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**An Unsettling Artificial Intelligence: Algorithms, Curriculum, and
Futurities**

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Abstract:

Algorithmic entities, or artificial intelligences, were once the purview of science fiction, but have now become an urgent topic of a present moment uncertain of its own imminent becoming. In this conceptual paper, we discuss how a particular algorithm informs the curricula of our theorizing, teaching, and wider lives—namely, unsettling accounts of the algorithms of settler colonialism. We trace the development of this artificial intelligence from the beginnings of the nation-state we call Canada, illuminating its physical and psychical inscription on the land and settler colonial thinking. We further move through how such thinking has seeped into how we understand ourselves as humans—biologically and through practices of education—particularly through histories and lasting influences of eugenics. Returning to the material technology of AI and its futurities, we consider the implications of its future development and deployment amidst this enduring context of “rule.” We conclude with a reading of an Indigenous Futurist novel, *The Marrow Thieves*, as a counter-algorithmic and counter-genetic curriculum, hopefully inspiring future curricular thinking beyond logics of settler colonial futurities.

Keywords:

Curriculum studies; algorithms; artificial intelligence; settler colonialism; eugenics; Indigenous futurism; futurities; dreaming.

Again, it is now disturbing and revealing that methods developed for eugenics—a system that did not believe in learning—now form the basis for machine learning.

(Hui Kyong Chun, 2021, p. 253)

As a network of curricula, algorithms have, since time immemorial, been inscribed not only in the promethean promises of technology, but also in our minds and deep within the very marrow of our bones. An algorithm is, after all, any codified set of decision-making values. Informally, we could say our lives are mediated by algorithmic thinking, from tying our shoes, cooking a favorite meal, to writing a “grammatically” sound sentence that frames, for some of us, our pursuits for a socially intelligible personal, academic, or professional life trajectory. Formally, as code/ified instructions, machine learning, executed by a computer program, we should all by now recognize on some level how our lives are filtered through and perhaps even co-opted by algorithms. As technological ‘things,’ algorithms now determine how and what proprietary corporate search engines and/or AI applications such as but not limited to Google or ChatGTP scrape and retrieve from data mining our different digital networked—0 and 1s—epistemic discursive regimes. Algorithms increasingly automate curricular decisions for us—which route to take, personalizing playlists, news to read, through to who should land a first date or job interview. For some, such algorithms that evaluate one’s productivity in relation to units of time working for different international corporations (Workday for example) are seeping into public education via online teaching, its platforms, and students’ standardized test scores. Looming on the horizon is the “death algorithm,” or deference to an encoded set of decisions for who should live or die (Simanowski, 2018). Algorithms make up the so-called neural architecture of self-improving programs—that is, artificial intelligence—and so the machine learning of potentially and perhaps imminently at some future point in time quantum computationally-supported sentient software (Kop & Wadhwa, 2023). Between the informal and the formal, the very future of biological life, its genetic makeup, is increasingly understood as algorithmic (Amadae, 2021). Taken to their logical end game, formally or informally, as the next societal technological revolution, algorithms are constituted as curricula, perturbations, 1s and 0s oscillating and entangling back and forth, between destruction, death, and creation, creating a “productive” life worth living as artificially intelligent sentient beings.

Critically, algorithms, whether mental or digitally encoded schemas, are also made by humans and are therefore just as flawed. More troubling, algorithms and algorithmic thinking tend to take on an illusionary sense, like the Wizard of Oz, behind the statistical curtains of a correlated objectivity. This statistical correlational objectivity, even when

questioned, becomes difficult to dislodge (Hui Kyong Chun, 2021). Nevertheless, we continue to live our daily algorithmically-filtered lives. From a technological perspective, we are increasingly surrounded by algorithms whose (settler colonial) human biases are obscured. “By becoming cyberspace,” as Hui Kyong Chun reminds us, “the Internet became an ‘electronic frontier’ and thus a wilderness ripe for settler colonialism and exploitation” (p. 9). Most of the data that exists, to which we have access to via the Internet and the respective correlations that inform corporate search engines proprietary algorithms are based on predominantly White, neoliberal, heteronormative, (neo)libertarian settler colonial assumptions of what is natural (Fredericks et al., 2022; Karumbaiah and Brooks, 2021). Moreover, they are taken as infallible because of the allure of their mathematical theoretical conceptions and technological innovations, particularly through their ethos of optimization as progress. O’Neil (2018) warns of these encoded biases becoming “weapons of math destruction,” optimized for “efficiency and profitability, not for justice or the good” of the data and the real human beings they optimize (p. 129-130). From conflating race and poverty with crime to school rankings with student and teacher worth, through the algorithm, as O’Neil warns, the “verdict becomes its own truth” (p. 132). Jer Thorp (2021) concurs, noting that algorithms “act as magnifiers, metastasizing existing schematic biases and further darkening the empty spaces of omission. These effects move forward as the spit-out products of algorithms [becoming] inputs for other computational processes, each with its own particular amplifications and specific harms” (p. 145). To live a filtered life with and through algorithms, Thorp laments, “is to be used, to be without agency, and to be overwhelmed with complexity. It is to be lost, bewildered, marginalized, harmed” (p. 31). Addressing these curricular and pedagogical conditions will require “as much unmaking as making, as much erasing as drawing, as much unthinking as thinking” (p. 31). We would add here a consideration of algorithms understood broadly as onto-epistemological logics that in turn digitally organize the making of our realities. Consequently, this will require as much unlearning and unsettling in our unmaking and making of our curricular understandings and entanglements with AI pedagogical applications in the classroom and our future research as curriculum studies scholars.

Indeed, in terms of AI and its futurities, we are currently at a global—and curricular—inflection point that has yet to fully be resolved. Advancements in AI are fueled by vast scraping of the Internet for training data, using methods that are proprietary and shielded from scrutiny by corporate interests even while these

intelligences are applied publicly towards sorting and classifying individuals who often have no right of appeal (Garfinkel, 2018). In education, we are currently witnessing a flurry of excitement and fear over AI applications like ChatGPT, which some scholars warn will upend our approaches to teaching and assessment (e.g. Rudolph et al., 2023)—at least in higher education; its presence and place in K-12 has yet to be studied. The emergence of “precision education,” meanwhile, promises—or perhaps threatens—to use AI and even genetic profiling to ostensibly tailor education to individual students (Sabatello et al., 2021). Existentially, AI can now be called the next promethean revolution in military technology, after gunpowder and the hydrogen bomb. As Russian president Vladimir Putin has been quoted as ominously declaring, “Artificial intelligence is the future, not only for Russia, but for all humankind [...] It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world” (quoted in Arif, 2021, p. 220). What was once the purview of science fiction has become an urgent topic of a present moment uncertain of its own imminent becoming.

