Roadsides

#Logistics

Edited by: **Julie Y. Chu** and **Tina Harris**

Roadsides is a diamond Open Access journal designated to be a forum devoted to exploring the social, cultural and political life of infrastructure.

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Introduction: #Logistics

Julie Y. Chu and Tina Harris

In late March 2021, global commerce seemed to grind to a sudden halt when a massive container ship, the *Ever Given*, ran aground and blocked the entire Suez Canal for six days. Amidst a global pandemic that closed borders and triggered shelter-in-place orders everywhere, the sight of this immobilized ship – and the maritime traffic jam around it – finally crystallized what more than a year of Covid-related medical shortages, vaccine inequities, marooned travelers, supply-chain breakdowns, data gaps and panic buying had been pointing to in various guises. We were not just facing contemporary challenges that were global and interdependent in nature. The problems repeatedly animated by the pandemic – and made iconic by the *Ever Given* – were becoming legible as 'logistical nightmares'. As the subheading of one *New York Times* article noted in October 2021, "We didn't even have a logistics beat before the pandemic. Now we do."[1]

#Logistics – the theme of this *Roadsides* issue – takes up the hashtag that circled the world when internet memes of the *Ever Given* briefly flooded public imaginations along with a stream of alarmist news headlines that recast the fragility of the global order and its related crises in supply and shipping, finance and distribution, as distinctly logistical at their roots. This public marking of logistics as a newsworthy and viral

sensation came as something of a surprise while we set about organizing our initial call for submissions to this issue. Although both of us have spent substantial time doing fieldwork in key sites of logistical operations (Tina at airports in the Netherlands and Nepal, Julie at container seaports in Southern China and intermodal distribution hubs in the American Midwest), we were accustomed to thinking of logistics as mainly an opaque, muted or backgrounded field of relations – the wallflower industry of global capitalism next to the old-school appeal of manufacturing-cum-production and the newfangled dazzle of IT-driven high finance.

It's been a pleasure ruining the global economy with you.
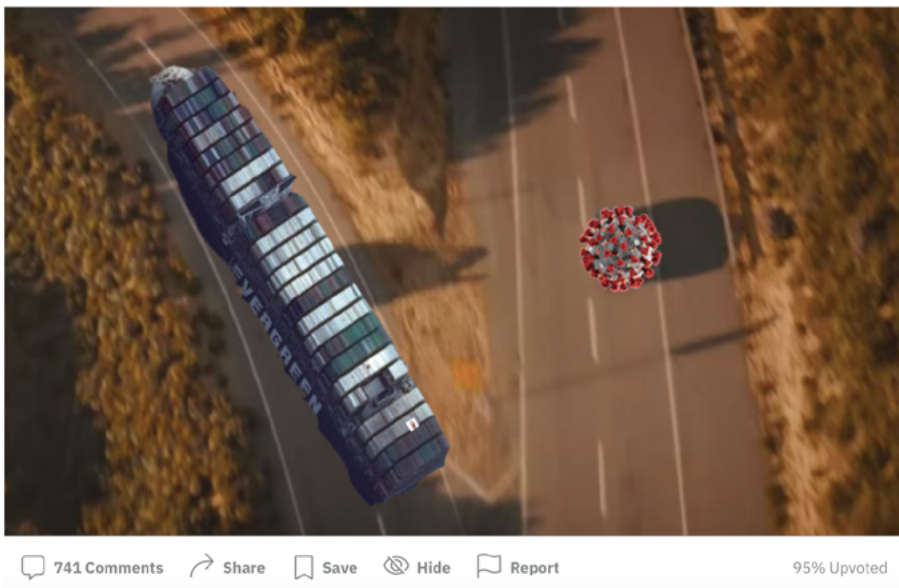
Memeifying #Logistics: a Reddit post capturing the fragility of the global order and its related crises in supply and shipping.
Posted on Reddit by Nekrubobby64.

Originally a niche field in the military sciences, logistics has proliferated into the designs and reorganization of commerce and of social life more broadly as advances in systems thinking, information technologies and the invention of the standardized shipping container – with its related intermodal networks of distribution – came together in the latter half of the twentieth century. A few have dared to dub these developments "the logistics revolution" (e.g. Bonacich and Wilson 2008; LeCavalier 2016). Yet despite these grand proclamations and its military-colonial roots (Chua et al. 2018), logistics has continued to be seen as a mere add-on to manufacturing concerns in the market or, at best, as an unglamorous subfield of operations research in business management. Similarly, in academic research logistics figures mostly as a secondary dimension of infrastructure in its mundane register as "the study [of] boring things" (Star 1999: 377) or as the handmaiden to the particular flows that it mediates.

The spectacle in the Suez Canal looked to some like a surreal dream. But ports are much closer than we think; we were accessing the very news of the Suez Canal through another kind of port – our home data links. These various gateways of relay and distribution – institutionally mediated Zoom calls and emails – were the channels through which we were able to organize our own co-editing logistics: the work of delivering this issue according to certain standardized expectations and in line with the calendar (two issues per year with a spring target date).

Aligning these ideas meant that we – seven hours apart and with contributors in several other global time zones – began with necessary calendaring and calculations of feasible timeslots via Coordinated Universal Time or UTC. The shared logistical devices that we used to interact across distance trace their genealogies to maritime imperial concepts; for instance, time coordination is rooted in the British colonial

Ports everywhere: On our laptops (top left), ethernet routers (top right), motherboard ports (bottom left), and the container shipping port (bottom right).
Images: Depositphotos. Montage: Julie Y. Chu.

