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A Railway Carpenter in the History of Technology?: New Opportunities From Modern South Asia

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ABSTRACT

This article examines interconnected questions that are central to new scholarship on the history of technology in modern South Asia. Which communities, groups and individuals have formed and sustained relationships with knowledge and practices that are seen as representative of technological modernity? Why were some individuals and communities understood—by both the state and various South Asian publics—to be cultivators of technological knowledge, while others were not? And to what degree were claims on technical knowledge and practice made and sustained through South Asian “vernacular” languages, practices, and conceits? The article integrates Punjabi verses written by an early 20th-century railway carpenter with an analysis of current historiographical trends. In doing so, it explores both the opportunities and limitations of the new social historical turn in the history of technology in South Asia. I argue that recent efforts to expand the “who” of the South Asian history of technology must lead us to new approaches to the social role of technology itself, and to new considerations of technology’s relationship with science, labor, the environment, and material culture.

1 | Introduction

In 1927, ‘Abdul ‘Aziz, a carpenter employed by the colonial railways in Lahore in British India, wrote and published a twelve-page, Punjabi-language versified lament about the conditions of labor in the city’s workshops (‘Abdul ‘Aziz 1927). Like ‘Abdul ‘Aziz’s workday, the verses were punctuated by a piercing “ghoo-ghoo” sound of the workshop siren, rushing workers to their stations, a noise ‘Abdul ‘Aziz compared to the trumpet heralding the judgment day (2). This noise gave the text its title, the *Ghoo-ghoonamah*, or book of the siren. ‘Abdul ‘Aziz repeated a refrain: “Oh my peace is gone, as this frightening *ghoo-ghoo* blares on.” He also expressed disdain for workshop supervisors who hung their “certificates” (*sirṭīfkīṭs*) from colonial institutions on the walls of the workshop. “Now this strange certificate has arrived, which makes [the supervisors] care for no one” (7). These state-certified supervisors, ‘Abdul ‘Aziz

complained, lorded their new authority over artisan-laborers (*kārīgārs*) who, he argued, had God-given technical prowess, and did not require a paper from the colonial state to prove it.

Carpenters and other workers like ‘Abdul ‘Aziz are not often presented as key actors in histories of technology, including in South Asia, a term I use to describe geographies from Afghanistan in the northwest to Sri Lanka and the Bay of Bengal in the south and east. These workers are not recorded as inventors or experimenters, responsible for the development new knowledge and technical practices. Like the “invisible technicians” who Steven Shapin described in his analysis of servants of early modern European laboratories, they worked in roles “deemed to involve physical effort or manual skills but... little knowledgeability” (Shapin 1989, 556). In the context of colonial industrial labor regimes, their work was made even more illegible; they were often positioned by the state and their

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supervisors as mere cogs in a process of transplanting “European” technologies to India (Krishnan 2022; N. Sinha 2012).

Nonetheless, a new social historical turn in the study of the history of technology in modern South Asia makes it possible to write about figures such as ‘Abdul ‘Aziz at the center of technical knowledge and its material practices. A decades-long trend toward analyzing localized meaning-making for new technologies under colonialism has drawn attention to how practices of technological modernity were embedded in regional social hierarchies (Arnold 2000; Chakrabarti 2004; S. Sarkar 2014; Mukharji 2011; Wickramasinghe 2014). Recent work is likewise indebted to ongoing analyses in the global history of science that have complicated categories such as “indigenous” and “vernacular,” drawing attention to the influence of colonized peoples on technologies that are popularly perceived to be “Western” (Raina 2016; Raj 2016; Tilly 2010).

But there are crucial differences that set the most recent social historical studies of technology in modern South Asia apart from previous analyses, making it increasingly possible center a carpenter, his workshop, and his poetry. First, scholars have examined the distinctive—sometimes conflicting—meanings that technologies held depending on the class-, caste-, gender-, and religious positionalities of those who used them (Hussain 2021; Kapoor 2021; Mitra 2015). And second, several have asked how these diverse and divergent meanings were cultivated through South Asian intellectual traditions, which often engaged with—but were not co-terminus with—colonial epistemologies (George and Narayan 2022; Kannan 2023; Singh 2022).