AI is thus a complex curriculum of power, and, as we explore in this essay, our individual and collective ability to imagine particular futures—perhaps our very capacity to *dream*, and, logically extended, what kind of dreams we impart onto future AI entities. As Simanowski (2018) suggests, “in their obsessive, creative conquest of the world, human beings have [through algorithms] also created unforeseen empiric constraints that restrict their freedom for future actions” (p. xvii). Importantly, this empiric—or imperial—constraint of our futurities did not originate with computer programs, but rather informs their coding and potential self-learning. As Northeastern University computer scientist David Lazer (2015) reminds us:

The fact that human lives are regulated by code is hardly a new phenomenon. Organizations run on their own algorithms, called standard operating procedures. And anyone who has been told that “it’s a rule” knows that social rules can be as automatic and thoughtless as any algorithm. (p. 1091)

Just as Lazer reconsiders algorithms from a social perspective, in this article we discuss how a particular algorithm informs the curricula of our theorizing, teaching, and wider lives—namely, unsettling accounts of the algorithms of settler colonialism. We trace the development of this artificial intelligence from the beginnings of the nation-state we call

Canada, illuminating its physical and psychological inscription on the land and settler colonial thinking. We further move through how such thinking has seeped into how we understand ourselves as humans—biologically and through practices of education—particularly through histories and lasting influences of eugenics. Returning to the material technology of AI and its futurities, we consider the implications of its future development and deployment amidst this enduring context of “rule.” We conclude with a reading of an Indigenous Futurist novel, *The Marrow Thieves*, as a counter-algorithmic and counter-genetic curriculum, hopefully inspiring future curricular thinking beyond logics of settler colonial futurities.

Unsettling Accounts: Algorithms of Settler Colonialism

The desired outcome of what we are calling ‘colonial algorithms’ is to legitimize white authority whilst deliberately or inadvertently silencing, denying, and dismissing Indigenous ways of knowing, doing, and being.

(Fredericks et al. 2022, p. 159)

On the land some of us now call Canada, settler colonialism has operated algorithmically for centuries. Canada’s “National Dream” was born through algorithms of ethnocide, particularly the extinguishment and subjugation of this land’s First Peoples (Daschuk, 2019). The logics of settler colonialism have been encoded and scarred into the very earth beneath our feet, settler agri-eugenics having changed climate and earth to displace traditional Indigenous foodways (Anderson, 2018). The same logics have severed us from place and each other across our everyday lives, cutting off our ability to perceive ways of relating outside a nuclear neoliberal, capitalist worldview (Donald, 2019; 2021). From the very start of a nation-state formation project here in what some of us call Canada, the school curriculum, its knowledge-mobilizing systems, have and continue to engineer the artificial intelligence of settler colonial logics.

In *A Bounded Land*, historian Cole Harris (2020) narrates how these logics took root in what some now call Canada. These same logics, we suggest, have informed a continuing settler algorithmic appropriation of the land and its material “resources” into a neoliberal capitalist extractive state. As Harris recounts, before European settlers could operate in North America, “the European imagination had to make some sense of it, less,

perhaps, to establish what was there than to arrange and order the land in terms that Europeans could understand” (p. 25). To be clear, such understanding would then establish “the circumstances and conditions in which Indigenous communities could be controlled and exterminated physically and ideologically from the national consciousness” (Sinclair, 2019, p. xi). This national intergenerational settler colonial consciousness endures and continues to foreclose the possibility of good relations between Indigenous and non-Indigenous Peoples with Turtle Island and our more-than-human kin (Ng-A-Fook et al., 2023; Tupper, 2020). As Niigaan James Sinclair (2019) reminds us, in “countries of the world this is called ethnic cleansing, extermination, and genocide. In Canada this is called progress” (p. xii). The earliest algorithmic gestures of settler progress, according to Harris (2020), were the European settler compulsions to map and rename the lands of Turtle Island. “Once translated into this language, the land could be communicated, and then could be argued and strategized over from afar” (p. 25). This “shifted the land into a different category of information, one that Indigenous Peoples did not need but that Europeans did, for it allowed them to visualize space,” and, in turn, this “rudimentary knowledge of the land, made available in Europe, became a considerable source of European power—a cartographic equation of power and knowledge that would be repeated across the continent” (p. 34). Abstracting and drastically simplifying appropriated Indigenous knowledges of the land had profound effects. “A few lines on a map served to eviscerate the land of its Indigenous knowledge, thus presenting it as empty, untrammelled space available for whatever the European imagination wished to do” (p. 25). Harris likens this settler imagination to a “centre of calculation,” after Latour (1987), in which “a few bits of information, real or fanciful, about a distant place” could be “put to work” (Harris, 2020, p. 29). In effect, the land became stripped of its local relational complexity and turned into a certain kind of computational data intelligible to settler colonial algorithms.

The algorithm of mapping synergized with European exploitation of land and introduction of disease to recalculate and reconstruct Turtle Island into allotments of land that were then transformed and colonized into settler private property. Here James Daschuk (2019) warns that those “who place human agency and greed and the expansionism of colonial powers at the centre of the decline of Indigenous nations in the western hemisphere are missing half of the story” (pp. xxix-xxx). Such missing foregrounds the role of disease and biology in the displacement of Indigenous Peoples from our historical consciousness as an emerging and evolving settler Canadian

