TECHNOLOGY, VISUAL CULTURE, AND THE POLITICS OF REPRESEN-TATION

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Michael Joo
Bodhi Obfuscatus (Space-Baby)
2005
Mixed media (sculpted Buddha, Pakistan, Gandhara area, Kushan period, late 2nd to early 3rd century CE, Phyllite; aluminum geodesic structure; surveillance cameras; monitors; mirrors; steel)
Dimensions variable
Installation view, Asia Society Hong Kong, 2012
Originally commissioned by Asia Society Museum, New York

"A Gandharan Buddha statue is given a geodesic halo of sorts. Forty-eight live surveillance cameras in the suspended 'helmet' examine every square inch of the statue's face. The close-up images, at once representational and abstract, are presented on a dense matrix of monitors, projectors, and mirrors that surround the sculpture, expanding the perception of depth within the space and implicating the viewer's own reflected image(s)." —Michael Joo
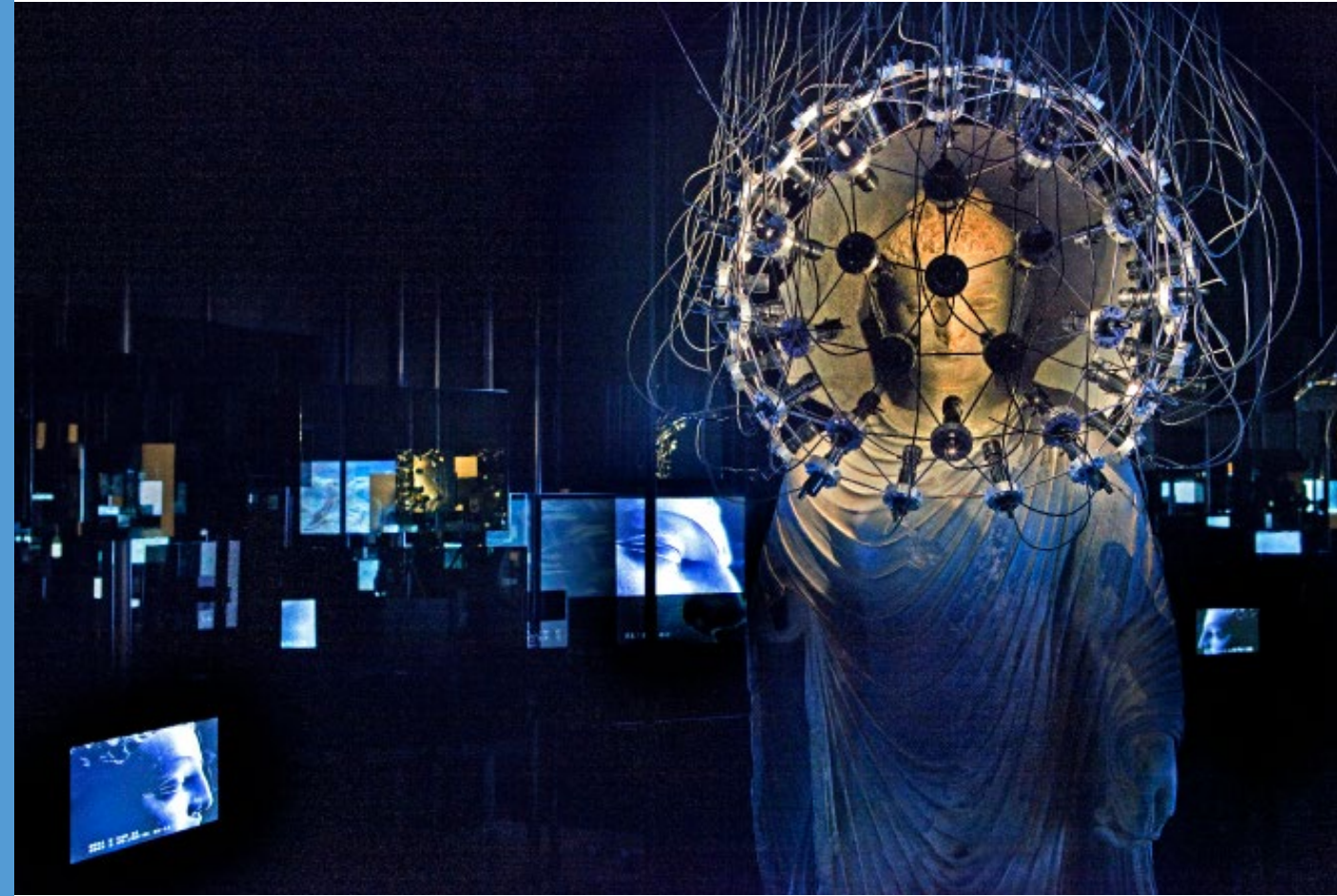
Decolonizing "Artificial" Art Making

The Impact of AI on the Art Ecosystem

Amir Baradaran

Artificial intelligence has, in many ways, become an index for our technological dreams and nightmares: our utopian hopes for transcendence as well as our dystopian visions of monstrosity. Fearing the negative potentials of technology is nothing new: Mary Shelley's *Frankenstein*, 1818, is one manifestation, as are more recent concerns about state-sponsored surveillance and robotic warfare. AI brings new dimensions to that fear, both those embodied in well-established science fiction tropes (machine consciousness, annihilation of the human species) and those apparent in concerns about the capacity of new kinds of computers and software to reproduce systems of inequity with previously unimaginable scale, scope, and speed.

