

Digital Colonization and Virtual Indigeneity: Indigenous Knowledge and Algorithm Bias

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Digital Colonization and Virtual Indigeneity: Indigenous Knowledge and Algorithm Bias

A growing body of research examining the role of technology in indigenous knowledge production and distribution has helped define the new ways that communities are connecting to each other and organizing around the world. At the same time, social justice activist focus in the United States has turned to the underlying infrastructure of the internet and the ways in which it may in fact hinder these connections, not the least due to the amply documented “filter bubble” which delivers content supporting one’s own existing opinion and may prevent alternate and minority voices from being seen or heard. In an environment where nascent artificial intelligence Twitter bots can become white supremacists within hours, where auto-generated tags classify photos of African Americans as gorillas and where searching Google for “Latina lesbian” delivers only pornography, what exactly does a self-determined representation for any minority group look like online? This paper will examine how we got here and what projects are currently underway to resist the dominant racial classification hierarchies online that help feed algorithm bias. By pulling together two areas of scholarship (online indigenous networks and anticolonial algorithm critique) in the context of current projects giving indigenous communities control over the terms of access to their own web-based cultural production, I hope to suggest alternate ways to think about online information discovery in terms of social justice.

I. “Can the internet be indigenized?”

In November of this year Mikaela Jade, a developer with Indigital Media, an Australian indigenous media company, was notified by Apple that her company's new app, Indigital Storytelling, had not been approved for inclusion in the iTunes store.¹ The augmented reality app was designed to function within the space of indigenous cultural specificities by using the phone's camera to recognize sites of indigenous significance. When a user is in the presence of such a site, a video of an oral history with a community elder begins to play, providing the user with context-specific knowledge detailing the cultural importance of the place to the history of the community. The app functions even without access to the internet, an acknowledgment of the realities of technological barriers to access in remote areas. The developers of the app are careful to note in their documentation that community elders (known as Senior Traditional Owners on Country) had requested that augmented reality features such as the oral histories be limited to those on-site. This app concept follows from Indigital's mission to "ensure Indigenous Peoples' have access to developing cutting edge, safe, affordable, quality digital engagement that is appropriate to our social, cultural and economic needs."² What reason did Apple have for denying the request, even after Google's iTunes counterpart for Android phones had launched the app to acclaim? According to Mikaela Jade, Apple found the app's usefulness to be "limited." After the press gave attention to the story, Apple reversed course and the app continues to be available for download.³

This example is one of many in the larger story of colonial thinking as expressed through technological change, as well as one of the anti-colonial resistance responses of indigenous

¹ Breen, Jacqueline. 1100a. "Apple Rejection of Indigenous App a Symptom of 'Digital Colonisation'." *ABC News - Australia*, 2016-11-17 <http://www.abc.net.au/news/2016-11-17/apple-drops-indigenous-app-creator-warns-of-digital-colonisation/8032904>.

² "Indigital: Culture. in Digital." Indigital: Culture. In Digital., accessed Dec 13, 2016, <http://www.indigital.net.au>.

³ Breen, Jacqueline. "Apple to Publish Indigenous App After Questioning its Usefulness." *ABC News - Australia*. 2016-11-18 <http://www.abc.net.au/news/2016-11-18/apple-to-publish-indigenous-app-after-questioning-its-usefulness/8037246>.

peoples around the world. The story speaks to the barriers to access to contemporary tools of communication that exist at multiple levels throughout the technological infrastructure, including those through which individuals access the internet. These barriers include access to hardware and the education to make the most of its potential, access to the internet, and language barriers including but not limited to the fact that html, the very language of web-based text display, is English. The story of Indigital's experience further touches on issues related to cultural imperialism as represented by the business models originating in the global north which govern the visibility of minority-produced content on the web locally and worldwide. The internet is often perceived as connecting the world in such a way that renders one's physical location irrelevant, however Christian Sandvig neatly describes the contradiction this poses for indigenous peoples the world over: "The state of indigeneity, in contrast, is a continual assertion of place..."⁴ He notes also that pushes towards digitally preserving and providing open access to the world's knowledge is similarly problematic: "from a Native perspective the interconnection of knowledge is not read as neutral—it is read as extraction of valuable knowledge for use by others without compensation or control."⁵

However, in some cases, the perception of indigenous peoples by funding agencies may necessitate a change in rhetoric in order to receive the same level of access assumed for everyone else. Government agencies and nonprofit organizations mounting efforts to expand access to the internet to local indigenous communities regularly turn to the rhetoric of educational and economic value as the justification for the investment, tacitly confirming the sense that providing basic internet services that are available everywhere else requires a special and morally sound

⁴ Sandvig, C. 2013. "Connection at ewiiaapaayp mountain: Indigenous internet infrastructure." In *Race after the Internet*, Lisa Nakamura and Peter Chow-White, eds. Taylor and Francis, 2013: 178.

