SILENCE AND BANALIZATION: AN ANALYSIS OF HISTORY WRITING ABOUT COMPUTING

by

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THESIS ABSTRACT

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Myth, hype, and industry-captured historiography depict this moment as a unique and unprecedented confrontation with computational power and the devastating effects it has on vulnerablized communities. But automated decision schemes are neither new nor newly urgent; they are the inheritance of almost seventy years of computing history, a history that has *never not* been entangled with state repression, genocidal and ecocidal violence, and racialized expropriation. Carceralilty and computing are mutually reinforcing projects, an entanglement that remains underappreciated by vernacular historicity. This paper attends to that breach, offering an account of how computing loses track of its own past. Through an analysis of historical writing from three specific sites, each characterizing a distinctive orientation towards computing and historiographic custom, I describe how historical production, as it relates to computing, is the consequence of a tightly managed program of disinheritance.

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Acknowledgments, too, are a genre of history writing. Mapping for posterity (and law enforcement), the lineage of a thinker: their influences and social entanglements; mapping (and fastening) the history of a problem and its relationship to the document at hand; and mapping a trajectory for that problem, contriving an orbit (where it will go, how it will get there), to inundate its present condition with pluripotency. But a thesis—at least this one—is not a problem; it's not even the answer to one. It's something between a mugshot and a gift receipt: this is a capture (an inadequate one) of where things were when a deadline approached. It's an artifact that I'm nevertheless grateful for, as well as to those who made it possible.

So, to begin, Allah SWT and His Messenger (PBUH), the genesis of all good things in my life, and to whom is owed my first duty of love, devotion, and loyalty. My family, who taught me how and why to love and to do so fiercely—and, just as fiercely, how and why to read. My husband, who has given me such extraordinary freedom in my life: to think, be, grow, change, fight, and be ruthless—all while giving me safe harbor and creating in our home a place to scream, cry, to be scared, be tired, and when everything else fails, to plot. AS, SW, and MS, who tolerated my absence and neglect this year, letting me recede into myself under the aegis of their constant encouragement and support. And of course, there's Sushi, who kept me company every night that I stayed up through fajr trying to work something out. Lastly, my organizing community: the various pods, pockets, and networks that offer not just care and vital, life-preserving knowledge, but also the context within which struggle is embedded. You are whose freedom I fight for, who I will continue to fight for. You are all my gifts from God, my mercies.

Next, to contend with the text itself. I came into this project with a specific goal in mind: machine breaking. It took about three weeks for both 'the machine' and 'breaking' to

disintegrate into a million different contexts, questions, and problematics, something I was naïvely unprepared for. There were several crises of thought, all of which were attended to with such care and generosity by people who offered me a lifeboat: a way to re-think and re-position. Patrick Jones, who gave me Noortje Marres. Stephanie Dick, who gave me Lorraine Daston. Valérie Simon, who gave me Eric Stanley and Gaston Bachelard. Bonnie Sheehey, who gave me James Baldwin. Mary McLevey, who gave me Manning Marable and brought me back to George Jackson. The 'bad Asians' abolitionist writing group, who gave me Joy James and Monica Kim, as well as the resolve to deny the archive as archive: to find knowledge in seed banks, to read against books, and to perceive my own body as a repository of historical learnings (a legitimation of the sovereignties it embodied before Empire displaced us). Harsha Walia, who gave me Paul Gilroy. (Puck Lo, who gave me Harsha Walia). André Brock, who gave me Venus Green, Katherine McKittrick, Achille Mbembe, and Jessica Marie Johnson. (And André Brock who gave me André Brock). Tariq Lee Rahman, who gave me Michelle Murphy, David Scott, *Active Intolerance* and *Intolerable*, Ibn Khaldun, and Timothy Mitchell. Christopher Chavez, who gave me a way to connect my organizing to this writing in a way that I had wholly unanticipated but desperately needed. Which is to say, Christopher Chavez, who gave me Sarah Hamid—gave me back to myself.

Finally, there is Carol and Colin, to whom this document is dedicated. In every sense, this paper is a devotional to these two individuals, who have played a key role in my maturation as a thinker for nearly a decade now. They gave me this year to absolutely run wild and chase down every lead and curiosity my heart desired, only to gently guide me back whenever I needed it, so I didn't get lost. This has been one of the most rewarding years of my life, and I'm so grateful to both of you for making it possible.

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I feel like this text is a poor representation of the learnings you've all imparted, and that shortcoming is all mine. There was so much more I wanted to get done. But alas—deadlines. White people love their deadlines.

To Carol and Colin. Thank you.

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1. INTRODUCTION

History, argues Manning Marable, is more than a cataloging of artifacts or the narrativizing of collective experience: "History is also the architecture of a people's memory, framed by our shared rituals, traditions, and notions of common sense."[1] History (which, in this paper, will refer to both the sociohistorical process or 'fact' of past of events, as well as our knowledge of that process given the irreducible distinction and overlap between the two[2]) then, becomes political in two senses: in the first instance, it is transmitted through a press of political interests that manifest in "narrative gaps, strange silences, and lacunae of all kinds [that] litter its interpretive landscape."[3] In the second, history writing itself offers the potential for profound personal and social reorientations—the effects of seizing "hold of memory as it flashes up at a moment of danger."[4] The stakes of history writing have never been low.

This paper offers an analysis of historical writing concerning three sites, each of which represents a distinctive orientation towards computing: computing as an *intellectual practice* (the International Mathematical Union), computing as *technology* (through Melvin Kranzberg and Charles Beard, who I cast as Kranzberg's intellectual progenitor), and computing as an *implement or artifact* (the IEEE *Annals of the History of Computing*).[5] Each site engenders its own historiography and styles of history writing which erect mechanisms through which computing loses track of its own past. Taken together, and individually, these three sites bring into relief how history writing about computing is, at once, the fabrication of 'the computer' as a "natural object"[6] of history and the "silencing of history"[7] in service of this object. They reveal how historical production, as it relates to computing, is the consequence of a tightly managed program of disinheritance: as the computer is written into history, it displaces the ongoing and

simultaneous histories of colonial violence and carceral science through which it derives significance and definition.

NOTES

[1] Marable, *Living Black History*, 1. 'Common sense,' traced through the thinking of Italian Marxist and imprisoned intellectual Antonio Gramsci, is a structured and inherited belief system. Gramsci, *Selections from the Prison Notebooks of Antonio Gramsci*, 325–26. The historical ontology of common sense, which is a limiting condition of philosophy and criticism (Gramsci, 330–31), "partitions the planet along racial and class lines." Estes et al., *Red Nation Rising*, 19–20. Common sense is politicized, even genocidal: "anti-Indian common sense is the ideology that organizes Native elimination, encompassing everyday racist depictions of Natives in popular culture (like mascots) and more spectacular forms of genocidal violence (like massacres) ... For settler societies, to ignore anti-Indianism is to participate in it." Estes et al., 19. Common sense also articulates a politics of race: in 1923, when the Supreme Court ruled that Bhagat Singh Thind was ineligible for naturalized citizenship in the United States, the Court did so on the basis of "common sense":

> It may be true that the blond Scandinavian and the brown Hindu have a common ancestor in the dim reaches of antiquity, but the average man knows perfectly well that there are unmistakable and profound differences between them today; and it is not impossible, if that common ancestor could be materialized in the flesh, we should discover that he was himself sufficiently differentiated from both of his descendants to preclude his racial classification with either. The question for determination is not, therefore, whether by the speculative processes of ethnological reasoning we may present a probability to the scientific mind that they have the same origin, but whether we can satisfy the common understanding that they are now the same or sufficiently the same to justify the interpreters of a statute written in the words of common speech, for common understanding, by unscientific men—in classifying them together in the statutory category as white persons. (*United States v. Bhagat Singh Thind*. On "racial common sense," see Crenshaw et al., *Critical Race Theory*, xxxii.)

[2] This irreducibility is not without specificity; as Michel-Rolph Trouillot explains, the semantic ambiguity in the vernacular use of the word history (between history as fact and history as account) indicates the fundamental importance of context: "the overlap and the distance between the two sides of historicity may not be susceptible to a general formula. The ways in which what happened and that which is said to have happened are and are not the same may itself be historical." Trouillot, Silencing the Past, 3–4.

[3] Marable, *Living Black History*, 21.

[4] Benjamin, "Theses on the Philosophy of History," 255.

[5] The distinction between these three sites (practice, technology, artifact) should not be read as a theory of how computing should or should not be understood. As has been pointed out, the schematic is nevertheless reminiscent of the triadic formulation of technology advanced by media theorist André Brock. Brock's heuristic emerges from a different set of questions, however. In "Critical Technocultural Discourse Analysis" Brock proposes a "critical cultural approach" to the study of internet phenomenon, a method that avoids reductivism and demands consideration of both the affordance ("semiotics") of information communications technologies and the discourses produced on, about, and in relation to them. The artifact and its cultural contexts are mutually constitutive, and culture (vis-à-vis Clifford Christians) acts as a conditioning constraint on how an artifact is designed, fabricated, and used. Christians, "A Theory of Normative Technology." Brock's triadic model is a transposition of Arnold Pacey's formulation of "technology practice" to the study of digital contexts.

Pacey (winner of the 2017 Leonardo da Vinci Medal) devoted considerable effort to expanding the objects of interest for historians of technology; technology for Pacey included everything from nuclear power grids to snowmobiles and hand-pumps in Kerala. Pacey's vocational background is significant here: before turning to professional history, he spent time as a development practitioner for Oxfam and UNICEF. Those formative concerns around technology transfer, the democratization of technology, and modernization/development through technology seem to have followed him into his work as an academician. "2017 Leonardo Da Vinci Medal Winner, Arnold Pacey." In *Culture of Technology*, Pacey advances a criticism of technology-focused poverty relief efforts that prioritizes North-South technology transfer; he argues instead for a specific and localized analysis of the uptake and diffusion of technologies. Pacey achieves this contextualization through the concept of "technology *practice*," analogized from the operational distinction between medical *practice* and medical *science*. Pacey, *The Culture of Technology*, 3. A technology *practice*, Pacey formulates, should be considered through its technical (or material), organizational, and cultural elements; the primary objective is to "strip away some of the attitudes that restrict our view of technology to expose these neglected cultural aspects." Pacey, 4, 8.

The specific conversation that Pacey is having (with both the international development community and historians of technology) accounts for some of the deficiencies that Brock identifies in his triadic formulation of technology: the "cultural," for Pacey, is the outcome of inquiry, so it remains under-theorized. For Brock, alongside the material and operational, technocultural ideology plays a constitutive role (establishing "controlling norms" and "operating principles;" Christians, "A Theory of Normative Technology," 131). "Popular conceptions of technology center on the first two pieces, often obscuring the beliefs that power the dissemination and use of the technology," he writes. Brock, *Distributed Blackness*, 54–55. Brock's triad—artifact, practice, and belief—suggests a way to overcome methodological inadequacies of affordance-only (artifactual), implementation-only (deployment), or discourse-only (cultural texts) investigations. Multiple fields of positivity are activated at once and exposed to facilitate observation of how "society, techné, and culture" interact to stabilize a field of meaning in which neither the user nor the artifact can be taken as given considering "the computer's ability to re-create practices, people, and even environments through virtuality"—i.e., it's subjectivizing quality. Brock, 27. This is an extremely effective formulation given the disciplinary legacy against which Brock is writing (see Chakravartty et al.,

"#CommunicationSoWhite"), but there is nevertheless an ontology being expressed here. For Brock, digital phenomena are empirically categorized as suspended somewhere within these three elements: artifact, practice, belief (naturally, with a high degree of adaptability required to account for non-white technocultures).

This paper is more narrowly concerned with the discursive than computing's artifactual or contexts of deployment (although, as Brock rightly argues, these are co-constitutive categories). I focus on historical narratives as a way to make sense of how various sites articulate computing through the decisive moments of historical production that Trouillot identifies: the moment of fact creation, the moment of fact assembly, the moment of fact retrieval, and the moment of retrospective significance. Trouillot, *Silencing the Past*, 26. For me, these sites are distinguishable through *these* differences, not necessarily through a specific orientation towards or effect on computing, and certainly not in a way that I feel prepared to draw conclusions on. Moreover, this paper observes only three sites; there are many more to consider, and each should be given due consideration individually and in relation to one another. "Tracking power requires a richer view of historical production than most theorists acknowledge. We cannot exclude in advance any of the actors who participate in the production of history or any of the sites where that production may occur." Trouillot, 25. Most important of all, I am trying to be extremely cautious so as not to inaugurate any (new) essentialization regarding the nature of computing—or even the communities that historicize it. That field of meaning is already over-saturated.

[6] In his 1997 essay, "Foucault Revolutionizes History," Paul Veyne writes against the illusion of natural "well-known, unchanging, virtually material" objects in history writing. Instead, he writes, "we must stop focusing our gaze on natural objects in order to notice a certain practice, a very specifically dated one, that objectified those objects in a respect that is as dated as the practice itself ... For, unlike the list of natural objects, that of objectivizations remains open." Veyne, "Foucault Revolutionizes History," 160, 149–143.

[7] "The presences and absences embodied in sources (artifacts and bodies that turn an event into fact) or archives (facts collected, thematized, and processed as documents and monuments) are neither neutral or natural," writes Michel-Rolph Trouillot. "They are created. As such, they are not mere presences and absences, but mentions or silences of various kinds and degrees. By silence, I mean an active and transitive process: one 'silences' a fact or an individual as a silencer silences a gun. One engages in the practice of silencing. Mentions and silences are thus active, dialectical counterparts of which history is the synthesis." Trouillot, *Silencing the Past*, 48.

2. COMPUTING AS PRACTICE

Before Anne Balsamo's sister Rose was dispatched to the northern no-fly zone in Iraq to help "clean up" the aftereffects of the mass slaughter-event known as Operation Desert Storm,[1] providing "medical attention to the Kurdistani refugees exiled during and after the technologically hallucinogenic Gulf War"[2] (which, for Balsamo, refers to "the media coverage of the spectacular technological display of smart bombs and SCUD missiles,"[3] not the technoscientific innovations made during the "first modern information war"[4]); before Anne Balsamo's mother was certified at Felt and Tarrant School of Comptometry to operate a comptometer (an electromechanical calculating machine) for Sears ("for two more years before she was replaced by a machine");[5] before Katherine Hayles turned Anne Balsamo's family history into a "a synecdoche for the panoply of issues raised by the relation of Homo sapiens to Robo sapiens;"[6] before the women called 'computers' were replaced by machines called 'computers,' there had to be a kind of practice known as *computing*, one that pre-figures the furious efforts to recover the suppressed histories of women[7] doing "war work"[8] for the "warfare state"[9] (although I can't help but wonder how suppressed this history ever truly was).[10] Those practices—numerical and scientific computing, both mechanical and human—trace their lineage to *mathematics*.

Mathematics often plays a figurative role in technocriticism: recognizable attributes of mathematical practice (enumeration, discretion, abstraction) or mathematical operations ("vectorization, optimization, probabilization, pattern recognition, regularization, and propagation"[11]) functions as a foil to describe both a predominant style of reasoning found within an "ethnographic locale"[12] and the violence engendered by that style of reasoning (by virtue of either historical allegory or common sense associations).[13] The indictment is bidirectional,

implicating both the thinker and the thought, and often relies on (professional) philosophical treatments of instrumental rationality, binarism, quantification, etc., to explain the connection.[14] Electing for a different strategy in this chapter, I have yoked computing to mathematics via its practitioners: tracking the vocational enclaves that grew out of eighteenth-century learned societies[15] and formalized to promote the profession and professional interests of mathematicians. From these societies, computing emerged as a discrete community and intellectual pursuit, one that took on independent significance (especially as cryptology came to be properly considered a branch of mathematics, one the state increasingly invested in through the First World War, Prohibition, and, of course, World War II),[16] such that it could then be deliberately *re*-integrated into the practices and profession of mathematicians.