project to institute Greenwich Mean Time as the 'hub' of time standardization, which allowed for more efficient control of imperial trade and territory. In addition, we both had childcare duties, which meant early mornings and late afternoons were out; while we worked on "#Logistics", the logistics of care remained quietly in the background.
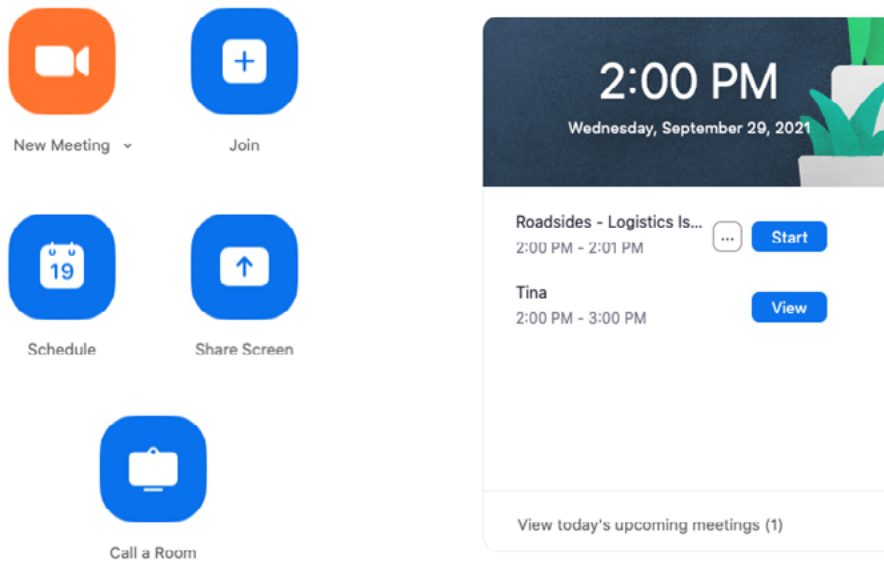
The logistics of co-editing – coordination via Zoom and calculations of standardized time: 2 pm CST (Central Standard Time, Chicago) = 9 pm CET (Central European Time, Amsterdam).
Screenshot by Julie Y. Chu.

As the title for *Roadsides* collection no. 007, #Logistics is intentionally performative as a way of capturing the operational effects of logistical designs that we negotiate daily and in particular through the whole process of co-editing: to organize, collect, store, retrieve and distribute flows across space-time. In this case, the hashtag reformats the word, Logistics, as metadata – a standardized higher-order piece of text – now algorithmically responsive to user commands for linking and 'containerizing' other texts and images for future searches and (re)distributions. In sum, the hashtag elevates Logistics from a semantic term to an operational one: it 'logistifies' the word, making #Logistics enact its own modus operandi (cf. Mullee 2021).

Moreover, #Logistics animates a key dynamic that pervades logistical phenomena. The hashtag and the term, logistics, take on a gestalt-like form in a shifting figure–ground relation, at times drawing attention to #Logistics as #<metadata> and then backgrounding the hashtag in favor of its semantic content as <#>Logistics. Just as the spectacle of the *Ever Given* was quickly replaced by the next news cycle as logistics receded once again into business-as-usual, #Logistics embodies these magical effects in its operation as organizing code – now you see it, now you don't.

Our cover design – a collaboration between Julie and designer Shahira Bhasha – further plays with the logistical magic of figure–ground reversals. In one sense, the front and back covers can be read as graphic illustrations of the logistical networks of storage, relay and distribution. In another register, they work as fully operational logistical designs – machine-readable QR codes – for linking a viewer with the right device (try your smartphone camera[2]) to the deliverable digital contents of this issue. The back

cover offers a special 'Easter egg', a hidden feature, linking to <u>an earlier Roadsides piece</u> that laid some of the conceptual groundwork for this issue (plus, look for our whimsical oval "Where's Waldo" amidst the boxy landscape in the illustration…).

Inside the covers of *Roadsides* 007, we take an even closer look at the various disappearing acts and occasional spectacles of logistics. What do we not see between the moment of the mouse click to the delivery worker ringing our doorbell? What is deliberately revealed, and which details of the organization and coordination of the data or supply chain are we prevented from fully understanding? What if – as Ruha Benjamin (2019) has claimed in her work on discriminatory design – a glitch in the system is more akin to déjà vu, covering up existing inequities? In this collection, we view logistics through an analytical lens, as both a metaphor for organizing the circulation of goods, data and people, and as a social conundrum to puzzle out or endure – as in the logistical nightmare of a stuck container ship, or a military convoy unable to proceed, or a port shutting down.

The materiality of logistical work is often obscured – tucked away in boxes, back rooms or back stages, and these underlying analogue practices are mistakenly viewed as distinct from their digital surfaces. Articles here explore the backdropped work of logistics – of office cleaners in Bhutan (<u>Wijunamai</u>) and the administrative files that facilitate the movement of container ships in southern Spain (<u>Leivestad</u>). These hidden workings, however, go hand in hand with the spectacles of logistics, whether animated by mass media (<u>Singh</u>), conspiracy theories (<u>Hockenberry</u>) or techno-utopic discourse (<u>Zhang</u>). While it is difficult to know the extent to which logistical work hides violent and poisonous traces of displacement and occupation, several of the pieces in this issue begin to disentangle and uncover these traces: the way extracting and moving metals in shipping containers link to toxicity contained by bodies along these routes (<u>Graeter</u>), how truckers absorb or "buffer" spatio-temporal burdens in maintaining the "just-in-time" illusions of delivery (<u>Hopkins</u>), and the ways satellite data shape the 'remote' and vulnerable inhabited areas of ground stations (<u>Bennett</u>).

The issue also introduces a new multimodal feature: the *Roadsides Breakdown*. This novel format zooms in on a specific single object, idea or event, and takes it apart piece by piece, allowing readers to interpret and understand the feature in more depth. Our debut *Breakdown* pieces show readers "How to Play" a simulated war game like a logistics strategist (<u>Sheldon and Mullee</u>), as well as "How to Read" the logistical traces of packages moving along algorithmically managed routes like a warehouse worker or last-mile delivery driver (<u>Veenhoven</u>).

Finally, we wish to thank all the <u>reviewers for this issue</u>, including a special shout-out to Lucyna Talejko-Kwiatkowska for design feedback. *Roadsides* works with a double-open peer-review system, which means that the reviewers' and authors' names are known to each other. Given the short turnaround to ensure a timely publication, we are grateful to everyone involved in the behind-the-scenes logistical process for helping us deliver *Roadsides* 007 to you.

Notes:

[1] Thanks to Editorial Board member Christina Schwenkel for pointing this out.

[2] For best results, use a dedicated QR reader app on your phone. If you use your native camera app, you may need to experiment with angle and distance to get it to read.

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Julie Y. Chu is Associate Professor of Anthropology at the University of Chicago and author of the award-winning ethnography *Cosmologies of Credit: Transnational Mobility and the Politics of Destination in China* (Duke University Press, 2010). She is currently finishing a book entitled *The Hinge of Time: Chronopolitics and Infrastructure at China's Global Edge.* Based on fieldwork with Chinese migrant couriers and customs inspectors, this work examines how figures of 'infrastructure' animate the global politics of time in three key ways – as matters of constancy, rhythm and non/event. She also currently leads two collaborative multimodal research projects on logistics: Logistics in the Making of Mobile Worlds hosted by the Neubauer Collegium for Culture and Society at the University of Chicago, and Understanding Logistics Through Multimodal Experiments in Ethnography sponsored by the U.S. National Science Foundation.