⁵ *Ibid.*: 185.

impetus when extended to indigenous peoples. A typical example of this can be seen in a 2013 newspaper article about infrastructure enhancement in Chiapas in which Jesús Caridad Aguilar Muñoz, head of the Oficina de Asesores de la Secretaría estatal de Educación in Chiapas explains that “el internet ha llegado a las comunidades indígenas para inducir su desarrollo, educación y comercio de productos naturales...”⁶ This logic and vocabulary may then be appropriated and strategically used by indigenous people themselves. Sandvig points to an example where the goal of education (“uplift”) and cultural preservation is presented by native internet users themselves specifically as a way to re-position their relationship to technology for the purposes of being seen by funding agencies as a good bet for investment:

Again, undoubtedly Punky is right when she says that the Internet is used to “better yourself,” but what is fascinating here is the moral burden—the requirement for utility—that subsidized Internet has put on Indian users. As mentioned above, providing Internet access here is one of the most difficult challenges in Internet provision anywhere. To justify their expensive and heavily subsidized use of the Internet they must perform difference—they must act like disadvantaged Indians who seek uplift and the preservation of their culture, despite the fact that (just as it was in Michaels’s account of the Warlpiri), they may be more interested in MySpace or soccer games.⁷

In Chiapas, the group *ciudadan@s chiapas 2.0* includes in its list of priorities, a bullet point urging the “promoción de la cultura libre” without critically examining the issue of extraction and cultural appropriation of indigenous knowledges.⁸ As Kimberly Christen notes,

The unstated privilege ... is presumed without acknowledging that the cultural reservoir from which these projects pull is inevitably a public domain replete with information/signs unhinged

⁶ Velasco Castañeda, Heriberto. 2013. "Destacan importancia de internet en etnias Chiapaneca." *SinEmbargo MX*, Aug 15, n.p. <http://www.sinembargo.mx/15-08-2013/720909>. n.p.

⁷ Sandvig, C. 2013. “Connection”: 185.

⁸ "Iniciativa Internet." *ciudadan@s chiapas 2.0.*, accessed Dec 12, 2016, <https://ciudadanoschiapas.wordpress.com/iniciativa-internet/>.

from the oppressive structures and regimes that defined them as “open.” The commons has never been open to all; in fact it has always relied on exclusions to maintain its appeal to the “public”⁹

Extending the infrastructure of the internet to indigenous communities is wrapped up in developmentalist rhetoric which requires these groups to publicly define themselves in the terms of funding bodies in order to secure the conditions for their own self-determination in the digital environment. By this logic, colonized peoples secure rights and services by appealing to funders through language asserting not that they are inherently worthy of equity, but that they are entitled because they are compliant with externally developed moral expectations, an argument reminiscent of the drug-testing requirements imposed by some U.S. states on welfare recipients. These stories parallel the one told by Mikaela Jade about Indigital Storytelling, underscoring the ways in which the challenges confronting indigenous technology access is framed by a rhetoric of colonization at every level. They speak to Lisa Nakamura and Peter Chow-White’s assertion that

...the Internet and other computer-based technologies are complex topographies of power and privilege, made up of walled communities, new (plat)forms of economic and technological exclusion, and both new and old styles of race as code, interaction, and image.¹⁰

Wendy Hui Kyong Chun, too, notes the importance of race in contemporary constructions of power through technology, reminding us of the “‘scenes of empowerment’ that flooded the airwaves in the mid- to late-1990s—conflations of racial and technological empowerment that argued that technology would eradicate racial difference.”¹¹ Jessie Daniels has observed that

⁹ Christen, Kimberly. (2007). "The politics of search: archival accountability in aboriginal Australia." Paper presented at *MIT5: Media in Transition 5 Conference*, Apr 28, <http://web.mit.edu/comm-forum/mit5/papers/Christen.pdf>: 5.

