Repair work as care: on maintaining the planet in the Capitalocene

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Abstract. If the Anthropocene is the Capitalocene, then one of its signature attributes in the drive for profits is the abstraction of life itself and of the human/nonhuman relations that sustain it, creating a wake of waste in its path. Repairing the fraying human and ecological systems that underwrite life entails ongoing care work that is frequently invisible or devalued, and whose burdens fall disproportionately on vulnerable populations. We detail this through three connected instances: infrastructural labor that recuperates the detritus of city life; social reproductive labor that undergirds these systems and life itself; and hands-on repair work inherent to care. By understanding maintenance and repair work as care, our paper demonstrates the importance of this labor to our collective survival in a broken world, and the imperative of embracing a care ethics where we shoulder together the everyday burdens and benefits to live "as well as possible".

Keywords. waste, repair and maintenance, care, work, infrastructure, Capitalocene,

Introduction

Researchers on maintenance and repair regularly lament the inattention to this "humble but vital" everyday work (Graham and Thrift 2007: 2); as broadly conceived, repair and maintenance keep dwellings livable, infrastructure working, our relationships amiable, and our planet thriving. If the work of repair and maintenance is invisible, it is *not* because everything is working perfectly but because someone, somewhere, is expending invisible and often undervalued labor. The work is ubiquitous. From utility repairers who fix electric and water mains, sewer workers who keep the drains running in cities, construction workers who patch the roads, gardeners and sweepers responsible for the upkeep of parks and green spaces, nurses and daycare workers who care for the elderly and the young, the neighborhood repair shops that fix and extend the life of everything from sewing machines to small electronics to automobiles, the waste pickers and scrap dealers who salvage and recycle people's discards, to the home workers who carry the double burden of earning incomes and tending to the everyday social reproduction of their families. It is frequently mundane work, yet a vital form of labor that takes care of human and non-human others around us.

Our paper explores how this labor is integral to the functioning of our present-day socioecological conjuncture, now commonly termed the Anthropocene. The naming of a new deep-time that substantially departs from the Holocene emerges from and elicits further recognition of the implications of life in an era of dramatic, human-borne transformations and disruptions, opening "a new space for thinking about the connections between long-term geological or planetary timescapes and human or earthly time-frames" (Kelly 2019: 3). The Anthropocene prompts thinking people and nature together, from the looming threat (and geographically uneven effects) of climate change to the rise of 'de-globalist' ethno-nationalist politics. While the importance of work that maintains and subtends human ecological relationships is not unique to our current age, we believe that in a time in which the normalcy of on-going breakdowns has become ever more apparent, it is imperative to attend to the power and potential of this (often informal, precarious, and racialized) work.

Studying the connective tissue of this work underscores the conceptual inadequacy of the Anthropocene for understanding present-day socio-ecological configurations. Decolonial, Marxist and post-humanist scholars have criticized the concept of the Anthropocene as flat and apolitical, attributing the threat of impending ecological collapse to humans as a species – thereby failing to differentiate who disproportionately inflicts ecological harms and who bears the burdens of care and repair (cf. Collard, Dempsey and Sundberg 2015; Haraway 2016; Moore 2017, 2018; Todd 2015). Scholarship that insists on understanding the Anthropocene as Capitalocene underscores how the relentless drive for extraction and accumulation has invariably depended on stigmatized laboring bodies, serving as a potent reminder that environmental changes are ineluctably tied to historical geographies of racialized and gendered violence (Davis et al. 2019; Wright 1999; Wright 2018). We therefore begin with the premise that if our current geologic epoch is to be named after its major driving force, then we must look to capital as generating the vastly unstable and unequal socio-ecological system we all inhabit today. In the wake of scholarship on the Capitalocene, the Plantationocene[1] and the "racial Capitalocene" (Davis et al. 2019; Sharpe 2016; Vergès 2017), we study repair and maintenance work as existing within an economic system that functions through the devaluation of racialized others to dramatically reshape the web of human and non-human relations and their existential prospects to the (short-term and temporary) benefit of a few. Tsing (2015: 19) describes this process as an entanglement of the "ideas of progress…with the spread of techniques of alienation that turn

both humans and other beings into resources." Even as capital disrupts lives and places, the effaced, background labor of these workers in diverse realms – care, social reproduction, agriculture, equipment maintenance and repair, and urban infrastructure, among others – provides an under-appreciated and exploited subsidy to capital, enabling it to be mobile and mercenary.[2]

In short, there is a double sidedness to repair and maintenance work. It undergirds our existence: both in perpetuating problematic relationships of exploitation and waste, as well as in providing pathways to an ethics of care. By prying open the worlds of maintenance and repair, we begin to fathom the banal violence of our neglect of people and things but also the everyday virtuosity of practices that renew the conditions of possibility for life. Thus, repair and maintenance resuscitate what might otherwise be relegated to the category of waste. Waste has been characterized as matter out of place (Douglas 2002 [1966]) as well as matter out of time (Thompson 1979; Viney 2014). It is matter, organic and inorganic, sometimes simple in form and content but at other times complex, even unwieldy, which has exited the utility-space that once ordered its existence. What makes it dangerous is its capacity to linger, momentarily or obdurately, often for years, alive with potential for reorganizing ecosystems, tiny and vast, human and beyond. This spatiotemporal potential presents a danger to human life possibilities unless impounded or 'managed'. As we discuss below, it can also be a powerful source of new social and political possibilities when, for instance, waste processors and repairers alter undesired matter into re-usable forms (see, for example, Fredericks 2018). Although maintenance and repair work may prolong extractive processes, it also offers a way of thinking relationships beyond the calculative logic and violence of abstraction that objectifies and deforms beings rendered as "standing-reserve." Such work can instead foreground care as an alternative mode of cohabiting that is attentive to the tenuousness and interdependence of bodies and systems.

