Video 6: Sensing – Actions

[00:00:00]

Natasha Schull: I'm Natasha Schull. I'm here at MIT. This has been a really fun symposium so far. And I had a lot of fun on my own in the past week or so, immersing myself in the work of those on this panel.

Carrie originally told me she had planned to have this session be the very first to begin this symposium, following the empiricist view that sensing precedes perception. But as she moved down the road of conference organizing, she realized that for the neuroscientists in the mix, it wasn't apparent that that was the place to begin and that many things are happening before the threshold of sensing and action.

Here we are finally at that threshold. But I want to start my introduction by picking up on some of the themes of the keynote session yesterday. In various ways, I see this panel as a continuation of that conversation.

What I noticed yesterday was that Latour and Poggio shared not only Napoleon across their two talks but also two very similar dances. In both dances, there was a race away from something, towards something else. Then there was a halt, a moment of horror, and a backing away, a slow backing away. In the case of the Angel of Geo's story, the sensitivity, the sensitizing to this event happens after the confrontation with horror and the shock.

In the case of, let's call her the Angel of Volvo's story, the sensing happens in advance of the confrontation and the shock, and happens remotely from the protagonist. Another difference is the Volvo angel is saved in the end. She's free to run off to her meeting, hopefully with more awareness about the world in which she lives. Although, it's unclear, right? The main point actually seems to be that she can go about her life acting, trusting that something else is doing the sensing and watching out for her.

Tomás, from whom we'll hear more in a moment, offers us another vision of how we might wake up to the world-- and ourselves to it. His art is about dis-habituation, sensitizing us to our kinesthetic habits, to the world in which we dwell, to our entangled relationships with that world and others in it.

His aim is, I think, to make us aware of our codependency, clue us in to how our movements here can affect others' movements over there. And it provokes cognitive remapping. In order to act, you have to reorient. In his installation spaces, you need to reorient to the space and time in which you're acting.

As Bruno Latour yesterday discussed of Tomas's work, the works can make us attentive in new ways to our world, make us see its time and space, and feel its situations in new ways.

Alva, a phenomenologically-minded, if you can be a phenomenologically-minded philosopher, comes to us from Berkeley. He is also a member of the Institute for Cognitive and Brain Sciences and the Center for New Media. In his work, he stresses the importance of time and space to human consciousness, in a related way to that of Tomas, I think. He goes against the grain of most in the field of cognitive science by suggesting that consciousness is not something that happens inside us or to us, but something we do out in the world.

And here, you see an image from the website of the Forsythe Dance Company in Germany, which is a group he's worked with, and something we might hear more about today. As I understand it, he's interested in how dancers think inferentially, or sense how to move and act with each other.

For him, it's a window into this question of sensing and action, those being practices that happen not in the head but in the world. Consciousness is an act, a practice that emerges out of interaction with an environment. And to think you need a body, to think you need a world, this, of course, evokes Tomas's installations.

Just a little bit more on Alva. His books include *Action and Perception*, one called *Out Of Our Heads*, *Varieties of Presence*. And I should mention -- it doesn't say this in the program -- he is a 2012 recipient of a Guggenheim fellowship.

One of the things about neuroscience and cognitive science that he pushes back against in his work is the idea that computation is the useful, the key, the driving metaphor for thinking about how we think, thinking about how we sense and act. And I'm looking forward to exploring, in the next couple hours, the tensions that might arise between his approach and that of Josh Tenenbaum, whose work is very much about how brains compute.

[00:05:14] I wanted to put that tension upfront. I think it's a productive tension. And correct me if I'm wrong. Maybe it's not a tension at all but some other kind of synergy.

His lab -- we're speaking now of Josh Tenenbaum -- uses mathematical modeling, computer simulation, and behavioral experiments to explore how human brains compute and uncover the logic behind everyday perceptions and inferences. There is still this attempt that's shared with Tomas and Alva to take what is that intuition and unsettle it, open it up.

The fascinating question that drives his work, or one of the questions, is, how is it that when the human is given sparse fragments of evidence, computer-generated images of objects we've never seen before, how can we so quickly categorize and recognize them? How can we negotiate uncertainty and intuit, or make differences, make inferences, that enable action? His goal, as he describes it, is to reverse-engineer the brain and its cognitive processes.

Before I wrap up this introduction, I thought it would be useful to go a little bit in a whirlwind tour of the history of this metaphor, of the brain as computer, how we came to talk about brains that compute. I think it's important to what Josh is doing, important to what Alva is reacting against.

