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DEPARTMENT: ART ON GRAPHICS

Tomás Laurenzo: Pushing Back on Colonization

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With a background in both computer science and art, Tomás Laurenzo's research spans across different practices and interests, including artificial intelligence (machine learning), human-computer interaction, physical computing, and extended reality. In reviewing his work to date, we found many themes that resonated with recent events highlighted in mass media and were curious to find out more about his process and perspective. He had much to say on the matter as can be read in our interview with Tom documented herein.

Francesca: Thank you for joining us. The CG&A editorial board has been open to Bruce and I using the *Art on Graphics* column to expose innovative notions on data visualization or other visuals, or work that spans both.

So when I saw your *Brain Portraits* and other things from your online portfolio at laurenzo.net, such as your interest in AR and VR, and your water pieces that are another way of capturing those kinds of things, I wanted to hear your thoughts about the connections to that in your work. Are comfortable starting there?

Tom: Absolutely. My work is a little eclectic. I think of my practice as new media art, which I understand as the art that becomes possible when artists appropriate the knowledge behind a certain technology or behind some scientific fact or process. I am also very interested in the processes of creation of new knowledge, and in the "cognitive colonization" of new modes of thought.

This colonization leads to new perspectives that can work in both directions: artists are able to provide new points of view by rooting new thoughts into the sensible and into human reality, and, on the other hand, those new modes of thought are able to expand the palette of artistic expression.

I am very interested in politics, which often shapes my practice both as an artist and as a researcher. There is apolitical component to this colonization of pre-established bastions of power; technologies always communicate a certain understanding of the world through their intended use, and these intended uses crystallize a worldview. Artistic appropriation is sometimes able to shift that intended use, and therefore constitutes a subversive activity. I am interested in this potential subversion.

This is related with what you mentioned about data visualization. Perhaps what first interested me about it is how presenting information is also a political activity. Each time you create a data visualization, you are ascribing to a set of beliefs as to what the information means or what role it plays.

In my classes I often show various maps with different projections (e.g. Mercator, Gall-Peters, etc.) for it showcases clearly that each time you make a visual decision you are also making a comment on what the world is or should be.

In my work I am often trying to find these new points of view. Many times, I start with a set of data and play with it until I find a way I want to represent it. This partially explains the eclecticism that I mentioned earlier, some experiments converge in a VR project, while others end up being a music piece, or an installation. This variety within my work also happens because I am often interested in the colonization itself, which can be somewhat separate from the details of my actual practice.

F: That makes perfect sense actually. It's a process of finding what's out there and poking at it. Are you interested in talking about the thread that runs through your work or specific pieces?

T: I am interested in both.

F: I am really interested in your process that considers colonization. I think that's at the root of how all disciplines grow. Can you pick two or three pieces to compare and contrast in that light for our readers? For example, this is one colonization and this is another colonization. I took this from here and that from there. Does that make sense?

T: Yes, absolutely. I think there are two components to giving an answer: these colonizations I refer to implicitly include multidisciplinary as my work is influenced by having obtained a PhD in computer science and by having worked as an artist for many years, and so my investigation and research starts from different places and follows directions that are sometimes surprising.

Three pieces I'll choose, I'll chose because one is among my oldest, one is my latest, and the third one is from in between in terms of my art career. All three started with a process of research and discovery and in all of them different experiments and areas converge.

For example, in my latest one, *Be Water* (Figure 1), different topics came together. I have long been interested in the concept of flexible screens. Since forever I've been wanting to create screens that incorporate an orthogonal axis of expression.

Figure 1 – *Be Water* adapts to a cumulation of visitor heart rate information to blur the ability to track a single visitor's state.

While working with these screens, I discovered that I was able to make them move in ways that heavily resembled a fluid (Figure 2), which I found not only beautiful but also interesting as a potential modality of the screen: we have this preconception that a screen is a solid and fixed thing. After these experiments, the idea of a screen that could be made to behave as a liquid was something that I kept in the back of my mind for a long time.

Figure 2 – *Ekphrasis* and other previous works helped investigate representing fluid dynamics in flexible materials

I have also been working quite intently with machine learning (ML) and artificial intelligence (AI) for the last few years and have developed pieces that explore some of the potentialities and effects of AI. I am particularly interested in exploring and contesting the worldview that AI researchers crystallize.