¹⁰ Nakamura, L. and P. Chow-White. 2012. “Introduction.” In *Race After the Internet*, edited by Lisa Nakamura, Peter Chow-White. New York: Routledge: 17.

¹¹ Hui Kyong Chun, W. 2012. “Race and/as technology, or how to do things to race.” In *Race After the Internet*, edited by Lisa Nakamura, Peter Chow-White. New York: Routledge.: 50.

“For the most part, the burden of noticing race on the Internet has been left to ‘minority participants,’ that is, to researchers who are people of color.”¹²

These observations provide a crucial framework for understanding rhetoric surrounding access to the internet by indigenous peoples, suggesting that the dominant logic of technological infrastructure development is perhaps a proxy for cultural erasure. This is not to say, of course, that there is something inherently problematic in the extension of internet access to all. It simply highlights the importance of the question posed by Kyra Landzelius in her article “Paths of Indigenous Cyber-Activism”: “Can the internet be indigenized?”¹³

To answer this question requires looking at how the politics of physical technological infrastructure development and access plays out in indigenous communities, how the “digital divide”/“brecha digital” logic may hinder efforts towards equity of access in the long run, and how contemporary business models of information distribution on the web perform a gatekeeping role that is particularly notable in the context of content produced by communities of minority language speakers and those who live in rural and remote regions.

II

Indigenous Infrastructure and the Digital Divide/Brecha Digital

Questions surrounding access to the physical infrastructure for telecommunications have often been framed as part of the “digital divide” conversation. In this section I show that although this rhetoric is acknowledged to be flawed and rests upon racialized and gendered operations, it is nonetheless, as in the above examples, used by indigenous communities in order to obtain greater access when the rhetoric of equity has proven ineffectual. The digital divide

¹² Daniels, J. 2013. *Race and Racism in Internet Studies: A Review and Critique*. *New Media & Society* 15(5): 707.

¹³ Landzelius, K. 2003. "Paths of Indigenous Cyber-Activism." *Indigenous Affairs* 2: 7.

rhetoric has also proven useful to some indigenous women when seeking equitable access to the tools of communication within their own communities.

La Brecha Digital and Emancipatory Participation

The Digital Divide/Brecha Digital has been thoroughly critiqued in the literature of internet studies. Peruvian scholar Eduardo Villanueva Mansilla asks the question “¿bajo qué criterios vale la pena juzgar el acceso a la tecnología, y ultimadamente, la brecha digital?” and puts the digital divide into the context of technological determinism, noting:

La tecnología tiene un potencial transformativo, pero las prácticas sociales no desaparecen porque se cuente con un medio con potencial, a pesar de la insistencia en el determinismo tecnológico, compartida por muchos promotores de la brecha digital, cultivadores de las “mitologías digitales” (Valovic, 2000). Para ello, el cambio es institucional o directamente estructural, y aumentar el acceso a la tecnología no tiene que producir este cambio. Discutir la brecha digital como una problemática de acceso es pues, irrelevante y banal.¹⁴

Selwyn, summarizing Burgelman, notes that “concepts such as ‘universal access’ and the digital divide, grounded as they are in primarily economic judgements, are ‘simplistic, formalistic and thus idealistic’”¹⁵ Jessie Daniels brings our attention to the racialized and gendered notions that form the foundational logic of the digital divide conversation:

“Once again, affluent white men (to vastly simply) and their habits of access and use end up being the standard against which everyone else is measured, so that when there’s any difference from that pattern, it ends up getting read as “bad” or pathological somehow. The framework of “digital divide” also encourages us to assume that certain categories of people (everyone other than white males) are somehow less technologically adept.”¹⁶

¹⁴ Villanueva, E. 2005. “Brecha Digital: Descartando un Término Equívoco.” Paper presented at III Congreso Panamericano de Comunicación, Buenos Aires, julio.

<http://www.razonypalabra.org.mx/antecedentes/n51/evillanueva.html>: n.p.

¹⁵ Selwyn, N. 2004. “Reconsidering political and popular understandings of the digital divide.” *New Media & Society* 6(3): 345.

¹⁶ Mims, C. 2012. “There is no Digital Divide.” *MIT Technology Review*, May 31., <https://www.technologyreview.com/s/428043/there-is-no-digital-divide/>: n.p.

