DEPARTMENT: ART ON GRAPHICS

Nathalie Miebach: Sculpted Data Infused With Craftsmanship

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As a fascinating artist compelled by craftsmanship, Nathalie Miebach's prodigious art production spans across different practices and interests including sculpture, music, and the intersection of art–science with the visual articulation of scientific observations. In reviewing her work to date, we noticed many themes that we believed our readership might benefit from when considering for their own work practices. We were curious to find out more about her process and perspective. She had much to say on the matter as can be read in the interview with Nathalie that follows.

Francesca: Thank you for joining us. I want to say first and foremost that I like how your studio visually suggests data as more than just numbers (see Figure 1).

Nathalie: Yes. I think of data as a whole bunch of Lego pieces. As interesting and as complex as it may appear, they are still like Legos. That's the beauty of data. Anyone who uses data—from scientists, to a coder, to an artist—is using the same base material. What we do with it, and the stories we want to tell with them, and the mediums we use, builds the conext around the data.

I remember being asked to speak at a marketing conference in London a few years ago and thinking how I really did not want to speak because I could not imagine what I had in common with someone who wants to advertise Coca-Cola. But I needed the money and thought I'd just come up with something. Thankfully my talk was at the end of the day so I spent the irst portion of the day just listening to people attending the conference.

One thing I realized was that we were all really after the same thing: honing down craftsmanship with data. Yes, I make musical scores and sculptures out of it. Someone else uses it to look at consumer behavior and maybe create ads, graphic or otherwise. At the core though, we are after something very similar: to understand data better. To dig into the numbers deeper so we can get to that poetry that is necessary to make a connection with a viewer or whoever is on the other side of that conversation. It's about finding a hidden story beneath the data and to reveal it. We just do it in different ways.

F: We often are looking at how to translate the data into a human language, a language of interest to both art and marketing. Could you talk more about the links you saw between the marketing community and the artistic community's approach to data?

N: When I heard people at the conference talk about data, they were talking about nit-picky things they do with code. I don't understand code. It is not my world at all. And yet, what they struggled with didn't sound that different to me than when I'm tweak- ing a sculpture while still staying true to the data. I'm building a piece right now that translates COVID-19 data. As I am building this piece, I am constantly going back and forth between the data I am working with, the sketches in my notebook, and the sculpture. It creates a conversation back and forth between the data, the sculpture, and me. When I

start with the data, I start building something, but as I build the form, the sculpture starts having a voice. It starts talking back to me saying, "hey, what about here, I am tipping over, what about...," and I think it over conceptually and think that might work. We have a metaphorical meeting and see the COVID data is all about infections and causing disequilibrium in our lives. So, if I put something that juts through it, and stabilizes it—that's the vaccination data—then I'm using the data structurally to prevent the sculpture from tipping over, but also conceptually keeps building the story about COVID-19 and its impact on our lives.

FIGURE 1. Nathalie working in her studio on a piece called *Changing Waters*.

Everyone starts with some core pile of data and then tries to make something with it. Whether that end product is some kind of ad campaign or a new medical device, or a sculpture, I think it's the same kind of back and forth—the same kind of conversation between data, the story one is trying to tell, the form or product and who ultimately this is being made for: the audience. A lot of people think I start with the data and then I go straight to building something and stay there. Sometimes I wish it was that easy. But data doesn't come with instructions. It's precisely this back and forth from where the poetry can come out, can live and breathe and connect to human experiences. It doesn't come out by just replacing the numbers with apples and oranges. I want that human messiness to be involved in the translation process. All these teeny-tiny decisions I make to get from this pile of data to a sculpture or an installation (see Figure 2). That's what makes it alive for me.