Fortunately, we are not without a map for navigating the social complexities posed by AI. Art and art making provide an opportunity to examine AI's unique possibilities while allowing us to remain cognizant of the pressing issues of access and equity. Indeed, we must grapple with the opportunities presented by AI as well as with the dangers it entails, both of which may be fleshed out by art and art making. Decolonization provides a theoretical framework that allows us to imagine the generative role that artists and others involved in the art ecosystem can play in the future of AI.

Priming the Art Ecosystem

I use the expression *art ecosystem* to encompass the numerous multifaceted, overlapping, and diverse institutions, products, processes, and agents involved in the creation and consumption of art. It is an ecosystem in a constant state of flux, and like any system, it does not exist in a vacuum: the forms and dynamics of power that exist at any given social moment also shape the art ecosystem.

Among its components are *gates*: the physical, virtual, and conceptual institutions that govern and ensure the longevity of the art ecosystem, for example, educational institutions, media, and funding bodies. The second aspect is the *art* or *artwork* itself, that is, the physical, conceptual, or virtual body that is produced, selected, or curated by artists. In the past, artworks were understood as static objects—paintings or sculptures—but in the contemporary era, static works have given way to the interactive works of kinetic, performance, relational, and digital art.

1 Ben Goertzel and Cassio Pennachin, "Contemporary Approaches to Artificial General Intelligence," in *Artificial General Intelligence: Cognitive Technologies*, ed. Goertzel and Pennachin (Berlin: Springer, 2007).

2 Stuart J. Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 2nd ed. (Upper Saddle River, NJ: Prentice Hall, 2003).

The art ecosystem also incorporates *processes*, which are the actions undertaken, decisions made, and paths followed by its agents. These paths can involve tools, skills, and efforts, to name a few, and can be grouped into the categories of creation (actions or processes enacted through approaches, practices, techniques, methods, and skills); consumption (the act of engaging with a piece of art, whether a museumgoer viewing a painting or a theatergoer watching a play); and gatekeeping (the tasks undertaken by institutions inside the ecosystem, such as establishing a curriculum, deciding whether or not to fund a project, or hosting an exhibition).

The fourth constituent of the art ecosystem is its *agents*: the individuals who enact the processes of the art ecosystem, or those positioned at the two ends of the production-consumption spectrum as well as those in between. Agents include artists, audiences (patrons, spectators, and so on), museum curators, gatekeepers (art teachers, art historians, critics, and institutional funders who ensure that the system is sustained and capable of reproducing itself), and others. In a traditional sense, agents are believed to possess self-awareness and autonomy. An individual can assume many different agent roles at once.

How "General" Can AI Get?

Artificial intelligence can mean many things. I use it as an umbrella term to refer to the machines capable of applying intelligence to solve specific sets of problems. Also known as *narrow AI*, this field marks a difference between AI as it exists now and AI as it might exist in the future—as something general and free from the bonds of its human engineers.[1] *Artificial general intelligence* is the expression used to describe the free-thinking, independently acting machines often portrayed in novels and films. Three main categories of questions must be answered for AGI to become a reality.[2] The first asks about the nature of intelligence and its core components. Does intelligence require creativity, critical thinking, logic, consciousness, self-awareness, agency, and autonomy? The second investigates whether our human-centered understanding of intelligence is enough. There are surely countless more interpretations that invite reflection on the multitude of

3 George Zarkadakis, *In Our Own Image: Savior or Destroyer? The History and Future of Artificial Intelligence* (New York: Pegasus Books, 2015).

4 Bartu Kaleagasi, "A New AI Can Write Music as Well as a Human Composer," *Futurism*, March 9, 2017, https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer.

5 Ernest Edmonds, "The Art of Interaction," *Digital Creativity* 21, no. 4 (2010): 257–64; Frank Popper, *From Technological to Virtual Art* (Cambridge, MA: MIT Press, 2007).

diverse and alien forms of intelligence that exist currently, but we are mostly unfamiliar or unaware of them. Humans must be decentered in how intelligence is conceptualized and enacted in order to realize AGI. Answers to the first two types of inquiry help guide the third: whether humans have the capacity to create intelligence and, if so, the ways in which it can be achieved. Is our only chance of, or hope for, creating intelligent machines to do so, as George Zarkadakis asked, "in our own image"?[3]

As such questions are prodded forward by the promise of AGI, it is certain that any answers produced will reshape our sense of self and, by extension, art and art making. Intelligence, creativity, and agency are all at the heart of AGI and also of how we understand the essence of artist creation. Beyond attention to who (or what) creates art, AGI offers a complete destabilization of the art ecosystem, from being to becoming, conception to creation, consumption and beyond.