In her treatise on an ethics of care, Joan Tronto (along with Berenice Fisher) explicitly invokes repair and maintenance to define care: "On the most general level, we suggest that caring be viewed as a *species activity that includes everything that we do to maintain, continue, and repair our 'world' so that we can live in it as well as possible.* That world includes our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life-sustaining web" (1993: 103). Scholarship on repair and maintenance has consistently emphasized

the importance of understanding repair as caring for things within webs of material, social, economic, and political interactions and that all of us, living and non-living, are fragile and in need of care – from everyday objects, infrastructure, and ecosystems (Orr 1996; Houston and Jackson 2016; Denis and Pontille 2015; Henke and Sims 2020) to art, taxidermy and space stations (Domínguez Rubio 2016; Patchett 2016; Cohn 2016). For repair and maintenance work, breakdown is an ever-present possibility. Although they operate with different temporal relationships to breakdown (Sims 2017), where maintenance aims to avert breakdowns and repair has a more episodic and reactive character (to fix breakdowns), both repair and maintenance take the functioning of entities and systems as neither permanent nor stable but instead in recurrent need of attention and care*taking*.[3]

Whereas capitalism draws its power from abstracting, dividing, recombining, and exploiting workers and materials for accumulation, maintenance and repair reveal the interdependence of humans on each other and with non-humans. In fact, because such work seeks to return nonhuman and human bodies to their everyday state of functioning within an emplaced latticework of relationships, it must engage them in their concreteness through intimate forms of dialogue, diagnosis, and discovery that promise restoration. It cannot avoid confronting the complexity, particular malfunctions, messiness and unpredictable nature of the things and people that come into its care: "Care helps us to rethink humans as interdependent beings" (Tronto 1993: 21).

We use the lens of repair and maintenance to connect three seemingly distinct types of labor that subtend everyday existence: *infrastructural labor*, *social reproductive labor*, and *work with wasted things*.[4] Following Cowan (2019), we gather these forms of living labor under the rubric of repair and maintenance work because they make legible the critical work that is primarily supportive rather than explicitly productive of capital – work that "repairs and renews" the conditions of possibility for capitalist reproduction, as well as of the beings capital exploits and expels (Gidwani 2015: 576).[5] We understand this repair work as *care work* which is racialized and gendered; and as ethnographies of repair vividly demonstrate, varyingly intimate, hazardous, degrading, unremarked and under-valued (see, for instance, Callén and Criado 2015; Rifat, Prottoy and Ahmed 2019).[6] We detail this care work through three connected examples: infrastructural labor that recuperates, recycles and repurposes matter which, left untreated, would erode the frail certitudes of city life; social reproductive labor that undergirds these systems and

human life; and hands-on repair work, which recognizes the individual care needed to make things work. A critical ethics of care helps us reckon with life in the Capitalocene as fragmented yet interdependent; and points to the radical potential of maintenance and repair in revaluing and holding together our waste-ridden world.

Maintaining systems: infrastructural and social reproductive labor

Wasted people and wasted matter stand as stark symbols of our current geologic epoch, in which our relationship to materials and things has changed towards one of casual usage and disposal. Global capitalism relies for its reproduction on people and places that are regularly relegated to its 'outside' but intimately involved in its functioning – *until* they become superfluous to capital's needs. In *Grundrisse*, Marx writes that "Positing a certain portion of labour capacity, i.e. of the labour required to reproduce it, as superfluous, is…a necessary consequence of the increase in the ratio of surplus to necessary labour" (2010: 528). To wit, entities that are exploited as resources for capital accumulation, will eventually become 'waste' as they lose their use-value for capital.[7] A "waste-value dialectic" (Gidwani and Maringanti 2016) arises, characterized by "the time-sensitive churning of people, knowledge and environments from conditions of unproductive 'waste' to productive uses for capital, before their eventual disposal to make way for further market expansion" (Cowan 2019: 6).

Madanpur Khadar is a multipurpose waste hub in Delhi. Day after day it processes thousands of tons of detritus and discards, primarily paper, plastics and biomedical waste, whose accumulation would render urban existence as we know it impossible.[8] While maintenance work is often associated with formal operations management of infrastructure, we draw attention to the thousands of places like Madanpur Khadar, scattered across cities in India and around the world, from which people informally support the continued functioning of urban spaces. Waste hubs and the people, objects, information, and money that flow through them are vital nodes in the lymphatic systems of cities, sequestering their waste and inoculating them from lasting damage. The intricate yet under-valued operations of this sprawling waste infrastructure – from waste hubs to municipal landfills to sewage pipelines – hinges on the toil, ingenuity, practical knowledge and risk-taking of several hundred thousand workers, small entrepreneurs, and petty government functionaries. This infrastructural labor recuperates, recycles, and repurposes matter

that has outlived its time and place and which, left untreated, would erode the frail certitudes of city life.

