



Unmaking as Emancipation: Lessons and Reflections from Luddism

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(a)



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Figure 1: (a) Locations of nineteenth-century Luddite activities in England, (b) The imaginary Luddite leader Ned Ludd (image courtesy British Museum [19]), (c) Artistic illustration of the Luddites breaking machines (image courtesy Look and Learn [90])

ABSTRACT

Emancipation is fundamentally a work of unmaking, as it entails undermining, dissolving, and undoing oppressive structures. This paper offers an account of a frequently misunderstood unmaking movement, Luddism. The Luddites were a loosely organized collective of nineteenth century English textile makers who destroyed machines that were replacing their skilled labor and leading to deteriorating working conditions. In this account, we show that the goals and tactics of Luddism have significant alignments with current HCI work in the areas of unmaking and social justice. Through articulation of six characteristics of unmaking in Luddism - practical and symbolic, community-engaged, emancipatory, selective, antagonistic, and enduring - we identify potential limits and opportunities in HCI research and design practice, as currently construed. In doing so, we build upon and extend prior HCI research to suggest

unmaking as emancipation, a new category of unmaking around issues of social justice.

CCS CONCEPTS

• **Human-centered computing** → **Interaction design theory, concepts and paradigms.**

KEYWORDS

unmaking, emancipation, Luddism, design

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1 INTRODUCTION

Designing with and for social justice refers to how "designers attend to the ways in which people experience oppression and marginalization, including how burdens, obligations, power, benefits, and privileges have been unevenly distributed within society" [37]. Many of the claims for social justice in HCI are constructive or making-based in origin. For example, they often construct qualitative and/or

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quantitative research apparatus to understand the source and contours of the issue [85, 122] or use participatory design (PD) or value sensitive design (VSD) to prescribe a technological intervention [15, 17, 26, 86, 123]. They make prototypes with participants as means for engaging with socio-technical issues [58, 114, 150], craft professional designs to democratize sites and modes of action [10, 29, 35], and create venues, classes, and policies to bring awareness to social, cultural, and political issues [153].

But another line of work, echoing other traditions in social justice thought and history, is more *emancipatory* in orientation, motivated by transformations that "uncover the real structures in the material world in order to help people change conditions and build a better world for themselves" [96, 104]. In this tradition, building a better world entails understanding what constitutes emancipation in the first place, the conditions under which it is possible, and how to practically work toward such conditions [3]. This in turn requires material, political and epistemic tools that, as some theorists argue, *undermine* [10], *unlearn* [3], *dissolve* [138], and *undo* [1] unjust structures and epistemologies in place so that new structures and knowledge arise from the "ashes" of the old [7]. This tradition as such is grounded in the release, freedom from, or refusal of oppressive and unequal social orders - and as emphasized here, involves *unmaking* (of tools, systems, and infrastructures) as its central modality.

Given the increasing attention in HCI to questions of emancipation and social justice [38], the natural affinity between unmaking and emancipatory change, and the growing discourse on unmaking in HCI [110, 124, 135, 136, 154, 154], situating unmaking within HCI's agenda for emancipation and social justice is a timely endeavour. In a recent CHI paper, Sabie et al. [123] use a participatory design case study with youth to propose *critical unmaking* as a rhetorical design move that does the work of contestation through acts such as undoing, disassembling, or destroying. The authors argue that while unmaking may not entail the "making" or "invention" often expected in HCI, such moves supported candid articulation and difficult discussions around social injustices and diverging future visions in the youth community through ways that making-centric approaches did not. They attribute this performativity to the way unmaking highlighted the loss that might be needed for change and the irreconcilable nature of priorities in human societies. They caution however that while unmaking can "open up participation to outside groups that may be more limited, trapped or foreclosed by more conventional understandings of design" [123], its under-explored and potentially fractious and antagonistic aspects require more careful investigations.

In this paper, we respond to this need by investigating a case study where unmaking formed the central tactic for seeking emancipation. Our case study, Luddism, refers to early nineteenth century English textile makers who organized toward the breaking of machines as a means of contesting deteriorating wages and working conditions. While far from being the only historical movement that involved the destruction of technology, Luddism has cast the "longest shadow" [99], and, as we will argue, remains relevant for thinking about how unmaking may be used to evaluate, critique, and fundamentally change sociotechnical and economic life. Though Luddism has often been misunderstood as a purely militant activity against technology and progress [144], it is currently receiving a

resurgence of interest in critical technology discourse, including calls for reviving the Luddites' particular vision of emancipatory unmaking [18, 99, 106, 144]. We chose Luddism as a case study for its resonance with HCI and richness with lessons on unmaking. The Luddites possessed a critical awareness of (negative) technology impacts akin to what we see in our field, while their actions, executed with selective and immense craftsmanship, recall the careful and critical traditions of HCI. At the same time, Luddism offers lessons on mobilizing action across multiple registers including rhetoric and community engagement - two dimensions we do not sufficiently see in HCI works on unmaking yet. It further inspires us to consider what sustained and organized forms of unmaking might mean for our field.

In our reading and analysis of the historical and interpretive accounts of Luddism, we find that the Luddite practices were practical and symbolic, community-engaged, emancipatory, selective, antagonistic, and enduring. While Luddism built power, created myths, and amassed community support in order to accomplish its goals, its repertoire of organized, explicit, and forceful unmaking played a vital role in seeking the emancipation of skilled labor agency and dignity in the face of workplace mechanization. Such unmaking practices help us in turn see that much of the thinking around unmaking in HCI (including around emancipation and justice) is centered on making and other constructive sentiments, which requires a category of unmaking as emancipation to better support these aspirations in the field.

This paper makes three contributions. First, we provide a reflection of the applied activities, politics, and consequences of unmaking as a practice for emancipation through the analysis of the influential yet often misinterpreted Luddism. Second, we show ways in which Luddism can help us extend our understanding of HCI efforts that seek emancipation. Third, we suggest a category of unmaking as emancipation for HCI, including the ways in which Luddism can inform this category. The rest of the paper is organized as follows. We first situate our work within the literature on historicist research in HCI and unmaking in HCI. We provide an extensive account of the latter given the argument made later on in the paper about expanding the unmaking categories. We then offer a background on Luddism in Section 3, followed in Section 4 by a targeted engagement with the technical, human, and political practices of the case study. In Section 5, we show how Luddism is closely tied to unmaking and build on it to suggest unmaking as emancipation for HCI.

2 RELEVANT LITERATURE

2.1 Historicist Research and HCI

A historical case study refers to an "in-depth exploration from multiple-perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a 'real life' context" [130] that happened in the past and can be temporally delineated. Though historical research stands to make a number of contributions to HCI, there has been a notable concentration of efforts around the relationship between history and contemporary emphases on computation and social justice [133, 134]. Here, history is thought to be able to illustrate the contingencies inherent to contemporary socio-technical configurations, demonstrating

that things might always be otherwise [120, 133, 146]. Tracing the lineage of such configurations may also help surface the values and politics embedded in the design of contemporary technologies, which may serve to sharpen critique or inspire alternatives [45, 128]. Other work in this vein seeks to recover lost or silenced perspectives, challenging dominant narratives about technological developments and the many biases they contain [13, 131]. As with any complex research methods and approaches, the linkages between historical research and HCI are multiple and in flux. This paper thus adds another example to the growing body of work in HCI that turns to history as a source of inspiration and insight for the present. In particular, we contribute to a genre of study that looks at historical examples of technology development or deployment for insights into contemporary phenomena. Such studies include lessons from Ames' critical reflection on the One Laptop per Child (OLPC) project for contemporary discussions of edtech [6] and a growing number of studies that focus on historical labor conditions in order to situate contemporary workplace technologies [46, 78].

Historians Hamilton, Howard, and Pick note that historical case studies "are not ready made; nor do they lend themselves to definitive solution; they are unlikely to stare one in the eye from the start, and the cast list itself often mutates as we go along" [57]. For this purpose, we are guided by the historical case study structure given by Nash [103] to construct Luddism by focusing on the "technical core", "historical core", "human aspects", setting "in intellectual and social history", and "modern relevance of the facts and ideas". We started our investigation by reading recent interpretive accounts of Luddism that frame the movement as an "intellectual tradition" [82] within the concerns around evaluating and taking down harmful technologies. Our reading spanned works published in critical media studies [18, 18, 99], literary studies [71, 144], and the digital humanities [106]. Since these readings focused primarily on what Luddism could offer contemporary discourse on critiquing certain technologies, we sought more nuanced details of the material practices the Luddites engaged in, the socio-political context of their activities, and the associated tensions and consequences. We therefore broadened our investigation boundary, reading the general historical accounts on Luddism (i.e. secondary sources) considered to be the authority on the subject including by E. P. Thompson [143], Eric Hobsbawm [60], Malcolm Thomis [142], Adrian Randall [113], and Frederick Burwick [21]. We further consulted books on the Luddite writings and songs [41, 129], pseudonyms [31], and trial details [63, 112, 118] for direct evidence from the era. Lastly, we consulted references on worker rights, technological innovation, and the textile ecosystem in eighteenth and nineteenth century England [55, 56, 116] to fill in missing contextual details of the circumstances from which Luddism emerged.

It remains to note that any reading of history is partial. Our goal therefore is not to re-produce a complete rendition of the historical movement. Rather, it is to uncover (as accurately as possible) the socio-material unmaking practices involved with Luddism and the complex and critical conditions that surrounded the Luddite acts of unmaking. Our interpretation generally aligns with the sympathetic and inspired tone of contemporary literature on Luddism, which diverges from the earlier literature and reprimanding public statements described in Section 4.5. But the historical investigation,

findings, and discussion in this paper are guided by core HCI sensitivities around materiality, participation, community engagement, and political awareness.

2.2 Unmaking in HCI

HCI and related design fields have witnessed an increasing attention to unmaking [123, 135, 136] and concepts such as un-crafting [102], un-fabricating [154], un-knowing [101], un-raveling [108], and un-designing [110]. Each of these concepts have nuanced characteristics as articulated by their authors. For example, un-crafting proposes the take down of artifacts as a craft in its own right [102], un-designing conceptualizes a theoretical framework for negating technology [110], while un-fabricating designs for disassembling yarn and conductive thread [154]. Collectively, they refer to deconstructive modes of thinking and design and have been applied to produce art [151], embroidery [108], games [42], erosive physical scanning [100], stunning photographs of internal technology components [95], and educational engineering lessons [54]. They further extend to decolonizing how research and knowledge are produced in HCI and science and technology studies (STS) [72, 85, 109].

When it comes to *unmaking*, the term we use in this paper, multiple perspectives have been developed. In the social sciences, unmaking is tied to the degrowth movement [44], which refers to processes designed to "deliberately 'make space' for alternatives that are incompatible with capitalist socioecological configurations" [149]. In critical literary studies on technology, author Matt Tierney describes unmaking as the "labor of picking apart social machines in order to understand them, and an insistence on smashing those antisocial machines that sustain unequal distributions of power" [144]. In design, philosopher Tony Fry defines unmaking as "the disassembly of an object or structure to recover material to reuse. It also means unmaking values, habits, beliefs, affiliations, and knowledge that obstruct acting against the unsustainable and acting for sustainment" [50]. In HCI, Song and Paulos articulate unmaking as "the destruction, decay, and deformation — of physical artifacts" which works over pre-defined fabrication paths along actions such as cracking, splitting, shedding, dissolving, shrinking, and sagging" [136]. Generally speaking, unmaking remains an emerging term and evolving area of study in HCI, and does not have a specific or encompassing definition [124]. Our usage of the term in this paper draws on the constellation of definitions cited above to identify unmaking as *modes of thinking, articulation, and action that take on an issue primarily by taking away, taking apart, and/or taking down (including to the point of intelligibility) what currently exists.*

In lieu of a definition, organizers of the 2022 Unmaking@CHI workshop suggest five categories for describing the current scholarship on unmaking in design and HCI [124]. The category "Unmaking as Elimination for Good" [124] is concerned with the emotional, mental, and ecological harms that accompany (designed) objects and how to pragmatically eliminate them. This includes by intentionally and explicitly un-designing or non-designing certain technologies [12, 110], possibly through persuasive design and prefigurative criticism [145]. This category further spans the increasingly salient right to disconnect [73, 76, 77, 111], the affordances of unmaking for emotional letting go [91, 126], and supporting participatory engagement around design waste [89]. Other relevant works

in this category include dismantling capitalist and solution driven design paradigms that might cause harm through "anti-solutionist" designs [16, 32, 33], "doing nothing" [105], and "abolishing work" [20].