I am also interested in computer vision and surveillance. For example, I have a couple of pieces created in collaboration with Katia Vega (from UC Davis) where we use computer vision-based ethnicity prediction to create pieces that behave differently depending on the ethnicity that the artwork predicts each user to have.

Interestingly, from my research in surveillance I found several projects that aim to measure a person's heart rate (among other types of physiological activity) through computer vision. Remote photoplethysmography (or rPPG) enables measurement of the heart rate, for example, of patients that need to be isolated. It also has surveillance uses. For example, it can be used to detect shoplifters or people in stressful situations in general where their heart rate increases.

Finally, while I was living in Hong Kong, I was very impressed by how quickly and imaginatively Hongkongers adapted to a quickly changing political and legal landscape during the 2019-2020 protests. For example, when the government outlawed the protestors' slogan "Liberate Hong Kong; revolution of our times" (光復香港, 時代革命), protestors started painting four squares, that could mean anything but were immediately understood as an abstraction of the slogan.

Protesters often referred to a quote from Bruce Lee: "be water", to describe their ever-adapting, always fighting-back protest strategies.

So, all these topics came together in my piece, also titled *Be Water*. The artwork tries to measure the heart rate of the person who stands in front of it, it then combines it with the last twenty or thirty persons who have visited it, creating a rhythmic pattern that is the combination of the heartbeats of the last few visitors. This pattern is represented in a flexible screen (that is pulled by a string attached to a stepper motor) that behaves like a fluid (trying to *be water*).

The artwork allows participation through surveillance and then destroys it through a process that represents a group of people coming together, in a reference to the protests.

It is worth noticing that it is not really possible to do explicit protest-related artworks in Hong Kong—where I developed and exhibited the piece—so the work only focuses on protest processes of adapting to the context and does not explicitly talk about the underlying political issues.

F: That is very interesting. I had not picked up on the surveillance aspect. It rings true with where you are living. You say that by definition your work is multidisciplinary but you have quite a few things going computationally and with physical objects representing outputs of computation and you then have the contextual reading. It was that tripod that intrigued me. It is such a mix and that's why I am so interested in that. I like your work with UC-Davis for that same reason.

T: There's a trick to talking about disciplines, as disciplines are another form of controlling our way of seeing the world. This becomes very obvious when we talk about disciplines like engineering: engineers monitor the world looking to see which problems deserve to be solved.

I think when people say interdisciplinary, sometimes they mean they are unsure of the validity of the disciplines. That being said, interdisciplinary is an intense focus of mine, as my interests often reside in engineering, philosophy, politics, art, music, and computer science.

Figure 3 – Gumball and Door objects used in systematic racism experiences for exhibit visitors.

When working in politics and philosophy, there is a line that one needs to tread between the exploration of the sensible and plain propaganda, and with our ethnicity work, we were explicitly jumping over that line. We created a couple of objects: a gumball machine and a door (Figure 3). As I mentioned earlier, both behave differently depending on the interactor's ethnicity: the gumball machine gives free candy to those it believes are white and the door is locked unless it thinks that you are white.

The absolute lack of subtlety responded to two main reasons. First, if you look at the history of Latin America, political art has always been a part of the mainstream, it always has been natural to integrate political discourse in the art practice (Katia and I were Latin Americans, so we wanted to honor that tradition).

Here we wanted to create an exhibit that was obviously racist and explore the aesthetics of their interaction with the audience, as well as observing their reaction. While we are always exposed to systemic racism, explicit racism tends to be less frequent, and this explicitness changes the relationship to an object.These works are also interesting in two other respects.

On the one hand, they show the potentialities of surveillance—people do not suspect that many physiological variables can be remotely measured—and, on the other hand, they create a tense and interesting situation when the measurement does not align with their self-perception, when people say "oh, it is telling me I am what I don't think I am". This tension was behind my first idea for the door artwork. I wanted to create a door that locked itself in response to sexual orientation prediction.

The idea came from the research of Stanford's Kosinski, whose paper (which is very bad neo phrenology), claims that they can predict sexual orientation with 95% accuracy (what they actually "measure" are some spurious correlations).

While it is painfully obvious that their claim is wrong (while enforcing also wrong, obsolete, and hurtful models of sexual orientation and human sexuality), I really wanted to explore the aesthetic space of a homophobic door that would inevitably also make mistakes.

But, anyway, this tripod you mention is always present in my work. There is a quote from a period movie titled Anonymous that says: "*All art is political […], otherwise it would be just decoration"*. It is not completely true but there is something there.