Very quickly -- and I apologize for speeding through this -- here's our friend Leibniz, who was probably the first to formalize human reasoning as a symbolic process, a process involving the manipulation of symbols. He thought all our ideas stem from this very small number, or alphabet, this alphabet of human thought, as he called it.

And he thought that complex ideas proceed from these simple ideas by this uniform and symmetrical combination that is analogous to arithmetical multiplication. So he thought human reasoning could be reduced to a calculation of a sort.

Leaping ahead in history to our friend Alan Turing, a mathematician, World War II code breaker, and father of computer science, and revolution in information processing. He was influenced by Leibniz's idea that all reasoning is a form of calculation.

And he proposed the notion of what came to be known as the Turing machine, theoretically capable of performing any act of algorithmic logic. We should note that he here was describing his theories with a computer as mind, computer-like human mind metaphor rather than mind as computer. We weren't quite there yet. The human is still a model for the machine.

Then along comes McCulloch and Pitts, psychiatrist and a logician working in cognitive psychology. They were inspired by Turing's paper. And they said, what we're going to do is create a logical model of neuronal activity. In other words, they were taking Turing's ideas about digital computation and using them to model the brain itself. There was this sort of twist back.

And what they wanted to demonstrate was that the physical structure of the neurons would allow neurons to theoretically perform any logical operation, depending on the inputs and outputs. Axons and dendrites were the inputs, synaptic transmission the output. In essence, they wanted to show that a neuron behaves following a digital logic of and/or and other

logical operators. This is known as the artificial neuron model, still used today as the foundation for neural networks.

Here we have von Neumann. He in turn is inspired by McCulloch and Pitts' description of these artificial neurons, neural networks. He described the modern computer then in terms of the human nervous system that McCullochs and Pitts had represented, inspired by Turing, right? You've got this looping going on.

He later summarized his view here in this book, *The Computer and the Brain*, by directly comparing the computational abilities of the central nervous system and the modern computer. He described the computer as brain-like but also made it's possible to speak of the brain as a kind of computer. Here,you see this really taking shape.

And then, as the writing of computer programs and software development became an activity in its own right beyond hardware, the analogy between brain and hardware was then complemented by the analogy between mind and software. And here, you have two who have promoted this kind of analogy. They argue that information processing, or computer programming, is a good way to describe mental computation.

[00:10:21] As an anthropologist, I find this lineage incredibly interesting, to see how this metaphor moves and is inflected by emerging knowledge and technologies, et cetera. Very quickly here, thinking of the metaphor, here is an image of the brain depicted, a German image, as a factory. Here we have a telegraph. Here we have a switchboard.

Film -- I don't have an image of it -- was used to describe the brain in 1920s Germany. Here we have, from the Canadian neuroscientist William Penfield, the brain depicted as a tape recorder that could capture life's experience and then play them back when prompted. And there's more I won't go through.

This is the Turing model -- the test, operate, test, exit model; equating cognition as a certain kind of computational process. Here we have the idea that information is processed in this serial fashion. Input moves simply to output.

Then more recent, connectionist models that say, oh, no, mental computation is not a serial process but a parallel and distributed process. Again, as technology is developing, computer technology, new model that's being mapped onto new models of the brain. Clearly, these metaphors are linked to technological evolution and the technology of computing.

I want to wrap up now. But before I do that, neuroeconomics I wanted to add to the mix. This is one of the most recent iterations of the brain-

computer metaphor coming from this young field, which happens to have been the focus of my research a few years back. I won't go into it, but here, you have neural tissue is doing this work of evaluation. Our minds are sort of this wet ware that performs calculations.

And one of the key focuses in neuroeconomics is this question of how you compute the value of choices in time. This brings us back to yesterday's keynote, et cetera. Between something now and something later. As Poggio put it yesterday, we're extremely handicapped in thinking about deep time. We don't have the equipment to do this.

And the problem of the future -- here, you have a really interesting image. You've got this brain here, and then it's scaling all the way up to the planet. Chronic conditions, obesity epidemic, addiction, debt, back up to market crisis and global warming being figured as rooted in this problem of computing the future and relating to time.

Full circle, we're back to Gaia, and to sensing, and to action. How to sense the future, how to sensitize ourselves to it, how to act in relation to it. Here's a neuroeconomist who says, we will be, with this data, able to design policies that can mitigate self-defeating behavior, if we do this research.

But how? How do you do that? One answer is, Nudge, a neuroscientifically informed mode of policy design that starts with the premise that we're not equipped to make the best decisions about time. Another answer is devices that sense for us, protect us, like the pedestrian-detection system we saw the advertisement for yesterday.