Unlike elimination for good which centers unmaking to achieve desirable goals, the second category - "Unmaking as a Sustainment Agent" [124] - highlights the invisibilized role of unmaking in all design and making practices. While any making, whether material, affective, or epistemic "simultaneously destroys" other materials, emotions, norms, or habitats, unmaking is generally "unquestioned, unexamined, unchallenged" and "unseen" all together [48, 49, 127, 155]. By recognizing the ignored role of unmaking in sustaining the world, works in this category invite designers and researchers to take the broken, constrained, imperfect, or ephemeral as the starting point for their work [40, 65, 68, 70, 92, 98, 117, 147, 156]. "Unmaking as an Inevitable Occurrence" is a third category. It relates to sustainment but differs subtly, and encompasses a major body of work focused on unmaking as the inescapable destiny of materials, interactions, technologies, and social networks [24, 67–69, 79, 88, 119, 147]. Analytical scholarship in this category attends to the intricacies of when phones break and batteries diminish in performance [64], machines give out in the workspace [107], or large technological projects collapse [84], highlighting the need for "digital death care practices" [79] and the "convivial" handling of technological infrastructures nearing their death [27].

The fourth category, "Unmaking as Material Innovation", refers to the increasing explorations that push the boundaries of design, materiality and interactions in HCI through dissolving, unravelling, and collapsing assemblies [124]. This includes the work of Song and Paulos on designing decomposable interfaces [135] and fabricating objects with pre-defined unmaking paths [136]. Wu and Devendorf explore similar practices for unfabricating smart textiles [154]. Mueller et al. develop a "destructive" 3D physical scanner [100] while Murer et al. propose uncrafting to explore constituent parts and materials, derive inspiration, inquire into design logic, and draw form-function relations [102]. The last category, "Unmaking as Resistance" [124], leverages unmaking to support confrontations, contestations, and emancipation through film making, photography, and performance. This includes creating sabotage thrillers around climate activism [52], smashing historical pottery to question the value of material objects [151], staging unmaking as a strategic site of intervention [121], and engendering a "mass-therapy" around war calamities through auto-destructive art [97]. Artful resistance through unmaking goes beyond physical instantiation to include the use of "aesthetics and novelty to draw the user or spectator in" [124] and destabilize practices such as information over-sharing [80], surveillance [35], and repressive social norms [36]. Perhaps most relevant to our work, Sabie et al. propose critical unmaking as a rhetorical design move for provocation and contestation [123]. Their formulation is inspired by a community-based civic design program during which youth participants advocated destroying an existing luxury condominium from their increasingly gentrified neighborhood *without replacement* as their design proposal. Because the luxury condominium was home to other participants and a member of the research team, Sabie et al. report on how unmaking generated conflict in the program, raising difficult questions

around ethical paradoxes when designing for social justice, and the potential violence that might accompany unmaking [123].

The five unmaking categories can have "overlapping applications", such as art pieces and digitally fabricated objects that are a "hybrid" of unmaking as resistance and material innovation or unmaking as elimination for good and material innovation [124]. While some of these categories are underpinned by an imperative to remove certain harms or restrictions (e.g. the resistance and elimination for good categories), they are primarily framed within designer and making rather than justice agendas and do not engage sufficiently with the complex organizational and political facets inevitable when seeking emancipation from oppressive forces. With the exception of a few works such as Sabie et al.'s [123] (which again is geared towards provocation and critical design), there is generally a lack of empirical case studies and discussions of unmaking as emancipation in HCI. Our paper therefore contributes to these growing conversations by explicitly signalling the emancipative potential of unmaking for social justice and the pragmatics associated with it through a rich historical case study that shares many of HCI's commitments to social justice. Our focus on unmaking as emancipation addresses a further gap around the tensions inherent to (emancipatory) unmaking. The existing literature suggests possible tensions including the contextual, non-generalizable nature of unmaking [69, 89] and the conflict it might induce [123]. Our paper tends to the other complications and serious ramifications that can accompany unmaking when enacted beyond design contexts and maker labs, with actors who are antagonistic to the unmaking, and when the *thing* unmade does not belong to the unmakers.

3 LUDDISM

"They said Ned Ludd was an idiot boy

That all he could do was wreck and destroy, and

He turned to his workmates and said: Death to Machines

They tread on our future and they stamp on our dreams" [41]

Ned Ludd, the "boy" destroying and coaxing others to destroy machines, was the mythical leader of the nineteenth century movement of English textile makers known as Luddism. The textile industry dominated English manufacturing in the eighteenth century [21] and played a vital role in the country's export economy [113]. It entailed complicated processes done manually on simple looms, and required apprenticeship, training, and time to master. With expanding domestic demand [55], textile makers in England enjoyed a set of manufacturing regulations that ensured comparatively decent work conditions and compensation including limiting the use of gig mills and looms, preventing the concentration of weave masters, protecting against material embezzlement, and banning certain imported textiles [31, 56, 139]. As historian Adrian Randall notes, "the development of specialist skills enabled the gentlemen clothiers to build up work forces of thousands and capital assets of tens of thousands" [113]. The advent of industrial weaving machines however, introduced in the late 1700s, led to cutting down the work hours of textile workers, replacing their artisan labor all together, and as one critic has argued, "producing inferior cloth, thus harming their reputations and the reputation of their skilled trade as a whole" [71]. By the early nineteenth century, the rapid

mechanization of the textile industry had the effect of sidelining and ultimately eradicating the aforementioned "statutory protections", especially those that limit concentrated skills and labour-saving machines [21, 31].

Stockingers (textile workers who knit on a stocking frame), croppers (who cut wool cloth with large shears after it is produced in the mill), and weavers (who weave fibers together to make fabric) petitioned officials to make constitutional changes to regulate machine adoption, allow trade unions, and guarantee work for skilled craftsmen. The artisans' political efforts failed however in the face of rapid industrialization and increased global trade, and the weavers slipped into poverty [31]. The simultaneous economic hardships caused by the Napoleonic war, increased famine levels, and trade union illegalization further created a fertile soil of contempt and grievance. The artisans therefore rose to contest deteriorating wages and working conditions and preserve their jobs, creative freedom, and dignity [142]. This materialized when a collective of British weavers and textile workers from Nottinghamshire, Yorkshire, and Lancashire (Figure 1a) started to smash, wreck, and burn down gig mills (machines for creating "raises" or "naps" in woollen cloth), shearing frames (machines with multiple shears for cutting fabric), and automatic looms (for weaving yarn and thread into fabric) [118].

The seed for Luddism was planted on March 11, 1811, when framework knitters demonstrated in Nottingham while a group at a nearby town broke sixty stocking frames in the presence of a cheering crowd [31]. Artisans in other counties followed suit, and the destruction of machines became a widespread practice of social resistance. The organized action ensuing in 1811 spread across England at an unprecedented scale by 1812, lasting in some parts of the country until 1817 [71]. The Luddite raids occurred overnight, sometimes by hundreds of masked Luddites at once, and as often as every night in some regions [99]. The groups met outside towns, orchestrating the raids as some guarded the mill and factory pathways, while others entered with hammers and axes to destroy the machines. The Luddite machine breaking was not deterred by the urgently enacted 1812 Frame Breaking Act which legislated the death penalty for those found guilty of machine breaking. In response to the raids, scared mill owners slowed down machine adoption and increased wages – but only temporarily. As the number of factories employing the "wicked" machines declined, the Luddite strikes became predictable [31]. By 1813, the state was largely able to put an end to the insurgency by increasing armed presence and capturing, trying, and executing several Luddite leaders [99].

Machine smashing was accompanied by letters, proclamations, and poetry valorizing machine breaking and threatening with further destruction. While the physical destruction largely died down around 1813, the literary rhetoric (such as the chant quoted at the beginning of this section) continued for much longer [41]. The potent and enduring rhetoric won the Luddites sympathy from large swathes of the community and helped cultivate collective solidarity and secrecy oaths that kept the Luddite identities concealed [99]. It alarmed the state that machine-breaking was not spur-of-the-moment chaos, suggesting "the presence of a coordinated force whose ultimate strength could not be easily discerned" [31]. Lastly,

the rhetoric constituted a "linguistic legacy" that cemented the Luddite unmaking practices both in folk culture and scholarly discourse [41].

Luddism lives on today through contemporary thinking and scholarship around the history of technology [21], social history [143], literary studies [71, 144], and critical media studies [18, 18, 99]. The verdict on what Luddism achieved and what it meant to subsequent generations has pragmatically and intellectually oscillated over the past two centuries depending on the overall political climate and writer's positionality. Historically, Luddism was misunderstood and disparaged as technophobic [112]. Some argue it was an admirable "collective bargaining by riot" given the illegality of other means such as unions [60]. Others contend that "the willful destruction of fixed capital" [144] is doomed to fail, and that the Luddite actions were "unsophisticated and ultimately ineffective tactics to further a lost cause" [31]. Many ultimately concur that the most lasting legacy of the Luddites was ideological, by dismantling salient and uncritical beliefs around progress (that human and technology progress is one) and production (that the goal of production is only efficiency) [144].

Recently, the Luddite movement has been cast as inspiration for "decelerationist politics", particularly around "slowing down change, undermining technological progress, limiting capital's capacity, while developing organization and cultivating militancy" [99]. Rather more loosely, it has been re-constructed (and inaccurately romanticized) as a "desire for a simple life" even when that was not the original movement's goal [71]. The legacy of Luddism is further celebrated today for giving us "a common name for machine breaking" against industrial capitalism and to "designate the emergence—albeit still in embryonic form—of a modern form of class struggle all internal to the capitalist mode of production" [31]. The legacy of critically rejecting or taking down forms of modern technology to support emancipatory change further lives on today as Neo-Luddism [82] and allies itself with movements such as environmentalism, anti-globalization, anti-capitalism, and deindustrialization.

4 LUDDITE PRACTICES

Following the broad overview of Luddism in the previous section, we present here a more targeted engagement with the technical, human, and political practices of our historical case study. This engagement is guided by the following questions: What did it mean to take on, and take down, technology in this way? What were the more generalized properties and characteristics of this work? And how might these inform growing HCI interests around social justice and the nature of unmaking? We begin to address the first two questions by identifying six characteristics of the Luddite practices. Rather than a comprehensive list capturing the entirety of Luddism (as any reading of history is partial), these six characteristics reflect our own interpretation and synthesis of a broad reading into the scholarly literature on Luddism and what we deemed relevant to HCI and informative for its commitments. While collecting the empirical details in Section 3, we continuously scanned the historical and interpretive accounts for dynamics and mediums that were involved when seeking emancipation from unfavorable conditions brought by technological innovation. Our process was collective

and iterative, with each of the four authors identifying practices from the data that seemed crucial to Luddism. Some of the emerging practices included devising tactics in multiple mediums beyond physical smashing, building a mass movement, thinking critically about what technologies should stay and what should go away, leaving traces that outlived the immediate historical moment, and dealing with the fractious consequences. We then reflected on the practices found, discussed our different perspectives on how they contributed to Luddism, and conceptualized preliminary practices that could be of interest to HCI. Over the span of four iterations, we converged on six practices which we then described as six characteristics, opting for encompassing terms whenever possible - for example “practical” over “material” - to make them relevant for different contexts.