AI + Art Ecosystem

It is common to imagine AI as reshaping the creative process or becoming the creator itself. The true potential of AI, however, lies in its capacity to reform every single aspect of the complex and dynamic art ecosystem in an exciting but potentially dangerous process. AI is, in many ways, already a part of the art ecosystem. Consider AI's role in the creation of art: several artists have already partnered with software engineers to develop and employ AI as a tool of creation, generating, for example, classical music that is indistinguishable from that composed by a human.[4] AI also has the potential to create opportunities for interactivity and audience participation that extend well beyond those of performance and relational art.[5] In both of these examples, AI has played a part in the process of creation, though it is a narrow part: a tool employed by human agents for the consumption of human audiences in shows funded by human institutions run by human gatekeepers.

Another possibility is that AI itself is the artwork, an outcome achievable with our current state of technology. The possibility of AI as the artist, however, is imaginable only in the future of AGI. I make this distinction to stress the diverging implications of AI and AGI for the art

6 Ngũgĩ wa Thiong'o, *Decolonising the Mind: The Politics of Language in African Literature* (London: James Currey, 1986).

7 Walter Mignolo, *The Darker Side of Western Modernity: Global Futures, Decolonial Options* (Durham, NC: Duke University Press, 2011).

8 Eduardo Beira and Andrew Feenberg, eds., *Technology, Modernity, and Democracy: Essays by Andrew Feenberg* (New York: Rowman & Littlefield, 2018), 30. See also Sara Wachter-Boettcher, *Technically Wrong: Sexist Apps, Biased Algorithms, and Other Threats of Toxic Tech* (New York: W.W. Norton & Company, 2017), and Ricardo Baeza-Yates, "Bias on the Web," *Communications of the ACM* 61, no. 6 (June 2018): 54–61.

ecosystem and in terms of our understanding of agency, consciousness, and creativity. These pivotal questions regarding AGI come into especially sharp focus when examined in the context of the art ecosystem. Indeed, AGI could feasibly choose to embody any or all agent roles within the ecosystem, participating in creation, consumption, and gatekeeping.

Many people have expressed resistance to the idea of nonhuman agents engaging in the process of creation. This resistance may stem from the centrality of creativity in Western cosmologies of the human experience. Alongside agency, creativity has largely been viewed as an exclusively human quality (despite emerging evidence of creative practices in the animal kingdom). Ultimately, contemplating AGI as operating in and from every corner of the art ecosystem returns us to the earlier questions concerning the nature of intelligence and creativity.

Decolonizing AI + Art

Neither AI nor the art ecosystem exists in a vacuum: they are beholden to the same dynamics of power that shape our social world.[6] The presence of those power dynamics necessitates a consideration of access, fairness, and equity in the context of AI and art: What is the process and what might be gained from decentering traditionally privileged epistemologies, ontologies, and cosmologies? How can art and art making support the decolonization of AI more broadly?

Although this examination and implementation are likely to be rewarding, they are also likely to be arduous, exhausting, and often minacious. As Walter Mignolo points out, decolonization requires both thinking and doing, which is why artists are uniquely placed to engage in this space.[7] I propose four interrelated points as one way of giving shape to the journey of decolonizing AI through art. The first is identifying access as power. Who has access to, and benefits from, AI technology? Technology, through the process of production, already incorporates subjective values that cater to "the interests and vision of specific actors, sometimes at the expense of other actors with less power."[8] Given that racial and economic divides often share the same boundaries, access to AI remains in the hands of a privileged few.

9 Cathy O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy* (New York: Broadway Books, 2016); Meredith Broussard, *Artificial Unintelligence: How Computers Misunderstand the World* (Cambridge, MA: MIT Press, 2018); Virginia Eubanks, *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor* (New York: St. Martin's, 2018).

10 O'Neil, *Weapons of Math Destruction*; Eubanks, *Automating Inequality*.

11 Gilles Deleuze, "Postscript on the Societies of Control," *October* 59 (Winter 1992): 3–7; Michael Hardt and Antonio Negri, *Empire* (Cambridge, MA: Harvard University Press, 2000); Rosi Braidotti, "Posthuman Critical Theory," *Journal of Posthuman Studies* 1, no. 1 (2017): 9–25; Brian Massumi, "The Autonomy of Affect," *Cultural Critique* 31, pt. 2 (Autumn 1995): 83–109.

The second point is attempting to understand the notion of bias by means of debunking the dominant discourse of objectivity. There is a fallacious idea that the mathematical algorithms that compose AI are neutral or objective.[9] In reality, human agents are very present in the development and deployment of AI technologies, which explicitly or implicity introduces biases. While power dynamics already create inequity in the art ecosystem, such inequities threaten to amass exponentially when empowered by the scale, speed, and scope of AI technologies. It is important that we contend with this reality as part of the decolonization process, identifying and critiquing the biases inherent in any product of human engineering.

The next concern is gauging the pervasive impact of AI on disenfranchised communities. As in most facets of life, the brunt of destructive forces of AI's biases and prejudices falls mostly on groups that are already disenfranchised: people of color, immigrants, women, and the poor.[10] As AI continues to shape tools of knowledge creation and dissemination and assists gatekeepers in making decisions about funding distribution and other activities, it is vital to ask who is disempowered through this process and what perspectives are marginalized.