Reading ‘Abdul ‘Aziz’s verses alongside this emerging scholarship suggests the potential for the history of technology to address how South Asians experienced and conceptualized shifting (post)-colonial material and environmental worlds. His palpable frustration at laborers’ diminished authority in the workshop reveals the efforts of socially marginalized actors to challenge elite claims on superior technical practice. Likewise, his evocation of the soundscape of industrial timekeeping technologies suggests a poetic, Punjabi-language imagination of a physical, laboring world shaped by new technological practices. The scholarly turn toward the vernacular and local registers of technical concepts and practices allows us to go beyond placing these assertions in their social historical context. It necessitates a reevaluation of the power structures and hierarchies that lead to the exclusion or marginalization of figures like ‘Abdul ‘Aziz—and the materials and texts they produced—from our narratives of the technological past.

This article is organized around what I see as three central questions in modern South Asian histories of technology, which I re-fame through ‘Abdul ‘Aziz’s writing. First, who are the subjects and claimants of technology? Second, how are hierarchies and exclusions within technical knowledge produced? Third, how, in colonial and post-colonial contexts, are technologies translated, localized, or “creolized,”—that is, made distinctive and new, despite their origins elsewhere (Edgerton 2006). Traced through the work of ‘Abdul ‘Aziz, these questions probe whether the claimants of the history of technology include railway carpenters. They examine how colonial

workshops marginalized certain forms of technical authority while valorizing others, as the colonial state sought to transform Indian workers into human capital capable of using but not commanding technology (Nite et al. 2023). Finally, these questions highlight how Punjabi verses reveal local engagements with technology beyond narratives of transfer and adaptation from the West to the non-West.

We are perhaps too close to this historiographical moment to identify all its causes. It is clear, however, that the complex legacies of rethinking modern South Asian histories “from below”—with reference to the persistence of social exclusions—have elicited creative new responses from the history of technology in the last decade. It is now beholden on us, as historians of technology, to continue to ask questions that include a widening range of technological actors and archives. These questions must be asked in conversation with scholarship on other geographies—including in Africa, Latin America and the Caribbean—that have revealed how colonized communities transformed technologies beyond imperial control (Bulstrode 2023; Osorio 2022). Indeed, these approaches to South Asian histories of technology have the potential to spur revisions in how we use “technology” itself as a category, including its relationship with science, medicine, and the environment. By understanding technology in its local, quotidian and material practices, as well as its imbrication with social exclusion, we can better come to grips with the experiences of technological actors, including workers like ‘Abdul ‘Aziz.

2 | *The Carpenter: New Subjects and Claimants in the History of Technology*

The communities and groups that scholars study as central to modern South Asian histories of technology have expanded over the past decade. But the social history of technology has been a prominent theme for far longer. In a 2003 review of the status of the history of science, medicine, and technology in South Asia, Deepak Kumar emphasized the study of the “values” of technology and questions of who circulated “forms of knowledge” circulated (D. Kumar 2003, 2249). The recent shift is marked by a refocusing of these questions, away from “how colonialism determined the transfer mechanisms” of technology and toward the meanings that technologies held for South Asians who engaged with them.