Or to take my current research on wearable devices that sense what's happening in our bodies, and monitor our choices in the world, and tell us-- through little vibrations, or dings, or messages-- when to slow down, even when to breathe, when to take a bite in the case of the smart fork.

Finally, there's art. This art happens to be art created by someone who's a member of the “Quantified Self” movement, who tracks herself. She turned it into art.

And of course, you'll recognize these images. I just threw this up here to bring it back to Josh's work and how something like what he does might also be a kind of sensitizing machine. So like an Auerbach piece, or a Saraceno installation, or even like a musical performance, dance performance, is there some kind of exercise that could dis-habituate us to our inferential habits, our inductive leaps, et cetera, the matter that he talks about in his work? I don't know what such an exercise would look like, but I wanted to put that out there.

[00:15:14] And I'll quickly review the timing. It's going to begin with Tomas and then a conversation between Tomas and Leila, who's an art historian, Executive Director of the Arts Initiative at MIT and CAST, and someone who's had the privilege of attending four of his installations. Then we'll have Q&A with Tomas. And then a break to caffeinate and stretch.

Afterwards, we will all reconvene. I hope there won't be a trickling in but that we'll come back en masse, as Alva has stressed he would really like. Then we'll hear from Josh, then from all panelists, and a discussion led by Carrie Lambert-Beatty, an art historian coming to us from Harvard. You can read more about her work in the program. Finally, we'll have a last open Q&A period. At this juncture, join me in welcoming Tomas, wherever he is, to the stage.

Tomás Saraceno: Hello. Hello. The beginning is always kind of complicated for me. I don't know. I was thinking today we'd have a -- you start to kind of find out who is sleeping, who is sending the SMS, how the echo of the room kind of start to resonate. And somehow, it always take me a time somehow to start and to find somebody who you can look in the eyes.

And that's a little bit also how is every beginning. And a little bit also is like -- I need to listen myself a little bit more loud. Sorry. You see, then adjust myself, and then I start to hear myself. And I feel a little bit more maybe secure. Nevertheless.

Well, I'm extremely happy to be here. And a little bit the mood that I have been in these last days is not really much as a presentation but more, a kind of a discussion. I'm trying to engage with some scientists here at MIT. I hope so, you know, all the simple story that I tell at the end will kind of resonate also in some of the words that we try to see.

There are many, many images. Usually, I always try to say, like, I would love that all of you have a kind of remote control from a television. And this mean every time that you press the button, you can kind of scroll the images, and I might be able to talk with you. Somehow, what I'm trying to say is how we can somehow be aware a little bit much more one to each other. And somehow. So what I kind of end up talking -- it kind of disappear. You put down the volume again. Oh, OK. Then I have to get it closer. Sorry.

Let me take it out from here. OK. It's too loud? No. OK. I think so that will be interesting exercise, no? You understood what I said, no? Everybody press plus, plus, plus. I mean, I think so. In the presentation at the moment, there are 500 slides. This mean there would be challenge also to arrive. But we can do also very quickly.

And it's a little bit also what Bruno said. Also, something which is kind of a still image, so something which is kind of maybe the images will start to

move. And in this kind of conversation, that maybe we can establish from one to each other-- and let's say that we have 20 minutes. Let's see when is the moment that we will stop and when will the moment that unconscious we might see to perceive something. But maybe it's there, but maybe we're not able really to see, because it's too fast.

There is this kind of cinematic-- 22 frame per second is something that you can perceive as something which is fluid. It moves. When you start to add more images. I think so now David Cameron is recording with 60 frames per second. But actually, you don't see this motion, but there is something.

They kind of not allow any more to show, more frame per second, because-- I think Coca-Cola was always showing this frame. You will never see the frame of Coca-Cola, but at the end, you want to drink Coca-Cola, during these movies. OK.

[00:20:15] Then the other exercise I'll do in a little bit also, which I think-- well, I'm a great admirer of Bruno. I don't know if he managed to came up here. But I hear he's in the back. But as a kind of reframing myself, I thought I put the images, and I kind of keep changing them until the last minute.

This mean I don't really know also what the images, in which order are there. This mean it's kind of all the time keep me very uncomfortable. Then I wrote something that I could not read also. This means it's kind of a constant exercise. I don't know how I will manage to handle it. But I thought it's something which I enjoy, and I do enjoy myself doing it.

But otherwise, if I don't do it, I stop learning. And this mean it's something which -- I put it as an exercise, as all the time, confronting with something which is a little beyond comfortable, which is a little you are afraid of. In many of the installation that I do, I hope so it happen this.