Finally, decolonizing AI requires undoing through unthinking and thinking through doing. We must critique existing modes of thinking and create space for other forms of epistemology, ontology, and cosmology, including those previously rendered invisible by the colonial project as well as those that have yet to be imagined.[11] While efforts have been made to address issues of toxic masculinity, whiteness, technological determinism, and lack of diversity within cultures of technology, they have largely been driven by those within technological communities and have tended to favor the "details" of inequity and injustice rather than addressing the structural forces by which they are sustained.

The disconnect between these kinds of macro and micro analyses reflects the siloing of higher education, which creates a critical distance between, on one side, artists, theorists, and social scientists and, on the other, software developers and engineers. This distance prevents both sides from effecting change, even if their goals are aligned. The education of artists and engineers must

be decolonized, allowing ideas and expertise to move more freely between fields of knowledge if there is to be any hope of addressing the limitations and realizing the potential of AI.

Yet undoing the system we have inherited is no less plausible than achieving AGI. These formidable goals may very well support one another through the generative and prodigious processes they require. Indeed, what is the purpose of art and art making if not to seek out the divine, transformative, and improbable beauty of creativity?

A Heterotopian Future

A significant portion of the AI research conducted globally is set to achieve AGI with the humanlike qualities of consciousness, agency, and creativity. This state of affairs positions agents of the art ecosystem in the center of the race toward a thinking machine. Thus we must acknowledge our professional and moral responsibility to engage with AI while simultaneously exercising critical vigilance in shaping the course of its development.

AI is already being used by giant technology companies to craft detailed narratives about each one of us—stories about our habits, likes and dislikes, networks, and more— that are used to make decisions that affect our lives. Alas, these stories, which serve commercial interests almost exclusively, are for the most part unregulated by law or policy and often exist without our knowledge or permission. As an artist and a queer person of color, I am especially attuned to AI's fallacies—but I also believe that AI can offer a uniquely speculative space for examining our very sense of the self.

This inspection will foster philosophical and ethical questions that are aware of but not constrained by the nature of AI. Some of these questions may be uncomfortable: Are Western ontologies useful, sufficient, or perhaps even necessary to take on examining the nature of AI? Do we need to seek guidance from other—and often othered—cosmologies that live outside the temporal, spatial, and bodily sites of knowledge through which AI and art are conceived and produced? If so, how? This exploration may be the perfect opportunity for rethinking anthropocentrism and allowing for the emergence of bodies (of knowledge) that stem from, or live through, the

types of cosmologies that have been marginalized or erased by Western ideas of being and ideals of becoming. In this momentous space, perhaps we should foreground the idea of imagining a radical future that may not need to be about AI but, somewhat counterintuitively, about a metanarrative of the self versus the other that gestures toward a more generative process of be(com)ing. ▲

Amir Baradaran

artist-researcher

Farai Chideya

journalist

Michael Joo

artist

Isolde Brielmaier — **We are going to explore how art and art making, as well as media, intersect with technology, storytelling, and ideas around representation and engagement. I think we can all agree that in the present day, technology is developing at light speed. Technology touches almost every aspect of our lives, and it has critical implications on the sectors of art, art making, and media—and how it intervenes and intersects in these sectors for the artists, storytellers, and creators who work and exist within those spaces.**

Michael, your work is grounded in research and is concerned with materials and with the interaction between history, the natural environment, memory, and, of course, science. How has technology impacted or found its way into your practice? Can you speak specifically about your recent work, *Migrated*?

Michael Joo — My mobile, *Migrated*, is based on the migration patterns of Japanese red-crowned cranes through the demilitarized zone between North and South Korea. I extracted their flight paths, particularly the sections where they would fly over this no-person land, this unidentified territory, and then made relative lengths for the arms of the mobile. Attached to the arms of the multi-tiered, segmented mobile were volcanic rocks I'd collected from the civilian control zone just below the DMZ. One might speculate that they came from volcanoes; nobody knows about the DMZ or North Korea—these are things that are kind of unverifiable. So you have these very factual, very real things, very real events and urgencies contrasting in linear and cyclical patterns. Then there was a sensor-driven motor to have the viewers potentially trigger and initiate movement of some of the stones along circular paths that would then hit other parts and activations.

IB — **How did you map out the flight patterns?**

MJ — With radio-tag research that had already been done. That was a collaboration with ornithologists and people who were doing hard science and observation of these cranes.

IB — **Amir, can you give us an elevator-pitch definition of some of the technologies that you use?**

Amir Baradaran — With virtual reality, or VR, imagine if you put a headset on, and you're thrown into a fully imaginary computer-generated world with a butterfly. Augmented reality would use the same kind of headset. And that butterfly would exist and would understand the space in which we all are, and it would come and sit on your shoulder. If you move your shoulder, that jittering would force it to move away because a real butterfly would move away. The juxtaposition of virtual content upon real time streamed live is called *augmented reality*.

For those who know post-production, imagine everything you do to a photo after it has been shot, and then imagine all of that being done live as you see through your camera. Let's say you have a zit, and you don't want to post it on Instagram. So you would place on a little "mask." What does the mask do? It understands the color, texture, and lighting of the

contour of that area and then applies that onto the pimple itself and asks, "If the pimple wasn't there, how would it look based on the contour, based on the context?" And it does that. Basically, you add this virtual content as a literal layer onto your image.

