"Indigenous Technical Literacies and Data Sovereignty:
Some Problems in the History of Science and Digital Humanities"

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Scholars of mining and metallurgy in the early Americas confront a deep methodological challenge in our work: we know from census records and tribute tallies that Indigenous and mixed-race miners represented the majority of the workforce in the 16th and 17th centuries, but because these mining women and men did not leave evidence of their experiences written in their own hands, and in their own languages, we know little about their technical and scientific contributions to one of the largest and most lucrative colonial scientific industries – an industry that shaped the history of world trade and globalization.[1]

Because silver was worth nearly twice as much in East Asia as it was in Europe, relative to gold, Iberian merchants extracted silver from the Americas, shipped it to China, and used profits from favorable bimetallic trade rates to buy and sell people and goods in Africa and Europe. For the first time in human history, people in Asia, Africa, Europe, and the Americas were knit into global exchanges of goods, ideas, and services, orchestrated and facilitated by Spanish imperial economic, jurisdictional, legal, and religious frameworks.[2]

[1] Modesto Bargalló, *La minería y la metalurgia en la América española durante la época colonial* (México, D.F.: Fondo de Cultura Económica, 1955) and *La amalgamación de los minerales de plata en hispanoamérica colonial* (México, D.F.: Compañía Fundidora de Fierro y Acero de Monterrey, 1969); Julio Sánchez Gómez, *De minería, metalúrgica y comercio de metales: la minería no férrica en el reino de Castilla, 1450-1610*; 3 vols, v. 1 (Salamanca: Universidad de Salamanca, 1989); Peter Bakewell, *Miners of the Red Mountain*: *Indian Labor in Potosí, 1545-1650* (Albuquerque, NM: University of New Mexico Press, 1984) and *Silver Mining and Society in Colonial Mexico: Zacatecas 1546-1700* (Cambridge: Cambridge University Press, 1971).

[2] Dennis Owen Flynn and Arturo Giráldez, *Metals and Monies in an Emerging Global Economy* (Aldershot: Ashgate), 1997, xix-xxii; Flynn and Giráldez, "Born with a 'Silver Spoon': The Origin of World Trade in 1571," *Journal of World History* 6.2 (1995): 201–21. See also Earl J. Hamilton, "Spanish Banking Schemes before 1700," *Journal of Political Economy* 57.2 (1949): 134-156; Akinobu Kuroda, "What was Silver *Tael* System? A Mistake of China as Silver 'Standard' Country," *Moneta*, ed. Georges Depeyerot, Catherine Brégianni, and Marina Kovalchuk (Wetteren: Agence Nationale de la Recherche-Dépréciation de l'Argent Monétaire et relations Intérnationales, 2013), 391-399; John TePaske, A *New World of Gold and Silver*, ed. Kendall Brown (Boston: Brill, 2010).

In other words, American silver played a major role in world history, and Indigenous miners and metallurgists played a major role in the silver industry. And yet we know little of their technical, scientific, and intellectual contributions. Without books written in languages like Quechua, Aimara, or Nahuatl, we have not been able to document the movement of ideas in the same way that we have charted silver output and labor units. What I'd like to suggest today is drawn from chapters 8 and 9 of my book, *Cultural Touchstones: Mining, Refining, and the Languages of Empire in the Early Americas* (Omohundro Institute of Early American History and Culture for the University of North Carolina Press, in press), and it offers one way of addressing this methodological challenge. Other ways of documenting the history of ideas and exchanges of information in the early modern era are sure to emerge from this conference, and I am eager to brainstorm solutions together.

Sometime in the 1550s, merchant Bartolomé de Medina (1497?-1585) left his wife, children, and business in Sevilla and departed for New Spain. Upon arriving in Pachuca around 1553, he began to experiment with a new method of metallurgical processing. A German man in Spain had told him that it was possible to cheaply extract silver without smelting or refining. In Pachuca, Medina built an elaborate refining complex (*hacienda de minas*) around the mine of Purísima Grande.

