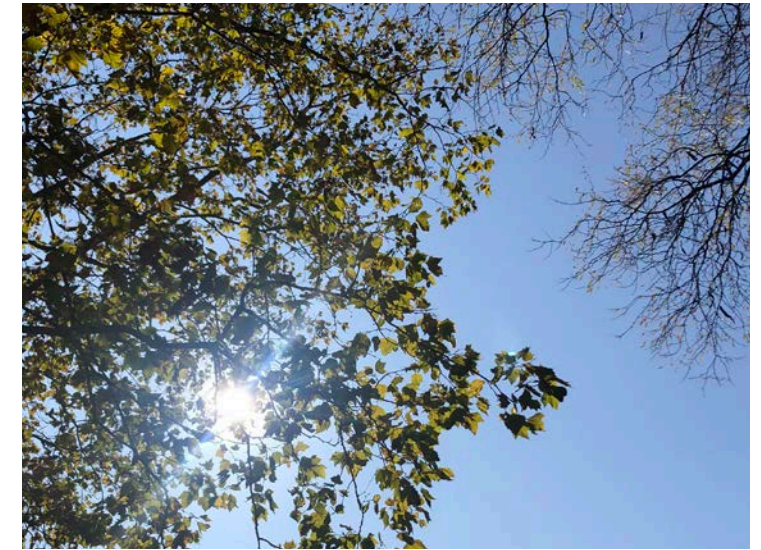
“I make things out of wood.”

⁴Adapted from
*Scarry, Elaine. On Beauty and Being Just. Gerald
Duckworth & Co., 2000.*

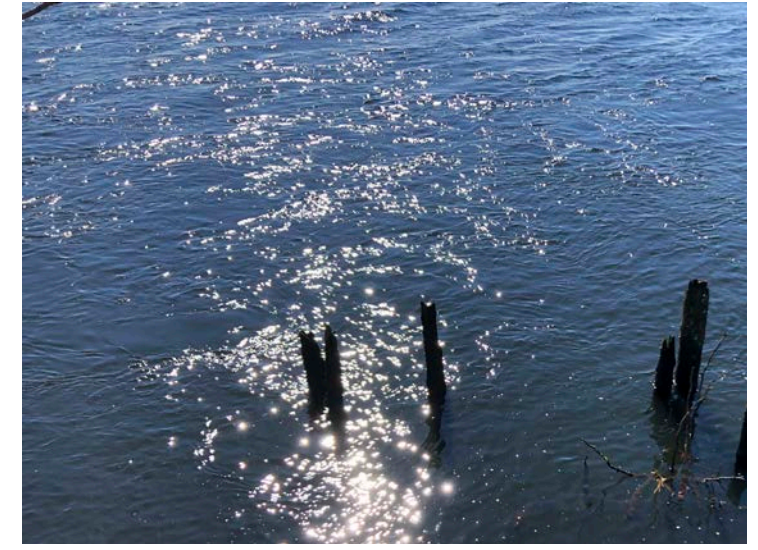
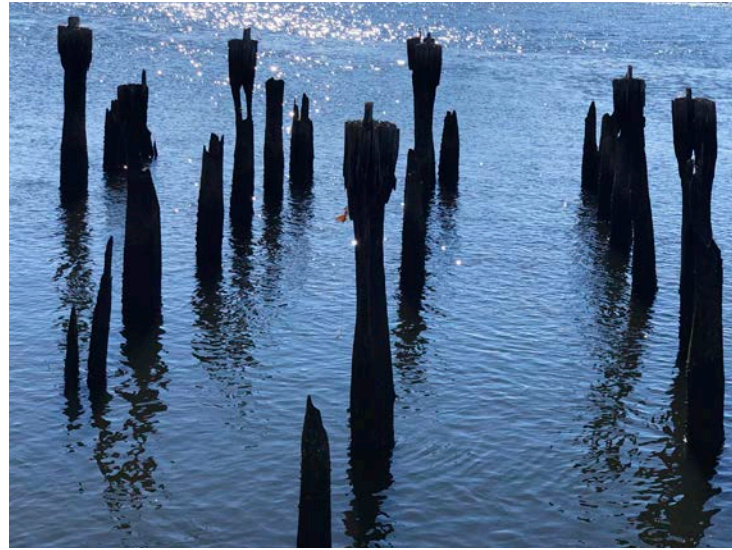
**process is
all we have**



My first design degree was taught from the perspective that the particulars of the world constitute margins of error.



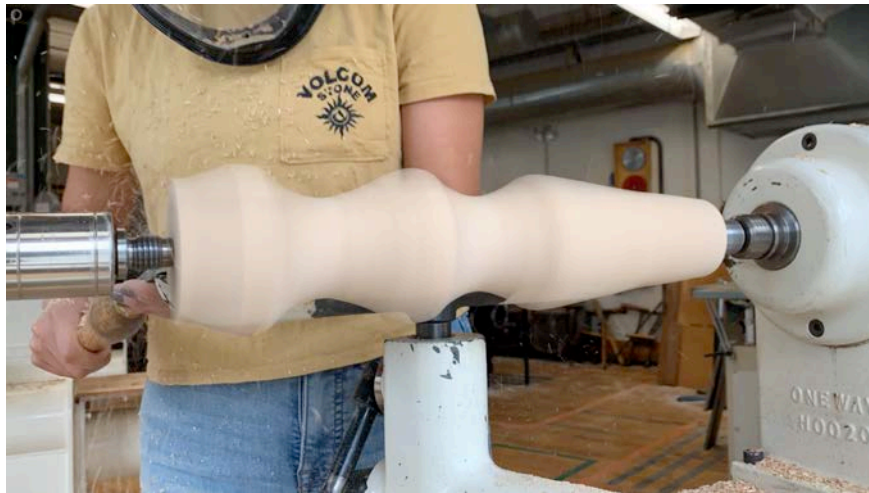
As an engineer I optimized for variables in abstract spaces.



In my second design degree I've learned that nature doesn't make errors.



Nature evolves from the proposition of new opportunities.



At the beginning of the thesis process I was curious to understand how making affects thinking. I wanted to know how it is that the making process changes the maker.

There are a few things I've learned.

The process is important because it is all we have.

This piece of wood came
from an ash tree that
grew somewhere in the
Northeastern United States.

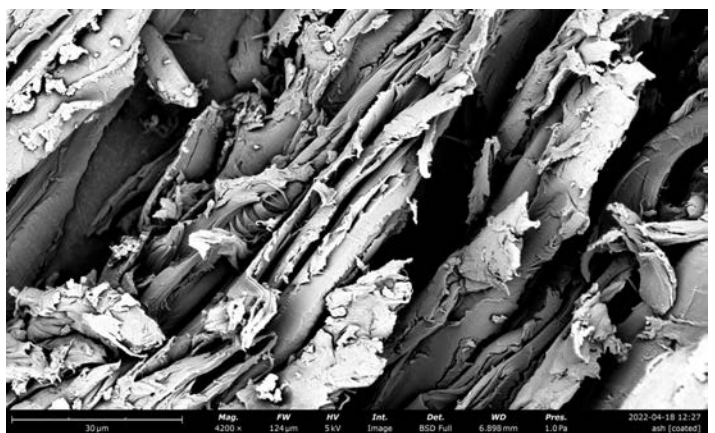
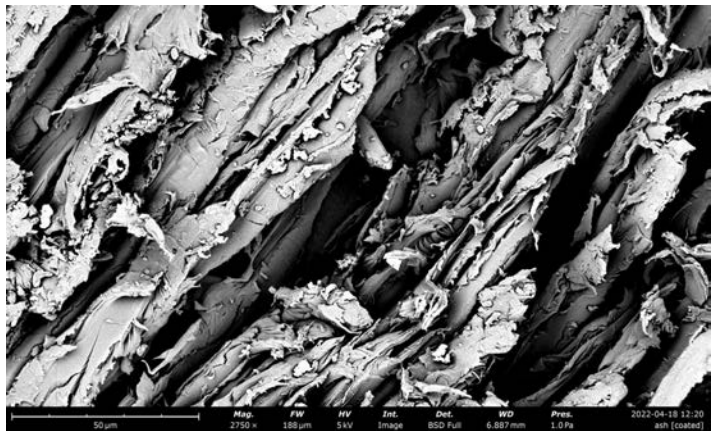
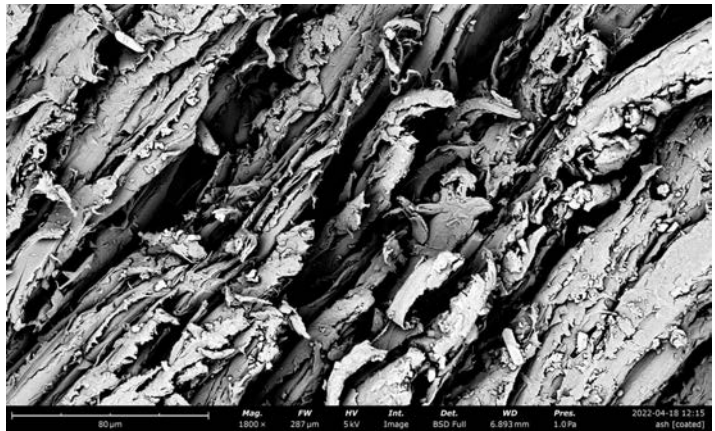
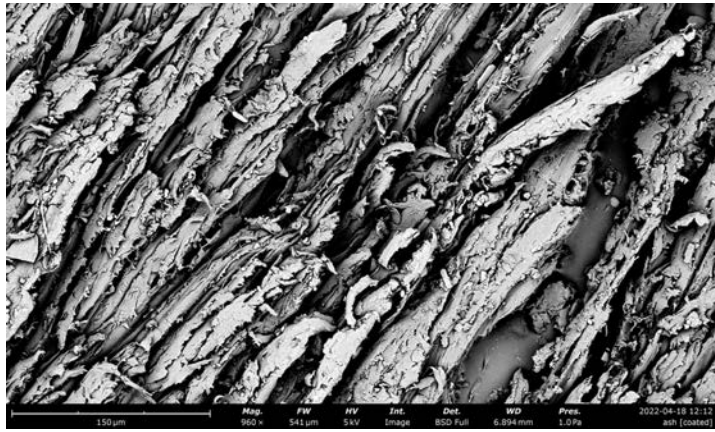




Rustling leaves sprouted from branches shooting off from a trunk that was once just a seed.