democratic commonwealth nation-state society. Harris (2020) notes that settler colonial logics made use of the terrible human toll that European-introduced smallpox and measles took on First Nations and how such devastation reinforced the devastating and violent intergenerational material effects of settler colonial logics and its futurities (Tuck & Gaztambide- Fernández, 2013). Early European cartographers rendered depopulated Indigenous settlements and territories as blank space. “Pervasive settler assumptions, backed by the colonial state” mapped out and programmed settler futurities where Indigenous Peoples were doomed to disappear while their use of land was deemed wasteful and inefficient and “therefore should be replaced” (p. 186). Such settler colonial curricular programming fueled a differential calculus of dispossession, that still informs intergenerational relations between Indigenous and non-Indigenous Canadian citizens, the land, oceans, lakes, air, and more-than-human kin. Ironically, many of these settlers were in effect fleeing the “rhetoric of dispossession” that closed off the commons, or the customary right to use and live off the land, to European peasants (Marzec, 2007). The only land these Europeans typically had access to at home were crofts, which, “like reserves, were small spaces for the dispossessed,” or those perceived to be “lazy, filthy, improvident people who did not know how to use the land properly” (Harris, 2020, p. 189). These crofts were not sufficient to support life, breeding disease, malnutrition, and abject poverty. The prospect of owning land therefore meant that, for imperial interests and individual European settlers alike, “colonial settings [like Turtle Island] provided fresh opportunities for the expansion of exclusive property rights and the [European] market economy” (p. 189). Indeed, once Indigenous populations were dispossessed of their lands and often forcefully displaced onto reserves (Thompson & Suzuki, 2022), the settler colonial algorithm continued to advance its work (Hao, 2022).

Despite treaties, to “Canadian officials, the widespread occupation of reserves had another benefit: it greatly facilitated their control of the treaty population” (Daschuk, 2019, p. 181). The government could withhold food and other support to quash any protests, including during the rise of the residential schooling system and the subsequent abduction of generations of First Nations children. This politics (or curriculum) of starvation (Daschuk, 2019) arguably endures in how Canada relates to Indigenous Peoples today, with ingrained systemic anti-Indigenous racism and inequitable funding and disregarded treaty obligations to, and relations with, First Nations contributing to ongoing issues of clean drinking water, health care, settler government-contested land claims, inequitable access to education and child welfare services (Blackstock, 2007;

Howell & Ng-A-Fook, 2023). Meanwhile, the settler colonial state and its extractive capitalist allies continue to benefit from the land and its exploitation, continually transforming once-complex, “finely worked-out Indigenous understandings of place and land” into settler property (Harris, 2020, p. 23). In fact, the same algorithmic curriculum, its settler colonial artificial intelligence, is inscribed and scarred onto the land itself.

In corollary to a curriculum of Indigenous dispossession, a narrative of settler possession is etched across the land as an historical text (Banivanua Mar, 2012; Donald, 2012). Although never complete, this algorithm continues to attempt overwriting the socioecological relationships different Indigenous communities have maintained with the land since time immemorial (Simpson and Bagelman, 2018). “Settler landscapes therefore ratify dispossession in spatial ways, constantly affirming metanarratives of *terra nullius*, the fatal impact and extinguishment of Indigenous entitlement by tides of History” (Banivanua Mar, 2012, p. 176). Agriculture, in particular, is a critical nexus that maintains futurities of an “insatiable dynamic” whereby “settler colonialism always needs more land” (Wolfe, 2006, p. 395). In Wolfe’s (2006) analysis of settler colonial logics, he points out that agriculture anchors settler identity to land while denying Indigenous relations. As it is “inherently sedentary and, therefore, permanent,” agriculture “is a rational means/end calculus that is geared to vouchsafing its own reproduction, generating capital that projects into a future where it repeats itself” (Wolfe, 2006, p. 395). This is not to say that Indigenous Peoples had or have no agricultural knowledge or practices. Rather, with “its life-sustaining connectedness to land, [agriculture has become] a potent symbol of settler-colonial identity” that simultaneously rationalizes the “progressive” appropriation of Indigenous territory, turning “native flora and fauna into a dwindling resource and [curtailing] the reproduction of Indigenous modes of production” (pp. 395-96). Land becomes transformed into a “socio-symbolic space [in close] proximity to the settler self” in which settlers see themselves as the rightful overseers of land use, essentializing, racializing, and naturalizing hierarchies of who and who does not have access to growing food (Rotz, 2017, p. 158).

A settler colonial algorithm dreams up, manifests, and maps out its correlated futurities as a manifest destiny not only in how it historically divides, allots, and transforms land into property with particular owners and particular economic purposes, but also in how it works on defining the productive vitality and reductive utility of the land and its ecologies. In/deed, settler colonialism seeps not only into our political ecologies but also our physical ecologies as well. It is worth noting that early European

colonization of Turtle Island in the 15th century killed so many Indigenous People that the climate changed in response (Brant-Birioukov, 2021). An estimated 54 million hectares of Indigenous foodways were depopulated and succumbed to regrowth of trees and other vegetation, resulting in so much carbon dioxide being removed from the atmosphere that it triggered what Amos (2019) has called that century's global 'Little Ice Age.' Although it is only a passing reference by Daschuk (2019), it is further worth noting that early "extirpation of furbearers and large game changed the ecology of many regions [of Turtle Island] for decades if not forever," hastening dependence on settler farming and state welfare and severely fragmenting finely-tuned, sustainable Indigenous relationships to land and food production (p. xxxii). Later and ongoing settler cereal breeding would genetically engineer species like wheat so that it could conquer, for settlers, even more Indigenous territory, while native species like wild rice were reduced to ornamental plants (Anderson, 2018). For the first time in more than three decades since its inception, the United Nation's Intergovernmental Panel on Climate Change (IPCC) mentioned the term "colonialism" in a 2022 report — an acknowledgment that colonialism has and continues to be a driver of the global climate crisis (Raja, 2022) — even seemingly benign settler movements like environmentalism maintain the same settler algorithmic assumptions of land.

For Reibold (2023), these assumptions permeate the mental, cultural, and physical geography of mainstream settler colonial societies, including the discourses and practices of environmentalism and sustainability. Reibold terms this marked geography as "Western settler ethnogeography" (p. 624). An ethnogeography, Reibold (2023) explains, is "a culturally specific conception of land which comprises two elements: an ontology of land and specific land-use patterns in which the land ontology is materialized" (p. 625). The output of the settler colonial algorithm, a settler ethnogeography is thus a material expression of settler relationships with land, including how it is valued, used, and cared for (or not), and whose understandings of land infuse our environmental futurities. Importantly, an ethnogeography materializes when it has the power, as Reibold (2023) suggests, to interpolate members of a culture into participating in it within their daily lives. For Indigenous Peoples, imposition of a settler ethnogeography firstly serves to obstruct meaningful redress of other colonial injustices, such as loss of land and self-determination. Even in the guise of "benevolent" environmentalism and climate awareness, a settler ethnogeography creates "universalizing and silencing" perceptions of the world, such as the 'Anthropocene' (McEwan, 2021, p. 77). The progressive concept

of the Anthropocene — the notion that we are in an era in which the human race is responsible for global-scale degradation of the climate and environment — recognizes human involvement yet simultaneously instills “the notion that an essential human nature has created the current crisis. This ignores the role of systems, such as colonialism, capitalism, and patriarchy, that a small minority of humans created” (McEwan, 2021, p. 77). This politics of recognition enfold the future of the Earth into a settler colonial enterprise, positioning Western settler society as the saviors of the planet (Coulthard, 2014).

