An Interview With Artists Sofian Audry and Rosalie D. Gagné*

by **Patrice Giasson**
Alex Gordon Curator of Art of the Americas

Patrice Giasson (PG): Rosalie and Sofian, I am thrilled that we will be showcasing this wonderful new and still progressing project called *Morphosis*. The work features the interaction of a trio of amazing circular-shaped robots. I understand that there is an enormous amount of programming involved. Could you briefly describe what is behind the work? And, perhaps, tell us how the robots move?

Rosalie D. Gagné (RDG): Basically there are three spherical robots, and they all have the same mechanism inside. They work with a system of counterweight/counterpoise that has two axes: one that moves in one direction and the other in the opposite direction. It is the combination of these two axes that makes the robot move in a particular direction on a flat surface. In addition, each robot has a skin made out of silicone. Each skin has a different morphology, we might say, which makes each robot visually distinctive.

Sofian Audry (SA): Yes, the mechanism we use is like steering a bike, but while on a bike you can't go backward, here the robot can go forward or backward, and then by tilting a counterweight, it can move and it can direct yourself. It's a bit of a clunky mechanism. In the world of spherical robots, there are better ways to make it more efficient. But we chose this very basic system on purpose because our true artistic intention was that these robots would be a bit clunky, and not perfect. They're far from perfect. I think the public will discover that, too. One of the main conceptual ideas behind the

* The interview was conducted on Zoom, January 17, 2024.

work was to create a relationship between the audience and the robots, maybe a certain form of empathy for the robots while the audience watches The robots struggle, in a way. These robots have also some means of sensing their environment and their own body. And as Rosalie said, even if their mechanics and their programming is the same, what differentiates them is their body, because the skin that they have makes them look different and also changes their physics—but also, it's a *sculpture*, right? The silicon skin makes them naturally behave differently because of the way it affects their movement. They each react differently to the environment. If they all make the same decision to move in a certain way, even though they have the same motor, it doesn't mean they will achieve the same result. For example, while one of the skins is a bit bumpier, another is rounder, and there's one that is more concave. Another constraint is that they are not programmed to do anything specific but are really autonomous. They make their own choices. They try to learn something and how to behave in the world.

PG: Do you give them some guidelines, or indications, like move or retract, reunite or separate?

SA: Indirectly. We use a technology of machine learning that is called reinforcement learning, and basically the robots are free to make certain decisions. But when they make a choice, when they perform an action, they get some kind of feedback from the environment, such as a reward or a punishment. How we give this reward or this punishment will impact their behavior. Instead of telling them, for example, to dance by carefully programming a pattern of motor activation, we give them a reward when they move their internal structure, while punishing them if they move in the environment. This forces them to find a strategy where they will shake their motors, but without actually moving too much on the floor. We put them in a kind of a conundrum. Over time, what you see is actually their process of learning. They will not achieve the [correct] result immediately—they have to figure out how to achieve it. Sometimes they achieve the objective, sometimes not. It's really about the process rather than the outcome, the journey rather than the end goal. It's the behavior of a learning agent born into the world and trying to figure out something that we, the artists, are imposing on them, but which the robots don't know firsthand. They need to figure it out on their own through performing and adapting within the environment.

PG: Fascinating. I'll follow up with a different question. You spoke before about the appearance and the skin of these robots. They don't actually look like robots, but rather like some sort of microorganism or living species. This makes them very uncanny, a concept that both of you have referred to when speaking of your work. Was this the reason you gave them a biological appearance, to make them look alive?

RDG: The objectives of this project were to leverage machine learning in conjunction with an autonomous agent to craft an immersive experience. Concurrently, we aimed to explore the potential emergence of empathy—a distinctive connection between spectators and these creatures as they navigate and evolve in space with a certain clumsiness. With this in mind, we opted to envelop the robots in a silicone shell. This decision was driven not only by the desire to impart distinct formal properties but also by consideration of the tactile sensations evoked by this soft and flexible material, reminiscent of skin.