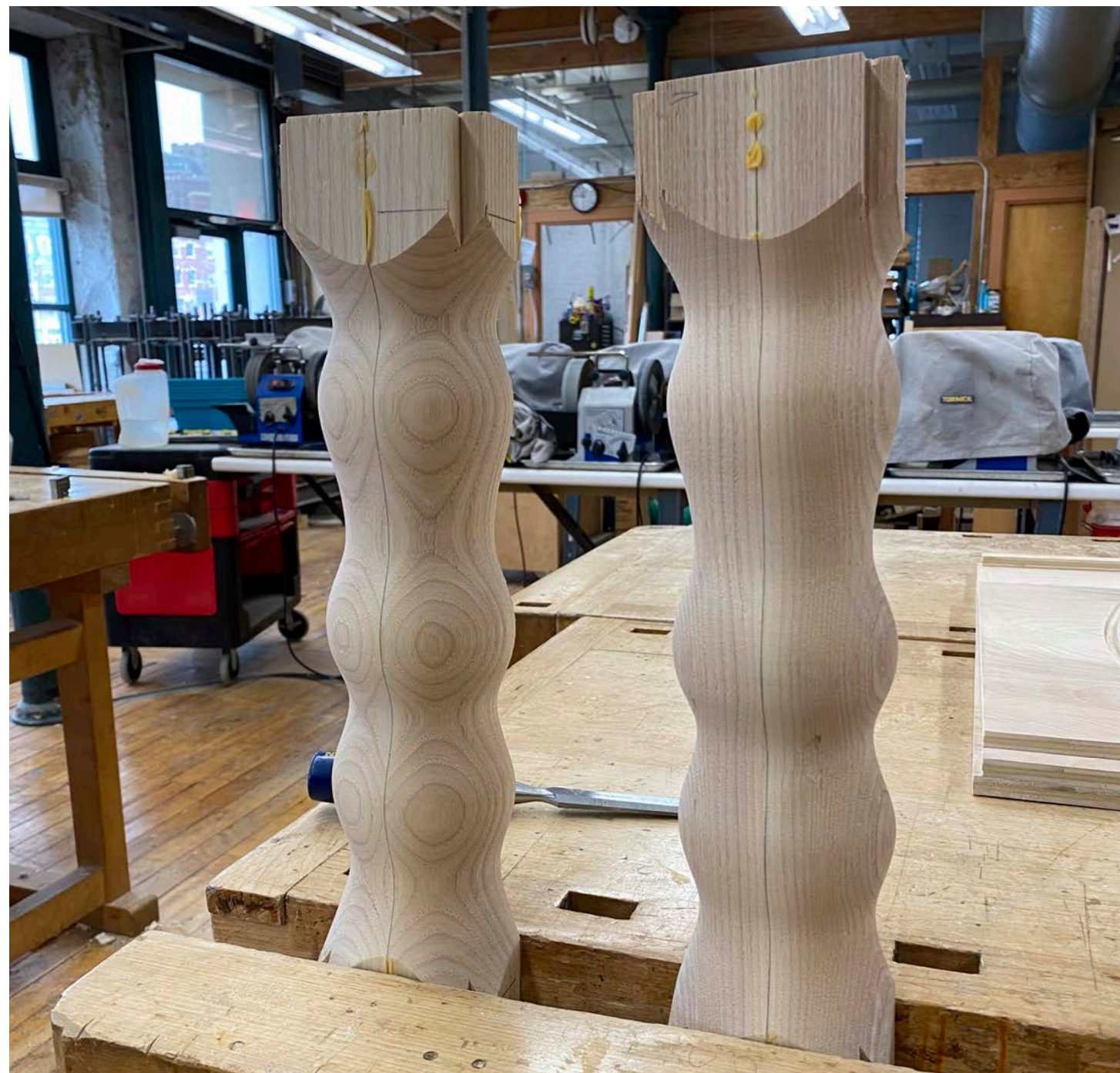
And the atoms that made up that seed replaced themselves time and time again.



They had been
dirt, or dust,
or water, or
galactic matter -



now they sit under
my fingertips.



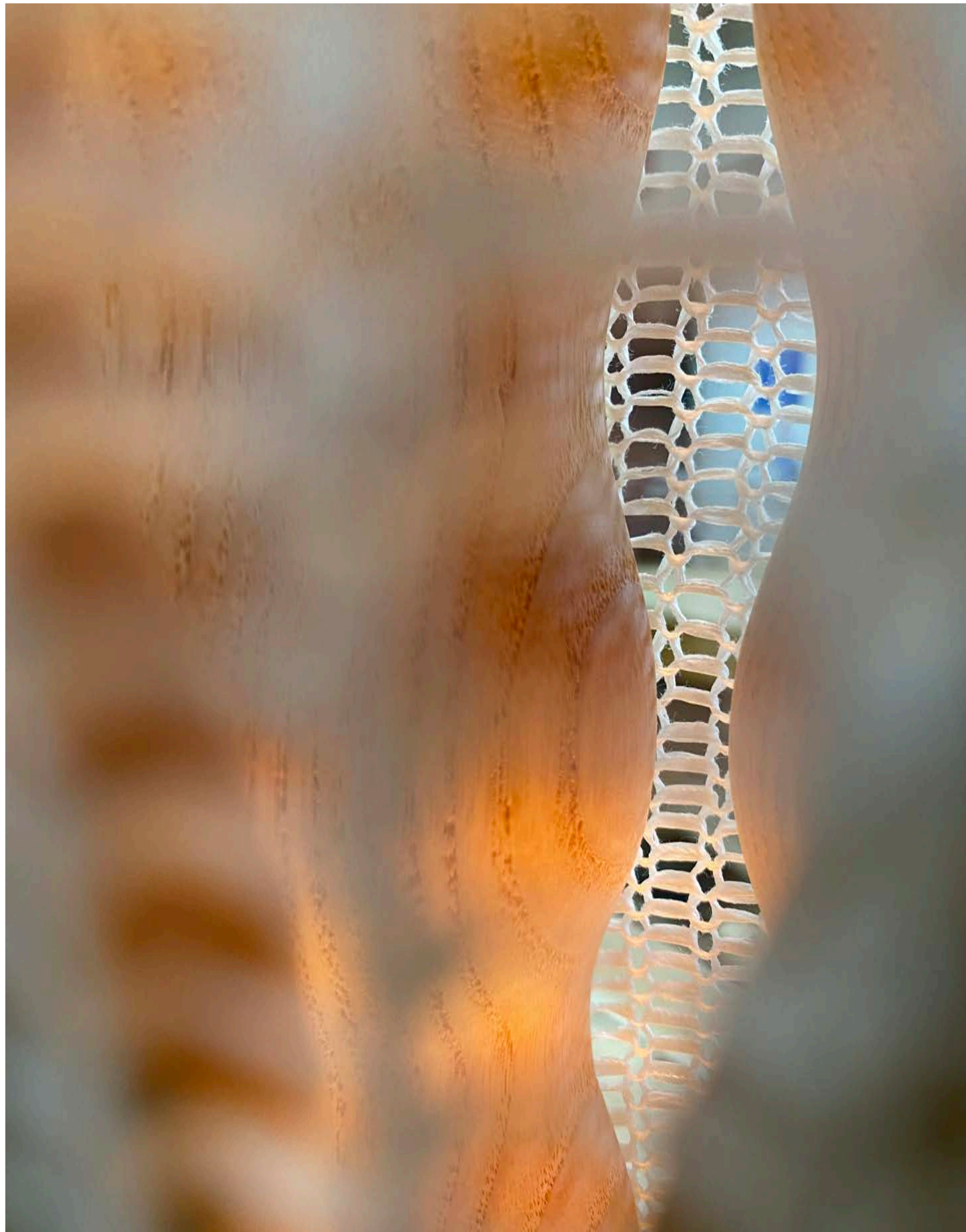
I don't think 'finished' really exists.



When I am 'finished' my body will become nutrient-rich dust,



either slowly over time, or quickly in a bright flame.



In this process, to be finished is failure.



To not have anywhere else to explore means I haven't allowed
myself to be lost enough.

There is no more potential.

Everything is in a tension between potential and fulfillment.



Potential to some degree is nothing - it is
literally what does not exist but what could.

But it's not entirely nothing, because it's what
could be.



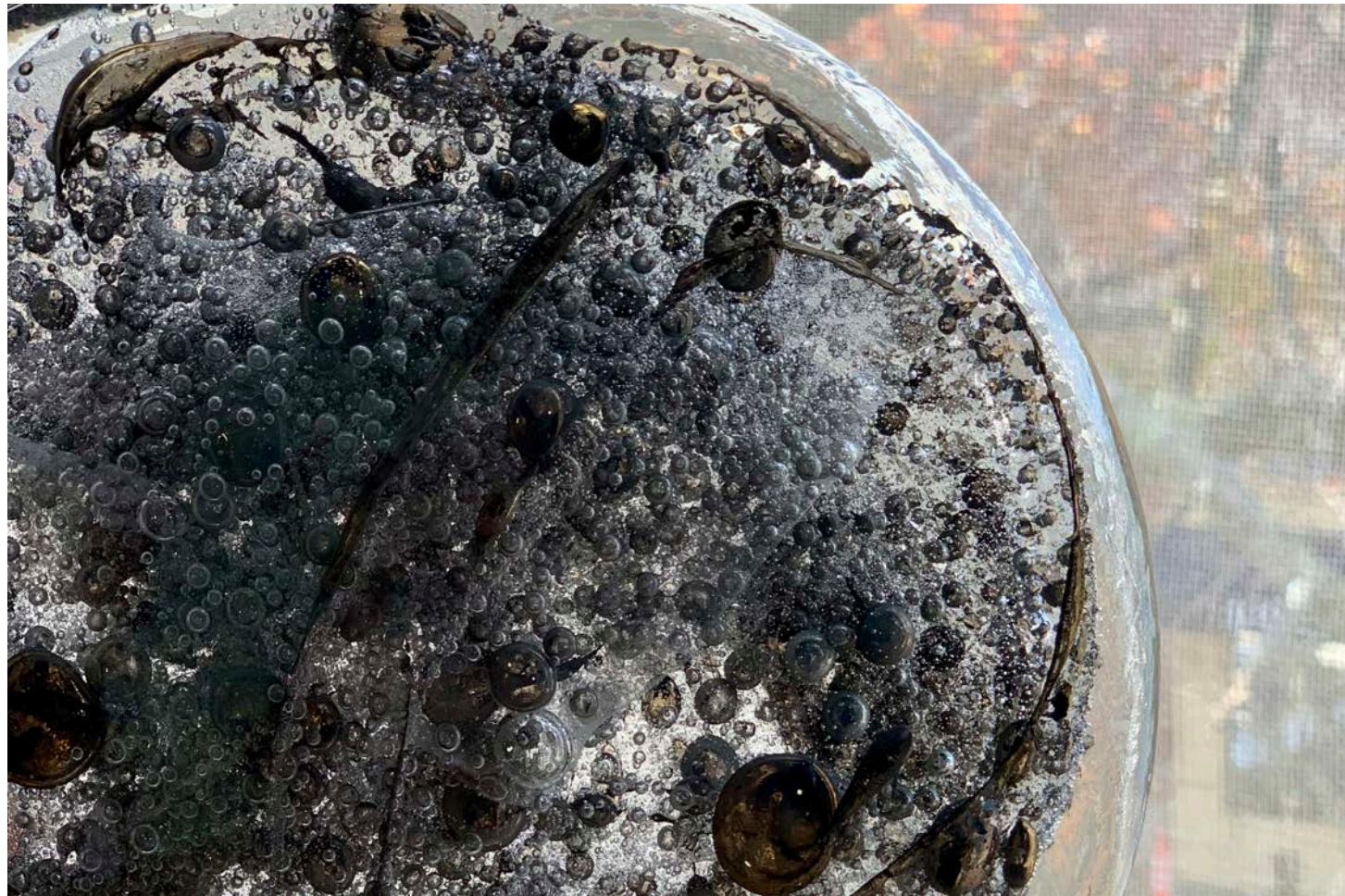
Fulfillment is in some ways everything - it is
exactly what is and what has been.

But it is not entirely everything - to some
degree it is the reality of potential that was
lost, or wasted, or unused, or unseen.

It's what could have been but never was,
instead of what could be.