Such a settler colonial ethical and ecological limitation of thought and action (Stein, 2019) belies what Papaschase Cree scholar Dwayne Donald (2015) terms the “Great Forgetting.” In effect, colonialism and disciplinary Eurocentric Enlightenment thinking have necessitated that we forget how to be human, in relation to one another and the more-than-human world. Donald urges curriculum scholars and educators to “contest curricular conceptions of human being-ness” derived from market logic and “the divisive competitiveness that metastasizes from it” — the “North American settler dream imaginary” that has “slowly morphed into a curriculum mythology and ideology that promotes the market as a concept through which all forms of human living can and should be understood” (p. 102). As Donald continues, this “dream-way manifests itself as a naturalized, universalized, and common sense logic that has come to have tremendous influence over public education curriculum initiatives in mostly subtle ways” (p. 103). Before considering Donald’s (2015) call to embrace “a large-scale ‘letting go’ of myopically anthropocentric understandings of life and living and instead promote an educational project committed to acknowledging and honoring the complex connectivities that human beings have to the abundant more-than-human entities that live amongst us” (pp. 102-3), we next turn to certain curricular conceptions that have maintained denials of human relatedness and which are presently being encoded into our futurities of artificial intelligence.

A Settler Curricular Algorithm of Eugenics

Rather than condemn these tools as inherently eugenicist, I seek to understand the tools’ limitations and possibilities by engaging their logic.

(Hui Kyong Chun, 2021, p. 25)

In 1978, educational historian Steven Selden prompted his readers to ask about the originating “social mind” of curriculum, what shaped “the ideational landscape during the period that gave rise to the curriculum field,” or, “What were this period’s generative ideas? its metaphors? its world view?” (p. 68). As fellow educational historian Ann Gibson Winfield (2007) notes, for the “first six decades of the twentieth century, political and social discourse in the United States was dominated by an ideology that relegated the vast majority of the human race to imbecility, declaring that only those of Nordic ancestry were worthy of survival” (p. xvii). During this same period Selden questions, “hundreds of Americans were denied the right to reproduce as a result of forced sterilization, marriage restriction, and institutionalization” (p. xvii). For Selden and Winfield, this formative ideology is eugenics: a set of beliefs and practices that emerged in the late 19th and early 20th centuries, through which its advocates aimed to enhance and improve the genetic quality of certain human populations. It is based on discriminatory notions that certain heritable traits, such as intelligence, physical attributes, or moral characteristics, can be selectively promoted or suppressed through controlled breeding and social interventions. During this period, curriculum thought across North America would be infused by seemingly “naturalistic” notions of human difference to the point that eugenics might be called one of the foundational paradigms of curriculum as a practice and field of study (Selden, 1978). Such pseudoscientific ideology added to “hegemonic social constructions of merit, race and disability” across culture and education (Selden, 2000, p. 235). Coalescing with and extending the colonial imagination, hierarchical notions of race and human worth, guided by early theories of evolution, “coupled with a growing interest in colonial populations and mostly celebratory attitudes towards European imperial expansion set the stage for the acceptance of eugenics” (Levine, 2010, p. 43). As a settler-colonial algorithm, we can trace its lasting influence on educational thought in both direct and subtle ways.

The educational history of eugenics can be analyzed and understood as an algorithmic socially engineered curriculum with lasting influences (Popenici, 2022). Here we focus in particular on its educational history — from the broadly construed to the specific — in what some of us now call Canada. In post-confederacy Canada, according to historian James Douglas Belshaw (2015), support for eugenics emerged from the spreading conditions of the settler state and its ethnogeography. With settler colonial populations becoming increasingly concentrated in city centers, the effects of working and living in these urban environments were recognized as deleterious to the health of

most poor citizens. Instead of addressing these (capitalist, colonial) conditions, eugenics proponents advanced the concern that, if left uncontrolled, those deemed unfit for these modern conditions would propagate a genetically “weak” population. At the same time, early social and pseudoscientific constructions of mental health fitness cast those with such disabilities as a liability to be managed, first through special schools for the so-called mentally defective, and later through forced sterilization practices (Belshaw, 2015). Institutionalization, either through city asylum, prison, or school effectively limited the reproductive rights of those deemed worthless to the progress of the settler state — and as a white supremacist state. Changing immigration patterns brought peoples who did not map onto the settler algorithmic racial ideal and who needed to be algorithmically managed. Those deemed “unassimilable” and so threats to the long-term racial hygiene of the settler state could be controlled through institutionalization (Belshaw, 2015).

Forced sterilization practices in the United States and Canada concretized this settler colonial logic, and, in particular, focused on control of their enduring and still-resilient Indigenous populations, including their lasting kinship relations (Leason, 2021). In Canada, the provinces of British Columbia (1933 to 1973) and Alberta (1928 to 1972) passed Sexual Sterilization Acts which were not repealed until the 1970s. These laws made it possible for a government-appointed board of eugenics to order the sterilization of any individual deemed likely to perpetuate an undesirable trait through reproduction. These laws disproportionately affected Indigenous Peoples, suggesting a persistent settler colonial and genocidal algorithmic bias (Leason, 2021; Stote, 2015). Moreover, such laws and practices coincided with a growing Indigenous population in the United States and Canada following the second world war, and arguably extended settler state projects of control and extinguishment begun by early exploration, settlement, and state and Church-run institutions such as the Industrial Schools in the United States and the Residential Schools in Canada (Pegoraro, 2015). As Howell and Ng-A-Fook (2022) examine, many settler citizens still (mis)understand these institutions to have been “beneficial” for both Indigenous Peoples and their settler colonial nation.