I want to believe that anyone who is interested in the craftsmanship of data as amaterial, is interested in that back and forth with that subjective human interface in the middle. That's not isolated to the arts. The first thing any craftsperson learns is that to really, and I mean REALLY, understand a material—whether that is wood, glass, data, or a musical instrument—one has to fail with it a hundred times, or a thousand times. You need to burn it, sit on it, melt it, and ultimately break it in order to find its true limits and potentials. I find it's harder to take that attitude of exploration with data. When we talk about playing with data and exploring it as a material, we quickly find ourselves in murky territory. Is data now impure? Is it still data or has it become something different? Data has this stigma that it is supposed to represent truth. I think thatmakes us a bit shy at times to approach it the way we would any other material.

Richard Sennett wrote a book called *The Craftsman* in 2008, in which he proposes a much broader definition of craftsmanship. If a person's intention is the desire to get better at something with a deep commitment to spending time on it to truly understand what they are looking at, then that's someone who is trying to develop craftsmanship. And that can be a pianist, a sculptor, a surgeon, a coder, or a person working with data. Sennett's expansive view of craftsmanship has made me comfortable working in cross-disciplinary areas. I work with musicians but I don't play music and cannot read music and yet I write musical scores. Knowing we are of similar intent—getting a better understanding of our craft—I feel less inhibited collaborating with people who are experts in something I know very little about.

FIGURE 2. *Sibling Rivalry*—Translating data from Hurricane Katrina and Superstorm Sandy.

F: Can you talk about how and why you choose topics and the accompanying data?

N: Where and why depends a lot on what I am working with. Right now, I am working with COVID-19 data and I don't understand it. I'm thrilled to think that my pieces are conveying that I understand the science behind the data, but I honestly don't.

F: I would say we are all in the process of exploring, and that exploring is a means toward understanding.

N: If I understood everything,whatwould be the point of making the sculptures? I make the sculpture not only to understand the science better but also the human responses. The work I do is about revealing the complexity that comes about when these two sides meet. The sculptures look complicated because what I am looking at is complicated (see Figure 3). I don't want them to become simplified. I don't want them to become 3-D graphs. You could put your data into the computer and get a result with a less laborious process than this. The audience has a lot to do with what data I choose. For example, I did a show in Houston that took place two years after Hurricane Harvey. Assuming that most people who walked through the doors of that gallery had experienced Hurricane Harvey and I had not, I wanted to take a much broader, more metaphorical approach to the storm's interpretation. I wanted to tell a kind of story that didn't just look at Harvey as a singular disaster,

but to use it as a jumping off point to look at the larger flooding issues and causes that have affected those communities in the past (see Figure 3).

FIGURE 3. *Harvey Twitter SOS*, translating data from Hurricane Harvey.

I deliberately gave myself time. I know there's this expectation of the immediacy of data. But I find there is a great benefit in slowing down and letting the data marinate a bit and letting the flow of time change the way I look at the data. When a storm first hits an area, I become a kind of data hoarder. I gather weather and ocean data wherever they publish it and pay a lot of attention to how the storm is being talked about in the local and national media while it's happening. Then I step back and return several weeks or even months later. How is the stormbeing talked about now? Storms have this uncanny ability to reveal strengths and weaknesses in the urban fabric of a city that may or may not have been visible prior to the storm. Every hurricane recovery is different because every community is affected and responds differently. Those differences tend to reveal themselves only after all the major news outlets have left. But people affected by storms still deal with their aftermath years after the event.

I also think about the data as something I am going to be building a musical score with. Knowing where the exhibition is going to take place influences how I build the musical score. With Harvey, I knew the concert would take place in a small space at the Houston Center for Contemporary Craft that had two exits on either end. I built the musical score to include the highway system to nudge the composers to consider the space and to use this gallery space as a stage. We created a seating system as best as we could to replicate the highway system. This gave the audience a kind of geographic anchor that the composers utilized to write compositions in which the audience became a part of how the musicians moved through the space.

F: Your description of that process makes it very clear. Data are numerical but meaning requires context.

FIGURE 4. *Little ones*.