The purpose of this process is to create potential-



and to teach us to see the
opportunities that appear
in our field of view.



process in hand

We experience the world through this human apparatus. I am more concerned with the process by which materials can be understood than creating something that looks finished - since my work will decay and transform into other instantiations of matter I am curious to know how the process of creating the work can change our relationships to ourselves, to each other, and to the environment we live in. It begins by getting materials in hand.



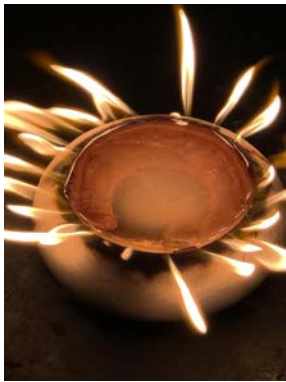
turning



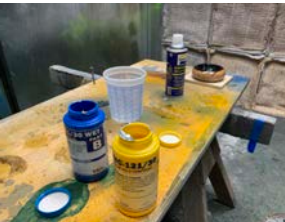
sealing



releasing



burning



preparing



molding



casting



noticing



waiting

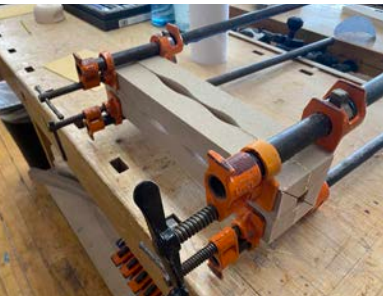




milling



turning



glueing



glueing



splitting



fixturing



fixturing



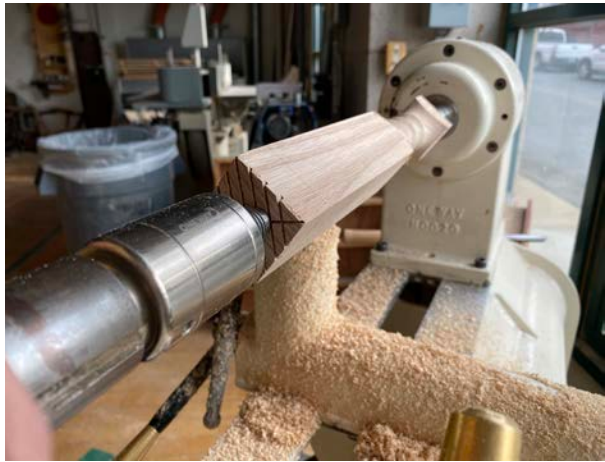
turning



marking



fixturing



seg



men



ting





burning



dumping



noticing



watching



burning



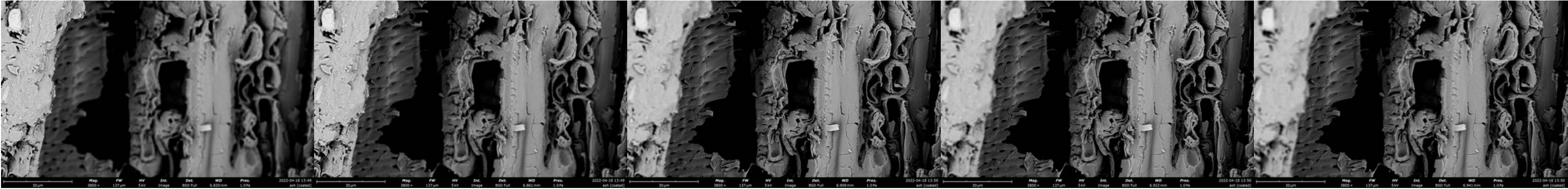
centering



gathering

**making
changes
what we see**

Seeing has less to do with what's
in our field of view than the way in
which we focus.