We suggest that this is because a eugenic algorithmic thinking has been perennially embedded in our curricula as a “master narrative” of human-beingness (Kelly et al., 2021). In turn, this master narrative combines settler colonial logics with contemporary state-sponsored policies of control and hierarchy: narrow ideas of what it means to be human, which are becoming increasingly narrow over time; tools and instruments, including standardized testing, that objectify and deny bodily experiences and reinscribe Eurocentric value-laden notions of human worth; hierarchical control of knowledge; and the immutability of differences as a justification for continued racial

sorting of populations deemed a threat to a mostly-white nation (Mohamed et al., 2020; Snell, 2003). Kelly et al. (2021) note, as we have suggested throughout this paper, that this narrative formed alongside settlers' forced inscription of land use and values. Here in Ontario, Kelly and colleagues elsewhere (2022) demonstrate through archival research that the teaching programs of Ontario universities included both explicit and implicit eugenics content. Canadian teaching and learning institutions have, then, arguably been involved in the transfer of such dangerous knowledges and narratives since settler schooling began on these lands. For example, consider the following excerpt from the Ontario Ministry of Education (Minister of Education for Ontario, 1915) training manual created for teachers studying at Ontario Normal Schools:

Since education aims largely to increase the effectiveness of the moral conduct of the child by adding to the value of his experience, the science of education must decide the basis on which the educator is to select experiences that possess such a value in directing conduct. Now a study of the progress of a nation's civilization will show that this advancement is brought about through the gradual interpretation of the resources at the nation's command, and the turning of these resources to the attainment of human ends. Thus, there is gradually built up a community, or race, experience, in which the materials of the physical, economic, political, moral, and religious life are organized and brought under control. By this means is constituted a body of race experience, the value of which has been tested in its direct application to the needs of the social life of the community. It is from the more typical forms of this social, or race, experience that education draws the experience, or problems, for the educative process. In other words, through education, the experiences of the child are so reconstructed that he is put in possession of the more typical and more valuable forms of race experience, and thus rendered more efficient in his conduct, or action (p. 21).

Through curricula, as Winfield (2007) reminds us, "definitions about race, ability and human worth, provided by race theorists from the nineteenth century, entered into the public vernacular and, subsequently, the collective memory of our nation[s]" (p. 217). Eugenics, as Winfield stresses, "provided American [and Canadian] culture with the justificatory tools in the form of testing and classification schemes. Finally, eugenic

ideology satisfied the apologetic element of culture by redefining civic duty and virtue such that they reified the inherent assumption regarding human worth” (p. 217). Today, to reduce health care costs, “large health care systems in the USA,” select “potential vendors” as Mohamed et al. (2020) warn, “for algorithmic screening tools at the expense of other values such as addressing inequities in the health system” (p. 662). Such algorithm screenings are then used to predict “an individual’s health expenses (defined as total healthcare expenditure) indirectly leading to the rejection of African-American patients at a higher rate relative to white patients, denying care to patients in need, and exacerbating structural inequities” (p. 662). Algorithms of settler eugenics remain deeply embedded in our curricular futurities.

Unsettling Algorithms of Our Futurities

In sum, to prevent the AI apocalypse we need most importantly—as Ariella Aïsha Azoulay has eloquently argued—to “unlearn” the temporality and the colonial logics that undergird our archives.

(Hui Kyong Chun, 2021, p. 254)

Deeper yet, we thus forget that the statistical logics of our digital algorithmic lives were born of the same settler colonial eugenic logics. Hui Kyong Chun (2021) recounts how the logics of modern statistics and data analytics, which power the algorithms and architecture of our digitized scholarship, “have evolved from those of eugenics [and] both are social and historical products” which segregate knowledges and peoples (p. 71). In response, Noble (2018) calls for us to draw on a Black feminist intersectional lens to disrupt logistical coding and decoding of existing “normalized” everyday contexts, reminding us that our algorithmic, digital scholarly lives tend to “socialize us into believing that [algorithms offer] access to credible, accurate information that is depoliticized and neutral” (p. 25). Meanwhile, opportunities for curriculum theorists and developers to engage with the deeply encoded racist legacies of genetics remain limited (Gouvea, 2022), let alone how these algorithms are carried into our digital spaces and lives. The curriculum of algorithms thus seeps deep into our collective material, historical, and psychic consciousness.

Taking “a first step in bringing together the literature on intelligence testing, eugenics and colonialism from a range of disciplines with that on the ethics and societal

impact of AI,” Stephen Cave (2020) of the [Leverhulme Centre for the Future of Intelligence](#) offers an insightful assessment of the concept of intelligence itself as a value-laden cipher (p. 29). Specifically, Cave deconstructs the historical and lasting use of intelligence as a means of legitimating racial, gendered, social, political, and economic hierarchies within and across societies — a use that artificial intelligence is arguably being deployed for in the present. More precisely as a Western ideological construct, intelligence has been used to justify the values and material dominance of those in power since ancient Greece, “[naturalizing] and [normalizing] these power relations, and [doing] so based on claims about mental aptitude,” including dichotomies of master and slave (p. 30). Cave contrasts this with the millennia of Christian ideological dominance in Europe, when power was justified more through divinely inherited right than intelligence. Ironically, intelligence as a measure of worth and ‘natural’ dominance hierarchies re-emerged during the Enlightenment, where new republics needed sociopolitical justification for their logics of rule, now based on seemingly natural merit. Simultaneous “was the need to provide a moral and intellectual justification for aggressive colonial expansion from Europe, with its associated conquest, pillage, and enslavement” (p. 30). This “matrix of domination” (Collins, 1990) therefore “deployed conceptions of intellectual rank to legitimate exploitation of both nature and those ‘races’ considered to be in a state of nature; while this very technological capacity to exploit was in turn part of the proof of intellectual superiority” (Cave, 2020, p. 31). Through eugenics-informed standardized testing culture which endures to this day — the American SAT, for example, was designed to keep universities as white and economically elite as possible — intelligence as a measure of worth and justification remains fetishized in how artificial intelligence is developed, promoted, and deployed (Cave, 2020).