By settling on Pachuca, Medina capitalized on Mexica imperial networks of laborers, experts, and trade routes. Archaeological data on Postclassic Mesoamerica (1200-1530 CE) shows that between 90 and 98 percent of obsidian traded in Mexica markets in Tenochtitlán went through Pachuca. According to a Spanish-language *relación* of 1580, and its accompanying pictorial map of Zempoala, about 22 kilometers south of Pachuca, the region was home to three main indigenous communities: Nahuas, who controlled most of the land and extracted tribute

payments from Otomís, the largest group; and Chichimecas, who were displaced by Nahuas but still held some uncultivated lands.[3] Early colonial records suggest that the first tribute miners were probably Otomís who formed approximately 65% of the population and had a long history of being drafted into Mexica imperial tribute systems.[4] In other words, Medina's choice of Pachuca was no accident.

Medina's "patio" method, so named because refiners mixed metals on sun-drenched patios to reduce heating costs, was a ten-step process. In the 1570s, the technology was transferred to Peru by experts who traveled with the support of viceroy Francisco de Toledo (1515-1582), who was eager to expand production in Potosí. When refiners processed silver using traditional methods of smelting, whether in *hornos castellanos* or Andean wind ovens, called *guairachinas*, they used exorbitant amounts of wood. This was a costly material in the arid environment of Potosí. Furthermore, some mixed-metallic ores, especially those with large proportions of sulfur, antimony, iron, and copper, were too difficult to separate silver from base metals and chemical elements. In contrast, by using mercury as a reagent to extract silver particles, refiners could profitably separate it from even the most refractory ores – and they could do so with minimal costs. Even if *un quintal* (100 pounds of earth removed from a mine) yielded only an ounce and a half of silver, refiners could still turn a profit.[5]

But with the different metallic mixtures and colder ambient temperatures of the Andes, metallurgists had to adapt the Mexican patio method to local conditions. One key change came in the fifth step of the amalgamation method. Instead of adding mercury all at once, they

[3] Karl W. Butzer and Barbara J. Williams, "Addendum: Three Indigenous Maps from New Spain Dated Ca. 1580," *Annals of the Association of American Geographers* 82.3 (1992): 536–542, 540-541.
[4] Jesús Ruvalcaba Mercado, "Agricultura colonial temprana y transformación social en Tepeapulco y Tulancingo (1521-1610)," *Historia Mexicana* 33.4 (1984): 424–444, 426, 433.
[5] Bakewell, *Silver Mining and Society in Colonial Mexico*, 138.

incorporated it in two rounds so that it would absorb more of the silver and form less sediment along the bottom of the mixing bin. Mercury is much heavier than silver. Today, we express that difference using atomic mass (Hg = 200 u; Ag = 107 u). Colonial refiners did not have spectrometer technologies or mathematical definitions like Avogadro's law, but they knew metallic weights from experience. As one miner explained the importance of adding mercury in two rounds, "y mientras mas fuere menos conchos se causaràn" (and the more you do it fewer sediment [*conchos*] will be produced).[6] The term "conchos" is a clue that we can use as evidence of Indigenous knowledge production.

In Spanish, the word for "sediment" is *heces* or *asientos* (Diccionario de la Real Academia Española). But here, Andalucian priest Álvaro Alonso Barba (1569-1662) does not use the Spanish expression. Instead, he uses a Hispanized form of the Quechua term *qqunchu*, what he writes as "conchos." In this way, Barba records a moment in which Indigenous refiners left a linguistic footprint upon amalgamation technologies as they were practiced in the Andes.[7] Had Spanish-speaking miners developed the two-stage incorporation technique, they presumably would have named it with their own vocabulary. They certainly named and claimed things that they did not invent, so it seems safe to say that they would have branded their idea as such.

Translators of Barba's book struggled to understand neologisms like "conchos." In 1670, in a work so popular that it sold out within four years, necessitating another print run, English translator Edward Montagu (1625-1672), who lost his life commanding a fleet in the Third Anglo-Dutch war (1672-1674) instructed his readers that if they added mercury in two rounds,

[6] Barba, *Arte de los Metales en qve se enseña el veradero beneficio de los de oro, y plata por açogue* (Madrid: Imprenta Real, 1640), 53v. Making of the Modern World Electronic Database.
[7] González Holguin, *Vocabulario de la lengua general de todo el Peru*, 67.