And I think so by being together and when you socialize with others, it's something which somehow you stop to be a little be afraid of, hopefully. How to say? Could have been much more easy. But I think Bruno made a great job, besides saying that I'm very expensive yesterday, on showing some of the images. I thought also the exercise-- we'll try to do is kind of describe a space before seeing the images, and maybe see some of the sketches that I was imagining.

And also, I'm very curious with other later noise. It's kind of maybe between invented language or try to see retrospectively what I was thinking, and how I was thinking this space might react. This mean I kind of start to know the language myself. And then maybe we see the images together.

And then maybe also, with Leila, that she had been many times in some of the installation, and we have been together. How we could-- this is an

exercise with Leila I was posing to Leila, kind of to form this imagination before see the images or the videos that we will see. This mean very easily, we can scroll through some of the images.

But basically, it's a pressurized space. As you can see, there are some people blowing down there. This mean it's something. And all the time, to have a space who somehow follow you, it's kind of a science fiction. This mean it depend amount. If you move alone, you might open up a certain amount of space. If you are with two or three people, you open more. You see how complicated it is for me to try to explain something you don't still see. Maybe I scroll back, and then we see some images, and we go back.

But it's kind of a space which all the time is in transit. It's never fixed. And what is more interesting to me is a space which is very, very hard to experience alone. This mean this state of codependency or relationship is very, very high. Here were some of the first models that we started to do. Here we are blowing up air inside. We were simulating-- we tried to do it with magnet, positive and negative, of how people might be able to move in the space and try to perform. How our space was going to change. But it didn't work really well.

Well, we did very similar of what we were doing with the spider, kind of illuminating with the laser and try to see a section. Again, remember yesterday, Bruno, it's like, try to imagine how people were moving through a space, but at the same time, for health, and safety, and security reason, they were really asking me how this space might be able to behave.

But basically, once again, it's like I got a huge cube, which is pressurized with air. This means the people which are up there are suspended in this-- I don't know. I forgot how many thousands of cubic meter which are down here. And at the same time, it's not one layer, but there are three layers. This mean it's kind of a lasagna, and we are the meatball inside the lasagna, which are all the time moving.

And this mean, once again, when we were saying how the space open and close according with the movement of the person -- look, the first person on the left, you see that he is completely closing the space. I mean, you have to imagine how complicated it is to try to explain this in advance to the insurance company, which is telling you, look, you know what I mean. If there are three people here, there is no space.

[00:25:05] But then everybody will squeeze on top of your head. When I say, well, hopefully, people will be conscious enough that they will kind of start to foresee that somebody's coming toward them, and then you will move to the side. And then you come back. This mean it's kind of a huge trust on synchronicity, responsibility, behavior, solidarity.

One thing, also, which for me is still difficult -- and we'll try to -- and with Leila also, we -- here is Leila in the middle. To understand how it work, basically, it's kind of a breathable space. It's a space which every breath that you take, it modified somehow. But somehow, it's not so easy kind of to understand it. There is a moment that you kind of learn how, more or less, it work.

I'm fascinated by the butterfly effect. But this is very simple. Even if somebody even back in the room were going to move, it will affect my position in the space. And I think this is something which is not so common. I think the earth, or the ground we have been walking since we are child is something which do not perform in this way.

Let's say when you are in a boat, if all people come here, well, they will come up here. But it's not quite the same, because everybody comes like this. Here, it measures the specificity of your own weight.

One of the books which I like which I was reading is *The Hidden Dimension*, Edward T. Hall, when he started to talk about proxemia. He described all these books about how is the perception of space in relationship with the culture, the baggage that you have. This mean he make this book, and then he start to put all these graphic where we say, well, between two Argentinian person, we talk five-centimeter difference. Between Germans, you have a little more difference, and so on.

And this means he does the same with smell, with hear. And then it start to come up all these kind of intercultural relationship, but you don't know how much is the distance that you take. You know, one kiss, two kiss, three kiss is when you say hello. But this is something that you kind of measure. And it's possible that somehow, you can take a distance towards the person. And this is something that he argues and he makes all this stuff.

But at the same time, this is dynamic in space. And then he made the exercise, let's say, well, today in this room, we will be naming the president of Argentina, whatever. And then suddenly, if she's the president and I know that she became the president, whoa, you know.

There is a kind of aura between me and her, because now I know that she became something else. And then wow, a lot of respect, right? It's like, whoa. And this is something, again, which the distance which we relate one to each other, it's so much engaging relationship of the culture that we have been living, but also on the perception that we know and the recent history that you might relate.