Although Marx famously begins Volume 1 of *Capital* with a discussion of capital's cell-form, the "commodity," his focus is not the domain of consumption; rather it is on establishing how (surplus) value is generated within the production process and ferried in various attires until its realization. The rub is that keeping the cycle of surplus value extraction going—a requisite for capital accumulation—is far from guaranteed. The prospects for breakdown are ever-present, whether in the form of labor shortages or recalcitrant labor; raw material bottlenecks; creaky infrastructure for production and marketing; disequilibrium between aggregate supply and demand; or ecological contradictions generated by overexploitation of "cheap [nonhuman and human] nature" (Moore 2015) as well as the sheer proliferation of waste. Thus, the urban experience and the viability of its socio-spatial processes hinges on a continuous whittling away, even reversal, of the "chronography of things" as they pass from the domain of "use-time" to "waste-time," re-investing objects with new functions and social use-values (Viney 2014: 5, 7).

The infrastructural work that occurs in places like Madanpur Khadar survives off capitalism's excesses, even as it attenuates them. Madanpur Khadar's original residents were relocated here in 2000-2001 after being evicted from slums in various parts of Delhi. Since then, a steady influx of renters has added to the settlement's population. Single room exposed brick tenements, stacked one atop another as owners and slumlords strive to garnish maximum rent from desperately tiny plots, are the typical form of housing. According to Naveen Kumar[9], who runs a small teashop and doubles up as a petty scrap dealer, approximately 3,000 households in Madanpur Khadar rely on waste work. The bulk of them are migrants from eastern India, mainly Assam but also West Bengal and Uttar Pradesh. Their places of origin underscore the deeply uneven geographies of agrarian transformation in India and how the modal condition of survival for a rural majority is increasingly one of semi-proletarianization (Lerche 2011; Ramamurthy 2011; Levien 2018). Contemporary agrarian studies scholarship shows that combinations of farm work and non-farm wage labor, disguised wage labor, indentured work, self-employment, and various forms of petty commodity production, are now all routine elements in the livelihood repertoires of impoverished households (Bernstein 2010; Harriss-White 2012; 2014). In the words of Henry Bernstein, "the growing global army (or reserve army) of labour pursues its reproduction in conditions of increasingly insecure and oppressive wage employment combined

with a range of likewise insecure 'informal sector' ('survival') activity, typically subject to its own forms of differentiation and oppression along intersecting lines of class, gender, generation, caste and ethnicity" (2004: 204; cf. Gidwani and Ramamurthy 2018).

With its relatively low barriers to entry and seasonal flexibility, informal waste work is a common entry point into the urban economy for rural-to-urban migrants. While most waste pickers who reside in Madanpur Khadar obtain the recyclables that sustain their livelihoods from door-to-door collection of municipal waste in middle-class neighborhoods and apartment blocks that adjoin the settlement, a sizable minority earns its living from wage work at warehouses that process plastics, dry paper waste, and bio-medical waste. There are approximately 10 warehouses that handle hospital waste, which arrives from various medical facilities around Delhi in large black polythene bags. The high-volume items include white and glossy paper, cardboard, file folders, and used tissue paper. But truckloads of hospital waste are also common, with red and yellow polythene bags containing discarded medicines, injections, needles, bottles, rubber items, and so on.

While much of the maintenance and repair work in waste hubs like Madanpur Khadar is vital to enabling life in the *polis*, it is only hazily appreciated by the average city resident. Its invisibility is an attribute of the manifold forms of labor that reside in the "infra-economy" – an understanding of the informal sector as waste sink, underwriter, and engine of capital accumulation (Gidwani and Maringanti 2016). Deeply intertwined with what economists like to call the "formal sector", the infra-economy – like the more visible and valorized forms of capitalist enterprise that it subtends – relies on and exploits deeply unequal socio-economic relationships for its existence. On the one side, in places like Madanpur Khadar waste matter is given a new lease on life, urban ecosystems that otherwise might reel from its buildup are reprieved and repaired, and various fractions of capital – petty and large, informal and formal – are revivified: waste, now invested with use-value, is able, again, to don the garb of commodity. But this care and repair of urban environments, which reproduces capital's conditions of possibility, frequently inflicts long-term damage on labor's capacities for self-care and social reproduction. By transporting or transforming waste matter, labor earns a money wage, allowing it to reproduce its "life-activity"; but this renewal of "living immediate labour" (Marx 2010: 220) comes at a steep price, the inexorable depletion of labor's capacity to renew itself as a result of repeated exposure to the physical and biochemical hazards associated with waste-related work.

Labor is unique in that respect within classical political economy's holy trinity: while land and capital can be amassed and hoarded, for some duration, without peril, labor's "life-activity" cannot. Its biological survival is intimately conjoined with time. To replenish its physical and imaginative capacity it needs time to rest, to devote to activities that rebuff the summons of utility and instrumental reason.

However, when capital comes to shape social relations and gains the power to command labor, labor becomes a standing-reserve: to survive and reproduce, it must allow capital to commandeer its labor-time. Workers dispossessed of every other means of production other than their labor-power can ill-afford to idle time, lest they be cast out into the anxiety-inducing realm of the "reserve army". Marx tersely depicts labor's predicament: "Labour itself is productive only as absorbed into capital, only where capital constitutes the basis of production and the capitalist is therefore the commander of production" (Marx 2010: 234). Hence, the willingness of workers in Madanpur Khadar to transact with forms of waste matter that imperil their wellbeing: fully cognizant that the longer they work the shorter their lease on life, as daily wear and tear, accidents, and chronic exposure to toxins truncate their bodies' capacities to regenerate. By the same token, because labor is the "*general possibility* of wealth" – "the living source of value" – capital not only strives to regulate labor's spatiotemporal practices, including time for 'leisure' but also, to the extent possible, pass on the costs of labor's upkeep to labor itself. Indeed, how capital repeatedly denudes labor's capacities to "be human" is a refrain across Marx's corpus of writings but stated with particular acuity and force in *Grundrisse*. At the nub of this theft of labor's capacity is the relationship of labor to time, as illustrated by Marx's barbs at bourgeois political economy:

> The workers should save enough in times of good business to be able to more or less live in bad times, to endure SHORT TIME or the reduction of wages, etc. (The wage would then fall still lower.) It really amounts to the demand that they should always make do with a minimum of pleasures of life and make crises easier, etc., for the capitalists; that they should consider themselves as pure laboring machines, and pay as much as possible of their WEAR AND TEAR themselves (Marx 2010: 216).