"fewer inequalities like Oyster shells will be produced."[8] Six years later, German author Johann Lange translated Montagu's "Oyster shells" into "Auster-Schalen."[9] Montagu's interpretation of "concho" as a printer's error for "concha" occurs at the same time that English completed what linguist Anne Curzan calls the long history of the gender shift. In turn, Montagu's book became the source text for subsequent translators, like Lange, whose work was reprinted by the Pietist community of Ephrata, Pennsylvania, in an edition that became part of George Washington's library. These events suggest how the power and prestige of languages – or, rather, the perception of such prestige – as well as their translations, mistranslations, and grammatical genders, have shaped colonial scientific writing in ways that the historiography of mining and metallurgy has not always acknowledged.[10]

To that end, historians of science and technology have not often analyzed the discursive particulars of technical treatises or their translations. The preeminent twentieth-century scholar of mining in the colonial era, Modesto Bargalló, famously dismissed such vocabularies as "palabras de sentido poco preciso" (words with little sense).[11] Literary scholars who are trained to focus on language – especially phrases with fuzzy registers and ambiguous meanings – tend not to spend a lot of time with books about metallurgy. These texts fall frequently into the gap

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[8] Montagu, *The Art of Metals, In which is Declared the manner of their Generation and the Concomitants Of Them: In Two Books … Translated in the Year, 1669 By the R.H. Edward Earl of Sandwich* (London: Printed for S. Mearne, Stationer to the Kings most Excellent Majesty, 1674), II: 72, Early English Books Online (EEBO).
[9] Lange, *Albaro Alonso Barba Berg-Büchlein: Darinnen Von der Metallen und Mineralien Generalia und Ursprung* ... (Hamburg: Gottfried Schultzens Kosten, 1676), 184, Wilson Library, University of North Carolina-Chapel Hill. Charles Hautin de Villars skipped the passage in his *Traité de l'art métalique: extrait des oeuvres d'Alvare-Alfonse Barba, célebre artiste dans les mines du Potozi* (Paris: Chez Saugrain, pere, 1730), MMW. In 1750, Nicolas Lenglet du Fresnoy corrected the omission: "se mêle avec le nouveau Mercure qu'on y met, & celui-ci aide à l'autre à se former en corps," *Métallurgie ou l'art de tirer et de purifier les métaux* … vol. I. (Paris: Chez Didot, 1751), 191, Hathi Trust.
[10] Curzan, *Gender Shifts in the History of English* (Cambridge: Cambridge University Press, 2003); Barba, *Gründlicher Unterricht von den Metallen* (Ephrata: J. Georg Zeisiger, 1763), Early American Imprints I: Evans 9333. Lawrence Washington, Bushrod Corbin Washington, and Thomas Blackburn Washington, *The Final Sale of the Relics of General Washington* (Philadelphia: Thomas Birch's Sons, 1891), 133.
[11] Bargalló, *La amalgamación de los minerales de plata en hispanoamérica colonial* (México: Compañía Fundidora de Fierro y Acero de Monterrey, 1969), 221.

between history and literature. When that happens, important evidence of Andean "technical literacies," understood in the ways that scholars like Joanne Rappaport, Tom Cummings, Rocío Quispe, and Walter Mignolo suggest, goes unexamined.[12]

As I argue in *Cultural Touchstones*, in using translation and mistranslation to trace the intellectual origins of terms like "conchos" to their Andean etymologies, we can understand how the knowledge economy of colonial Latin America stitched together technical practices and scientific understandings of matter from indigenous and European communities. I have not yet been able to document African knowledge production through language, but the work of scholars like James H. Sweet, Sara E. Jonson, and Christina Mobley, who use Kongo linguistics to unpack Francophone documents in the archives of Haiti and Louisiana, suggests an approach to recovering African knowledge systems that could potentially be used in scientific domains like agriculture and metalworking.[13] What I have been able to show is where Indigenous ways of knowing, as signaled through language, were written out of scientific histories in the early modern Atlantic world. In some of these cases, the erasure of Andean etymologies and their replacement with colonial vocabularies sheds light on other aspects of life in the early Americas – especially racial and color classifications.

