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Keynote, Crossing Boundaries
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An Orderly Assemblage of Biases – Computation as Cultural Material

I would like to open by acknowledging that we are on Treaty 7 territory. I thank my Blackfoot cousins for the opportunity to visit, and I hope my talk today will honour the ancestors who have walked this land before us.

I would also like to thank Andrew Stuart for initiating the conversations that brought me here, Naomi Sato for taking care of all the details, and the organizing committee for their invitation. It is an honour to be asked to join in this sharing of good minds.

I'll start with a reading of a poem of mine. The poem is called "What They Speak When They Speak to Me"

{Performance: Speak}

[Everything about me is mixed, bridged and on the cusp." Jessica Hansell a.k.a. Coco Solid]

I spent the last week at the imagineNATIVE Film & Media Arts Festival in Toronto. I attend the festival every year, and one of the reasons why is for the opportunity to meet talented and passionate Native creators from all over the world—Turtle Island, Samiland, Aotearoa [Ah-tee-a-roa]… Coca Solid is a multitalented Maori artist who makes music, animations, and web sitcoms. She was new to me, but has been building a following worldwide for the last ten years. Everything about her is mixed, bridged, and on the cusp.

This is my understanding of *Crossing Boundaries* is trying to do. Mix things up. Bridge disciplines and practices. Think about what is the cusp on which we find ourselves, here, near the beginning of the 21st century.

Tonight, I'm going to take an approach I've only tried once before—up the road, here, as a matter of fact, at Alberta College of Art and Design, last spring. I've been professionalized to keep my creative work—the work of the "I"—separate from my analytical work—the work of the royal "we". Such a separation has always felt awkward and forced. I've begun reflecting lately on how such a separation does damage to our understanding of ourselves. It flattens the world, thins it out, throws understanding under the bus in favour of analysis. I'm interested in bringing volume back to my work. You can tell me how it works afterward.

Normally, when I speak publicly, I talk about one or the other of the two sides of my practice.

[Slide: Writing Complex]

One side is Writing Complex, a series of conceptual, computational and creative engagements with digital texts and typography.

[Slide: AbTeC]

The other side is Aboriginal Territories in Cyberspace, or AbTeC, a series of projects in the Indigenous community looking at how we use digital technologies to tell our histories, illuminate the present, and dream of the future.

Let's see if I can bring them together in a way that is meaningful to you.

[Slide: D Niatum The Years in the Blood]

Now, my first creative practice was and is poetry. Why poetry? At root, who knows? I like language. I adore the way it can be sculpted and moulded, the way in which I can inflect it using tense and pronunciation, that moment when I've finished editing the perfect line, one so dense and tightly coupled that you couldn't slip a molecule between its adjacent components. I am enamoured with the alchemical process of transforming thoughts into words, which then get transformed into thoughts in somebody else's head.

In hindsight, I would say it's also because poetry forces me to pay very close attention to how language is constructed. Each word is precious, every bit of punctuation considered, and every rephrasing examined like a jeweller strategizing how to cut a diamond. Syntax is a puzzle with multiple solutions, each one of which carries with it its own set of connotations. I can use different formal microstructures—rhyme, meter, assonance, dissonance— and different macro-structures—sonnet, sestina, rondel, villanelle—each triggering a different configuration of sonic and semantic resonances in your brain. Words, syntax, form—these are the material out of which poems are made.

[Slide: Unique Sequence Code]

When I reached university as an undergraduate I was forced to take a programming class. It was a revelation. Here was a form of poetry. The rules were strict, yes. The syntax strange, indeed. But it was a compressed, concise, expressive language that required a sustained and eye-wateringly detailed engagement with structure. An elegant recursive function is breathtaking in its efficiency. A well-constructed data structure is a thing of beauty. And it is all functional, language that makes things *happen*—pixels switch on, notes get played, rockets fly. Alchemical to the core.

My interest in programming grew into a more general fascination with computation and its material qualities. I wanted to understand how the different strata necessary for computation affected what I could do with it. I wanted to understand how I could use those material qualities creatively.

[Slide: WordNozzle video]

I started exploring the place where poetics and programming came together. Given that I am speaking in a Fine Arts faculty, I thought it would be fun to show my thesis project from when I was in graduate school in the Royal College of Art, in London. The work was called WordNozzle; here is a video from 1996—twenty years ago!

The question I was pursuing with it was, what would happen if you were to take the paint inside of a spray can and replace it with letters and words and sentences? What would it be like to spray text onto a surface, manipulating the font and size and color as you went? What kind of new texts might I write? What kind of new readers might those texts engender?