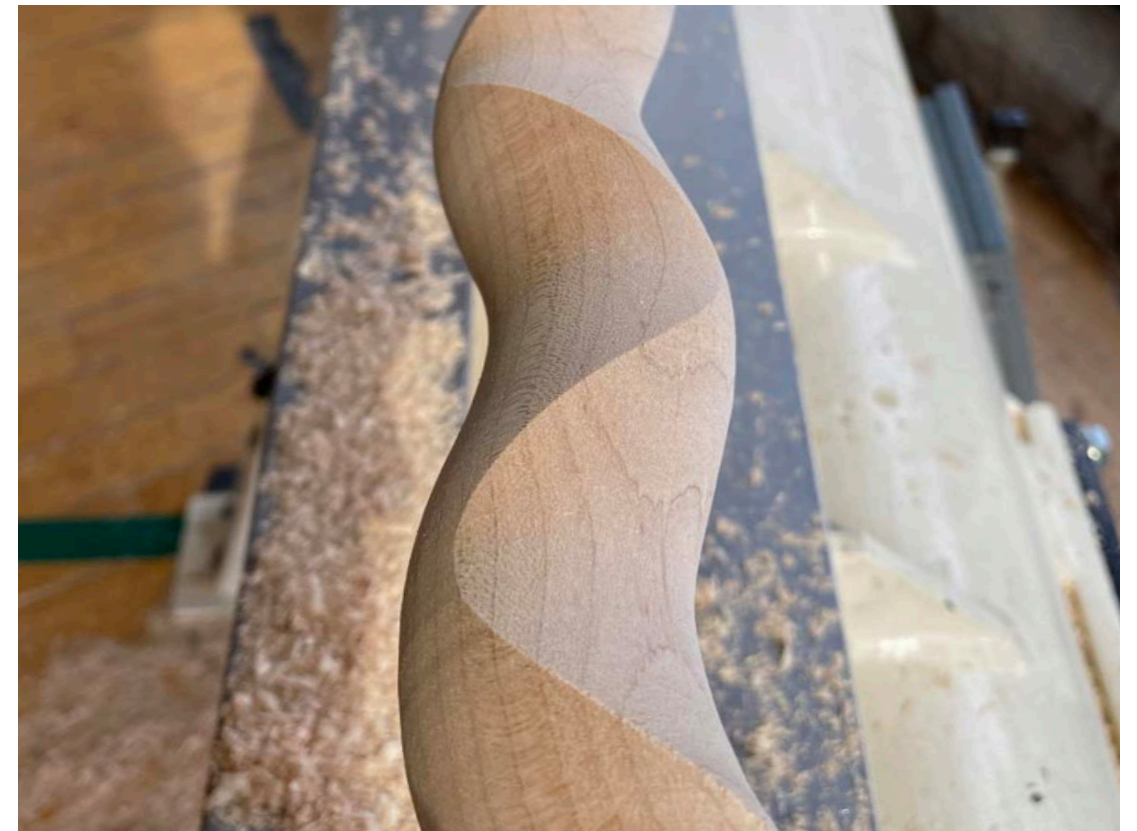




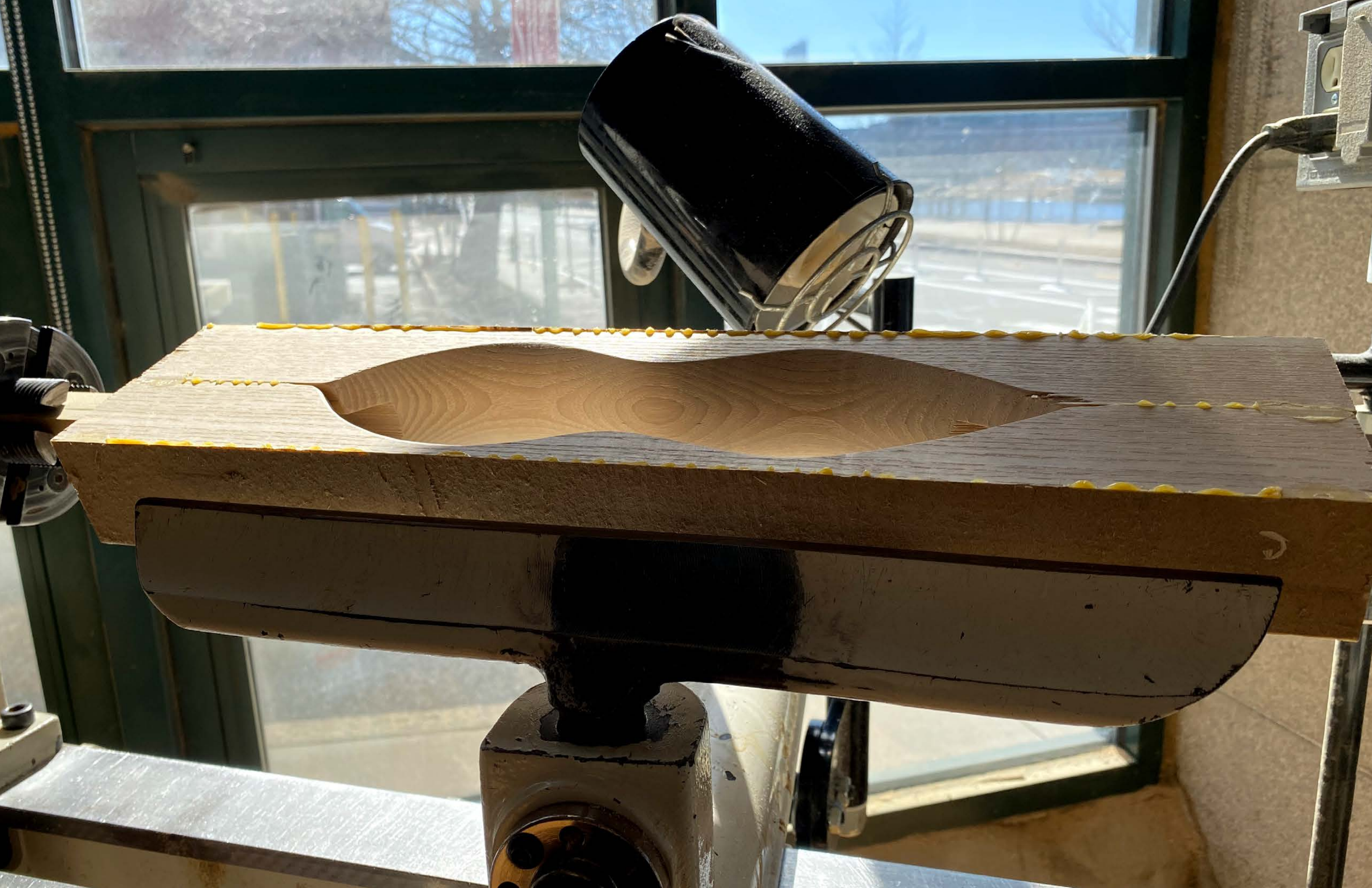


















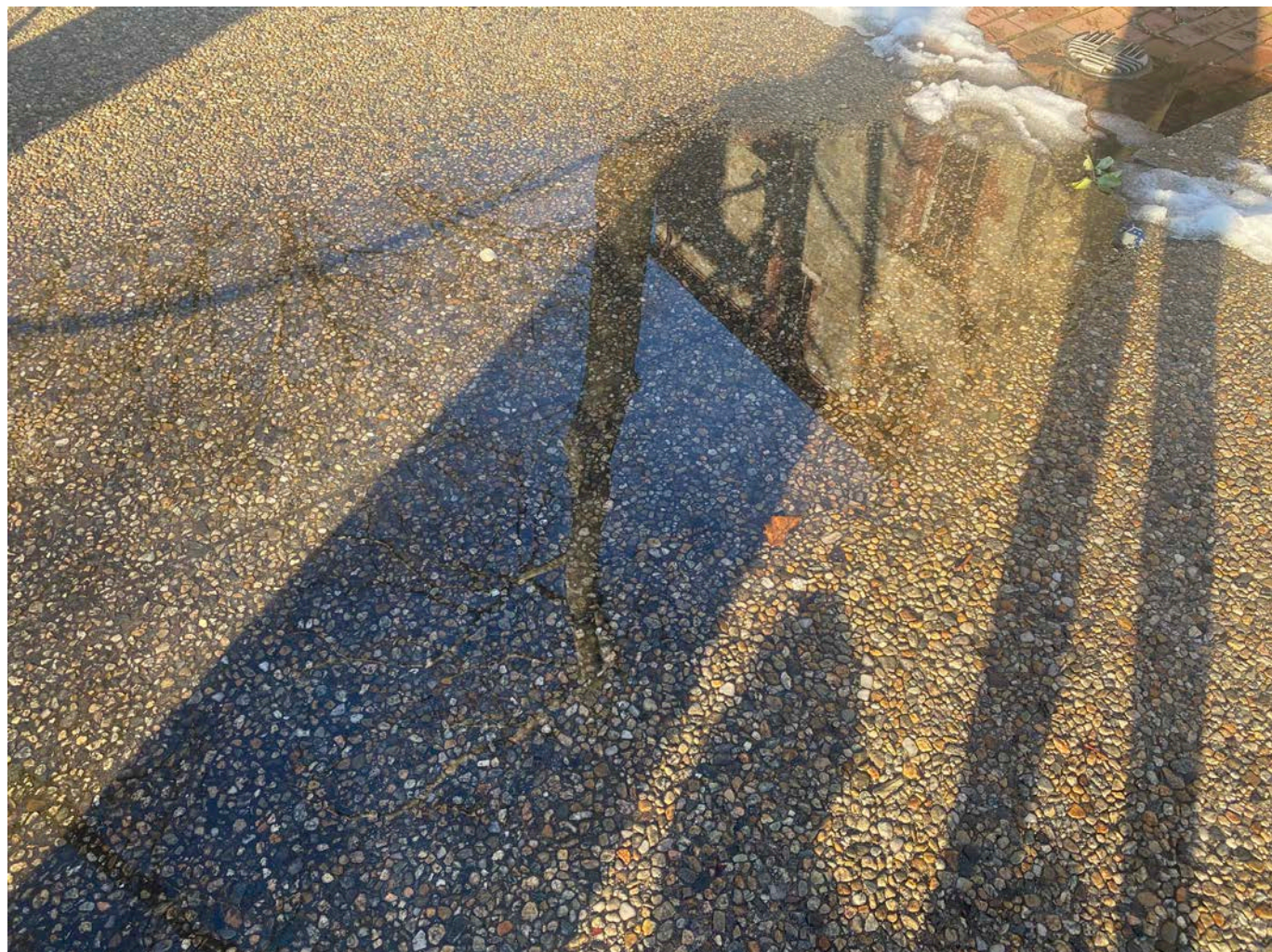


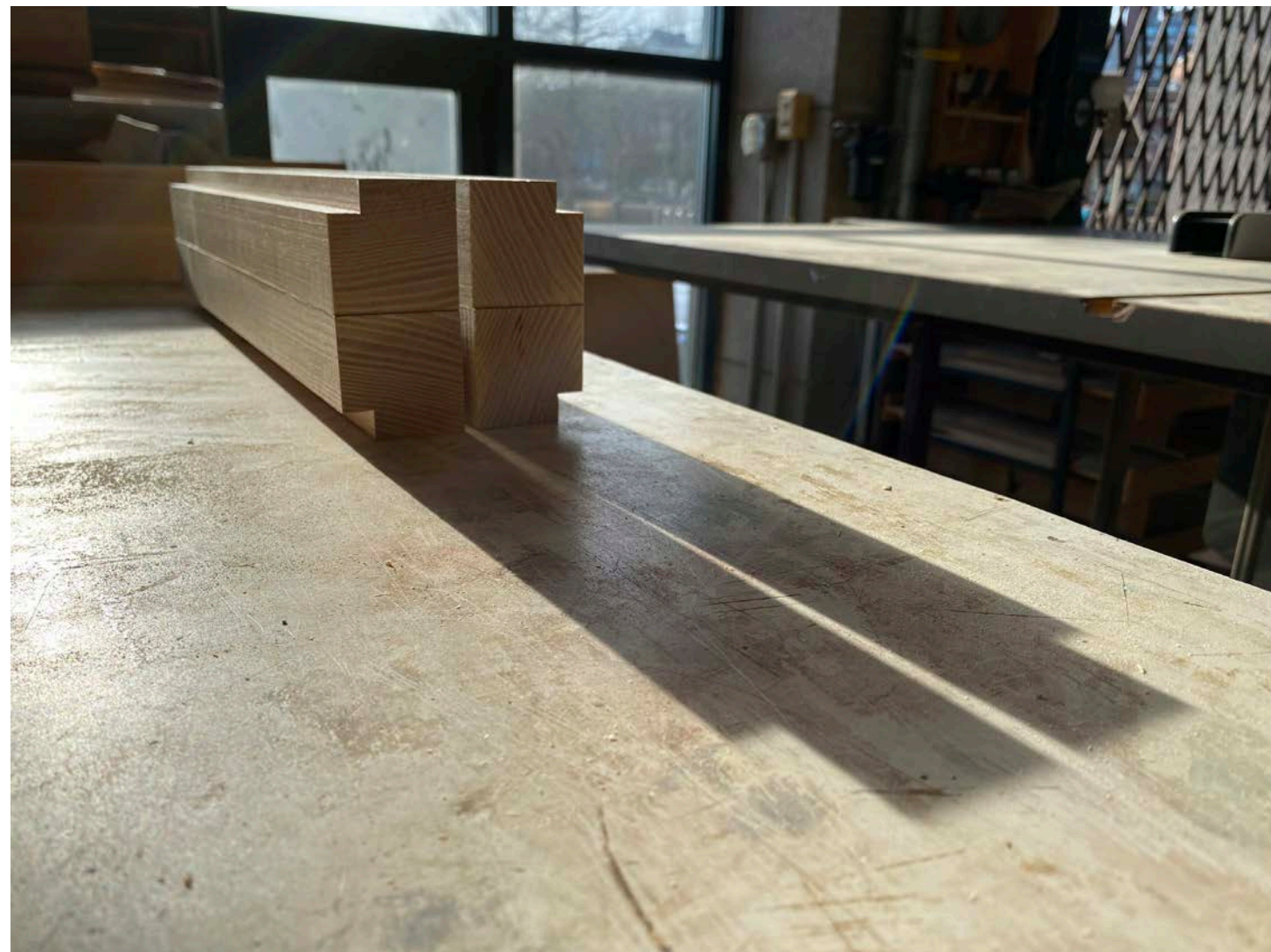


