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FIELD REVIEW

Hacking, Computing Expertise, and Difference

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ABSTRACT

Hackers are often, and sometimes contradictorily, seen at once as geeks, experts, amateurs, rule breakers, and even as forces of sociopolitical resistance. Popular media accounts of hackers focus on their acts of transgression and infiltration, but scholarly explorations of the hacker ethos—from hack-driven leakers and journalists to young people who organize hackathons and hacker schools—indicate that hackers vary widely in terms of their identities, practices, and motivations. Thus, the definitions of both who a hacker is, and what a hack constitutes, vary by who tells the origin story with significant consequences for justice.

This review presents the phenomena of hacking and the hackathon. It also addresses issues of access and equity in how racialized, gendered, classed, or other marginalized social groups can undertake hacking or how they are treated within hacking spaces. It examines how emerging forms of hacking operate under multiple, often contradictory logics, resulting in more or less equitable technological structures and interactions that may well provide opportunities for liberation and inclusion but that also succumb to profit pressures leading to exclusion and inequality. It shows how visibility and shifting norms of who gets to break rules are both closely interconnected in the construction of hacking culture. Understanding how some forms of hacking have been valued and others devalued—even criminalized—is central to understanding the limits and potential of hacking as a practice and an identity.

Finally, the review addresses critiques from the point of view of the Global South, conceptualized as voices that have been excluded from technology and hacking culture, and insists that attention be paid to forces that disempower struggles for justice against capitalist, patriarchal, and colonial exploitation. The review ends by highlighting research projects that demonstrate how cultures of computing can be connected to activist legacies to advance projects in the name of hacking "in/from the South."

Overview of Hacker Studies

What Is Hacking?

"Hacking" in its specific use in the twentieth century is a broad label encompassing alternative practices and means of exchanging knowledge; modes of cultural and technical production that defy convention; counter-cultural ethics and politics; and most saliently, computing expertise. To understand how people from different backgrounds are attracted to hacking, and what this tells us about the role of computing in contemporary society, researchers have used a range of ethnographic approaches to explore the practices, ideologies, and identities of different cultures of computing.

With Silicon Valley and its corresponding techno-entrepreneurial culture always looming in the backdrop of many of these hacking spaces, emergent politicized forms of hacking can both accommodate and even succumb to market logics of competitiveness, agility, autonomy, and risk while also providing openings for more critical, anticapitalist, and decolonial approaches.

This is especially important when considering the relationships between technology-driven capitalism, entrepreneurship, and hacking outside the Global North context. A growing collective of transdisciplinary scholars have organized and collaborated transnationally to propose "in/from the South as method" in hacking studies as a unique way of conceptualizing connections, divergences, and contradictions in how the Global North and the Global South hack and use computational technologies (Amrute and Murillo 2020).

Who Are Hackers? Why Do They Do What They Do?

Definitions of hacking vary according to which origin story or typology we subscribe to. Hacking can include some aspects of repurposing technology for means other than for what it was intended; playful tinkering (which usually involves computation); technical competency; or remixing old and new media infrastructures with grassroots organizing.[1] Across its various expressions, hacking can be seen as a site where craft and craftiness converge (Coleman 2017a, 161). A hack generally connotes a clever technical solution arrived at through non-obvious means. The hacker identity, then, might be taken up by (or assigned to) "hacktivists, free software developers, hacker-entrepreneurs, hack-driven leakers and journalists, criminal extorters of bitcoin, or information security researchers in search of a safer internet" (Kelty and Coleman 2017).[2]

Early academic studies of hackers focused on the rise of "geeks," a social demographic largely made up of young white men attracted to technical pursuits who often wound up studying computer science at places like MIT (Levy 1984; Turkle 1984). Weizenbaum (1976, 116) calls them "compulsive programmers" and shows that they are attracted to the mastery, obsessive dedication, and control that is part of a technical masculinity that precedes computing. The most famous journalistic account of this hacker culture is Levy's (1984) account of the "original" hackers. These were, according to Levy, the "brilliant" and "eccentric" geeks who founded the Tech Model RailRoad Club in the basement of forgotten buildings at MIT (6); they took their tinkering and technical curiosity to all domains of life, and

saw themselves as hackers because of their shared interest in the computer as a revolutionary tool. These hackers inspired later generations of coders to follow in their footsteps by focusing on dissecting, manipulating, reassembling, and solving problems within the given constraints and tools at hand to create more sublime, beautiful code (Coleman 2013, 118; Coleman and Golub 2008, 262).

Computer enthusiasts use of the term hacking to reflected their approach to computing: they shunned formal education and played with the computer until they got it to work.

Another way to view the hack is as the practice of an amateur tinkerer. In this more expansive conceptualization, a hacker is an autodidact who tries many solutions to a problem before arriving at a "good enough" resolution. Cybersecurity expert Robert Graham traces the use of the term "hacking" to the fourteenth century, when the word hacker referred to somebody who was inexperienced or unskilled in a particular activity, such as "golf hackers" (Graham cited by Galloway 2004, 151). When computer enthusiasts adopted the term to refer to themselves in the mid-twentieth century, their use of the term reflected their approach to computing: they shunned formal education and played with the computer until they got it to work, in the same way a golf hacker might keep hacking at a golf ball until they get it in the hole.[3]

Others claim that the question of whether a particular hack is the work of a talented craftsman or a persistent amateur arises when various communities within the hacker movement are misunderstood or misidentified. Hannemyr (1999) identifies three main shifts in how hacking has been understood, categorized by decades: in the mid-1960s, the "original" hackers were computer professionals who adopted the term "hack" as a synonym for computer work and applied the noun "hacker" to skilled code workers who took pride in their work; in the 1970s, the second wave of hackers—the techno-hippies—were grassroots activists who believed computers meant equality and social power; and by the second half of the 1980s, when the "computer underground" emerged and "to hack" meant to break into or sabotage a computer system, a "hacker" was identified as the perpetrator of such criminalized activities.[4] Today, hacking has come to mean broad, clever practice outside of the computer coding realms and that almost anything can be hacked (see Jordan 2017; Reagle Jr. 2019).