Developing WordNozzle brought me face-to-face with a core *material* problem. At that time, you had programs that treated text as ASCII, allowing you to edit the text as language. You had programs that treated text as a collection of pixels, where you could edit the visual appearance of the text. But you didn't have anything that allowed you to do 'live text', or text that could be manipulated linguistically and visually.

[Slide: ASCII-Wall]

This forced you into a very cumbersome process, where you composed the text in a word processor, then rendered it into a collection of pixels that you would run through a series of special effects. Once you did this, though, the language-ness—the semantics of the text—was lost. The special effects software had no way of knowing that this pixel belonged to an 'h' and that to an 'x'. And the loss of language-ness meant that you could no longer edit the text as a writer.

This was a huge barrier to writing drafts and sketching at the same time. Once I had applied visual transformations, I couldn't then decide to edit the text—re-order the words, add a line, change the capitalization—without starting again from scratch. This killed the ability to experiment with both word and image at the same time. And without that ability to experiment in both dimensions, it was very difficult to master the material out of which I was fashioning these texts.

So I decided to write my own software. I knew the problem was solvable at the computational layer; it wasn’t rocket science. It's just that nobody else had thought it important enough to do.

[Slide: Ingredients + NextText]

I and my team brought together techniques from digital typography, three-d modeling, word processing, vector graphics, and computational linguistics, and

remixed them into new materials. Software architectures, libraries for use with multiple programming languages, applications, and, ultimately, artwork.

[Slide: Writing Design Programming]

My goal was to able to write, design, and program at the same time. It took me almost fifteen years to get there, where we had created the tools I needed that allowed me to experiment freely in semantic, visual, and computational dimensions simultaneously. That freedom allowed me to weave the computational material in a way that was expressively powerful in precisely the way that I wanted it to be.

[Slide: PoEMM Logo or collage]

The cumulation of this research-creation trajectory is the P.o.E.M.M. Cycle, a series of eight touch-driven dynamic poems. We first create a 42" touch-screen version of each one to be used in exhibition, and then recreate it for mobile—iPhones and iPads.

The poems I'm reading tonight come from the P.o.M.M. Cycle. Time for another one: "The Summer the Rattlesnakes Came".

{Performance: Rattlesnakes}

[Slide: Symbolic Systems logo]

I was lucky that, while I was discovering these two strange new worlds of philosophy and programming and trying to figure out how to fit them in with poetry, Stanford, my undergraduate school, was beginning a new degree program called Symbolic Systems.

[Slide: Symbolic Systems quote]

Symbolic Systems was founded to explore how "computer systems, robots, and people are all examples of symbolic systems, agents that use meaningful symbols to represent the world around them so as to communicate and generally act in the world. The notions of symbol, meaning, representation, information, and action are at the heart of the study of symbolic systems." The program provided a home where asking the question of how poetry, philosophy and computation intersected wasn't seen as weird, or, worse, dilettantish. How it was all, in some way, the study of the nature and scope of knowledge. And it was also home to great group of faculty and fellow students interested in understanding how computational systems both reflected and shaped the human experience.

Fast forward twenty-five years, and that set of concerns has proven prescient. We are enmeshed in computational structures, to the point they determine as much, if

not more, of our daily lives than other such society-wide symbolic systems such as the law.

[The Stack]

Modern computing systems work via a very narrow logic, admit only certain kinds of information as data, and can perform operations representative of only a small, impoverished subset of the operations we enact as humans every day. These systems exist as components of the "stack": the vertically interrelated and interdependent series of hardware configurations and software protocols that make high-level media computation and networking possible. The software stack sits on top of the hardware stack. Moving up the hardware stack is to move from circuits to micro-chips to computers to networks; moving up the software stack is to move from machine code to programming languages to protocols to systems. As you go upward, you are moving from custom solutions to generalized solutions, from specifics to abstractions. As you make this traversal from the deep structure to the surface interface, ever more of the details of the underlying configurations are hidden from you. With the increasing opacity, your ability to assert fine control over the execution of your algorithm decreases. Eventually you get to the software application or web service layer of the stack. It is at this highly abstract level that most people interact with computational systems, as they use Microsoft Word, Instagram image sharing, or Google search.

The technologists building the stack rarely acknowledge that bias infuses every layer of it, and with greater affect the farther one moves up and away from the physical constraints of the material substrate. Software applications such as Word, for instance, can be thought of as orderly and (mostly) predictable assemblages of biases that reify the imagination of their creators into executable code.