Tina Harris is Associate Professor of Anthropology and a member of the Moving Matters research group at the University of Amsterdam. She holds a PhD from the City University of New York Graduate Center. Her research focuses on aviation, infrastructure, cross-border mobility and the movement of commodities, particularly in the Himalayas. She is the author of *Geographical Diversions: Tibetan Trade, Global Transactions* (University of Georgia Press, 2013), and her articles have been published in journals such as *Cultural Anthropology, Antipode, Political Geography* and *Environment and Planning D: Society and Space.* Her latest research project explores how aviation professionals around the globe are attempting to transform the future of flying in accordance with new climate legislations.

None Dare Call It a Supply Chain:
Logistics as Conspiracy

Matthew Hockenberry

The resurgent impact of the Covid-19 delta variant in Fall 2021 has amplified the pandemic's supply chain disruptions. Stock has run out. Shipments have slowed. Prices have risen. Consumer demand is at levels that – in some areas – exceed all prior demand, with temporary price fluctuations giving way to rampant inflation. In this context, an absence of clear explanations for uneven distribution has provided a formative canvas for false, misleading and sometimes dangerous claims about the state of global supply. Refracting an array of imaginaries built around the obtuse operations of global logistics, narratives surrounding the supply chain have become a site for contested claims about the interconnected nature of contemporary life. Dislocated images of empty shelves circulate, their ubiquitous use in polarized political debates such that they have been flagged as misinformation. Photographs of vinyl sheets and cardboard inserts in awkward approximation of absent goods are mocked by some, but suggest to others signs of deliberate subterfuge. Even mundane maritime maps are assembled as evidence of – commenters claim – countries "under attack" (Reuters 2021).

Supply chains are mysterious. In that mystery, they become capable of enrolling all manner of messages, communicating all kinds of conflicting ends. This is hardly
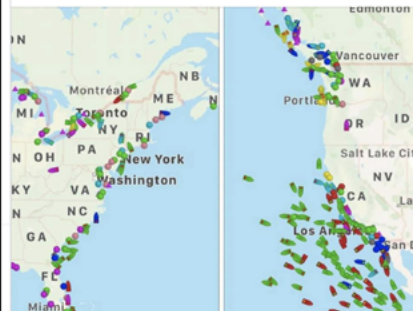
surprising. By design, they are a model premised on unknowing – with each stop on the chain intended to abstract every successive link. Given their scale, and the removal of the public from spaces of logistical operation – as port, warehouse and factory infrastructures have become relegated to the peripheries of urban space – perceptions of their workings have become (at best) fragmented. At worst, they are now fictitious. As disruptions resonate throughout a deeply divided United States (and in different ways, across Canada and the UK), logistics is no longer just the cause of economic and material life, but a formative source for half-truths, lies and outright conspiracies about the personal and political circumstances surrounding that life. In response, one finds an attempt at explanation: there is an intentionality to the operation of the supply chain, and thus, an intentionality to its recent failings.

Understanding of logistical operation has always been made piecemeal, formed from subjective experience and comparison to other, similarly complex, systems. This partial, personal nature is evident when consumers in the United States build an imaginary that places them at the end of the supply chain rather than as another node interwoven in its global circulations. The result is a discourse limited to the immediate, bodily, painful (and often temporary) unraveling of those ends – stories about underlined contaminated pharmaceuticals or heavy metals found in children's toys, for example. More an affective knowledge than an intellectual one, it is something to be felt rather than thought. I have argued that this lends to a "material epistemology," where an assembled object becomes the primary source for understanding its system of assembly (Hockenberry 2018: 491–92). What is most striking now is that these perceptions operate even in the absence of objects, fashioning conspiratorial accounts around the empty spaces they would otherwise have occupied. But these too are material in that they focus on material infrastructures. A snapshot of a shelf shows a shortage, just as colored icons locate ships waiting outside ports. In the confines of a photograph or screenshot, they communicate all that there is to say about their absent objects. What they do not – and cannot – capture is the cascading network of parts, places and processes responsible for rendering those singular scenes.

Order packing processes shared on Instagram (#packingorders, #shippingorders). Photos (clockwise from top): @saturnstreasure, 20.12.2021; @thedewdropdesigns, 7.04.2020; @thedewdropdesigns, 24.09.2020; @winejourney, 19.12.2021.

Writing about the work of merchants during the lockdown in the United States, Tamara Kneese (2021: 4) uses the term "logistics fetishism" to describe how documentation of packing and shipping goods on platforms like Instagram "imbued a networked, often invisible process with a sensuous aura" that "rematerialized" human qualities of labor. And indeed, this fetishistic quality is everywhere present in current conspiratorial accounts. But while Kneese finds in her images a means for reaffirming connection, these images stand apart from the fractured network they claim to depict. Assembled packages, posted by the person who packed them, fix a connection to a shipment. Snapshots of store shelves, on the other hand, communicate nothing fixed about the mechanisms responsible for stocking them. Full, they may be signifiers of comforting expectation or calamitous excess. Empty, they may reveal simultaneously temporary and terminal faults.

As with other dislocated circulations – images of crowds or city streets – <u>many of the images from Fall 2021</u> offer no indication of their originary time and place. The condemnation or exoneration they provide can turn easily from one political use to the next: past reminders of Trump's America in one context, present evidence of Biden's America in another. Photographs of vinyl sheets and cardboard cutouts illustrated with fake groceries have been widely offered as evidence of food shortages. But there is no proof of when they were taken, or where. One with visible dollar signs was linked to Brexit, others from British retailers were attributed to the United States.

Images of shelf inserts (often of <u>uncertain provenance</u>).
Photos: <u>@shitlondon</u>, 22.10.2021; <u>@GoatSarah</u>, 20.10.2021; <u>@QTRResearch</u>, 16.10.2021.

It is in the moment of breakdown – when the "server is down … [or] there is a power blackout" – that one finds an "understanding of the relational nature of infrastructure" (Star 1999: 382). But given the scale of logistical infrastructure, this is not so easily arrived at. Even experts struggle to explain these interwoven connections, fashioning reports and visualizations that do what consumers cannot: explode a finished form across time and space to approximate the thousands of parts, people and places enrolled in its assembly. The 'invisible' work of contemporary logistics has been hidden for a reason – because it abstracts processes that could not be easily understood, rationalized or justified. American consumers who had not confronted the labor demands,

economic impacts or environmental costs of outsourcing and subcontracting pursued by multinational corporations now face a direct threat as the changes underlying them lay bare the fragility of consumption itself (Tsing 2009).