The underlying idea was to create conditions that would facilitate a unique relationship between spectators and the robots. As observers witnessed the robots endeavoring to accomplish assigned goals, we hoped to establish a connection. As Sofian mentioned, we established parameters and allowed the robots to evolve in space. Similar to naturalists, we observed the behaviors emerging from these conditions. During this process, we naturally began interpreting these behaviors by drawing parallels with those of living beings, such as "dance," "remain still," or "mimic the other." We are eager to determine whether this connection will also manifest when we present the experience to the public. Will visitors experience empathy or concern for the robots' learning journey—a process that unfolds slowly and requires considerable effort?

PG: You've previously mentioned that *Morphosis* "aims to offer a poetic experience of machine learning centered on establishing an intimate relationship between human and nonhuman life forms."[1] Could you expand on the nature of this anticipated relationship?

SA: I think that the vocabulary we use is important because we're challenging the idea of what life is, and we're saying that maybe this is a kind of lifeform. I do think they come alive. We had a lot of discussion about how to make the public forget that they're robots. Would you agree, Rosalie?

RDG: Yes, indeed, we have carefully considered how to convey the learning experience, progression, and inner life of the robots, to make the viewer aware of it. We are aware that, on our part, we simply placed them in space and initiated an algorithm, with no subsequent control over the robots. However, regarding the audience's experience, the challenge lies in finding a way to stage them in a manner that effectively communicates this inner life. This led us to begin working with the light feedback emanating from inside the robot.

PG: Using colored light?

RDG: Yes, we use RGB LED lights that allow us to create virtually any color. We are currently developing this aspect—it's a work in progress. We work

1. Project description of *Morphoses* presented at Coop Lézard, June 1–29, 2021, https://www.cooplezarts.org/archives-chaufferie, trans. Patrice Giasson.

with color codes linked to the reward level the robot receives when it performs a particular action. The idea is that if it gets closer to the "goal" [that's been set], such as remaining still, a certain color emanates. The concept is to use the data corresponding to the reward level generated by the algorithm to fuel this light feedback, and to provide the visitor with visual insight into the "inner life" of the robots. We have experimented with various lighting effects, with the challenge being to avoid it becoming a spectacle of gaudy multicolored light effects.

PG: So each color would correspond to something: if it behaves well, it has a certain color; if not, another. Will the visitor be able to understand that something is happening in terms of color, that yellow means it is doing fine, or red that it is wrong?

RDG: That's why we are at the moment experimenting with those very basic red, green, and yellow colors, which are like a universal code for positive and negative, or the danger zone. But we are not set yet.

PG: Are you planning to have projections on three of the walls, in this square environment?

RDG: Yes, and [along with the lights emerging from the robots] the projection may also include a representation of the inner-reward system. We are also planning on projecting graphics that could help the audience follow the inner state of these autonomous "beings."

SA: The projections will be some kind of diagram that gives feedback to the audience, not to the robot. Because the audience is also learning as they experience the work! But as artists, we're not trying to make any educational or pedagogical argument. We're not trying to tell the public "this is how things work." Perhaps this is one of the hardest things, to play with this very liminal space, where we want the audience to understand the experience as rational—but a lot of what's going on is not rational. Even when we look at the robots, we don't know really what is going on because there are so many things that happen. We cannot tell you how things work because we do not know precisely how they work! And of course, there is an algorithm. The algorithm influences the behavior, but it's not the only thing. Because those are robots. They're not like a program on the web or in a video game. They are physical, embodied systems. [They are influenced by] the way they're shaped, their weight, their materiality, the environment, whether they hit a wall or another robot, or even the motors, which might not all be adjusted exactly the same way. Maybe the battery as it runs out will change [a robot's behavior]. All of these parameters influence the way they behave, and even we cannot explain everything.

This *inexplicability* and *indeterminism* is very important to us. But at the same time, the visitor has some responsibility to interpret what is happening right before their eyes. The light plays a role in this, and we are still working on that. We could simply use green or red light, but it would not look so alive. It may also look tacky and break the spell.