Imagine all of that being done live as you see through your camera; this is what you see in Snapchat. You hold your phone and Snapchat recognizes a face, and it recognizes where the eyes are. Based on the filter you choose, it puts brown eye shadow or purple lips on the face—and the lips don't change; a mask goes over the lips.

IB Can you tell us about your work *Frenchising Mona Lisa* and your thinking behind that piece in relation to augmented reality?

AB I made the piece at a time when Nicolas Sarkozy, the president of France, was banning the hijab in public areas. I looked at the *Mona Lisa*, and I saw that the woman was painted with a veil over her dress because it was customary at that time for Christian, upper-class ladies who were pregnant or had just given birth. So I said, "Well, that's interesting." You have an immigrant woman—she's Italian—in a foreign land, France, veiled in a public space. What would Sarkozy do? Is Sarkozy going to kick Mona Lisa out of the Louvre?

Based on that, we did this augmented reality piece with Matteo. Every time you would hold your phone in front of the *Mona Lisa* in the Louvre, you would no longer see Mona Lisa, you would see a performance of me made into Mona Lisa as I put a French flag on my face, like the hijab.

In that specific location, visitors saw the performance through their phone. But there are two ways of augmentation. You could take a two- or three-dimensional object and recognize it and replace it with content. Or you can do it by geolocation. So for people who couldn't go to the Louvre, they could place their phone in front of any image of the *Mona Lisa*, and they would see the performance.

IB Chris Milk, founder and CEO of Within, a VR media company, has argued that VR can be used as an "empathy machine." I'm interested in this notion of technology and empathy and the emotive qualities of technology. Milk says that because he feels that VR has the ability to bring a foreign place or experience or person physically closer to the user, it creates an awareness-raising experience—you might even refer to it as a phenomenological experience that's engaging multiple senses. He stated on Twitter, "In all other mediums, your consciousness interprets the medium. In VR, your consciousness is the medium." With this in mind, we know that the *New York Times*, *Guardian*, *Washington Post*, and other media outlets have been incorporating VR and AR technology as a new tool for storytelling.

Farai, as a multimedia journalist and storyteller, tell me about your thinking on Milk's quote and how you felt early on about the importance of utilizing technology.

Farai Chideya I'm a fellow at the MIT Media Lab, and I'm studying virtual reality and how it applies to journalism. There are not a lot of women in VR overall, but I find that in VR journalism, there are actually quite a lot.

Lynette Wallworth just won an Emmy this year for her piece about an atomic test on aboriginal lands in Australia—it's a beautiful film. She's now working on one in Latin America that has to do with the first woman to become a shaman in her tribe. It's about gender equity and a return to home. One of the people in the tribe had lived in London and decided to come back to his village, renewing the language and renewing the culture. There's a level of empathic storytelling. You view her work with any number of headsets of varying quality and price that you use with your iPhone. But Nonny de la Peña, another pioneer in VR journalism, creates work that is used on elaborate museum-quality VR with wires going to cables in the ceiling. And it's a much more immersive experience. In one, you can have a much broader audience and it's somewhat less immersive, and in the other, it's super-immersive but you have to go to the museum.

One of the things that Nonny de la Peña did was re-create children's perspectives of a bombing in Syria through, I think, a mix of photographs and satellite footage. What was it like for these kids on the street to experience a bombing? And people are literally falling to the floor because they're wearing the headset and all of a sudden feel like they are there with the concussive sound and their brains transmitting electrical signals. If you can get the right mix of sound and sight and haptics, then your brain says, "Oh crap. I'm being bombed." And it doesn't matter that you're not being bombed. For that instant, it gives a different perspective than watching someone from across a room on TV. She tackles really tough stuff.

The question I have is not, Does this get into questions of empathy? It certainly does. The question, for me, is, What is the role of empathy in news? There's a lot of evidence that shows that people who consume news that provokes momentary empathy don't necessarily have a greater long-term understanding of the issues. You can have momentary empathy for children who have been bombed in Syria and then say, "Okay, what's for dinner?"

AB There is something to be said about our interaction with the subject matter. If you're reading a book or an article or watching a video or a film, you're engaging with a topic in a particular way. What you are prompted to do as a step after that experience really has to do with how much you were moved, how many tools are around you to take it further, how much you have that desire to take it further.

I don't know if a full-on 360-degree immersive experience is more useful in creating empathy toward action or if it actually inhibits the user from taking that extra step. If you're reading an article, it leaves you almost desiring more. You're unsatiated; you haven't fulfilled that desire. But if you are fully immersed and you have "lived" it, you might think, I'm done. I can move to the next task.

IB Getting to the gallery, putting on the headset, and spending time having that experience is much different than reading about a bombing in Syria. For me, that is the disconnect. We talked a little bit about the idea of VR and AR being marketed as an empathy machine. There's marketing behind it as well—if you can bill these technologies as capable of magnifying

people's empathy, then maybe it's an easier sell. But after you've had that empathic moment, where's the call to action?