Andean miners classified ore by space: top, bottom, and "in-between," a transitional zone between surface-level *pacos* (silver chlorides, derived from the Quechua *ppaqu*, or reddish) and *negrillos* (silver sulfides that were found at the deepest profundities). Despite these color names,

[12] Rappaport and Cummins, *Beyond the lettered city: Indigenous literacies in the Andes* (Durham: Duke University Press, 2012); Mignolo, *The Darker Side of the Renaissance: Literacy, Territoriality, and Colonization*. 2nd ed (Ann Arbor: University of Michigan Press, 2003 [1995]); Quispe-Agnolio, "Cuando Occidente y los Andes se encuentran: Qellqay, escritura alfabética, y tokhapu en el siglo XVI." *Colonial Latin American Review* 14.2 (2005): 263-298.
[13] Sweet, "Research Note: New Perspectives on Kongo in Revolutionary Haiti," *The Americas* 74.1 (2017): 83-97; Johnson, "'Your Mother Gave Birth to a Pig': Power, Abuse, and Planter Linguistics in Baudry des Lozière's *Vocabulaire Congo*," *Early American Studies*, Forum: The Global Turn and Early American Studies, ed. Mary Eyring, Chris Hodson, and Matthew Mason. 16.1 (Winter 2018): 7-40; Mobley, Christina. "The Kongolese Atlantic: Central African Slavery & Culture from Mayombe to Haiti" (PhD dissertation, Department of History, 2015).

pacos included "metales verdes cobriços" (green copper-bearing ores) and Barba insists that "no todos los metales negros se comprehenden debaxo de nombre de negrillos" (not all black metals are included under the name of *negrillos*, 53v). In other words, categories are named for colors, but color does not determine categorization.

Colonial mining dictionaries help to explain the logic of silver classification in Potosí. According to overseer García de Llanos, underground, the chloride elements in *pacos* transitioned into sulfuric elements of *negrillos* for "dos o tres estados," or the length of 2-3 human bodies. In Quechua and Aimara, there are several words to describe these kinds of transitional, intermediary spaces, including *chaupi mitta*, *pactas mita*, and *pactasak*. Spanish-speaking miners offered their own term for "in-between": *metales mulatos*.[14] In turn, writers like Barba and García de Llanos explained how to classify and refine the three main "castas de metales … que llaman *pacos*, *mulatos*, and *negrillos*" (metallic castes … which are called *pacos*, *mulatos*, and *negrillos*).

How did translators treat these three categories of metals? Much as they had with the case of "conchos." Sometimes, they left "negrillo" in the source language, and sometimes they translated the idea behind it, rendering the word as "black Oar" and "schwartz Erze."[15] (French translator Charles Hautin de Villars always leaves it in the source language.) Within each metallic "casta" – a term they never translate as "caste" – translators approached the color properties of the metals in their own ways. When Barba describes *metales mulatos* as "de color

[14] García de Llanos, *Diccionario y maneras de hablar que se usan en las minas y sus labores en los ingenios y beneficios de los metales* [1609], ed. Gunnar Mendoza L. and Thierry Saignes (La Paz: MUSEF, 1983), 85; Diego González Holguín, *Vocabulario de la lengua general de todo el Peru llamada lengua Qquichua o del Inca* (Lima: Universidad Nacional Mayor de San Marcos, 1989 [fascimile edition, 1608]), 584.
[15] Montagu, *Art of Mettals*, I: 39-41; Lange, *Berg-Büchlein* 32-33.

baço," named for the splenetic organ that produced melancholy and black bile, Montagu suggests that it is "of a Brown colour," and Lange follows: "es ist einer braunen Farbe."[16]

To them, "mulato" means "brown," so they translate the passage in ways that reflect their – and their readers' – understandings of human classification systems. It is almost always the case that when European translators show confusion, either by rendering "conchos" as "Oyster shells" or translating the same word in different ways within the same chapter, the source of the confusion reveals the influence of Indigenous miners and metallurgists, and the ways in which colonial authors recorded ideas and practices of Andean metalworkers through language.

By using translation and mistranslation to document the existence and erasure of indigenous knowledge production, my book shows how Andean ways of knowing shaped technical transfers from Mexico to Peru, and how such technical literacies were removed from scientific writing in Europe. It also shows how the silencing of Native knowledges allowed colonial writers and European translators to inscribe their texts with their own ideas of racial and color categories. This is an important story about the past, and one that should be told.