4.1 Practical and Symbolic

Machine smashing constitutes the most widely known aspect of Luddism, and the central core of the movement’s activities. But the practical and physical tactics were far from being the only practice the Luddites resorted to, as symbolic practices - in the form of myths and literary production - played impactful and enduring roles within the Luddites’ struggle. We describe below the applied and material forms of machine smashing before tending to the more symbolic aspects.

Historians suggest that the Luddites broke machines in partial and practical ways - for example just enough to incapacitate the machines [60]. Thus, rioters could dismantle a frame secretly and within minutes. This was not surprising given that the Luddites were “specialized techs” whose work entailed “the use of huge, heavy hand shears, complicated looms, or large, table-sized cropping or weaving machines”, as Steven Jones, the author of *Against Technology: From the Luddites to Neo-Luddism* notes [71]. Aiding their take down of machines were “sledgehammers, axes, pikes, and, on occasion, guns” [71]. These acts were simultaneously practical and symbolic, physically effective but also performative, charismatic, even (at risk of anachronism) photogenic in nature. They were designed both to frighten inventors and factory operators and inspire a movement, which led to delaying or temporarily interrupting machine adoption [113].

The destruction of machines was supported by a mythical component. Nottinghamshire textile makers *knighted* a mythical leader for their move named Ned Ludd (Figure 1b) in 1811 and the textile makers in other regions soon followed suit [71]. According to Luddite mythology, Ludd had wrecked a textile apparatus in 1779 (his motivation is debated [22]) and resided in Sherwood Forest like Robin Hood. The Luddites claimed Ludd as a leader and a legend surpassing Robin Hood as evident by their famous ballad: “Chant no more your old rhymes about bold Robin Hood \ His feats I but little admire \ I will sing the Achievements of General Ludd \ Now the Hero of Nottinghamshire” [71]. Ludd provided the Luddites a name and a subject to attribute the (illegal) smashing to. “Ned Ludd” even became a verb to describe machine breaking; if a stocking weaver “was out of patience with his Employer or his Employment, he would say, speaking of his Frame, ‘I have a good mind to Ned Ludd it.’ meaning, I have a good mind to break it” [71]. This was reinforced by the Luddites giving power to Ludd in “the way he

was imagined, directing the actions of many men and authorizing threatening letters and manifestos from his hiding places” [71].

The Luddites further supplemented machine-breaking and mythical practices with rhetorical devices such as letters, ballads, and manifestos themed around destruction, adversity, and death. Their “voluminous decentralized letter-writing campaigns”, signed by “General Lud” threatened mill and factory owners [99]. The letters demanded the removal of specified machines, bargaining that factory owners “had better be content with a moderate profit, ... than have mills destroyed” [41]. Other letters declared that compliant employers would be protected from sabotage whereas “all frames of whatsoever discription [sic] the workmen of which Are not paid in the current Coin of the realm will Invarioably [sic] be distroy’d [sic]” [41]. The letters also reminded that the Luddites were “fully Determined to Destroy Both Dressing Machines and Steam Looms Let Who Will be the Owners We Neither Regard those keeps them nor the Army for We Will Conquer Both or Die in the Conflict” [41].

In addition to letters, the Luddites composed poems and ballads celebrating the heroic destruction acts of their leader. During raids (roughly 151 have been reported [112]), the Luddites would chant about Ludd’s bravery in destroying for triumph:

“I will sing the Achievements of General Ludd
Now the Hero of Nottinghamshire
Brave Ludd was to measures of violence unused
Till his sufferings became so severe
That at last to defend his own Interest he rous’d
And for the great work did prepare
...
And when in the work of destruction employed
himself to method confines
By fire and by water he gets them destroyed
For the Elements aid his designs” [129]

When they “invented Ned Ludd, wrote letters, composed ballads, and swung Great Enoch sledgehammers” [71], the Luddites were acting both practically and symbolically.

4.2 Community-engaged

The Luddites also put effort into establishing collective rapport with local communities. As a group of independent artisans breaking machines together, the Luddites could not “compose themselves in the way mass workers might” [99]. For the sake of their survival, they braced their activities with political tactics such as secret oaths and community-wide confidentiality bonds. The songs, poems, letters, and unifying Ludd persona helped cultivate rapport and solidarity. Further, historical documents reveal that those charged or hanged in the wake of the Luddite activities came from a wide range of occupations and not just textile making [112]. These tactics of community building therefore worked as authorities struggled to get other Luddites and community members to inform on their comrades.

Taken with the practical and symbolic acts, Luddism created an impression of “a disciplined organization that had a frightening

effect" [71]. It produced itself collectively as a subculture "by performing public acts that defined its own meanings within and in resistance to a mainstream or dominant culture" [71]. Each practice supported and fed into the others. For example, in absence of social media, the breaking of frames spread the Luddites' legacy in news outlets as the Robin Hood-like myth of Ludd cemented their "subculture" among local communities. Their linguistic devices in return, which rendered them "formidable and indelible" [71], charged their morals, gathered a sympathetic crowd, and cultivated a course of action for destroying what remained non-compliant after threat [31, 71].

4.3 Emancipatory

The Luddites activities of breaking machines and factories were portrayed by news outlets and some historical records of their time as "blind vandalism" and "a throwback to the disorganised activities of a pre-industrial age" [23, 113]. In more recent accounts, however, Luddism is presented more sympathetically, alongside evidence of the mounting poverty and hardship the textile makers faced in 19th-century England, with the simultaneous war, famine, and craft-repressing constitutional changes following innovations in weaving technologies [112, 148]. As an example of the technology impact on work reorganization, the gig mill could "do part of the work of a dozen shearmen, while the shearing frame made three of four shearmen redundant" [113]. Since shearmen alone formed around fifteen percent of the adult workforce in West England, work mechanization rendered the skills of a large group obsolete [113]. Further, the wide adoption of machinery did not only rob wages; it assumed control over production pace, labor divisions, and social practices at production points [82, 125]. With no unions to bargain for safeguards in the textile industry, the Luddites resorted to destruction as a direct and immediate way to emancipate themselves from repressive economic and political circumstances [71]. According to historian Adrian Randall, this practice was a means to "refute the whole ethic of laissez-faire industrial capitalism that it represented" [113] by dictating which technologies should be allowed in the factory (or developed in the first place). Beyond a physical confrontation, it was "an ideological struggle" [113] to emancipate production from the shear dominance of efficiency and commercialization [106]. The Luddite machine smashing and its accompanying practices ultimately aspired to emancipate "their trade — which, more than a job, was a culture, an economy, and a group of coworkers, a labor "gang," their social identity in the community as well as a technique or set of practices" [71].

4.4 Selective

Technophobia is a misunderstanding that persists today in common or naive uses of the terms Luddism and Luddites. In practice however, their unmaking was targeted and selective, or as Randall phrases it, "carefully controlled and directed and used as part of a wider organized response to detrimental change" [113]. The Luddite machine breaking was distinct from prior industrial conflicts in which workers wrecked all machines, raw material, finished goods, and even private employee properties as a way to express and enforce their demands [60]. The Luddites only targeted new machines

that cut down their wages and workforce or facilitated the employment of unskilled labor [31]. They left the rest intact. Philosopher Ursula Franklin labels these types of machines "prescriptive technologies" [47], noting that the separation of complex tasks into discrete steps that can be executed by separate individuals had the effect of making workers more susceptible to surveillance and shifted the overall power over production processes to managers. The Luddites' selective and destructive interventions draw on the specific standing and knowledge of expert workers in this domain (and that this standpoint was essential both to the motivations and the efficacy of the movement). Framework knitters therefore destroyed the "new wide frameworks that produced cheap "cut-up" stockings, gloves, sandals, and socks" and left the traditional knitting machines. Cotton weavers similarly targeted steam-powered looms that led to plummeting wages. And clothworkers targeted shearing frames and gig-mills since they cut down "the number of work hours necessary to raise and sheer a woollen cloth" [31]. Luddism is therefore not a hostility towards all forms of technology or progress as so often misconstrued, but rather a selective reaction against a specific category of workplace technologies and the impacts they had on the dignity, self-determination, and living standards of workers.

4.5 Antagonistic

The Luddites' machine destruction ignited a public battle between "progress" and "tradition" as well as between "economy" and "society" on a national stage [113]. The destruction and letters, while veiled behind secrecy accords and the legacy of Ludd, were confrontative, leaving no room to avoid the textile maker's discontent with machines. The battle also led to antagonistic encounters and exchanges between the textile makers and multiple entities from the era including machine inventors, the press, factory owners, parliament members, and the army.

With the rise of an "unfettered machine economy" in the early nineteenth century, textile makers in West England sought constitutional rights that would protect them from technological progress through "lobbying, petitioning, and pamphleteering" [113]. They started their emancipation efforts as such with non-destructive methods. When these attempts failed, they took down machines, and it proved to be confrontational and antagonistic for multiple reasons. First, the machines belonged to, were used by, and valorized by subjects who were not the unmakers. Second, the destruction inflicted fear and capital loss on mill owners, machine inventors, and the state. Third, the rapidly spreading take downs left no chance to keep the issue out of public exposure or evade the challenging circumstances. Public statements were also antagonistic, describing the artisans in response as "deluded men" committing "disturbances" with "anarchical spirit", and declared that they were carrying out "daring outrages ... occasioned by the wicked misrepresentations of ill-designing persons, who have deluded the ignorant and unwary" and were "destructive of the good order and happiness of society" [112]. The Luddites were further unsympathetically viewed as driven by "the spirit of factious discontent, excited for the purposes of revolution by demagogue orators, and demagogue journalists" rather than poverty and necessity [112]. Others described such actions as fueled by "the mistaken Notions

of the infatuated Populace, who not being able to see farther than the first Link of the Chain, consider all such Inventions as taking the Bread out of their Mouths; and therefore never fail to break out into Riots and Insurrections whenever such Things are proposed" [113]. Mythology and the inability to identify Luddite leaders and rioters further exacerbated the antagonism, thus compounding the adversary and legal consequences [112]. Since manufacturers and frame owners were scared to pursue prosecution [63], the state responded with ultimate hostility by introducing five emergency acts that criminalized frame breaking, labeled the Luddite activities as peace disruption, and even set the death penalty as a possible consequence [112].

4.6 Enduring

Luddism has proved to be "culturally and symbolically significant" even when numerous other moves across history have involved machine breaking [71]. The discourse on Luddism has spanned history [60, 71, 113, 142, 143], literary studies [41, 129], the digital humanities [106], and critical technology studies [99, 125, 144]. It has inspired a wealth of contemporary analytical scholarship around tactical machine take-downs [31, 60], its rhetoric [41], and the epistemic dismantling of "unrestricted technological development as a synonym for human emancipation" [144]. The literature suggests two sources for this endurance. The first lies in the mythology of Ludd - i.e. the fantasy of machine wrecking hero who comes out at night like Robin Hood to help the oppressed - and the literary dimensions of the movement: songs and verses easy to chant, memorize and spread. These two dimensions popularized Luddism as a generic term in history and among the public to describe labor resistance of the "technological reorganization of work" [99, 113, 144]. The second has come from the romanticism Luddism acquired through numerous reinterpretations over time around "projecting an alternative, utopian possibility that, paradoxically, involves a nostalgic return to an older way of life, one reconciling humanity and nature in voluntary simplicity" - even when such a portrayal "has very little to do with the historical Luddites" [71]. Regardless of the mythology, the romanticism, or utopianism projected onto and from Luddism, the mounting global crises and unprecedented growth in critical consciousness and social mobilization, particularly in the face of computing-related harms are likely what inspire contemporary scholars to call that "it's time for a revival of Luddism—machine-smashing for the sake of survival" [53], suggest epistemological Luddism around cyberculture [144], and locate "High-Tech" Luddism in common interventions such as browser privacy plug-ins [99]. The Luddism practices have ultimately proved to be enduring when it comes to changing worldviews around progress and work place mechanization.