This list of myths used in digital divide rhetoric can all be viewed as falling under the umbrella of one of the more commonly held myths, singled out by Villanueva Mansilla, which is that bridging the divide will result in a “modelo democrático de educación, que facilita el acceso a la misma a todas las personas. Educación / formación para todos.”¹⁷ This myth in particular is problematic in the context of indigenous communities, as it suggests that technological access is a magic bullet of sorts, with which the entire legacy of colonialism will be rendered irrelevant. It further follows that those communities resisting technology adoption in the prescribed way are perceived to be actively working against their own education and citizenship formation. Mixed as it is with the logic of economic productivity and citizenship as wholly linked concepts, the digital divide framework stands in as a replacement for granting equity on humanist grounds. While this can still bring short term gains (as seen in examples in the Section I of this article) it is not ideal as a long term strategy to secure access to desired technology for indigenous communities. A better framework can be found in the UN Secretariat’s 2012 statement on access to the internet as a human right: “By vastly expanding the capacity of individuals to enjoy their right to freedom of opinion and expression, which is an “enabler” of other human rights, the Internet boosts economic, social and political development, and contributes to the progress of humankind as a whole.”¹⁸ This statement uses similar developmental arguments, but couches them in an understanding of rights. Economic productivity is *only possible* once online freedom of opinion and expression are enjoyed. The statement asserts that access should be guaranteed not because of what individuals could productively do with the technology, rather that they are

¹⁷ Cabrera Almenada, J. 2004. “Reflexiones sobre la brecha digital y la educación.” In *Tecnología, educación y diversidad: retos y realidades de la inclusión digital*, Soto, F. y Rodríguez, J., eds. Murcia, Consejería de Educación y Cultura <http://tecnologiaedu.us.es/cuestionario/bibliovir/brecha.pdf>: 2.

¹⁸ Human Rights Council, United Nations. “The promotion, protection and enjoyment of human rights on the Internet.” A/HRC/32/L.20: https://www.article19.org/data/files/Internet_Statement_Adopted.pdf

deserving in and of themselves as individuals. This is a crucial and substantive shift in the narrative that gives it value in conversations over the how and why to expand internet access. It effectively denies state actors the ability to give technology with one hand while taking recognition with the other, which may be the net result of investments couched in the logic of bridging the digital divide.

Infrastructure Development Outside the Digital Divide

There is a voluminous literature on telecommunication infrastructure development by and for indigenous communities, much of which details how communities negotiate securing the substantial investment necessary to secure connections in remote areas. This negotiation often requires participating in the digital divide logic, but what about those examples that successfully sidestep this potentially damaging paradigm?

Christian Sandvig details one such example in his essay “Connection at Ewiiapaayp Mountain.” On the Southern California Native American lands where he conducted his research, even basic telephone service was widely unavailable and only 3 of 18 reservations had broadband infrastructure at all, partly due to a history of neglect from the Federal Government and partly due to cultural specificities of tribal sovereignty. He noted that land buying and selling was not possible on reservations and that there were also barriers to digging on reservation property. These translate into disincentives to investment by major telecom companies who are already loath to build infrastructure in remote areas where costs are high and a large customer base is not assumed. In one case he describes, the tribe ended up mounting an extraordinary effort to construct its own high speed internet infrastructure, after receiving funds attached to a grant at a nearby university. As noted by one of the native architects of the project to build what became known as Tribal Digital Village (TDV):

You know, we were stuck on Indian reservations in the worst part of the counties. Well, guess what? Haha! We've got all the mountaintops and now we can create this cool wireless network that nobody thought we could do.¹⁹

The TDV infrastructure was wholly owned and operated by the community itself meaning that, outside the initial grant (written by a scientist looking to enhance network infrastructure near the university for the sharing of scientific environmental data), the tribe didn't need to involve itself in the "performance of Indian" to secure approval over their own technological self-determination.

Other indigenous communities have solved the infrastructure access problem by creating their own telecommunications service in partnership with NGOs funded by major internet corporations.²⁰ These communities don't always use their telecom service to support an internet connection; rather, communications in some of these indigenous communities are handled through mass texts. One would imagine that this eliminates the problem of algorithm bias (discussed below) entirely. However, these network expansions have been underwritten by large internet companies like Facebook and Google, who recognize the need to get more people online in order to increase their market share. As noted by Rhisomatica, a non profit organization helping indigenous communities in Mexico get connected,

Perhaps, in some round-about way, it does make sense for these big companies to underwrite the construction of new networks. Yet the proposition is a scary one. Imagine the control these companies have and continue to amass when they not only control the content platforms but the physical infrastructure over which data is transported as well.²¹

¹⁹ Sandval, C. "Connection": 176.