New social histories also reflect an effort to move beyond the longstanding debate surrounding technological “transfer” through imperial expansion. In the 1980s and 1990s, scholars such as Daniel Headrick theorized “transfer” as a process of the “cultural diffusion” of technical “knowledge, skills, and attitudes” through imperial rule (Headrick 1988, 9). These narratives revised the universalizing narrative of the “spread” of science and technology from the West to the non-West that had been schematized by George Basalla (1967). They emphasized instead the social relevance of technologies and forms of individual engagement. Nonetheless, critiques of transfer-based approaches to the history of technology under empire noted that “transfer” sometimes elides the inequalities and violence

inherent in colonial forms of knowledge production and adaptation (Siddiqi 2015). David Arnold and Erich DeWald sought to upend understandings of transfer by framing “the colony” as a “locally constituted” space for technological engagements, rather than approaching it as a derivation from the imperial metropole (Arnold and DeWald 2011, 972). Other critiques of transfer-based approaches include David Edgerton’s advocacy of “creole technologies,” in which “imported” technologies acquired new uses outside of wealthy centers of empire (Edgerton 2006, 43–44).

In the wake of these debates, scholars of technology in colonial and post-colonial era South Asia have asked how people cultivated local and regional meanings and intellectual traditions for seemingly “foreign” technologies. Colonial-era “intermediaries”—often employed by the colonial state as technicians—remain crucial to our understanding of how technical knowledge associated with the state was developed, translated, and applied in British India. But scholars including Projit Mukharji (2016), Charu Singh (2021), and Animesh Chatterjee (2018) have also surveyed the translation of technical knowledge and practice outside of institutions associated with the state and its South Asian intermediaries. Chatterjee examined the “social and cultural meanings” assigned to the technology of electricity in urban colonial India, tracing the “urban class politics” through which electricity became a way for members of the urban middle class to distinguish themselves from the urban poor (Chatterjee 2018, 104).

Even studies of large-scale state-led technological innovation have complicated top-down analyses of technical authority and expanded our understanding of the range of actors in the history of technology (Phalkey 2013; J. Sarkar 2022). Jayita Sarkar analyzes the history of the “socio-technical imaginaries of political leaders... and scientific institution builders” in the context of development of a post-colonial nuclear program in India (J. Sarkar 2022, 2). While rooting this story in the international political history of nuclear technology, she also disaggregates the state and its exclusive claims on technological development through focus on individual scientists, politicians, civil society groups, and foreign stakeholders.

The expansion of actors within the history of technology remains an incomplete project. As we shall see, women have become the subjects of the history of the consumption and application of technology, but they remain marginal in the histories of invention and adaptation. There are a few notable exceptions. Nira Wickramasinghe, for instance, has analyzed how women mediated the introduction of new technologies of production and hygiene into the home in colonial Lanka (2014). And David Arnold has also considered how women claimed typographic, sewing, and food production technologies (2013).

Additionally, the relative paucity of histories of repair within the history of technology—not only in the context of South Asia, but also globally—also limits attention to the quotidian work of sustaining technologies. Scholars including Ramesh (2018) and Bear (2020) have directed our attention to projects of “maintenance” and “renewal” technology associated with (post)-colonial states and capitalist economies, including the ways in which maintenance reshapes regional environments and labor. Others

have turned to the contemporary economic and material sustainability of technologies of mobility (Rahman and Assadekjaman 2013). Still, the people who have repaired and maintained these technologies remain understudied and undertheorized as actors within the history of technology.

What does it look like to write histories of technology in South Asia that do not center, for instance, the consumer of an automobile or telephone or the rise of *desi* manufacturers, but instead the knowledge of the repair worker? Can we write histories of technology through the in-home, adaptive repair work undertaken by women domestic laborers? These questions are increasingly explored ethnographically (Rai 2019; Shaikh 2019; M. Sur 2020), and they also feature prominently in Science and Technology Studies (STS) approaches that analyze contemporary repair skill within global knowledge flows and localized tacit practices (Ahmed, Jackson, and Rifat 2015; Rifat, Prottoy, and Ahmed 2019).

But the historical antecedents of contemporary practices of repair and maintenance—and the ways we might locate their practitioners’ experiences in the historical archive—have not yet commanded sufficient scholarly attention. This is an important elision, because repair, as Stefan Krebs and Heike Weber point out, “alter[s] the original structure of things... blending [the] old and new” (Krebs and Weber 2021, 11). Our understanding of who adapted, localized, or creolized technologies in South Asia remains incomplete without reference to those who repaired.