5 DISCUSSION

In common parlance, Luddism has been sometimes (mis)associated with a kind of technological ignorance - a charge that did not fit the original movement participants, some of whom at least were among the most technically skilled and sophisticated workers, or "specialized technes" [71], of their age. The Luddite practices - physical and symbolic, emancipatory, community-engaged, selective, antagonistic, and enduring - reveal a material, social, and political

complexity that is lost when Luddism is romanticized as a precedent movement for "an older way of life" or against "consumerism" [71]. These practices span the components required for historical case study analysis as delineated by Nash [103]: "technical core", "historical core", "human aspects", setting "in intellectual and social history", and "modern relevance of the facts and ideas", thus offering a sufficiently nuanced picture of the movement and a *rich empirical case of unmaking*. Furthermore, this account offers several lessons for unmaking, particularly in the area of HCI for social justice. In this section, we first show how Luddism is closely tied to unmaking including the role it played in enabling and supporting the workers' actions. Second, we argue that Luddism help us see that much of the thinking around unmaking in HCI (including around social justice) is centered on making and other constructive orientations. Lastly, building on lessons from the Luddite unmaking, we suggest the need for a new category of research in HCI: *unmaking as emancipation*, and describe six associated implications.

5.1 Luddism as Unmaking

While Luddism built power, created myths, assembled organizations, and established practices in order to accomplish its goals, *it is clearly a deliberate, explicit, and forceful form of unmaking* as we define it in this paper: taking on an issue by taking away, taking apart, and/or taking down what existed. The Merriam Webster dictionary states that to unmake is to "cause to disappear (DESTROY); to deprive of rank or office (DEPOSE); to deprive of essential characteristics; to change the nature of". As evident by the scholarship reviewed in Section 2.2, unmaking is much broader than the dictionary definition, as it can be found "in decay, breakdown, obsolescence, disaster, and ruin just as in smashing, dismantling, shattering, deleting, smashing, cancelling, discontinuing, burning down, letting-go, and many others" [124]. Luddism resorted to several means to pursue its goals, including trying to change public policy, increasing political power by building coalitions amongst marginalized people, and publishing immense amount of rhetorical devices. At the same time, the history of Luddism and the interpretive scholarship around it provide us with a corpus of terms that span tactics and nouns around destroying, ludding, removing, eradicating, breaking, dismantling, and wrecking. These terms operate across several registrars including the physical (the taking down of machines), textual (the letters and ballads on ludding non-compliant machines), mythical (the brave Ludd wrecking for justice), and ideological (the dismantling of simplistic progress narratives). Luddism, including all of the six characteristics identified in Section 4, is therefore closely tied with unmaking.

Luddism went far through its unmaking practices. For example, many Luddites were operating individually or in small groups scattered around the country. Machine destruction, as contemporary scholars note, resulted in a "class composition" in a struggle for livelihood [99]. It was doable and effective since breaking a small part of the machine could suffice [60]. Machine smashing performed as a connective act of solidarity among the Luddites, and the unmaking rhetoric constituted a vital part of "a network of pragmatic actions and semiotic expressions" that bolstered their struggle [31]. While not fruitful for its unmakers, it urgently forced statutory changes with the government outlawing "violence against

machines at the beginning of the eighteenth century" [34]. Lastly, it laid out the ground work for "future emancipatory struggles" [99, 143]. Luddism then sensitizes us to the role of unmaking practices - including both their affordances and tensions - when it comes to emancipation.

Of course Luddism was not the only movement leveraging unmaking to seek emancipation from harmful conditions; countless others have resorted to destructive means to achieve the same purpose in various contexts. Examples include agricultural workers wrecking farm machinery in 1830 to improve harsh working conditions [60], craftsmen taking down wallpaper factories in response to lowering wages [4], and rioters destroying administrative monuments in the 1740s due to rising grain prices [43]. More contemporarily, citizens involved with the degrowth movement [30], the Arab Spring, and George Floyd protests have engaged in taking down civic structures to seek systemic transformational emancipation. There is further the long history of organized sabotage in the workplace [99] to reduce efficiency or fully break machines as "political acts at a micro level" [94] and combat organizational injustices [5]. In parallel, our field is experiencing increased interest in unmaking as discussed in Section 2.2 and related phenomena such as technology non-use [8, 76], refusal [11, 51], and resistance [61, 152]. What is common among these examples and Luddism is that they foreground "when to stop" using, making, or living with that which causes perceived harm [51] including by taking away, taking apart, or taking down completely. Despite these commonalities, several aspects of Luddism come together to create unique and valuable resonances with HCI. First, the Luddites were skilled at using technology and quickly grew aware of its impacts on textiles, wages, workers' agency, and the existence of their communities. Their resistance and subsequent unmaking therefore came out of a critical awareness that mobilized action across multiple registers, proving the power of rhetoric and community engagement - two dimensions we do not sufficiently see in our scholarship on unmaking yet. Second, the Luddites leveraged material disassembly during raids in ways that were selective, fast, and with immense craftsmanship - this recalls the careful and critical traditions of HCI [102, 109, 117] in an emancipatory unmaking context that differs drastically from "blowing up a pipeline" for example [93]. Lastly, unlike comparatively more emergent social movements, Luddism inspires us to consider what sustained and organized forms of unmaking might mean for our field.

5.2 Unmaking through Making

Sabie et al. have argued that works of unmaking in HCI are, ironically, often positioned within broader imperatives of making and constructive development [123]. This includes the role of unmaking in giving broken objects a new life through artful reassembly [68, 117], framing repair as creativity [92], engendering novel socio-material interactions [42], developing unprecedented material properties [135, 136, 154], and devising welcomed visions for reducing environmental and societal harms [89, 110]. As such, a typical approach in HCI to redress situations of injustice and support emancipation may involve building qualitative and/or quantitative research apparatus to understand the source and contours of the

issue [85, 122]. The work could further entail practices such as participatory design (PD) or value sensitive design (VSD) to establish an alternative technology [15, 17, 26, 86, 123]. These approaches to unmaking thus retain an overall orientation towards making.

Using more examples, works in critical design [2, 10, 35, 58, 114, 141] aim to unmake stagnant technology trajectories through critique, revealing power, and striving for freedom and emancipation. They do so primarily through *constructive design*, which refers to "design research in which construction — be it product, system, space, or media—takes center place and becomes the key means in constructing knowledge" [81] (cited in [10]). Critical design therefore seeks social justice, which requires *undermining* [10], *unlearning* [3], *dissolving* [138], and *undoing* [1] unjust structures and epistemology, by *crafting* professional designs (for example to democratize the user position as the meaning maker [10, 29]), by *making* prototypes with participants (for example as a means for engagement with socio-technical issues [114]), and by *building* social assemblies of dissensus through the affordances of ubiquitous computing [35, 59]. Elsewhere, scholars have called for decolonizing HCI research and practice from the authority of Western technology design and scholarship [25, 85]. Their suggestions focus on concerted "day-to-day" approaches such as creating venues for discussion, making courses, building relations within the community, and establishing design accountability measures [85] - again, an unmaking through steps of making approach.

The Free and Open-Source Software movements (F/OSS) is another case of unmaking through making for emancipation. F/OSS *has been building an entire ecosystem* of coding, collaboration, and licensure to allow software copying and sharing in face of legal limitations that started to be imposed on software in the late 1970s. In less than two decades, making this parallel ecosystem has had the impact of eradicating the beliefs (and restrictions) that high quality software can only come through proprietary means [28]. F/OSS is unmaking, having sought to emancipate software development from the sole control of companies and legislators, but through making. A further example comes from neo-Luddism, which refers to refraining from "using certain forms of technology for very personal, religious or philosophical reasons" [34]. Kirkpatrick Sale, a Luddism historian and a neo-Luddite, notes that "modern-day Luddites are not, or at least not yet, taking up the sledgehammer and the torch and gun to resist the new machinery, but rather taking up the book and the lecture and organizing people to raise these issues" [74]. More explicitly, Marcel O'Gorman, a digital humanities scholar, invites neo-Luddites to take a *making-oriented approach* where in lieu of "picking up sledgehammers or avoiding digital tools altogether, they use soldering irons and other analog and digital technologies to build objects-to-think-with" [106]. Such objects, akin to critical designs, encourage discussion, reflection, speculation, and the questioning of prevailing technocratic norms around innovation and efficiency. Neo and contemporary Luddism, as O'Gorman suggests, works "alongside the burgeoning maker movement; however, it does so with a critical eye toward what, why, and how things are made" [106].

Taken together, we can say that unmaking in HCI and related fields is focused on *making incremental and constructive steps* toward a broader unmaking agenda. These steps are envisioned to have popular support and desirable effects. This resembles some

of the inherent principles of participatory design (PD) and user-centered design (UCD). In PD and UCD, designs are incrementally created (“prototyped”) and tested for unfavorable feedback or potential ill effects before being deployed in the real world [62]. This model allows failure, but only gradually, in steps, and in a safe controlled environment. And it can be effective. Participatory design, for example, has democratized design in multiple ways, particularly by unmaking boundaries that separated professional designers from users, or saw users as having no expert knowledge. *But is unmaking through making sufficient for HCI that strives for emancipation and justice?* We address this question in the next section.

5.3 Unmaking as Emancipation

Luddism, as a historical case study of emancipatory unmaking, and unmaking as emancipation more broadly holds multiple implications for HCI. This includes recognizing unmaking praxes that are not contingent on making or novelty imperatives, highlighting the antagonistic and paradoxical dimensions likely to accompany unmaking for emancipation, supporting participatory and organized unmaking, cultivating awareness about the limits of making-oriented approaches, and setting down agendas around the ethics of unmaking as emancipation.

The Luddite practices, through their practical (breaking machines and factories), symbolic (letters, poetry, mythology), and epistemic (around technological progress) dimensions, intersect with the unmaking categories discussed in Section 2.2 in multiple ways. From the textile makers and general community perspective, unmaking was “elimination for good”, with machine breaking serving as a sustainment for workers’ agency and living conditions. Luddism further foregrounds the inevitable dissolution of all material objects, forcibly reminding us about their ephemerality. The Luddites show aspects of material mastery and creativity through dismantling machines quickly and strategically. Ultimately, Luddism was unmaking as resistance, aided with tactical prose and poetry. But Luddism entails aspects of unmaking that go beyond the existing categories, revealing important implications for when unmaking is leveraged for emancipation in a real-world context.

First, the Luddites show us unmaking not framed within plans to make new things, generate novel outcomes, or create technological progress. In Luddism, we see unmaking as a means to revert to a past state of workplace arrangements and legislation, with the unmakers being content with mere destruction (of machines) to emancipate the present from undesirable circumstances and sustain what was before or underneath. This has not been discussed much in HCI - the implication that unmaking at times (particularly when it comes to emancipation) needs to be done “on its own ground, on its own terms, unobscured by any design/making imperatives” [123]. This, as Luddism shows, does not mean less work or a lack of significant outcomes, but when making and novelty are the ultimate goal, the complexity of unmaking may be undermined. Through examining how the Luddites operated on material, rhetorical, and epistemic fronts, we are inspired by how much unmaking (as emancipation) alone requires work across multiple registers and in ways that are not straightforward nor self evident. This in return warrants greater attention in HCI research and design.