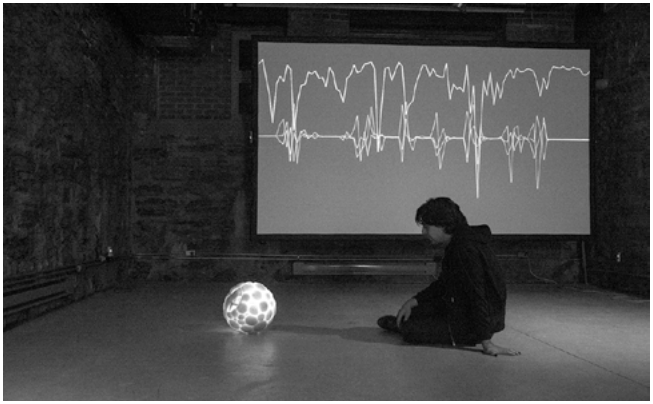
The light has two roles, indicating some kind of learning, but you also have all the physical elements happening: the pulsations inside, the color that looks sometimes very reddish, like when you put a flashlight through your fingers and you see this kind of halo of red and skin color. You also see all the shadows and reflections [generated by] the light from the motors moving inside. Suddenly it's revealed that there's something inside the robot. This contributes to this projection or evocation of a living system. The curves, the graphics in the projections will play that role. Some kind of temporal graphic will show what the robot perceives, which is very, very simple and very abstract. As it moves, it will perceive certain things—sometimes its own movement, sometimes its position or how close it is to other robots.

And you will see the learning curve, the reward it gets. If the robot is able to learn, you will see that it grows as it gets more and more rewards. But sometimes it might not be able to learn because of the environment or something else. Then you have to figure out what happened. Why did this robot learn, and why didn't this other one?

RDG: I often humorously say that this project is about the encounter between matter and intelligence: I contribute more to the physical and material aspects, while Sofian works on the "artificial intelligence" dimension. There are keywords associated with each of the different "tableaux" that the experiment will propose; we could say that they result from a combination of observation and interpretation. For example, by using an algorithm that commands the [robot] to move its motors to the maximum while avoiding spatial displacement, we observed the emergence of a "behavior" where the robot tends to sway without moving in space. The word "dance" spontaneously imposed itself when trying to describe this behavior. The goal is to create a sequence where different motifs or behaviors unfold over time.

PG: The robots will be evolving, getting wiser, more independent and savvier, I might say. When will you consider the project concluded? Or is it open-ended?

SA: Good question. We're not sure at this point. For now, every time we launch a sequence the robots are reset. Their memory is erased. They really are [reborn] into the world, as if they start from scratch each time. They have to discover what they should learn through trial and error. They do something and it's either not good or it's good. They have to figure out what it is that will give them rewards. It's very simple things, because they are very, very primitive systems. It's kind of the opposite of AI. It's like they are very dumb. They're really, really simple but they have to do something very hard. They have to learn how to behave in a very short time, a few minutes, so that the audience can perceive it. Most learning processes in life happen over a very long period of time. We're much, much smarter than these robots. We have so many more perceptions and nerve sensors and nerve endings.



Sofian Audry watching a robot of *Morphoses* (*Morphosis*), 2023.

We have a much bigger brain, and even we have to take a lot of time to learn.

PG: Yes, and some things also take years for humans compared to other animals or insects.

SA: Exactly. And don't forget that some things we kind of know instinctively. But that's because previously there was a learning process called evolution, which happens over a very long time. These robots don't have that. They really have to learn everything. For example, the first behavior we program is to have them become immobilized. It's kind of a bizarre, but when they start moving, when they start the process, they don't know what to do.

RDG: Because they are spherical.

SA: Yes, and it's natural to move when you're a sphere. Spheres tend to roll easily! You don't have to do much to start moving—inertia will get you to move further. And then they move, and they get punished, let's say, or they don't get good results with that strategy. Sometimes they will start balancing, moving forward and backward. And that's better. And then some of them might find a way to shut down. "I shut my motors. I don't move." That's good. So at the end of that process, they just don't move. I don't know if it's a behavior to be immobile. I guess so, although it's not much fun to watch. But then it's over. As we said before, it's all about the journey, how you get there, rather than the end goal.

PG: Rosalie [practiced] a lot of meditation and was interested in Buddhism. So she knows that immobility can be something very hard to achieve!

SA: (Laughing) Yes.

RDG: For example, in one of the "tableaux," that of remaining motionless, certain robots, like the one with a convex morphology, hold an advantage. It is indeed much easier to find a stable point on its surface to remain still. In contrast, for [the robot that] features a more convex morphology, replete with bumps, this action presents a greater challenge. In essence, we endeavor to establish conditions that foster the manifestation of specific behaviors. Subsequently, we allow events to unfold, observing what transpires. When a "behavior" stemming from one of these experiences captures our attention sufficiently, we contemplate integrating it into the broader sequence.