And shortly thereafter:

> [T]he capitalist desires nothing more than that the worker should *expend his dosages of life power as much as possible without interruption* (ibid: 220; italics in the original)

However, the daily grind and hazards associated with waste work ensure that waste pickers age prematurely, their bodies depleted of "life power". Few can work into their fifties.

Shashank, a large warehouse owner in Madanpur Khadar, employs about 50 men, primarily Muslims and Dalits[10] from eastern Uttar Pradesh, according to one of his workers. They collect and process the dry, largely paper, waste (*kabaad*) that Shashank sources from around the city. Most of the workers live in the compound that houses two pressing machines which transform the sheets of paper they are fed into tightly packed bundles. They have no fixed work hours and are put to work whenever a delivery arrives. Their tasks range from unloading the trucks that deliver scrap paper to operating the pressing machines to loading trucks that arrive to fetch the bundled paper. Some of the workers say they have been working at Shashank's warehouse for six to seven years. They earn between INR 6,000-7,000 ($90-$105) per month but are neither paid overtime nor have any days off. No formal instruction is provided on how to operate the pressing machines; workers are expected to learn on the job. Labor regulations and work safety protocols are absent, and workers seemed unaware of (or were possibly indifferent to) legal protections that apply to them. Inability to work due to illness or family obligations means loss of pay. In the law's gaze, Shashank's workers do not exist. There is no record of their hiring, no labor register is maintained, the warehouse operates under-the-radar with the complicity of police and municipal staff and, thus, workers have no basis to mount complaints. As migrant workers from marginalized castes and ethnoreligious communities, they serve as the constitutive outsides of capitalist enterprise: living labor that creates value and ensures the continued functioning of urban ecosystems while themselves being rendered as 'wasted lives' (Bauman 2004; also, Yates 2011; Stanley 2015; Kornberg 2019; Sreenath 2019).

Without the care work of maintenance and repair undertaken by Madanpur Khadar's migrant population life in the conurbations that characterize the Capitalocene would be inconceivable. *But who maintains the workers? Who cares for them?* Linking social reproduction and capitalism, Cindi Katz (2001: 709) conceptualizes the former as the repertoire of "social practices through which people reproduce themselves on a daily and generational basis and through which social relations and the material basis of capitalism are renewed." These practices

are now in jeopardy, with foreseeably dire consequences for livelihoods and ecologies. Nusrat Begum, a resident of Madanpur Khadar, says she is from Dhubri district, in the northeastern state of Assam. She has been in Delhi for 9 to 10 years and has worked with waste from the time she arrived. Her husband, who she guesses is in his forties, has fallen ill and is unable to pick waste these days. She notes that he keeps falling ill: "When he gets sick, he gets some treatment here [in the city]. But if the illness persists, he returns to the village for treatment." Nusrat Begum's children don't attend school: they also pick waste, partly to compensate for their father's illness. Her unrequited aspirations for her children are apparent when she bitterly remarks: "*Agar ma-baap koode mein rahenge to bacche is se door kaise reh sakte hain*?" ("If the parents live amidst garbage can the children stay away from it?"). Her comment mobilizes the double sense of the word '*kooda*' (waste). She implies that her children's trajectories can't be otherwise given that *kooda* is both a source of the parents' livelihood and the squalor or filth that marks their lives. Nusrat's existence is a blunt reminder that women carry the double burden of production and reproduction. Their labor time is never done. After she has finished sorting the day's waste, Nusrat turns her attention to household chores such as cooking the evening meal. Nusrat Begum says that her bones ache and her back constantly hurts; she is unable to sleep at night.[11] While Nusrat's work, along with myriad others like her, underwrites the city's – and capital's – very possibility, she is barely able to care for her family or herself. In other words, the maintenance and repair of an urban regime of accumulation are accomplished to the detriment of self and social reproduction.

In short, by examining the neglected worlds of maintenance and repair, we are forced to confront the ethical scandal that neglected forms of care work – which keep the infrastructures of modern existence operational – are frequently based in harmful and exploitative systems and can sustain already harmful relations (Barnes 2017; Mattern 2018; Duclos and Criado 2020). The political questions that arise are pressing: Who does the work of repair and care, what is repaired/maintained,[12] and who benefits from it? These questions summon us to the crisis of care as waste proliferates, capitalism shreds the "web of life" (Moore 2015), and vulnerable populations that perform this critical work find themselves in an untenable state of "embodied precarity" (Doshi 2017). Thus, the crisis of care that is also a crisis of social reproduction alerts us to the constitutive injustice that lies at the heart of the Capitalocene. Here, Shannon Mattern's (2018) reminder that "(1) Maintainers require care; (2) caregiving requires maintenance; and (3)

the distinctions between these practices are shaped by race, gender, class, and other political, economic, and cultural forces," is both prescient and sobering. Accordingly, we now shift to examining how work with waste can embody a care for things considered valueless or dirty and how this care for discarded things and people is a way of recognizing and re-signifying the many webs of relations within which we all exist. We consider how intimate work with wasted things can encourage and foster relationships not as resources or tools for accelerating capital accumulation, but instead as networks of interrelated care*taking*.