Second, the existing unmaking literature in HCI largely studies or enacts unmaking on objects that are residual/discarded [68, 89, 117], available in the lab [100], made specifically for unmaking [136, 147], assumed to be amiable for unmaking [145], or are in the realm of theory [115]. Luddism however shows unmaking as it tinkers with objects and priorities set within a stable network of laws, actors, and structures and the antagonistic dynamics arising accordingly. In that rich and very real constellation, unmaking is not a welcomed relief, romantic act, or legal intervention; it is an undesirable but final resort when other means such as petitions and persuasions fail. We learn about other, often powerful, stakeholders who may not consent to unmaking. We further learn that there is a polarity when it comes to unmaking categories: what was for the Luddites “elimination for good”, “sustainment”, “repair”, and “emancipation” was undesirable and detrimental for the factory owners and law makers who held different priorities. This calls upon our unmaking discourse to investigate and make explicit the antagonistic and paradoxical facets that accompany unmaking generally, and as emancipation particularly, in order to identify pathways for navigating them.

Third, the Luddites launched and sustained their movement by participating in a range of political and community-engaged endeavors including the cultivation of “irrepressible” solidarity spirit among the textile workers, spreading critiques of technological optimism widely, and signing secrecy accords with the surrounding communities [99]. These activities enabled participatory unmaking by amassing the Luddites in organized and situated ways and keeping their identities concealed while the unmaking itself served as a “sociological context for workers’ traditional forms of resistance” [71]. Social anthropologist Gerlad Mars notes that having “sizable constituency with unifying grievance, an imbalance of formal power, [and] the ability to communicate and organize” [94] has historically helped take down and sabotage activities flourish. In HCI, we already have a solid record of participatory traditions galvanized by these factors, and are starting to see justice, unmaking, and participatory orientation come together in workshops [124, 137]. The implication to take away from Luddism here is to extend this record in two ways. The first is by identifying concrete, situated, and stable contexts - a milieu - where participatory unmaking can occur (akin to how place-based activism is making a comeback in HCI [132]). The second is to not undermine the performativity of shared symbolic tactics and their role in cultivating “cultural resonance” [71] around unmaking as emancipation that could endure far beyond the endeavor, workshop, or movement at hand.

Fourth, Dombrowski, Harmon, and Fox note the increasing number of contemporary efforts in the field focused on emancipation and social justice [38]. HCI scholars have advocated for challenging practices that perpetuate capitalist values in the design of technologies [12, 87]. They have sought to democratize design and work practices beyond “expert” or “management” control [14, 66, 140]. Scholars in our field have called for dismantling power inequalities stemming from the global authority of (Western) technology design and scholarship and establishing self-determination of knowledge and expertise [25, 85]. A case has further been made for instantiating “alternative forms of government, social relations, or technical capabilities” through deconstructive moves [115]. Works under the critical design umbrella in HCI are also relevant. Motivated by a

concern that "technology is always assumed to be good and capable of solving any problem" [39], this body of work [2, 10, 35, 58] focuses on critique, revealing power, and striving for freedom and emancipation.

Building on these studies, unmaking as emancipation here has yet more implications for HCI and social justice. It helps us see that the HCI works mentioned above require *dismantling* boundaries that exclude users from engaging with sites of technology design [14, 140], *taking down* technologies that perpetuate capitalism [75], supporting confrontations through design and technology to *disintegrate* hegemonic inequalities [35], *removing* power relations within the human-computer interaction discourse [85], and seeking alternative systems by *taking down what exists* first [115]. This linguistic shift can lead to shifts in modalities of action and thinking, necessitating more work and workshops such as Strohmayer et al.'s [137] which tie social justice with unmaking. Fifth, unmaking as emancipation has an implication for us to develop realistic expectations about the limitations of what we can do with our normative practices. For example, the Luddites initially sought to emancipate their craft from machines harming wages and textile outputs through non-violent means such as petitions and persuasion. They finally resorted to machine breaking when other, less spectacular means had been exhausted. Given that many of HCI's endeavours for emancipation and justice are making-based, then unmaking as emancipation will make us regularly ask, as others in climate change activism [93] and engineering pedagogy [9] have: what if we have to go beyond the making? After all, "Brave Ludd was to measures of violence unused / Till his sufferings became so severe" [129]. When the Luddites' initial efforts failed, and their conditions became dire, were there gradual, unmaking through making approaches available to improve their livelihoods? What does that limitation tell us about our capacity in HCI to support emancipation for social justice?

Lastly, emancipation and social justice require some or many forms of material, rhetorical, and epistemic unmakings. In HCI that aspires for social justice, a timely implication of unmaking as emancipation is to make us see our role as unmakers on potentially rocky, antagonistic, and uncharted journeys, where we have to look back at Luddism and other cases and ask what practical, symbolic, community-engaged, emancipatory, selective, and likely (or inevitably) antagonistic unmaking might mean for our field, practice, and collaborations with communities and partners. While we do not suggest going as far as the "the work of destruction employed" mythical Ludd resorted to on machines and factories [129], we must know that "making" our way toward emancipation may not suffice. Sabotage is projected to proliferate further [94] just as realizations that desired social change based purely on "non-violent struggle does a disservice to the reality of history" [83] are mounting into calls to resort to more destructive approaches (not directly aimed at human beings) [93]. If we acknowledge the necessity of constrained unmaking in some cases for emancipatory social change, while remembering that the machines and factories belonged to the industrialist owners not the Luddites, then an ethics of unmaking is in order given the ethical paradoxes likely to be involved.

6 CONCLUSION

In this paper, we have shown how Luddism has sought an alternative workplace organization still imbued with technology, but with the wide frame knitting machines, steam-powered looms, shearing frames, and gig-mills taken down. We then drew on the example of Luddism to shed light on contemporary efforts in HCI to suggest unmaking as emancipation category for social justice. We showed that the goals and tactics of Luddism have significant alignments with current HCI work in these areas. Yet, Luddism as we argued goes beyond the existing unmaking praxes in HCI by leveraging unmaking that is not contingent on making or novelty imperatives, dealing with antagonistic and paradoxical dynamics, and embracing participatory and symbolic tactics for activating and pushing its goals. Finally, we reflected on what Luddism reveals about some of the potential limits of HCI research and design practice, as currently construed, to contribute to emancipation and social justice goals.

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REFERENCES

- [1] Ben Agger. 1991. Theorizing the Decline of Discourse or the Decline of Theoretical Discourse? In *Critical Theory Now*, Philip Wexler (Ed.). The Falmer Press, London, UK, 117–144.
- [2] Philip E. Agre. 2009. Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI. In *Social Science, Technical Systems, and Cooperative Work*, Geoffrey Bowker, Geoffrey Bowker, Susan Leigh Star, Les Gasser, and William Turner (Eds.). Psychology Press, New York, 131–157. <https://doi.org/10.4324/9781315805849>
- [3] Amy Allen. 2017. *The end of progress*. Columbia University Press, New York, NY.
- [4] Micah Alpaugh. 2009. The politics of escalation in French Revolutionary protest: political demonstrations, non-violence and violence in the grandes journées of 1789. *French History* 23, 3 (July 2009), 336–359. <https://doi.org/10.1093/fh/crp055>
- [5] Maureen L. Ambrose, Mark A. Seabright, and Marshall Schminke. 2002. Sabotage in the workplace: The role of organizational injustice. *Organ. Behav. Hum. Decis. Process.* 89, 1 (Sept. 2002), 947–965.
- [6] Morgan G. Ames. 2015. Charismatic Technology. In *Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives (CA '15)*. Aarhus University Press, Aarhus, Denmark, 109–120. <https://doi.org/10.7146/aaahcc.v1i1.21199>
- [7] Stanley Aronowitz. 1999. *From the ashes of the old*. Houghton Mifflin (Trade), Boston, MA.
- [8] Laura Augustin, Björn Kokoschko, Andrea Wolfram, and Michael Schabacker. 2021. Defining the Non-user: A Classification of Reasons for Non-use. In *Design for Tomorrow—Volume 1*, Amaresh Chakrabarti, Ravi Poovaiah, Prasad Bokil, and Vivek Kant (Eds.). Springer Singapore, Singapore, 339–349.
- [9] David Adam Banks and Michael Lachney. 2017. Engineered Violence: Confronting the Neutrality Problem and Violence in Engineering. *International Journal of Engineering, Social Justice, and Peace* 5, 1–2 (Aug. 2017), 1–12. <https://doi.org/10.24908/ijesjp.v5i1.6604>
- [10] Jeffrey Bardzell and Shaowen Bardzell. 2013. What is "Critical" About Critical Design?. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '13)*. ACM, New York, NY, USA, 3297–3306. <https://doi.org/10.1145/2470654.2466451>
- [11] Eric P.S. Baumer, Morgan G. Ames, Jed R. Brubaker, Jenna Burrell, and Paul Dourish. 2014. Refusing, Limiting, Departing: Why We Should Study Technology Non-Use. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI EA '14). Association for Computing Machinery, New York, NY, USA, 65–68. <https://doi.org/10.1145/2559206.2559224>
- [12] Eric P.S. Baumer and M. Six Silberman. 2011. When the implication is not to design (technology). In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*. Association for Computing Machinery, Vancouver, BC, Canada, 2271–2274. <https://doi.org/10.1145/1978942.1979275>