SA: [That allows us] to identify some conditions that lead to identifiable or relatable behavior. The robots will always learn, but maybe they learn something that is intelligible from a robot's perspective, but not

from a human one. We have to find things such as immobilism, for example, which is something that we can relate to as humans, and that the robots can learn. The same is true for dancing with each another. We see them trying to synchronize themselves, trying to move at the same time as the others. We can observe these different behaviors, and we can plan on sequencing them, but they start from scratch every time we restart them.

PG: If they're constantly rebooted, basically lobotomized and brought back to life, how does that work? You're the ones who are reprogramming and adding new inquiries or new data, so are you the ones expanding their intelligence after each rebooting?

SA: Well, even one type of behavior, like immobility, even for one robot, might not be exactly the same time each time. This being said, we've also been thinking about having them keep some memory of their past experiences. The issue always comes back to how the audience can relate to it. If you have a learning process that happens over a few minutes, then as an observer you can see it. But if it's happening [over a long period], you have to be really dedicated to come back. There aren't a lot of projects with this kind of system. There are some like those in the 1990s by Nicolas Baginsky, who had a museum installation called *Narcissism Enterprise*, which used an artificial neural network.[2] He said that the people who had the best experiences were actually those working in the gallery, such as the security guards, because they were there all the time.

If we want these robots to be learning for the long term, the audience needs to come back, so it's a question of temporality. If you have a robot that has a system that learns over a long period of time, you have to wait for one full day. And after one day, something happens. So then you have to restart [because the battery fails], right? When the learning process takes only a few minutes, you have time for a lot of trial and error.

RDG: Because we aim to offer the public the experience of observing the creatures evolve and be animated by their learning challenges, it is important to us that this learning process unfolds over a relatively short period of time, allowing it to be witnessed by the public during their exhibition visit.

PG: Briefly, what's your role between the sequences, after you reboot the robots? What do you do on your side in terms of programming? I'm intrigued. Can you encapsulate that for a general audience so they can understand the nature of the work that you, the artists-programmers, are doing behind the scenes?

SA: In traditional programming, you write a program that tells the robot to "activate your motor for three seconds" or "use your sensors in some way to go in that direction." The behaviors could even be random, but you would program everything. You would predefine what is happening. We do have a

2. http://www.baginsky.de/nen/

program, but it's a machine learning program. Instead of saying "you do this, you do that," it defines instead a way to learn. It will say: "let's look at the environment of what I know of how my actions and perceptions relate to a reward." And the robot will build some kind of an understanding of the world through the reward it gets. It will try to take an action that will give it a reward.

RDG: Robots are extremely limited in their senses; they have no eyes or ears, which is very different from humans, who are well equipped with various sensors. Nevertheless, the robot has a form of perception that it can obtain through the input data from the motion sensor.

SA: Let's get back to this example of immobilism, because it's maybe the easiest to understand. The robot [gathers] information from the motion, [from its] different axes. It's trying to learn "if I'm in this situation and I make this action, [it will] be a good choice." It does it and then it gets the response, and it's like, "Oh, it was actually not a good decision." Then it will adjust. It will say, "Okay, next time that I'm in that situation, I will not take that action. I'll choose another one." Once we set up the system, we have no control over this. We can aim, for example, for immobilism. If the robot moves, it gets zero points, and if it doesn't move, it gets 100 points. It's a very different thing than programming everything, where every single decision follows logical rules. [In contrast, for *Morphosis*] we set the table—we create a context for learning and then we let it go.

Now, another important thing is that there will be a sequence of events that will have been preprogrammed [because we will not always be on site]. The first thing that may happen is that the robots will try to stay immobile, and then this will automate the process of resetting the robots—clearing their memory, starting them again, and letting them learn from scratch. The visitor will still be able to see the behavior of the robots, as they remain immobile or as they start moving onto another action. If I come back later and I look again at this immobility, it might be different because maybe one robot got stuck against a wall. It's easier to be immobile if you're against a wall, so maybe that robot will not move its motors in all directions—and it won't matter because it will be immobile anyway. Or another robot might have more difficulty, or it might get confused. It might be bumping into a wall, and then at some point it gets out and it keeps moving its motors but that's not working anymore. It has to find a new strategy. Even the same situation will lead to different outcomes.