This does not receive nearly as much attention as it should, how firmly our computational systems embed a certain worldview, a certain set of assumptions about humans and how we operate in the world. That we are rational, that we compartmentalize and categorize cleanly, that we separate reasoning from emoting, the human from the animal and the natural, that our goal, always, is to dominate the world rather than live in it.

My experiments with text and typography are an example of this written small—the software developers of the time simply did not envision that somebody would have a different approach to text than that which was expected by the desktop publishing industry or film affects industry. Small potatoes, of concern only to me and the very small group of people that live at the intersection of poetry and interactivity.

But in a North America where it is increasingly difficult to do anything without touching on a computational interface of some sort, decisions like this that developers are making *all the time* have profound consequences for how we live our lives.

And when we start writing large, when we begin, in the words of computational philosopher and poet David Jhave Johnston, when we begin 'writing the thoughts of systems', things get political—things become about how power is exercised—*real fast*.

[Technological Biases]

It gives us hardware and software systems where image processing defaults are biased in favor of white skin, artificial intelligences are trained such that they consider beauty to be a predominantly white trait, and virtual environments don't come with any brown skins for their avatars.

This defaultism, as it's called by some, may seem trivial. But it's as if, every time you stepped out of your house, you had to stop to change your skin color to, you know, your actual skin color, your hair to your hair, your bone structure to your bone structure, etc.

[Barnaby; "sick of being a man," File Under Miscellaneous **]**

The first few times, it's a little annoying.
Every. Damn. Day. And it becomes a chore.
If it goes on Every. Damn. Year. It becomes existential.
And if it goes on Your. Whole. Damn. Life. You begin to slowly understand that you live in a world programmed by white supremacists.

[Slide: AbTeC logo]

This brings me to Aboriginal Territories in Cyberspace, or AbTeC. The artist Skawennati and I founded AbTeC because we saw that these computational systems were being used to define a new territory, the archipelago of websites, social media services, shared virtual environments, corporate data stores and multiplayer video games we call cyberspace. We—Indigenous people—needed to stake out ground in it. Cyberspace was clearly going to become central to our lives, and we wanted Indigenous people out there in it, exploring the blank spaces and filling them up with our voices, our faces, and our dances.

[Slide: Skins logo]

AbTeC approached this challenge from two directions. The Skins Workshops on

Aboriginal Storytelling and Video Game Design train Indigenous youth in the tools of digital production, transforming them from simply consumers to producers of work in this new world.

We designed the workshops to integrate storytellers and storytelling from the community with creative and technical instruction. We ran four of these workshops, and each produced a game where the students remediated stories from their oral tradition into an interactive, playable narrative. The process helped the students' connect their cultural knowledge, passed down from the past, with the knowledge of the technology it takes to shape the conversation in the present.

[Slide: TimeTraveller™ collage]

The second direction was to actively imagine ourselves into these new territories. Skawennati's TimeTraveller™ project was the biggest effort we took in this direction. This is a series of nine videos made using machinima, or machine cinema, where you use virtual environments to make videos.

TimeTraveller™ is the story of a young Mohawk man from the 22nd century who 'visits' events of importance to First Nations history. As he experiences the other side of the one-sided fairy tales that pass for history in this country, the series constructs a counter-narrative that calls into question the basic legal and cultural structure of the mainstream society.

[IIF logo]

We are now working on the Initiative for Indigenous Futures with about a dozen collaborators and institutional partners. The Initiative is focused on enabling and sustaining a conversation about how we see ourselves seven generations hence—150 to 200 years in the future, science fiction territory.

The problem with most popular science fiction is that it, too, presupposes the continuation of white supremacy. To quote the science fiction writer Nalo Hopkinson (herself paraphrasing the author Ian Hagemann): "when I read science fiction set in the future, where there are no people of color, I wonder when the race war happened that killed us all of and why has the writer seen fit not to mention something so huge?" Our absence from the future imaginaries of the settler culture is worrisome. Absence implies non-existence, or, at the very least, non-importance. A people that are absent in the future need not be consulted in the present about how that future comes about.

{ Performance: Sharks in the Ocean }

[IIF Logo]

Sketching visions of a future life—whether at the level of individuals, cultures, societies, or species—is rarely just about the jetpacks or the aliens or the minority reports. Jetpacks represent humanity's technical cleverness and desire to be unshackled from gravity; aliens represent the Others of our world—be they the primitive, the outcast, or the superhuman; and the minority reports represent living in a state of anxiety about the loss of free will in the face of a technologically overwhelming hegemonic state.