- [13] Pernille Bjørn and Daniela K Rosner. 2022. Intertextual design: The hidden stories of Atari women. *Human-Computer Interaction* 37, 4 (2022), 370–395.
- [14] Erling Björgvinsson, Pelle Ehn, and Per-Anders Hillgren. 2010. Participatory Design and "Democratizing Innovation". In *Proceedings of the 11th Biennial Participatory Design Conference (PDC '10)*. ACM, New York, NY, USA, 41–50. <https://doi.org/10.1145/1900441.1900448>
- [15] Erling Björgvinsson, Pelle Ehn, and Per-Anders Hillgren. 2012. Agonistic participatory design: working with marginalised social movements. *CoDesign* 8, 2-3 (June 2012), 127–144. <https://doi.org/10.1080/15710882.2012.672577>
- [16] Mark Blythe, Kristina Andersen, Rachel Clarke, and Peter Wright. 2016. Anti-Utilitarian Strategies: Seriously Silly Design Fiction. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. Association for Computing Machinery, New York, NY, USA, 4968–4978. <https://doi.org/10.1145/2858036.2858482>
- [17] Alan Borning, Batya Friedman, Janet Davis, and Peyina Lin. 2005. Informing Public Deliberation: Value Sensitive Design of Indicators for a Large-Scale Urban Simulation. In *ECSCW 2005*, Hans Gellersen, Kjeld Schmidt, Michel Beaudouin-Lafon, and Wendy Mackay (Eds.). Springer Netherlands, Dordrecht, 449–468.
- [18] Don Bowman. 2009. Neo-Luddism and the Demonisation of Technology: Cultural Collision on the Information Superhighway. *SIGCOMM Comput. Commun. Rev.* 39, 3 (jun 2009), 19–21. <https://doi.org/10.1145/1568613.1568618>
- [19] British Museum Images. 1812. The Leader of the Luddites, print, satirical print. <https://www.bmimages.com/preview.asp?image=01613289895>
- [20] Jacob Browne and Laurel Green. 2022. The Future of Work is No Work: A Call to Action for Designers in the Abolition of Work. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 5, 8 pages. <https://doi.org/10.1145/3491101.3516385>
- [21] Frederick Burwick. 2015. *British Drama of the Industrial Revolution*. Cambridge University Press, Cambridge, UK. 158–179 pages. <https://doi.org/10.1017/CBO9781316276082.007>
- [22] George Gordon Byron. 2001. *The Works of Lord Byron*. Adamant Media Corporation, Chestnut Hill, Massachusetts.
- [23] Duncan Bythell. 1969. *The Handloom Weavers*. Cambridge University Press, New York.
- [24] Stephen Cairns and Jane M. Jacobs. 2014. *Buildings Must Die: A Perverse View of Architecture*. The MIT Press, Cambridge, Massachusetts.
- [25] Vikram Kamath Cannanure, Dilrukshi Gamage, Christian Sturm, Heike Winschiers-Theophilus, Juan Fernando Maestre, Naveena Karusala, Pedro Reynolds-Cuellar, and Neha Kumar. 2021. Decolonizing HCI Across Borders. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*. ACM, Yokohama Japan, 1–5. <https://doi.org/10.1145/3411763.3441348>
- [26] Rachel Clarke, Peter Wright, Madeline Balaam, and John McCarthy. 2013. Digital Portraits: Photo-Sharing after Domestic Violence. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Paris, France) (CHI '13). Association for Computing Machinery, New York, NY, USA, 2517–2526. <https://doi.org/10.1145/2470654.2481348>
- [27] Marisa Leavitt Cohn. 2016. Convivial Decay: Entangled Lifetimes in a Geriatric Infrastructure. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW '16)*. ACM, New York, NY, USA, 1511–1523. <https://doi.org/10.1145/2818048.2820077>
- [28] E. Gabriella Coleman. 2012. *Coding Freedom: The Ethics and Aesthetics of Hacking* (illustrated edition ed.). Princeton University Press, Princeton.
- [29] Peter Dalsgaard, Christian Dindler, and Kim Halskov. 2011. Understanding the Dynamics of Engaging Interaction in Public Spaces. In *Human-Computer Interaction – INTERACT 2011*, Pedro Campos, Nicholas Graham, Joaquim Jorge, Nuno Nunes, Philippe Palanque, and Marco Winckler (Eds.). Springer Berlin Heidelberg, Berlin, Heidelberg, 212–229.
- [30] Federico Demaria, Francois Schneider, Filka Sekulova, and Joan Martinez-Alier. 2013. What is degrowth? From an activist slogan to a social movement. *Environ. Values* 22, 2 (April 2013), 191–215.
- [31] Marco Deseriis. 2015. *Improper Names: Collective Pseudonyms from the Luddites to Anonymity*. University of Minnesota Press, Minneapolis.
- [32] Laura Devendorf, Kristina Andersen, and Aisling Kelliher. 2020. The Fundamental Uncertainties of Mothering: Finding Ways to Honor Endurance, Struggle, and Contradiction. *ACM Transactions on Computer-Human Interaction* 27, 4 (Sept. 2020), 26:1–26:24. <https://doi.org/10.1145/3397177>
- [33] Laura Devendorf, Kristina Andersen, Daniela K. Rosner, Ron Wakkary, and James Pierce. 2019. From HCI to HCI-Amusement: Strategies for Engaging what New Technology Makes Old. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, 1–12. <https://doi.org/10.1145/3290605.3300265>
- [34] Joachim Diederich. 2021. *The psychology of artificial superintelligence the psychology of artificial superintelligence* (1 ed.). Springer Nature, Cham, Switzerland.
- [35] Carl DiSalvo. 2012. *Adversarial design*. MIT Press, Cambridge, Massachusetts.
- [36] Kelly Dobson. 1998. *ScreamBody*. <https://web.media.mit.edu/~monster/screambody/>
- [37] Lynn Dombrowski. 2017. Socially Just Design and Engendering Social Change. *Interactions* 24, 4 (jun 2017), 63–65. <https://doi.org/10.1145/3085560>
- [38] Lynn Dombrowski, Ellie Harmon, and Sarah Fox. 2016. Social Justice-Oriented Interaction Design: Outlining Key Design Strategies and Commitments. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems* (Brisbane, QLD, Australia) (DIS '16). Association for Computing Machinery, New York, NY, USA, 656–671. <https://doi.org/10.1145/2901790.2901861>
- [39] Anthony Dunne and Fiona Raby. 2013. *Speculative Everything: Design, Fiction, and Social Dreaming*. The MIT Press, Cambridge, Massachusetts.
- [40] Tanja Döring, Axel Sylvester, and Albrecht Schmidt. 2013. A design space for ephemeral user interfaces. In *Proceedings of the 7th International Conference on Tangible, Embedded and Embodied Interaction (TEI '13)*. Association for Computing Machinery, New York, NY, USA, 75–82. <https://doi.org/10.1145/2460625.2460637>
- [41] Kevin Ed. Binfield. 2004. *Writings of the Luddites*. Johns Hopkins University Press, Baltimore, Maryland.
- [42] David Eickhoff, Stefanie Mueller, and Patrick Baudisch. 2016. Destructive Games: Creating Value by Destroying Valuable Physical Objects. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. Association for Computing Machinery, New York, NY, USA, 3970–3974. <https://doi.org/10.1145/2858036.2858113>
- [43] Joyce Ellis. 1980. Urban Conflit and Popular Violence THE GUILDHALL RIOTS OF 1740 IN NEWCASTLE UPON TYNE. *International Review of Social History* 25, 3 (1980), 332–349. <http://www.jstor.org/stable/44581828>
- [44] Giuseppe Feola. 2019. Degrowth and the Unmaking of Capitalism. *ACME: An International Journal for Critical Geographies* 18, 4 (Sept. 2019), 977–997. <https://acme-journal.org/index.php/acme/article/view/1790>
- [45] Megan Finn. 2018. *Documenting aftermath: Information infrastructures in the wake of disasters*. MIT Press, Cambridge, Massachusetts.
- [46] Sarah Fox and Franchesca Spektor. 2021. Hormonal Advantage: Retracing Exploitative Histories of Workplace Menstrual Tracking. *Catalyst: Feminism, Theory, Technoscience* 7, 1 (2021), 1–23.
- [47] Ursula Franklin. 1999. *The real world of technology*. House of Anansi, Toronto, Canada.
- [48] Tony Fry. 2003. The Voice of Sustainment: An Introduction. *Design Philosophy Papers* 1, 1 (Feb. 2003), 41–48. <https://doi.org/10.2752/144871303X13965299301515>
- [49] Tony Fry. 2003. Why Philosophy?: The Voice of Sustainment. *Design Philosophy Papers* 1, 2 (April 2003), 83–90. <https://doi.org/10.2752/144871303X13965299301713>
- [50] Tony Fry. 2018. A Political Lexicon on Design. <https://www.TheStudioattheEdgeoftheWorld.com/lexicon.html>
- [51] Patricia Garcia, Tonia Sutherland, Marika Cifor, Anita Say Chan, Lauren Klein, Catherine D'Ignazio, and Niloufar Salehi. 2020. No: Critical Refusal as Feminist Data Practice. In *Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing* (Virtual Event, USA) (CSCW '20 Companion). Association for Computing Machinery, New York, NY, USA, 199–202. <https://doi.org/10.1145/3406865.3419014>
- [52] Daniel Goldhaber. 2022. How to Blow Up a Pipeline. 2022 Toronto International Film Festival.
- [53] Mitchell Goodman. 1971. *The Movement Toward a New America: The Beginnings of a Long Revolution; (a Collage)–a What? ...* Pilgrim Press, Philadelphia, USA.
- [54] Katie Grantham, Deborah Moore-Russo, and Kemper Lewis. 2010. Comparing Physical and Cyber-Enhanced Dissection: An Analysis From Multiple Perspectives. *International Journal of Engineering Education* 16, 6 (Jan. 2010), 1378–1390. <https://doi.org/10.1115/DETC2010-28350>
- [55] Trevor Griffiths, Philip A Hunt, and Patrick K O'Brien. 1992. Inventive activity in the British textile industry, 1700–1800. *J. Econ. Hist.* 52, 4 (Dec. 1992), 881–906.
- [56] Bishnupriya Gupta. 2013. *Competition and Control in the Market for Textiles: Indian Weavers and the English East India Company in the Eighteenth Century*. Brill, Leiden, The Netherlands, 281–305. https://doi.org/10.1163/9789047429975_012
- [57] Marybeth Hamilton, John Howard, and Daniel Pick. 2008. Editorial. *History Workshop Journal* 65, 1 (03 2008), i–vi. <https://doi.org/10.1093/hwj/dbn023> arXiv:<https://academic.oup.com/hwj/article-pdf/65/1/i/1796175/dbn023.pdf>
- [58] Karin Hansson, Laura Forlano, Jaz Hee-jeong Choi, Carl DiSalvo, Teresa Cerratto Pargman, Shaowen Bardzell, Silvia Lindtner, and Somya Joshi. 2018. Provocation, Conflict, and Appropriation: The Role of the Designer in Making Publics. *Design Issues* 34, 4 (Sept. 2018), 3–7. https://doi.org/10.1162/desi_a_00506
- [59] Usman Haque and Matthew Fuller. 2010. Networking Overload, with Potplants: An interview about the Natural Fuse project. *Thresholds future*, 38 (2010), 40–45. <http://www.jstor.org/stable/43876779>
- [60] E. J. Hobsbawm. 1952. The Machine Breakers. *Past & Present* 1, 1 (Feb. 1952), 57–70. <https://doi.org/10.1093/past/1.1.57>
- [61] Daye Hong and Chang-Hoan Cho. 2022. Factors Affecting Innovation Resistance of Smartphone AI Voice Assistants. *International Journal of Human-Computer Interaction* 0, 0 (2022), 1–16. <https://doi.org/10.1080/10447318.2022.2080899> arXiv:<https://doi.org/10.1080/10447318.2022.2080899>
- [62] Stephanie Houde and Charles Hill. 1997. What do Prototypes Prototype? In *Handbook of Human-Computer Interaction (Second Edition)*, Marting G. Helander,