FC Well, we talked about VR and AR, but there's also immersive, which is similar to VR except that you're not able to fully explore a world—you're taking something akin to a guided tour of a three-dimensional world. People are using that a lot for nonprofits. The group charity: water did an immersive video about a girl in Ethiopia and how she was taking care of her younger siblings and had to spend all this time fetching water from the well and couldn't go to school. Charity: water built a well to aid girls' education. That project was very message-oriented.

What you can't do in a linear-narrative immersive film is explore on your own. Immersive is more geared toward fact-based storytelling.

IB **In your practice as a journalist, is there one technology that you feel is more useful or more effective at telling the kinds of stories that you specifically want to tell?**

FC There's promise in all of it. One thing that strikes me is that the most durable artifact that we have that transmits information is paper or a stone wall. You can keep reproducing and recopying and reformatting, but anything digital that we create is much more likely to become obsolete. Let's be really clear about that. We're living in a moment when we're creating technologies that are going to be obsolete. So let's play in the playground, but let's not think that this is the invention of paper.

IB **I'm smiling because Michael works with fossils. It's interesting because there's nothing obsolete about them—they're still here, right? Unlike the floppy disk.**

MJ A piece of stone or rock, a piece of landscape, in geopolitical terms, has a lot of value and is potentially contested, potentially desirable, but it also means something else to the people who might live on it, to people who might access it. So it has these multiple identities. It's not just a fossil: potentially it's the bedrock under which the layers above it have been built.

Once it's taken out of that status, which is kind of abstract, it's something that goes to an institution. To me, there's something valuable in seeing material through the use of technology—that's how you access this stuff or even find out about it: through GPS locators; technology to get there; technologies to communicate, to negotiate; ultimately, a smile and handshake. But along the way, all of this material is generating or acknowledging its own place in the world.

I'm re-creating a fossil bed that has been buried for five hundred million years. I want people to walk on it. If we piece together all of its parts from collectors, institutions, and places that have desired them and have taken this land piece by piece, and if it's put back together as a field of fossilized flowers and we're allowed to walk on it, are we also transgressing and pushing against the institution? And that's just from a rock. So I think there are still ways that we can look at our space, and the parallel to what's virtual, immersive, or potentially a method for framing and reframing. That's about time. Getting it is about speed. But I think

we cut straight to speed and bypass time altogether when we're talking about some of the things around VR.

IB **I was in your studio walking on and touching this thick sprawl of fossil. I imagine that could be re-created in a virtual reality setting. But the live and the virtual experience are two completely different things.**

I'm thinking about representation. We're experiencing VR and obviously there's a direct connection to those who are creating it. The space of technology is not particularly diverse; it's made up of predominantly white men. How is that impacting production or what we're seeing? What are the conversations about opening up some of those behind-the-scenes spaces?

FC Daryle Conners has been a real mentor to me in understanding VR. She has been everything from a news and doc producer, who many years ago worked on a huge documentary series about the Vatican, to a video game designer—and there are very few female video game designers. Now she works as a VR designer on medical application VR, but she also is doing some creative work in VR.

There's a whole group of people who are emerging who have interdisciplinary experience. Anecdotally, I find women tend to be more in that cluster. If you look at the people who are active in VR or in video gaming with strong career interdisciplinary experience across different media platforms, would you see more women? I have various theories about it. One of them is that because of the sometimes-hostile work environments in tech, women and people of color seek higher ground and, often, will take more leaps and move around more. But that also makes you more adaptable.

In terms of representation, I don't know the numbers, but the level of gender bias in the technology industry is grim. The first computers— that was a job title—were women. There's no reason that women shouldn't be well represented in the technology industry. It's become normal for men to dominate programming jobs, but it was not always normal. We don't know how it affects storytelling; we can only surmise.

Harry Potter is a franchise that has really good gender diversity in its fans. But for a lot of video game franchises, they're looking for products that appeal primarily to teenage boys, and they assume that the only people who can make those products are young men, and often young white men. People never ask, "What would a teenage girl want from a video game? What would a Black person, or an Asian American, or an immigrant want?" Maybe not anything different, but shouldn't we ask the question? And there's not consumer-driven research into diverse content development because people just don't ask the question.

AB The way in which I think about that particular question of representation is through understanding. As a Creative Research Associate at Columbia University, one of the things we do with augmented reality and artificial intelligence is to recognize that it's so new that very few people from different fields are playing with it. So we create as we conceptualize. Then we throw it back to academics, journalists, peers, everybody else, and ask them to respond.

Artificial intelligence is basically when you have the capability of having the machine feel, smell, and absorb data through different sensors. It could be vision, it could be sight, haptics, anything. And then not only see, which means absorb data, but also analyze the data and then respond. Artificial intelligence says, "I'll function like your brain. I'll absorb the data. I'll aggregate it. I'll analyze it. I'll respond back to it."