I say re-integrated, but that really gives the false impression that there wasn't continuous exchange and mutual influence between the two domains: as Michael S. Mahoney wrote in the forward to the published proceedings of a conference on the history of scientific and numeric computation (1987, Princeton University), "the computer was central to the development of scientific computing. In a real sense, the computer defined the field of numerical analysis as the study of numerical algorithms designed to be run without intervention and hence to avoid or to contain accumulating errors that arise from the finite nature of digital computation."[17] Stephen Nash adds, in the volume's introduction, that "computing is as old as mathematics itself, and a history of scientific computing would diverge from a history of mathematics only in its later chapters."[18] Nash and Mahoney have their own reasons for closely associating the histories of computing and mathematics,[19] but their conviction on the matter makes it all the more interesting: we should take careful note when practitioners themselves make a self-conscious

effort to internally distinguish among themselves, or, as we'll see in the case of the International Mathematical Union, overcome perceived distinctions.

2.1 MADRID, 2006

> There is no object, large or small, and almost no aspect of human existence, to which mathematics cannot contribute understanding… In particular, the great questions facing the planet, such as how to model and manage the climate, pose profound mathematical challenges. The need for an understanding of mathematics, of the mathematical way of thinking, and of the role mathematics can play in society, is no longer confined to scientists and engineers, but is increasingly important for those who work in industry, finance, the social sciences, and in many other walks of life… As subjects become better understood, they become more mathematical… In sharing mathematical knowledge and experience with those who work around the world, it is the whole mathematical community that benefits, and we make our own contribution to peace and stability through the binding together of peoples by a common language independent of politics, religion, and culture.[20]

With those words, Sir John Ball, then-President of the International Mathematical Union (IMU), opened the 25th International Congress of Mathematicians (ICM) in Madrid. 2006 was an ambitious year for the ICM: over 3,600 participants representing a record high of 108 countries were in attendance (including representation from the Falkland Islands, Hong Kong, and the Netherlands Antilles).[21] Spain's now-*Rey Emérito* King Juan Carlo made an appearance during the opening ceremony. It was also Congress that, as suggested by Ball's opening address, would mark a subtle shift in how the ICM understood its own history, its position in the world, and how it saw its "science" advancing in the future. As the Congress' press kit proclaimed:

> An overwhelming majority of mathematicians would say that mathematics are beautiful in themselves and that they are their own justification. But mathematics are also important, not to say necessary. They could be called the invisible science; part of their importance arises from the fact that they are behind many aspects of daily life, at once hidden and essential. They are also the engine of change; there is no aircraft, no robot, no computer... no future technology without mathematics.[22]

2006 was the first time the Carl Friedrich Gauss Prize was awarded, a new recognition awarded jointly with the German Mathematical Union and inaugurated in Madrid "to honor scientists whose mathematical research has had an impact outside mathematics—either in technology, in business, or simply in people's everyday lives."[23] At the IMU General Assembly, a resolution was endorsed setting in motion plans for a 'Digital Mathematical Library': an enduring world-wide network of digital mathematical literature.[24] The closing roundtable, "Are Pure and Applied Mathematics Drifting Apart?" moderated by President Ball himself, "took as a starting point the fact that mathematics is broadening its scope, a process that causes the cross-fertilization between different fields of mathematics."[25]

True, this emphasis on applications served a practical objective: Manuel de León, President of the ICM 2006, described in the published proceedings how the Executive Committee struggled "to attract funding from the private sector, which eventually fell short of initial expectations," because "Spanish companies and those with their headquarters in Spain, are still a long way from recognizing mathematics as a driving force in research, technological development, and innovation."[26] But these twin objectives—to upgrade and modernize the ICM, and, in the process, to reclaim the rightful sociocultural inheritance of mathematics—is quite consistent with what appears to be a culture of adjustment and accommodation normalized within this community. In 1954, Princeton University's Oswald Veblen (son of Thorstein Veblen), who presided over the first ICM held after WWII (1950 in Cambridge) spoke at the following Congress, in Amsterdam, of the priority and importance the community gave to ICM (in particular, priority over of any governing apparatus), and the dynamism inherent to this untethered, coalitional model: "The series of International Congresses are very loosely held together. They are not congresses of mathematics, that highly organized body of knowledge, but

of mathematicians, those rather chaotic individuals who *create and conserve it*"[27] (italics added). Create and conserve: the ICM was, from the first instance, a site of historical production.

Held every four years, the ICM traces its origin to an 1893 convening organized by the then-newly founded University of Chicago's Faculty of Mathematics as part of the World's Columbian Exposition. The program drew papers from several leading European mathematicians and was profiled in *Science* as having been "decidedly cosmopolitan in the authorship of the papers presented." (Of the 45 attendees, three were women.)[28] The opening address, "The Present State of Mathematics," was delivered by Felix Klein, who was attending as the Imperial Commissioner of the Prussian Ministry of Culture. "When we contemplate the development of mathematics in this nineteenth century, we find something similar to what has taken place in other sciences. The famous investigators of the preceding period, Lagrange, Laplace, Gauss, were each great enough to embrace all branches of mathematics and its applications," Klein observed.[29] "With the succeeding generation, however, the tendency to specialization manifests itself." Klein's remarks specified a distinct historicity for mathematicians, a historicity which suggested a process was underway, one he wanted very much to intervene against. "A distinction between the present and the earlier period lies evidently in this: that what was formerly begun by a single mastermind, we now must seek to accomplish by united efforts and cooperation. A movement in this direction was started in France some time since by the powerful influence of Poincaré. For similar purposes we three years ago founded in Germany a mathematical society… but our mathematicians must go further still. They must form international unions…"

At the 1893 World's Congress at Chicago, a manifesto was thus established: to establish a program for international cooperation among mathematicians. Over a century later, the hallmarks of that first Congress obtained—most especially, the self-conscious historicity. The

2006 program featured several "cultural activities" alongside the usual plenaries and talks: "Fractal Art: Beauty and Mathematics" (a tribute to Benoit Mandelbrot),[30] "The Life of Numbers" (an exhibition of artifacts "drawn from the world of culture"—Roman coins, pre-Romanic manuscripts, incunabula, Renaissance mercantile arithmetic books with the first recorded usage of the current arithmetic symbols, both celestial and terrestrial maps—offering visitors "an account of ourselves, using numbers as a tool"),[31] and "History of Mathematical Knowledge" (a bibliographical exhibition held by Universidad Complutense de Madrid in its Historical Library, one of Europe's oldest libraries, showcasing the development of mathematical science through 16th-century texts).[32] On the occasion of the ICM's silver jubilee, the Congress took particular care to highlight another exhibition, "ICM through History" curated by Guillermo Curbera,[33] which provided "a visual chronicle of all the ICMs, emphasizing their significance in terms of human endeavor and using the activities of mathematicians at the ICMs as a mirror in which history, culture, technology, fashion and changing attitudes were reflected."[34] The exhibition, which featured some 500 written and photographic documents (portions of which are still available to view on a digital archive[35] and have been printed in a 2009 volume published by AK Peters[36]), provided a "twin portrait" of the ICMs: "on the one hand, a chronological review of the history of the ICM, and on the other a transversal view through the social life of the congresses…"[37] Far from the anti-historicism we've all be taught to expect from STEM practitioners, the ICM radiated a strong sense of "historical self-consciousness."[38]

It also evinced a *political awareness* (if not consciousness). Even setting aside the most blatant indicators—the presence and patronage of Bourbon-Anjou monarchs or the close to one hundred fifty press representatives and dozen or so television cameras that flocked the Congress

proceedings[39]—something very powerful was being demonstrated at the 2006 ICM in Madrid. The event was saturated by a deliberate concern for power, the distribution of power, and *the political*, at multiple scales: geopolitical, cultural—even concern over the politics of knowledge.[40] This isn't anti-politics;[41] quite the opposite. As far as scholarly communities go, the IMU checked all the requisite boxes required for an aesthetically liberal politics: diverse, global, cosmopolitan, filial,[42] cultured, tradition-aware, and openness and appreciation for interdisciplinary dialogue, and *specific* tolerance of difference—an opposition to "political discrimination"[43]—but one that nonetheless echoes the kind of "agonistic politics" implied in the nostalgic political fantasy writings of Fred Turner or Tara McPherson.[44]

These mathematicians were absolutely hip to something, and it isn't easily legible through the typical critical vocabularies humanists use to describe the reactionary politics enacted by technical communities such as the IMU. Instead, there is a localized economy of power in exchange here, being circulated through subtle *and* explicit means, but one which only gains meaning through historical awareness, both of this community specifically, and the broader histories within which it's embedded.

2.2 MADRID, 1492

ICM 2006's program was carefully designed around three axial themes imagined by the program committee to reflect "the geo-strategic situation of Spain in history and in the world, in particular in relation to Europe."[45] The premise was to position Spain as a meeting point for these three axes, as well as to build programming specific to the perceived needs of the mathematical community in each region (with Spain fulfilling the role of benefactor). The Latin American Axis, "which seeks to encourage participation from mathematicians belonging to countries in this region as a contribution to their development and to increase scientific

collaboration," inspired new travel bursaries and financial aid to "stimulate attendance from these countries and strengthen research relations, which, although they exist, are not as strong or as numerous as we would like them to be. There is still a great deal to do, and Latin America is a natural area of collaboration with Spain."[46] In a similarly development-oriented vein, the Mediterranean Axis imagined Spain as "a bridge between Africa, the Near East, and Europe," and signaled "the intention of increasing mathematical co-operation in this sphere." Accordingly, the ICM convened a pre-conference, the "Mathematics for Peace and Development School," that brought "young mathematicians from Arab countries (including Palestine), Latin America, Europe, and Israel attended eight courses given at the Universidad de Córdoba by prestigious mathematicians from different countries. The aim was to draw attention to mathematics as an effective means of contributing to the progress of peoples, as well as its use as a universal language for mutual understanding among different cultures." President de León contended that "co-operation is not only a matter of sending medical teams or providing financial aid. It is also necessary to co-operate in research. Arab mathematicians are starting to appear in Spanish universities, some with grants and others who are here on a more permanent basis. This is something we want to encourage; they belong to countries that need this support."[47] The European Axis, a reflection of Spain's position in Europe, occasioned a lighter tone: it was signified by the choice of venue for the 2006 IMU General Assembly, which was held in Santiago de Compostela, a UNESCO heritage site in Galicia and a historic destination for Catholic pilgrimage along the *Camino de Santiago*, or Road to Santiago, "a channel for culture and science in the Middle Ages."[48] In other words, what Spain felt it could offer the European mathematical community was a sense of history (historic *culture*, more precisely).

There's a lot to unpack with regards to the kind of STEM-diplomacy that the ICM 2006 Executive Committee was trying to effect, especially through its "geo-strategic" axes, not to mention the absurd Eurocentric posturing of it all—although, there is that, and that too is significant. That too has its topological likeness to frontier-thinking and conquest. "The violence and paranoia of the Inquisition," writes Charles Hirschkind, is "alive and well in fortress Europe... The continuous erasure of this inheritance, its transformation into a museum piece by modern historical discourse, are ideological procedures designed to shore up Europe's temporal and geographic borders."[49] Those topologies of conquest are finding new meaning in the context of contemporary pan-Europeanism: in 1987, the European Council inaugurated its "Cultural Routes of the Council of Europe" (CRCE) initiative by issuing the "The Santiago de Compostela Declaration" certifying the *Camino de Santiago* as its first "European Cultural Route."[50] The CRCE program was enabled by the 1954 European Cultural Convention, which authorized projects of common action "designed to safeguard and encourage the development of European culture."[51] Since 1987, the Council has verified over thirty so-called cultural routes, the perimeters of which extend beyond the EU and into North Africa and the Middle East,[52] to allegedly offer a model "for transnational cultural and tourism management."[53] This is, quite literally, a conservation scheme of roads white people once walked on, one that nonetheless finds coherence in an era of bordering regimes that abolitionist and migrant justice organizer Harsha Walia astutely terms "an empire of [border] externalization."[54] Imperial habits are hard to break.

During the opening proceedings of the ICM Madrid, Mayor of Madrid Alberto Ruiz Gallardón, openly declared: "Under the auspices of the Crown, and in keeping with the scientific and cultural progress that this Institution has enabled in Spain, Madrid bears today the honour and the responsibility of being the world capital of mathematical science."[55] The IMU's

overtures toward Latin American STEM communities that year is not an isolated gesture; it follows and is followed by a range of policies that strategically position Spain as a conduit for EU regional expansionism: the Ibero-American Summit,[56] EU Regional Development and structural adjustment schemes,[57] multiple integration programs that target Latin American intellectual communities[58]—which includes the EU's Erasmus Mundus program that launched the same year as the ICM.[59] This resurgent regional influence is not going unnoticed: this year, the U.S. is poised to host the first Summit of (some of) the Americas since 1994, [60] where it has been intimated that President Biden will announce a migrant relocation agreement with Spain.[61] Replaying the all-too-familiar "dynamics of capital accumulation, labor control, and citizenship regulation in relation to migration,"[62] the agreement promises to be doubly beneficial: Spain is able to address its low-wage labor shortage,[63] while the Biden Administration manages a brief respite from the Democrats' own intractable crisis, one driven by the contradictory drives of courting a disaffected middle-class immigrant voter base, and its more fundamental commitment to a race supremacist carceral border politics[64] articulated through constantly updating technofascistic modalities[65]). The year 2006 and 2022 and inextricably bound.

2006 is also 1492. The choice of venue for the General Assembly, Santiago de Compostela—a "crystallization" of ICM 2006's "support for the European space of higher education and research." Santiago de Compostela rose to prominence in the European imaginary in the second half of the eleventh century after the papacy took a colonial interest in the region, inspiring the forty-day siege and massacre of Barbastro in 1064: the "crusade before the Crusades," that "made manifest that French knights could reap substantial spiritual and material rewards by taking part in the wars in Spain," and established a decisive spiritual, political, and economic template for the Catalan crusades and European expansionism more broadly.[66] The

Camino de Santiago is comprised of a network of pilgrimage routes leading to the shrine of the Apostle James/Jacob/Yaqub, whose relics, at least in the eleventh century, were believed to be preserved within the Santiago de Compostela Cathedral—though this, too, is a locus for contested historiography.[67] The rituals of peregrination were enshrined under Roman rule but took on a specific significance in the eleventh century when history writing such as the *Historia Compostelana* and the historian Diego Gelmírez, the first archbishop of the Catholic Archdiocese of Santiago de Compostela, explicitly resurface the importance of St. James to Iberian Christianity, as well as the significance of the shrine.[68] Pilgrimage to the area was first encouraged, then incentivized (and securitized through Church militia) as a political and legal technology, which saw accomplishment in 1492 after the fall of Grenada to the expanding Empire of Isabella I of Castile and Ferdinand II of Aragon. The Catholic Monarchs (*Reyes Católicos*) would issue the Capitulations of Santa Fe (entitling Christopher Columbus) and Alhambra Decree (Edict of Expulsion) that very year.