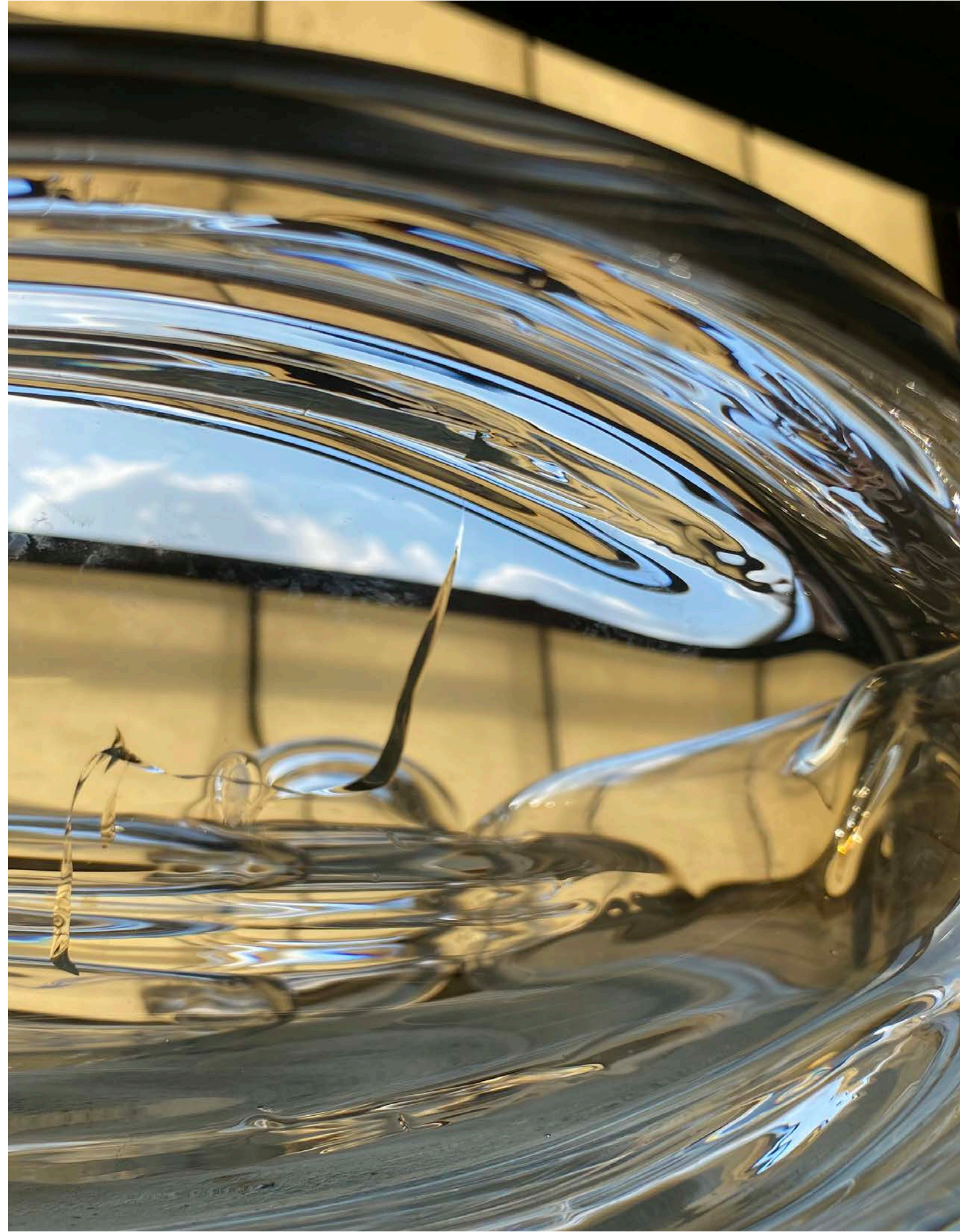


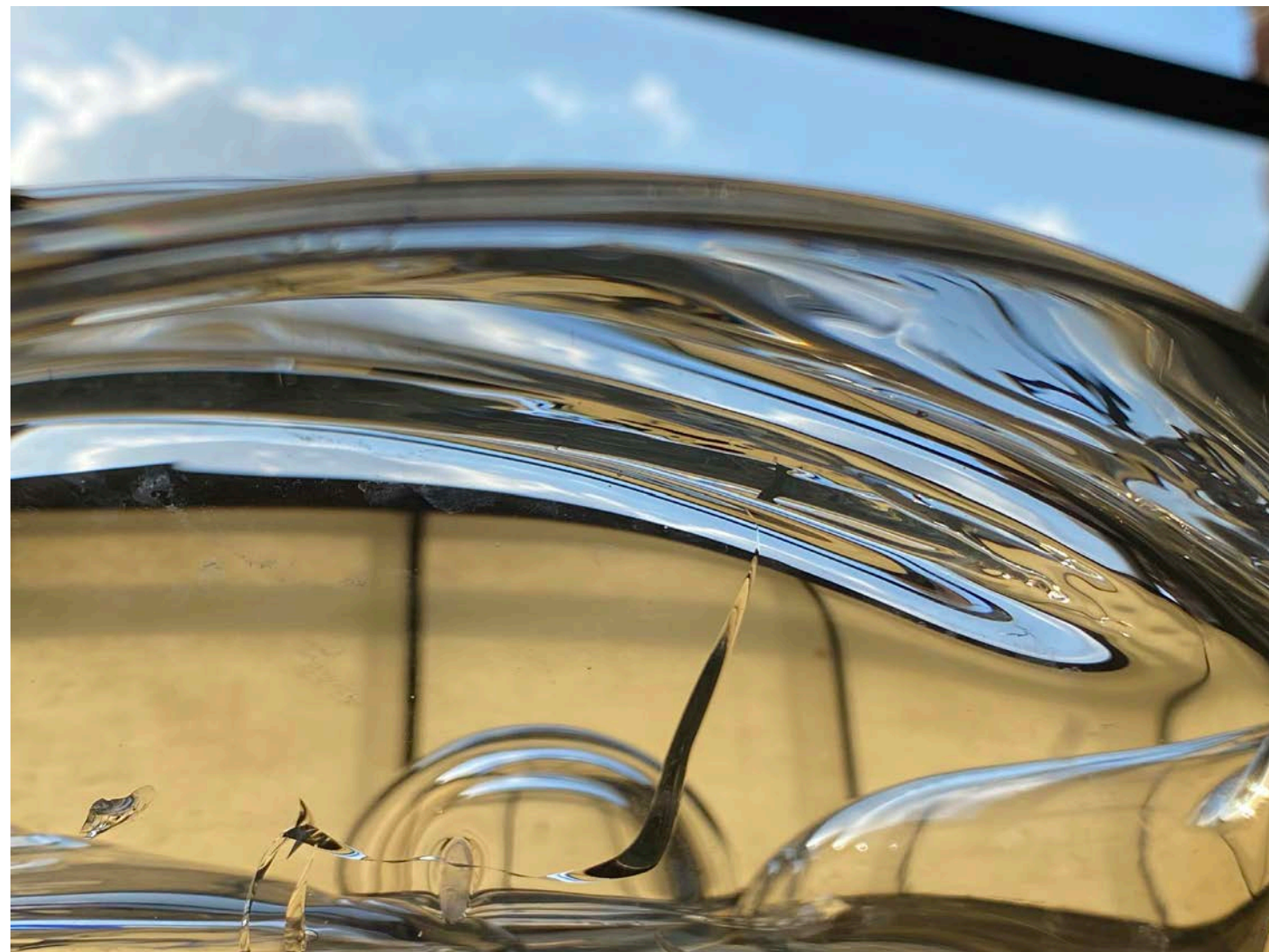


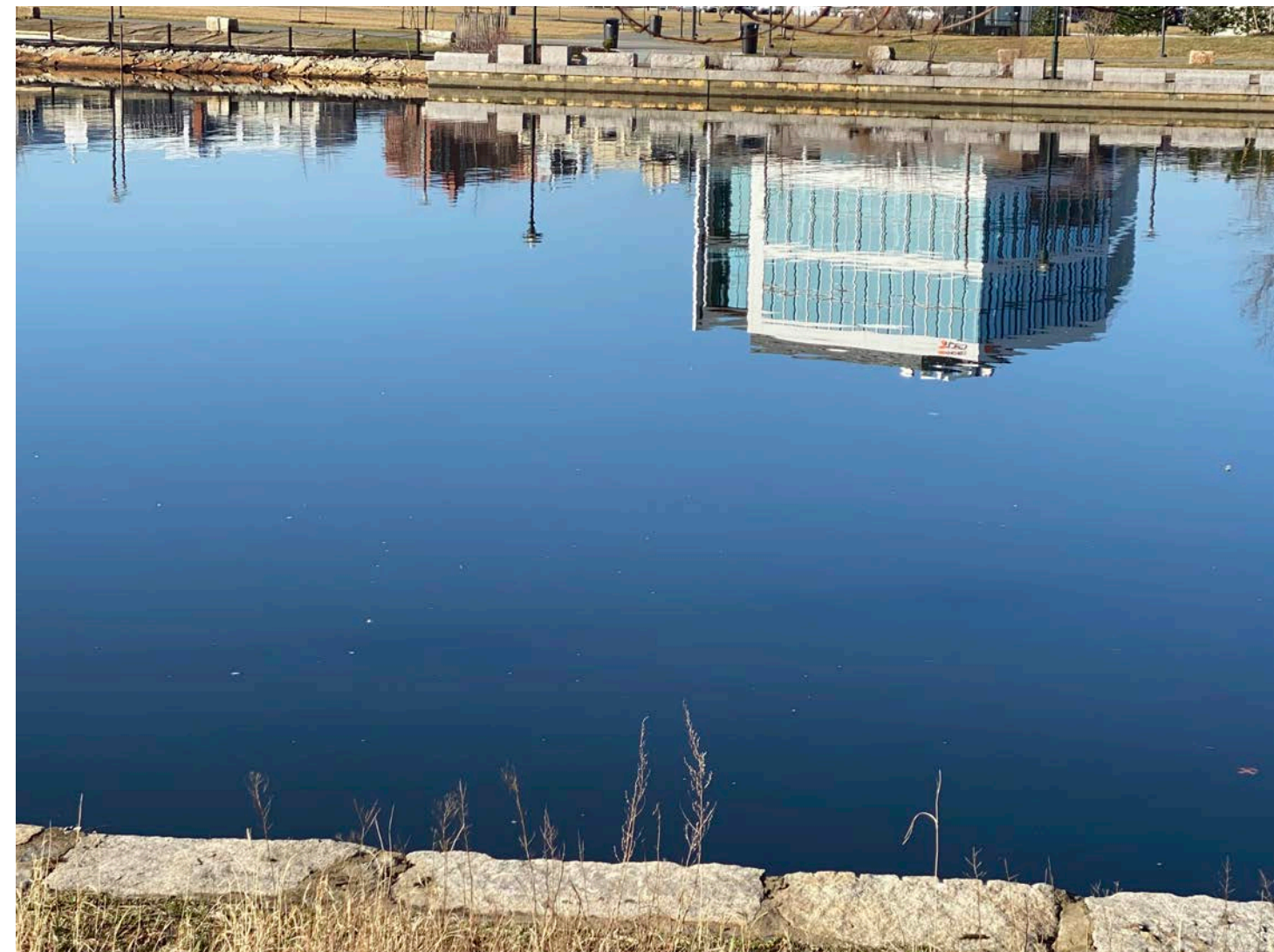
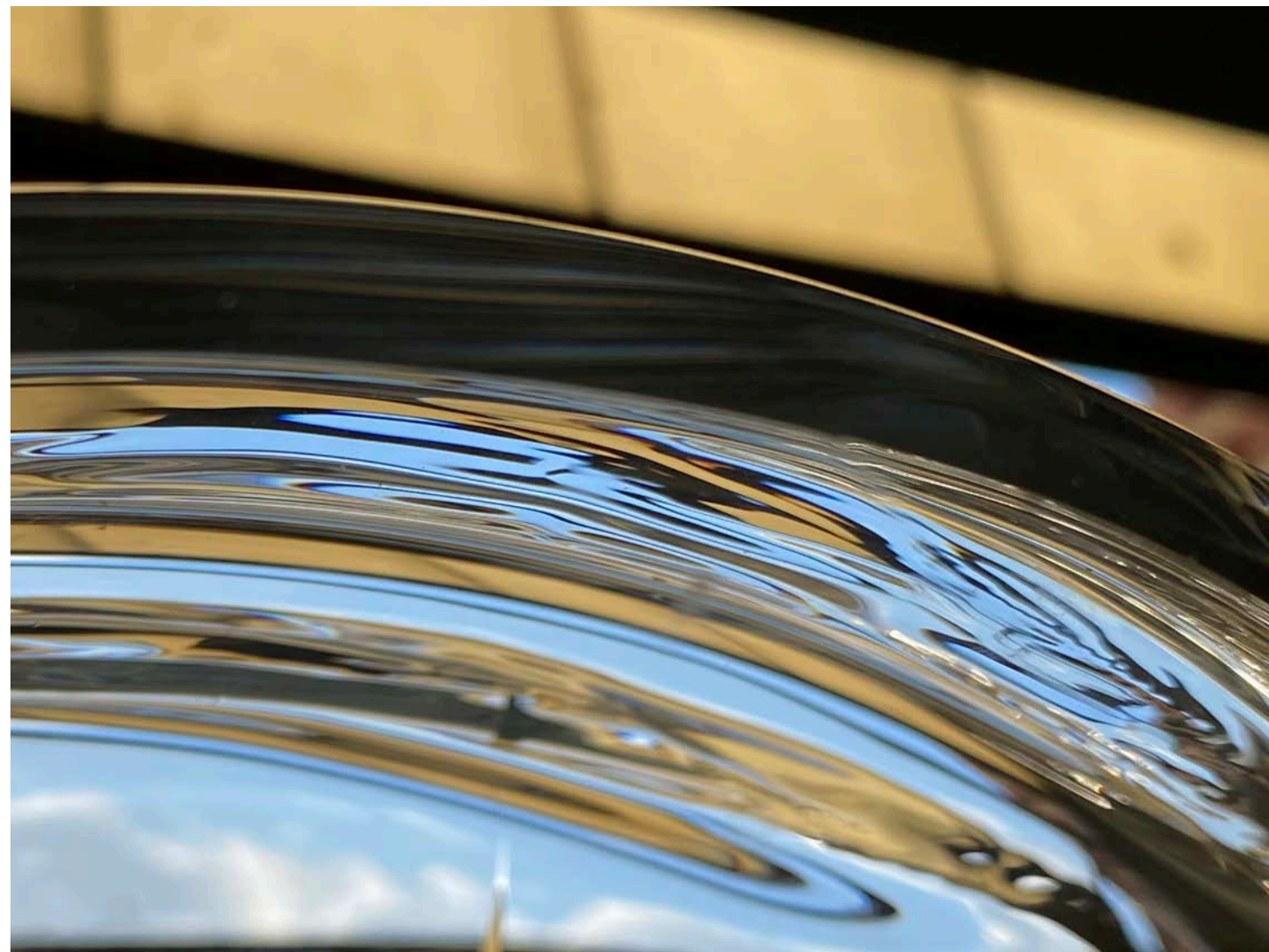