F: Why did you pick out *Memories of the Blind*? I see the association with *Be Water*, but I am interested in how one led to the other or how they are connected in your mind. Or not?

T: I did try to pick out three pieces that had a narrative and that also made sense to your magazine. The *Brain Portraits* piece might not fit in as well. They connect because they all explore the subjects of surveillance and computer vision. *Memories of the Blind* (Figure 4) is a piece that focuses on the moment when it is seeing you, but you are not seeing it.

The installation is a little black box with an oval-shaped screen. It shows a black and white picture of a face with its eyes closed. I like that at first it does not seem to be interactive. However, all of a sudden it is your face with its eyes closed that it's been displayed.

What happens is that when the visitor blinks, the installation takes a photo and uses it.

Sometimes when people find out what is happening it becomes a kind of video game for making faces, blinking and getting their photo taken. It also turns out that people discover it and then tell other people, thus eliminating that moment of uncertainty that I really enjoy creating.

It is very poetic when people are surprised by their picture suddenly appearing; it's quite a magical moment that prompts exploration and investigation of the possibilities of the piece. It also reflects on surveillance, perception, and agency in more subtle ways than other pieces of mine.

On the other hand, I'm always intrigued by what Paul Virilio calls machine time and human time. For us, a blink of an eye is considered no time, but in this case a blink of an eye is where all the computation happens. The computer vision tracks a face, detects the blink, the photo is taken, and then it is manipulated and presented. I find it interesting to represent the asymmetries between these two times.

And there also the area of AI where we usually think of the computation as a black box because we don't really know how it works. So this piece also refers to it by literally being a little little black box.

Figure 4 – *Memories of the Blind* contrasts interest in human experiential time with the potential of computational time.

F: You mentioned AI and machine learning in a couple of pieces. I am interested in the computer vision and how it reflects back an audience to itself, but also what is the role of machine learning in that context?

T: The intersection of computer vision and machine learning ion a Venn diagram is very large, but of course there are machine learning processes that have nothing to do with computer vision and there is computer vision that does not use a machine learning approach. However, in the case of the pieces we discussed, and in many of other pieces of mine, the computer vision processes are a direct application of machine learning techniques.

Machine learning-based computer vision is something I find fascinating, as many people also do these days. Machine learning's approach is a completely different approach to computation that dramatically expands what can be approached computationally, because it frees us from the need to understand the problem.

The traditional approach in computer science is that if we want to attack a certain problem, we need to understand it; we first need to create a model of the problem, and then we use that model to instruct the computer how to behave. For example, if I want to know how long it will take for an object to fall to the ground, I need to use Newton's laws, and knowing that the object's acceleration will be mass times g squared, I have a model of reality. I can then, using that model, write an algorithm that can predict how long the object will be falling for.

On the other hand, machine learning, instead of building an explicit model, automatically creates an implicit one, by compressing the information present in many examples. We call this process of using millions of examples to create an implicit model, "training". This model can then be used to make decisions. A very common architecture for these models is a matrix with millions and millions of numbers that, through training are pushed towards a useful combination. These matrices are called neural networks.

There are a few other complexities (for example, the problem space needs to be differentiable), but essentially it is only that: showing many examples and automatically adjusting the model a tiny bit with each one. This is the black box that is often mentioned in relation with machine learning: the training process creates all those numbers, and no one really knows what it is actually modeling and what the relationships between the components of the models are.

F: My question is what is the role that plays in the work? I understand machine language as a black box, but for all the things you use it for, I don't understand.

Well, for example, in *Be Water*, I used machine learning to detect people's hearts beating and to calculate their heart rate. In this case, the training process consisted of many examples of frames that the cameras captured. A first machine learning model was used to detect and track faces, and a second model takes the colors of pixels corresponding to the person's forehead and estimates a heart rate. It is a computer vision process, but its components are these black boxes that were trained.

F: Ah yes. That makes sense. You also mentioned an early piece. Do you want to talk about how that piece ties in?

T: Of course! *Nibia* is a piece I am very fond of. It is also the first one I exhibited at a large venue with a large audience. I am also happy with both its graphic and interaction components, for I think both make sense.

The work's background is that in Uruguay, where I am from, we had a fascist dictatorship from 1973 until 1985. The dictatorship systematically violated human rights, tortured people, and established a regime of terror.