Now, what happened in this space? Let me get to some of the images. Yeah. Here, we started to fall. One of the things which is very, very important is people should not get too close one to each other. If everybody get too

close one to each other, we fall, and we start to fall. And it starts to happen, this kind of social black hole, I call it. Because everybody fall in the same place.

And this mean something that you very quickly-- let me see. Yeah. Here, you see this layer upper. It kind of really start to deform. And it somehow drags all the other people which are next to you. By this end, then it's very complicated then to start to get out. This mean one of the -- well, here is one of the layer which disappeared. Oy.

And then when we showed a video. This means to end up with this idea of proxemia. I forgot now what I was going to say. Maybe we watch the video, and then I come back. But the distance that we could-- ah, that's what I wanted to say.

It's like an insurance, also. And I think Bruno also was having fun of my mountaineers. It's people who live in the mountains, and they're very expert. We have to have two of them all the time that this exhibition was open in case of somebody get a panic attack or we have to rescue them.

Now, what we figured out, what we learned is if you explain to the visitors, or to the people, or the participant, the person who will form the space in advance the rules of the game, they behave very badly. And they do not behave so responsible and sensitive between each other and between the other one. What happens when you get up there is there is the fancy guy who say, yeah, yeah, no problem. And he's the one who will suffer more, usually. Then if nobody explains you nothing, it's kind of a quiet, strange situation.

[00:30:22] Let me put back some of the images. Because at the beginning, you face -- whoo. Down there, it's kind of a deep hole. And if you enter in one of the first layer, the transparency, it kind of loses also when you get more higher. But somehow, you don't know how all this situation will be.

Does it mean you enter there, and then you move, and then you see somebody else move? Usually, it happens that there is a lot of solidarity right from the beginning, because you knew that when you enter this space, somehow, you were afraid of-- and you don't know what the hell was going to happen. And you also, at the beginning, passed through a corridor. I will get back. But does it mean that somehow you are always attentive and you keep a lot of attention to the entrance, because you know that you came through that door?

And you know that you were afraid to enter in a space that you don't know how the space will change and react so much according with the others. This means when people enter, you always keep an eye when somebody's entering? And does it mean when an older person is entering, somehow, I

notice the people kind of slow down a little bit and let somebody else enter. Because you know it's the moment that you can't kind of step, because you cannot really walk, right? It's kind of you crawl, and then sometimes you can be up. But it will depend really a lot--

One thing which we have to make very, very clear -- because I know how you will see it -- everybody, maybe when you were a child, you have been in a jumping castle. This is the killer for my art. Let's put it that way. No, because it happened very easily. We'll say, yeah, but Saraceno made a jump. Well. Let me put it that way.

But it's OK, because -- and then with Leila, and I'm interested also with Alva, you have to refer to some experience that you have had as a child to try to explain something, which I hope so, is kind of new, to a certain extent. This means the first thing that you engage is, well, it's to jump, because-- well, I tell you, it's impossible to jump.

Or if you will be able to jump, it's like, well, you know, all people around the planet Earth might be able to jump in synchronicity and we will change the axis of the Earth, this kind of possible thing that while it's nice to imagine, but very rarely might be able to happen.

Now, let me put it that way. A jumping castle usually has a high pressure of air, right? It's something that you can jump. Here, the volume of air is, I don't know, 7,000 cubic meters. This means something which is much more-- if I move, you have to press all the column of air that we have above us. I don't know how many barometrics, millimeter of air that's just there.

And then you kind of wave. It's like maybe-- I like to think about Alvin Lucier, how these kind of sound waves kind of press the air and then somehow it moves. And this is a little bit how you sense these spaces, something which you take your time to -- this butterfly effect comes back to you.

Then we have to prepare a small video. I don't know how many minutes I talked already. Ten, five? Because I get always lost on-- can somebody help me? Ten more minutes. OK. Wonderful. I did this video with the hope-- yeah, there we are.

Two people are heavier than one person. But then you get air inside. And you see when you get air inside, everybody fall on the side again. Now you open the door down. Always take care that there is the door open on the left. You see two people that [SOUND EFFECT]. Everybody tracks to the hole.

Now, how are you going to get out from there? Then you pump again air inside. Then the people go up and they split again. Now, there is not one layer, it's three layers. And that gets very complicated, I tell you. With the

people entering up and down in the lower. This means it changes a lot. And then some are squeezed, some not. Once again. They put air again.

There are a couple of jokes. No, but you know, it's like if you start to think-- if we build some material which is a little bit-- let's see what happened here. Yeah. Well-- [LAUGHS] Yeah, it's too close to reality. Maybe this is why we don't laugh too much. You know what I mean? The other one is almost impossible. But that, we were on the threshold of not really happening. Don't close your eyes and be so afraid.