I call my students—engineers and computer scientists who are doing their PhDs—my poAlts: p-o, capital A, capital I, t-s. It has two goals. One goal is to say that our technologists are also our poets and artists of the day in a way that we forget. The second is to recognize that the language that's being created and the text that's being produced through coding looks like modern poetry. Technologists use syntax, words, which are letters, spacing, symbols, punctuation. All of this together makes up the components of good, modern poetry. The same way poets pour themselves into their texts, so do programmers who put their lived experiences, value systems, and everything that comes with their lives into their texts. Even though it has to do only with zero and one at the end of the day—until we hit quantum computation, which is a little bit down the road—there's nothing neutral or objective about the text that's being produced. And if there's nothing objective about it, then let's talk about the subjective nature of that text and the knowledge that's produced.

I can give you an example. When Pokémon Go came out, it became the most-used app in the world. It's augmented reality. You catch monsters in different places, so you have to be mobile. But here's the thing: as a person of color, if I wear my hoodie, and I want to catch monsters, do I really have that privilege of mobility through my colored body to be able to catch as many monsters as are available to other bodies? Is a female body able to go during the night to places that perhaps are not safe? As a person of color, there are many places that are not safe for me. But the people who wrote those codes had no understanding of that. They didn't even think about that because it was not part of their lived experience.

FC Augmented reality definitely raises questions of safety, not just physical safety but also psychological safety. People are questioning, for example, how young is too young for augmented reality? Because part of the job of childhood is to teach you to distinguish between dreams and reality.

I relate to your code as poetry. I'm not a coder, but I've had coder friends. They can recognize other people's code; they can often recognize what nationality people are from their code; they make little inside jokes in their code; you can pick up the slang in people's code.

We have come to believe that we are living in the modern era and things are just the way they are. We don't really know what the impact would be of having a more race-, gender-, and national-origin-diverse program or pool. Some groups from outside the United States are highly represented in US companies, and some groups are not. But I do think of questions around ethical design.

MJ I'm very interested in that idea of ethical development and programming. To me, it speaks to these ideas of introducing disparate elements from

interdisciplinary thinking fields and markets, putting them together in a potent mix, but not really knowing the impact because the research is not being done; it's ahead of itself. This is where technology is ahead of the results and the endgame impact. Anything that has the subjectivity that Amir's talking about is a place I'm interested in. Who can get that content, or who can get access, and what is the potential content delivery, and the goal of that content? This idea of programming being subjective means there is an agenda.

AB For those of us who are working along that intersection of art and technology or humanities and technology, we have had decades of good scholarship and theoretical tools and frameworks that we used to understand bodily movement, gender studies, theater studies, and performance studies. We have a wealth of beautiful, wonderful knowledge that has been created. And the good news is that for everything we have created up to now, we can extract those theories and utilize them to gauge and assess what we have. The technology I'm working with—augmented realities, artificial intelligence—it looks very new. But at the end of the day, there's nothing new about it. We have all the required tools to be able to engage with it in a critical way. The medium itself has created some changes, which I call *choreography of the space*, that makes things a little bit different. But so be it. Let's build on the existing tools to have critical thinking.

Audience In these times, we relate to each other based on how we define ourselves as individuals, as human beings, but also through the collective. How do we coalesce around a central identity as a society, and how can we use technology to foster that? In regard to gender, there's a lot of technology and immersive experiences of war games and violence, and all of that is part of what young males identify with as defining what it means to be male—conflict and aggression and so forth. How do you see our ability to tackle the question of what kind of society do we ultimately want to be?

AB I don't know how much agency we have to define society when it comes to the question of technology. To do the kind of work I do, I need programmers that have their doctorate degree in a specific technology of AI, machine learning, augmented reality, and other areas. Hard-core, heavy-duty hardware is expensive, so there are major financial restrictions to access these things. So who gets the privilege to have access? More and more, the investors in artificial intelligence are the big corporations that can afford it.

We need to make sacrifices to understand what priorities we're going to put forth. If AI is outdoing Moore's Law—an observation from the 1960s that the size of chips is going to shrink by two every two years—we're going to have this constant progress. We are realizing that actually we have outdone Moore's Law, and we have what we call a progressive incremental increase in how technology is moving. That's why you might be feeling as if every six months, there is something new. There's truth to be said about that. There's a progression that's exponential at a fixed rate.

As practitioners, museums, art institutions, educational institutions, we have a responsibility to say, AI is going to take over a lot of the things

that we're going to do, and it takes a lot of money to get into. Is it worth getting into? Do we have the capability? And if so, at the expense of what? Or do we leave it to Facebook or Uber?

The real valuation of Uber is based on the fact that they're aggregating so much data to feed to their machines. Then they can create an AI machine that outdoes IBM's Watson based on our information. And it's the simple things: What time of the day do you take Uber? How long do you take from the time you call the car to the time you come down to take it? Are you a late person? Do you make the car wait or not? Do you go from work at night to a bar? Which kind of bar do you go to?

IB **And what are the socioeconomic and demographic stats of the neighborhoods you're coming from and going to?**

FC It's not "our" information. It's being sold even as we speak. Now, paying in cash is considered a flag for terrorism. I covered big data for the *Intercept* and did a bunch of stories on the sale of commercial data. And it's not as if you can pay with a credit card as a private transaction. Information is sold to political marketers, it's sold to pharma companies, it's sold to any number of entities that I have no control over. A credit card is basically a very flat surveillance device. Understand that when you use yours: it's not just about the money. The creation of technology is not value-neutral; there's always money and power going upstream.