In Shannon Mattern's (2019) analysis of 5G network conspiracies, she suggests that concerns about health and environment in marginalized communities express fears about "how externally imposed, seemingly invasive technologies are sometimes experienced by people sensing their own vulnerability and disempowerment." Indeed, it "gives people more sense of control to imagine that, rather than random things happening, there are these shadowy groups and agencies that are controlling it" (Andrews 2020). When conspiracies about the 2020 US presidential election surfaced claims about the mysterious movements of ballots and 'surprise' reserves of votes, they not only shared similar cognitive deceits, they prefigured the suspicion of the current moment. What these conspiracies get right is that the systems in question are massive, complex and diffuse. The operations of global logistics, working at the intersection of economic, material and social life, are beyond the individual perception of any single actor. But they are nonetheless critical to all of them.

Illustrating the supply crisis (diagrams of part suppliers, container usage and typical commodity journeys).
Photos: Nikkei Asia, 8.12.2021; Wall Street Journal, 7.12.2021; Bloomberg, 28.08.2021.
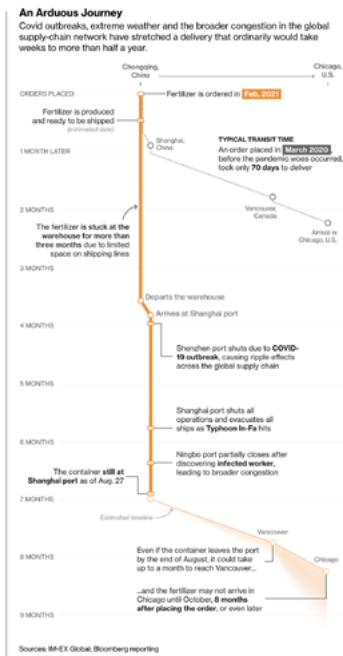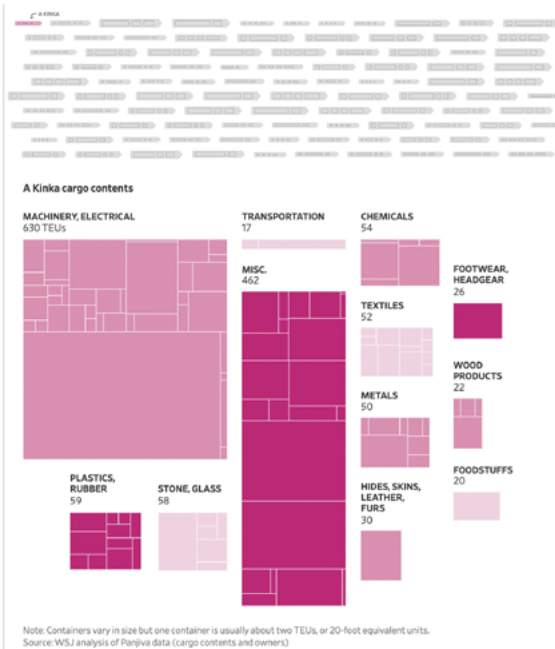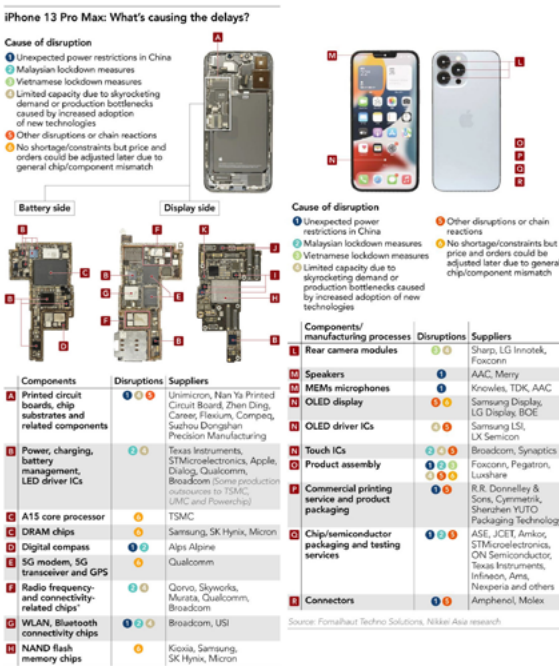
To suggest logistics as conspiracy is to ascribe intentionality to the failings of the supply chain. There is a crisis, but someone has 'manufactured it' – just as one would a mobile phone. Combining mistrust of the government and corporations with widening economic and political disjunctures, the majority of these accounts direct responsibility for orchestrating shortages toward the federal government, the president and his political party. Others suggest more shadowy international cabals. Common to all is the need to find a single fault for a system that has otherwise, they feel, been without one. But while logistics is concerned with the manufacture and distribution of

materials, conspiratorial logistics is more interested in the manufacture of absences. While a delivered object has, necessarily, a singular pathway that brought it into being, the account of the absent arrival remains open, accessible to political and social contestation. Rather than offering evidence of real conspiracies by corporations and cartels, these foster a more fundamental and unfixed suspicion. This is no longer an affective knowledge, but a *disaffective* one. The pain of supply chain contamination gives way to an overflow of anger, made all the more acute by the fear that the supply chain is no longer something that happens elsewhere. The supply chain works, must work, and – these users declare – it must do so at any cost.

"Conspiracy is the poor person's cognitive mapping in the postmodern age," writes Frederic Jameson (1991: 356), "it is a degraded figure of the total logic of late capital, a desperate attempt to represent the latter's system." But with the opacity of these systems, the momentum afforded by the global mass of their infrastructures, how could the total even be thought? As difficult as it is to figure the causes of supply chain failure, it is almost more inconceivable to recognize a system working as intended. After all, the failure to deliver goods has not meant a failure to profit off their anticipation. Nor was it a 'failure' that so many have been exploited, displaced or enslaved, or that countless countries and cultures have been mined in pursuit of the extraction of value at any cost. It is no mistake that supply chains stand amid the greatest period of environmental degradation in the history of the world, or that food, building materials and medical equipment are indefinitely delayed, but all sorts of junk can arrive the next day. Despite the attempt to find some external cause for this emptiness, there is no conspiracy here. There is just the supply chain.