New trends in the history of technology have made room for figures such as ‘Abdul ‘Aziz as the subjects of technology, figures whose daily life and work was reshaped by the technological shifts they experienced around them. But to study a railway carpenter—engaged sometimes in production and sometimes in repair—as someone who claims technology requires additional steps. In his verses, ‘Abdul ‘Aziz claimed technology by describing the physical effects it has on a worker’s body. He described the “tired legs” that result from standing and grinding wood, and the cautious hand that learns to “not press too much” while driving a drill, to avoid injury (‘Abdul ‘Aziz 1927 5). To truly place figures like ‘Abdul ‘Aziz in the history of technology, we must consider technological claims mediated by bodily practice, and we must consider not only those who built knowledge through writing or experimentation, but also through embodiment.

3 | *The Workshop: New Approaches to Hierarchies of Technological Knowledge*

The exclusion of technological actors who cultivated their knowledge through embodiment is not only a question of limitations of the archive, but also a case of benign oversight. Hierarchies and exclusions were cultivated through colonial and post-colonial regimes that enforced gender, caste, and class boundaries on technological knowledge. These hierarchies were highly visible in places of training and labor, such as workshops and plantations (P. Kumar 2012), though they also pervaded homes, bazaars, and places of worship (Das 2019; V. Sinha 2023). We will return to ‘Abdul ‘Aziz’s experience of the

workshop to explore individual experiences of marginalization within these hierarchies.

From the late eighteenth century, some South Asian communities were positioned by the colonial state as people who could act upon with technology, even though technological authority often remained the perceived purview of the state's European administrators (Ramnath 2017). Some South Asian groups and individuals have also consciously self-fashioned themselves as scientific and technological actors, positioning themselves as authorities in workshops, laboratories, and homes. Many ultimately also incorporated this understanding of the techno-scientific self into their vision of a nation-state and their role within it (Chakrabarti 2004). Even as the colonial state used its claims on technical knowledge to justify its rule, Indian authority over that knowledge and its translation was dispersed and expanded through the establishment of Indian social and cultural organizations (Prakash 1999).

Building on these insights, scholars have sought to understand how the colonial state produced hierarchies of technological knowledge. In the eighteenth century, some European travelers admired and learned from the “tacit” knowledge of Indian craftworkers, artisans, and miners in their investigations of “useful” industrial knowledge and practice (Berg 2013). But Maxine Berg argues that East India Company leaders did not share the travelers' enthusiasm for Indian craftwork as a source for potentially adaptable technical knowledge and skill. Even as “demands for Asian imports fed into those of Europe's industrialization,” the East India Company increasingly positioned India as a site for exportable raw materials, rather than skilled technical work (140).

However, as colonial infrastructure expanded, the state also relied on local technical skills for its construction and maintenance. Europeans were consistently placed at the top of the systems of technical and scientific oversight, but South Asians who worked under them were also slotted into racialized and caste-based technological hierarchies (Bear 2007; Kerr 2007; Ramnath 2017). S. Prashant Kumar, for instance, studied the creation of new categories of technical-scientific workers by the colonial state at an eighteenth-century observatory school. He contrasted forms of scientific and technological ability ascribed to Tamil Brahmins and so-called “half-caste orphans,” or those of mixed Indian and European descent (S. P. Kumar 2023, 316).

From at least the mid-19th century, dominating-caste status has enabled South Asians to access forms of technical education that led to positions of oversight, a process that Ajantha Subramanian recently examined through engineering training (Subramanian 2019). Conversely, Dalit and other caste-marginalized communities were often excluded from technical training schemes in their fields of expertise, including through literacy requirements (Bhattacharya 2018). In contemporary India, “meritorious” access to elite forms of scientific and technical education and employment remains casted, rooted in performances of status and skill that are often learned by members of dominating castes (Fernandez 2018; A. Sur 2011).