²⁰ Santillán, Ernesto. 2016. "Indígenas Tendrán Su Propia Red De Internet Y Celular." *Cultura Colectiva*, Jul 29,. <http://culturacolectiva.com/telecomunicaciones-indigenas/>

²¹ Rhisomatica. 2016. *Connectivity for the Unconnected: A Double Bind // Rhisomatica*. <https://www.rhisomatica.org/connectivity-for-the-unconnected-a-double-bind/>: n.p.

The author goes on to show how dangerous it may be to open up these communities to new forms of surveillance and control, particularly in areas of political unrest. Where once the internet was about peer-to-peer sharing, it is now comprised largely media platforms whereby information is delivered based on parameters supporting a business model that rewards advertising dollars as measured through exposure and clicks. It is easy to see how this structure could be utilized to suppress indigenous activism and organizing where it conflicts with either corporate or government priorities. The true scope of the problem is framed this way:

Unless we radically re-imagine networks: how they are built, managed and how people engage with them, there seems to be no way that pursuing increased connectivity doesn't also do a whole lot of harm both directly and indirectly to the people it is meant to help.

Further, the questions of access to technology, the infrastructure of that technology and gender cannot be separated. Scholars have long documented a lower participation rate in the computer technology among indigenous women than men, and when women do have access to computers, they may have been denied appropriate training.²² As noted by Delgado and Becker, women have frequently been prevented from obtaining necessary competencies in the use of computers and as a result their voices may go unheard. They note:

Indigenous websites have, for the most part, failed to include indigenous women. While women have gained stronger representation in indigenous organizations, their opportunities to work with electronic equipment has been circumscribed. Thus, women's voices on the Internet are very limited and access to resources that would facilitate their training continue to be scarce.²³

²² Allende, Hernandez, O. and A.I. Zanfrillo. 2013. "Digital divide in indigenous women of the Mixtec region." Barcelona, July 1-3. *Proceedings of the 5th International Conference on Education and New Learning Technologies*: 2320-2325.

²³ Delgado, Guillermo and Marc Becker. 1998. "Latin America: The Internet and Indigenous Texts." *Cultural Survival Quarterly* 21 (4): <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/latin-america-internet-and-indigenous-texts>: n.p.

III

Algorithmic Gatekeeping and Indigenous Communications

“Despite early developments which indicated that computer networks might prove to be a democratizing influence, it now threatens to become another tool in which the elite use to dominate society and exclude indigenous peoples from political discourse. Today, those with access to telephone lines and PCs are indeed experiencing certain privileges, and those without access are becoming increasingly marginalized.”²⁴

Indigenous communities today may have greater access to the physical technology and meaningful education in how to make use of it, but the barriers do not cease once indigenous-produced content is published the web. Unless the issues surrounding algorithm bias are addressed, little will have changed from this assessment made nearly 20 years ago. The rise of importance of algorithms that perform a gatekeeper role for information online in effect continues to build the same barriers to access that have plagued these communities under colonial structures. For this reason, the utility of the digital divide argument is limited because the business model of online visibility as represented through algorithmic decisions will always place subordinate cultures at a disadvantage. Access is more than simply having and using existing technology, rather it is having an infrastructure that is content neutral.

While there is a large body of literature about digital projects created by and for indigenous communities, no research specifically connecting the issue of Latin American indigenous-produced online content and algorithm bias could be located by the author of this paper; therefore more general literature involving minority content online and algorithm bias was

²⁴ Ibid.: n.p.

chosen to provide context relating to the challenges faced by Latin American indigenous online content visibility and distribution.²⁵