The year 1492 is before itself, too: as historian Felipe Fernandez-Annesto explains, the conquest of Upper Andalusia—the "First 'Atlantic' Empire"—prefigured October 12, 1492, "when our Great Sorrow began."[69] There is "a tendency among historians of this subject to distinguish motives from means, as in popular detective fiction, and treat both as preconditions of European expansion," Fernandez-Annesto writes. "While the motives were of long-standing—indeed, it is hard to discern any 'new' motives in the critical period—the means were of late medieval contrivance, and lay in the development of techniques of shipbuilding, navigation, and cartography. There is something in this analysis."[70] These histories aren't just political, they're artifactual. The transmutation of Medieval Spain into a frontier, and then, from frontier to Empire, is but one among many elementary reactions interred in this history: from the vow of

taking the cross—its rituals and regalia, emerges a technology of martial professionalization; from a bureaucratic scheme intended to manage the distribution of non-combatant Crusaders emerges spiritual technologies of penance and commutation, which are then themselves transmuted into capital extraction schemes to fund military orders—who, themselves, are a category of work that transmutes combat duties into finance through Templar banking operations. And this moment of history itself, that too is transmuted: from a set of practices and symbolic orders surrounding the Crusade industries into *95 Theses*.

What I want to emphasize here is how much ICM 2006, just this one space/place/object of analysis, is *saturated* with histories, and histories of many different kinds and qualities. And it's all wildly fascinating, not to mention immensely satisfying to observe, connect, map, and objectivize. You find yourself advancing from one object to the next, surgically excising new, different, other meanings, forcing the artifactual remains of material culture to disclose to you a *truer* essence. There's an absolute thrill to this mode of inquiry, so much so that I, too, am seduced by Peter Galison's appeal to "relentless historicism."[71] But then—that's just it, isn't it—in all this talk over papal bulls, sextants, martial uniforms, and each transmutation (or *innovation*) that cascades over the next, we've left behind all historical awareness of and accountability to over 500 years of holocaust.[72] History, Trouillot writes, "begins with bodies and artifacts: living brains, fossils, texts, buildings. The bigger the material mass, the more easily it entraps us... We suspect that their concreteness hides secrets so deep that no revelation may fully dissipate their silences."[73]

2.3 SLEIGHTS OF HAND

There is definitely a politics materializing at the ICM—something much more specific than *bias*, something diametrical to anti-politicism,[74] and qualitatively distinct from "neutrality."

Neutrality is a frequent trope in critical discourses about technology. Math is not neutral, polemicizes Cathy O'Neil in the book that launched her consulting career into national prominence: "If we back away from them and treat mathematical models as a neutral and inevitable force, like the weather or the tides, we abdicate our responsibility. And the result, as we've seen, is WMDs ['Weapons of Math Destruction'] that treat us like machine parts in the workplace, that blackball employees and feast on inequities."[75] Data and algorithms are not neutral, Justin Joque writes: "As seen in sexist and racist outputs calculated from avowedly 'neutral' algorithms, the unjust epistemic terrain of daily life tends to get baked into each machine learned system and model, as well as the data from which algorithmic insights are drawn. Often, algorithms end up simply automating the bureaucratic opacity and injustice they are meant to replace. Thus, even attempts to decode how these systems make their decisions are unlikely to overturn the unjust social systems they operationalize."[76] Ruha Benjamin reminds us that names, technology, and code (among other things) are not neutral.[77] Artificial intelligence is guilty, too, writes Kate Crawford: "Artificial Intelligence is not an objective, universal, or neutral computational technique that makes determinations without human direction."[78] Stephanie Hare just wrote a whole book about it.[79]

These frequent castigations, given the obvious political consequence of computing as an industrial, intellectual, and sociocultural practice seem a bit bizarre. I've never encountered a technologist who truly believed that their creative and cognitive efforts were in the service of crafting value-neutral general-purpose artifacts, and who maintained a strict agnosticism towards how these artifacts were embedded in the world.[80] (Not to say such a person doesn't exist—just that I haven't met one.) On the one hand, I think tech neutrality has become a marquee concept for technocriticism, meaning it's an easy referent for a range of activities people point to through

which technologists deflect responsibility. On the other hand, I think something very interesting happens when the charge is made—a different kind of displacement, one that shifts focus from the political investments of the critic towards the attributed apoliticism (or ahistoricism) of the technologist.

NOTES

[1] "Iraqis Buried Alive: U.S. Attacked with Bulldozers During Gulf War Ground Attack"; Human Rights Watch, "Needless Deaths in the Gulf War."

[2] Balsamo, *Technologies of the Gendered Body*, 133.

[3] Balsamo, 201.

[4] Corera, *Cyberspies*, 160–63; Boden, *Mind as Machine*, 825.

[5] Balsamo, *Technologies of the Gendered Body*, 133.

[6] Hayles, *My Mother Was a Computer*, 1.

[7] Light, "When Computers Were Women"; Ceruzzi, "When Computers Were Human"; Grier, *When Computers Were Human*; Hicks, *Programmed Inequality*.

[8] Boggs, *American Revolution: Pages from a Negro Worker's Notebook*, 48.

[9] Boggs, 22.

[10] This fact was freely acknowledged in the first International Research Conference on the History of Computing at Los Alamos in 1976. See Tropp, "The Smithsonian Computer History Project and Some Personal Recollections," 119.

[11] Mackenzie, *Machine Learners*, 16.

[12] Koopman and Matza, "Putting Foucault to Work," 822.

[13] For example: "The problems with correlations are neither new nor limited to big data and weapons of math destruction, however. Based on eugenic reconstructions of the past and cultivated to foreclose the future, correlation contains within it the seeds of manipulation, segregation, and misrepresentation." Chun, *Discriminating Data*, 59.

[14] The examples here are numerous, but to name a few: Cheney-Lippold, "A New Algorithmic Identity"; Cheney-Lippold, *We Are Data*; Neff and Nafus, *Self-Tracking*; Lupton, *The Quantified Self*; Humphreys, *The Qualified Self*.

[15] Fay, "Learned Societies in Europe and America in the Eighteenth Century."

[16] Fagone, *The Woman Who Smashed Codes*; Center for Cryptologic History (National Security Agency), *The Friedman Legacy*; Center for Cryptologic History (National Security Agency), Boone, and Hearn, *Cryptology's Role in the Early Development of Computer Capabilities in the United States*.

[17] Mahoney, "Book Forward."

[18] Nash, "Introduction."

[19] Michel Foucault argues in *Archaeology of Knowledge*:

> It is this history that mathematics never ceases to recount about itself in the process of its own development. What it possesses at a given moment (its domain, its methods, the objects that it defines, the language that it employs) is never thrown back into the external field of non-scientificity, but is constantly undergoing redefinition (if only as an area that has fallen into disuse or temporary sterility) in the formal structure that mathematics constitutes; this past is revealed as a particular case, a naive model, a partial and insufficiently generalized sketch, of a more abstract, or more powerful theory, or one existing at a higher level; mathematics retranscribes its real historical trajectory into the vocabulary of vicinities, dependences, subordinations, progressive formalizations, and self-enveloping generalities. For this history of mathematics (the history that is constituted by mathematics itself and which mathematics recounts about itself), the algebra of Diophantus is not an experience that remains in suspense; it is a particular case of Algebra as we have known it since Abel and Galois; the Greek method of exhaustions was not an impasse that had to be escaped from; it is a naive model of integral calculus. Each historical event has its own formal level and localization. This is a recurrential analysis, which can be carried out only within a constituted science, one that has crossed its threshold of formalization. (Foucault, Archaeology of Knowledge, 189–90.)

[20] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:27.

[21] Curbera, *Mathematicians of the World, Unite!*, 301.

[22] Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: Dossier."

[23] International Mathematical Union, "Carl Friedrich Gauss Prize."

[24] International Mathematical Union, "Resolutions of the IMU General Assembly (2006)."

[25] Curbera, "The ICM through History," 297.

[26] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:4.

[27] Curbera, *Mathematicians of the World, Unite!*, xv.

[28] Curbera, 7; O'Connor and Robertson, "1893 International Mathematical Congress - Chicago."

[29] O'Connor and Robertson, "1893 International Mathematical Congress - Chicago."

[30] Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: 'Fractal Art: Beauty and Mathematics' Exhibition (Wayback Archive)."

[31] Asociación International Congress of Mathematician, "International Congress of Mathematicians MADRID 2006: 'The Life of Numbers' Exhibition (Wayback Archive)."

[32] Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: 'History of Mathematical Knowledge. Bibliographical Exhibition' Exhibition (Wayback Archive)."

[33] Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: 'The ICM through History' Exhibition (Wayback Archive)."

[34] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:9.

[35] "Navigate through ICM."

[36] Curbera, *Mathematicians of the World, Unite!*

[37] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:9.

[38] Computing historian Michael Mahoney, a formative figure in the field who I will discuss more extensively in Chapter 4, described this as a kind of "historical self-consciousness" that he would often observe in practitioners— though one that is open to error, in his judgement In a footnote, he adds, as though to demonstrate, "One has to wonder about an article on software engineering that envisions progress on an industrial model and uses photographs taken from the Great Depression." Mahoney, *Histories of Computing*, 35, 211.

[39] Jackson, "International Congress of Mathematicians 2006."

[40] Grigory Perelman, one of the two recipients of the 2006 Fields Medal ("the Nobel Prize of mathematics"), declined to accept, expressing his dismay over the lax ethics in the international mathematics community—a first. See Nasar and Gruber, "Manifold Destiny: A Legendary Problem and the Battle over Who Solved It."

[41] Malazita and Resetar, "Infrastructures of Abstraction."

[42] In an interview with Peter Lax (Abel Prize-winner, 2005), Lax described this inter-community bond: "During the harshest days of the Cold War, Soviet mathematicians and American mathematicians developed very close friendships; mathematics is a bond that transcends political and cultural differences." Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: Bulletin 11 (Wayback Archive)."

[43] The IMU's 'non-discrimination policy' has its origins in prohibitions placed against Germany and the Central Powers from participating in IMU activities after World War I—or, more specifically, the reaction to these prohibitions. The policy was immediately subject to vigorous objections and ultimately reversed after the American Mathematical Society (among others) threatened to pull funding and support. When plans were underway to reinstate the Congress after WWII, the AMS informed the Executive Committee that it was "interested in the revival of plans for the Congress only if the Congress could be an open Congress to which all mathematicians would be invited, irrespective of national allegiance," which ultimately resulted in the adoption of a non-discrimination policy in 1946. Lehto, *Mathematics Without Borders*, 74.

In the 1970s and 80s, the IMU aggressively applied the non-discrimination policy to prohibit travel sanctions against apartheid South Africa. In 1978, one year after the assassination of Stephen Biko, the Finnish government was deterred from imposing travel restrictions on South African mathematicians after the organizing committee appealed "to the principle of the free circulation of scientists." Curbera, *Mathematicians of the World, Unite!*, 203. In 1986, against the backdrop of a movement to bar the Republic of South Africa from the activities of one of ICMI's (International Commission on Mathematical Instruction) affiliated study groups, the IMU General Assembly at ICM Berkeley adopted a resolution explicitly reaffirming an ICSU article on non-discrimination:

> One of the principal objectives of the IMU is to promote international cooperation for the advancement of mathematics. It is therefore of fundamental importance that adhering organizations support the basic policy of non-discrimination including freedom of access to higher education, publication in international journals, and participation in mathematical meetings, as expressed … [as such] shall observe the basic policy of non-discrimination and affirm the rights of scientists throughout the world to adhere to or to associate with international scientific activity without regard to race, religion, political philosophy, ethnic origin, citizenship, language, or sex." International Mathematical Union, "Resolutions Made at the Tenth General Assembly in Oakland, U.S.A. (1986)."

There was a lively debate in the June 1986 *ICMI Bulletin*: views were expressed both in favor of and against leveraging the non-discrimination policy to undermine sanctions. The IMU's then-Secretary, A.G. Howson, wrote in an opinion piece that "The matter is not easy, but on balance I fear we have much more to lose than to gain from banning South Africans." Lehto, *Mathematics Without Borders*, 261.

[44] For Turner, "agonistic politics" becomes coterminous with The New Left: "The New Communalists parsed this dilemma by fusing the technocentrism and celebration of knowledge

and experimentation common to the cold war research world with their individual quests to create alternative communities. As they turned away from the agonistic politics of the New Left, the New Communalists turned toward what they imagined to be a world interlinked by invisible systems." Turner, *From Counterculture to Cyberculture*, 244. It's also worth noting that, commensurate with that ethos, the entire discussion of racial politics is designated less than one-third of a page in Turner's canonical text—a mention of the temporal overlap between the *Whole Earth Catalog* and the freedom struggles of the Panthers and AIM (American Indian Movement) and the anemic attempts "to deal with race." Racial politics for Turner is subsumed by "questions of gender, race, and class," which, in turn, is subsumed by "agonistic politics." Turner, 97.

In the case of McPherson, I offer the random aside to an otherwise fascinating essay that incensed me in 2015 when I first read it (a few months after Darren Wilson, Michael Brown Jr.'s assailant, was acquitted by a St. Louis County grand jury):

> Let me be clear," McPherson writes, "By drawing analogies between shifting racial and political formations and the emerging structures of digital computing in the late 1960s, I am not arguing that the programmers creating UNIX at Bell Labs and in Berkeley were consciously encoding new modes of racism and racial understanding into digital systems. (Indeed, many of these programmers were themselves left-leaning hippies, and the overlaps between the counterculture and early computing culture run deep, as Fred Turner has illustrated.) ... The emergence of covert racism and its rhetoric of color blindness are not so much intentional as systemic. Computation is a primary delivery method of these new systems, and it seems at best naive to imagine that cultural and computational operating systems don't mutually infect one another. McPherson, "Why Are the Digital Humanities So White? Or Thinking the Histories of Race and Computation."

I don't want to belabor the point, but here's one, brief, beautifully articulated excerpt from a letter written by 'Phil Allen' of Stony Brook, New York to the *Science for the People* circular in 1971, later referred to as the "Conditions at Bell Labs" Letter:

> The bulk of the lab is working on 'Bell System' type work; also, there are approximately 1,300 employees at Whippany doing military work on Gov't contract ... The crack in the ivory tower is a steady leak of research personnel into applied (Bell-System or Military) research ... Blacks at BTL have always felt oppressed; promotions were rare and racially insensitive peers and supervisors are the rule. It is only within the last year, however, that the Blacks have gotten together and realized they were all in the same boat—PhD's, MBA's, BA's, secretaries and caretakers all had common grievances, but hadn't been able to break down class distinctions and get organized. A year ago, organization finally began, so quietly that the administration was totally taken by surprise, and forced to negotiate. This movement was accomplished so quietly and skillfully that most people here, outside the Blacks and higher level administrators, are unaware that a revolution of sorts actually took place. Allen, "Letters: Dear Mario."

[45] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:5.

[46] Asociación International Congress of Mathematicians, "International Congress of Mathematicians MADRID 2006: Bulletin 11 (Wayback Archive)."

[47] Asociación International Congress of Mathematicians.

[48] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:5, 7, 17, 27.

[49] Hirschkind, *The Feeling of History*, 2–3.

[50] European Council, "The Santiago de Compostela Declaration."

[51] "European Cultural Convention."