Colonial infrastructure projects were especially important sites for the cultivation of hierarchies of technical subjects. But other

spaces of production in colonial South Asia likewise informed which communities and groups were valorized or marginalized within new systems of technological authority. Understanding the production of social hierarchies of labor includes analyzing why laborers—people like ‘Abdul ‘Aziz—who possessed tacit, embodied knowledge of technologies were excluded from middle-class authority. These technological-class hierarchies were bounded by extant forms of caste-dominance, though some workers managed to challenge caste boundaries through technical education (A. Kumar 2018). Shivani Kapoor termed this hierarchy the “organization of knowledge production and labor as two distinct caste and sensory activities” (Kapoor 2021, 999). Still, in their own spaces of work, leisure, and worship, workshop laborers across the subcontinent—and in its growing diasporas—imbued technologies with meanings that were not always legible to the middle classes or the state (V. Sinha 2023).

Middle classness was cultivated and displayed not only through command over the technical knowledge of production and trade, but also through the consumption of technology (Arnold 2013; Datto 2020). Consumption spurred “economic dominance, social status, and patriarchy, even as it sometimes “served as a platform to contest... prevailing orders” (Haynes et. al., 2010, 4). Modern middle-class identities were developed through the consumption of technologies that held perceived associations with global “modernity.” Projit Mukharji notes the importance of the consumption of material objects such as thermometers, alongside educational goods such as degrees, in the cultivation of the Bengali *bhadralok* (*genteel classes*) and their claims on medical knowledge (Mukharji 2016).

Consumption of technologies likewise served to communicate gendered class identities. Consumption is one of the few spaces in which South Asian women are consistently analyzed as technological actors. In colonial India, women were more often positioned as subjects of scientific and technical study, especially in the study and translation of knowledge of sexuality (Mitra 2015). In the context of skin-lightening cosmetics that Mobeen Hussain has studied, consumption allowed women a form of “material self-fashioning,” in which they produced and preformed their femininity and middle classness identities (Hussain 2021, 932). Advertisements for consumer technologies referenced both understandings of South Asian women's position in an imperially or globally cultivated modernity, and simultaneously reflected their anxieties about their role in local social hierarchies.

Some women pursued technological engagement and consumption as a form of liberation or independence, but gendered hierarchies and systems of patriarchy were also produced or reinscribed through the consumption of technology. Arnold argues that narratives that associated women's labor with traditional technology often denied women access to technological modernity (Arnold 2013, 191–92). A crucial task for historians of technology is the continued disentanglement of the colonial and post-colonial patriarchal hierarchies in which men are believed to act upon technologies, while women are framed as consumers, sometimes in ways determined “appropriate” by their male counterparts.

The adaptation of technologies allowed some individuals and communities to communicate participation in gender- or caste-

norms or assert educational and economic authority. But these same technological hierarchies of authority and knowledge inherently relegated people like ‘Abdul ‘Aziz to new social margins. In his workshop, ‘Abdul ‘Aziz identified the “certificate” that hung on the wall of a middle-class overseer as a mark of technological authority, a piece of paper (rather than knowledge or ability) required to ascend in localized, factory-based hierarchies. These overseers, ‘Abdul ‘Aziz noted, were dependent on systems of colonial approval and authority. “Then, they provide aid to the government/they are busy wishing it well,” he wrote. Recognizing their alienation from embodied technical knowledge, he also bemoaned their lack of physical labor: “why don’t they sweat anymore?” (‘Abdul ‘Aziz, 9).

Colonial and post-colonial systems of work and education thus placed not only ‘Abdul ‘Aziz but a wide range of caste-, gender-, or class-marginalized people at the bottom of new hierarchies of technological authority. To understand how these hierarchies were established—and challenged—requires not only creative readings of state and colonial archives, but also rigorous engagement with alternative sites of knowledge production.