But first a definition of algorithm bias and why it is important to include in the discussion of technology access: Algorithm bias is the result of human-written computer instructions that themselves contain bias, as well as machine learning processes that learn bias from content that suffers from the same bias. Several real-life examples of contemporary algorithm bias involving race and sexuality were included in the introduction of this article. The most famous of these examples is Tay, the Twitter bot created by Microsoft. Tay was an expression of a sophisticated machine learning algorithm that created a personality and communication style based on previous interactions with humans on Twitter. It took less than 24 hours for Tay to begin expressing white supremacist sentiments, due to the nature of tweets directed its way by others. The algorithm simply made Tay a reflection of its surroundings and interactions, which served only to recreate dominant conditions: garbage in garbage out. Another example not mentioned previously is documented by Latanya Sweeney, a researcher at Harvard in her article “Discrimination in Online Ad Delivery.”²⁶ Sweeney shows that Google searches for names correlated with African American heritage are more likely to display advertisements suggesting the person had a prison record, than for searches of names not associated with African Americans. Studies such as this are common in the United States, but none have yet been published looking at these types of bias and discrimination in the context of indigenous peoples and knowledge online. Still, other questions may be raised and answered in the absence of these studies.

²⁵ By minority content I don't mean numbers of individuals in the real world, rather I am referring to those situations where the amount of content produced for the web by those communities is a minority of all available content.

²⁶ Sweeney L. 2013. “Discrimination in Online Ad Delivery.” *Communications of the ACM*,56(5): 44-54.

One of these questions involves the impact of the business models of search engines and other gatekeeping platforms on the visibility of indigenous web production. Some concerns arise when thinking about the relationship of content volume to content visibility. Even in regions across the Americas where indigenous peoples are majority populations, without the clear path to infrastructure availability and an incentive to use it for content creation and distribution, the material created by and for other indigenous peoples will always suffer from a de-prioritized visibility. Authority (and therefore the visibility ranking) of a website is determined algorithmically by search engines, taking into account a number of factors that leave some communities at a perpetual disadvantage. These factors include slow website loading speed (a chronic problem in remote areas lacking physical infrastructure for quality servers), insufficient metadata (audio/visual media, which is a popular form of indigenous cultural production found on the web, is particularly likely to be lacking metadata descriptive enough to be machine-read and understood by a search engine), number of incoming links (for those communities with smaller numbers of individuals online, this is a real barrier to search engine visibility - in short, one must already be somewhat popular to receive appropriate consideration for inclusion on top search results pages), and language of the website.

This last factor is of particular note to indigenous-produced content. Machine learning algorithms use the existing digitized corpus of a language to continually maintain an up-to-date inventory of individual words, the forms each word can take, and their synonyms or related words. This helps search engines deliver relevant content even when the exact words typed into the search box do not match on a relevant web document. However, the corpora of indigenous languages is not always well-defined or in a machine-readable format and cannot therefore be

used by search engines for ranking purposes.²⁷ In these cases, search engine algorithms will rely entirely on the content that is already on the web. This simply means that the less content that is already there, the poorer the relevancy treatment it will receive. The bias of search engine algorithms may therefore reinforce the lower visibility of indigenous content created outside majority content parameters.

One solution to these problems is to put more content in indigenous languages online, a proposal supported by *ciudadan@s chiapas 2.0*. Contributing to Wikipedia is a good example of how this can be accomplished for a couple of reasons. The first is the site's existing visibility and authority as measured by usage. But it is also an excellent source for language corpora due to the large number of direct article translations that can be used to train machine learning algorithms for their enhancement. The project already includes a number of indigenous language sites. The Quechua-language Wikipedia (qu.wikipedia.org), for example, contains over 19,000 separate entries. However the site suffers due to the lack of available/interested Quechua-speaking contributors, prompting the editors to attempt to remedy the problem through this call for help:

Actualmente una de las mayores carencias de la Wikipedia Quechua es la escasa prosa en los artículos, para remediar esto se ha creado esta lista de **frases útiles** para que usuarios que no sepan quechua puedan emplearlas en los artículos.²⁸

This effort will certainly bear fruit, not only for the visibility of Wikipedia pages in Quechua, but for all content in Quechua on the web due to the utility of Wikipedia as a corpus for machine learning.

²⁷ The process of creating and maintaining a quality language corpus is extraordinarily labor intensive work for linguists. See this project on the revisions to a major Spanish language corpus currently underway at Brigham Young University: <http://corpus.byu.edu/neh2015.asp>

²⁸ "Wikipidiya:Kusaq rimasqakuna." https://qu.wikipedia.org/wiki/Wikipidiya:Kusaq_rimasqakuna Accessed Dec 9 2016.