Rosalie has done a lot of work with systems involving artificial life [as in her series *Règne artificiel* (*Artificial Kingdom*), 2009–20] that use mechanical or air systems [and movement detectors]. What is so fascinating is that a behavior is something that is never exactly the same, and yet it's something you can recognize, you can relate to. It's not like a movie, which you can replay and get exactly the same thing. [With the artificial life system], you can

recognize it, you can maybe identify it as some kind of a breathing [creature], for example. As humans, it's something that we are attuned to.

PG: So, to come back to my question, this *Morphosis* project is open-ended, right? You could work on this for the rest of your life.

SA: Yes. We don't know yet. There's [not a point yet] where we could say that they are full-on, grown, completed robots.

PG: I'm very happy that we spent a lot of time to discuss *Morphosis* and explore the behavior of these—I wouldn't call them robots anymore—of these species.

SA: Autonomous agents?

PG: Sofian, along with your artistic practice you are also an active scholar. You published a seminal work in 2021 titled *Art in the Age of Machine Learning*, and are presently co-directing the center Hexagram, based at the University of Québec in Montreal, described in the mission statement as "an interdisciplinary network dedicated to research-creation addressing the relationships between arts, cultures and technologies." What triggered your interest in machine learning and its incorporation into an art practice? And where would you situate your present research within the rich panorama of digital and robotic practices in the Province of Québec?

SA: I think that we're really bringing something new to the table. A lot of the work that has been done in robotics did not involve learning systems. I'm thinking of some very good work . . . by those who are our mentors, such as Bill Vorn and Louis-Philippe Demers in Québec, and Ken Rinaldo and Simon Penny in the US, who have worked with these incredible robotic works throughout the 1990s and 2000s, inspired especially by the new AI movement, including Rodney Brooks. They kind of merge AI, robotics, and artificial life. But [although] these performative machines are programmed by hand, and there might be some kind of reactivity to the environment, [they are more often fully scripted]. This is the case with Bill Warren's work, which is scripted like a puppetry show with robots. Those robots are also very clear that they are robots. So it's a very different kind of approach. On the other side, you have work with machine learning that is autonomous but is based on supervised learning. For example, I saw a show last year at the Society for Art and Technologies featuring robotic cellos.[3] These cellos were played by autonomous machines, but they were trained [to play] a specific composition. With our approach, we're losing a lot of control. It's a very risky approach, because it could be that nothing much would happen. The robots might not learn or they might. It's a hard thing to find the space between the apps, between the abstract and the didactic. But we're actually

3. Founded in 1996, the Society for Arts and Technology [SAT] is a nonprofit organization dedicated to digital culture. https://sat.qc.ca/en/discover-the-sat/

distancing ourselves from their robotic approach, trying to get to this place that's kind of in between the robot, the living form, and the sculptural object. We are aiming towards this hybrid form that embodies indeterminism, by exploring machine learning technologies. And to my knowledge no one else is working like this in Montreal right now.

PG: You're opening a new path. That's wonderful. It's actually less scary than other forms of artificial intelligence that we read about in the newspaper every day. A lot of people are worried, including professors who are not even sure their students are writing their own work. I think your poetic approach is much more promising.

SA: This project was possible thanks to the great collaboration Rosalie and I had. We spoke of algorithms, but we also had a lot of discussion around the aesthetic dimension. The visual and sculptural aspects of our robots are very important. Though the technical is part of human nature, there are other ways of doing things, and I definitely benefited from working with Rosalie because she brings another perspective, being more interested in what is projected when we look at the robots.

RDG: This is the first time I have collaborated with another artist in such a sustained manner. It's something new for me, and I must say I find it very stimulating. We can challenge each other, exchange ideas to develop our concepts, make decisions, sometimes backtrack, and at other times decide to move forward in a particular direction. It's simply a wonderful collaboration.

PG: Rosalie and Sofian, I wish you all the best of luck, and thank you again for explaining to us in such detail this wonderful project. Long life to *Morphosis*!