But what happens when Indigenous communities don't want to share their knowledges? This is the question that I want to end on – the flip side of my book project, and something that I have been trying to work through with a collaborative team of students and faculty from the US and Guatemala as we build a thematic research collection (https://multepal.github.io/popolwuj/) of the *Popol Wuj*, the Maya K'iche' book of creation. Working on this project has forced me to ask different kinds of questions, relative to what I normally trod in when I am knee-deep in colonial archives, about the ethics of research and the nature of scholarly publishing. The first half of my talk, and the book project from which it is drawn, which includes chapters on Taíno

[16] Montagu, *Art of Mettals*, II: 9; Lange, *Berg-Büchlein* 135.

influences in the gold industry of La Española, and African artisans in the copper mines of Venezuela, uses a variety of literary methods to document and recover knowledge production. But as scholars of race and ethnicity like Laura Helton and Shauna Sweeney push us to think "beyond recovery" in the early Americas, we should also ask what happens when historically marginalized communities don't want to be recovered, and don't want their knowledges to be documented by or for outsiders.[17]

The *Popol Wuj* is divided generally into two parts, each of which contains a few subdivisions. One story begins in mythological time and explains the emergence of Maya lifeways from otherworldly spaces and earthly planes. The other one traces family lineages, migrations, and histories through 1524, when conquistadores arrived in western Guatemala. Given the text's layered cosmological narratives, which move back and forth in space and time, and its history of translation in the Pre-Columbian (ca. 10th-14th centuries), colonial (ca. 1550-1702), and national eras (19th century), and its more recent translation into electronic space (2007-2017), the text is well-suited to the work of digital remediation. According to WorldCat, there are approximately 1,200 editions of the *Popol Wuj* published in 25 languages. The within-language differences are substantial. Guatemalan translator Adrián Recinos follows Dominican friar Francisco Ximénez, whose 18th century manuscript remains the only version to survive the colonial era, in rendering the opening line as "Éste es el principio de las antiguas historias de este lugar llamado Quiché" (This is the beginning of the ancient histories of this place called K'iche'). Yucatecan autor Ermilo Abreu Gómez takes a different approach: "Entonces no había ni gente, ni animales, ni árboles, ni piedras, ni nada" (And so there were neither people, nor

[17] Helton et al., "The Question of Recovery: An Introduction," *Social Text 125* 33.4 (2015): 1-18. See also the essays in special issue edited by Helton et al., "The Question of Recovery?: Slavery, Freedom, and the Archive."

animals, nor trees, nor stones, nor any thing).[18] There are varying interpretations of the K'iche' columns, too, because colonial authors – already orthographically fluid – are especially fluid when converting K'iche' sounds and glottal stops into Latinized letters. Scholars like Allen Christenson and Sam Colop interpret the K'iche' lines differently, producing small but notable variant readings. For Christenson, the opening lines of Ximénez's manuscript would be sung as "ARE' U XE' OJER TZIJ / Waral K'iche' u b'i'" (THIS ITS ROOT ANCIENT WORD / Here Quiche' its name); Christenson's prose translation reads, "THIS IS THE BEGINNING OF THE ANCIENT TRADITIONS of this place called Quiché."[19] Guatemalan linguist Sam Colop interprets the glottalizations in similar but not identical terms, writing "Are' uxe' ojer tzij waral K'iche' ub'i'" (This is the origin of the ancient word of this place named K'iche').[20]

These different interpretations of the language are compounded by diverse interpretations of the text. Let's consider reader responses within two groups, grassroots activists and politicians in Guatemala. Some activists cite male-female relationships in the *Popol Wuj* to explain gender inequality in contemporary Mayan communities.[21] Others see it as a repository of ancestral knowledge that provides the keys to unlock a new future of resistance to Western capitalist systems that are rooted in racism, discrimination, and inequality.[22] There is a similar dynamic within political audiences. For much of the nineteenth and twentieth centuries, the *Popol Wuj* was ignored by politicians who sought to fold Guatemala's Indigenous roots into a myth of

[18] Recinos, *Popol Vuh: Las antiguas historias del Quiché*, 36th ed. (México: Fondo de Cultura Económica, 2012), 21; Gómez, *Popol Vuh: Antiguas leyendas del Quiché*, 14th ed. (México: Fondo de Cultura Económica, 2010), 19.
[19] Christenson, *Popol Vuh: Literal Poetic Version*. Vol. II (Norman: University of Oklahoma Press, 2008), 13, ll. 1-2, and *Popol Vuh: The Sacred Book of the Maya*, Vol. I. 2nd ed (Norman: University of Oklahoma Press, 2007), 59.
[20] Colop, *Popol Wuj: Versión Poética K'iche'* (Cholsamaj: Iximulew [Guatemala], 1999), ••/22. The text is paginated with K'iche' and Arabic numerals; the K'iche' sequence starts with the opening line of the story, marking the first page with a "•," while the Arabic sequence includes the preface and introduction, which begin with a "1."
[21] Clara Arenas Bianchi and Matilde González. *En el umbral: explorando Guatemala en el inicio del siglo veintiuno* (Ciudad de Guatemala: Instituto AVANCSO, 2007), 410.
[22] Ricardo Córdova Macías, Günther Maihold, and Sabine Kurtenbach, eds. *Pasos hacia una nueva convivencia: democracia y participación en Centroamérica* (San Salvador: FundaUngo, 2001), 233.