The Initiative for Indigenous Futures aims to build new sets of metaphors, new assemblages of biases, new imaginaries: ones that assert an Indigenous presence in the future of our species, ones that will bridge between who we as Indigenous people are now and who we might be. By encouraging Native people to become producers of digital, networked media, and eventually creators of digital technology, we hope to encourage our communities to embrace and engage what promises to be a highly technologized future.

[Stack]

The Initiative will continue the Skins workshops, to build that capacity, teaching Indigenous youth how to make software applications. Then how to make libraries and other middleware that those tools depend on. Then how to write their own operating system kernel. And we'll keep going down, to the hardware itself.

Participating at this more fundamental level will greatly increase our ability to make the technology speak in the way we desire. We must always struggle against the deep structure on which cyberspace is built, but the nature of digital devices and networks is such that our ability to customize our cyber experience—to bend it towards our cultural context—and make the results available to the public is much greater than our ability to, for example, storm a network studio and take over the evening television broadcast.

[Bush]

At the same time as we work at this material level, we continue dreaming, populating the Indigenous future imaginary with scenarios of how our communities might thrive unto the seventh generation and beyond. For this final part of my talk, I'd like to show you some of those visions. For the most part, I'll let the artists themselves describe their work.

[Illustrating the Future Imaginary]

Since the spring of 2015 we've been commissioning Indigenous artists to create

illustrations of what they think or want the lives of their descendants to be like. The project is called, straightforwardly enough, Illustrating the Future Imaginary. So far we have ten illustrations in this series, and will be commissioning several more a year for the next six years.

[Steve Sanderson – Plains Cree - Picking Up Where We Left Off]

depicting one of his descendants reclaiming the plains and using a mixture of the old ways and the new to chart their path in a post-apocalyptic world.

[Elizabeth LaPensee – Anishinabe - Returning to Ourselves]

"Returning to Ourselves" reflects our cyborg selves of the future in a spacetime when we activate interstellar travel by recognizing the depth of teachings from the past. Blood memory echoes as thought initiates form and the triangulation of breath ignites the connections of planetary traplines.

[Ray Caplin - Mi'kmaq - Hunter of Altered Game]

Ray writes: 16 generations into the future, where Massive corporations and industry have long since coated the planet with towering cities and factories, all of earth's industrial resources had been depleted, and the cities have been left abandoned to crumble. The density of the cities has made it difficult for nature to reclaim the earth. Toxic chemicals and radiation had soak the soil, drastically mutating most life that dwells there. In the midst of the ruins, a lone hunter preys upon the altered game. Knowledge passed down from generations has shaped him into a formidable hunter. Adapting modern tools such as his power spear, combined with the teachings from his ancestors, allow the Mi'kmaq hunter to survive in this rugged forest of steel skeletons with poisoned skies.

[Joseph Erb – Cherokee - Turtle Translation App]

"The Turtle Translation App is about learning the old stories and ways with better communication. The idea is that future technology brings us back to who we are."

[Teyowisonte Tommy Deer - Mohawk - Perservance]

I thought about what the future of our community would be in terms of likelihood and in terms of how I hope it would age. The illustration is intended to be an aspiration portrayal of our future. The illustration shows the dominant colonial

world growing around us, amidst the contrast of the foreground depicting a Haudenosaunee Longhouse, which is holding colonialism at bay. The Longhouse symbolizes our enduring culture and nationality and the smoke symbolizes that it continue to exist and live. The rows of purple wampum on top and on the bottom of the illustration reflects the Two Row Wampum, which represents the desired relationship of coexistence and non-interference between our peoples. The top row is falling apart, which symbolizes the colonial failure to respect this relationship.

[Youth Workshops - Dechinta]

We've also been working with Indigenous youth on illustrating their future imaginaries in workshop settings. Our first one of these we did at the Dechinta Bush University Centre for Research and Learning, located in Dene territory north of Yellowknife. Dechinta was founded in 2010 to integrate Indigenous traditional knowledge about living on and working with the land with University courses. It's an amazing place; I urge you all to go take a look at the amazing work they are doing up there.

In between moose-hide tanning and ice fishing, Skawennati and I led a workshop where we asked the students to imagine a character from their future.

[Kayla Tulugarjuk - Inuit]

Kayla wanted to imagine a future of female Inuit empowerment, where her "little Inuit descendent are running around living a nomadic lifestyle, using the knowledge of their ancestors to survive the environmental post-apocalypse."