N: To add to your question about the purpose of the work and what I am intended to communicate to the audience, I am not so much trying to create sculpture and musical scores as much as trying to create spaces where people can talk about the weather. I know this sounds simple, but it still is such a divisive topic. It's really hard to get people to talk about climate change. Ironically, many people I meet are quite eager to talk about the weather, because so many of us are seeing the effects of climate change in our own communities. It's not just happening in Alaska or up towards the pole—it's here now. There is a kind of urgency, I think, to try to understand how our immediate environment—the communities we live in—are affected by climate change.

There is a 2014 article by Zadie Smith in The New York Review called "Elegy for a Country's Seasons" that has influenced my sculptural approaches in data translation. In the article, she's talking about the need for more nuanced, more poetic, more diversified language with which to talk about the weather as even now it is very much in the science versus politics narrative. It's preventing the more complex responses we are having to the environment to have any kind of voice. Her article made me feel much more comfort- able to use data as a vehicle to build metaphors and questions that entice people to think about what is happening to the weather.

F: That makes sense. I work with climate data. I think about the conversation as being key. A piece of art is not just the object but the conversation that is sparked by the work. Artists over time have used art to broach difficult subjects at the time: To get people to talk about death and famine, all of which are part of life. One thing I like about your work is that while the topics are serious, the language is playful and that playfulness enables entry. Once you begin to explore the piece, the levels of connection and complexity reveal themselves. The work provides an entry into difficult topics.

N: I agree. Weather is invisible which is what I love about it. You can feel it, you can experience it, you can measure it, but you cannot really see it (see Figure 4). We use visualizations to reveal the complexity of weather. But I wonder how our understanding of that complexity would change if we could touch weather, hear weather, smell weather, or even taste it? We have five senses and I've always been wanting to use them. I sent a proposal to the University of Colorado for an Experimental Weaving Residency to use smell to translate information. I didn't make it as a finalist, but it hardened my resolve to try this out some time. Weather is such a visceral experience and what I have noticed with my mask on during the pandemic, is how much of my experience with weather has to do with smell. What if we can actually smell temperature changes? What if we can smell the difference in weather in another location on the globe?

F: We are beings with five senses. We use the visual. People are using sound more. You don't see researchers using smell. I do see them interested in using touch more—to investigate data through touch. I have to wonder if those senses, as survival skills, don't carry the same fidelity as our visual sense? Or are we not as attuned to them? So perhaps we don't have as rich a vocabulary? Perhaps not with smell as much, except perhaps with food, right? Can you talk more about the limits in material use and limits on our perspectives of the data?

N: I noticed that when I began to incorporate music into my practice, I got more people to talk about using data as artistic material. That could be because music is much more integrated into everyday life than visual arts might be, so more people can relate to how music affects them than a sculpture. Integrating music and sculpture opened up more entry points for viewers to talk about data as an artistic medium. Having a concert and an art exhibition in the same space gives me the opportunity to ask viewers how they respond to the weather being translated this way. Does it change the way they view hurricanes and the complex human responses to them? I think people are more open to experiencing music in public and hearing sounds as bringing in an emotional reading. There is a layer of abstraction that the visual brings to us. It's a lot harder for me to do that with sculpture.
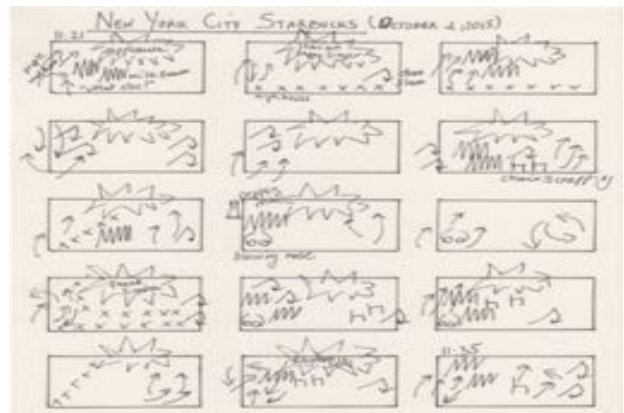

FIGURE 5. Nathalie's sound sketch from a day in NYC Starbucks.