How might we then, as curriculum theorists, understand AI in terms of its curricular algorithms as we stretch its definitions in relation to historical and contemporary ongoing settler colonial correlational assumptions of natural merit and hierarchical ordering of the world and its peoples (see Miller, 2022)? AI ethicist Timnit Gebru, who was fired by Google for refusing to withdraw an as-yet unpublished paper about the dangers of Large Language Models — the type of algorithmic nexuses that power much of the presently emerging excitement about generative AI such as ChatGPT — writes on the prevalence and mechanisms of harmful algorithmic intelligence (Artandi, 2023). These models represent a trend in the development of AI towards AGI — or artificial general intelligence. A mature AGI would, theoretically, be able to

complete any task asked of it, in effect functioning as a superintelligence. Dangerously, however, this ostensibly utopian tool would be based on the biased data and state of those who originally created it. As Gebru (2020) outlines, these generalized models are already causing harm, from sexist job applicant screening AIs to racially profiling crime mapping and face recognition applications. Based on fallible data, these algorithmic entities create feedback loops of bias and discrimination, amplifying the assumptions encoded in their training data (Hui Kyong Chun, 2021). When, in effect, we accept the output of AI as objectively neutral, we also tend to assume its superiority and inevitably. Cave (2020) demonstrates this assumption in the popular fear of a sentient AGI — we fear sentient software because we believe we would be subordinate to it as an inferior race or species. Whether current AI or future AGI, the trustworthiness of the output of algorithms is self-ascribed in its “easily consumed slurry” of crushed, “clean *white* bone[s] of truth” (Thorp, 2021, p. 168, emphasis added).

In addition to the enduring algorithms of settler colonialism, eugenics-informed high-stakes testing, academic streaming, and imperial logics embedded in how we engage in scholarly activities and values, the curriculum of algorithmic general intelligence continues to infuse education and schooling in ways that suggest the future, widespread acceptance of AI and genetic algorithmic logics as necessary yet unchallenged. Sabatello et al. (2021) note that the concept of “precision education,” or tailored curricula based on genetic profiling of students, is gaining traction in the United States. The ethical dilemma that has yet to be resolved is how such historically marginalizing practices can be reconciled with the fear that, if not pursued, the presently marginalized will be further left behind in our ostensibly inevitable AI and genetic algorithmic futurities. More generally, our algorithmic futures appear caught in a paradox: “both believing race to be a tool to elucidate human diversity and believing that race is a poorly defined marker for that diversity” (Yudell et al., 2016, p. 565). As Yudell et al. (2016) argue, this paradox cannot be solved with more technology. Yet, opportunities for teachers and students to learn about the social and cultural dimensions of genomics remain limited (Gouvea, 2022). Meanwhile, in the practice and teaching of AI across fields and our contemporary human experience, the importance of ethics is rarely considered part of the emerging discourse on “AI literacy” publicly (Ng et al., 2021), in K-12 school settings, teacher education, and/or the workplace (Hagendorff, 2020). The dominant curriculum of AI now calls forth its necessity and tacit acceptance that it will somehow solve its own dilemmas.

As AI ethicist Rachel Adams (2021) thus asserts, “it does not go far enough to restate that AI is having a racializing effect, or that its ubiquitous power throughout the world is hegemonic and neo-imperialistic” (p. 190). Adams instead asks:

If colonial modes of power over and dividing practices of racism are being re-instituted through AI behind the veil of technocracy, what is the precise form of this re-institution of race and colonialism? How can AI be located within the *longue durée* of colonialism and race? (p. 190)

Adams contends that our futurities of AI are based on Eurocentric and Anthropocentric notions of world domination by humans, and neo-Darwinian assumptions that those who do not fit into this future are not worthy of it. Instead, “recognizing that the undoing of coloniality was always a possibility of the original event of conquest—that it always could have been otherwise—simultaneously reinforces the possibility of different futures to come” (p. 191). In other words, we are not bound by the settler colonial futurities our present algorithms suggest and that we assume are inevitable. As human beings, how might we remember pre-colonial relationships in relation to reimagining the future of what AI, and ourselves, might become? “To speak of decolonizing AI,” therefore, “not only then contains the imperative to collectively reimagine a multifarious world space and ask whether AI can be ascribed a role within, and conducive to, this new imagining—but also to be imaginative enough to conceive of a future without AI” as we presently conceive it (p. 191). As curriculum theorists, then, how might we unlearn and learn with and from Indigenous conceptions of their futurities in relation to an AI ethics that might lead us toward more responsible, culturally relational, and inclusive decolonial countering curricula and their respective algorithms?

Countering Curricula as Counter-Algorithmic and Counter-Genetic Futurities

We go to the school and they leach the dreams from where our ancestors hid them, in the honeycombs of slushy marrow buried in our bones. And us? Well, we join our ancestors, hoping we left enough dreams behind for the next generation to stumble across.

(Dimaline, 2017, p. 90)

Futures are out there to be imagined together. Indeed, as Choctaw poet, fiction writer, filmmaker, and playwright LeAnne Howe (2002) suggests, “Even if worse comes to worst and our people forget where we left our stories, the birds will remember and bring them back to us” (p. 47). While Howe speaks about the kinship between Choctaw Peoples, birds, and their shared stories, she implicates a sense of kinship and memory that endures outside but is yet accessible to individual human bodies. Elsewhere, Howe (1999) contends that embedded in the narratives of our North American settler colonial nation-states are Indigenous lessons from which we still draw and through which we yet identify ourselves as “Canadian.” Howe retells how Indigenous Peoples of the Americas related to the first settlers through a shared sense of narrative. The stories shared with settlers inevitably created what some now understand as the countries of the United States and Canada, from agricultural abundance to confederation — the latter of which was learned by settlers from examples such as the Iroquois Confederacy (Howe, 1999). The oral traditions of these stories were both literacies of intergenerational knowledge and future-shaping transformation (Lear, 2006). Since first contact, then, settlers have learned from Indigenous stories, albeit while not always fully understanding or respecting their power. Through Indigenous literatures that continue to not only survive but also thrive and evolve, settlers, including curriculum scholars, have an opportunity to unlearn and relearn.