IB **And this is not the kind of society that we want, but it's where we live. It's the one we have. So the question then becomes, how do we navigate it? Where do the ethics, the morals come in? Where can the changemakers step in and impact in some way?**

FC I saw a prototype for an AR device where you hold your phone over a can of soup, for example, and you put in your medical needs, and it would say, "This soup has too much salt" or "This brand of cereal has wheat, and you are gluten intolerant." So what about using AR for something like that?

We talk about police accountability—very controversial. But what if you had just a badge number seeker? It doesn't record anything except noting that you see this police officer at this location and this was his or her badge number. If anything happened, you would have a crowdsourced record of where officers were. You're being surveilled by any number of entities that record your presence everywhere. I don't view it as an escalation to be able to surveil back. AR could provide a means for doing that. It's unfortunate to think of equality coming from mutually assured surveillance, but maybe that's the only way to go.

MJ It does speak to the idea of what society we would propose. We are on the consumer part of the collective. The proposal would be: Are you part of the collective that is the consumer part that is uploading, uploading, uploading, or are you able to turn that around and start rethinking yourself as a collective on the other side with a certain amount of agency? In the positions some of us here are in, what do we do with that access? Do we delve deeper into those arenas or places where we can ask questions

rather than upload? Do we begin to download, or challenge, or push against, to ask the questions that require us to be on the other side of that collective?

When I did a residency at the Smithsonian, I was given some research access. I wanted to work with digital technologies and imaging and representation across a huge archive of our society: objects, things, parts of visual culture, parts of objects, parts of historic significance, markers of what we've done, our accomplishments, who we are. And I wondered if that archive of who we are as things, as pictures, as images, as a government-verified and -ratified thing, object, identity, has sides that are hidden?

Is it more important to look at that mummy and see its place in a macro sense of history and what place it played in society? Or is it as interesting to say, "Who is that mummy?" If we go in with a CAT scan and explore its guts and see the quality of the removal of organs, would we know more about whether this was a higher-class person, whether or not that particular society had different values? Interrogating things at every level is a possibility to work through and reexamine what role and what part we're on.

Audience I've seen a lot of different examples of video games being used for therapy or other humanitarian action. I think it's also fair to say that video games are one of our first immersive experiences in terms of technology. What do you think the role of video games will be in the future? Or even the idea of gamification—making incentives as a form of a game—and what that can mean?

FC I'll give you an example that blends a video game, or at least the gamification strategy, in the VR world. Daryle Conners—I mentioned that she has done video game design and now does medical VR design—has been working on a product that uses beautiful images and storytelling to achieve a measurable medical result. You can use a narrative environment and, in this case, a VR environment, a video game environment, to achieve psychological and medical effects.

There's a whole company being developed now that will program music for people who have clinical depression. Think about it: when you're down, don't you feel better when you find that one song that makes you rally? What if there was an entire arc of music that got you through a day—it would calm you at certain times and it would lift you up at certain times. So there are ways that video gaming is being used as interventions for mental health.

And there's video gaming for education. One of the best platforms in video gaming for education is Scratch, which allows kids to make games by having this almost Lego-type system for programming actions. To teach people how to create is so valuable. It would be great if we can surface more opportunities for kids and adults to engage as creators and not just consumers.

AB One of the things I'm working on is the notion of spherical narrative formation. To give you a little context, imagine the world of cinema, which

has affected us for more than a century. We're used to being seated across from, usually, a two-dimensional plane, and we consume a product that has been set and authored by the director in a very linear way. If you're Hitchcock, you're blocking every scene from A to Z.

You, as the audience, have nothing to say, other than experiencing the narrative in a group. You can't change the narrative. What I call spherical, instead of linear, narrative formation is: Imagine if you were able to put on your augmented reality glasses and watch a 007 movie. The camera moves right behind the actor, and we see what he sees. Instead of watching him come through crazy car moves, get shot, then come out of the car, and be all impeccably dressed—instead of following him where the story is happening, you can follow that other person who went through a door. You would be capable, in a spatial and temporal way, of choosing your own narrative within this larger narrative. In that case, 007 may no longer be your lead character.

Basically, a notion of co-creativity comes into play, and that's something interesting that's being explored within the gaming industry, though in a very limited way. But there are tons of artists who are pushing back, questioning, If artificial intelligence is enabling our characters to engage with the audience and change the narrative spatially and temporally on multiple levels, who is the real author in this space? The whole notion of authorship is challenged. If authorship is challenged, then who's the artist? I believe myself to be the artist because I create, I am the author.

If there's someone on the other side who's creating with me and choosing the path, to whom does the project belong? To whom does the narrative belong? We can go further than that. If art making is changing through AI, we need to retrain our artists, we need to retrain our audiences, because we have learned for over a hundred years that we sit down, and we consume. Continuing that line of thought, we need to retrain our institutions, be it the museums, be it the cinema, be it the theater, to provide space where we can engage with them differently.

And as for the kind of society we want, we'll have to reinvent with new discussions about authorship, art making, artistry, and technology, all woven into one another. ▲