F: That's an interesting approach. I wonder if it is because sound bypasses our visual and literal means of processing?

N: I think another difference between sight and sound is that sound is 360. I used to do the sound map where I would go to a place, close my eyes for two or three minutes and just listen. Then I would start to sketch the sounds I heard every minute— the kind of sound I am hearing and where it is coming from. While I am doing that, my brain is coming up with a visual language of sketch marks that differentiate each sound. Since I have to do this quickly, I can't overthink any of my marks.

F: Oh that is interesting. We are going to need a picture of that (see Figure 5).

N: Is it high-pitched or low-pitched? Is it rhythmic? Is it manmade or natural? I'm trying to create a simple, visual language to deconstruct all the ways that sound can be explained. At the same time, I'm keenly aware of how these visual marks are also oversimplifying what I hear and leaving out other qualities of the sound. I found these listening exercises are a way of realizing how little I attend to what I actually hear. To hear, it's a matter of training yourself or slowing down. Taste is just

as complex. A painter might have ten different words for the color red, because they have learned to literally see these different variations and have given them names. I'm doing the same thing with my visual marks. I'm giving sounds I would usually not hear a visualmark, and a kind of presence it didn't have before. At least in my mind. And, of course, it's a subjective approach–my mark will be different from your mark because you might hear the sound differently. I'm sure it's the same with taste.

F: Because taste can be just as varied, diverse, and multidimensional.

N: Absolutely.

Bruce: What is interesting about smell and taste is they linger longer compared to sights and sounds that can pass through you and be gone. Tastes and smells linger for a long period of time in comparison. Once you have tasted something, it is going to affect your next experience, and the next experience, and might even affect the experience after that. So, I think of taste and smell as useful for describing the background, but not so much for rapid sequences of data.

N: I love that. I like that. I think one of the most powerful installations I have experienced in regards to smell was Sissel Tolaas's piece "Fear I," which I saw in 2006 at the MIT's List Visual Arts Center. She was able to extract the body odor from people who were afraid, and then worked with a company that makes scratch and sniff stickers to extract the body odor chemistry and put it on the wallpaper. The installation was a big white room, which you walked into, that invited you to scratch the walls. When you did that, you released the smell of that person's fear.

The more people in the room, the more the installation became terrifying because you were in a large room with fear. There was a lot of psychology happening to the audience that made me really think wow, what if people could walk into a room and smell a hurricane.

What is it like when a person is trapped in a room in an upper floor with winds howling and water rising up? What does that smell like? Because you don't just smell the person's fear. You smell the wood and the water, which might contain sewage coming up. There is that potential too of what the storm surge might smell like. What if we could smell the weather but also the human experience? How would that change how we understand climate change? Would those visceral dimensions make climate change a little bit less abstract?

My first hurricane that I experienced was in New England. It was Hurricane Noel. I was out on Cape Cod trying to measure this thing, which in itself was a disaster. I lost all my equipment the minute I walked out into the storm. I then tried to walk to the ocean, which was another comical episode where the wind would literally lift me up. I walked like an astronaut on the moon. The parking lot was covered with tiny fish that had been lifted by the wind out of the ocean. Totally wild! Of course, I loved it all. But the one thing that really struck me was how loud the hurricane was. Everything that could make a sound around me was doing so. We spend so much effort on data and the modeling we do with it. We visualize hurricanes but, wow, what if we could hear the structure of them as well?

F: We talk about that in our group, that our experience of life is via the physical world. When we look at data, they are abstractions. The question becomes how we can provide experiences with data that give a fuller visceral understanding of events rather than just numerical analysis. What context and or vocabulary can we incorporate in the work in order to provide experiences of either the locations or contents of the data?