Caring for 'wasted' things through repair

In the Capitalocene, the thing as commodity and its end-of-life fate as waste is predicated on the seemingly seamless process of things being made, used, and then discarded when broken, obsolete or just no longer desired. Single-use items or items used for short durations predominate, with little to no thought spared to the countless things we dispose or discard daily, the vast natural resources on which they depend, or the work required to care for the increasing number of things in the world (Houston and Jackson 2016). The sheer volume of things available to a global class of consumers in the North and the South has dramatically soared over the past century, marked by growing dependence on household goods, fast fashion, and consumer electronics among other items – all arriving and departing from myriad locations across the world. This consumption-driven cycle of accumulation relies, among other stratagems, on what Joseph Guiltinan (2009) terms "destructive creations"—products designed to become obsolete. Physical obsolescence combines with technological obsolescence to foster faster replacement of commodities by consumers.

Our now-common relationship to things as easily replaceable and soon to become waste is relatively new. In her research on American waste cultures, Strasser (1999: 68) documents how the notion of rubbish was far from universal before widespread consumer capitalism: "as late as 1882, a manual written for teaching children household economy had to define a wastepaper basket for its readers: 'It is for collecting all the torn and useless pieces of paper, and should be emptied every day, care being taken that nothing of value is thus thrown away.'" This seemingly more traditional relationship with things, from a time when children were instructed to use care when handling everyday objects to ensure they were not discarded (or fell into disrepair), endures today in spaces where wasted things are redeemed and revalued. In their

recycling or their repair, used and discarded things offer an economic lifeline to people like the workers in Madanpur Khadar and other similar communities across the world that undertake waste work. These industries are the counterlife in the social biography of commodities, as they travel through rapidly quickening lifecycles of production, consumption, and disposal.

While the thing as a commodity denotes a shortened life and certain death, repair can re-signify the thing as a non-commodity, what Thoburn (2010) calls an anti-commodity or communist object. The anti-commodity is outside the constrictions of property and utility, instead existing as part of a "social community of things and people" (Thoburn 2010: 5). Reflecting on the life of a thing as distinctive is to decommoditize it, antithetical to the conjuring trick of equivalence that renders unique things (use values) as inherently exchangeable. In *The Social Life of Things,* Arjun Appadurai and Igor Kopytoff approach the commodity as a thing in circulation with its own life history or career beyond its commodity existence, what Kopytoff refers to as its "biography." For Kopytoff (1988: 67), a thing moves through time as a commodity (with use and value in exchange) and then, spends time as a singular, non-exchangeable entity – up to and including its aging and death. Or, perhaps, but never guaranteed, redemption.

Maintenance and repair, as we have previously asserted, redirect attention to the non-abstract, distinct relationships of humans to things and the material world. Repair work consists of caring for broken or discarded objects, attending to them as things whose health and functionality can be maintained or restored. While as a commodity any one product can be replaced with its duplicate, in the process of repair the concrete entailments of that individual thing, and its relationship to other things and people, matter. To the repairer, it matters how something broke, the interactions with its user, the specifics of its failed or misaligned connections, the different options to repair it. As Jackson (2014: 228) so aptly puts it, "All working technologies are alike. All broken technologies are broken in their own way." During processes of repair, each individual thing is a unique, decommoditized entity that, for at least a short time, works against the abstraction of things as mass produced commodities divorced from relationships with their surrounding world and with an inevitable destiny in the rubbish heap.

Corwin's research on the repair of electronic devices regularly underscored the care that went into fixing individual things, as repair workers endeavored to understand the machines and work with them to restore their functionality. An older man running a printer repair shop in Delhi

guided Corwin through his work with machine repair, demonstrating keen attention to detail to individual machines. “Printer Uncle” owned and ran a shop off the main hallway in the basement of a building in Nehru Place, Delhi’s main market for new and used computer sales and repair. His shop is part of a vast network of electronics repair shops populating much of Nehru Place, offering services from data recovery to screen replacement and everything in between. Like waste-sorting neighborhoods like Madanpur Khadar, Nehru Place’s “anti-commodity” market ethos is based in a shared recognition of the potential value of something once considered broken or trash, operating against corporate capital’s rapid cycles of consumption and disposal.

Printer Uncle was a retired government officer who had started his business in the mid 1990s and had continued to run it for over 20 years, into his 70s. He said that when he first opened his shop, his was one of only three printer and cartridge repair shops in Delhi, and that people came from all over the country to get their cartridges repaired and refilled in bulk.[13] His business had two main technical operations: the refilling of printer ink and laser cartridges, and the repair of laser printer cartridges. By repairing and refilling cartridges, Printer Uncle’s shop significantly diminished the waste of these one-time use printer accessories – to the chagrin of the printer manufacturers, who derive most of their printer profit from the replacement of single-use toner and ink cartridges.