4 | *The Versified Lament: New Perspectives on “Vernacular” Histories of Technology*

The expansion of the communities, classes, and groups that are written about as actors and agents in the history of technology has required the study of South Asian “vernacular” archives of technical practice, knowledge, and skill. As Charu Singh notes, the “translatability” of scientific and technical discourse was “grounded in local sociocultural, epistemological and linguistic regimes” (Singh 2021, 63–64). In colonial India, writers and practitioners across a range of languages and intellectual traditions wrestled with the commensurability and translatability of scientific and technical terms, concepts, and practices (Amstutz 2023). Studying vernacular technical practices in colonized spaces can ultimately reveal localized knowledge and practices that belied the supposed universalizing technological and scientific claims of European imperialists (Bulstrode 2023; Murphey 2011).

Histories of South Asian vernacular technologies, and the development of self-consciously technical knowledge in South Asian languages in the colonial and post-colonial periods therefore reflect an expansion of Helen Tilly’s definition of “vernacular sciences” in the colonized world. For Tilly, “vernacular science” refers to “studies that made various forms of ‘native’ knowledge visible, credible, and mobile” under empire, revealing the “porous boundaries” between epistemologies that were considered “scientific” and “non-scientific” (Tilly 2010, 117).

In the context of South Asian histories of technology, this definition might be expanded to include studies and practices carried out by South Asians that rearticulated local knowledge in an adaptive language of technical modernity. Conversely, South Asian “vernacular technology” also includes the ways that people remade technical practices associated with the colonial state or foreign trade to accommodate their own experiences, cultural

expectations, and needs. Michael Dodson has argued that translation and adaptation are often “creative”—sometimes even “subversive”—processes of integrating new forms of knowledge into extant “ways of conceptualizing the world” (Dodson 2002, 296). The cultivation of vernacular or “indigenous” knowledge in this context reflects not only linguistic translation but also conceptual adaptation, which could be communicated through both language and practice (Menon 2021).

The circulation of vernacular technical knowledge across a range of South Asian social groups was rooted in the expansion of new media and public spheres. The rapid expansion of South Asian vernacular printing presses in the 19th century enabled the circulation of technical knowledge and norms to new, growing print publics (Dato 2020; Gupta 2021). Radio, photography, film and television were likewise crucial to the promotion of new technologies and the development of regional and national norms and narratives around them (Huacuja Alonso 2023; Roychoudhuri 2017; Siddique 2023). South Asian communities engaged with these technologies as part of new technical socialities, integrating them into material practices of the home and daily life, even as they sometimes used them to cultivate political resistance or escape from daily struggles (Leuzinger 2019; Mahadevan 2015; Massoumi 2022). The adaption of media technologies to meet the demands and interests of South Asian publics has necessitated processes of vernacularization. These often differed across South Asian linguistic and cultural geographies, though many simultaneously contributed to the consolidation of national publics (S. Roy 2007).

Engagement with the printed book has often been described as a primarily literate middle - class practice. Print democratized text, but consumption of the printed book also helped to mark middle class and elite social identities, many of which were localized within cities, towns, and regions (Gupta 2021; Robb 2021). However, as I have argued elsewhere, groups with more limited literacy engaged in printed technical writing through community literacy, orality, and engagement with the text as an object (Lanzillo 2024). Some printed technical manuals and artisan community histories published in the late 19th and early 20th centuries even explicitly noted that they were meant not only for readers, but also for workers who “hear [them] read aloud by another” (Muhammad 1907, 7). In other cases, practices of versification suggested that the authors of technical manuals intended for them to be memorized and recited.

The circulation and vernacularization of technical knowledge were thus predicated on the embrace, engagement, and adaptation of the technology of print. It was also rooted in colonial debates about the suitability of South Asian languages to the expression of scientific thought, and the commensurability of South Asian-language terminology with European-language technical knowledge (Dodson 2005). By the early 20th century, Indian elites increasingly wrote technical glossaries and developed new translation practices for their own purposes, using them as a form of self-assertion (Singh 2021). As Singh argues, in identifying appropriate language and terms for technologies and technical knowledge in South Asian languages, “Indian elites attempted to transform their languages into effective media for science” (65).