Not only do different forms of hacking belong to different time periods but hackers themselves go through phases, and the type of attention given to these phases varies as well. While many varieties of hacking persist, and indeed coexist, over time, tensions between experts and other participants within a given political moment influence how particular types of hacking come to the forefront (while others fade into the background) of both public debate and academic investigation (Kelty 2019). Also, who tells the story of a particular hack matters, as origin stories shape both hacker genealogies and definitions of hacking—including their legality.

Contemporary ethnographic accounts have brought the practices of these diverse hacking cultures into better view. Hackers engage politics for a variety of purposes and ends, that include "liberal, civic engagements designed to enhance government statecraft to anarchic attempts to develop software and communities that exist outside of the capitalist economy and its concomitant liberal political institutions" (Coleman 2017b, S99). While no single ethos or worldview can be ascribed to hackers, scholars have pointed to the pushback against state and corporate surveillance, as well as the commodification and alienated labor within technical pursuits (Milberry 2014; Söderberg 2008). Anarchist hacker collectives, for example, might be more resistant to taking on projects that are associated with capital accumulation; blockchain hackers, on the other hand, might embolden capitalist structures.

While popular media accounts of hackers focus on transgression and infiltration, most hackers are law abiding; many work on volunteer projects in their spare time. The popular origin story depicting the solitary, "ostracized" young man working from his parent's basement (Turkle 1984, 199) does have some truth to it. The "do-it-yourself" (DIY) cultural ethos that permeates these communities is a direct result of post-WWII narratives that encouraged parents to allow their sons to tinker with technical components as a way to promote engineering and scientific education that could lead to national prosperity. A cultural history of ham radio (amateur radio) reveals that to escape de-industrialization and the corresponding feminization of work, men constructed shacks or garages as separate spaces within the normative suburban home—a space where women and children would not interrupt them, and where they could connect with other men to reclaim their hands-on, brawny masculinity (Gelber 1997, 73; Haring 2006, 139). This history informs broader public assumptions about who hackers are, as does the contemporary example of Anonymous. One of a number of interventionist collectives, Anonymous claimed authority through technical competence and promise of collective anonymity, and the fact that the public imagined an angry, middle-class white male under the Guy Fawkes mask (a symbol used extensively to represent the collective's identity) likely allowed the collective to advance its politically conscientious action (Coleman 2014, 166; Tanczer 2015, 605).

Photo by Christina Morillo

How Have Definitions of Hacking and Hackers Changed over Time?

Phone phreaking—an important origin story in hacker lore—is an excellent example of how visibility and shifting norms around rule breaking are closely interconnected in the perception of hacking. Phone phreaking (originally called freaking) was the practice of using audio tunes to make free phone calls, sometimes with the aid of an electronic device called the "blue box."[5] As Coleman (2017b, S93) notes, "rule breaking was often essential to gaining access to any equipment," and even if phone exploration was the primary purpose of using phreaking to connect with other technology enthusiasts, phreaking meant breaking state and federal laws. While phreaking did grab the attention of the FBI and did eventually lead to arrests (Lapsley 2013, 59), the original phreaks (those who successfully managed to hack the system) have become heroes in popular culture, especially since Steve Jobs and Steve Wozniak were both among the first phreakers. Wozniak claims to have been intrigued by the "brilliant engineers" who used their rebellious attitude to gain access to and control a mega infrastructure like the phone system, and Jobs claims that the experience of successfully building the first digital blue box imbued them with confidence—a sense of magic and power to influence the world that was essential to creating the first Apple computer (FiveThirtyEight 2015).

The account of phone phreaking tells us several things. First, the association of "brilliance" and "genius" with technical competence and dominance ascribes wizardry and elitism to predominantly white male hacking practice (Dunbar-Hester 2016, 151; Thomas 2002, xiii).[6] These hackers are also seen as preserving an autonomous way of being, thinking, and interacting, as well as expressing persistent

antiauthoritarianism and profound skepticism toward centralized power. Coleman (2017b) calls these shared conventions, sensibilities, and political tactics "weapons of the geek." That Jobs and Wozniak figure prominently in this origin story is also quite revealing. They embraced the reverse-engineering of communication technologies, but Apple, the company founded by Jobs and Wozniak, subsequently fought to criminalize the legal reverse-engineering of the Macintosh computer to preserve the exploitability of markets in the Global South, like Brazil (da Costa Marques 2005).

Dunbar-Hester (2020, 37) further argues that inventions—hacks—by members of racialized populations have "rarely been portrayed as hacking in a positive, agentic sense." Drawing from the work of Rayvon Fouché (2003) and Ben Chappell (2001), she points to the horse hay rake and the lowrider car as examples of hacks that were initially questioned and that had to be defended as genuinely ingenious inventions. The "hydraulic suspension system was, by several accounts, a pragmatic modification that allowed cars to ride lower than the California legal limit, but then to be lifted in an encounter with a police officer" (Chappell 2001, 100). The lowrider hack was not only devalued but actually criminalized.

Valuing some forms of hacking and criminalizing others—as well as making some forms of labor less valuable than others—is therefore also central to this hacking genealogy.