I hesitated in choosing this work because it refers to a case that is very well known, but only locally. This case is a young activist and high school teacher, Nibia Sabalsagaray, who was captured by the administration and tortured to death in 1974. When democracy was restored in 1985 there were many social and political movements working towards prosecuting those who had committed crimes during the dictatorship, and this specific case was very prominent in the news, especially once two responsible military were found guilty of her murder.

One thing that I have always been interested, is that in my home country, there seems to be a apparent consensus about the dictatorship being something horrible that happened to us all, as it if had come from Mars, and everyone plays the role of victimhood.

The discussion seems to be about how to move forward, if we have to turn the page, or participate in reparations, or whatever. There has never been a mea culpa from society itself, which is something that to me makes no sense. With this piece I wanted to explore that detachment from any role of responsibility.

The piece was shown (in two different museums in Uruguay) in a very large room that I painted black and kept completely dark (so you couldn't see how big it was), and in the middle of the room I put up a piece of cardboard onto which I projected a picture of Nibia (Figure 5).

Her photo was floating in the middle of an infinite void, and next to it I put a stool, and on top of it there was a lighter (I borrowed the stool from the architecture school where the girl's boyfriend was studying at the time).

Figure 5 – *Nibia* affords exhibit visitors a first-person perspective on state sponsored torture.

Only one person was allowed to enter at one time and if the visitor picked up the lighter and lighted it up, the projection of the Nibia's image would start to burn in the corresponding place. This way you could move the flame in the air and the projection would start to burn. However, it was impossible to ever burn it completely as it was programmed for it to reappear.

With the act of actively burning, I referred to society being partially responsible. And by not being able to completely burn it, I referred to the fight for justice that kept Nibia's memory alive.

I was interested in exploring this new kind of interaction. Again, there is computer vision tracking the flame, although it is quite simple. There's also an appropriation of the algorithms that simulate burning, however they are not very different from those implemented in image manipulation software like Photoshop. However, the result, the application of this knowledge I think was quite interesting.

F: Well there are a lot parallels to the underlying conception of that work today. Very timely at least for our country.

Bruce: Yes. You talk about flexible screens as something you always think about. What are some of the aspects of data visualization that you would like to be able to change? Or wish you could change?

T: That is a great question. I am working now towards another flexible screen. I have built a volume that is a large, metallic cage with a screen suspended in the middle. It has motors that can pull the screen from different directions and I can move it and deform it within the volume of the cage.

Currently, it makes absolutely no sense in terms of data visualization, unless it does. It's interesting to see how it behaves and how the screen is deformed. A first thing I am trying to do is "slow visualizations" where data is projected onto this screen, the screen then moves and changes its shape, and I have a camera taking long exposure images that creates a volumetric representation of the process.

I am also thinking of 3-D printing the reconstructed volume, somehow closing the loop of data manipulation, I'm still thinking as it is very much a work in progress. Right now I am just focusing on creating the objects.

F: Well, that is really interesting because you talk of data and how the presentation changes and we talk about what we know and uncertainty and how everything is fluid still and those are the reflections that come back. Interesting as we talk about process at the end of the day. But you are in Hong Kong during a charged time politically these days. It must affect your thinking. How has that affected your work and your approach to your work?

T: I have been here for seven years, so of course it has affected my work. One thing that particularly affected me was to witness how about half of the population would come out for a political demonstration. While this shows an incredibly engaged city, the characteristics of the political conversations tend to be very naïve. It's hard to find conversations that transcend "China good democracy bad" or "Democracy good China bad".

There are very few discussions of what would we want as democratic social arrangements, or non-democratic social arrangements. There's very little discussion on capitalism or other possible forms of social organization. Hong Kong is the most capitalistic place in the world, with no social security for example, while at the same time health care is basically free. It's a complex situation.

I have been giving talks all my professional life and I think one of my favorite experiences was a talk I gave in Hong Kong in front of inmates at local prison. There was a program that linked prisons with universities and different professors gave talks to the inmates. My talk was centered on the politics of data visualization. There was time for Q&A after, and the first question was "what do you think about China and democracy?"

And immediately there was a very engaging conversation between myself and the prisoners, where I tried to focus on the lack of discussion on what social arrangement would people want. This lack of conversation is blinding as it facilitates the role of oppression because if you cannot imagine possible alternatives, then those in power just have to keep everyone silent in order to disarticulate potential changes. It was amazing to see all the eyes of the participants widen. It's been wonderful, personally. Hong Kong is an incredible city.