Unsurprisingly, then, Daniel Heath Justice (2018) quotes Howe in his preface to *Why Indigenous Literatures Matter*. For Justice, the heart of Indigenous literatures is a relational power, for they help “bridge the gap of human imagination between one another, between other human communities, and between us and other-than-human beings. Fundamentally, they affirm Indigenous presence—and our present” (p. xix). At the same time, however, such Indigenous literature and its respective literacies “articulate lived truths and imaginative possibilities through spoken, written, and inscribed forms and project them into a meaningful future” (p. xviii). This is critical to a project such as curriculum studies, as such literacies, contemporarily, “are at least as concerned with developing or articulating relationships with, among, and between Indigenous readers as they are with communicating our humanity to colonial society, if not more so” (p. xix). Critically, “these literary works offer us insight and sometimes helpful pathways for maintaining, rebuilding, or even simply establishing these meaningful connections” (p. xix). Of particular interest to this essay is Justice’s (2018)

concept of “wonderworks” which gesture “imperfectly, toward other ways of being in the world, and [remind] us that the way things are is not how they have always been, nor is it how they must be” (p. 152). The relational questions that Justice sees at the heart of Indigenous literatures — How do we learn to be human? How do we become good relatives? How do we become good ancestors? How do we learn to live together? — are part of a futuristic, countering, storying curriculum. In this last section of our essay, then, we engage in a curriculum of critical futurism through reading the voices of Indigenous literature (Phillips, 2021). We read closely and relate insights from Métis author Cherie Dimaline’s *The Marrow Thieves* (2017) as a curriculum of counter-settler algorithmic and counter-genetic futurities. We conclude with prompts and wonderings for students and scholars of curriculum studies to (re)consider in their own lives and practices.

A common reading of *The Marrow Thieves* reveals a plot that explores the struggle for survival in a harsh world and themes of cultural survival through to cultural thriving, resurgence, affirmation of one’s identity, and the enduring strength of Indigenous communities and their different relational ways of knowing and being in the face of adversity. A closer reading reveals a piece of Indigenous critical futurism in direct dialogue with genetic and algorithmic imaginaries. A seemingly young adult dystopian speculative fiction novel, the story is set in a near future where humanity has been devastated by a cataclysmic event that has not only decimated the settler capitalist way of life in what we call Canada, but also caused most non-Indigenous people to lose the ability to dream. In turn, the loss of dreams leads to madness and death. However, settler states find zealous hope within the slushy marrow buried within the bones of Indigenous Peoples, which they believe, when extracted and consumed, will bestow the ability to dream again. Repeating the horrors of Canada’s history of the residential schooling system, Indigenous Peoples are constantly pursued by ruthless and relentless government agents known as Recruiters, who capture and bring Indigenous Peoples to special “schools,” a thinly veiled front for a program of murder and extraction. The novel follows a young Indigenous teenager named Frenchie, who is on the run with a group of fellow — in the sense that they share a situation, rather than genetic relation — Indigenous Peoples. Throughout their journey, the group faces numerous challenges and hardships. They forge strong bonds with each other, forming a makeshift family that teaches each other an intergenerational countering curriculum through storying their relations with each other and the more-human-world.

Arguably, this sense of family — or kinship — runs deeper than the algorithms in which we currently find ourselves enmeshed. Of course, *The Marrow Thieves* is also a critique of contemporary notions of truth and reconciliation education here in Canada. As Saravanamuttu (2022) notes, the implications of Dimaline’s critical future demand “nothing less than parity of status between Indigenous nations and settler communities” (para. 3). Here Saravanamuttu (2022) quotes Dimaline (2017):

[Proponents of reconciliation] had this crazy notion that there was goodness left, that someone, somewhere would see just how insane this whole school thing was. That they could dialogue. That they could explain the system had to die and a new one had to be built in its place. Like that wasn’t scarier to those still in the system than all the dreamlessness and desert wastelands in the world. (p. 141)

Frenchie and his newfound kin learn that at the end of a settler capitalist world, while on the run, they can find each other, reconnect, and share their stories of humanness—harm, joy, humor, loss, and love—with each other. *The Marrow Thieves* offers its intended adolescent readers a critique of settler colonial capitalism. Dimaline’s protagonist fills in the reader of the novel’s backstory: “[Settlers] visited their head doctors—psychiatrists—and they took pills to help them sleep when they stopped having the will lie down at night. Soon they turned on each other, and the world changed again” (p. 29). However, the story’s criticality transcends critique of the present and instead gestures towards a generative future in which relations are not quantified and hierarchized.

Indeed, Pravinchandra (2021) argues that “Dimaline counters the fixed ideas of biological relatedness increasingly expressed by genetic inheritance” and the algorithmic logics of identity based on race, blood, and DNA (p. 138). Pravinchandra thus reads *The Marrow Thieves* as a work of counter-genetic thinking which challenges dominant conceptions and futurities of relatedness and self-determination for Indigenous Peoples. These futurities are presently under threat from multinational and corporate genomics projects that seek to extract, classify, and measure human differences based on genetics. “Human population diversity research,” as Pravinchandra (2021) warns, “effectively redefines Indigeneity in genetic terms. One of the more insidious problems this move causes is that some of the most common tests used to determine indigeneity [...] are so narrow that most Indigenous Peoples, many of whom are indeed ‘admixed,’ simply will

not possess it” (p. 137). Such genetic algorithmic epistemologies effectively project a settler futurity which, like the early mapping of Turtle Island, assumes that Indigenous Peoples are destined to vanish — this time, for example, through genetic admixture and algorithms that sort out a precise human identity with a tailored insured health plan. At the same time, settler individuals now leverage dubious claims to Indigenous identity by way of genetic ancestry tests to secure social, economic, and political advantages. As in Dimaline’s story, once mapped onto genetics, identity reinscribes settler assumptions of human (and more than human) worth and identity as hierarchized settler colonial nation-state capitalist for-profit commodity.

We would add here that this critique of human beingness — indeed life in general — as algorithmic epistemologies implicate not only Indigenous and non-Indigenous human futurities on this planet, but also the future of how the more-than-human, including AI, is conceived. As Justice (2010) argues, “Indigeness is not ethnic difference; it is both cultural and political distinctiveness, defined by land-based genealogical connections and obligations to human and nonhuman bonds of kinship” (p. 250). Throughout *The Marrow Thieves*, characters unlearn and relearn not only what it means to be kin but also a human being. Early on his journey, the protagonist Frenchie encounters hungry feral pets, and realizes that they are in the same situation as he is, feeling kinship even amongst dread; later, he encounters large game animals, learning to honor their being. Once in his found family, he and other members of his group begin to unlearn poisonous epistemic notions of relatedness amongst themselves and with the more-than-human world, from animal kinships and treaties to spirit and dreaming. Their pre-disaster identities begin to feel like myth, as they try to remind themselves of deeper truths, “of things [they] couldn’t quite remember but that [they] knew to be true” (Dimaline, 2017, p. 21). They cherish the group’s de-facto Elder, Minerva, who teaches them the stories and language of the land — indeed, to live and relate through Story. Along the way, they enact their own resurgence of being, learning to think, live, and relate as human beings in direct contrast to the ways that the settler dystopia around them demands. As the leader of their group, Miigwans, reminds Frenchie: everyone “tells their own coming-to story. That’s the rule. Everyone’s creation story is their own” (pp. 78-79). The group’s relational understanding of identity, kinship, and belonging opens the future to anyone willing to live in a good way together as relatives.