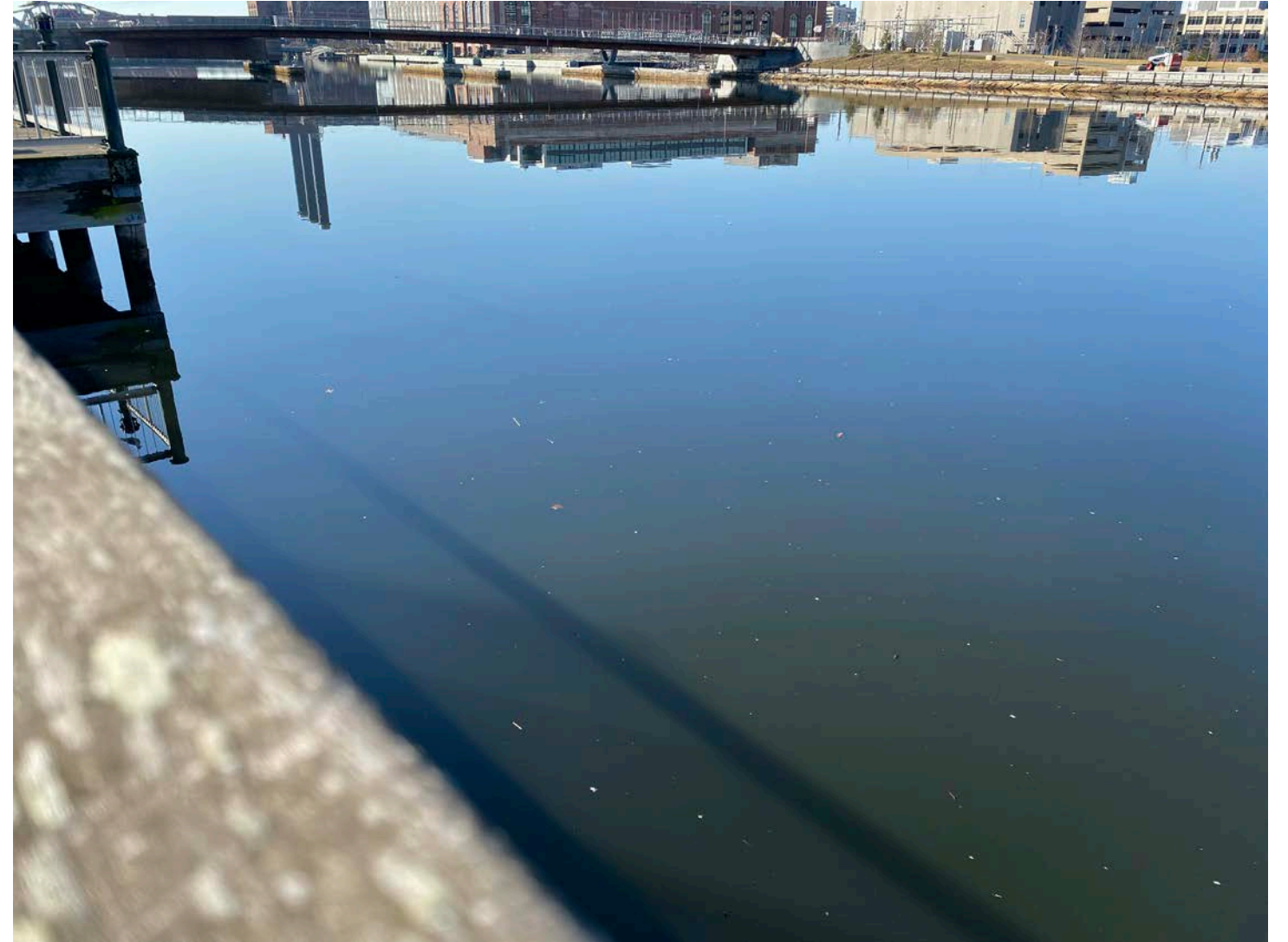














sense seeing

I run my hands over the smooth, freshly sanded curves. A gossamer layer of sawdust accumulates on my fingertips, each particle so fine that they're indistinguishable from each other by eye. The sun warms the wood grain, creating the illusion that it's softening in my hands. I made it by feel - I know it by touch.

Focused Unconscious

Yesterday I was walking up Main Street and passed by an allyway. The air was warm, and the wind wrapped around me and I could feel it over my entire body. It was a comforting embrace. I love feeling the air on my skin especially when it is that temperature - slightly warmer than cool. And the fluid of the air wrapped around me so I could feel it even opposite from its origins. It truly felt like a fluid, not like the sharp cold of a winter gust, but a warm embrace that I needed then and that I need every day. I think everybody needs a warm embrace every day, even when we don't say that we do. Maybe that's when we especially need one.

There are so many layers to feeling, and I think that's why I'm so obsessed with feeling things with my hands. The smooth surface of a piece I just turned, my hand gliding over the gentle curves, I love it. The differences between the hard and soft grains, the shapes I find with my focused but somehow also unconscious actions, I love them. These moments are quiet. These moments let me be in a place that I love, doing something that I love, loving myself from outside of myself, the warmth of the sun on my skin and the warm light shining on the objects around me, setting them aglow in their still beauty. I hear the waves in my head, but I know I can't hear them from that spot. But I see their light, even when I'm not looking I see it somehow. And all these loves of mine are in this spot on Earth and in this warm place in my heart that is blessed and makes me feel blessed.

I wonder if that is what eternity feels like - to simply be feeling everything around and inside of you, to feel the intense but gentle value of it all, to feel the importance of everything around you and your place within it.

The Hot Shop

You see a long hallway as the elevator doors open. It's awkward to walk towards the other end of the building as students are staring at you from your left, right, in a front that progressively becomes a behind. Beyond a threshold in the middle of the hallway there are burn marks along the wooden floorboards, lines of black that delicately trace the space from you to the metal doors ahead. But before that you stop and turn to your right, there is a shelf of plastic bins. Open one of them, preferably one with your name written in sharpie on fluorescent orange duct tape stuck to it, pull it out so you can flip the top towards you, and pull out a large face mask. This isn't a covid mask, it's a full face covering, a dark, curved grid, suspended a few inches from your face by a plastic structure which you tighten around your skull. Put it in place and flip it up while you continue to rifle through the box. A turquoise shirt with snap front buttons, patterned with burnt-through holes around some of the forearm areas, stained tan in others. A pair of leather gloves that are always surprisingly cool to the touch - but for now those go in the back pocket of your jeans. Slide the box back into place and throw the shirt on, snapping it in place up to your neck. Now you're ready to walk through those metal doors.

On the other side of the bank-vault-lite is the smell of smoke - heat - sweat - air filtration that cannot keep up with all the scents. You walk around a large steel table to pick up what in comparison looks like a small steel ladle, but balancing it upright from the ground you realize it almost reaches to your shoulders. It's heavier than it looks. You take it to an aluminum tub full of icy water, dunk it, lift it, turn it upside down, shake it out.

“Ready?”

“Yep.”

“Door.”

Your brave friend slides a small door open - it looks fragile but you know it's heavy, made of something that looks like a mix between clay and concrete, framed by steel. You flip your mask down. You lift up the ladle. Approach a heat you didn't realize existed in any place on Earth.

solitude

The intimacy I feel most often
is with the wood I'm cutting
and shaping and grazing
with the tips of my fingers,
the grain of my fingerprints
lightly following the curved
grain of a softly sanded
oscillating surface. The fleshy
mass returns my heat back to
me instead of keeping it for
itself, implying a choice to
be or a warm presence of its
own. Either way that space
isn't lonely - my mind is so
dissolved within my body in
that place at that time with
those sensations - I may be
'alone' on the human scale
but I am in this intimacy,
without loneliness.



Finish

There are only a few pieces of mine that I've put finish onto, and most of those were positives I used for creating casted objects. To take a mold of wooden objects you first have to seal them - I usually use shellac as a sealant, either spraying it on or brushing it on (recently brushing), making sure that the porous surface is no longer able to absorb the liquid of the casting material I'll pour onto it. These pieces have a different smell to them than the others - it's a more artificial smell, and they have the brittle shell of a once sticky substance that still is layered on their surface. I feel like they can't breathe anymore. But to an extent I also feel like I've extended their lifetime - wood without finish on it will decay faster than wood that's been sealed or varnished or painted. There are furniture pieces from many centuries ago that still exist in museums, many of them are or once were painted. It's incredible to me that something so degradable can last so long, but I think that's only the case because it's been maintained over time.

I've also put finish on bowls and butchers blocks I've made as gifts. I've sealed them with a mixture of butcher block oil and beeswax, slowly massaging the warm and creamy mixture into the alternating walnut and maple grains of the board. Even that finish is not really *finish* - it needs to be applied throughout the lifetime of the board, maintaining its moisture levels and ensuring it doesn't check and crack over time. The finishing process of a functional piece happens at the beginning of the lifetime of the object - as we live around it it accumulates a history visible in the scratches and tears and fills and repairs of the piece, and if it's taken care of instead of thrown away it adds a value that you can't create with something new. It may be one of many of its kind but it is the only one with those repairs - it is the only one from that part of that tree that grew in that place at that time, that lived with that person in that kitchen cabinet and endures that set of dull knives and accidental dishwashing.

The Value of Unfinished

If something is finished, does that mean it has no more potential? Does it stop being, or does it live on indefinitely in the state that it existed in when it was declared finished? And declared finished by who? I feel bothered when objects and projects that have been ‘finished’ are seen as more valuable than those that have not - those open ended inquires, those works in progress, the lifetimes of work that accumulate into a small set of knowledge to be passed on to the next generation, sometimes they’re seen as sad, or unfruitful, or something less than the injection-molded product, designed and shipped in an eight month time frame. That thing is shiny for a moment, out of the box, then loses its appeal as it sits on a shelf and collects dust.

The Existence of Finished

I don't think 'finished' really exists. When I'm 'finished', when my consciousness leaves my body (probably) and ceases to exist (in this form... potentially) or moves on to a different space (in another world... maybe) my body will still exist on this Earth, itself full of potential. If I am 'finished' at a young age (hopefully not) and doctors get to my body fast enough my organs could be used to prolong the consciousness of a few other bodies. Or if I'm 'finished' many decades from now my body will become nutrient-rich dust, either slowly over time, or quickly in a bright flame, and placed in an urn for some unknown amount of time.

For a while now I have wanted my ashes to someday be scattered over the ocean, the Pacific Ocean to be a little more specific. When I have the opportunity to swim in the Pacific Ocean I often stay in the water for much longer than I realize, bobbing up and down in the waves as they lap against the land and then oscillate back to the center of the sea. I'm a sack of mostly water floating in a larger pool of also mostly water with a higher salt content that seeps the hydration from all of the skin above my basal lamina. It is only that thin hydrophobic membrane that keeps me 'separate' from the sea.

Then as I stumble through the rolling waves back onto the shore, tripping over my own feet in the force of the current and pausing periodically to let the water rush back to its origin, I stand on the slope that is most obviously to me air and sea. Partly that once hard surface, washed to dust, slowly drifting away, and partly that pool of water that will only ever exist on the upper layer of that land. Stuck between a pool of two fluids - one we breathe, one we drink.

So I want to be scattered into the ocean, because I would like to live there for a time. Maybe I love the ocean so much because most of me was ocean at some point - maybe most of me was fish or was seaweed or was the sand between peoples' toes. Maybe people who love spending time in the mountains were mostly mountain at one point, or mostly pine trees, or sticky sap, or prickly pine needles or cones, filtering the thin, clean air.

We were all something of this Earth, we will all be something of it again. We are all something of it now.

**making
puts the
mind in
the world**



There are three spaces involved in the act of making - the space of the body, the space around the body, and the space of the mind.