N: Yes, with the caveat that the sensorial vocabulary I might come up with would be completely different than for another person. Subjectivity is another interesting angle in talking about data. I think we value data often because of its objective potential. But when I think about how we try to understand our responses to climate change and extreme weather changes, I can't help but think that subjectivity has to be part of how try to understand it.

 Extreme weather events have at least two narratives. The first is scientific, made up of temperature, wind, and pressure gradients that generate energies to build these storms and propel them forward. The second narrative is made up human experiences, both during and long after the storms have left. This provides the important and nuanced emotional perspectives through which we interpret the storms and try to draw lessons from them. I believe we need both types of narratives if we are to come to terms with climate change and its effect on weather systems.

 I think that's why I love absurdity so much and try to bring that into the translation process to mediate a kind of connection between these two narratives. Despite all the science that we have, I find it amazing how irrational a lot of our responses to extreme weather events continue to be. But that irrational response is also a very human response. We don't just calculate

with science and reason. Our emotions also play a huge role in how we assess risk.

Take my parents, for example. They live in a beach front, bottom floor apartment in Florida facing the ocean. Every year the tide creeps in closer to their door. For years, I have been sending them articles suggesting that if they want to get any value from their property they are going to have to sell it soon, because eventu- ally, that ocean water will be in their living room. They want to grow old there. They don't want to uproot everything at this stage of their lives. Who am I to argue against that? It's absurd, but also very relatable.

FIGURE 6. *The Ride*—Translating data from Seaside Heights, NJ, USA.

I began to use absurdity more deliberately when I focused on Superstorm Sandy. I was struck by the images of amusement park rides along the New Jersey/New York shoreline that had been destroyed by Sandy. After a bit of research, I found that these parks have a long history of dealing with storm damage and rebuilding right after. It begs the question, why don't they just move the whole thing a mile inland? But that is a simplistic way of disregarding how important these amusement rides are to the community fabric, to the economic resilience of these places, and to the identity.

My *Sandy Ride* series consist of fantastical amusement parks that seem to exist underwater or floating on rafts, while all being built of data from Superstorm Sandy (see Figure 6). The data build the structure, but the structure is absurd because it's desperately trying to stay rooted in where it is now. I think the absurdity can be a powerful lens to see truths that are just a bit uncomfortable.

F: What you are talking about is contextualizing our experience and suggesting that particular aspect is a reliable way of surviving absurdity and difficulty. I hear you saying that is incorporated into the work. It is part of the poetry and the magic when you present one of your works. Amusement rides underwater. What?!

N: Just think a year ago we were all worried about toilet paper. We can survive without toilet paper. I find that kind of human response puzzling, unnerving, and yet somehow beautiful at the same time.

FIGURE 7. Day of play leads to a sculpture.

Continuing on the theme of art as contextualizing and bridging data to human experience. I am struggling right now working with COVID-19 data. I began to focus on this type of data after being constantly surrounded by the daily infection rates and deaths. I find myself somehow getting numb to the numbers—like I am a deer in the road, just watching this tsunami of daily statistics of the pandemic surging and ebbing. The pieces I am making now are not about trying to get through the complexity, but to acknowledge it. They are made up of many data sets that are woven together and begin building a kind of white noise. I am not at the place yet where I feel like can interpret or translate that data. It's more like I am trying to record it, while not seeing actually what I am recording. My hope is that if I do it long enough, I will get through the opacity and understand the human dimension underneath. Of course, we are all living through this right now, so the human experience is actually preventing me from seeing the data.

F: You talked about your process of needing to sit on it, stamp on it, and burn it. It seems to me that is exactly what you are doing right now with the COVID data. It is all part of the process that enables you to tease out the connections within the data—be it about the disease itself, an individual experience, or the impact on society. There are statistics and body counts, but you are wrestling with the data to filter down to the salient elements and connections. That is part of the artistic process. It is also part of the scientific process and the data scientists' process.