modern mestizo nation-statehood; writers like Nobel prize winner Miguel Ángel Asturias (1899-1974) facilitated this reading. Five years ago, in contrast, the *Popol Wuj* was declared "patrimonio cultural intangible" (intangible cultural patrimony).[23]

This recent embrace of the text signals an important change within the state's relationship to Indigenous art, languages, and cultures, and it forces scholars to ask new questions. If the *Popol Wuj* is "patrimonio de Guatemala," who can grant permission to digitize it? Elements of the work trace back centuries and even millennia, and thus could be considered, in Western terms, part of the public domain, what legal scholar James Boyle calls "the basis for our art, our science, and our self-understanding."[24] But Western definitions are at best inadequate to regulate the sharing of Indigenous arts, cultures, and knowledges; at worst, colonial laws have proven themselves capable of justifying the unjustifiable. For these reasons, Native studies scholars Eve Tuck and K. Wayne Yang remind colleagues eager to "decolonize DH" that decolonization "is not a metaphor," but rather research methods and scholarly practices that "bring about the repatriation of indigenous land and life."[25] This raises new questions for the *Popol Wuj*. If a story is "intangible," can it be digitized? Can it repatriate? In other words, what is the relationship between a physical copy of the *Popol Wuj* and the story it tells?

No single print edition can convey the visual, narrative, and cosmological complexities of the *Popol Wuj*, or its history in global literary markets and often competing political projects. It is a story well-suited to digital publication, even though many DH platforms, tools, and legal frameworks, from encoding standards to markup languages like XML and TEI, to public domain

[23] Ann González, "The *Popol Vuh* for Children: Explicit and Implicit Ideological Agendas," *Children's Literature Association Quarterly* 39.2 (2014): 216-233; Marcelo Ferrando Castro, "El Popol Vuh es declarado Patrimonio Cultural de Guatemala," *RedHistoria* (28 March 2013); available at https://redhistoria.com/el-popol-vuh-es-declarado-patrimonio-cultural-de-guatemala/.
[24] Boyle, *The Public Domain: Enclosing the Commons of the Mind* (New Haven: Yale University Press, 2008), 39.
[25] Tuck and Yang, "Decolonization is Not a Metaphor," *Decolonization: Indigeneity, Education & Society* 1.1 (2012): 1-40.

and common use rights, were not designed for non-Western textual traditions. These are the questions that my team is grappling with as we prepared – and continue to update – our digital critical edition of the *Popol Wuj*, available at https://multepal.github.io/popolwuj/.

For our project, we began by partnering with the Newberry Library and Ohio State Library to use the digital edition of the *Popol Wuj* that they prepared in 2007. Ximénez's manuscript is a copy of the mid-sixteenth century edition prepared by bilingual Maya elites like Cristóbal Velasco, Nim Ch'okoj Kawek. The Newberry-OSU site contains the first electronic edition of the text, providing key access to the public at no charge. But unless readers are familiar with colonial orthography and paleography, the text is not really accessible. Our team uses rs (referring string) elements to mark analytical attributes in the K'iche' and Spanish columns. In this way, readers who want information on, say, the Hero Twins Junajpu or Xbalanke, can click on the character names and learn more about them.

Sometimes, markups are straightforward enough, as when we tag Junajpu as <rs ana= "JUNAJPU"> in the K'iche' and Spanish columns. We use the orthographic conventions of the Academia de Lenguas Mayas de Guatemala because we are working with a K'iche' text.