The vernacularization of technical knowledge took place not only at the level of linguistic translation and adaptation, but also through bodily and material practices and engagement with regional environments. Scholars focused on these bodily, material, and environmental practices have increasingly asked how extent regional technical knowledge traditions reshaped and interacted with technical knowledge that was perceived as foreign or new. Tamara Fernando, for instance, analyzes bodily practices of pearl divers in Ceylon and the wider northern Indian Ocean rim (Fernando 2022, 2023). In the late 19th and early 20th centuries, Europeans sought to use technologies such as steamers and dredges to study the conditions of oyster growth (2022). But as Fernando shows, these technologies were not well suited to the regional conditions, and the surveyors relied instead on the tacit knowledge and abilities of local pearl divers. The divers' bodies themselves became the technologies of surveying, central to "European" collection of information about the sea and its pearls.

Much of this recent scholarship on the "vernacular" practice of technology seeks to identify and trace what Mukharji described as the "distinct strands from heterogenous cultural traditions in the "East" and the "West" that were "braided" together (Mukharji 2016, 92). Particularly through an emphasis on this "heterogeneity" within South Asian technological epistemologies, new studies challenge not only Eurocentrism, but also nationalizing narratives. In India specifically, science and technology are increasingly integrated into Hindutva religious-cultural narratives, and Brahminical Hindu practices are reimagined as "cultural" ideals in scientific and technical spaces (Thomas and Geraci 2018). An emphasis on what Minakshi Menon terms the "processual in the making of cultural objects," can help us avoid the techno-scientific "claims made by the dominant ethno-nationalist projects" (Menon 2021, 2).

Indeed, as Banu Subramaniam argues, in contemporary India, technologies have increasingly been "harnessed to reinvigorate old categories of race and class into modern subjects and objects" within Hindu nationalist state ideologies (Subramaniam 2019, 225). To study the production of technological knowledge through South Asian vernacular epistemologies and practices does not—must not—mean subordinating the history of technology to triumphalist post-colonial nationalism.

Considering alternative vernacular archives, including materials like 'Abdul 'Aziz's Punjabi verses, might help us avoid the pitfalls of technological triumphalism of both colonial projects and post-colonial nationalisms. The *Ghoo-ghoonamah* is neither technophobic nor celebratory of technological potential for nation or polity. Instead, it both valorizes technical skill and decries the decreasing value placed on laborers' bodily knowledge of the technologies with which they work. Describing a workshop crew of 12 men, he notes that they "work in the blink of an eye" to measure, saw, and affix wooden beams, but "only reprimand is their fate/If there is even a slight deficiency" ('Abdul 'Aziz 1927, 6).

But it is not only this clear-sighted description of physical work and punishment that sets the Punjabi verses apart from state records on railway workshop. The very organization and cadence of the text places the reader in the workshop. 'Abdul

'Aziz's mourns over and over, "oh, my peace is gone/ as this frightening *ghoo-ghoo* blares on." His vernacular, Punjabi-language, Shahmukhi-script assertion of technological experience and knowledge thus draws readers into the ways technologies upended daily life, creating new sounds and spaces.

5 | Toward New Definitions for "Technology" in South Asian History

Recent efforts to untangle (post)-colonial understandings of who possesses a history of technology, alongside studies of the vernacular assertion of technology, help us center actors such as railway carpenters. The ways in which technical knowledge and practice was translated, adapted, and circulated through South Asian languages and traditions differed depending on the class, caste, and gender of translators, practitioners, and consumers. Laborers like 'Abdul 'Aziz recognized and described the inequalities and exclusions of technical knowledge claims that were renegotiated under colonial rule.