Valuing some forms of hacking and criminalizing others—as well as making some forms of labor less valuable than others—is therefore also central to this hacking genealogy. Techno-entrepreneurship, generally seen as profit motivated and potentially exclusionary, is deeply interwoven with hacker culture, which is often seen as providing opportunity for innovation and inclusion. These sometimes contradictory practices create tensions within and across communities, especially with the prominence of the "hackathon" in the early twenty-first century. The hackathon offers ordinary citizens the captivating promise of the hack as a way of life, to which we turn next.

What Is the Hackathon?

While hackathons differ depending on their organizers and sponsors, the basic form is an interdisciplinary group of (mostly) young people who meet and network with other hackers or entrepreneurs over the course of a few days.[7] During a given hackathon, the participants prototype project ideas that would resolve an issue related to an organizing theme for the specific event,[8] such as healthcare, inequality, or climate change. Within the scope of the hackathon, open (i.e., non-proprietary) data formats are often used and are meant to encourage the creativity and problem solving that many attribute to hacking and DIY culture. Participants then present "pitches" to a panel of experts who judge the viability of the proposed projects, which usually offer technological solutions to the identified problem (Beltrán 2020b). While thousands of prototypes might be initiated at these events, many hackathons have similar endings: participants shake hands and say goodbye, and much of what "gets built" never gets

built at all (Irani 2015, 804).[9]

How/Why Are Hackathons Sponsored and Attendance Encouraged?

Academic explorations of hackathons indicate three interconnected threads: (1) connections with state-based hacking (Beltrán 2020a; Irani 2019; Lindtner 2020); (2) the re-emergence of the maker movement and the DIY ethic both of which center hacking as broad clever practice (Jordan 2017);[10] and (3) hackathons as a training ground for the (frequently unpaid) grunt work of the knowledge economy (Gregg 2015; Zukin and Papadantonakis 2017).

In the case of state-based hacking, hackathons are advanced by governments that are interested in creating both temporary and permanent hacker and maker spaces as models for a new society where openness, acceptance, discussion, and participation flourish, and where digital technologies are viewed as tools for empowerment. From the state's perspective, the construction of such modern hacker and maker spaces represents a newly forming "innovative culture;" such spaces function as an efficient and scalable way to "develop," "modernize," and appear to be economically competitive (Beltrán 2020a, 491). Within these spaces, young people are encouraged to take matters into their own hands and assume their roles as technical, non-complaining "entrepreneurial citizens" (Irani 2015, 2019). For the states, the promise of entrepreneurial engineers and scientists helps promote a political agenda where young people are asked to appropriate neoliberal discourses that promote initiative, being self-sufficient, not waiting for government to solve a problem, and even being socially conscious (García Canclini and Cruces 2012; Urteaga Castro Pozo 2012).[11] Of course, the contradiction here is that these ideal non-demanding citizens being trained at the hackathon are unlikely to be the empowered subjects of an open society who call for inclusion and justice within the hackathon or outside of it; spaces and events created by governments more focused on optics than social reform are unlikely lead to sustained, systemic change.

Courtesy of Hector Beltran

The second thread of academic explorations of hacking emphasizes the crossover between hacking based on manipulating software, and hacking based on manipulating materials. With the rise of hackerspaces, then, we also see a rise in Fablabs (fabrication laboratories) and other makerspaces which center "making" as an activity (Jordan 2017, 539; Gauntlett 2011). Here, "making is framed as a solution to social and economic struggles in the West by enabling a return to a state of authentic, deep, and hands-on engagement with the world—one that was lost due to outsourcing of manufacturing and advances in IT [information technology]" (Lindtner 2015, 871). Hacking and making are thus framed as being opposed to passive consumer culture. Lombana-Bermudez et al. (2020, 19) mobilize the term "prosumers" (combining producer with consumer) to identify the technology producers and engaged citizens who address societal concerns in a hands-on manner and gain the skills to intervene in the market economy, or at least become employable in it. This implies that citizens are taught to solve their problems in the market themselves rather than asking for remedies from regulatory bodies and the state.

The third line of research, overlapping with the second, emphasizes that Silicon Valley always looms large in the background of the hackathon—often literally, with images and inspirational quotes from famous Silicon Valley entrepreneurs painted on the walls of hackerspaces (Beltrán 2020b). Thus, hackathons can be analyzed as a microcosm of Silicon Valley dynamics, where participants work in focused, high-innovation cycles meant to mimic free-market business processes (Jones, Semel, and Le 2015, 341). Although Silicon Valley is by no means governed by a single ethos,[12] the concept has come to represent techno-entrepreneurialism and high-tech capitalism, and has, therefore, shaped a set of

conventions concerning the branding and packaging of ideas, toolkits, and ways of working around the world (Avle, Lindtner, and Williams 2017, 472).

The hackathon is an ephemeral but public event during which different communities come together and disperse as they align with hacker and entrepreneurial identities. Companies capitalize on this "from below" hacking energy to promote their products and get developers to work on their infrastructures (Söderberg and Delfanti 2015, 793).Anthropologists and other researchers have benefited from the space-and-time compression of the event to interrogate the exclusions cultivated at the hackathon, but also to explore the possibilities and opportunities for inclusion. They have illuminated the concentration of imaginative and communicative labor, in addition to the technical work that enthusiastic hacker-entrepreneurs come to perform within these spaces (Irani 2020). What is being "made" at these events is really a set of dispositions and attitudes about how to develop relationships to new technologies and to each other, often in the face of precarity and marginalization (Ames et al. 2018; Beltrán 2020a, 490; D'Ignazio et al. 2016).[13]

Can Hackathons Provide Opportunities for Critical, Activist Forms of Hacking?