F: What I heard from you when talking to the prisoners is that there's a "it's only this or only that" with no grey area and I find for myself is that those questions that are batting around in my head, whether intentional or not, come out in the work. You have been wonderfully articulate and interesting so I would like to give you a chance to talk about anything you want to talk about.

T: There is a quote from Gramsci that reads "Each man, finally, participates in a particular conception of the world, has a conscious line of moral conduct, and therefore contributes to sustain a conception of the world or to modify it, that is, to bring into being new modes of thought." I have quoted it so many times that I think I have burned a hole in my brain.

Data scientists have the responsibility to explore that creation of an understanding of the world, knowing that data visualization should not be prescriptive, there should be room for uncertainty, for a joint creation between users and designers of an understanding of the world. I think artists can create spaces for that exploration.

This joint construction is what I loved about the talk I gave in a Hong Kong prison. And it's what I try to do—successfully or not—with my work. For example, a piece that I did where the results were perhaps not that great, but the process was fantastic.

I was working with the Architectural Association from London. Thanks to Tobias Klein, a professor at City University of Hong Kong, there was a summer program here in Hong Kong where a group of students from the AA worked with some local professors in Hong Kong. I worked with about ten students and we interviewed foreign helpers.

Hong Kong, being such a capitalistic place, does not have infrastructure for many things. For example, it does not have a lot of infrastructure for children day care. Hong Kong's society works with the assumption that if you are a (wealthy enough) family, you have a foreign worker working with you, who is a domestic helper who lives with the family, working six days a week with Sunday afternoons free.

They have to live with the family and the salary is mandated by the government and it is very low for an expensive city like Hong Kong. They can never gain citizenship or residency and, even after, say, fifteen years, if they are fired, they only have two weeks to find another job —as a foreign helper—or they are deported.

It is a position of power asymmetry that is extreme. Amnesty International has repeatedly described it as modern-day slavery. And because the power asymmetry is so big there are many reports of abuse of foreign helpers. And there are a lot of them, they comprise three percent of the population. In addition, the money that they send back to their families in countries like the Philippines is a sizable percentage of the country's GDP (about 10% in 2019).

What was very surprising to discover during the project with the AA students was that while the power asymmetries I mentioned do exist, all the helpers we interviewed were very grateful to be in Hong Kong.

What we did with the students was to interview a group of foreign helpers over the course of a few weeks and made a short documentary. The interview was about their life, but mainly it was about their relationship to the city, because the students were students of architecture.

The students edited the documentary and I created in installation that comprised four projectors projecting into an interspace. If you stood in that space holding a projection surface, an object with some infrared LEDs I created, a projector will project onto the surface you are holding.

Participants then can move around, exploring the space, and as they move different projectors take over. The installation also had spatial sound, so it allowed to explore a metaphorical reconstruction of the city, aiming at reflecting the helpers' relationship with Hong Kong.

The end result was somewhat primitive (Figure 6), but I still like it. I bring it up to answer your question about being prescriptive. With this piece I was not really trying to say anything myself (at least not explicitly), instead I wanted to create a space where the foreign helpers were able to communicate or express a political standing, or a point of view that was foreign to me. And then to create a space for the joint creation of meaning with the audience. That being said, I know that there can't be an apolitical practice. What I want to say is that the politics of my practice aim to collaborate in the creation of Gramci's new "modes of thought."

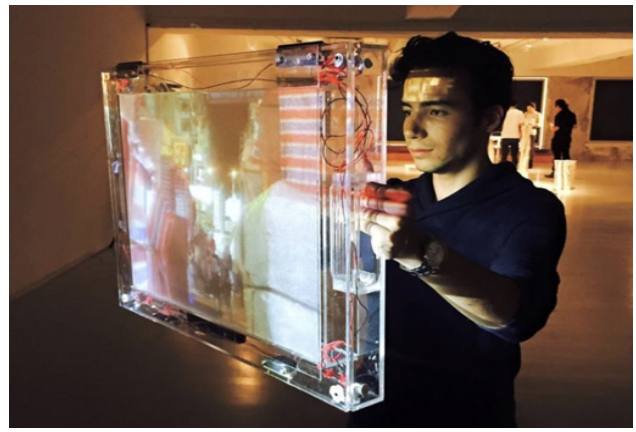

Figure 6 – *Foreign Helpers* provides an exploratory experience for considering points of view from essential workers.

F: Thank you for being very clear, eloquent, and on point.

B: Yes, Thank You.

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