However, this potential solution is only part of the larger problem, which is that the very idea of indigenous production as a site for knowledge extraction in bulk by tools in the global north remains problematic. A promising move towards addressing those concerns can be found in a project called Local Contexts (<http://www.localcontexts.org>), which helps cultural institutions crowdsource from indigenous communities themselves the local contexts tagging of their digitized cultural production. The project creates partnerships between cultural institutions distributing indigenous production online and the communities from which they originated, and allows those communities to provide Traditional Knowledge Labels (TK Labels) to enhance context and understanding of those digital materials. From the project site:

The TK Labels are a tool for Native, First Nations, Aboriginal and Indigenous communities to add existing local protocols for access and use to recorded cultural heritage that is digitally circulating outside community contexts. The TK Labels offer an educative and informational strategy to help non-community users of this cultural heritage understand its importance and significance to the communities from where it derives and continues to have meaning.²⁹

A project such as this one aims to give control over the terms of online access to indigenous knowledge and production to the indigenous communities themselves. While it is not specifically a solution to problems of algorithm bias, it provides a framework for thinking about how to work within the existing models of digital distribution from an indigenous perspective. As these TK Labels are adopted and used by cultural institutions with algorithmic authority to search engines (the .org domain is well-placed in current relevancy ranking algorithms, as is site longevity) the vocabulary self-determined by indigenous communities will itself gain algorithmic authority and therefore visibility online. This is a perverse victory, of course, as it demonstrates that successfully inserting decolonial practices into online communications may in some cases

²⁹ “Traditional Knowledge Labels.” *Local Contexts 2.0*. <http://www.localcontexts.org/tk-labels/>

require the assistance of institutions that may in the not so distant past have been complicit in colonial extractive practices.

An additional promising project called Digital Indígena frames itself this way:

“ O trabalho realizado hoje avança no sentido de garantir aos povos indígenas as condições de conhecimento tecnológico para que eles mesmos possam criar o conhecimento que consideram necessário para compartilhar com a nação brasileira. É um trabalho de mediação entre o estado e as comunidades, através de políticas sociais, mas que garante total autonomia dos povos indígenas quanto aos temas discutidos e propostas de audiovisual.”³⁰

This group provides Guarani youth in Brazil with the audiovisual equipment and education to use it, for the purposes of creating digital documentaries by and of their own communities. Each community chooses the theme of the film themselves, with an eye towards sharing it with the country online for the purpose of cultural relationship building and mutual respect. The films are all made accessible through the project site, preventing them from being shared out of context.

The value of each of these three projects as well as the Indigital augmented reality app project mentioned at the beginning of this paper is that they reflect the fruits of re-theorizing indigenous production in the context of globalization on the web. They assert the value of cultural specificity and control over access to traditional knowledges, and therefore resist commodification and appropriation.

Conclusions

This essay has attempted to lay out the practical and theoretical politics impacting the visibility of content produced by indigenous communities for web distribution. The issue of access to technology is primary, and although rapid gains are realized every year across the Americas, much work remains. Highlighted here were some of the contradictory rationales

³⁰ “Indígena Digital.” <http://www.iela.ufsc.br/ind%C3%ADgena-digital>

utilized to gain access to infrastructure investment, including problematic racialized and gendered rhetoric surrounding the concept of the digital divide and the implementation of infrastructure development. A broad approach was taken and any further study would need to be grounded in specificity through field work, which lies outside the scope of this paper.³¹ Given the scope of the challenges to online indigenous self-determination, none of the promising projects described in the final section can individually fully address the structural problems related to development, distribution and visibility for indigenous digital content. However there is value in viewing them together, as each tackles a different piece of the puzzle. They may not point a clear way forward, but they demonstrate the context-specific thinking taking place in indigenous communities around the complex inclusion/exclusion mechanisms of the internet.

³¹ Examining the digital organizing work done as part of the Dakota Access Pipeline resistance could be a next step in this project.