[00:35:21] We did all the measures that this would not happen. Anyway, this gets more like on space-time foam and what foam might be in, and the title of the piece. I don't know if I-- well, here, where people are-- one of the situations where are collapsing to the middle.

Now, one thing which is very important-- and I think refer again of what Bruno has said. And maybe I'm trying to rewind myself with Tomaso Poggio. And somehow, in some moment, you understand the ecosystem, the ecology of the space, the environment.

I like Felix Guattari when he talked about three ecologies. There is an environmental ecology, the mental ecology, and the social ecology. And this conjunction of these ecologies is what-- today we mostly talked about environmental ecology.

But anyway, this is a moment where we understand this, how it works. I move, you move, the other move. I take care that somebody's not stepping on top of me. I move on the side. But this is what happened. When somebody opened the door downstairs and you don't see that somebody's entered and the two doors are forgotten, all the system collapses very quickly.

It's like, prah, because everybody falls. Because you are sustained by this breathable air, by a medium that you didn't realize at the beginning, because nobody understood that you are supported by this kind of something which-- well, somehow we live on the planet Earth, thanks also to this air. But it became presence.

I think when Bruno talk also from a matter of fact to a matter of concern. It became really something that, oh, my god, there was somebody else who was much more bigger than our interrelationship of how we understood space, or how I move, and the other move, and you move, and we move. The proxemia, all of this, there was something which was much, much wider of our relation. Stopping, over. A little bit. Well, the other thing is a very easy explanation.

Leila Kinney: We might show the other film, and then we'll talk.

Tomás Saraceno: Yeah, wonderful. Good idea.

Leila Kinney: I wanted to say, I'm Leila Kinney, because some people out who are watching us on the webcast asked us to identify ourselves. So hello, and thank you to those of you who have texted or emailed me, saying that you're participating from afar. We really appreciate it. So while we're getting this video queued up, I just wanted to say a brief word about why we're focusing on this work and what it has to do with MIT.

So this work, which was in HangarBicocca, which is an old Pirelli factory in Milan -- Tomas opened in 2012 just before he arrived at MIT as the first visiting artist for CAST. And we used this work as a basis to create this extraordinary network, if I may say, or I said to Tomas. He's taught me how to weave a web around the various departments and interest at MIT.

We talked to people in building technology about solar, and wind, and how it would affect some of these inflatables. He's also a solar balloonist. We talked to the physicists about cosmological ideas. We talked to synthetic biology, of course, to architecture, art historians, STS. So it was a really sort of extraordinarily crossing, or cross-talking, to use a metaphor, from this morning.

So what I want to do here is simply try to describe what my experience was in the space. I know Bruno is here. He was in the space. May I ask, is there anyone else in the room or outside who was in the HangarBicocca installation? No.

Well, we'll hear from Bruno, yes, in a moment. But I just wanted to try to describe it. I'm not going to be an art historian. I'm just going to throw out one art historical concept here. And that is this concept of de-familiarization, which I'm sure many of you are familiar with, from Russian formalism, where it's just a technique presenting to an audience something that's common in an estranged or displaced way in order to enhance, therefore, your perception of the familiar, what you ordinarily experience.

And I want to say that to me, what this experience of being in this space and several of the others I've been in is this kind of full-bodied disorientation, and how, then, you try to re-stabilize yourself. And you notice things.

[00:40:08] And now I'm referring to a conversation we had this morning about impairment, the use of sort of slight impairment of senses not only in formulating how our senses operate but also in doing various sorts of experiments. So you have this slight impairment. You can't walk. You can't really verbally communicate with the people in the space very well at all. So what do you do? Then you turn to what I think cognitive scientists would call priors. What's the prior that helps you operate in this space?

So as Tomas was saying, could you turn on the video? We asked him to make a video of the installation. And I want to be quiet for just a moment, so you can hear the sound of it, because the sound, to me, is a very important part of it. There we go.

So it's 25 meters of this concrete cube. OK. Now we can turn it off, and I'm just going to let it loop behind me. Thank you very much. So the most dramatic and if they're frightening moments are the getting in and the getting out, because there are these ladders.

So you'll see in a moment these ladders. So you come in on these ladders and you plunge. You can't really stand up very well. So what do you do? I mean, you can stand up, but then the whole thing collapses around you. It's the thick-- well, it's not terribly thick.

What is it in terms of thickness? The PVC, the plastic? But anyway, it's transparent enough that you can see through it. But you see, when you try to stand up, you create a sort of reverse parabolic arch or something. I mean, it's really quite hard. And then you try to balance yourself.