In Printer Uncle’s world, these supposedly disposable parts, designed for one-time use only, were almost endlessly reusable – easily refilled and repaired. While Delhi’s repair economy is made up of small, independent shops, each one seemingly insignificant, their collective labor drives an entire reuse economy, moving computers, printers, and all manner of electronic devices through many new and sustained life cycles. Shops like Printer Uncle’s, often accused of being dirty and polluting (as evidenced by several cases in Delhi courts), also simultaneously interfered with the business as usual of commodity production by forestalling that very production. Well-known to each other as well as to repair shops in cities across India, these repair- and used-electronics shops were the center of a universe of reuse, operating against the logic of our increasingly ‘use and throw’ society and its seemingly endless proliferation of commodities.

When asked to demonstrate his work, he picked up a spare cartridge from his desk and sat down to explain the life cycle of laser printers: how they work, break, and are repaired. He started the demonstration by putting the cartridge in a test printer and printing a test page, but he

stopped the printer before it was finished and removed the test page and cartridge together. The printer imprints the images on a thin green spinning tube the length of the printer (called the "photoreceptor drum," learned later from technical manuals), which then rolls over the page, transferring ink to the paper, and is then immediately wiped clean by another printer part, so that the images to be printed are continuously rolling in parts over the paper and then being cleaned off the tube, all the while rendered permanent on the paper through heat. Printer Uncle likened the printer's functioning to the human digestive tract: it uses new toner and then shits out old toner. Like the digestive tract, however, sometimes things get stuck, and you need to figure out why. In each laser cartridge are several moving parts, all of which can be repaired and replaced over and over again, almost endlessly, like a printer's equivalent of the ship of Theseus,[14] a cartridge with new wiper blades, drums and rollers making an entirely new cartridge – or was it the same cartridge, just rehabilitated?

How did he learn all this? *How can he tell what is broken*? Uncle explained that if you look at things for long enough, you figure it out. To show what he meant, he picked up a stack of used printer paper on his desk and began to rifle through it. It looked like a pile of junk paper, poorly printed test pages from malfunctioning printers, but to Printer Uncle it was an archive of printer problems. He examined each page carefully, pointing out how this page had a faint stripe down the center, how that one was missing discreet little dots from the test page, that another had some places darker than others. Each printer malfunction, however unnoticeable to the untrained eye, was plainly displayed to him on the test print page, as he read in that paper a story of the machine's problems, its difficulties in shitting, through the paper it spit out. Printer Uncle's reading scrap paper was one of many examples of workers in the electronics refurbishment business who "read" their machines. In the repair shop, attention to detail and care is afforded to each individual component, each one of them possessing a life affected by and affecting others.

In his work on repair, Jackson (2014: 221) encourages an "exercise in broken world thinking," which is based in "an appreciation of the real limits and fragility of the worlds we inhabit—natural, social, and technological." Repair workers recognize this as the reality of living with others, stemming from their material experiences working with things: things need regular attention, details matter, and nothing functions alone. Similarly, in his ethnography of Xerox repair workers in the US, Orr (1996) contends that repair work is part of a web of relationships between the (broken) object, the repairer, and the users of the object. Without understanding the

socio-technical life of the users (in this case, office workers often jointly managing a photocopier), the nature of the problem cannot be understood, and nothing can be easily or reliably fixed. The machine functions as part of a network of practices and relationships, and often the machine's breakdown is caused by repeated human behavior ("user error") rather than purely technical breakdown.

Murray's (2020) ethnography of solar panel and lamp repair in Kenya likewise attends to repair as part of socio-technical relationships. Murray notes that users of solar lamps engage in what he calls "repairs of practice," finding ways to continue to function with their lamp's diminishing capabilities, from reduced battery capacity to loose cables. This type of work is not an easily visible technical repair; in contrast to the (male-dominated) repair industry, it functions through changes in the behavior of the user rather than material changes to the device itself. Recognizing these actions as repair work — since they do in fact contribute to the continued functioning of the device — makes legible the significance of interactions between user and device, and like Orr's Xerox repair trio shows how people and things undergo "transformation by encounter" (Tsing 2015: 28). Repairs of practice include, for example, adapting to new battery charging practices or finding ways to ensure an electrical connection by fiddling with a wire's position. Recognizing these often-indiscernible forms of repair and maintenance of objects, which happen primarily in the home and are regularly done by women, affirms the abundance of labor that goes into the continued functioning of individual things and systems, from a single printer or solar lamp to socio-urban infrastructures and crop ecosystems.

Repair work, grounded in collaboration and creative labor practices, demonstrates the inseparability of ourselves and our work from the world at hand. The attention that people like Printer Uncle give to the care of things offers a path away from the shortened life of commodities and the potential for care-*full* relationships with other things in our lives, with creative invention countering the creative destruction of planned obsolescence. Repair offers the potential for a relationship with things not as commodities but as comrades, with caring for the material world an integral part of living as well as possible in the Capitalocene. Tronto (2013: 20-21) recognizes the significance of caring for other people and caring for the world, distinguishing between *nurturant caring* that is "directed at the relationship with a particular other person, whose wellbeing is improved through the caring" and *non-nurturant caring* — "that is, caring directed at the physical world" which she argues "is a prerequisite for nurturant

caring." As we explore below, this vision of care – close, engaged interaction with those around us, from machines to people to the environment – points to the potential for repair as critical care ethics to refigure and recuperate people and materials deemed as 'waste'.