When I am working with collaborators they often say, "but you are a professional—you should be able to do this more quickly." But I say, "No, that is not how it works." I need to cycle through more iterations to get to my more closely honed vision! What you seem to be are struggling with is right in line with what you describe as your process. It is part of teasing understanding out from the data.

N: Yes, that is true. I find that my rate of failures is just as high now as it was 20 years ago. I still need to start 50 pieces that end up in the trash to get to that one that's magic. So, yes, right now I am in that phase where it is me and the dumpster. I think a lot about play. To create the conditions of play is a lot of work. It is really easy to build up blinders for your own work. How do you approach the project, the subjects you look at, the material you choose, and so forth? Play is a method of deconstructing or taking away those blinders. Numbers are a very powerful partner to work with, partially because we place so much trust in them. Some days I need to step away from the numbers to give them a day off.

So I have created this play day where I make a piece on that day from all the components that never made it into a sculpture (see Figure 7). I have a pile of failures in my studio that I have not quite had the heart to throw out. I call itmy pile of possibilities. The purpose of these pieces is to not overthink anything. I've got to finish it that day with all its colors and all its forms. I find them to provide great mental aerobics, because they bring the focus back to sculpture without the burden of telling a story about data. I find quite a few sculpture solutions through these play guys that I would never have reached for if I had not had the play experience.

FIGURE 8. Detail of *Harvey Twitter SOS*, translating data from Hurricane Harvey.

F: In my experience, play opens up a wider range of options because the critic is not there. With regard to play, your pieces are very playful. I am curious, do you have any interest in providing your audiences interaction or "play"?

N: I disagree a little bit. When I "play," the critic is very much there but looks at the piece I am working on with different eyes. I have no expectations of what it should look like, but I do have a hunch of what a good composition looks like. The craftsman is very much in the room when I play. I think of it as a form of "deep listening"—being really focused and ready for surprises. Someone once said that "play is training for the unexpected." I can't remember where I read it, but I completely agree. People do always want to touch my work. And how can I not relate to that impulse—after all, I am a sculptor. Part of me is very hesitant about interaction because I have done things that are kinetic and it always becomes about spinning the wheel and it kind of takes away from what the sculpture is actually about. Honestly, I have not developed any sophisticated way of engaging the viewer yet. But absolutely there could be great potential in having the viewers build the sculpture for me or build it with me.

F: I think that is a really important observation as to how you get it beyond just spinning the wheel. How do you get a deeper engagement? It's often not in the content but in a superficial activity and that's not a question we have solved yet.

N: The interaction I care most about is to get the viewer to slow down (see Figure 8). The work is deliberately complex visually so that I can reward the person for spending a little more time with the piece than someone who blows right by it and heads straight for the wall label. I want the viewer to become a detective. In every sculpture, there is a legend built right into the structure—you just have to find it. And the wall label would not tell you where to find it either.

I think that observing complexity and deconstructing complexity requires listening to it. That might be a highly poetic way of saying it. Maybe building craftsmanship is actually a form of listening. Even though I build visual objects, I think of what I do in the studio as a form of listening. You can stand under a tree and, if you just open your eyes for a brief moment, you can see this network of branches and leaves. But when you look at it a little longer, you begin to notice the various depths, you notice detail in the sky behind it—the variations in the blue. If you then look a little longer you start to notice how light is reflected off some of the various leaves. Nature reveals itself slowly. I think if I had an interactive piece I would have another purpose besides slowing people down.

F: What would that be? Why would that be?

N: Because not interacting is stillness, and it's amazing how many things one notices when one is still.

F: Can we talk a bit more about the role of collaboration in your work?

N: I have collaborated with a variety of people: science teachers, scientists, musicians, composers, art teachers, other artists. I never find these collaborations easy. And they have ranged from epic failures that felt like pushing a block of concrete up a mountain, to successes that seemed effortless.