- Thomas K. Landauer, and Prasad V. Prabhu (Eds.). North-Holland, Amsterdam, 367–381. <https://doi.org/10.1016/B978-044481862-1.50082-0>
- [63] Thomas Bayly Howell. 2017. *A Complete Collection of State Trials and Proceedings for High Treason and Other Crimes and Misdemeanors, from the Earliest Period to the Year 1783, Vol. 31*. Forgotten Books, London.
- [64] Elaine M. Huang and Khai N. Truong. 2008. Breaking the disposable technology paradigm: opportunities for sustainable interaction design for mobile phones. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '08)*. Association for Computing Machinery, New York, NY, USA, 323–332. <https://doi.org/10.1145/1357054.1357110>
- [65] Miwa Ikemiya and Daniela K. Rosner. 2014. Broken probes: toward the design of worn media. *Personal and Ubiquitous Computing* 18, 3 (March 2014), 671–683. <https://doi.org/10.1007/s00779-013-0690-y>
- [66] Lilly C. Irani and M. Six Silberman. 2016. Stories We Tell About Labor: Turko-pitcon and the Trouble with "Design". In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (San Jose, California, USA) (CHI '16)*. Association for Computing Machinery, New York, NY, USA, 4573–4586. <https://doi.org/10.1145/2858036.2858592>
- [67] Steven J. Jackson. 2014. Rethinking Repair. In *Media Technologies*, Tarleton Gillespie, Pablo J. Boczkowski, and Kirsten A. Foot (Eds.). The MIT Press, Cambridge, Massachusetts, 221–240. <https://doi.org/10.7551/mitpress/9780262525374.003.0011>
- [68] Steven J. Jackson and Laewoo Kang. 2014. Breakdown, Obsolescence and Reuse: HCI and the Art of Repair. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '14)*. ACM, New York, NY, USA, 449–458. <https://doi.org/10.1145/2556288.2557332>
- [69] Steven J. Jackson, Alex Pompe, and Gabriel Kriehok. 2011. Things fall apart: maintenance, repair, and technology for education initiatives in rural Namibia. In *Proceedings of the 2011 iConference (iConference '11)*. Association for Computing Machinery, New York, NY, USA, 83–90. <https://doi.org/10.1145/1940761.1940773>
- [70] Steven J. Jackson, Alex Pompe, and Gabriel Kriehok. 2012. Repair Worlds: Maintenance, Repair, and ICT for Development in Rural Namibia. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work (CSCW '12)*. ACM, New York, NY, USA, 107–116. <https://doi.org/10.1145/2145204.2145224>
- [71] Steven E. Jones. 2013. *Against Technology: From the Luddites to Neo-Luddism*. Routledge, London, England.
- [72] Silvana Juri, Cristina Zurbruggen, Sofia Bosch Gómez, and Marysol Ortega Palanez. 2021. Transition Design in Latin America: Enabling collective learning and change. *Front. Sociol.* 6 (Nov. 2021), 725053.
- [73] Tero Karppi, Urs Staheli, Clara Wiegthor, and Lea Zierott. 2021. *Undoing Networks*. University of Minnesota Press, Minneapolis, MN.
- [74] Kevin Kelly and Kirkpatrick Sale. 1995. Interview with the Luddite. <https://www.wired.com/1995/06/saleskelly/>
- [75] Os Keyes, Josephine Hoy, and Margaret Drouhard. 2019. Human-Computer Insurrection: Notes on an Anarchist HCI. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, 1–13. <https://doi.org/10.1145/3290605.3300569>
- [76] Awais Hameed Khan, Scott Heiner, and Ben Matthews. 2019. Disconnect: A Proposal for Reclaiming Control in HCI. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems (Glasgow, Scotland UK) (CHI EA '19)*. Association for Computing Machinery, New York, NY, USA, 1–6. <https://doi.org/10.1145/3290607.3313048>
- [77] Awais Hameed Khan, Stephen Snow, Scott Heiner, and Ben Matthews. 2020. Disconnecting: Towards a Semiotic Framework for Personal Data Trails. In *Proceedings of the 2020 ACM Designing Interactive Systems Conference (Eindhoven, Netherlands) (DIS '20)*. Association for Computing Machinery, New York, NY, USA, 327–340. <https://doi.org/10.1145/3357236.3395580>
- [78] Vera Khovanskaya, Lynn Dombrowski, Jeffrey Rzeszotarski, and Phoebe Sengers. 2019. The Tools of Management: Adapting Historical Union Tactics to Platform-Mediated Labor. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019), 1–22.
- [79] Tamara Kneese. 2022. Breakdown as Method: Screenshots for Dying Worlds. *Media Theory* 5, 2 (2022), 141–166. <https://journalcontent.mediatheoryjournal.org/index.php/mt/article/view/150>
- [80] Matthias Korn and Amy Volda. 2015. Creating Friction: Infrastructuring Civic Engagement in Everyday Life. In *Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives (CA '15)*. Aarhus University Press, Aarhus, Denmark, 145–156. <https://doi.org/10.7146/aahcc.v1i1.21198>
- [81] Ilpo Koskinen, John Zimmerman, Thomas Binder, Johan Redström, and Stephan Wensveen. 2012. How to work with theory. In *Design Research Through Practice*. Elsevier, waltham, Massachusetts, 109–123.
- [82] Maciej Kryszczuk and Michał Wenzel. 2017. Neo-Luddism: Contemporary work and beyond. *Przeład Socjologiczny* 66, 4 (2017), 45–65. <https://doi.org/10.26485/ps/2017/66.4/3>
- [83] Guy Lancaster. 2017. Book Review: Nick Hewlett, Blood and Progress: Violence in Pursuit of Emancipation. *Political Studies Review* 15, 4 (July 2017), 607–607. <https://doi.org/10.1177/1478929917172190>
- [84] John Law and Michel Callon. 1992. The life and death of an aircraft: a network analysis of technical change. In *Shaping technology/building society studies in sociotechnical change*, Wiebe E. Bijker and John Law (Eds.). MIT Press, Cambridge, Mass.
- [85] Shaimaa Lazem, Danilo Giglito, Makuochi Samuel Nkwo, Hafeni Mthoko, Jessica Upani, and Anicia Peters. 2022. Challenges and Paradoxes in Decolonising HCI: A Critical Discussion. *Comput. Supported Coop. Work* 31, 2 (jun 2022), 159–196. <https://doi.org/10.1007/s10606-021-09398-0>
- [86] Christopher A. Le Dantec, Jim E. Christensen, Mark Bailey, Robert G. Farrell, Jason B. Ellis, Catalina M. Danis, Wendy A. Kellogg, and W. Keith Edwards. 2010. A Tale of Two Publics: Democratizing Design at the Margins. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems (Aarhus, Denmark) (DIS '10)*. Association for Computing Machinery, New York, NY, USA, 11–20. <https://doi.org/10.1145/1858171.1858174>
- [87] Débora de Castro Leal, Max Krüger, Michael Ahmadi, Jason Appiah, Ricardo A. Baquero Gómez, Daniel Courtney, Ata Dae, Maria Belén Giménez Cicioli, Lena Hieber, Md Shakhawat Hossain, Jeongmin Lee, Ramona Plogmann, Liliana Savage Pinto, Sasmitha Sinnathurai, Darinka Yezec, and Volker Wulf. 2021. HCI's Role in the Capitalocene: Lessons Learned from a HCI Master Course Across the Globe. In *Seventh Workshop on Computing within Limits 2021. LIMITS, PubPub, Internet*, 1–12. <https://limits.pubpub.org/pub/f8ee6iac>
- [88] Siân Lindley, Robert Corish, Elsa Kosmack Vaara, Pedro Ferreira, and Vygandas Simbelis. 2013. Changing perspectives of time in HCI. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems (CHI EA '13)*. Association for Computing Machinery, New York, NY, USA, 3211–3214. <https://doi.org/10.1145/2468356.2479649>
- [89] Kristina Lindström and Åsa Ståhl. 2020. Un/Making in the Aftermath of Design. In *Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise - Volume 1 (PDC '20)*. Association for Computing Machinery, New York, NY, USA, 12–21. <https://doi.org/10.1145/3385010.3385012>
- [90] Look and Learn Ltd. 1974. Luddites destroying machines in an English textile mill. <https://www.lookandlearn.com/history-images/A011944/Luddites-destroying-machines-in-an-English-textile-mill>
- [91] Michal Luria, Ophir Sheriff, Marian Boo, Jodi Forlizzi, and Amit Zoran. 2020. Destruction, Catharsis, and Emotional Release in Human-Robot Interaction. *ACM Transactions on Human-Robot Interaction* 9, 4 (June 2020), 22:1–22:19. <https://doi.org/10.1145/3385007>
- [92] Leah Maestri and Ron Wakkary. 2011. Understanding repair as a creative process of everyday design. In *Proceedings of the 8th ACM conference on Creativity and cognition (C&C '11)*. Association for Computing Machinery, New York, NY, USA, 81–90. <https://doi.org/10.1145/2069618.2069633>
- [93] Andreas Malm. 2021. *How to Blow Up a Pipeline*. Verso, London ; New York.
- [94] Gerald Mars (Ed.). 2001. *Work Place Sabotage*. Dartmouth Publishing, London, England.
- [95] Todd McLellan. 2013. *Things Come Apart: A Teardown Manual For Modern Living*. Thames and Hudson, London; New York.
- [96] David E McNabb. 2016. *Research methods for political science* (2 ed.). Routledge, London, England.
- [97] Gustav Metzger. 1965. *Auto-destructive art: Metzger at AA*. Destruction/Creation, London, England.
- [98] Mohsen Mostafavi and David Leatherbarrow. 1993. *On Weathering: The Life of Buildings in Time* (1 ed.). The MIT Press, Cambridge, Mass.
- [99] Gavin Mueller. 2021. *Breaking Things at Work: The Luddites Are Right About Why You Hate Your Job*. Verso Books, Brooklyn.
- [100] Stefanie Mueller, Martin Fritzsche, Jan Kossmann, Maximilian Schneider, Jonathan Striebel, and Patrick Baudisch. 2015. Scotty: Relocating Physical Objects Across Distances Using Destructive Scanning, Encryption, and 3D Printing. In *Proceedings of the Ninth International Conference on Tangible, Embedded, and Embodied Interaction (TEI '15)*. Association for Computing Machinery, New York, NY, USA, 233–240. <https://doi.org/10.1145/2677199.2680547>
- [101] Michael Muller and Angelika Strohmayr. 2022. Forgetting Practices in the Data Sciences. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (New Orleans, LA, USA) (CHI '22)*. Association for Computing Machinery, New York, NY, USA, Article 323, 19 pages. <https://doi.org/10.1145/3491102.3517644>
- [102] Martin Murer, Anna Vallgård, Mattias Jacobsson, and Manfred Tscheligi. 2015. Un-Crafting: Exploring Tangible Practices for Deconstruction in Interactive System Design. In *Proceedings of the Ninth International Conference on Tangible, Embedded, and Embodied Interaction (TEI '15)*. Association for Computing Machinery, New York, NY, USA, 469–472. <https://doi.org/10.1145/2677199.2683582>
- [103] Leonard K. Nash. 2013. The Use of Historical Cases in Science Teaching. In *General Education in Science*, I. Bernard Cohen and Fletcher G. Watson (Eds.). Harvard University Press, Cambridge, MA and London, England, 97–118. <https://doi.org/10.4159/harvard.9780674283596.c11>
- [104] W. Lawrence Neuman. 2005. *Social research methods* (6 ed.). Pearson, Upper Saddle River, NJ.
- [105] Jenny Odell. 2019. *How to Do Nothing*. Melville House Publishing, Brooklyn, NY.