Maintenance, repair, and care in the Capitalocene

What can we learn from repair and maintenance labor, which, on the one hand, has historically sustained capitalism and its accelerating ecological injuries, to the detriment of its maintainers; and on the other, has the potential to offer a regenerative relation to others and the world? Tronto's care ethics helps us to distinguish between repair and maintenance work that undergirds exploitative relationships, and an ethic of care which emphasizes intentional relationality that attempts to live together in this world "as well as possible." Tronto's ethics of care begins with looking outside the self; to practice an ethics of care "requires that one start from the standpoint of the one needing care or attention" (Tronto 1993: 19). For Tronto, a care ethics consists of four "interconnected phases" [15] (1993: 106): caring *about* (which begins with that initial recognition of the need for care), caring *for* (the process of recognizing one's responsibility in caring), care-*giving* (the work of care), and care-*receiving* (the recognition of care by that entity which has been cared-for). Subsequently, Tronto (2013: 23) adds a fifth phase: caring *with* (how caring needs and the ways in which they are met are rendered consistent with democratic commitments to justice, equality, and freedom for all, thereby ensuring that care burdens do not disproportionately fall on society's most vulnerable populations). Tronto is careful to differentiate an abstract notion of 'care' from 'caring about,' because simply recognizing that someone else needs care is not a securely moral space, and therefore inadequate for a genuine ethic of care. In other words, *care requires actual practices of care*; one cannot simply 'care' about something and remain disengaged from it. Similarly, Tronto (1993: 105) parses care *work* from care: care work may occur without the presence of care itself, as happens in jobs that require attention to another's wellbeing but that are done for compensation rather than as an act that begins by "taking the other's needs as the starting point for what must be done."

Maintenance and repair work can prompt attention to the webs of interdependency that sustain life and the importance of deliberate care-full work with others: human and non-human, material and systemic. Puig de la Bellacasa (2017: 4) understands these relationships as

entanglements that not only extend beyond the human world but are fundamentally based in the non-human world. That we are entangled in the worlds of others means that we exist as codependent, an "ontological state in which humans and countless other beings unavoidably live". For Puig de la Bellacasa, then, care is a "human trouble" but not "a human-only matter," because "for interdependent beings in more than human entanglements, *there has to be some form of care going on somewhere in the substrate of their world for living to be possible*" (2017: 5, our emphasis). Repair work, like Printer Uncle's and the networks of repairers across India, demonstrates the entanglements of people with others, human and non-human, and how thoughtful, careful (and care-full) attention to the functioning and well-being of others can provide things and people with new life -- even as the work can be time-consuming and difficult.

Understanding repair work as care work – and emphasizing the power of this work in maintaining life as we know it – is imperative for conceptual, ethical, and political reasons. Repair as care highlights the importance of recognizing people, places, and things and their inter-relationships as impermanent, always in jeopardy of breakdown or wastage and thus in need of recurring maintenance and attention for their continued functioning. In an economic system based on creating waste in its wake, this means attending to human and nonhuman entities not as abstracted or alienated beings – laborers, commodities, resources, disposable objects – but instead as complex, multifaceted beings in relationships of codependence. If this becomes the starting premise of our interactions with one another, then caring for individuals means learning to *give* and *receive* care – caring *about*, caring *for*, and caring *with* the textile weave of relations that comprise the planetary web of life and the human-ecological systems that are its conditions of possibility. Only by embracing a democratized ethics of planetary care can we maintain our increasingly fragile world for "as well as possible" relationships.

There is no denying that this level of attention to and care for things, people and relationships is hard work, and this reality compels us to recognize the abundance of labor involved in working against waste and breakdown to ensure the continued health of our worlds: from the micro-worlds of the individual body to the meso-level of households and communities, to the macro-scale of urban infrastructures and planetary ecosystems. Nonhumans are vital, but also increasingly impaired, in maintaining and repairing the human-ecological depredations of the Capitalocene. For the (disproportionately burdened) racialized and gendered bodies like the workers in Madanpur Khadar, who engage in everyday practices of maintenance and repair, there

is stark recognition that no matter how care-full their toil, things and relations cannot be returned to their unblemished original states; damage, devaluation, decay, and deterioration are ongoing effects of capitalism's contradictions that demand continuous repair and care. If we recognize the sheer wealth of labor that is daily invested in caring for beings, then we must also recognize how some entities are uncared for, and how some people shoulder a greater burden of repair and maintenance work than others.

Thus, an ethic of care is not easily practiced in our power-laden world. As we have described earlier, power relationships dramatically shape who is able to *not care* (about others, about their own self-sustenance, about the world) because they trust or take it as given that someone else is taking care of things instead. In a world where some people are able — sometimes very easily — to not work to maintain the world, this work is done by those who have no choice but to 'care.'[16] In other words, if we take for granted that some amount of care (furnished varyingly as paid labor, unpaid labor, or in a non-work-based form) is necessary to sustain life, then some if not most of that life maintenance will be care *work.* For Tronto, the labor of social reproduction is not by itself sufficient to be considered part of an ethics of care. Instead, it is often care *work,* involving labor that is integral to sustaining life, done by people who have no choice but to sustain their worlds and contribute to the continued maintenance of larger systems. The political question is then, who does the labor "aimed at maintaining, continuing, or repairing the world," (Tronto 1993: 104) and who benefits from this labor without doing their own work of maintenance and repair?