The hackathon is subject to state and market influences that may restrict possibility and exclude people even as they aim to provide opportunities. However, a hackathon may also provide openings for solidarity and agency through the forging of new alliances and the self-guided learning that takes place within the compressed time-space of the event. Members of racialized, gendered, and class-based marginalized groups participating in the cultures of computing and entrepreneurialism could use the space to organize and advocate for a critical, oppositional politics that looks to dismantle structures central to the oppression and dispossession of others (Irani 2019, 210; Maxigas 2012).[14] Hackathons thus offer the potential for communities to create and deploy unique socio-technical infrastructures against hierarchies of power and expertise. I discuss the phenomena of hacking and the hackathon as well as issues of access and equity in how marginalized groups are able to access hacking and are treated within hacking spaces. An intersectional approach can show us how the genealogies of hacking are broader than conventionally assumed, and can also re-establish and re-orient those genealogies by imploding popular terms such as "hacking" and "entrepreneurship," which we'll explore next.

An Intersectional Approach to Hacking

An intersectional framework of analysis attends to questions of access and equity for members of marginalized groups, whether marked by race, gender, class, disability, or other markers of difference. The concept of intersectionality suggests that markers of difference may overlap and intersect, and thereby compound forms of discrimination (Crenshaw 1989).[15]

Analysis of the role of such differences within hacking communities brings into focus some of the shortcomings in hacking ideology, which purports to rise and fall on the elegance of coding alone, but which may not live up to its ideals of open access, meritocracy, and transparency.

Intersectional analysis calls attention to such exclusive norms by asking who gets to count as a hacker and what counts as hacking. For example, Dunbar-Hester (2020) analyzes how different strands of feminist hacking align the goals of specific movements (radical politics in general, antimilitarism, and anticolonialism) with those of open-technology cultures. Far from the masculinist practices of dominance or "pwning,"[16] Dunbar-Hester mobilizes bell hooks (2001) to point to the platonic love that permeated some of the hacker communities that Dunbar-Hester spent time with; fusing hacking with values of care, these communities demonstrated their appreciation of care, trust, honesty, and commitment to community and principle (Dunbar-Hester 2020, 179).

How do Hackathons Both Restrict and Enable Inclusion?

Visibility, recognition, and respectability are closely tied to practices of hacking. The increased recognition of hackathons as places for "respectable innovation" inadvertently marks other design practices, especially those attributed to marginalized populations, as not innovative or even criminal. Thus, even the new forms of hacking that amplify previously underrepresented voices and perspectives continue to be marginalized and excluded. Costanza-Chock (2020, 140) argues that the "hacks" that occur within "subaltern design sites" such as the home rarely receive the same recognition or resources as those perceived as properly technologically innovative within the hackerspaces.

Moreover, the emergent field of "life hacking" (Reagle Jr. 2019) generally fails to recognize the work of members of the disability community who were the "original lifehackers," consistently developing creative ways to make their worlds more accessible (Jackson 2018).[17] When hackers do address issues affecting disability communities, they tend to play the role of savior, often without consulting with or involving disabled people. Yergeau (2014) describes most hackathons as the "hipster version of telethons," focused on the normalization of bodies by emphasizing fixing, curing, and rehabilitating people, and calls for "criptastic hacking" instead, which moves from body-tweaking and patches designed by non-disabled people to a collective, disability-led movement.[18]