The act of making changes the relationships
between these spaces



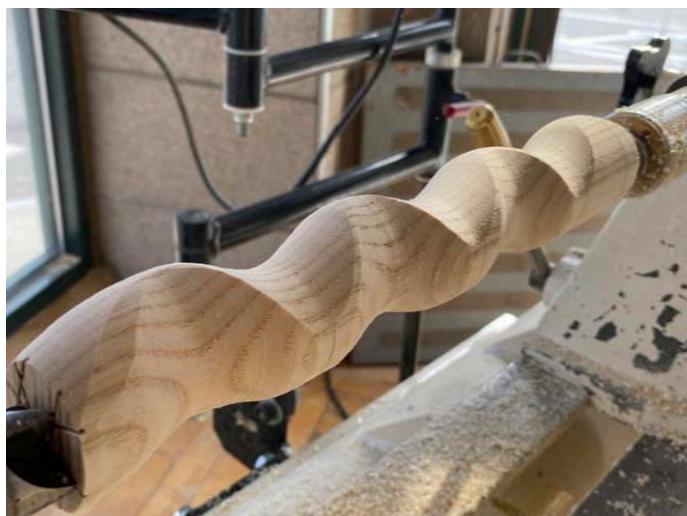
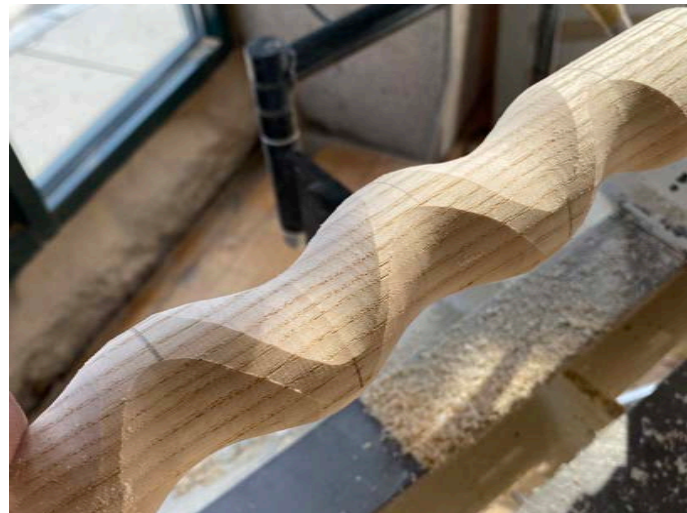
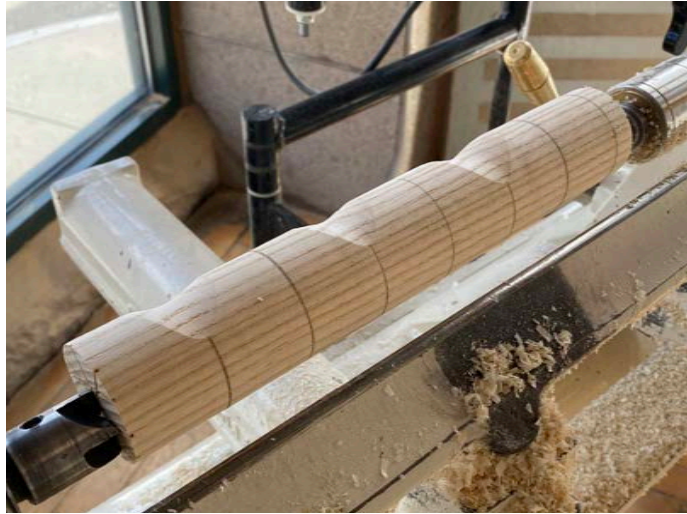
and can allow the mind to exist in the space around
the body.



This happens when we connect the space of the mind to the space around the body through the membrane of our body and its senses.

The act of making creates a feedback loop between the space of the mind and the space around the body, sensorily informing each action and response, at first depositing the ideas the mind produces in material and then, over time, allowing the mind to think through the material itself.





It is a material fluency and an intimacy with material that allows a response such that the mind travels through the membrane of the body and enters the space the body inhabits.

Cognition itself is
happening in the
material realm.





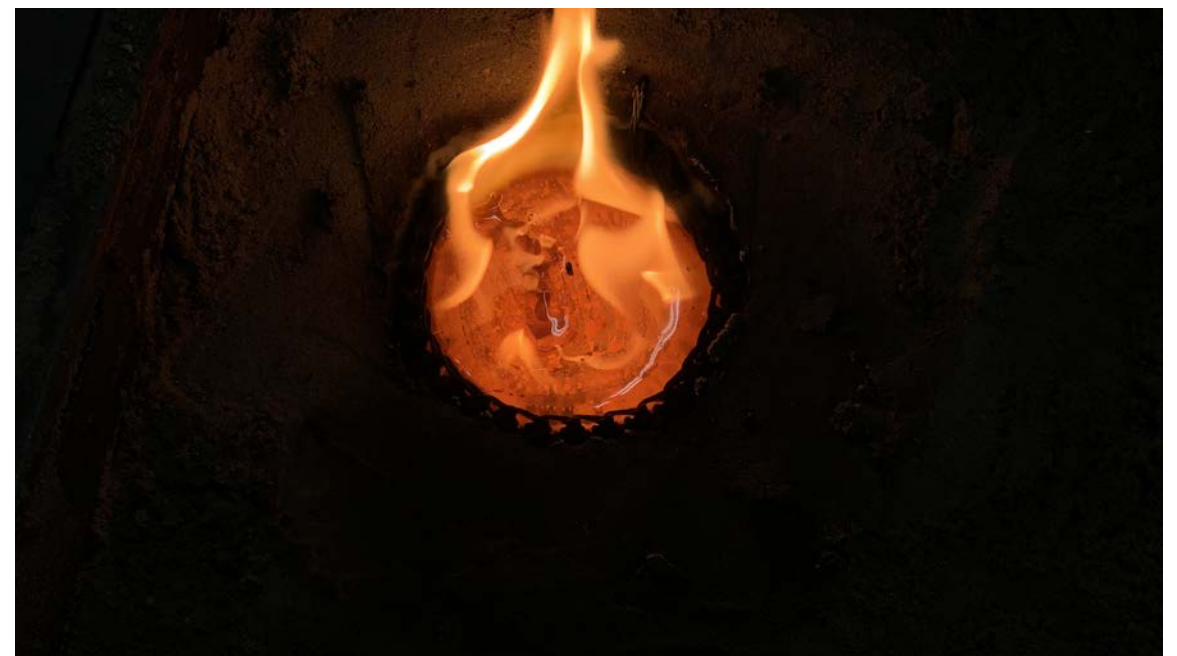
To be fluent is to hold the abilities to deliberately rationalize and to intuitively respond simultaneously.



It is fluid, casual conversation, and it is intensive discourse and reasoning.



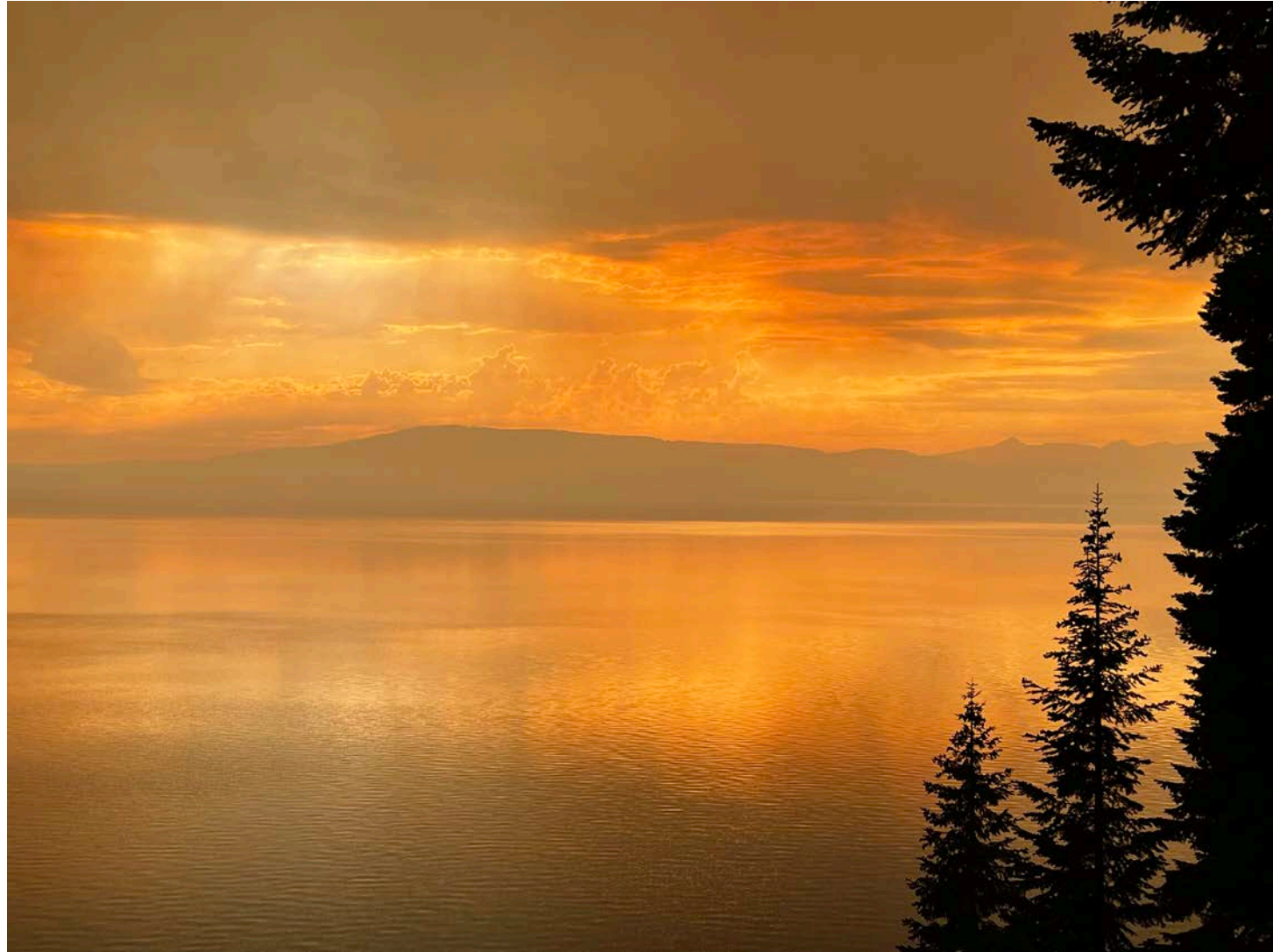
It is both technical and
epistemic, pragmatic
and emotional.



It is allowing the thing of fluency to become a part of your being and living within it to a degree that it frames your thinking habitually.



I started with wood, and
I ventured into glass, but
neither are necessities.



Any material will do.



What matters is
the not stopping.



What matters is the
noticing, and the
learning to notice.



The capacity to learn
from material is literally at
our fingertips.



material fluency

I have been saying that materials are like languages, but I'm starting to believe that they truly are languages. When you first begin learning a material it is awkward and frustrating and sometimes humiliating - it is a humbling experience to realize exactly how much you don't know. To be able to think in a language, to use the affordances of a language as a way of thinking, you must become fluent in it. To be able to think in a material, and to use the affordances of a material as a way of thinking, you must become fluent in it.

question evolution

1. How does making change the maker?
2. What happens when making is the origin?
3. What good comes from heat?
4. What senses do we learn with?
5. How can we as makers shed light onto our practice for those who are not involved in their own?
6. What if we could let the world shed light on the mind through more than just language?
7. If something is finished, does that mean it has no more potential?
8. What can we find when we trust ourselves enough to get lost?
9. What does it mean to have perspective on oneself?
10. What questions can designing find?

the ideas of objects

Epistēmê is the Greek word most often translated as knowledge, while technê is translated as either craft or art. These translations, however, may inappropriately harbor some of our contemporary assumptions about the relation between theory (the domain of 'knowledge') and practice (the concern of 'craft' or 'art'). Whereas in traditional craftsmanship, the skilled worker created alone a piece of fine, careful work, from start to finish, gaining purpose, pride, satisfaction and pleasure through his or her labour, the industrial model placed workers on manufacturing lines, making them responsible for single, monotonous, disjointed tasks. The separation of craft from art and design is one of the phenomena of late-twentieth-century Western culture. The consequences of this split have been quite startling. It has led to the separation of 'having ideas' from 'making objects'. It has also led to the idea that there exists some sort of mental attribute known as 'creativity' that precedes or can be divorced from a knowledge of how to make things. The labour of supplying the basics of daily life – food, shelter, protection, clothing, warmth – was not simply physical work – these manual tasks require intricate thought processes, so our brains are hardwired to respond positively to physical exertion by rewarding us with deep satisfaction when our labours produce tangible results.