F: Which of those groups do you find feed you the most?

N: Working with musicians and composers, by far. I think a lot of that has to do with the fact that when I began collaborating with musicians, I already had some of those epic collaborative failures behind me. I think you have to learn how to collaborate and find structures of collaboration that work for you. One of those structural elements I need in collaboration is privacy—music or sculpture collaborations that are structured so we both start with the samematerial but pursue traction in the material in different ways. We are writing two different stories that start off with the same place of origin.

With some of the earlier collaborations with scientists, I got so hung up in expectations and outcome that the whole thing just ended up feeling constipated. But I learned from that, which made me change the way I approached working with musicians.

F: The same starting point with two different filters.

N: Yes. Exactly. The music collaborations make me rethink how I am approaching data. Because I don't know anything about music, they make decisions I would never make. But even with musicians, I had to continuously tweak how I collaborate. In the beginning, I would give them the score and say, "you have got to play every note on there and don't fudge anything." The pieces that came from that were pretty boring and somewhat predictable. If it is a true collaboration, I

want the other person to take something away from it—discover something new about themselves or about their practice.

I had to step away from my own expectations and let go of controlling the musical score too much. Some composers stick to the data with which the scores are built with, and others take a much more metaphorical perspective. I have learned to be fine with all of these approaches (see Figure 9). After all, it is about telling many stories. The more stories we can get out of a pile of data, the more I hope we can understand that data—at least from different vantage points.

FIGURE 9. *Harvey Twitter SOS* musical score about Hurricane Harvey.

F: As an artist, I have worked with many of these art- science collaborations but your process is very different. It is almost as if you are both working with the same ingredients but cooking independently! The collaboration is linked by the source rather than the practice.

N: The musician and I always present together because I stage concerts that take place where I have art exhibitions (see Figure 10). An example would be a concert I did in 2018, where musicians Charlotte Layec, Pemi Paull and Chloe Chabanole performed several of my scores that were on exhibit at Circa Gallery in Montreal. The audience usually both hears their performance and sees my work at the same time. This gives us a great platform to speak about using data to create artistic pieces about data.

F: Victoria Vesna and I have discussed collaborations in terms of what works and what doesn't. She only works on long-term projects with collaborators who understand her process and know that her focus is making art—art that ties back to the science. Col- laborations are relationships based on trust and respect. They take time, just like marinating!

B: I am hearing that collaboration is a slow process. It's like what you say about needing to savor data over periods of time and play with it. Collaboration can be that way as well—a slow process where you need to play with the pieces over a long period of time until it builds into something, through reflection, upon what those many experiences are in collaboration. What I have had to accept is that in a 6-week or 12-week studio course, all my dreams for collaboration cannot happen. Ninety-five percent of my students have expressed that they like to work as you just expressed you like to work. They find collaboration in my courses frustrating otherwise.

In Victoria's case, there is a long, slow process that gives time to bring out the personalities and shed light until something brilliant can come from being committed to collaboration. The collaborations I have enjoyed have been 10 or 15 years, but to get funding for even five years can be frustrating. Even with a brilliant group of people, without the requisite time to talk about the process of collaboration, after five years it can feel like we understand each other much better but we have barely touched the surface in what useful novelty our collaboration could produce.

FIGURE 10. Charlotte Layec Pemi Paull and Chloe Chabanole performing pieces from the Weather Score Project.

N: Absolutely. I am glad you brought up funding because I do think that can be a problem with the framing of some of these collaborations. They are short-term and they are very product-oriented. You finish your sculpture so you can get your check and that's the end of that.

F: Yes, I totally understand and have had that experience. I have been very fortunate in that I have had long-term funding that provided the opportunity to work with ocean modelers, climate scientists, and computer scientists over a number of years. Like everything, it takes an investment!

B: Yes. I thank you on behalf of our readership, for your notes on collaboration and everything else you have shared.

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