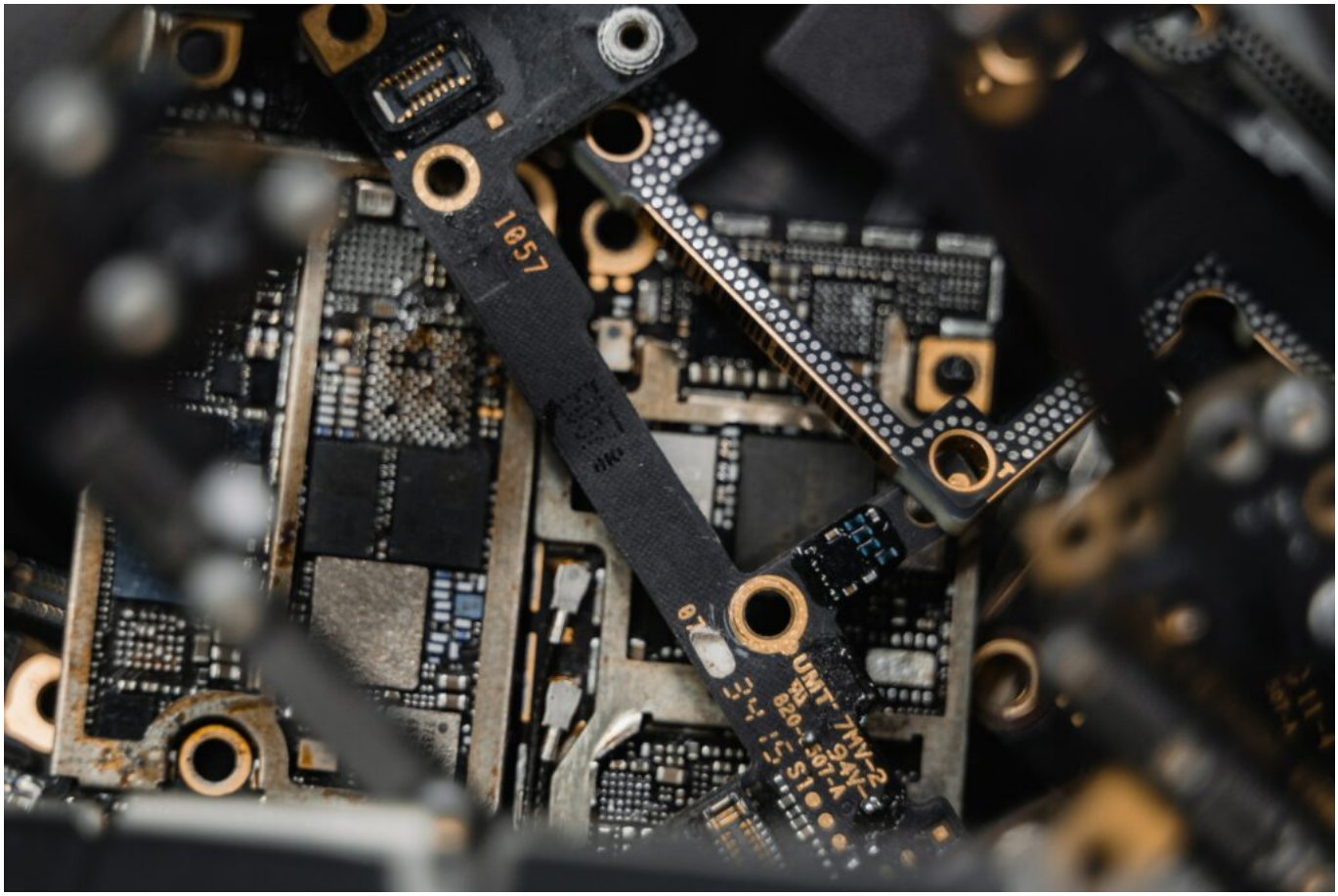

Photo by ***Tima Miroshnichenko***

However, hackathons can be organized to offer marginalized communities the potential for solidarity and critique. At the first all-women hackathon in Mexico in 2015, for example, the "smart home" theme led to active negotiation of how gender, labor, and femininity should align with the development of "new" technologies in the Global South (Beltrán 2020b).[19] In a space usually reserved for young makers who understand "new" technologies, during the final pitches to conclude the event, abuelitas (grandmothers) made a surprise visit to the hackathon. Instead of portraying abuelitas as nontechnical people who would not understand complex infrastructures unless they were explained in very basic terms, [20] the abuelitas were presented as the very backbone of these technologies during this surprise visit. Their conventionally undervalued domestic work was affirmed as foundational for the technological labor centered in the nations' narrative of technological progress.

These examples show the potential for social justice actions in hackathons and techno-entrepreneurial spaces. However, hacker participants may also face pressures to sell themselves as bundles of skills, qualities, and experiences that must be consciously enhanced and managed in the name of labor-market competitiveness (Gershon 2018; Martin 1999; Urciolli 2008). Scholars have shown that the volatile market's demand for constant innovation and flexibility from hackers helps them opt into modes of technological empowerment but simultaneously leads to new forms of inequality and economic precarity (Precarity Lab 2020).[21] Often, this false empowerment is constructed along markers of racial, gendered, and embodied difference. Once members of these communities are more fully included in hackathons, they can thwart the simplistic techno-solutionism of many hackathon initiatives, be they state sponsored or volunteer organized. Including diverse voices and positions opens new physical and conceptual spaces

to imagine unique approaches to what a given community truly needs to create fresh collectives and solidarities (including with researchers) and to imagine new forms of hacking, ethics and personas. The final section explores these possibilities further.

The South as Method: Critique and Reconceptualization of Hacking

Even though hacker manifestos consistently insist that "hackers should be judged by their hacking, not criteria such as degrees, age, race, sex, or position" (Levy 1984, 31) there is a prevalence of sexism, racism, and underrepresentation in the hacker worlds. Hacker communities are increasingly confronting these issues, and today more people of color participate in hacker worlds and redefine what it means to participate in cultures of computing and related techno-entrepreneurialism.

To understand the role of computing in racialization and vice versa, we must think of computing not only as a field of expertise and as a set of converging technologies, but also as a means of organizing and differentially valuing knowledge as well as a method for surveilling and categorizing groups of people and their knowledge practices. "In/from the South as method" focuses specifically on modes of exclusion in hacking and computing technology, and offers alternative perspectives.

What Does "In/From the South as Method" Bring into Focus?

A growing collective of anthropologists and transdisciplinary scholars has developed networks of solidarity and mobilized collaborative inquiry to study computing expertise in/from the South (Amrute and Murillo 2020).[22] As an empirical and methodological framework, computing in/from the South centers the contributions of Indigenous, African, and Asian mathematicians who have been "made invisible within computing's standard history" (Eglash 2005; Mavhunga 2018). This approach builds on theoretical frameworks that treat the South not as a geographical south per se, but as a perspective that fights for the recognition of knowledges and forms of being seen as "other" (Santos 2014).[23] Producing knowledge from the South means paying attention to practices that weaken struggles against three modern forms of domination: capitalism, colonialism, and patriarchy (Santos and Meneses 2020, xviii).

Computing in/from the South centers the contributions of Indigenous, African, and Asian mathematicians who have been "made invisible within computing's standard history".

Accentuating a perspective from the South does not mean simply valuing difference in relation to the Global North while covering up oppressions and exploitations within the Global South. When considering techno-entrepreneurial projects initiated in the name of liberation, we can follow Irani and Philip's (2018, 4) proposal for critical decolonial computing. They propose the following questions to ask of these

projects: “Who funded them? Whom did they recruit? What other movements did they displace or scramble? What practices accompanied these media and social-movement discourses?” Amrute and Murillo (2020) build on these questions by asking: “How do models of technical expertise (from the North) become tied to state practices and national imaginaries (in the South)? …Whose tools are being designed and deployed for listening? Whose computing is listened to? Who is doing the listening and on whose behalf?” In/from the South as a method also directs attention to the central role of computing technology in “waging and supporting domestic and foreign wars,” thereby “magnifying, reproducing, and reconfiguring structures of inequality [between] North and South” (Amrute and Murillo 2020).[24]

A “from the South” methodology can also address questions in the Global North. Duarte (2017), for example, calls for building Indigenous institutions that support the self-determination, self-governance, and cultures of Indigenous people in communication technology projects. Sandoval (2019) argues that to create a sustainable and just world of technology producers and consumers, Indigenous knowledge production must be centered in computer science educational programs. Similarly, Lewis (2016, 234) argues that users can appropriate computing technology to create Indigenous stories, characters, and ways of producing knowledge through which they can imagine and create a future defined by them, not by others.