Bibliography

- Allende, Hernandez, O. and A.I. Zanfrillo. 2013. "Digital divide in indigenous women of the Mixtec region." Barcelona, July 1-3. *Proceedings of the 5th International Conference on Education and New Learning Technologies*: 2320-2325.
- Breen, Jacqueline. 2016. "Apple Rejection of Indigenous App a Symptom of 'Digital Colonisation'." *ABC News - Australia*, Nov 17. <http://www.abc.net.au/news/2016-11-17/apple-drops-indigenous-app-creator-warns-of-digital-colonisation/8032904>: n.p.
- . "2016. Apple to Publish Indigenous App After Questioning its Usefulness." *ABC News – Australia*, Nov 18 <http://www.abc.net.au/news/2016-11-18/apple-to-publish-indigenous-app-after-questioning-its-usefulness/8037246>: n.p.
- Cabrera Almenada, J. 2004. "Reflexiones sobre la brecha digital y la educación." In *Tecnología, educación y diversidad: retos y realidades de la inclusión digital*, Soto, F. y Rodriguez, J., eds. Murcia, Consejería de Educación y Cultura <http://tecnologiaedu.us.es/cuestionario/bibliovir/brecha.pdf>: 1-24
- Christen, Kimberly. 2007. "The politics of search: Archival accountability in aboriginal Australia." Paper presented at *MIT5: Media in Transition 5 Conference*, Apr 28, <http://web.mit.edu/comm-forum/mit5/papers/Christen.pdf>: 1-22.
- ciudadan@s chiapas 2.0. "Iniciativa Internet." accessed Dec 12, 2016, <https://ciudadanoschiapas.wordpress.com/iniciativa-internet/>.
- Daniels, Jessie. "Race and Racism in Internet Studies: A Review and Critique." *New Media & Society*.15.5 (August 2013): 695-719.
- Delgado, Guillermo and Marc Becker. 1998. "Latin America: The Internet and Indigenous Texts." *Cultural Survival Quarterly* 21 (4): <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/latin-america-internet-and-indigenous-texts>: n.p
- Hui Kyong Chun, Wendy. 2012. "Race and/as technology, or how to do things to race." In *Race After the Internet*, edited by Lisa Nakamura, Peter Chow-White. New York: Routledge.: 38-60

Human Rights Council, United Nations. "The promotion, protection and enjoyment of human rights on the Internet." A/HRC/32/L.20: https://www.article19.org/data/files/Internet_Statement_Adopted.pdf.

Indigital: Culture. In Digital. "Indígena Digital." <http://www.iela.ufsc.br/ind%C3%ADgena-digital..> accessed Dec 13, 2016, <http://www.indigital.net.au>.

Landzelius, Kyra. "Paths of Indigenous Cyber-Activism." *Indigenous affairs* 2 (2003): 6-13.

Mims, C. 2012. "There is no Digital Divide." *MIT Technology Review*, May 31, <https://www.technologyreview.com/s/428043/there-is-no-digital-divide/>: n.p.

Nakamura, L. and P. Chow-White. 2012. "Introduction." In *Race After the Internet*, edited by Lisa Nakamura, Peter Chow-White. New York: Routledge: 1-18.

Rhisomatica. 2016. *Connectivity for the Unconnected: A Double Bind // Rhizomatica*. <https://www.rhisomatica.org/connectivity-for-the-unconnected-a-double-bind/>: n.p.

Sandvig, C. 2013. "Connection at ewiiaapaayp mountain: Indigenous internet infrastructure." In *Race after the Internet*, Lisa Nakamura and Peter Chow-White, eds. Taylor and Francis, 2013: 168-200.

Santillán, Ernesto. 2016. "Indígenas Tendrán Su Propia Red De Internet Y Celular." *Cultura Colectiva*, Jul 29, <http://culturacolectiva.com/telecomunicaciones-indigenas/>: n.p.

Selwyn, N. 2004. "Reconsidering political and popular understandings of the digital divide." *New Media & Society* 6(3): 345.

Sweeney L. 2013. "Discrimination in Online Ad Delivery." *Communications of the ACM*, 56(5): 44-54.

"Traditional Knowledge Labels." *Local Contexts 2.0*. <http://www.localcontexts.org/tk-labels/>.

Velasco Castañeda, Heriberto. 2013. "Destacan Importancia De Internet En Etnias Chiapaneca." *SinEmbargo MX*, Aug 15, n.p. <http://www.sinembargo.mx/15-08-2013/720909>. n.p.

Villanueva, E. 2005. "Brecha Digital: Descartando un Término Equívoco." Paper presented at III Congreso Panamericano de Comunicación, Buenos Aires, julio: n.p. <http://www.razonypalabra.org.mx/anteriores/n51/evillanueva.html>: n.p.

"Wikipidiya:Kusaq rimasqakuna." https://qu.wikipedia.org/wiki/Wikipidiya:Kusaq_rimasqakuna Accessed Dec 9 2016.