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How to Play *Logistics Command*

Zachary Sheldon and Jack Mullee

In 1978, Westinghouse Electric Company published *Logistics Command* (*LC*), a board game that put players in charge of maintenance operations for a fictional nation's armed forces while teaching them the engineering principles that Westinghouse pioneered on behalf of real-world militaries. Although the game never caught on in its time, it resurfaced at a 2021 meeting of Logistics in the Making of Mobile Worlds, a research collaborative hosted by the Neubauer Collegium at the University of Chicago, where its complicated rules and clumsy components flummoxed several academics.

Since then, we have taken a closer look at how *LC* uses technologies common to gaming – such as dice, tokens, turn-taking – to simulate geopolitics in logistical terms. Our archaeology of gaming also reveals the techno-managerial philosophy of Integrated Logistics Support (ILS) that informed *LC*. Westinghouse pioneered these principles of systems design, which are still implemented at the US Defence Department, the UK Ministry of Defence and many aerospace companies. The ILS method sought to integrate all the minutiae of military preparedness, from circuit boards to helicopter maintenance schedules, into a holistic and easily controlled system – all watched over by a Westinghouse contractor. *LC* puts control of that system in the player's hands.

In this pen-and-paper game, we discovered an approach to managing complex systems that foreshadowed innovations usually associated with the advent of digitally mediated interfaces. By getting into the business of system design, Westinghouse roped the cybernetic imagination of the American military industrial complex to the accumulative strategies of management consulting: think of the Enterprise Resource Planning software that has become indispensable for businesses, or the proprietary logistics software packages that surveille and command contemporary supply-chain capitalism (Rossiter 2014: 58–59). Unearthing *LC* suggests that logistical forms follow their own itineraries, which can cut across distinct phases in the history of capitalism. At a moment when the era of global connections is giving way to renewed bipolar struggle, *LC*'s anachronistic depiction strikes us as timely once again.

To view images of the individual game elements, drag your mouse over the numbers marking each section below.

Game map:

Through the medium of the game, Westinghouse Electric's logistical engineers make an argument about the world in which we dwell, and the problems we need to solve in order to keep on living there. The game map depicts two client states, the People's Republic and the Federal States, and their superpower sponsors, the Union of Red and the United Blue. Each player controls a client-superpower pair.

This set-up evokes Cold War polarities, but looks can be deceiving. The year 1978, when *LC* came out, capped off a decade-long decline in US military spending relative to GDP, and Westinghouse recognized that Washington had to justify new expenses. "The thing to avoid," wrote an ILS engineer in a conference paper published by the International Electrical and Electronics Engineers (IEEE), "is compromising the logistics implementation to save a few bucks" (Rasa 1978: 233). Employing ILS engineers would cost more up front, but by managing every element of project maintenance, from designing the test connectors on radar systems to writing the repair manuals for technicians, the ILS method promised to deliver savings over time. Note how this argument assumed that there would be a need for maximum military preparedness in the years to come.

Rulebook:

LC's rulebook claims that "[t]he game leads the players naturally to the concept of integrated logistical support" (BGS 1978: 21). But to arrive at this harmonious image, players must navigate the *LC* rulebook's dense two-column layout, which is packed with so many abbreviations that you might mistake it for a real-life military document. The rulebook orientates players to the interrelationships of a war machine's many components, from spare parts to support centres, at the same time that it situates play in a turn-based geopolitical imaginary. Gameplay proceeds across sixteen turns divided into five phases each. Players do not take turns subjectively, as in most other board games, but rather jointly experience each turn as an objective event. Across the ensuing eighty moments of gameplay, players roll dice, crunch numbers and try to keep their war machines from falling into disrepair. There are no rolls to attack or defend because attacking and defending are not within the scope of player agency. Rather, dice are rolled each turn to determine whether a given military system will break down or be repaired (see 5: The Matrix, below). Players attempt to mitigate the impact of any single breakdown through failsafe planning and a healthy distribution of risk across multiple platforms, leading them to experience logistics as a resilient and adaptable whole that overcomes routine wear-and-tear in anticipation of the next crisis (see 6: Situation Cards).

Control Sheet:

"System behavior is largely determined on the front end, before play begins," writes the game designer (BGS 1978: 21). In stark contrast to an emergent emphasis on flexibility and efficiency in 1970s commercial logistics – exemplified by the rise of Toyotism and just-in-time production – the Westinghouse ILS model demanded total foresight for military logistics. In *LC*, the result is a game world that feels doubly anachronistic: its logistics refuse both post-Fordist flexibilization and Bezos-style fulfilment-on-demand.

So, *LC* requires players to schedule all of their equipment 'orders' before the game even starts, by formalizing them on the Control Sheet. The Control Sheet incorporates an order delivery schedule that corresponds to the turn-based structure of the game: individual orders become ready at pre-specified turns, while existing equipment breaks down and gets repaired over time (see 5: The Matrix). *LC*'s rulebook suggests that players spend an hour or more planning their Control Sheets – before play begins.

Frontloading all the hard decisions does not make for a very dynamic contest. But it fit the bill for Westinghouse's marketing. As the IEEE memo explains, a project manager must "recognize the need for his ILS engineers at the very start and set up the basic ground rules that the ILS engineers are an integral part of the total engineering team!" (Rassa 1978: 233) By rewarding players who plan ahead and penalizing them for amending schedules during play, *LC* hammers this advice home.

Tokens:

Players populate the game board with tokens depicting a range of combat equipment and support facilities. Each token is a hieroglyph teeming with numbers and other tiny symbols, all of which convey information about the strength and reliability of the equipment depicted. As gameplay unfolds and players roll dice, they add, multiply and divide these numbers to determine their war machine's performance in high-stakes 'situations' (see 6: Situation Cards). For our players, tokens seemed both clunky and ahead of their time – evoking anachronistic images of computer games that crunch these kinds of numbers automatically.

The Matrix:

These tables show how die rolls translate into breakdowns and repairs, and provide space to track points, turns, repairs and expenditures. No part breaks down on its own. Instead, an unlucky roll will degrade the preparedness of all components that share a given Mean Time Before Failure (MTBF) value. Likewise, a single good roll will repair all eligible units that share the same Mean Time To Repair (MTTR). This makes it critical to acquire systems with a mix of MTBF and MTTR values – you do not want to get stuck with simultaneous breakdowns across the board, and service bottlenecks

will stop you from repairing everything at once. Healthy system behavior distributes loss and repair, maintaining aggregate preparedness for each moment.