At the core of all these projects is the idea that marginalized communities can—and should be empowered to—convene, develop, and appropriate new technologies and infrastructures to resolve issues important to their collective well-being and future livelihoods.

How Does Injustice in Coding Operate in Terms of Racial and Other Difference in/from the South?

Not only do technologies enable overt forms of domination, but racist, sexist, and ableist structures become embedded in the algorithms and other technical infrastructures constructed in the name of abstraction and efficiency in supposedly neutral code. In her formulation of a “race critical code studies,” Benjamin (2019, 45) invites us to consider racism as not just “ideology or history, but as a set of technologies that generate patterns of social relations, and [that] become Black-boxed as natural, inevitable, *automatic*.” Although Benjamin’s work is focused on the United States, it helps interrogate not only how racial logics enter the design of computational structures in the Global South, but also how race itself continues to operate as a mechanism for essentializing, ordering, and dividing groups of people around the world.[25]

Race (along with other differences) is not simply the labeling and categorizing of bodies but is meaning-making that is socially and historically constructed around difference. Racial differences are made to carry weight and produce consequences in society, influencing how people who are marked as different are perceived; framing interactions and relationships between members of different groups; shaping institutional policies; and ultimately providing hierarchical advantages to some groups over others. Racial meaning has historically also portrayed some groups (for example Black people or Indigenous peoples) as backward and in need of “development” or “modernizing,” or as the “periphery” to contemporary centers of innovative culture (Chan 2013; Takhteyev 2012).

From these marginalized locations, people might very well be trying to break *into* global techno-cultures from which they have been excluded. This is quite different from the breaking *out of* socio-technical limitations that hacking in the Global North posits. In the case of Vietnamese hackers, for example, the relatively mundane practices of unlocking and jailbreaking serve as a means to coping with the lived experience of frustration and desire for access to the centers of global modernity (Nguyen 2016, 638). However, framing hacking as innovation of the "right kind" can construct hacking approaches elsewhere as "copycat culture" that is distinct from respectable innovation, as is the case with Chinese hacker-entrepreneurs (Lindtner 2015; Murillo 2020).