Reading 'Abdul 'Aziz's verses alongside contemporary studies of the history of technology suggests that to understand the sociality of technology in South Asia, we not only need to look beyond the colonial "transfer" toward the quotidian lived realities of technology. We must also expand beyond questions of South Asian elite technological self-fashioning, to understand how communities that were not traditionally seen as technological actors engaged in processes of meaning-making for technologies.

To do so requires reevaluating the ways in which we delimit "technology" itself, and how we distinguish the history of technology from the history of science. Tirthankar Roy revisited this question in a recent study of the "transfer, transplantation, and adaptation" of "useful and reliable knowledge" in colonial India. Roy identifies a shared historiographical interest in "mediated knowledge exchange" that connects histories of science and technology (T. Roy 2021, 494 and 497). He argues, however, that histories of technology should evaluate the impact of technologies on "users" and "productivity," as opposed to a primary emphasis on knowledge and its codification in the history of science (497–498).

At the same time, in evaluating the impact of technologies on "users," scholars increasingly reach beyond questions of productivity by assessing the social, political, and cultural meanings that people assemble around technologies. Concepts of vernacular technology developed by scholars of pre-colonial eras provide models for the study of "notions of usefulness that did not feed into economic or utilitarian discourses" (Gurevitch 2021, 265). As Eric Gurevitch has argued, "useful knowledge" has often been used as a category to explain economic divergence between Europe and Asia during the industrial revolution. But people who have engaged with technologies have not always based their understanding of what was "useful" or "productive" on a technology's economic role. Instead, in the realms of both science and technology, "usefulness" could be fashioned in relation to "epistemic, linguistic, and political concerns," which often jostled against each other (285). While studies of technology may have

trended more heavily toward an analysis of the “everyday” than their counterparts in the history of science, this is by no means universal. Both science and technology can be quotidian practices reflected in everyday materials (Arnold 2013).

And yet, the experiences of a laborer like ‘Abdul ‘Aziz seem positioned to help us rethink histories of technology—rather than science or knowledge more generally—in modern South Asia. This is due, in large part, to the way that technology reshaped his material world, his tacit knowledge, and his own conception of his social context. While science and knowledge likewise possess materiality, technology penetrates material and environmental experiences in distinctive ways, retexturing systems of production, consumption, and social relations within which we are all embedded. In the case of ‘Abdul ‘Aziz’s verses, the educational technology of certification and the sound technology of the siren were joined by the laboring technologies of drills, lathes, saws, and sanders. All informed what laborers in the workshop touched, sensed, and knew, shaping their physical and tacit practices throughout the workday.

We must therefore approach ‘Abdul ‘Aziz and others traditionally excluded from the history of technology not only as subjects whose lives were remade by technologies but also as actors who claimed technologies for themselves. To grapple with the gendering of technological production and consumption, for instance, requires building on promising work that considers women’s self-assertion of gender and class through technological engagement. To locate people who repaired within technological hierarchies requires further consideration of how they might have used their technical knowledge to challenge forms of economic, social, or caste marginalization. Likewise, the turn toward the vernacular—in both language and practice—not only provides a model for considering the translation of technical terminology into Indian languages such as Punjabi. It also allows us to trace the ways that new technical practices were integrated into varied extant epistemologies, including among carpenters and other laborers.

Reading ‘Abdul ‘Aziz’s verses in the context of scholarly work that disentangles the social hierarchies of technological authority enables new considerations of the forms of resistance available to individuals whose technical knowledge was marginalized. For ‘Abdul ‘Aziz, this meant that even though the “greed” of workshop owners “has reduced us [workers] to nothing,” he concluded with gratitude to “the Mighty God,” who “made provisions” for the publication of his poetry, allowing him to expose the conditions of the workshops through the technology of print (12). The emergent social histories of technology provide an opportunity to expand our understanding of who lived and worked with technology and acted upon its development and cultural meanings in colonial and post-colonial South Asia.

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Conflicts of Interest

The author declares no conflicts of interest.

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