[Wade Vaneltsi – Dene - Old Joe]

Little Bear, with a bow that never misses and a feather pendant, both of which are passed down from generation to generation to represent and preserve the culture. Their wearer uses them to travel to the spirit realm, where he talks to the ancestors for advice, and then comes back knowing what they should do.

The twist is that the ancestors are aliens, but, since aliens don't like to be called aliens, they call themselves ancestors.

[Mandee McDonald - Cree- Future Moos Hunter]

Imagine a Future Moose hunter and moose hide tanner. Much of the future landscape is radioactive, with the rich living in arks suspended above the land and

the poor people on the ground below. But the poor people want to stay in contact to the land because the stories say that their ancestors will only be able to find them if they stay in touch with the ground. And they have figured out how to use the radioactive moose to access their blood memory, allowing them to go backward and forward in time.

[Residencies]

The other thing we do is host Indigenous artists to come to Montreal and work with us at Concordia on realizing artwork that addresses the Indigenous future imaginary. An example of this is our current collaboration with the imagineNATIVE Film + Media Festival, TIFF, and media developer Pinnguaq on the 2167 project. 2167 is a response to the celebrations that will happen here in Canada next year commemorating 150 years of Confederation. We are not interested in celebrating that milestone, as that history has not been kind to Indigenous people. Instead, we want forward. We commissioned six artists to imagine life on this continent 150 years from now, using virtual reality technology. Anishinabe artist Scott Benesiinaabandan and the Southwestern arts collective Postcommodity are currently working with us to produce immersive VR experiences that capture their visions of the future.

[Scott Benesiinaabandan – Anishinabe - Blueberry Pie Under the Martian Sky]

Anishnabe artist Benesiinaabandan recounts a story he was told by Cree Elder Wilfred Buck about Spider Woman. From her home at the centre of the Seven Sisters, Spider Woman wove a long thread along which the Anishinabe people travelled to Earth. Some modern interpretations of this legend say that this spider thread is a metaphor for a wormhole. Another story says that some day, a young boy will return to that place from where the Anishinabe came. *Blueberry Pie Under The Martian Sky* is a virtual reality artwork that will take place seven generations in the future, when human beings are able to travel through wormholes. It will follow that young boy as he journeys back to his people's place of origin.

[Postcommodity – Navajo/Cherokee/Xicano - Each Branch Determined]

Each Branch Determined imagines northern New Mexico 150 years in the future and finds a series of interconnected American Indian and Xicano pueblos working collaboratively to exercise community and regional self-determination. The immersive experience guides users through landscapes and settings that are framed

to exploit sci-fi conventions of an apocalyptic future. However, over time, the user discovers that what appears as apocalyptic is actually a series of managed processes intended to restore and manage land and natural resources, and community ceremonies intended to culturally and socially actuate past, present and future.

{ Performance: No Choice About the Terminology }

[The best way to predict the future is to invent it.]

Circuits, algorithms, and data are all culturally biased from the first moment—they are an expression of life, after all. Our computational systems are not separate from us, any more than the non-human natural world is separate from us.

We cannot predict the future through sheer mental effort. Yet we do know that a great building project is underway, and, as Kay observes, the only way to predict where it is going is to participate directly in it.

Native people need to grasp the unprecedented opportunities that digital networked media have for telling our stories our way, and, in the process, ameliorate the pernicious effects of five hundred years of being objectified by Western media technologies. Now it is time to look forward, to continue that work by teaching ourselves not only how to use these technologies but also how to make these technologies. We have the opportunity and the obligation to involve ourselves intimately in the shaping of the structures and systems in which we will be living for the next five hundred years. As Arthur Kroker said here, in a fantastic talk on this stage yesterday, "we must turn into the storm".

[Veregge]

We must imagine our own futures. We must also be manifest in the future imaginary of the broader society. When our seventh-generation descendants explore whatever the latest incarnation of virtual space might be, they will find ghosts. Those ghosts will be the remnants of the epistemologies and ideologies that built those spaces. We need to ensure that some of those ghosts will have been put there by Indigenous people.

We need to ensure that, when those descendants don the headset or plug-in the neural socket or strap on the digital wampum or do whatever it is that will then be required to interface with those spaces, we need to ensure that when they open their eyes and look out into whatever kind of world that might be, they will think: "This is a good place to be Blackfoot. This is a good place to be Cherokee. This is a good place to be Mohawk. This… is a good place for our people."