Situation Cards:

Each turn of *LC* is dramatized by its first phase, in which players draw from a deck of Situation Cards. Most cards describe routine missions – e.g. "PEOPLE'S REPUBLIC patrol boats transport guerrilla fighters to base camp" – through which players gain or lose points with little immediate consequence. Other cards, however, depict 'crises' in which the game suddenly hangs in the balance. If a player's war machine cannot meet the numerical threshold of preparedness specified on the crisis card, the player is eliminated: game over. Here, existential Cold War anxieties are materialized in gameplay. *LC*'s all-or-nothing imaginary of geopolitics helps explain the refusal of flexibilized logistics – emerging among commercial firms by 1978 – on the part of ILS (see 3: Control Sheet).

Debriefing Logistics

At the Neubauer Collegium meeting in 2021, neither the People's Republic nor the Federal States achieved victory. The hour allotted for gameplay was not nearly enough for the assembled social scientists to design and execute an ILS plan. Instead, the two teams 'hacked' *LC*, twisting its rules and eschewing long-range foresight in order to get into *LC*'s world and play. Players embraced contingency and on-the-fly planning against *LC*'s formula of foresight, calculation and control. In its prescribed form, *LC*'s gameplay foreclosed opportunities for dynamic decision-making, counseling players to program their control sheets toward predictable outcomes. But our social scientists were not suited to holistic control. Competing in their own flexibilized styles in 2021, the Federal States and the People's Republic enacted yet another iteration of geopolitical logistics. Sadly, the reinvention of logistics for a belligerent geopolitics seems only too timely.

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Satellite Underworld

Mia M. Bennett

We surf the web and trawl Google Earth, oblivious to the toll of the endless scroll. But how do photos taken of the planet from above reach us down below – and what are the hidden politics and logistics of the transmission of data from space to the ground?

Since the dawn of the satellite era in 1957, over 11,000 satellites have rocketed into space. With every passing year, an exponentially increasing number of satellites are sent into orbit to support Earth observation and communications. These spaceborne instruments are now critical to logistics at a range of scales, doing everything from assisting combines with precision farming to guiding ships through Arctic ice.

In reckoning with how satellites have transformed understandings of the planet, critiques have largely focused on the globe-spanning view from above (Cosgrove 2001; DeLoughrey 2014). Yet the 'planetary gaze' forms a somewhat myopic lens, training attention on satellite aesthetics while obscuring the nitty-gritty logistics underlying the data and the localized ramifications of its production and circulation. Satellites are depicted as operating autonomously in the vacuum of space. But they form part of a wider circuitry that touches down on Earth in an often-brutal manner, in environments
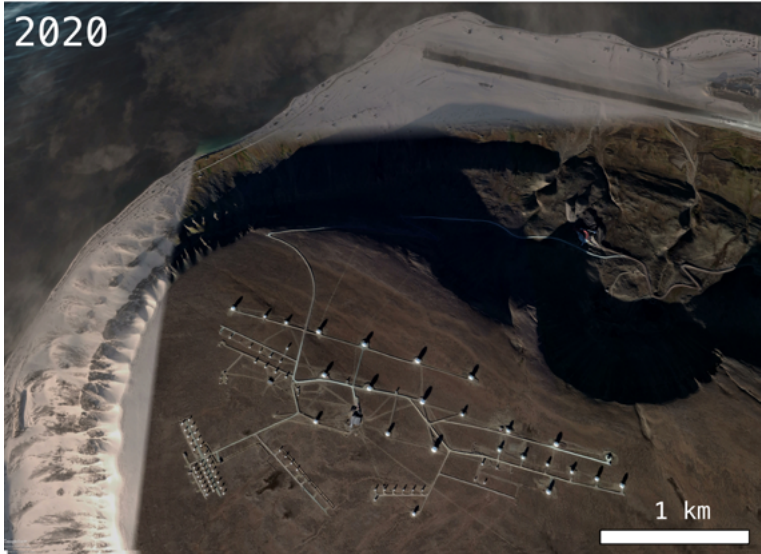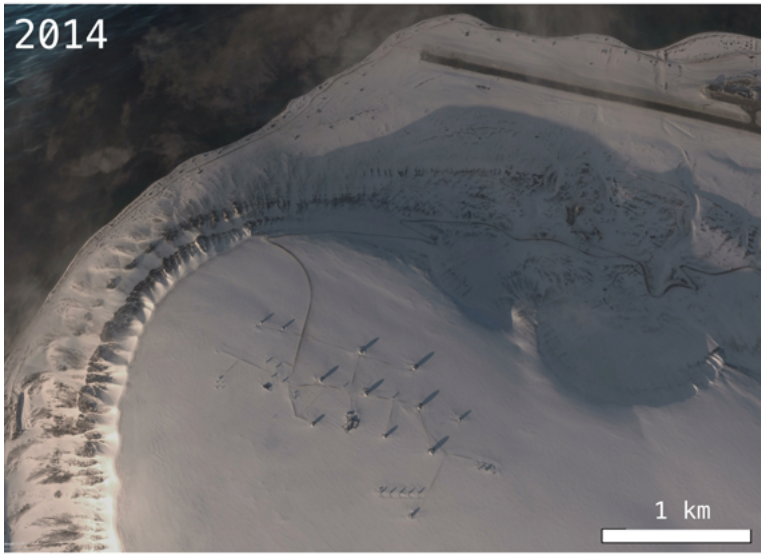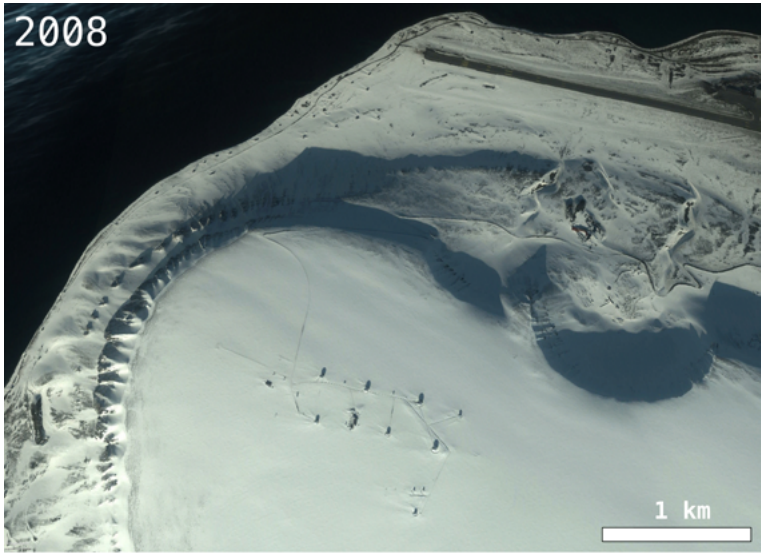
Svalbard Satellite Station's growth over time.
Original imagery: Maxar/ Google Earth Pro.

or among populations deemed by sovereign states to be peripheral and displaceable – and therefore ideal for making room for the space industry (Swanner 2017).