Other cases are less clear. For example, Ximénez names Xibalba, the term for the Mayan underworld, in the K'iche' column and translates it as "el infierno" (hell) in the facing Spanish column (12v, 13v, 14r, 14v, 17r; available here: https://multepal.github.io/popolwuj/xom-paragraphs.html#quc-xom-f12-s2). For the colonial friar, the two were equivalent. For us, they are not. Our task is not to change the text or obscure the history of colonial intervention, but rather to allow readers to see these layers and formulate their own interpretations of the narrative and its history of remediation – including our team's work. We had three options. First, we could mark both "Xibalba" (in the K'iche' column) and "el infierno" (in the Spanish column as <rs

ana="XIBALBA">. Second, we could mark one as <rs ana="XIBALBA"> and the other as <rs ana="INFIERNO">, meaning that readers who search for passages on Xibalba will not find the "infierno" cases in their results. Third, we could invent something new, and do so in a class with one professor who needed to finish her tenure book, one who was teaching the course on top of his full-time job, and 7 graduate students who were teaching 1-2 course of their own, taking other classes, and preparing for comps. There is, as Alexander Reid writes, an ethics of graduate DH pedagogy.[26] After careful discussions, we decided to tag both terms as <rs ana="XIBALBA"> so that readers could see when Ximénez intervened in the text. In other words, we used the same attribute tag to show how the K'iche' and Spanish columns diverge.[27]

As we made these decisions, we realized that we had no real framework to approach collaborative faculty-student digital work. Nor did we, as humanists who mostly work in the colonial era, have best practices to guide our collaborations with José Yac Noj, a K'iche' elder who contributes sources and ideas to the site. He emails me and I add his ideas to entries, citing him as I would another secondary source. José is in his 70s and is not familiar with Drupal, XML, TEI, GitHub, or JEdit, some of the major tools that we used to prepare the site. I am in my 30s and had a hard time learning to use these tools, with the benefit of being in the same room as Rafael Alvarado, my co-teacher at UVa's Data Science Institute. This informal method of

[26] Alexander Reid, "Graduate Education and the Ethics of DH," *Debates in the Digital Humanities*, edited by Matthew K. Gold and Lauren Klein. 1st ed. (Minneapolis: University of Minnesota Press, 2012), 350-367. Available: http://dhdebates.gc.cuny.edu/debates/text/19.

[27] Other challenges involved the classification of characters. Drupal allows us to indicate the gender of people, places, things, deities, etcetera. We are able to create these categories, so we picked female, male, trans, androgynous, combined, and unknown as our primary classifications. We can add others, if conference participants have suggestions. One of our longest debates was how to classify the character Xbalamke. Normally, the second Hero Twin is represented a man, following the phrase "kaib' k'ajolab" ("dos muchachos"/two boys). But the "x" in the character's name is also a feminine referent, and the text contains notable passages of gender complementarity, especially involving sun and moon iconography. After reading Dora Luz Cobián's *Genesis y evolución de la figura feminina en el Popol Vuh* (1999), collaborators were split, largely upon disciplinary lines. Literary scholars wanted to mark Xbalamke as female, while anthropologists-linguists wanted to follow graphic traditions from Pre-Columbian vases and mark the character as male. In the end, we marked Xbalamke as female and we explained the competing viewpoints in our prose annotation, available here: http://multepal.spanitalport.virginia.edu/node/10

collaboration – wherein José talks with the widow and family of renowed K'iche' translator Sam Colop to secure support for us to use Colop's work, and then emails us with approval – raised questions that we had not anticipated and allowed us to reflect on tensions with indigenous studies and DH. There are many responses to Tara McPherson's poignant asking, in 2012, "Why are the Digital Humanities so White?", and it is our hope that discussions like these will be part of a series of critical responses that help to move DH forward in these efforts.[28]

I'll conclude by briefly sketching what I think some of those ways might be, at least for our project. Here, I welcome ideas and input from people with experience on other projects, using different methodologies, and applying diverse critical paradigms.

One point of tension is the nature of knowledge and its transmission. In many Indigenous communities, elders are the keepers of wisdom. But young people are usually more comfortable with technology. DH projects that involve Indigenous makers and practitioners will have to develop collaborative modes of research and communication that respect these norms. Our project began in a graduate seminar (SPAN 7559, Latin American Digital Humanities, Spring 2017). As we move forward, it would make sense to partner with a K'iche' research group at la Universidad de San Carlos, where José is emeritus faculty. This would allow us to learn from students in K'iche' communities, and for them to learn tools like XML, TEI, and GitHub that they could use in their own research projects and professions. Reciprocity and mutual learning must be part of our goal – and what we achieve.