And so what do you call on? I mean, for me, I've done some climbing. I've done some skiing. You know, you're trying to call on these bits of muscle memory to sort of help you orient yourself in this space. Ultimately, I think it's kind of a regressive experience. You end up crawling. And that actually creates a very different experience, because you're touching on all fours. Or as some babies don't crawl, they scooch. You can also scooch through the space. So it's really very interesting.

Now, you become, as Tomas said, very highly alert to others in the space, because you need to predict what they're going to do, which is going to affect what you're going to do. And that's the other most poster traumatic moment is trying to get out of this thing. Because as you're trying to crawl over to get back to that ladder, if somebody else doesn't help you by sort of making the space go down, you can't reach the ladder to get out.

Now, there are three layers, as he said. It's interesting. Tomas talks about lasagna. I think Bruno Latour-- and there's a talk online of the session that we were all in, the HangarBicocca. And Bruno Latour was talking about it as a Mobius strip. When we were here at MIT and going around, we talked to Jerry Friedman, the physicist Nobel laureate, contributed to the discovery of quarks, very devoted to the arts, himself a painter. He saw this thing and said, Tomas, you're exploring the curvature of space.

Anyway, it really is-- and there are these wave movements, as Tomas said, where you really feel like you're in a passage. So is it amphibious? You have this kind of, am I in an amphibious space? Am I under water? Or if you've ever skied in a whiteout, it can feel like that, too, because the sound, too, of

the-- especially if you've skied in a whiteout, that sound of the roar of the blizzard and so forth is very interesting. So the layers, I think, are really quite important.

The experience is different on each level, because when you're on the top, you're like, ah. There's a kind of release. You feel a little bit king of the mountain up there. But then you're awfully close to the top of the hangar. When you're on the bottom, how you feel heights in your stomach, you're kind of very aware that there's a concrete floor 20 meters below you.

I think it's most interesting being in the middle, because you can look up and down, and you feel that you can control the curvature, the movement, the billowing, the waves. That feels most like a cloud kind of experience to me.

So I just want to say a couple more things and then ask Tomas maybe to react, because he spends a lot of time in this space. You'll see him in here. He enjoys it a lot. I think he enjoys having trying to conceive the space, then creating it, seeing other people enact the space, really, is what I would say, because I want to say that this is what's so interesting.

[00:45:09] We call these installations. I mean, please. There's absolutely nothing passive about this experience. And I think that's really, for those of us in the art historical realm, one of the great achievements of this. It's this full-body activation of the participant, the viewer, whatever.

Oh, there's one more thing I wanted to say, too, and why I wanted you to hear the sound. So you're trying to locate yourself in relation to this space. The sound is a sound of the air compressors, the blowers. But the plastic is also-- it's a very interesting tactile experience, because you want to be able to use it as a vehicle to move or to attach yourself.

You're just kind of afraid. Oh, am I going to break it if I press too hard on it? It is also kind of warm and can warm up when people are in there. So it kind of feels like skin a little bit, too. So this idea of spatializing the relationship between people begins to have a kind of tactical resonance, too.

And I don't know about you, but I've been absolutely fascinated by watching the signers here today and the way-- I don't know if those of you in the back of the room can tell that these two are aiding one another. They're communicating there. She's reinforcing on occasion what she's saying and so forth. So I have seen this as some sort of really wonderful, beautiful metaphor for how one reacts to others in this space. So do you want to comment on that?

Tomás Saraceno: I was thinking and I think so what we -- because in one moment, you remember when we started to talk with some people, so, so. I remember

one moment, I thought, what if we think about it as kind of a three-dimensional keyboard in the space. Somehow, if we can really kind of track sense, maybe we might learn also something somehow, how we could be able to move.

Leila Kinney: Are you talking about sensors?

Tomás Saraceno: Yeah, exactly. But if you think like the keyboard is somehow-- every letter is a person. You understand? Think about the installation being a keyboard where we kind of walk on top of the keyboard. But it's kind of a three-dimensional keyboard. I don't know. I got this idea which I thought it might be maybe useful.

Leila Kinney: Interesting to explore in the next round.