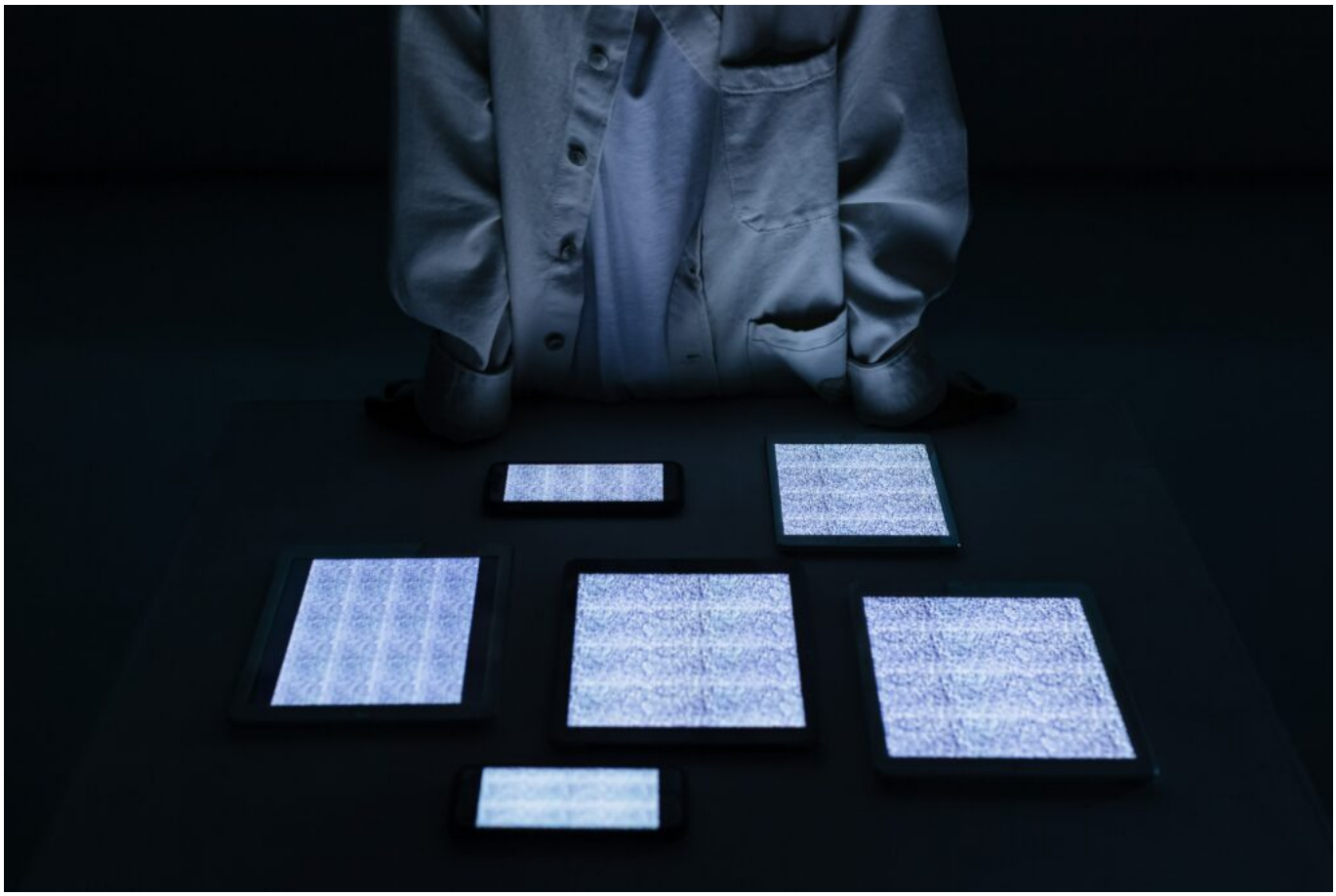

Photo by Ron Lach

Developmentalist narratives of progress that portray hackers and entrepreneurs sitting in front of their computers within sanitized "creative" spaces lead to the depiction of Kenyan techno-entrepreneurs as epitomizing the "Africa Rising" narrative (Okune 2020) or model Mexican hacker-entrepreneurs confirming the "Rising Aztec Tiger" narrative (Beltrán 2020a, 490)[26] to the exclusion of other forms of innovation. Theorizing from the Global South, Irani (2019) warns that computing projects oriented toward developmental ends divide high-end creative designers from folks who produce singular ingenuity rather than innovation that can be reproduced across time and space. This, again, raises the question of who the "real" innovative hackers are, pitching hackers like the phone phreakers against those who are simply solving local problems or "copying" others' technologies.

Guided by this question and using "in/from the South" as method, ethnographers have explored how unequal power relations relate to innovation and hacking "in/from" locations constructed as peripheral to

geographic centers of power. Roussel and Stolfi (2020), for example, show how the construction of alternative computational blueprints allows Black and Indigenous communities in Brazil to conceptualize and develop new technological systems. Building on long-standing community-based networks based in Quilombolas settlements, their infrastructures use flat structures, recycling technologies, and the branching shape of the Baobab trees, instead of more commonly used geometric patterns.

Chan (2018) demonstrates how open-technology hackers, public school teachers, media artists, and community organizers unite transnationally to disrupt the academic/activist divide and to critique simplistic, false universalism in digital spaces. Drawing on postcolonial theory, McElroy (2020) shows how technologists and hackers in Romania combine homebrewed technical ingenuity with Western techno-culture and infrastructure,[27] dodging global stereotypes that frame them as deviant cybercriminals, the by-products of a corrupt socialist past.

With Silicon Valley frequently appearing as the backdrop of hackathons and hacker schools, I (2020a) show how hackers in Mexico—as well as in diasporically connected Latinx communities in California's Bay Area—reinterpret coding logics and concepts to think about the ways they might reconfigure their relationships with state and economic entities who produce value from their hacking.

Considering how gendered, nationalized, and racialized differences are tactically negotiated helps us unpack the normative tropes that make up the cultures of computing: "hackers" as rebels; "software developers" as rock stars; and "tech entrepreneurs" as disruptive actors (Amrute and Murillo 2020). These transnational alliances across the academic/activist divide thus mobilize transdisciplinary methodologies that strive to center the practices and needs of marginalized communities when theorizing hacking and when developing concrete projects that use computing technologies.

Computing expertise is often gendered, racialized, and sometimes criminalized when seen as connected to marginalized populations.

It is important to remember that computing expertise is often gendered, racialized, and sometimes criminalized when seen as connected to marginalized populations. However, the perspective and expertise of marginalized communities may also offer liberatory possibilities when hacking is articulated with other social practices and ways of producing knowledge. Thus, as a methodological approach to hacking studies, "in/from the South" allows us to create transnational and transdisciplinary solidarity as well as conceptualize hacking and the use of computational technologies in new ways across the Global North and the Global South. Ultimately, this approach supports struggles against oppression, all in the name of constituting just tech designs.

Footnotes

References

1 See, for example, the *limn* journal's collection of essays "Hacks, Leaks, and Breaches" (https://limn.it/issues/hacks-leaks-and-breaches/) and the site https://hackcur.io/. For an example of how hacking meets grassroots organizing see Renzi (2020).

2 Some scholars dive deeper into each of these hacker subject positions to establish more precise hacker typologies. Schrock (2016), for example, characterizes the civic data hacker as someone who models and contests data to transgress established boundaries of political participation.

3 See Galloway (2004) who traces a genealogy of hacking, quoting Robert Graham on the golf hacker.

4 In the late 1980s, popular perceptions of hackers as DIY hobbyists shifted to include the image of the digital outlaw/terrorist—a shift that went hand in hand with the advent of malevolent computer viruses and the Computer Fraud and Abuse Act of 1986. Popular movies and imaginaries corroborated the view of the hacker as someone to be feared, either because they could break into a computer or because they were society's outcast. The image of the white male geek gone wrong was soon joined by both romantic and racist representations of hackers of color. The case of the Masters of Deception, often described as a hacking "gang," is emblematic (see Slatalla and Quittner 1995).

5 The hacker publication *2600: The Hacker Quarterly* is named for the 2600 hertz tone which could be produced with a plastic toy whistle to gain operator mode to access the telephone system

6 Thomas (2002, xvi) states that "hacker culture" is carefully cultivated alongside "boy culture," as both value practices of competition and promote the expression of "affection through mayhem," as boys partake in "playful spontaneity," "friendly play," and "rough hostility." Abbate (2012) and Chun (2013) further analyze the competitive and exclusionary aspects of electronics and engineering cultures, and Eglash (2002) demonstrates how these constructions of normative masculinity intersect with racialization. In her genealogy of geek cultures, Dunbar-Hester (2016, 151) argues that hacker culture's valorization of "wizardry" is gendered masculine and that the tinkering ascribed to the geek and hacker communities continues to be a predominantly male pursuit.