[52] Council of Europe, "'Countries Crossed by Cultural Routes of the Council of Europe' (Wayback Archive)."

[53] European Council, "Cultural Routes of the Council of Europe Programme."

[54] Walia, *Border and Rule*.

[55] Sanz-Sole et al., *Proceedings of the International Congress of Mathematicians, Madrid 2006*, 1:30.

[56] "Ibero-American Summits."

[57] Tondl, *Trade, Integration and Economic Development*; Dominguez, *EU Foreign Policy Towards Latin America*.

[58] Cortina and Sánchez, "Spanish Bilateral Initiatives for Education in Latin America."

[59] Cortina and Sánchez; Dominguez, *EU Foreign Policy Towards Latin America*, 41–42.

[60] Spetalnick, "Cuba, Nicaragua, Venezuela's Maduro Government Unlikely to Be Invited to Regional Summit -U.S."

[61] Kight, "Scoop"; "Joint Statement on the Meeting of the U.S.-Spain Working Group on Central America."

[62] Walia, *Border and Rule*, 178.

[63] Pons and Carreño, "Worker Shortage Jeopardises Spain's EU-Funded Recovery Plan."

[64] Walia, *Border and Rule*, 76–81, 107; Vitale, "Border Policing."

[65] Refer here to the crucial work and community research projects undertaken by the folks at Just Futures Law, Mijente, CA Immigrant Defense Advocates, Immigrant Defense Project, Detention Watch, California Collaborative for Immigrant Justice, among others. "Just Futures Law: Fighting for a Future beyond Deportation & Criminalization."; Just Futures Law and Barros, "Press Release: A Virtual Wall Is Trump's Wall by Another Name."; "Mijente: Un Eje Político."; "Immigrant Defense Advocates."; "Immigrant Defense Project: Fighting for Justice & Human Rights for All."; "Detention Watch Network."; "California Collaborative for Immigrant Justice." Also of interest is the Community Justice Exchange's 2022 report, "From Data Criminalization to Prison Abolition," which launched alongside a public education platform: Community Justice Exchange, "From Data Criminalization to Prison Abolition." For a deeper discussion of how liberal governance is ideologically and politically motivated to advance a technosolutionist carceral agenda, see: "From Data Criminalization to Prison Abolition" Launch Event, featuring Harsha Walia, J. Khadijah Abdurahman, Jacinta González, Sarah T. Hamid, and Puck Lo. Haymarket Books, "From Data Criminalization to Prison Abolition."

[66] O'Callaghan, *Reconquest and Crusade in Medieval Spain*, 24–27.

[67] Duchesne, "Saint Jacques en Galice."

[68] Fletcher, *Saint James's Catapult*, 53–54.

[69] Peltier, *Prison Writings*.

[70] Fernandez-Armesto, *Before Columbus*. See also: McCrank, *Medieval Frontier History in New Catalonia*.

[71] Galison, "Ten Problems in History and Philosophy of Science."

[72] Wolfe, *Traces of History*.

[73] Trouillot, *Silencing the Past*, 29–30.

[74] Malazita and Resetar, "Infrastructures of Abstraction."

[75] O'Neil, *Weapons of Math Destruction*.

[76] Joque, *Revolutionary Mathematics*.

[77] Benjamin, *Race After Technology*.

[78] Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*.

[79] Hare, *Technology Is Not Neutral*.

[80] This is an anecdotal claim grounded largely in my experience organizing on college and industry campuses with campaigns designed to interrupt 'school-to-defense industry-pipeline.' (For examples, see: "#NoTechForICE"; "No Tech For Apartheid.") Campaigns like these are templated after the Black Power, immigrant, Puerto Rican, and Third World Women's Alliance

campus activism of the 1960s and 70s, catalogued extensively in academic social movement research. See, among others: Murch, *Living for the City*; Gosse, *The Movements of the New Left, 1950-1975*. These efforts, which have gained momentum recently: "Math Boycotts"; Anonymous, "We Are Google and Amazon Workers. We Condemn Project Nimbus." are campaigns of persuasion and rhetoric. They require building a shared vocabulary around and commitment toward the domain of action—in other words, solidarity building. As such, pipeline campaigns demand a precise analysis of the beliefs and ideological commitments of STEM students and practitioners we attempt to activate, mobilize, and enter into community with.

3. COMPUTING AS TECHNOLOGY

In April 1978, Melvin Kranzberg, the "George Sarton of nuts and bolts,"[1] was asked to testify before the U.S. House of Representatives' Committee on Science and Technology during a congressional review of the progress and efforts of the Office of Technology Assessment (OTA), which had been authorized in 1972.[2] Kranzberg, the founder of the Society for the History of Technology and its quarterly journal, *Technology and Culture*, was then the Callaway Professor of the History of Technology of the Department of Social Sciences at Georgia Institute of Technology—which just one of a number of significant professional designations.[3] He began his testimony with admonitions that feels both prescient and familiar: "Technologies," he argued, "are interdependent and increase men's dependency upon one another and upon technology itself. As a result of this interdependence, perturbations in one element of the system can bring about almost disastrous consequences in other parts of the system." His support of technology assessments reflects an understanding of the "deepening impact of technology upon our lives and society," especially given the unexpected ways in which "several technologies coming together and interacting with other elements of society produce widespread social effects which do not seem inherent in the separate technologies themselves. A series of technical developments can thus have synergistic social effects."[4]

The testimony then took a bizarre turn, so much so that I think it worth reproducing in its entirety here. Kranzberg continues:

> For example, a series of technological changes are intimately bound up with the black revolution in today's America. The development of the mechanical cotton picker deprived the Negro field hand of his livelihood. There was no longer place or need for unskilled labor on Southern farms, so a vast migration of blacks flowed from Southern rural regions to Northern cities. Between 1940 and 1970, some 4.4 million blacks left the South. But the black migrant to the Northern industrial centers was again the victim of advancing technology, for he could find no place in today's sophisticated technology. In

the 1950's and 1960's we saw a new phenomenon in Western history; large-scale unemployment while thousands of jobs went begging. There was simply no match between the openings requiring highly skilled workmen, and the available labor supply. Compounding the frustrations of the blacks was another miracle of modern technology, the television set. Into the shabby living rooms of the Negro relief client were piped the dreams and sugar-coated realities of our affluent society. He was invited to spend hours watching how good life was—for everybody else—and hearing about products which everyone seemed able to buy. except him. For the first time in history, the disinherited could see the affluence of the wealthy intimately. with immediate perception of what they were missing. They wanted to partake of the great outpouring of goods which advancing technology had made possible and yet they were denied all legal and socially accepted means to obtain them. And so we packaged wealth and privilege for television. We displayed it publicly to the poor and nonprivileged whom we barred from the system. Then we wondered why they rioted and looted.[5]

I want to highlight four specific features of Kranzberg's thinking:

- *First*, Melvin Kranzberg (author of the infamous "Kranzberg's Laws,"[6] the first and most famous of which is, "technology is neither good nor bad; nor is it neutral"[7]), entertains a complex, non-essential, non-deterministic view of technology, one in which the political consequences of technological systems are an emergent, "synergistic" effect.
- *Second*, these synergistic effects demand increased democratic attention to the role of technology in public governance. Technology assessment functions as a "step in governmental intervention for the common good,"[8] and "a rational means for democratic control and guidance of technology,"[9] that institutionalizes a mode of "Participatory Democracy" he viewed favorably.[10] This is a theory of *politics* as much as it is a theory of technology.
- *Third*, though complex, and admittedly cause for concern (Kranzberg admits, "Who would have thought that 'America the Beautiful' would be pockmarked by the rash of urban blight, the ugly scars of strip mining and the varicose arteries of the freeways!"[11]), these synergistic effects are still no reason to adopt a naïvely pessimistic posture toward

technology, a view animated by either "the romantic longing for a nonexistent past" or the nonspecific concerns of some that the engineering imperatives of efficiency and economy are "taking precedence over humanistic values, ethical considerations and aesthetic concerns."[12] According to Kranzberg, though we "have not yet reached the material utopia envisioned at the beginning of the century," there was still occasion to believe in "the prospect of a world where poverty had ended, where democratic society had spread the blessings of liberty and equality to all mankind, where machines were to perform all wearisome toil so that men could live in leisure, where universal education had blotted out all traces of ignorance and superstition, and where international peace and brotherhood reigned."[13] "America is still promises," he argued. "We can make those promises come true if we have the will to utilize our technological skills and the wisdom to direct our technology to take us where we want to go."

- *Lastly*, I want to draw particular attention to the fact that, for Kranzberg, even as America enters its third and most promising century, Black Americans remain poor, segregated, and outside the history of America. For Kranzberg, there is no contradiction between the conviction that, on the one hand, American civilization is hurdling towards a more democratic and prosperous future bound up in (its) technological advancement. On the other hand, Black America can find no place within that civilization or "today's sophisticated technology."

Kranzberg's thinking, it turns out, is unremarkable for his time and context. Just one year before this hearing, Russell W. Peterson, former Governor of Delaware and influential environmentalist (Peterson received a lifetime achievement award from the League of Conservation Voters in 1995[14]) gave a speech before the Aspen Institute for Humanistic Studies

as the then-Acting Director of the OTA (he would accept the Directorship in January 1978).[15] The lecture, titled “Looking back from the Year 2000,” offers a speculative rumination on the Year 2000, modeled after Edward Bellamy’s *Looking Backward: 2000-1887*.[16] “What a piker am I to venture forth to look back only 23 years," Peterson retorts. In this fantastical future, Peterson, then projected to be 83 years old, plays out a series of fantasies for the audience: given the ecological temperament of the time, developers have been pushed back from despoiling Rehoboth Beach, Delaware, where he lives with his wife Lillian. There is no unemployment, thanks to President Mary Jones’ Job Security Act: “Her first year in office reminded me of Franklin Delano Roosevelt’s first year. In one fell swoop she wiped out the single most serious injustice in our country to be denied a job because the system did not produce enough jobs to go around.” Jones’ Job Security Act wipes out the welfare dole: “When a person loses a job, he or she is immediately offered a public job but no welfare dole. This has eliminated the debilitating impact on human dignity of being forced to accept charity and has furthered the psychological health of the breadwinner’s family.” Peterson describes how the public job guarantee has furnished urban America with low- and middle-income housing, parks and refuges, bike paths, and solar power. Erin, his granddaughter, is a bank manager living in New York among “people of such varied cultural backgrounds,” where the crime rate has plummeted “since there is little incentive for them to break the law to try to fulfill their most basic needs.”

The year 2000 sounds remarkable, except: “My granddaughter Karin works for the U.S. Immigration Service. She is quite upset about the great hostility between Mexico and the United States and worried about the possibility of open conflict... the millions of U.S. citizens of Mexican birth or ancestry are clamoring for admission of relatives and friends to rescue them from abject poverty... We have over the years added guards upon guards and electronic device

upon electronic device along the border until we now get accused of having built a modern Berlin Wall." What's more, Peterson then contrives a fake adopted son that he loses to a terrorist attack:

> Within two hours after the explosion documents were delivered to the President and the Congress demanding that within one week they vote to send, gratis, one-fourth of all U.S. production of grain to those countries in Latin American and Africa where over one-half million people have starved to death. This horrible famine was caused by the serious drought that had plagued those areas, and by the failure of the world community to establish a food reserve for such contingencies.[17]

Even if his wildest eco-utopian fantasy, Peterson imagines a woman in the White House, but can't *not* imagine the abjection of racialized and racially criminalized people.

Kranzberg and Peterson are by no means alone—or even original—in their thinking. In fact, they belong to a long-standing Anglo-European traditional of placing colonized people *outside* of history. "Georg Wilhelm Friedrich Hegel, one of the most important political philosophers of the modern era, denied that Africa has any history because blacks could not write and suggested that blacks were morally improved by being enslaved," notes Judson Jeffries. Hegel "spoke about the African American as 'natural man in his wild and untamed nature' and argued that there is 'nothing remotely humanized in the Negro's character.'"[18] Here, Jeffries is tracking a mode of racially motivated critique that has a long-standing tradition within the white scholarly community, one that denies the achievement of Black and racialized intellectuals. But it's still important to track how that broad libidinal substrate of race supremacy articulated itself,[19] throughout history, in different ways, just as with "race,"[20] the floating signifier.[21] Exemplary here is Johannes Fabian's study of Anglo-American and French anthropology and the chronotemporal orientation these academic communities fostered towards their objects of surveillance and study.[22] Anthropology's allochronism—an effective primitivization of

colonized peoples—was more than a methodological fallacy. As Fabian demonstrates, it was an orientation towards the history of other people that constituted anthropology itself as an intellectual vantage, i.e., from whence anthropology acquired objectivity and scientificity. Yes, one could make the case that these were race supremacists (as one probably could in the case of Kranzberg and Peterson), but their specific relationship to historicity is better explained in relation to a more specific project: that of anthropology itself.

This chapter positions Kranzberg and Peterson's temporal disenfranchisement of Black Americans in a tradition of thinking which also has a positive project: American civilization. Specifically, a civilizational project bound up in technology. "Technology has long been the unacknowledged source of European and Euro-American superiority within modernity, and its underlying mythos," argues Joel Dinerstein.[23] Technology functions as an incubator for stadial thinking,[24] exceptionalism, and race supremacy.[25] This effect is multiplied by the conceptual ambiguity technology affords: "Earlier I asked, 'What sort of entity is technology?' But the truth seems to be that it is not an entity at all," Leo Marx writes. He continues:

> An entity, according to my dictionary, is something that exists as a particular and discrete unit. But technology, in the sense of the mechanic arts collectively, lacks both particularity and discreetness, and indeed it is no sort of unit whatever. This elusive nonentity cannot be identified with any particular kind of artifact, or any particular social group, profession, or institution; nor does it represent any specifiable body of ideas, methods, or principles. This semantic vacuity is tacitly confirmed by the apparent inability of philosophers to say exactly what they mean by technology.[26]

"The chief hazard attributable to the concept of technology, as currently used, is the mystification, passivity, and fatalism it helps to engender," Marx contends.[27] Through technology, normative beliefs and suppositions are trafficked whose net effect is to constitute the same modes of disinheritance found in the technocratic (and race-supremacist) thinking of Kranzberg and Peterson.