Crucial to the web of logistics underpinning satellites are ground stations, which downlink data collected in space and transmit it to terrestrial computer systems for analysis. These lowly facilities are built in locations with a <u>direct line of sight</u> to satellites as they pass overhead. During each overpass, a satellite transmits its data via radio or microwaves to a receiving antenna – typically a 7m- or 12m-wide parabolic dish sometimes covered in a weatherproof enclosure, or radome, to protect it from the elements – at the ground station below. If a satellite does not frequently fly over the same place, more ground stations must be built at multiple locations within its line of sight to ensure the timely transmission of data.

The satellite industry's land-use demands are unevenly distributed across the planet. A ground station's location depends on a satellite's particular orbit, which is selected based on the operator's purpose. For instance, Earth-observing satellites whose imagery is used for science or surveillance often have <u>polar orbits</u>, gliding along a different line of longitude every time they circle the North and South Pole, enabling global coverage. For such satellites, polar ground stations are desirable because the high number of overpasses permits regular and efficient data transmission. When built in remote places, ground stations also offer states a means of concretizing their presence, particularly in areas where sovereignty claims are frozen, as in Antarctica, or increasingly called into question, as in the Norwegian territory of Svalbard. In both of these icy locales, Norwegian company Kongsberg Satellite Services, whose parent company is Kongsberg Gruppen – a major arms manufacturer and the world's leading producer of remote weapons systems – manages ground stations. Operations like these exemplify the inseparability of satellite logistics from warfare.

As the number of polar-orbiting satellites grows, interest in building ground stations in the Arctic and Antarctic is rising. In the rush to deliver Earth observations to end-users, alien arrays of lily-white dishes are popping up above the snow, while fiber optic cables are being woven around the world. The impact assessment for a forthcoming satellite communications antenna at McMurdo Station, an American research base in Antarctica, warns that it will cause numerous "earth-disturbing activities" (National Science Foundation Office of Polar Programs 2017: 5). Although the antenna is merely the size of a house, its construction will require "excavating approximately 42,300 m³ of rock and soil" and "drilling up to … a total of approximately 1,300 holes" in order to detonate 16,800 kg of explosives "in no more than 70 discrete blast events." Blast off, indeed.

The social and environmental impacts of polar satellite ground stations are more severe when they infringe upon Indigenous homelands. Sweden's Esrange Space Center and Canada's Inuvik Satellite Station Facility (ISSF) are surrounded by Sámi, Inuvialuit and Gwich'in lands, respectively. Since 2010, the facilities have together offered the <u>Kinuvik Concept</u>. As the Swedish Space Corporation operates antennas at both sites, it sells bundled services for the two facilities, "offering contact opportunity on every orbit" to low-Earth orbiting polar satellites (Swedish Space Corporation 2021). Yet strengthening contact between satellites and antennas can mean splitting local populations from

The Inuvik Satellite Station Facility's expansion is pushing new roads into the tundra. Orange line: original site. Red line: expanded site. White overlay: Inuvialuit lands.
Original imagery: Maxar/ Google Earth Pro. Inuvialuit lands data: Government of Canada

their traditional resource bases. Aside from the disturbances caused by construction, once an antenna array is in place, it may impede activities such as reindeer herding, hunting, gathering and fishing.

Few obstructions stand in the way of satellite data, with states using public funds to lubricate its seamless circulation. In 2017, the 1,154-km Mackenzie Valley Fibre Link opened to support the ISSF's continued expansion. The six-inch-wide cable hews to the route proposed in the 1970s for a controversial natural gas pipeline that was never realized, laying bare the path dependencies of digital infrastructures, despite their levitative qualities, on grimier industries. In the words of its operator, a private–public partnership, the Fibre Link has "solved the challenge of transmitting large data quantities

across Canada's north and beyond – quickly, reliably, and affordably" (Mackenzie Valley Fibre Link 2016). No mention is made of the trench dug into the boreal forest across the Northwest Territories to install it, nor the "unacceptable" protection levels for wildfire and fisheries, improper waste disposal, exposed holes and erosion which inspections have revealed (Thurston 2016). To make matters worse, the "last miles" of cable needed to provide nearby communities with high-speed internet are frequently yet to be laid (Desmarais 2020). What good is space infrastructure to residents if they cannot even view the data received by the antennas crowding their horizons?

Kashgar Ground Station in relation to damaged cultural sites in Xinjiang. Original imagery: Maxar/ Google Earth Pro. Damaged cultural sites data: Ruser et al. 2020.

Far from the Arctic, yet in a place which, too, is remote and territorially strategic, sits a ground station in Xinjiang Uyghur Autonomous Region. Located outside Kashgar, China's westernmost city, Kashgar Ground Station (Ch. 喀什地面站) is one of four facilities built across the extremities of the country's territory to ensure national satellite coverage. The station nestles between a highway, patches of rusty soil and irrigated arrays of verdant trees. With its arched windows and tan walls, the facility's main building, opened in 2008, reflects the local Islamic architecture. This façade is ironic, if not altogether shameless, considering that satellite imagery analysis has uncovered the destruction or damage of thousands of mosques and cultural sites in Xinjiang since 2017, including two just kilometers from the ground station (Ruser et al. 2020). Outside the building, a half-dozen ground antennas stand on the cinnamon soil listening to the skies, downlinking data from foreign satellites and the rapidly increasing number of Chinese ones as well (Luk and Wijeyeratne 2020).