Another challenge concerns the nature of DH itself. Debates in the digital humanities about the extent to which "information wants to be free," and whether codes, data, and

[28] McPherson, "Why Are the Digital Humanities So White? or Thinking the Histories of Race and Computation," *Debates in the Digital Humanities*, ed. Matthew K. Gold and Lauren F. Klein (Minneapolis: University of Minnesota Press, 2012), 139-160.

information should be open source and open access, reflect the perspectives of what Amy Earhart calls the "original users of the web, scientists, computer geeks, and hackers … battling against the corporate market intent on invading their open space."[29] However, Indigenous communities who have survived more than five-hundred years of state-sponsored appropriations of their knowledges, cultures, lands, and ways of being in the world have good reasons to withhold information. For non-Indigenous theorists, it is probably safe to say that terms like "data-driven," "big data," and "metadata" treat "data" as the *OED* defines the word: "an item of information" (n. 1). In contrast, for Indigenous theorists like members of the Te Mana Raraunga (Māori Data Sovereignty Network), "Data is a living tāonga [treasure] and is of strategic value to Māori."[30] Data, in other words, is a life-giving source of knowledge that is as much a part of the community as are other elements of a dynamic, connected ecosystem. This vision of data as self-governance informs the charter statement, policy papers, and research frameworks of the US Indigenous Data Sovereignty Network (USIDSN), based at the University of Arizona.

In Latin America, there are no such movements that I know of. In contrast, many Indigenous communities want to share their histories, accomplishments, and struggles with the world so that outsiders will know they exist. Consider the case of Q'ero healers in the Valle Sagrado, outside of Cuzco, Peru, who have resisted sharing medicinal knowledge and spiritual rituals with outsiders, whether tourists from China or mestizos from Lima. In the face of economic hardship and ecological challenges precipitated by a changing climate, elders resolved to open their most intimate traditions to tourists as a way of gaining access to currency and

[29] Earhart, "Can Information Be Unfettered?' Race and the New Digital Humanities Canon," *Debates in the Digital Humanities*, ed. Matthew K. Gold and Lauren F. Klein (Minneapolis: University of Minnesota Press, 2012), 309-318.
[30] Tahu Kukutai and John Taylor, eds. *Indigenous Data Sovereignty: Toward an Agenda* (Acton, Canberra: Australian National University Press, 2016), 18.

global visibility. This community is fighting for basic forms of survival, like access to water and land. Sharing information about itself is part of that strategy to survive, as community members explained to sociologist Macarena Gómez Barris.[31]

There are similar efforts to bring visibility to indigenous languages by mapping revitalization projects from Michoacán to Mapuche-speaking regions of Chile on an interactive map of Latin America. By situating local efforts in hemispheric terms, journalists, storytellers, and educators of the *Red de Activistas Digales de América Latina*, part of the non-profit network Global Voices, allow users to visualize patterns of activism and engagement. Our K'iche' collaborators have explained the importance of a trilingual edition on the Multepal site – with K'iche' for native speakers, and Spanish and English for readers around the world – as a crucial strategy to inform world citizens about Mayan art, history, and daily practices today.

These are acts of data sovereignty, but they are articulated in terms and with conclusions that are different from the frameworks developed by Indigenous scholars in other world regions.

DH has long seen calls to diversify and decolonize. But it's not always clear how frameworks developed for particular communities of historically marginalized people, such as the African-American writers whose work Kim Gallon makes visible in her Black Press Research Collective with an "ethos of recovery," or what Gallon calls "bring[ing] forth the full humanity of marginalized peoples through the use of digital platforms and tools," will square with intellectual and creative work in Indigenous communities who don't want to be recovered. And within the category of "indigenous DH," there are very different approaches to data sovereignty in Latin America, the US, Canada, Australia, and New Zealand.

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[31] Gómez Barris, "Andean Translations: New Age Tourism and Cultural Exchange in the Sacred Valley, Peru," *Latin American Perspectives* 39.6 (2012): 68-78.

We are now a long way from Andean metallurgy and colonial systems of racial and color classification, although we continue to grapple with issues of the production, communication, and translation of two equally unstable categories: knowledge and information, both in the early modern era and in our own time.

I don't have answers to these tensions. But I know that sitting in my office and thinking about them on my own is not going to lead anywhere. I look forward to your feedback and ideas about how to move forward as a scholarly community in Indigenous Studies and the Digital Humanities.

It's important that we do, and that we do this together. Thank you.