3.1 AMERICAN CIVILIZATION AND CHARLES BEARD

W.E.B. Du Bois's Black Reconstruction in America: An Essay Toward a History of the Part Which Black Folk Played in the Attempt to Reconstruct Democracy in America, 1860–1880 is a self-consciously historical text, one that possesses *a theory of history*. "It was not simply a historical work," writes Cedric Robinson, "but history subjected to theory."[28] Black Reconstruction recovers a history of collective mass action among enslaved, then emancipated, Black communities during the Civil War and Reconstruction Era—collective action which has "achieved the force of a historical antilogic to racism, slavery, and capitalism."[29] This recovery required of Du Bois a direct confrontation with American historiography, "with its racial biases, domineering regionalisms, and distorting philosophical commitments."[30] In the book's final chapter, "The Propaganda of History," Du Bois describes, with painstaking detail, the failure and blatant race-prejudice of professional historians who have played a role in crafting the consensus view of Reconstruction: one that was sympathetic and conciliatory toward Southern secessionists, condemnatory towards abolitionist views and actions, and denigrating of Black Americans before and after the Civil War. This consensus history emerged at the same time as the professionalization of history writing in U.S. universities. At the end of the nineteenth century, writes Richard Hofstadter, a practice that had been "dominated by well-to-do gentlemen-amateurs inspired by a literary ideal and writing grand narrative history" became the trade of academically trained and academically employed professionals, "inspired by the scientific ideal, and writing for the most part highly focused monographic inquiries intended for other professionals."[31]

The Civil War and Reconstruction, as a historical problem, serviced this burgeoning guild[32] in at least two ways: first, it issued a sense of urgency and greater purpose—"the great

task of national reconciliation, healing the wounds of the Civil War and Reconstruction, re-pairing and deepening national unity" to which historians could contribute, and second, it forced practitioners away from modes of pre-professional historical writing that were overwhelmingly local and sectional, "often in the most narrow and bigoted fashion." At the turn of the century, "The nationalization of historical perspective, the escape from parochialism, was a high-priority item on the professional historical agenda," writes Peter Novick.[33] To this list, Novick adds a third vector:

> The deliberate negotiation of a mutually acceptable version of the sectional conflict, of a consensual 'usable past,' was clearly a central strategy of the new professionals. In effecting the reconciliation, they had a powerful ally, whose contribution was indispensable: the pervasive racism which—across regions, classes, and political persuasions—dominated the thought of the period… The near unanimous racism of northern historians—not, of course, peculiar to them—made possible a negotiated settlement of sectional differences in the interpretation of the Civil War and Reconstruction.[34]

It is this "nationalist and racist historiographical consensus"[35] that *Black Reconstruction* had to work against. "Our histories tend to discuss American slavery so impartially, that in the end nobody seems to have done wrong and everybody was right. Slavery appears to have been thrust upon unwilling helpless America, while the South was blameless in becoming its center," Du Bois writes. "The difference of development, North and South, is explained as a sort of working out of cosmic social and economic law."[36] Prototypical of this propagandistic history is the work of Charles and Mary Beard (italics added):

> One reads, for instance, Charles and Mary Beard's *Rise of American Civilization*, with a comfortable feeling that nothing right or wrong is involved. Manufacturing and industry develop in the North; agrarian feudalism develops in the South. They clash, as winds and waters strive, and the stronger forces develop the tremendous industrial machine that governs us so magnificently and selfishly today. Yet in this *sweeping mechanistic interpretation*, there is no room for the real plot of the story, for the clear mistake and guilt of rebuilding a new slavery of the working class in the midst of a fateful experiment

> in democracy; for the triumph of sheer moral courage and sacrifice in the abolition crusade; and for the hurt and struggle of degraded black millions in their fight for freedom and their attempt to enter democracy. Can all this be omitted or half suppressed in a treatise that calls itself scientific?[37]

The Rise of American Civilization, by spouses Charles Austin Beard and Mary Ritter Beard,[38] was published in 1927 to wide acclaim.[39] The text was pivotal for Beard in more ways than one: it marked a turning point in his intellectual development, one in which he readily acknowledged "that the conceptions men held in their minds had affected the course of history; the idea of progress in particular had served Americans as 'the most dynamic social theory ever shaped in the history of thought.'"[40] Far from being responsive to the charge of empirical penury levelled by Du Bois, Beard had begun to pursue an activist historiography in "revolt against the confines of strict empiricism and to assert in its stead a conscious historical experimentalism," writes David Marcell. "Recognition of empiricism's limitations forced Beard to turn his attention toward the ethical framework within which the instrumentality of the empirical method could be used to end the crisis."[41]

"When he began *The Rise of American Civilization* with the words, 'The history of civilization, if intelligently conceived, may be an instrument of civilization,'" Hofstadter writes, "he [Beard] expressed a characteristic ideal that became even stronger with time… it became clear to him that historical writing would not perform this function automatically, that it must serve activist criticism and forge a social idealism consonant with the needs of the hour."[42] Civilization was therefore a triple investment for Beard, one that has a strong effect on Beardian historiography: an investment in activist historiography, in progressivism, and in technology. That same year that *Rise of American Civilization* was published, Charles Beard delivered the Presidential Address before the American Political Science Association's annual meeting in St.

Louis, Missouri. The talk, titled "Time, Technology, and the Creative Spirit in Political Science," made specific gestures toward the double meaning of "mechanistic" implied by Du Bois in the phrase I emphasized above. First: Beard's historical thought in the late 1920s was dominated by machines, technologies, and scientific advancement. In his address, Beard calls on his academic peers to connect their disciplinary practice "with the flowing stream of time and technology," for "time and technology move relentlessly upon all mankind and all institutions."[43] Eric Schatzberg offers a considerable account of the theory of technology that informs Beard's historical writing; he traces the influence of Thorstein Veblen in Beard's thinking, which, coupled with an "economic view of history, stripped of its Marxist dialectic" implied a strong technological determinism that "offered promise that material progress could lay the basis for moral progress."[44] He argues that, "With Beard, one sees not only the merging of *technology* with progress, but also the blurring of the distinction between science and *technology* that would bedevil scholarly use of the term in the future."[45] For Schatzberg, Beardian historiography about technology erects a genre all its own: an *apologetics*.

The relentless force of technological and industrial advancement was the prime mover of history for Beard, so much so that all other factors that animated Southern secessionism (namely, slavery) were subordinated to contestation over capital and industrial wealth. Hofstadter writes: "He was little interested in the argument over the morality of slavery, and he dismissed the agitations of the abolitionists as of small direct consequence because of their lack of appeal to the public. Neither did legalistic arguments over states' rights and secession detain him, nor the strategems and battles that had long fascinated military antiquarians." Instead, what was key to Beard's interpretation of the Civil War as the "Second American Revolution" was "the battle between capitalists and planters over measures of national policy: tariffs, homesteads, railroad

land grants, banking, and currency."[46] The economism of Beardian historiography subordinates specific recognition of ongoing historical processes of white supremacy and imperialism and displaces them with a caricature of power analysis. Economism deliberately invalidates discussion of the violent contexts of technology's emergence as extra-diegetical to more "rational," "universal," and, ultimately, governable historical process.[47]

3.2 DERACINATING TECHNO-CIVILIZATIONAL HISTORIOGRAPHY

The historiography of Melvin Kranzberg and Charles Beard can easily be dismissed as the kind of techno-utopian humanism that resembles the self-interested empowering today's industry enthusiasts to see the world as a nailbed.[48] In fact, they often are dismissed this way: Schatzberg writes that "Beard's prose could serve as copy for present-day technological enthusiasts… His concept of technology, with its firm faith in human progress, was better suited to defending the established order than critiquing it."[49] Similarly, Wisnioski writes about the "ideology of technological change"[50] engendered by influential post-1960s thinkers like Kranzberg. The Society for the History of Technology and its journal *Technology and Culture*, Wisnioski argues, "was a critical site of interaction" between humanists and technologists; "SHOT could be an engineer's first point of contact with the ideas of Mumford and Ellul, but it more likely served to reinforce an ideology of technological change... Melvin Kranzberg, SHOT's motive force, was a proponent of the culture lag thesis, a defender against technology's critical theorists, and a major engineering education reformer."[51] Wisnioski later adds that, "This affinity for technology as a positive social force shaped how humanist and social scientific educators guided engineering students through texts. Kranzberg and [Carroll] Pursell's 1967 anthology *Technology and Western Civilization* began in the Stone Age to demonstrate technology's centrality to humanity. Developed at the request of the United Armed Forces

Institute and Extension branch of the University of Wisconsin, the book hinted at technology's "ambivalence," but concluded that the "acceleration of technology" made the twentieth century the "American Century.'"[52] Ultimately, for Wisnioski, it is Kranzberg's "near-utopian belief in technology's beneficence"[53] that damns him—an ideological (and irrational) commitment to engineering and technology as a force for good which subordinates the more palatable normative commitments that engineers in the 1960s are coaxed away from (civil rights, nuclear de-proliferation, anti-militarism, sustainability, welfare provision, ameliorating low wage labor conditions—in other words, political commitments that can better attend to the contemporary "environment of globalization, climate change, terrorism, and controversial wars"[54]).

I think the criticism Wisnioski makes here of Kranzberg's thinking (and that of the New Engineers more broadly) is productive, as is Schatzberg's challenge to Beardianism, but both critics neglect something quite specific: technology is, for both Kranzberg and Beard, a *race-making*[55] project. Deracinating this mode of civilizational technologism shares a likeness with similarly inadequate challenges to computer-mediated carceral violence posed by concepts like "technochauvinism" (the belief that "tech is always the solution.")[56] "Technochauvinism," and it's various cousin concepts—"technocentricity,"[57] "technological solutionism,"[58] "technosolutionist platform-think,"[59] "the enchantments of tech solutionism,"[60] and the fabled[61] "technical solutions to social problems"[62]—abandons the specific for formulaic to the effect that technosolutionism can be dismissed as a cognitive bias or a categorical error, the innocent byproduct of over-enthusiastic application of one mode of problem solving to all other domains. The spectrum of ideological postures encompassed by technologism or technosolutionism, I argue, should instead be conceived of as a *political orientation*, one that is scripted through projects of racial supremacy, civilization, and Empire.[63]

In *Whither Mankind: A Panorama of Modern Civilization*, a collection edited by Beard in 1928, he describes 'civilization' it its "strict modern sense," including "all these implements, devices, and practices by which men and women lift themselves above savages—the whole economic order, the system of leisure built upon it, the employment of that leisure, and all manifestation of religion, beauty, and appreciation."[64] For Beard, 'ours' (American) civilization is, at its core, a technological one, and without a continuous advance of science technology, we risk losing both civilization and the West: "Unless there is a material decline in Western technology—and no evidence of such a slip is now in sight—then it may be safely contended that none of the agricultural civilizations of Asia or Africa will ever catch up with the scientific development of the West… If, in due time, the East smashes the West on the battlefield, it will be because the West has completely overtaken the technology of the West, gone it one better, and thus become Western in civilization."[65] Beard is not naïve: writing with his son, William (an MIT graduate) in 1931, he describes how "technology brings new perils in its train: falling aircraft, the solution streams, and dangerous explosives. It makes possible new forms of law violation: safe blowing, machine gun banditry, wiretapping, and submarine smuggling... It is accompanied by hazardous industries with increases in the number of injured and defective for whom provision must be made... If governments tried to cling to the functions assigned to them in the eighteenth century, modern societies could scarcely escape disaster."[66] Instead of a blind techno-optimism, the Beards advocate for a new and specific techno-political discourse, one that properly attends to the various crisis brought on by industrialization through the insights of human sciences: "The problem before us, therefore, is that of combining with the noblest philosophy with the most efficient use of all instrumentalities of the modern age—a challenge to human powers on a higher level of creative purpose."[67]

Through the machinations of these human sciences,[68] it took very little effort for the Beards' techno-humanistic endeavors to enact a calculated disinheritance of *other* Americans, those they find incompatible with the technoracial fantasies animating their civilizational project. For instance, the Beards characterize the displacement, forced assimilation, and genocide of Native communities as "the only alternative to their extinction."

> In the long run… the maintenance of primitive societies with large, landed interests in the midst of a highly developed industrial country proved to be exceedingly difficult. Confronted by this situation, the Government has evolved a definite politics looking to the final incorporation of the Indians into American civilization and the conversion of their tribal lands into individual and private property under the American system. The controlling principle of administration in this connection, therefore, is to prepare the Indian for life as a regular citizen of the United States, in the hope that he will find greater satisfaction in adapting himself to the prevailing footsteps of his ancestors now that the primitive conditions will disappear.[69]

This explains why I feel confident in casting Charles Beard as Melvin Kranzberg's progenitor. These two historians weren't just invested in technology as an abstract, rarefied notion; they are invested in technology as a racially specific *American*, project, one being advanced concomitantly with the expanding global footprint of U.S. Empire.[70]

Here is where the two historicities, that of mathematics and technology, entangle. If there is one thing to abscond from the self-referential scholarly writings of historians of science (or math, technology, and computing), it's that euromodern[71] reason should never be understood as just that. Instead, it was (and continues to be) a complex latticework of provincial rationalities: a bundle of epistemic localities, stacked on top of one another in a way that perpetuates its own advance through the circulation of myths such as 'criticism,'[72] 'mechanical objectivity,'[73] 'tolerance,'[74] 'system,'[75] and, ultimately, a reactionary dialectics of knowledge.[76] More importantly, the contradiction and paradoxes of the euromodern scientific tradition is ultimately resolved through an attitude of race supremacy.

This argument advances through four gestures:

- *First*, euromodern technoscience claims for itself a tradition. That tradition coheres through the conceptual ambiguity that Leo Marx indicates,[77] suturing together the artifacts, social groups, profession, institutions, unspecified body of ideas, methods, and principles under the marquee of a single civilizational/civilization's achievement.
- *Second*, that same civilization project, through the work of historians (of science, mathematics, technology, and computing), reaches through the wellspring of universal time to capture the scientific achievements of the very people slaughtered and dispossessed to fabricate a history for that manufactured tradition.[78]
- *Third*, that history is articulated and understood through a stadial logic: a mythology of development and progress wherein the civilizational project of Anglo Europeans becomes the so-called progress against which all others are inadequate or ultimately derivative.[79]
- *Finally*, in speaking from this position—the pinnacle of civilization[80]—the euromodern technoscientific tradition has erected for itself a double expertise: that of technoscience itself, and that of appraising technoscience and how it should (or should not) be historicized.

That slavery is *ir*rational and, somehow, the mechanical cotton picker[81] is not, gains coherence against the backdrop of this racial project, the same racial project that helps explains why "racial eugenics," imagined through the anemic caricature of a once historic error in judgement—a backroad that science should never have taken— is irrational, but computing the crimogenic variables that predict gun violence victimization through social contagion modeling is not.[82] In other words, it explains why white supremacist carceral violence and settler colonial

dispossession are irrational, and computing is not, despite both being a signature feature of U.S.

Empire.

NOTES

[1] Seely, "SHOT, the History of Technology, and Engineering Education," 759.

[2] The Technology Assessment Act of 1972. In *Engineers for Change: Competing Visions of Technology in 1960s America*, Matthew Wisnioski describes the OTA's emergence and its initial entanglement with a "self-consciously normative" 1964 program established at Harvard University under the aegis of a $5 million grant from IBM to for a ten-year study of the social effects of technology. "The Harvard Program's biggest impact was on the federal government. When Congress waded into debates about out-of-control technology, it turned to Harvard for expertise. In 1969, largely due to the efforts of Congressman Daddario, the Committee on Science and Astronautics of the US House of Representatives convened to discuss technology assessment. Brooks chaired the panel, which included testimony from Harvard Program scholars," Wisnioski writes. "To 'discipline technological progress' Congress approved the Office of Technology Assessment (OTA), an organization that would provide expert analysis for nearly a quarter-century until it was eliminated in 1995." During his testimony, Emmanuel G. Mesthene (a relatively unknown RAND analyst who had been appointed executive director of the Harvard program), "reiterated the positive effects of technology. He described criticism of technology itself as one of the problems assessment might solve." Wisnioski, *Engineers for Change*, 51–54.

[3] Technology, *Review of the Office of Technology Assessment and Its Organic Act*, 4.

[4] Technology, 4.

[5] Technology, 4–5.

[6] Kranzberg, "Technology and History."

[7] Sacasas, "Kranzberg's Six Laws of Technology, a Metaphor, and a Story."

[8] Technology, *Review of the Office of Technology Assessment and Its Organic Act*, 7.