Natasha Schüll: So now we're going to have Tomas and Leila. And I will moderate. We'll have about 10 minutes for questions. We're going to go a little bit into the break but not too much. I want to make sure that the audience gets time to ask questions of Tomas. And if I could just start-- so I'll steal the first position here-- I was curious, as I was watching Tomas, if you have other projects in the works, or if you've thought about--

Tomás Saraceno: No, I'd love to show you one thing. But maybe everybody knows what is this non-Newtonian fluid on a speaker. The cornflower. Everybody knows. If majority knows, I don't show you. Because I think I saw it--

Yeah. Let's show it. It's so much fun. And I thought also because Evan and Arnold were thinking that maybe we-- I'm kind of getting more and more interested in sound. Well, I'm a drummer-- very, very basic. But let me get it, because this could be fun, too.

It's only one second. I have so many. OK, here it is. I love these kind of super cheesy. Can we put sound also? It will be one. OK. Wonderful. There we are. A ver. A bit louder? Yeah, more loud. Yeah.

Audience: To what degree do you plan or have you done where you're actually getting feedback from the participants? For example, I would have loved to have heard new curse words or something from you had you had a mic on you. They could have had a head camera so that you could have seen things from their perspective. I would love to see what the EEG, EKG might have been and so forth.

[00:51:29] So the other thing is since you can't communicate with one another, do you have any plans for setting up some headsets, walkie-talkie type things so they can communicate? So I'm basically asking, what sorts of-- this is like a great space, and I was just wondering if you have any of these things in your future plans?

Tomás Saraceno: Yeah. Then let's get to the video. Hopefully this time--

Anyway. It's not my favorite music. What happened if we kind of-- you understand how a human might be able to aggregate one to each other. And I thought something like this. If you put this music, you will get, like, a-- you understand, right? You got it, no?

What the effect of music might produce.

Natasha Schüll: This was actually an answer to the question I was going to ask, which was, instead of a space in which you couldn't come too close to each other, how to design a space where you would sort of need to or be forced to?

Tomás Saraceno: But I'm thinking, the same piece of HangarBiococca. Not the same work which was before. Let's say now it turned to kind of a speaker, because a speaker is a membrane that vibrates. Because so much resonances with Alvin Lucier have been talking with Bruno.

And something that the space really depend how you tune it. The fluid, the non-Newtonian liquid, we are the moleculars. And somehow, if you put 110 megabytes, gee, you get this kind of vertical column. You understand. I thought it's the same space, but now adding what we are trying to aim at.

Leila Kinney: Well, I wanted to say, one of the things that we did talk about here at MIT-- some of you know Joe Paradiso's lab. And I think I saw Garshton here before. They work a lot with sensors. And we were thinking, well, maybe we could kill two birds with one stone if we put sensors on people so that the safety people would calm down, that we could be monitoring people's reactions.

[00:55:23] And at the same time, you would get all this sort of data about how people were experiencing space. And he mentioned earlier, there actually were two ski patrol guys in there, because you can get in trouble if you get too close to the edge. You can get kind of up against the wall a little bit. And then people, again, have to help you by depressing elsewhere, so you can roll yourself out.

Natasha Schüll: Questions. We have five more minutes. Yes. Do you want to wait for the mic there?

Audience: I saw a psychological demonstration several years ago where roughly 100 flies were place inside of a transparent jar. And the jar was gyrating constantly. So their external environment is changing. And yet, they were able to maintain their orientation relative to that change. And anyway, I just thought it was an interesting analogy relative to this incredible thing.

Tomás Saraceno: I mean, one of the things we are trying with Markus Buehler and -- you know, I have this little bit part of obsession is about spiders. And now we get really kind of to social spiders. And we are trying to send social spiders into the International Space Station.

And one thing which I learned-- when they made an exercise of-- when you put one bee into a weightless environment, the bee doesn't know. And then she start to flap. She cannot really move, because-- and then she stress out and she die after I don't know how long.

Now, when you put many together, they kind of start to talk. And then until a very new kind of extreme situation that you don't know how to react-- let's say when Bruno called Gaia or what the climate change might be. If you have a high degree of sociability among the animals, it seems that they are much more resilient and they will be able to survive much longer. I don't know if I answered the question.

Check everything that I said, because half true, half not.

Audience: What you described seems to be an experience of the space. The only thing that you described that was purposeful was getting in or getting out. And you suggested then that people were frightened. Is there some difference there? I mean, have you asked people to go in and do certain things, and does that alter the experience?

Tomás Saraceno: No.

Leila Kinney: No, I think he actually --

Tomás Saraceno: No, and I don't like really to tell people what to do.

Leila Kinney: I think he prefers--

Tomás Saraceno: I really hate.

Leila Kinney: -- to not give rules. Although, sometimes, like in the Dusseldorf, they required him to give people rules. And then people behaved very differently. Because I think one of the things he's interested in is the self-organization of groups. So how do you start interacting with the people that you are suddenly plunged into this environment with?