Parry, Richard. "Episteme and Techne." Stanford Encyclopedia of Philosophy. March 27, 2020. Accessed October 27, 2021. <https://plato.stanford.edu/entries/episteme-techne/>.

Davidson, Rosemary, and Arzu Tahsin. Craftfulness: Mend Yourself by Making Things. London: Quercus, 2019. Electronic.

Gauntlett, David. Making Is Connecting: The Social Power of Creativity, from Craft and Knitting to Digital Everything. Cambridge, UK: Polity Press, 2018.

Making is both the means through which the craftsperson explores their obsession or idea and an end in itself. It is through the doing of making-things that we develop a sense of ourselves as purposeful and inventive, bringing something forth, and participating in the world. The heart of creativity lies in the process of making rather than in the product of that making, therefore there is creativity in identity construction just as there is identity construction in the most mundane forms of creative expression. Everyday creativity refers to a process which brings together at least one active human mind, and the material or digital world, in the activity of making something which is novel. Creative thinking involves the discovery of novel connections and is therefore tied intimately to learning. One may have a vision of the object to be created and the path by which to bring it into being; one may instead have a vision of the object to be created and a technique that brings only its approximation into being; or one may have no prior vision and may simply entrust oneself to the action of creating (as in Richard Wollheim's account of the way one learns what one has been drawing only when the drawing is done). In any case, 'it is the object that exists in order to bring about the action'... 'not the other way around.'

Gauntlett, David. *Making Is Connecting: The Social Power of Creativity, from Craft and Knitting to Digital Everything*. Cambridge, UK: Polity Press, 2018.

Davidson, Rosemary, and Arzu Tahsin. *Craftfulness: Mend Yourself by Making Things*. London: Quercus, 2019. Electronic.

Kaufman, Scott Barry. "The Neuroscience of Creativity: A Q&A with Anna Abraham." *Scientific American Blog Network*. January 04, 2019. Accessed October 27, 2021. <https://blogs.scientificamerican.com/beautiful-minds/the-neuroscience-of-creativity-a-q-a-with-anna-abraham/>.

Scarry, Elaine. *On Beauty and Being Just*. Gerald Duckworth & Co., 2000.



The creative mode involves turning away from the path of least resistance and venturing into the briars... in an effort to forge a new path through the gray zone of the unexpected, the vague, the misleading or the unknown. Big ideas tend to appear when we are least expecting or prepared for them – and often when we are not striving for solutions, not actively doing, but rather when we allow the mind to wander. Serendipity and spontaneity alone do not guarantee either novelty or usefulness: we often need to redirect our thought processes away from what we already know and think hard about whether our ideas will actually work. This highlights two key elements of the creative thought process: idea generation and idea evaluation. This creative mode is called for in contexts that are unclear, vague and open-ended, such as in the act of creating definitions.

Davidson, Rosemary, and Arzu Tahsin. Craftfulness: Mend Yourself by Making Things. London: Quercus, 2019. Electronic.

Kaufman, Scott Barry. “The Neuroscience of Creativity: A Q&A with Anna Abraham.” Scientific American Blog Network. January 04, 2019. Accessed October 27, 2021. <https://blogs.scientificamerican.com/beautiful-minds/the-neuroscience-of-creativity-a-q-a-with-anna-abraham/>.

Beaty, Roger E.. “The Creative Brain.” Dana Foundation. July 02, 2020. Accessed October 27, 2021. <https://dana.org/article/the-creative-brain/>.



We make definitions through design. The way we do so depends on a very basic way in which humans connect things and words, or concepts: what philosophers call “ostensive definitions.” Gesture, whether in 3 or 2 dimensions translates language into thought.

The same brain structures that are representing locations in space are also representing conceptual and temporal and social relations. When we let our minds wander... we engage the default network [of our brain], without needing to focus our attention through our control networks; conversely, when we try to focus our attention on a given task, we need our control network to work efficiently, without distraction from the mind-wandering default network. [A] study with visual artists, along with subsequent findings with poets and others, suggests that creative thinking involves increased communication between brain networks that usually work separately. Several large-scale brain networks that are known to operate in circumscribed ways in the uncreative mode are engaged in an integrative and dynamic manner during the creative mode.

Redström, Johan. *Making Design Theory*. Cambridge, MA: MIT Press, 2017.

Stanford Seminar - Mind in Motion: How Action Shapes Thought. Performed by Barbara Tversky. YouTube.com. January 16, 2020. Accessed November 09, 2021. <https://www.youtube.com/watch?v=gmc4wEL2aPQ>.

Beaty, Roger E.. “The Creative Brain.” Dana Foundation. July 02, 2020. Accessed October 27, 2021. <https://dana.org/article/the-creative-brain/>.

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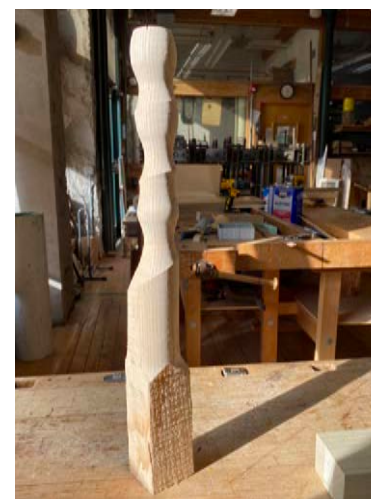
So, while the uncreative mode involves walking firmly along the “path of least resistance” through the black-and-white zone of the expected, the obvious, the accurate or the efficient.... [creativity] reflects our capacity to generate ideas that are original, unusual or novel in some way... these ideas also need to be satisfying, appropriate or suited to the context in question. This [spatial cognition] is a confluence of many senses, and is aided by actions in space [which] create abstractions. There is a space between design particular and design universal, and it ranges from addressing what a design is to what designing is, and It is [an] availability to the senses that is also one of the key features of beauty. No matter how long beautiful things endure, they cannot out-endure our longing for them. [Beauty] permits us to be adjacent while also permitting us to experience extreme pleasure, thereby creating the sense that it is our own adjacency that is pleasure-bearing. We willingly cede our ground to [beauty] that stands before us.

Kaufman, Scott Barry. “The Neuroscience of Creativity: A Q&A with Anna Abraham.” Scientific American Blog Network. January 04, 2019. Accessed October 27, 2021. <https://blogs.scientificamerican.com/beautiful-minds/the-neuroscience-of-creativity-a-q-a-with-anna-abraham/>.

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Where does the mind exist?

We know that the mind has something to do with our cognition, our ability to process the sensory information that comes into it through the membrane of our bodies, our ability to develop reasons that support a conclusion either to build it or support it in retrospect. It is connected to emotion. It has something to do with the brain, but is not encapsulated by it. It is enabled by the human apparatus, but can travel outside of it. We get lost in our minds or come back down to Earth after periods of time with our head in the clouds. The mind moves in space and time.

So sometimes the mind exists as its own space - sometimes complex and foggy labyrinths we can travel within, sometimes shockingly empty.

Sometimes the mind exists within the body - when we call attention to our senses, or when we employ our muscle-memory, or when we otherwise think through bodily action in the process of embodied cognition.

I have heard academics consider both of these concepts, but I have never heard them discuss this last possibility - that the mind can exist in the space around the body. I have heard artists talk about the conceptual properties of materials - those ideas which are embedded in the material itself, but for the mind to exist in the space around the body is something different. It is not a daydream in which I am transported to a sunny, breezy beach staring at the cyan waters of the Bahamas. It is not a fiction. It is defined by the space my body currently inhabits, the objects and materials I am touching. It is an intimacy with material and a material fluency which allows me to manipulate and respond to the material such that my mind travels through the membrane of my body and enters the space the body inhabits. The cognition itself is happening in the material realm.

This can only happen when we connect the space of the mind to the space around the body through the membrane of our body and its senses in the act of making. The act of making creates a feedback loop between the space of the mind and the space around the body, sensorily informing each action and response, allowing the mind to exist in physical space and depositing the ideas it produces in material and form.

This is what it means to think through making.

Back in that long hallway, hidden in a dusty alcove with cafe chairs, the woman in the waxed canvas apron finishes a small sip of her coffee.

She looks up from her cup. “Why wood?”

“Well,” I pause to consider my answer for a moment, hoping that I’ll be intelligible. “I used to make things out of metal - as an engineer I would design a system of parts and then fabricate them to tolerances within a thousandth of an inch. When I was introduced to wood I was also introduced to a new kind of making, a method of following the process and responding to the material. I started to develop an intimate relationship to wood, learning its qualities as I learned the techniques to work with it. I would turn pieces on the lathe and the sunlight would shine through the window behind it and make the piece feel as if it had a heat of its own. I could express and I could design interpretations, I could pre-design and prepare techniques that would take on lives of their own, slowly building a foundation of craft that itself was based in a theoretical understanding of material. So it allows me to sit in a position between design and art and engineering and craft... but being in that space can be disorienting and confusing, and it’s often difficult to explain to people what I’ve been doing... so that’s something I’m struggling with still.”

She set down her cup and flashed a grin.

“Follow me.”

Scooting her chair back from the table she began walking even deeper into the hallway. I don’t know why I trusted her but I knew that I did, so I followed her, past many doors each different than the last, some slightly ajar, until she slowed to a stop in front of one unlike any I had ever seen. The entire door was a gradient from top to bottom, transitioning from a shining obsidian down to the clearest glass, so transparent it disappeared. Behind the glass I could see stones, and when she opened the door it was revealed that they were part of a pathway. She walked through and I followed, turning around to close the door behind me and suddenly feeling warmth on the nape of my neck. An orange sunset was falling - I would have stared until it disappeared if I didn’t have somewhere to go.

We walked along the loose stone pathway towards the top of a hill, tall enough that I couldn’t see what was behind it. A gentle but firm wind oscillated towards us.

“Where are we?” I asked her.

“Depending on who you ask, the Earth has either four or five oceans.”

We crested the hill at the place where the sound of crashing waves entangled with the wind they created, far enough above the water’s surface to feel only the hint of a salty mist.

She stopped walking. “We are at the place where the Atlantic and Indian oceans meet.”

I looked at the vastness of it all, the never-endingness of a horizon that only promises the beginning of more, the frothy texture of water below my feet that dissipated into mountainous fluidity the farther I tried to look.

From where she stood to my right, I heard her turn to me and ask, “Can you tell me where the border lies?”



Photons enter through pupils onto retinas
into cones and rods.
{illuminate the space around the body}

Nerves reach through hands into fingers resonating
with heat and texture and vibration.
{illuminate the space of the mind}