[9] Technology, 8.

[10] Technology, 12.

[11] Technology, 8.

[12] Technology, 6.

[13] Technology, 8.

[14] "Russell W. Peterson."

[15] Peterson, "Looking Back from the Year 2000."

[16] Bellamy, *Looking Backward*.

[17] Peterson, "Looking Back from the Year 2000."

[18] Jeffries and Jeffries, *Huey P. Newton*, xii–xiii.

[19] Hall, "Race, Articulation, and Societies Structured in Dominance [1980]."

[20] Hammonds and Herzig, *The Nature of Difference*.

[21] Hall, "Nineteen Race, the Floating Signifier."

[22] Fabian, *Time and the Other*.

[23] Dinerstein, "Technology and Its Discontents."

[24] Adas, *Machines as the Measure of Men*.

[25] "Whiteness does not limit itself to civil and political dominance, however. More specifically, whiteness is strongly associated with the instruments of civilization and modernity: technology, industry, and technical capital." Brock, *Distributed Blackness*, 98.

[26] Marx, "Technology," 983–84.

[27] Marx, 984.

[28] Robinson, *Black Marxism*, 195.

[29] Robinson, 240.

[30] Robinson, 196.

[31] Hofstadter, *The Progressive Historians*, 35.

[32] Chapter 4, Note 34.

[33] Novick, *That Noble Dream*, 73.

[34] Novick, 74–76.

[35] Novick, 77.

[36] Du Bois, *Black Reconstruction*, 714.

[37] Du Bois, 714–15.

[38] I'm going to focus on Charles Beard here, but Mary Ritter Beard was a historian in her own right, one deserving of much closer scrutiny than I can afford her right now. A suffragette and women's labor activist, she authored numerous books prototypical of first wave feminist historiography: *Woman's Work in Municipalities* (1915), *On Understanding Women* (1931), *Woman as Force in History: A Study in Traditions and Realities* (1946), *The Force of Women in Japanese History* (1953), *America Through Women's Eyes* (editor, 1933), among others. She also did considerable work in institutionalizing and formalizing and the techniques of archiving women's' histories. Voss-Hubbard, "No Document—No History." This investigation is even more pressing given the strong indication that Beard effected a particular mode of race-supremacist gender politics, one that fortified Progressive-era practices of racial sanitation, eugenics, and genocide through gendered modalities of care, home economics, and social work. See Walsh, *Eugenics and Physical Culture Performance in the Progressive Era*; Leonard, *Illiberal Reformers*; Fischer, Jane *Addams's Evolutionary Theorizing*; Chapman and Withers, *A Violent History of Benevolence*; Willrich, *City of Courts*. This entanglement—race-supremacist gender politics and Progressive historiography—merits further investigation. See also: Jones-Rogers, *They Were Her Property*.

[39] Richard Hofstadter, in his extensive treatment of Beard in *The Progressive Historians*, recalls how he was among the many historians of his generation who took up the study of American history under the inspiration that came from this text. (Hofstadter, *The Progressive Historians,* 12.)

[40] Marcell, "Charles Beard."

[41] Marcell.

[42] Hofstadter, *The Progressive Historians*, 328–29.

[43] Beard, "Time, Technology, and the Creative Spirit in Political Science," 7–9.

[44] Schatzberg, *Technology*, 138.

[45] Schatzberg, 510–11.

[46] Hofstadter, *The Progressive Historians*, 303.

[47] Patrick Wolfe offers a fantastic account of the issue with this kind of race-blind analysis:

> A comparable problem is raised by accounts of race and racism that try to reduce this pathology of modernity to a rational calculus of interests, so that, to cite but one well-known instance, it was once seen as progressive to attribute the efflorescence of lynching in the southern states of the USA to the depression of the 1890s and to White people's perception that Blacks were rivals for their jobs. While this perceived rivalry may well account for all sorts of ruthless tactics to eliminate Black people from the job market, tactics that would no doubt extend to homicide—especially since the discontinuation of

> slavery had removed the constraint on killing Black people that their status as valuable property had previously entailed—it fails to account for the demonic redundancy, the step so far over the line that it had to surpass itself, that characterised the surfeit of public violence and cruelty that lynching all of a sudden began to manifest from around the turn of the 1890s. What kind of rational interest motivates individuals to wrench the teeth, nails and hair, peel the skin, gouge the eyes, castrate, and burn alive someone who is exclaiming in agony? Even harder to explain, how did such practices take place in public, in full daylight, and secure widespread popular endorsement—to the extent that an open trade in commemorative postcards and souvenir body parts developed? ... I leave the disturbing examples at that, but they could be multiplied at length. I cite them in order to stress that no rational calculus of interests can account for such redundant elaborations. Without some sense of the visceral force of race's appeal, we cannot begin to account for it, let alone do anything about it. (Wolfe, *Traces of History*, 9.)

[48] I'm of referring to the heuristic that is all-to-often deployed to describe a techno-solutionist orientation towards the world, one in which 'they' wield a hammer: "There is no such thing as a neutral algorithm, any more than there is such a thing as neutral technology. Technology always has inbuilt biases and tendencies. To a hammer, everything looks like nail. Algorithms aren't hammers, but they are still designed by humans." Kingwell, *The Oxford Handbook of Ethics of AI*, 235.

[49] Schatzberg, *Technology*, 140.

[50] "An ideology of technological change is not simply a variant of technological progressivism, and it is more than technological determinism. It is a normative philosophy based on a series of flexible concepts that render the past and present understandable and the future manipulable through expertise. Emphasizing the novelty of its discovery absolves vested interests of past responsibility for technology's deleterious consequences and positions the discoverer as best suited to make decisions about future innovations," Wisnioski writes. This ideology of technological change was erected for the benefit of engineers: "It restored identifications of engineering as a profession with expert authority, quelled intraprofessional dissent, and collapsed is back into ought by naturalizing technology in a way that denied legitimacy to 'ideological' opponents." Wisnioski, *Engineers for Change*, 12.

[51] Wisnioski, 60.

[52] Wisnioski, 169.

[53] Wisnioski, 3.

[54] Wisnioski, 191.

[55] Fields and Fields, *Racecraft*.

[56] Broussard, *Artificial Unintelligence*, 7. Broussard continues: "Technochauvinism is often accompanied by fellow-traveler beliefs such as Ayn Randian meritocracy; technolibertarian political values; celebrating free speech to the extent of denying that online harassment is a

problem; the notion that computers are more 'objective' or 'unbiased' because they distill questions and answers down to mathematical evaluation; and an unwavering faith that if the world just used more computers, and used them properly, social problems would disappear and we'd create a digitally enabled utopia. It's not true. There has never been, nor will there ever be, a technological innovation that moves us away from the essential problems of human nature." Broussard, 8.

[57] Costanza-Chock, *Design Justice*, 123.

[58] Morozov, *To Save Everything, Click Here*.

[59] Mattern, *A City Is Not a Computer*, 92.

[60] Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*, 227.

[61] Because I am deeply suspicious of the implied rupture in thinking that computational power is somehow different from *prior* modes of colonial and white supremacist rule, I'm also suspicious of awkward juxtapositions of historiographic constructions like "traditional" formations of power with more 'current' modalities of power. I'm not dismissing this analysis outright, but I want to pause here and think about what it's costing us. Consider, for instance, what David Golumbia writes about surveillance anxiety:

> Among the only discourses of critical thought about computers today has to do with surveillance; we are repeatedly warned, and rightly so, that computational tools 'increase surveillance' in society and increase the sense in which average citizens typically feel (and, in fact, are) watched. This worry is correct in so far as it goes, but it still neutralizes computation by viewing it as an instrument that carries with it certain mechanically produced effects: it remains a kind of technological determinism. The problem we still avoid in these discussions is not technological but social and political: there are powers at work in society that want to watch the mass of the citizenry, and that seek to control social movements via such surveillance… Because computation does empower individuals of all stripes, including those of us who are already extremely powerful, we cannot hope that this sheer expansion of power will somehow liberate us from deep cultural-political problems; because computation sits so easily with traditional formations of imperialist control and authoritarianism, a more immediately plausible assumption would be that the powerful are made even more powerful via computational means than are the relatively powerless, even as everyone's cultural power expands." Golumbia, The Cultural Logic of Computation, 151–52.

Here, I think Golumbia poses the right question about technological determinism, but because of how he has historicized this problem, is forced to draw arbitrary and wholly unnecessary distinctions between the technological and the cultural or political. All of these are *co-constituted* categories, something we lose sight of entirely through these empirically untenable demarcations.

Noortje Marres is particularly instructive here: "Politics is not a 'latent, surreptitious force that is exerted below the radar or public discourse'"; instead, objects are deployed in order to make a

public show of domestics environments 'to do normative work,'" (Marres, "Why Political Ontology Must Be Experimentalized."). So too is Timothy Mitchell, who writes:

> As the kinds of controversies we face clearly show, our world is an entanglement of technical, natural and human elements. Any technical apparatus or social process combines different kinds of materials and forces, involving various combinations of human cognition, mechanical power, chance, stored memory, self-acting mechanisms, organic matter and more. In introducing technical innovations, or using energy in novel ways, or developing alternative sources of power, we are not subjecting 'society' to some new external influence, or conversely using social forces to alter an external reality called 'nature.' We are reorganising socio-technical worlds, in which what we call social, natural and technical processes are present at every point. (Mitchell, Carbon Democracy, 239.

[62] Knox, "Cities and Organisation," 187–88.

[63] It's helpful to read the aforementioned accounts of 'technosolutionism' against that of Harsha Walia, who I feel properly accounts for techno-solutionism as a technique *of* racialized violence. Walia describes how:

> A billionaire wants to buy an island from Italy or Greece on which to stash refugees away, an architect wants to build a new city-state on the Tunisian Plateau, and two academics have proposed a network called Refugia. These proposals share a desire to isolate migrants and refugees, perfect for our current system of global apartheid, where displaced people are racially ordered and segregated as superfluous, capitalist techno-solutionism pretends to solve what it has created by trading in a market of dispossessions, imperial states spuriously claim to care about refugees without sullying their own heavily guarded sovereignty, and elite humanitarianism is positioned as more pragmatic than meaningful justice. (Walia, *Border and Rule*, 37.)

Technosolutionism-as-political orientation also shares an alliance with eco-fascism:

> While eco-fascist views are an extremist tendency, they are an outgrowth of the limitations of liberal movements struggling for the environment as a 'white sanctuary'... Like those on the left who inaccurately believe we can fight austerity through border controls, Sierra members advocated immigration restriction as a method of environmental protection. Environmental liberalism is steeped in such false solutions, evident in the rise of Elon Musk–style techno-solutionism. We are also presented with attempts to greenwash industrial extraction and corporate profiteering with propaganda for carbon markets, natural gas, and clean coal by corporations interested in sustaining their windfall profits, not the earth... This litany of false solutions stems from environmental liberals' blind spots to militarism, capitalism, and environmental racism—from ignoring the disproportionate impact of climate catastrophe on racialized communities around the world to land-grabbing conservation efforts erasing Indigenous jurisdiction and perpetuating colonial terra nullius." Walia, 247–49.

Compare this to Broussard's account of 'technochauvinism,' wherein the incarceration of racially criminalized communities is posed as a mere accident of disposition:

> It's easy to see how technochauvinism blinded the COMPAS designers from seeing how their algorithm might be harming people. When you believe that a decision generated by a computer is better or fairer than a decision generated by a human, you stop questioning the validity of the inputs to the system. It's easy to forget the principle of garbage in, garbage out—especially if you really *want* the computer to be correct. It's important to question whether these algorithms, and the people who make them, are making the world better or worse." Broussard, *Artificial Unintelligence*, 44.

[64] Beard, *Whither Mankind*, 11.

[65] Beard, 17.

[66] Beard and Beard, *The American Leviathan*, 6–7.

[67] Beard and Beard, 19.

[68] In addition to academic history, Beard played an influential role in early-20th century political science, sociology, and public administration. See: Jordan, *Machine-Age Ideology*; Barrow, *More Than a Historian*.

[69] Beard and Beard, *The American Leviathan*, 573–74.

[70] Schrader, *Badges without Borders*, 67–71; Rodriguez, ""Let the Past Be Forgotten...": Remaking White Being, from Reconstruction to Pacification"; Anderson, *Colonial Pathologies*; McCoy, *Policing America's Empire*; Shah, *The Production of Modernization*; Adas, *Machines as the Measure of Men*.

[71] "Euromodern" comes from Rowland Keshena Robinson (Robinson, "Marxism, Coloniality, 'Man', & Euromodern Science."), who refers to Lewis R. Gordon's corrective to Enrique Dussel ("transmodernity") that modernity is not something strictly owned by Europeans (see: Tamdgidi, Ciccariello-Maher, and Grosfoguel, *Conversations with Enrique Dussel on Anti-Cartesian Decoloniality & Pluriversal Transmodernity*.). Instead, what we generally refer to as modernity in a broad sense, is better understood as euromodernity. Robinson, like Ramón Grosfoguel (Grosfoguel, "Transmodernity, Border Thinking, and Global Coloniality.") , wants to specify a distinction between critiques of modernity written through the euromoderntradition (Marxism, postmodernism)—"Eurocentric" critiques of euromodernity—from critical traditions that are peripheral in two sense: (1) they are grounded in non-eurocentric knowledge traditions (what Boaventura de Sousa Santos refers to as "epistemologies of the south" (see: Santos, *Epistemologies of the South*), and (2) these knowledge traditions are have historically been (and continue to be) displaced by euromodern epistemologies.

[72] As exemplified by the view that, "The western scientific tradition is the most critical one that humanity ever knew, as [Karl] Popper so indefatigably and explicitly emphasized," (Agassi, *Science and Its History*, 8.).

[73] Daston and Galison, *Objectivity*.

[74] Winchester, *The Perfectionists*, 21–27.

[75] Siskin, *System*.

[76] Maher, *Decolonizing Dialectics*, 40–45.

[77] Marx, "Technology," 983–84.

[78] I'm thinking here of the historical writing of individuals ranging from George Sarton, writing in 1917 that, "science is the strongest force that makes for the unity of our civilization, that it is also essentially a cumulative process, and hence that no history of civilization can be tolerably true and complete in which the development of science is not given a considerable place. *Indeed, the evolution of science must be the leading thread of all general history*" (Sarton, "An Institute for the History of Science and Civilization"), to Donald Knuth writing in 1973 of "ancient Babylonian algorithms" (Knuth, "Ancient Babylonian Algorithms"), through to even Broussard, who uncritically embraces this historicity, fastening the abacus to the computer (Broussard, *Artificial Unintelligence*, 75), genuflecting to Kenneth O. May's coronation of computing as the "Queen of Technology." May, "Historiography: A Perspective for Computer Scientists."

[79] Adas, *Machines as the Measure of Men*.

[80] "When Fanon countered claims of Black backwardness by pointing to the accomplishments of African history, he suffered viscerally the sort of dialectical 'recolonization' that so worried Foucault. These accomplishments were simply folded with a condescending nod into a long historical progression in which white Europe stands as the pinnacle of civilization: 'you reconcile us with ourselves.'" Maher, *Decolonizing Dialectics*, 53.