- [106] Marcel O’Gorman. 2017. The Making of a Digital Humanities Neo-Luddite. In *Making Things and Drawing Boundaries: Experiments in the Digital Humanities*, Jentery Sayers (Ed.). University of Minnesota Press, Minneapolis, MN, 116–127. <http://www.jstor.org/stable/10.5749/j.ctt1pw6wq.15>
- [107] Julian E. Orr. 1996. *Talking about Machines: An Ethnography of a Modern Job*. ILR Press, Ithaca, NY.
- [108] Tania Pérez-Bustos. 2017. Thinking with Care. *Rev. d anthropol. conaiss.* 11, 1 (2017), a–u. <https://doi.org/10.3917/rac.034.a>
- [109] Tania Pérez-Bustos, Santiago Martínez Medina, and Fredy Mora-Gómez. 2018. What is “(un)making” STS ethnographies? Reflections (not exclusively) from Latin America. *Tapuya Lat. Am. Sci. Technol. Soc.* 1, 1 (Jan. 2018), 131–137.
- [110] James Pierce. 2012. Undesigning technology: considering the negation of design by design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI ’12)*. Association for Computing Machinery, New York, NY, USA, 957–966. <https://doi.org/10.1145/2207676.2208540>
- [111] James Pierce. 2016. Design Proposal for a Wireless Derouter: Speculatively Engaging Digitally Disconnected Space. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems (Brisbane, QLD, Australia) (DIS ’16)*. Association for Computing Machinery, New York, NY, USA, 388–402. <https://doi.org/10.1145/2901790.2901908>
- [112] Poitras Geoffrey. 2020. The Luddite Trials: Radical Suppression and the Administration of Criminal Justice. *Journal for the Study of Radicalism* 14, 1 (Jan. 2020), 121–166. <https://doi.org/10.14321/jststudrad.14.1.0121>
- [113] Adrian J Randall. 1986. The philosophy of luddism: The case of the west of England woolen workers, ca. 1790–1809. *Technology and culture* 27, 1 (Jan. 1986), 1–17.
- [114] Matt Ratto. 2011. Critical Making: Conceptual and Material Studies in Technology and Social Life. *The Information Society* 27, 4 (July 2011), 252–260. <https://doi.org/10.1080/01972243.2011.583819>
- [115] Matt Ratto. 2019. Not Just Guns but Bullets, Too: “Deconstructive” and “Constructive” Making within the Digital Humanities. In *Debates in the Digital Humanities 2019*, Matthew K. Gold and Lauren F. Klein (Eds.). University of Minnesota Press, Minneapolis, MN, 307–318. <https://doi.org/10.5749/j.ctvg251hk.29>
- [116] Giorgio Riello and Tirthankar Roy. 2009. *How India Clothed the World: The World of South Asian Textiles, 1500–1850*. Brill, Leiden, The Netherlands. <https://doi.org/10.1163/ej.9789004176539.i-490>
- [117] Mohammad Rashidujjaman Rifat, Hasan Mahmud Prottoy, and Syed Ishtiaque Ahmed. 2019. The Breaking Hand: Skills, Care, and Sufferings of the Hands of an Electronic Waste Worker in Bangladesh. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI ’19)*. Association for Computing Machinery, New York, NY, USA, 1–14. <https://doi.org/10.1145/3290605.3300253>
- [118] Matthew Roberts. 2017. Rural Luddism and the makeshift economy of the Nottinghamshire framework knitters. *Social History* 42, 3 (July 2017), 365–398. <https://doi.org/10.1080/03071022.2017.1327644>
- [119] Daniela K. Rosner, Miwa Ikemiya, Diana Kim, and Kristin Koch. 2013. Designing with traces. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI ’13)*. Association for Computing Machinery, New York, NY, USA, 1649–1658. <https://doi.org/10.1145/2470654.2466218>
- [120] Daniela K Rosner and Fred Turner. 2015. Theaters of alternative industry: hobbyist repair collectives and the legacy of the 1960s American counterculture. In *Design thinking research*. Springer, Switzerland, 59–69.
- [121] Joshua Kahn Russell. 2012. Blockade. In *Beautiful Trouble: A Toolbox for Revolution*, Andrew Boyd (Ed.). OR Books, NY, USA, 14–17.
- [122] Dina Sabie, Samar Sabie, Cansu E. Dedeoglu, Yasaman Rohanifar, Fatma Hashim, Steve Easterbrook, and Syed Ishtiaque Ahmed. 2019. Exile Within Borders: Understanding the Limits of the Internally Displaced People (IDPs) in Iraq. In *Proceedings of the Fifth Workshop on Computing within Limits (LIMITS ’19)*. Association for Computing Machinery, New York, NY, USA, 1–16. <https://doi.org/10.1145/3338103.3338104>
- [123] Samar Sabie, Steven J. Jackson, Wendy Ju, and Tapan Parikh. 2022. Unmaking as Agonism: Using Participatory Design with Youth to Surface Difference in an Intergenerational Urban Context. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 1–16. <https://doi.org/10.1145/3491102.3501930>
- [124] Samar Sabie, Katherine W Song, Tapan Parikh, Steven Jackson, Eric Paulos, Kristina Lindstrom, Åsa Ståhl, Dina Sabie, Kristina Andersen, and Ron Wakkary. 2022. Unmaking@CHI: Concretizing the Material and Epistemological Practices of Unmaking in HCI. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems (New Orleans, LA, USA) (CHI EA ’22)*. Association for Computing Machinery, New York, NY, USA, Article 105, 6 pages. <https://doi.org/10.1145/3491101.3503721>
- [125] Kirkpatrick Sale. 1996. *Rebels against the future : the Luddites and their war on the Industrial Revolution : lessons for the computer age*. Addison-Wesley Publishing Company, Reading, Massachusetts.
- [126] Corina Sas, Steve Whittaker, and John Zimmerman. 2016. Design for Rituals of Letting Go: An Embodiment Perspective on Disposal Practices Informed by Grief Therapy. *ACM Transactions on Computer-Human Interaction* 23, 4 (Aug. 2016), 21:1–21:37. <https://doi.org/10.1145/2926714>
- [127] Lynda H. Schneekloth. 1998. Uredeemably Utopian: Architecture and Making/Unmaking the World. *Utopian Studies* 9, 1 (1998), 1–25. <https://www.jstor.org/stable/20719740>
- [128] Phoebe Sengers, Kaiton Williams, and Vera Khovanskaya. 2021. Speculation and the Design of Development. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW1 (2021), 1–27.
- [129] Theo Simon. 2011. Mr Lud’s Song. *The Land Magazine* 10 (2011), 10–15. <https://thelandmagazine.org.uk/issue/land-issue-10-summer-2011-reprint>
- [130] Helen Simons. 2009. *Case study research in practice*. SAGE Publications, Thousand Oaks, CA.
- [131] Robert Soden and Austin Lord. 2018. Mapping silences, reconfiguring loss: Practices of damage assessment & repair in post-earthquake Nepal. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (2018), 1–21.
- [132] Robert Soden and Embry Owen. 2021. Dilemmas in Mutual Aid: Lessons for Crisis Informatics from an Emergent Community Response to the Pandemic. *Proc. ACM Hum.-Comput. Interact.* 5, CSCW2, Article 475 (oct 2021), 19 pages. <https://doi.org/10.1145/3479862>
- [133] Robert Soden, David Ribes, Seyram Avle, and Will Sutherland. 2021. Time for Historicism in CSCW: An Invitation. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW2 (Oct. 2021), 459:1–459:18. <https://doi.org/10.1145/3479603>
- [134] Robert Soden, David Ribes, Maggie Jack, Will Sutherland, Vera Khovanskaya, Seyram Avle, Phoebe Sengers, and Susanne Bodker. 2019. Fostering Historical Research in CSCW & HCI. In *Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing (Austin, TX, USA) (CSCW ’19)*. Association for Computing Machinery, New York, NY, USA, 517–522. <https://doi.org/10.1145/3311957.3359436>
- [135] Katherine W Song, Aditi Maheshwari, Eric M Gallo, Andreea Danielescu, and Eric Paulos. 2022. Towards Decomposable Interactive Systems: Design of a Backyard-Degradable Wireless Heating Interface. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (New Orleans, LA, USA) (CHI ’22)*. Association for Computing Machinery, New York, NY, USA, Article 100, 12 pages. <https://doi.org/10.1145/3491102.3502007>
- [136] Katherine W Song and Eric Paulos. 2021. Unmaking: Enabling and Celebrating the Creative Material of Failure, Destruction, Decay, and Deformation. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 429, 12 pages. <https://doi.org/10.1145/3411764.3445529>
- [137] Angelika Strohmayr, Laura Cortés-Rico, Tania Pérez-Bustos, Afrodit Psarra, Daniela Rosner, Özge Subasi, Irene Posch, Sara Nabil, and Jihan Sherman. 2022. Justice-Oriented Participatory Electronic Textile Making: Fostering Shared Spaces of Knowledge Dialogues through the Process of Making, Un-Making, and Re-Making Justice-Oriented Participatory Praxis. In *Proceedings of the Participatory Design Conference 2022 - Volume 2 (Newcastle upon Tyne, United Kingdom) (PDC ’22)*. Association for Computing Machinery, New York, NY, USA, 259–262. <https://doi.org/10.1145/3537797.3537880>
- [138] Piet Strydom. 2011. *Contemporary critical theory and methodology*. Routledge, London, England.
- [139] John Styles. 2013. Spinners and the law: Regulating yarn standards in the English worsted industries, 1550–1800. *Text. Hist.* 44, 2 (Nov. 2013), 145–170.
- [140] Lucy Suchman. 2002. Located accountabilities in technology production. *Scandinavian Journal of Information Systems* 14, 2 (Jan. 2002), Article 7. <https://aisel.aisnet.org/sjis/vol14/iss2/7>
- [141] Mamello Thinyane, Karthik Bhat, Lauri Goldkind, and Vikram Kamath Cannanure. 2018. Critical participatory design: reflections on engagement and empowerment in a case of a community based organization. In *Proceedings of the 15th Participatory Design Conference: Full Papers - Volume 1 (PDC ’18)*. Association for Computing Machinery, New York, NY, USA, 1–10. <https://doi.org/10.1145/3210586.3210601>
- [142] Malcolm I. Thomis. 1972. *The Luddites: Machine-Breaking in Regency England*. Schocken Book, NY, USA.
- [143] E. P. Thompson. 1964. *The Making of the English Working Class*. Pantheon Books, New York.
- [144] Matt Tierney. 2019. *Dismantlings: Words against Machines in the American Long Seventies*. Cornell University Press, Ithaca, NY.
- [145] Cameron Tonkinwise. 2014. Design Away. In *Design as Future-Making*, Susan Yelavich and Barbara Adams (Eds.). Bloomsbury Academic, UK, 198–213.
- [146] Z O. Toups, Nicolas Lalone, Sultan A Alharthi, Hitesh Nidhi Sharma, and Andrew M Webb. 2019. Making maps available for play: analyzing the design of game cartography interfaces. *ACM Transactions on Computer-Human Interaction (TOCHI)* 26, 5 (2019), 1–43.
- [147] Vasiliki Tsaknaki and Ylva Fernaeus. 2016. Expanding on Wabi-Sabi as a Design Resource in HCI. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, San Jose California USA, 5970–5983. <https://doi.org/10.1145/2858036.2858459>
- [148] Bernadette Turner. 1993. *Luddism and the law*. Ph. D. Dissertation. The University of Queensland.

- [149] Utrecht University. 2019. UNMAKING: Societal transformation to sustainability through the unmaking of capitalism. <https://unmaking.sites.uu.nl/about/>
- [150] John Vines. 2018. Playing with Provocations. In *Funology 2: From Usability to Enjoyment* (2 ed.), Mark Blythe and Andrew Monk (Eds.). Springer, Cham, 111–128.
- [151] Ai Weiwei. 2018. Dropping a Han dynasty urn 1995. In *Life and dreams: contemporary Chinese photography and media art*, Christopher Phillips and Hung Wu (Eds.). Steidl, Göttingen, 88–91.
- [152] Richmond Y. Wong. 2021. Tactics of Soft Resistance in User Experience Professionals' Values Work. *Proc. ACM Hum.-Comput. Interact.* 5, CSCW2, Article 355 (oct 2021), 28 pages. <https://doi.org/10.1145/3479499>
- [153] Richmond Y. Wong, Vera Khovanskaya, Sarah E. Fox, Nick Merrill, and Phoebe Sengers. 2020. Infrastructural Speculations: Tactics for Designing and Interrogating Lifeworlds. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (*CHI '20*). Association for Computing Machinery, New York, NY, USA, 1–15. <https://doi.org/10.1145/3313831.3376515>
- [154] Shanel Wu and Laura Devendorf. 2020. Unfabricate: Designing Smart Textiles for Disassembly. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–14. <https://doi.org/10.1145/3313831.3376227>
- [155] Lili Zarzycki. 2021. Revaluing emptiness in Chicago. <https://www.architectural-review.com/essays/city-portraits/revaluing-emptiness-in-chicago>
- [156] Amit Zoran and Leah Buechley. 2013. Hybrid Reassemblage: An Exploration of Craft, Digital Fabrication and Artifact Uniqueness. *Leonardo* 46, 1 (Feb. 2013), 4–10. https://doi.org/10.1162/LEON_a_00477