7 To get a sense of how popular hackathons have been in recent years, the organization BeMyApp dedicated to enumerating the events and their artifacts, reported that in 2016 there were at least 3,450 hackathons organized, 200,000 people participating in them, and 13,000 prototypes built in over 100 countries (Laudet 2017).

8 On the language of "prototyping" as used to reference the experimental, open-ended, and often aspirational desires for communal self-organization embedded in skill building see Corsín Jiménez (2014) and Suchman, Trigg, and Blomberg (2002).

9 McIntosh and Hardin (2021) conduct an empirical study of nearly 12,000 project code repositories related to the popular Major League Hacking events between 2018 and 2010 to conclude that very few show patterns of consistent development, with only 7 percent of projects showing any activity after six months.

10 These movements and corresponding ethics have been characterized by a turn toward the physical, especially spurred by the emergence of new technologies like 3D printing (Maxigas 2012).

11 I (2020a) give the example of a state-sponsored hackerspace in Mexico where government representatives are literally located in a connected office, giving politicians easy access for frequent photo opportunity drop-ins.

12 Scholars have shown that the concept of Silicon Valley represents a range of distinct values and ideologies, including conventional engineering commitments (English-Leuck 2002), "laid back" California attitudes (Saxenian 1996), narratives of rapid class mobility for specific ethnic groups (Shankar 2008), new age philosophies (Zandbergen 2010), neoliberal orientations (Marwick 2013), and countercultural practices (Turner 2006).

13 That the objects being built are less important than the people and mindsets being built directly contests the language of emancipation and access that often accompanies the introduction of computers, especially in "underserved" populations or "developing" countries (Ames 2019; Crooks 2018).

14 Maxigas (2012) makes a distinction between a later generation of "hackerspaces" and the early "hacklabs." The latter were situated in anti-capitalist movements and barriers of access to communication infrastructures which made them more overtly political in their call to spread access to the dispossessed and their championing of folk creativity.

15 Moraga and Anzaldúa (1981), Combahee River Collective (1979), Crenshaw (1989), and Oyěwùmí (1997), were among the first scholars to consider how race, gender, class and other markers of difference overlap and intersect.

16 This hacker and gamer slang term—pwn (pronounced "pone")—comes from "own," and means that you have gained power or mastery over someone. It is said to have originated when a user mistakenly typed a "p" instead of an "o," the two being adjacent on the QWERTY keyboard.

17 Boellstorff (2019) adds that practices by the disability community in digital social worlds challenge the ableist paradigms that structure both the digital social worlds and conceptions of labor, and reframe disability as a form of social action irreducible to limitation or lack.

18 There are representative examples of projects led by members of disability communities (Garfinkel 2020) and hacker events that are careful about the "engineer's trap" (https://hackaday.com/tag/disability). Many people come to the hacker worlds because of their disability.

19 As anthropologists have shown, the question of how women from the Global South spend their time, and whether it's leisure, pleasure, or work, is a critical site to investigate constructions of gender, productivity, and social change (Amrute 2016; Fleming 2018; Freeman 2000; Krishnan 2018). See Cowie (1999) and Nakamura (2014) on the recruitment of women of color as ideal workers for the electronic and software industries because of their supposed "nimble fingers and passive personalities" (933). See also Medina et al. (2014, 2) for an exploration of how technology experts in Latin America are frequently framed as passive recipients or followers, perpetually dependent on foreign "cultures of innovation."

20 In addition to the performances of technical masculinity that many times prevent women from participating in technical cultures, it's common among computer experts to use gendered language specifically to make women feel like outsiders. In the Free Software community, for example, the term "Aunt Tillie" is deployed to refer to someone who is not tech-savvy.

21 Rising hacker-entrepreneurs must learn to respond quickly and with agility to volatile market trajectories and frequently cross career, role, and political boundaries to perform their flexible or "latitudinal citizenship" (Ong 2006, 124). Market volatility becomes a way of life, where flexibility, instability, liquidity, and risk-taking are interpreted as desirable and as challenges that the modern subject can manage by employing calculative decision-making (Ho 2009; Miyazaki 2003; Zaloom 2003).

22 Amrute and Murillo (2020) propose that *in* the South centers digital infrastructures ethnographically to understand how they construct politics and ways of producing knowledge; "*from* the South opens up the material, immaterial and social aspects of computing to alternative forms of life and alternative realities." The "/" operator further calls attention to the "slips, sources of ambiguity, and tensions in computing projects."

23 Specific projects in the name of resisting political and epistemic oppression might take the form of bilingual education initiatives or the gradual inclusion of new concepts from the Global South, such as *ubuntu* or *sentipensar*.

24 One of the first theorizations of the Global South can be found in a report written by the Independent Commission on International Development Issues led by Brandt (1980) that stressed the idea of a more advanced center (the North Atlantic socioeconomic model) as a development model to be imposed on the rest of the world. See also Santos and Meneses (2020).

25 Other scholars who have analyzed computational algorithms with an eye toward the way they embed racial discrimination into respective technical infrastructures include Noble (2018) and Broussard (2019). An early examination of how ideas about race may be embedded in algorithms—even in their very formal operation—has been completed in Helmreich (1998).

26 In the Mexico case, newspaper article titles such as "The Comeback Kid," "Mexico Makes It," and "The Rise of Mexico" give a sense of the hype created by these narratives and tropes. See Friedman (2013) and Economist Staff (2012), the latter of which predicted that by 2018 "Made in China" would become "Hecho en México" [Made in Mexico].

27 See also Biagioli and Lépinay (2019).

Recommended Readings

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