[81] *Machanistic* historiography, like the that of Beard and Kranzberg, traffic in wildly inconsistent notions of 'innovation.' The case of technology and enslaved labor is instructive here: "As far as most historians have been concerned, the gin is where the study of innovation in the production of cotton ends—at least until the invention of the mechanical cotton picker in the 1930s, which ended the sharecropping regime," writes Edward Baptiste, but:

> There would be no mechanical cotton picker until the late 1930s. In fact, between 1790 and 1860, there was no mechanical innovation of any kind to speed up the harvesting of cotton. There was nothing like the change from scythe to mechanical reaper, for instance, that by the 1850s began to reshape the Chesapeake wheat fields Ball had left behind. Even slave-operated Louisiana sugar mills were more factory-like than the cotton labor camps were. And the nature of human bodies, the only "machine" that worked in the cotton fields, did not change between 1805 and 1860. Still, the possibility that enslaved people might have picked more cotton because they picked faster, harder, and with more

efficient technique does not come readily to our minds. In fact, during the late antebellum years, northern travelers insisted that slave labor was less efficient than free labor, a point of dogma that most historians and economists have accepted. (Baptist, *The Half Has Never Been Told*, 116, 128.; see also Rosenthal, *Accounting for Slavery*.)

[82] Green, Horel, and Papachristos, "Modeling Contagion Through Social Networks to Explain and Predict Gunshot Violence in Chicago, 2006 to 2014."

4. COMPUTING AS ARTIFACT

In "Making the History of Computing," Liesbeth de Mol and Maarten Bullynck—who I believe are historians, offer an "internalist" history of computing history,[1] "a relatively young discipline, that formed slowly since the 1970s at a time when the discipline of computing itself was hardly established yet."[2] The discipline emerged through an entanglement between three older traditions of history writing: history of mathematics, history of science, and history of technology. This vocational inheritance is significant: from very early on, the assorted mix of academic communities invested in computing history had to contend with the invariable intellectual tensions that haunt interdisciplinarity. Some of these tensions were never resolved—the authors describe the "distancing between the history of mathematics and computing," the result of "a complex and at times strained relationship." They also isolate the formative influence of historian Michael S. Mahoney who argued that the computer "is not one thing, but many different things, and the same holds true of computing," as well its "tripartite" and fundamentally contingent nature: an object stabilized through computer science, electrical engineering, and programming/software engineering. According to de Mol and Bullynck, Mahoney nevertheless hedged his bets: "To Mahoney, to get away from a machine and person centered history written by those who lived it, a turn towards the history of software and of computing systems would connect directly to many of the then-current issues in the history of technology," write de Mol and Bullynck.[3] In doing so, Mahoney is described as the origin point of computing history's entanglement with the history of technology, a much more intellectually varied (not to mention politically ambivalent)[4] history writing community.

Over time, as the intellectual investment in computing grew, the Society for the History of Technology (SHOT) and the SHOT Special Interest Group Computers, Information, Society

(SIGCIS) became the route through which a wide range of actors would come to articulate the history of computing: "sociology, business history, gender studies and other disciplines have been integrated into the philosophy and methodology of computing historiography following methodological developments of the Society for the History of Technology," de Mol and Bullynck explain. Essentially, since the 1970s, computing rose to prominence in everyone's priorities, not just that of academics, making it an object of universal historical concern for researchers coming from multiple scholarly traditions. There's something quite troubling, however, about the story that historians are telling themselves about their own history. It feels remarkably *un-historicized*. The objects of inquiry—science, mathematics, and, especially, computing—are being treated as positivities, and their relationship to historians as inevitable, even foreclosed. There are *other histories* that the history of computing can trace for itself, ones that can offer more clarity as to why the normative engagement with objects and actors who are decisively political is unsatisfying. The history of computing is a project of recovery. Like many topics that fall under the history of computing (war and martial science, scientific computing, information management, electrical engineering, etc.), computing is an object of inquiry that took on a strong stabilization in the present, thereby compelling a re-historicizing of adjacent historical fields. As an intellectual community, the history of computing was inaugurated and professionalized through the *Annals of the History of Computing*. Starting in 1979, the *Annals* canalized computing historiography and established the categories of inquiry that would go on to stabilize public understandings of computing today. This historiography, in effect, refashioned the history of computing itself, rendering the technocratic hold over our future and understanding of the past uncontested.

The Annals of the History of Computing was the first periodical established by the American Federation of Information Processing Societies (AFIPS), an umbrella organization of professional societies in information science founded in 1961.[5] Early on, individuals within AFIPS saw a need for a deliberate investment in archiving documents and artifacts relating to computer development. Efforts were disparate, however, and the "net effect of this fragmentation was that published descriptions of past events rarely went beyond the somewhat biased recollection of the participants," recalls Walter M. Carlson, who would chair the AFIPS advisory committee tasked with institutionalizing a computer history program.[6] Between 1967 and 1973, this committee devoted considerable efforts to establish what was then regarded as the "first priority of the project," oral histories: "Nearly all of the people who had been responsible for the early work on computers were still alive in the late 1960s. Obtaining their personal recollections of the events in which they had participated was crucial, so that such oral histories could supplement the written records that scholars would ultimately use to unravel the origins of the computer age."[7] Nearly 250 early oral history interviews were conducted, supplemented by a growing collection of bibliographic, pictorial, and video materials and artifacts.

Though support for the AFIPS's historical research fluctuated, interest began to pick up in the early 1970s as firms such as IBM and Digital Equipment Corporation, against the backdrop of *Honeywell v. Sperry Rand* (a landmark 1973 U.S. federal court case over who had invented the electronic computer), became invested in historical projects of their own to bring their accomplishments "into better historical focus." In 1974, AFIPS organized Pioneer Days at the National Computer Conference (NCC) to recognize institutions for historic contributions to the field, a clear indication of the growing historical awareness of the computing community. A few years later, Jean Sammet (chair of the AFIPS History of Computing Committee) and Aaron

Finerman (then chairman of the AFIPS Publications Committee) established the *Annals*. The journal was conceptualized as a deliberate intervention against the future orientation of computing communities;[8] there was a recognized acknowledgement that practitioners placed more of a priority on the future than the past.[9] This wasn't a criticism of futurism *per se*; rather, the *Annals of Computing* was created to provision a usable past in service of this future. In the forward to the inaugural issue, Finerman described the objectives of the Organizing Committee and Editorial Board in explicit terms: their hopes were to "learn from past accomplishments and from past mistakes how to better shape the future direction of this field." These efforts were to be supported by a wide constituency: "We hope to make the *Annals* a living history, useful to the novice first entering the field as well as to the old-timer who was there when it all happened. We hope to publish historical material submitted by the academician as well as by the practitioner, each writing about some activities in great depth and others in great breadth." A core part of this work, Finerman added, was to "preserve the pertinent records and documents for future historical work."[10] This became regarded as the "general archive problem": "the need to preserve all important papers pertaining to the history of computing, and to make sure that these are safely stored in one or more places with proper cataloging so that they are available to current and future scholars and researchers."[11]

4.1 THE EXPERTISE OF GUILD HISTORIAN

In 2021, a group of professional historians—those trained on and through the archives erected by the *Annals* and the archival projects of computing professionals in the 1970s—issued a manifesto of sorts. This was a "call to arms"[12] amidst crisis. *Your Computer is on Fire*, an edited collection, brings together "scholars who approach computing and new media from a variety of critical perspectives derived from humanistic, social scientific, and STEM disciplines

… to issue a manifesto that can be summarized as follows: Your computer is on fire."[13] Historian Thomas S. Mullaney in the text's first of two introductions, writes that, "Humanists and social scientists who work on computing and new media are subject to daily reminders about how little most technologists reflect upon our work or take our scholarship under advisement." Mullaney continues: "The long-standing dismissal or evasion of humanistic and social scientific critiques of computing and new media is over. It has to be over, because to allow it to continue is simply too dangerous." These scholars see themselves as writing in defiance of the "widespread dismissal of our work by those who are closest to the centers of production in the computing and new media economy."[14] This spatial designation is deliberate: here, the historian-as-humanist self-positions as speaking from the peripheries of power. They aren't just speaking *to* "the inequalities of gender, race, class, religion, and body type [that] find their way into robotics, automated decision-making systems, virtual assistants, code academy curricula, search algorithms";[15] from the margins looking in, they are also speaking *on behalf of* these political projects seeking justice for said inequalities.

There is a specific kind of expertise that this collection attempts to claim on behalf of humanists and social scientists. In the book's second introduction, editor Mar Hicks makes this explicit. They recall watching Facebook CEO Mark Zuckerberg October 2019 testimony before Congress,[16] this time in the context of Meta's proposed cryptocurrency scheme (first called *Libra*, then renamed to *Diem* before it was ultimately abandoned in 2022).[17] "During his questioning by Congresswoman Alexandria Ocasio-Cortez about misinformation on his platform," Hicks writes, "Zuckerberg tried to give a series of vague non-answers but occasionally tripped up in ways that showed that he truly did not understand the scope and scale of the problems he had helped unleash on society."[18] For Hicks, Ocasio-Cortez's interrogation[19]

exposed a lack of expertise: he, Zuckerberg, "actually didn't even have enough knowledge of politics or the world around him to really understand the problems of misinformation on Facebook, never mind the will to fix them." The implications are twofold: (1) Mark Zuckerberg, one of the world's most powerful technocrats, is a buffoon who doesn't understand the world in which he built his Empire, and (2), that knowledge—of politics and the world at large—is the advantage of the historian.

It's interesting to me that Hicks, despite the distance they place between themselves and the "centers of production," focuses so heavily on misinformation in this vignette. Of course, misinformation, as a *political problem*, is owed a history all its own. This history will need to map the discourses and techniques of inquiry ("contagion studies") stabilized by para-academic institutions like Data & Society (and its Disinformation Action Lab funded by the Knight Foundation),[20] Harvard Kennedy School's Technology and Social Change Research Project,[21] and RAND's Countering Truth Decay Initiative.[22] It will need to trace the evolution of these techniques through the wave of "White Liberal Panic"[23] that swept the United States following the election of Donald Trump, culminating in the multi-year campaign to invalidate the 2016 election results on the basis of hijacked political sensibilities.[24] This history of misinformation will have to account for the 2018 Facebook/Cambridge Analytica scandal that reactivated post-World-War-II anxieties over psychological warfare, both foreign and domestic,[25] as well as the outpouring of support, grant monies, and concentrated effort to enhance human and automated content screening mechanisms between 2019-2021 in the context of COVID-19 vaccine hesitancy and the attendant "infodemic."[26] This history of misinformation will have to articulate the way these vectors of public concern—and the technological capacities they built—would eventually converge in the Biden Administration's new National Strategy for Countering

Domestic Terrorism which, against the backdrop of January 6th, 2021, has established a new national security mandate for multi-jurisdictional surveillance, criminalization, and securitization schemes. Ultimately, then, this history of so-called misinformation will need to be accountable to the legal and computational technologies that the mis/dis/malinformation panic has erected. The same legal and computational technologies now being put to the service of incarcerating police abolition protesters caught in law enforcement dragnets in 2020,[27] despite Hicks' injunction to "protest (or support those protesting) widespread harms like racist violence"[28]

This history of misinformation is, of course, outside the scope of this thesis, but it's worth noting that this is not a history I would readily entrust to these gadfly historians.[29] For one thing, they appear to have uncritically assimilated themselves to categories of concern that mirror the Department of Homeland Security or the FBI.[30] For another, the extent to which the normative undercurrents in *Your Computer is On Fire* share with state computing projects is extremely disconcerting. Hicks, for instance, remains resolutely enamored of the technological achievements of euromodernity in their contributions to this collections—computing wins wars and kills Nazis. Hicks writes that:

> In 1943, Britain led the world in electronic computing, helping to ensure the Allied victory in Europe during World War II. By deploying top-secret code-breaking computers—the first digital, electronic, programmable computers in the world—the British were able to use computing to alter geopolitical events at a time when the best electronic computing technology in the US was still only in the testing phase. By leveraging their groundbreaking digital methods for wartime code-breaking, the British conducted cyberwarfare for the first time in history, with great success.[31]

For Hicks, the history of gendered hiring practices in post-WWII British computing sectors is intended to serve as a "cautionary tale" given their status as "a close historical cousin of the United States."[32] According to Hicks, "In this context, the US as a fading empire mirrors the UK in the twentieth century, and we have begun to see Silicon Valley corporations, and US

society as a whole, hurt by an inability—or refusal—to solve deep, structural problems with discrimination."[33]

My concern can be stated as follows: guild historians think that just because they are humanists, what they are doing is radical. Not being a mathematician (or "just" being a humanist) is no guarantee of politics. Moreover, this way of doing history (finding marginalized people in history who may or may not have been making bombs) just shows that all these people conscripted into guild historiography were acting in the interests of empire as well.

4.2 HISTORY AS CAPTURE

Guild historiography[34] occupies the terrain of reactionary historiography by reducing the disciplinary debates around how to properly historicize computing, artificial intelligence—and euromodern technoscience more generally—simply to questions over "context." The discussion around "context" was recently resurrected by Janet Abbate and Stephanie Dick in their introduction to an upcoming collection on computing history,[35] but it's been made before, many times. It's the first of Peter Galison's provocations in "Ten Problems in History and Philosophy of Science."[36] Galison, who is trying to ford the gap between History of Science and Philosophy of Science (a more consolidated field outside of the U.S. academy), refers to context (which he freely admits is an "elusive explanatory structure always invoked, never explained") as the non-textual environment through which scientific knowledge is stabilized and expressed: the political, institutional, industrial, ideological, etc..[37] Where this gets tricky is when *context* becomes a synecdoche for *politics*. For 'context' is, by all accounts, just an epistemic device historians administered to resolve the invariable disciplinary tensions that arise when a lot of different people, coming from different intellectual traditions, take an interest in historicizing the same artifact—i.e., the legislative aftereffect of an "intellectual civil war."[38]

Take, for instance, how Michael Mahoney distinguished between what he sees as his work, as a computing historian, and what he dismisses, somewhat flippantly, as computing literature which serves the functions of "social analysis, criticism, and commentary" as "popular accounts taken uncritically and episodically to support non-historical, often polemical, theses. Some of this literature rests on a frankly political agenda; whether its models and modes of analysis provide insight depends on whether one agrees with that agenda."[39] The demarcations here are alarming, especially given Mahoney's formative role in how computing historians understand their object of study,[40] and how forcefully they've expressed the desire to politicize their work against "inequalities of gender, race, class, religion, and body."[41] Even if guild historians wholly refuse the categories Mahoney prescribes—"social," "uncritical," "non-historical," "polemical," and so forth—there's the inescapable reality that the historiography itself prefigures the target and means for intervention.

I think there's a case to be made that, for computing historians, *history* itself has been rationalized bibliometrically: a throughline from George Sarton's "arsenal of cards,"[42] through Bernard Cohen's archive of clever devices, through Kenneth O. May's collection of "history slips,"[43] through the computer itself taking form in the historiographic imaginary of Mahoney as he disinterred the various technical and intellectual pluralities invested in this device, only to repatriate them under "computing."[44] There are serious risks to politicizing this mode of history writing. Debating "context," in that case, has narrowed the entirety of computing historiography down governing contingency. That, not history, and certainly not "politics,"[45] becomes the expert offering that guild historians have positioned themselves to resolve. What's more: if "context"—i.e., qualitative and quantitative representation within a stack of cards—becomes the "obligatory passage point" within your "program of investigation,"[46] then, in lieu of solidarity, those made

vulnerable[47] by 'inequalities of gender, race, class, religion, and body' are faced with yet another dynamic of power that undermines the extent to which their truth can circulate.