The fraught knottings of life mean that while this work is imperative to sustain life, it matters *whose* life, *what* is repaired and cared for, and *how* it is practiced. Instead of allowing maintenance and repair work to be outsourced and black-boxed as infrastructural labor, recognizing and redistributing care work would mean a more equitably dispersed responsibility to each other and to the earth. Given our ontological entanglements, care entails "thick, impure, involvement in a world where the question of how to care needs to be posed. That is, it makes of ethics a hands-on, ongoing process of re-creation of 'as well as possible' relations and therefore one that requires a speculative opening about what a possible involves" (Puig de la Bellacasa 2017: 6). Thinking repair work as care work in the Capitalocene does not presume that either things or people's relationship to them are returnable to some originary, untarnished state. This is Maria Puig de la Bellacasa's speculative ethics: that ethics are not only always situated but that

we must reflect on the speculative horizon of what it means to *live as well as possible* in our current socio-ecological conjuncture.

The messy and dynamic relationships of interdependent beings cannot be untangled. Like Haraway's (2016) call to "stay with the trouble" and Tsing's insistence on collaborative survival in capitalist ruins, a focus on care and repair in the Capitalocene is a call to acknowledge the imperfections and troubles of the present state of things, an acknowledgement of our collective inability to stop climate change, pollution, mass extinction, and other environmental ills in their tracks. Care as involvement in a complex, interconnected world means looking after things, non-humans, and ecosystems, as well as people, their living spaces, and the relations that sustain them as social beings. As we take stock of human possibilities in this age of "planetarity" (Spivak 2015), we may want to take cues from theorists of care like Tronto, Fisher, Puig de la Bellacasa or, in an extrapolated register, James Tyner, who calls for an "ethics of care [that] centers on a radical rethinking of life, death, and dying: not only a commitment to the prevention of taking life and the building of a nonkilling society but also a commitment to the elimination of those practices and policies that disallow life to the point of death" (2019: xv).

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[1] Scholarship on the Plantationocene (e.g. Haraway 2016; Tsing 2017) has also been critiqued for its lack of attention to race: Davis et al. (2019: 7) argue that the plantation functioned as "a racially and economically ordered space, which violently structured *differentiated* life" and that any discussions of the Plantationocene must reckon with the plantation as a component part of an apparatus of racial capitalism.
[2] Here we are alluding to discussions of a global supply-chain capitalism (Tsing 2016), in which sites of production and disposal move (and are subcontracted, subdivided, and abstracted from the final 'product') in ways that extract from people and nature in increasingly unpredictable and complex ways.
[3] Of course, the prospect that there is "no fix" remains ever present, summoning us to stretch the imagination to "seek out alternative scripts of expertise" and living (Thieme 2021: 3).
[4] Our focus in this paper is broadly anthropocentric, but we recognize that non-humans too are vital to the work of maintenance and repair, thereby mitigating capitalism's adverse effects on the planet (see for example landscape ecologist Kate Orff's (2013) work on oysters).
[5] This is a generalization with some obvious exceptions. We can think of companies providing social reproductive services (food, cleaning, laundry, etc.) which themselves capitalize on the need for this work and poor labor forces to generate profit. We would also want to separate social reproductive services from leisure or pleasure services (for example, fine dining or fast fashion), or media outlets that participate in the ideological reproduction of capitalist social relations.
[6] Lack of attention to these behind-the-scenes and end-of-pipe processes is symptomatic of a productivist bias, where people and processes most overtly connected to capital accumulation (such as design, manufacturing, marketing, and retail) are deemed significant, while the work ungirding these is devalued or black-boxed (Carr and Gibson 2016; Graham and Thrift 2007; Jackson 2014).

[7] This is not to say that this is a linear, unidirectional process; e.g. Corwin (2018).
[8] The discussion of Madanpur Khadar is adapted from Gidwani and Kumar (2019).
[9] Interviews in Madanpur Khadar were conducted in October 2014. All proper names from Madanpur Khadar are pseudonyms.
[10] The term Dalit is used for the formerly untouchable communities in South Asia, who have historically dealt with many forms of ritually polluting materials, from human excrement to household waste and dead animals (see Sreenath 2019). More recently, Muslim migrants from Bihar and West Bengal have become a common presence within urban informal economies based on redeeming value from municipal solid waste (see Kornberg 2019). Dalit and Muslim communities have also carved out niches in other sectors of waste management, from plastic recycling and reprocessing (Gill 2009) to e-waste (Laha 2015).
[11] We acknowledge the caution of scholars (Millar 2018, Thieme 2021) that waste pickers and workers do not invariably narrate their lives as ones of abjection. But many, like Nusrat Begum, do.
[12] As many social systems that we wittingly or inadvertently maintain are harmful, critical repair practices may entail deliberately letting go and allowing some systems to decay (DeSilvey 2017) and reckoning with living amongst the ruins and their continued effects (Stoler 2013; Tsing 2015).
[13] Interview conducted in July 2016.
[14] The ship of Theseus was a thought experiment posed by Plutarch (75 A.C.E.), in which a ship's planks were replaced individually as they decayed, so that over time the 'old' ship was made up of 'new' parts.
[15] Tronto's primary guiding aim is to intervene in feminist theory. She writes that beginning with another's standpoint "requires that we meet the other morally, adopt that person's, or group's, perspective and look at the world in those terms" (1993: 19); it entails understanding the world through another's perspective rather than approaching care through one's own personal framework. Also see Hobart and Kneese (2020).
[16] Tronto (2013: 33) puts it bluntly: "[S]ome people have to take up their caring responsibilities, while others are given 'passes' out of such responsibilities. They are given these passes because they are engaged in other activities that they (and, presumably, society) deem are simply more important than caring…. Conversely, those who are given a disproportionate amount of responsibility for care are presumed to have less interest and concern with such matters as protection, production, self-aggrandizement, or wealth. In a democratic society, all of these issues would concern everyone."