In the novel’s conclusion, the hope and possibilities of counter-algorithmic and counter-genetic futurities are embodied in the characters in ways that are yet non-

essentializing — through their differing actions and ways of relating. When the Recruiters manage to capture Minerva, the group’s Elder, the clergy running the ‘school’ attempt to extract her bone marrow. Once strapped into the extraction machine, Minerva sings a traditional song. Minerva’s song resonates through her bones deeper than the marrow, until she overloads the machine and its networked systems with a surge, a resurgence, of dream and spirit. Minerva’s defiant sacrifice causes the facility to explode and melt down in the face of a power — or intergenerational relational intelligence — incommensurate with its settler colonial technologies. Frenchie learns that “as long as there are dreamers left, there will never be want for a dream” (p. 231). The curricular message here is that dreaming and relating in good ways are not bound to the ways in which we are presently sorted and filtered by settler colonial algorithmic logics.

The future of our algorithmic lives is, for us as curriculum theorists and others, uncertain at this time. We do not yet know if sentient AGI will emerge out of present-day projects to develop artificial intelligence. We do not even know how such entities might fit into how we presently relate to other lifeforms and each other (Harris and Anthis, 2021). We do know, however, that our planet’s biosphere is under direct threat, and that our present settler algorithms and intelligences of relation are not sustainable. As curriculum theorists and human beings, we know that we need a new story to live and learn by (Donald, 2021). In response, we propose a curriculum of counter-settler algorithmic and counter-genetic dreaming. Dreaming as unlearning here is to imagine differently how our futurities might emerge despite present-day limitations on being. Dreaming, too, can be a political act — in that we can choose to dream alongside those whose knowledges and ways of relating to the world offer us pathways of unlearning settler algorithmic assumptions of what AI and our entangled futures might become. We can bring these dreams to our curriculum theorizing and teaching, and our own lives. In Ontario, Indigenous and non-Indigenous teachers and students are now studying such Indigenous literature and futurities as part of the Grade 11 English course *Contemporary First Nations, Métis, and Inuit Voices*.¹ This is a small step, we suggest, toward designing and enacting a countering curriculum.

¹ In addition to programmed inclusion of truth and then reconciliation education initiatives in schools and teaching through Indigenous literature, Ontario curriculum now includes dedicated courses in First Nations, Métis, and Inuit studies at the high school level. These courses stress historical and contemporary “exploration of Indigenous cultures, ways of knowing, and contributions to society [as] therefore essential for students as the global citizens and problem solvers of tomorrow” (Ontario Ministry of Education, 2019, p. 7). While the preceding quotation suggests a problematic framing of such history and knowledge

What part might we play as curriculum theorists? How might we continue, as curriculum scholars, to dream of post-settler decolonizing algorithms that are designed to address the historical injustices and power imbalances that have arisen from colonialism and settler colonialism? Such dreaming, its futurities, call on us to prioritize relational forms of epistemic justice in our algorithmic curricular designs. Our future use of large language model-based chatbots such as but not limited to ChatGTP and/or Pi, would be explicitly designed and leveraged in our school curriculum to undo the legacies of colonialism and settler colonialism. To do so would involve recognizing and rectifying historical injustices, returning control and resources to Indigenous Peoples, and challenging the dominant narratives and perspectives that continue to perpetuate settler colonial ideologies across the K-12 and higher education curriculum. Such post-settler colonial dreaming would also prioritize and acknowledge the implications of data sovereignty when conducting research in collaboration with different Indigenous communities here in Canada and elsewhere (Caballar, 2023; Kukutai & Taylor, 2016). Critically and even further, as Lewis et al. (2018) make clear in *Making Kin with the Machines*, “we will resist reduction by working with our Indigenous and non-Indigenous relations to open up our imaginations and dream widely and radically about what our relationships to AI might be” (p. 15). We contend that this begins to answer the questions raised through our readings of Adams’s (2021) work on what a decolonial AI future might become – a curriculum of what Wendy Hui Kyong Chun (2021) calls “responsible AI,” or what we might call a relational AI imaginary. Shifting machine learning into machine *unlearning*, AI input, and perhaps future emerging AI entities can yet “become probing and speculative—and thus responsible in the richest sense of this word” (p. 253). Responsible AI, its ethical algorithmic (core)relational inputs (1s and 0s), thus includes a rejection of assumptions and training of AI as technological tools—or slaves—to a single, human narrative of progress and mastery. In other words, we must further consider the development of AI as the dreaming into being and nurturing of future *kin*, and in so doing draw on and honor the knowledges and ways of being that have always understood mutually interdependent and respectful relationships between the animate and inanimate, human and nonhuman (Chun, 2021).

In turn, as curriculum scholars, makers of curriculum, how might we create relations and join conversations that seek to ensure that the future of AGI and its

through a Western imaginary of progress, we nevertheless see these developments as openings for teachers to enact curriculum differently.

applications seek to minimize and eliminate harmful biases, discrimination, and systemic inequalities, which are often rooted in settler colonial histories? We leave readers and ourselves to take up this question, as well as these other potential curriculum inquiries: In what ways do our every day and curricular assumptions of land and the more-than-human world contribute to our limitations of future dreaming, and how might we challenge these logics? How are we unsettling (or not) Eurocentric, Enlightenment notions of intelligence and worth in our theorizing, teaching, and living? What if the basis of AI development were relational, spiritual, and empathetic? How might we ensure that a countering curriculum is part of the iterative auditing and improving an algorithm's contributions to our futurities? If sentient AI or AGI emerges, how will we as curriculum theorists and colleagues treat such entities? What futures and for whom are implicated by our scholarly and educative practices?

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