In other words, *those* histories, the historical knowledge of those made vulnerable by U.S. Empire and its various death making programs (which most certainty includes computing itself)—that history becomes trapped in the vignettes fashioned by and for the guild. Thereby they—we—become subject to what's effectively a politically agnostic mechanism on which we now must hedge our liberation. This requires serious consideration the part of guild historians—to take seriously what Ann Stoler describes as "an appreciation of historiography as a political force;" that history writing is itself a "political act;" and that historical narrative can act as *both* "a tool of the state and as a subversive weapon against it."[48]

The near-universal injunctions to historicize computing and artificial intelligence make perfect sense: history writing is saturated with political potentials, and not necessarily the selfsame politics invoked by guild historians. Euromodern[49] history writing—as with euromodern empirical and experimental science,[50] euromodern material culture,[51] and euromodern practices of symbolic storage[52]—is, after all, just one tradition grafted over many. There are, and have always been, *other* historiographies.[53] And despite the epistemic displacements imposed on these knowledge traditions by Western[54] colonialism, these modalities of historical awareness become inescapable for we-*other*-moderns.[55] They impress upon the present a tacit confidence in the political efficacy of history writing in ways that cannot be reduced to Nietzsche,[56] Marx,[57] or Brooks[58]—but nonetheless conspire with these articulations to evoke the desire to produce "effective"[59] histories. But conspiracy, no matter how closely it resembles a shared political objective, can't be relied on. Conspiracy, too, is capture.

NOTES

[1] I think it's fair to characterize de Mol and Byllynck as advocates of a traditionalist historiography; the entire tone of this article is wistful:

> Some of the Practitioners of the field have become estranged from the history now being written, and the historians have adopted new methodologies, bringing in institutional, economic and social motives... The computer then often appears as a blackbox that, supposedly, need not be understood to tell the story... Moreover, the diversification of the field has resulted not just in a broad range of highly-specialized methods and approaches, but also in a fragmentation of communities who are no longer able or willing to talk to each other.

Although they do specify, they think "What is required then is not a modernist framework whereby the diversity of approaches is replaced by one ultimate approach nor a postmodern one where the diversity per se is being celebrated, but an approach which opens up the communication lines and allows to reconnect rather than to unify or reduce. (I also want to flag their turn of phrase when describing demographic changes in the field; they write that from the "1990s onwards, history of computing has become less a predominantly *anglosaxon* field," italics added.)

[2] Mol and Bullynck, "Making the History of Computing. The History of Computing in the History of Technology and the History of Mathematics."

[3] Mol and Bullynck, 371.

[4] Wisnioski, *Engineers for Change*.

[5] AFIPS was established on May 10th, 1961, by the Association for Computing Machinery, the American Institute of Electrical Engineers (AIEE), and the Institute of Radio Engineers (IRE) to support the professionalization and advancement of information science. In subsequent years, the federation would be joined by (among others) the American Documentation Institute, Simulation Councils Inc., the Association for Machine Translation and Computational Linguistics/Association for Computational Linguistics, the Society for Information Display, the Special Libraries Association, the American Statistical Association, the Society for Industrial and Applied Mathematics, the Instrument Society of America, the American Institute of Certified Public Accountants, the Institute of Internal Auditors, the Data Processing Management Association, and the American Nuclear Society. For a brief period, the American Institute of Aeronautics and Astronautics also joined, but left in 1982.

AFIPS's stated objective was to "advance and disseminate knowledge in the field of information science," as well as to represent member societies in the newly formed International Federation for Information Processing (IFIP): a global consortium of computing researchers and professionals established in 1960 under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO). What's now considered the first IFIP, the first International Conference on Information Processing, congress was organized by UNESCO in June 1959 in Paris. IFIP is still active today ("International Federation for Information Processing (IFIP)."). 1963, the AIEE and IRE merged to form the Institute of Electrical and

Electronics Engineers (IEEE); two subcommittees within these organizations—the AIEE's Subcommittee on Large-scale Computing and the IRE's Professional Group on Electronic Computers—integrated during the merger to form the IEEE Computer Society, or simply, the Computer Society (CS). CS established its own constitution and bylaws by 1971 and grew into what is now the largest of the 39 technical societies under the IEEE's governance. In 1992, the Computer Society also took over management and publication of the Annals after the AFIPS's dissolution in 1990.

[6] Carlson, "Why AFIPS Invested in History."

[7] Carlson.

[8] See Chapter 2, Note 20.

[9] For instance, see W.L. Zwerman's 1999 article in the *Annals*, "Profession/Occupation Without a History," which is concerned with how futurism prevents effective professionalization between software developers and related occupational groups:

> One early observation was that those working in information technology development held a peculiar attitude toward the history of software development, specifically, an ahistorical orientation," Zwerman writes. "Today's software leaves the past far behind. The creators of the past worked on uninteresting projects, and they served a less-sophisticated and less-interesting population of users. There is very little continuity in the creations of software or in the populations served. Tomorrow's software is likely to follow a similar pattern. This new technology devours its predecessor technology and devours the practitioners who ran the old technology ... This paucity of ties with the past suggests that there are exceptionally weak feelings of sharing and bonding within the occupational group. It also suggests that there are so many practitioners rooted in the present or leaning forward peering into the future that the past is viewed as irrelevant. (Zwerman, "Profession/Occupation without a History.")

[10] Finerman, "Foreword."

[11] Sammet, "General AFIPS History of Computing Activities."

[12] Mullaney et al., *Your Computer Is on Fire*, 8.

[13] Mullaney et al., 3.

[14] Mullaney et al., 8.

[15] Mullaney et al., 6.

[16] Paul, "'You're Trying to Help Drug Dealers.'"

[17] "Facebook-Funded Cryptocurrency Diem Winds Down."

[18] Mullaney et al., *Your Computer Is on Fire*, 11.

[19] Paul, "Ocasio-Cortez Stumps Zuckerberg with Questions on Far Right and Cambridge Analytica."

[20] "Data & Society to Launch Disinformation Action Lab Supported by Knight Foundation."

[21] "Technology & Social Change."

[22] "Countering Truth Decay."

[23] Dylan Rodriguez writes: "There are some who understand, because their wisdom is inherited, that the terror he embodies is both long-standing and carried in the thrust of a Civilization's futurity ... Liberal panic amidst proto-fascist ascendancy is the symptom of an insistent belief in the long-debunked narrative of (with apologies to the rest of the Américas) an American possibility that shines with justice and shared joy in the spoils of White Being." Rodríguez, "The Pitfalls of (White) Liberal Panic."

[24] Mak, "How Russia Used Instagram to Influence the 2016 Election."

[25] "Harry S. Truman Papers Staff Member and Office Files: Psychological Strategy Board Files | Harry S. Truman."

[26] "Infodemic."

[27] "Support Defendants & Prisoners From the George Floyd Uprisings"; "Malik Muhammad."

[28] Mullaney et al., *Your Computer Is on Fire*, 24.

[29] Mullaney et al., 3.

[30] "CISA: Mis, Dis, Mal-Information (MDM)."

[31] Mullaney et al., *Your Computer Is on Fire*, 138.

[32] Mullaney et al., 20, 137.

[33] Mullaney et al., 153.

[34] Trouillot, *Silencing the Past*, 19–22.

[35] Abbate and Dick, *Abstractions and Embodiments*, 5.

[36] Galison, "Ten Problems in History and Philosophy of Science."

[37] Galison appreciates "nonreductive" contextualizations of science, which is described through a masterful footnote that I highly recommend spending some time with—it's an entire syllabus, all on its own. Galison, 112.The idea is to pursue historical writing that ambulates between the

intellectual content of scientific practice and the material conditions that structure that practice, without capitulating to an essential theory of science or the world in which it's embedded. I get the sense that this is a methodological posture: a way to conduct historical inquiry to accumulate deeper empirical reserves through which to pose critical historical questions—what he elsewhere describes as specific theory conceived through a *finite* critical horizon. Galison, "Specific Theory."

[38] Galison, "Ten Problems in History and Philosophy of Science," 112.

[39] Mahoney, "The History of Computing in the History of Technology."

[40] Mahoney's posture is a familiar one for guild historians who, Foucault writes, often "take unusual pains to erase the elements in their work which reveal their grounding in a particular time and place, their preferences in a controversy—the unavoidable obstacles of their passion" (Foucault, "Nietzsche, Genealogy, History.").

[41] Mullaney et al., *Your Computer Is on Fire*, 6.

[42] Sami Hamarneh, as quoted by Aydin Sayili: "It is hard to explain the scope of his [George Sarton's] scholarly research. Consideration of their apparatus as of January 1931, for example, will be illuminating. He had consulted some 3100 books; 4000 booklets, monographs and reprints, and about 41000 bibliography cards. By 1947 'the arsenal' had grown into 3400 books, 13500 pamphlets, and 80,000 cards and other documents. Add to these the availability of the Harvard libraries. As it was, Sarton accomplished and enormous intellectual feat with disciplined erudition -a task to which he devoted the best years of his life" (Sayili, "George Sarton and the History of Science.").

[43] May, *Bibliography and Research Manual of the History of Mathematics*, 21.

[44] See Figure 4, diagram entitled "The communities of computing," in Mahoney, *Histories of Computing*, 62.

[45] Mullaney et al., *Your Computer Is on Fire*, 11.

[46] Callon, "Some Elements of a Sociology of Translation."

[47] "Made vulnerable" is an expression I've been using since early 2020 when, in the context of the COVID-19 lockdowns and pandemic conditions, organizers in Southern California mobilizing with and for day laborers, farmworkers, and domestic workers—many of whom faced document insecurity and the denial of state relief that comes with it but were nonetheless being asked to work through pandemic risks as "essential workers"—articulated an important corrective to the phrase "vulnerable communities": "communities-made-vulnerable." There is a deliberate and specific way in which these communities faced a vulnerability-by-design, one in which the carceral violence they faced at the hands of immigration enforcements worked productively to discipline workers, suppress wages and workplace organizing, and cheapen the costs of their labor. The vulnerability, in other words, should not describe the workers; it should describe the conditions of work. Attentive to this, I've used the phrase "made vulnerable" ever

since. Credit and gratitude go to the folks at IDEPSCA for this insight ("Instituto de Educacion Popular Del Sur de California.").

[48] Stoler, *Race and the Education of Desire*, 62.

[49] Chapter 3, Note 71.

[50] Al-Khalili, *The House of Wisdom*.

[51] Appadurai, *The Social Life of Things*.

[52] Renfrew, Scarre, and Research, *Cognition and Material Culture*.

[53] See Mahdi, *Ibn Khaldûn's Philosophy of History*; Iggers, Wang, and Mukherjee, *A Global History of Modern Historiography*. See also Daniel Woolf's article, "Historiography," in the *New Dictionary of the History of Ideas*, which replaced the 1973 entry by Herbert Butterfield the *Dictionary of the History of Ideas*. (Horowitz, *New Dictionary of the History of Ideas*; Wiener, *Dictionary of the History of Ideas*.)

[54] "Western" in the sense of Raymond Williams, who writes in *Keywords* that "the West (to be defended) is notoriously subject to variable geographical and social specifications." More consistent is the "West–East contrast," a "geographical into social" category inherited from the mid-3rd century West–East division of the Roman Empire. For Williams, "the West" is a historical category, not a geographical construct. Williams, *Keywords*, 264–66.; see also Salama, *Islam, Orientalism and Intellectual History*, 27–26.

[55] Tamdgidi, Ciccariello-Maher, and Grosfoguel, *Conversations with Enrique Dussel on Anti-Cartesian Decoloniality & Pluriversal Transmodernity*.

[56] Foucault, "Nietzsche, Genealogy, History."

[57] Marx and Engels, *The German Ideology*.

[58] Brooks, *Van Wyck Brooks, the Early Years*.

[59] "History becomes 'effective' to the degree that it introduces discontinuity into our very being— as it divides our emotions, dramatizes our instincts, multiplies our body and sets it against itself. 'Effective' history deprives the self of the reassuring stability of life and nature, and it will not permit itself to be transported by a voiceless obstinacy toward a millenial ending. It will uproot its traditional foundations and relentlessly disrupt its pretended continuity. This is because *knowledge is not made for understanding; it is made for cutting*." (Foucault, "Nietzsche, Genealogy, History." Italics added.)

5. CODA

> *White man, hear me! History, as nearly no one seems, to know, is not merely something to be read. And it does not refer merely, or even principally, to the past. On the contrary, the great force of history comes from the fact that we carry it within us, are unconsciously controlled by it in many ways, and history is literally present in all that we do.*
> *— James Baldwin, August 1965, "The White Man's Guilt."*[1]

In *Silencing the Past*, which informs so much of the thinking in this investigation, Michel-Rolph Trouillot 'plots' two rhetorical tropes that frequent Western historiography (in his case, that of late eighteenth century history writing on the Haitian Revolution, but I find them instructive here, too). Among generalists and popularizers, you will find "formulas of erasure," narratives that "cancel what happened through direct erasure of facts or their relevance. 'It' did not really happen; it was not that bad, or that important." Among specialists, "formulas of banalization": narratives that "sweeten the horror or banalize the uniqueness of a situation by focusing on details," emptying singular events of their specific content "so that the entire string of facts, gnawed from all sides, becomes trivialized." Trouillot explains that "the joint effect of these two types of formulas is a powerful silencing: whatever has not been cancelled out in the generalities dies in the cumulative irrelevance of a heap of details."[2] It is no accident that the in the histories produced by computing and its communities, violence is not a formative object of inquiry. Instead, in these scholarly traditions where technology, computing, algorithms, media, or science are the determining object of inquiry, the violent histories through which these technical artifacts emerge are displaced and banalized. "Carceral" becomes as a modifier, an aberration, subgenre of computing—not co-constitutive of computing.

Predictive policing, risk assessment algorithms, and the robot dogs being deployed at the Southern border to hunt down migrants—in one sense, these technologies are "new"—in another, they exemplify more of what Ruth Wilson Gilmore articulates as the "changing same."[3]

Contemporary computing practices descend from (and are informed by) the carceral violence of plantation, reservation, and penal science (among others); carcerality and computing are mutually reinforcing projects. These artifacts of violent dispossession find use in the work of state repression against racially criminalized and poor communities targeted by the state—of which there are many.

The history of computing, if historicized differently, can recount the history of calculative techniques innovated and refined through regimes of carceral violence. It can thread a line of continuity through carceral geographies: the Middle Passage, the plantation, the reservation, the prison, the housing project, the refugee camp, the detention center, the border, etc. Historic and contemporary carceral containment and immobilization share more than the expression of brutality: they share a scientific knowledge of carcerality. Contemporary computing techniques descend from the knowledge accrued from plantation management techniques, from the genocidal accounting of the Commission of Indian Affairs tabulating federal larders, from the export mandates that colonizers used to effect famine in Bangladesh, from whatever perverse math makes it possible for oil companies to calculate how much longer they can extract and excrete until the whole thing falls apart. These are the *unthinkable* histories of computing: "that which one cannot conceive within the range of possible alternatives, that which perverts all answers because it defies the terms under which the questions were phrased."[4]

NOTES

[1] Baldwin, *James Baldwin*, 722–23.

[2] Trouillot, *Silencing the Past*, 96–97.

[3] Gilmore, *Golden Gulag*.

[4] Trouillot, *Silencing the Past*, 82.

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