The Chinese government intends to leverage satellite data in a slippery slope of applications ranging from emergency response to maritime surveillance. With Xinjiang serving as one of China's two key regional demonstration areas for its high-resolution Earth observation system (Cankao Xiaoxi 2017), Kashgar Ground Station acts as a critical node for connecting spaceborne imagery to potentially oppressive applications on the ground. Chinese media portrays the station as instrumental to taming the restive region. One article asserted, "For the past ten years, the workers at the [Kashgar] Ground Station have struck roots into our motherland's western frontier. Living on the frontlines of the fight against terrorism, they have made outstanding contributions to the development of our country's science and technology and to the long-term stability of the frontier" (Gao 2018).[1] The ground station's alleged centrality to both China's space program and its territorialization strategies exposes how the earthly emplacements of satellite logistics can undergird the violent control of territory. In turn, the petabytes of data these facilities accumulate can be harnessed to police and persecute populations.

Ground stations have largely formed part of the "unexamined background," to borrow from Neilson (2012: 324), of the satellite industry. Data captured by orbiting instruments is transmitted to a fixed terrestrial location, often a peripheral corner of Earth, before coursing through submarine or subterranean cables to reach an analyst, who is typically sitting at a computer thousands of kilometers away in a more urbanized, temperate locale. The analyst may be oblivious to where the pixels they are manipulating first touched down onto the planet's soil. Yet those who live where data is downlinked are all too aware of how space and satellite logistics enclose, extort and upend their homes (cf. Goodyear-Kaʻōpua 2017; LaDuke and Cowen 2020). As nations cheer the liftoff of rockets and remote sensors, it is frequently the people residing within former frontiers who must shoulder the burden of bringing the data back down to Earth – or worse, become the target of its applications. To critique the rise of satellites, it is imperative to train our eyes not only on the skies, but on the ground, too.

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[1] The author is grateful to Trym Eiterjord for his translation from the original source in Putonghua.

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Piling Up:
Cargo Paperwork in a Global Port

Hege Høyer Leivestad

Piled up 1: Steel shipping containers stacked in long, neat rows, forming boxed barriers along asphalt streets. Boxes managed by machinery. One box collected, the next put in its place. Deafening noise as metal meets metal. One box rises into the air above orange helmets and heavy trucks. Shifted from ship to shore, from shore to ship and once more out to sea.

Piled up 2: Another document added to the yellow folder. The remaining papers spread out across the dirty desk. On the screen are lists of container codes. One hundred emails since this morning. Phones ringing. Another ship delay, transfers need to be moved. Terminal management, the custom broker, the warehouse, the transport company. Folder upon folder upon folder.

Introduction: Piling Up

The previous two descriptions offer familiar and unfamiliar images of a port. The first captures colourful shipping containers piled up on the seafront or on the back of massive containerships, a powerful image of global connections and commodity flows.

Piling up at the waterfront.
Photo: Hege Høyer Leivestad. Port of Algeciras Bay, 2019.
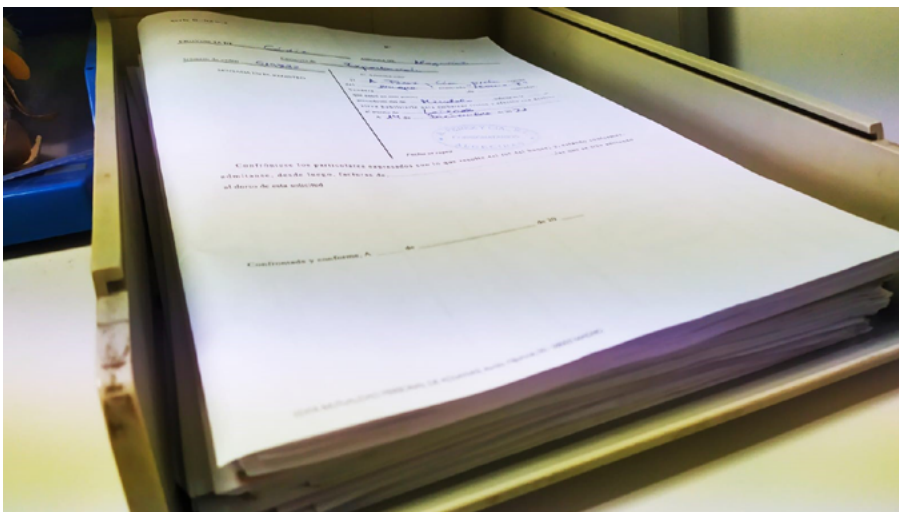
Piling up on the desk.
Photo: Hege Høyer Leivestad. Algeciras, 2021.

The second captures the vital backroom work of logistics.

This backroom labour takes place not on the exposed waterfront which comprises the recognizable spectacle of logistics, but behind the walls of logistics offices and

brokering businesses. Both descriptions speak to the logistical processes of temporary accumulation – of containers and paperwork. Although scholars are increasingly looking at data infrastructures and software solutions in order to make sense of supply chains, a parallel material world of papers also performs logistics. 'Piling up', as the title of this essay suggests, refers to the interrelated material circulation and accumulation of cargo and papers. From the transshipment port of Algeciras in southern Spain, I reflect upon how logistics mediation is achieved through the logistics document: a material technology often regarded as antiquated but which continues to define labour hierarchies, mediate port temporalities and connect logistics actors through acts of authorization and confirmation.

Agents of Flow

Through the large windows – desperately in need of a clean – one can spot the turquoise gantry cranes of the container terminal, located in downtown Algeciras. On a windy day, the leaves of the palm trees are blown almost horizontal along the heavily congested avenue facing the fenced-off port area. The inside walls of the shipping agency are covered in maritime company calendars, featuring photographs of gigantic containerships and smiling maritime workers. A whiteboard conveys in handwriting the expected arrival times of the ships, with names such as *Hansa Asia* and *Boxy Lady*.

The arrival times reflect the 24-hour operations of a port with only three days of planned closure a year. Victor, in his mid-twenties and holding a degree in maritime logistics from a local college, has just received a ship that was planned to dock at two in the morning but which due to delays did not arrive until eight.

Office views.
Photo: Hege Høyer
Leivestad. Algeciras, 2018.

The work-intensive logic of global trade involves a wide range of logistics brokers (Schubert 2021). Shipping agencies, responsible for handling shipments and cargo on behalf of their clients, are the local experts and the ship owners' or charterers' representatives in the port. Victor and his colleagues take care of everything – from arranging a berth with the terminals and the port authority, to legal clearing of the ship with the authorities, attending to the requirements of the captain and crew, and releasing or receiving cargo.

That means a lot of paperwork.

The yellow folder dedicated to the intermediary handling of a ship grows thicker and thicker with each operation. This folder is the desk-based accumulation of paperwork,
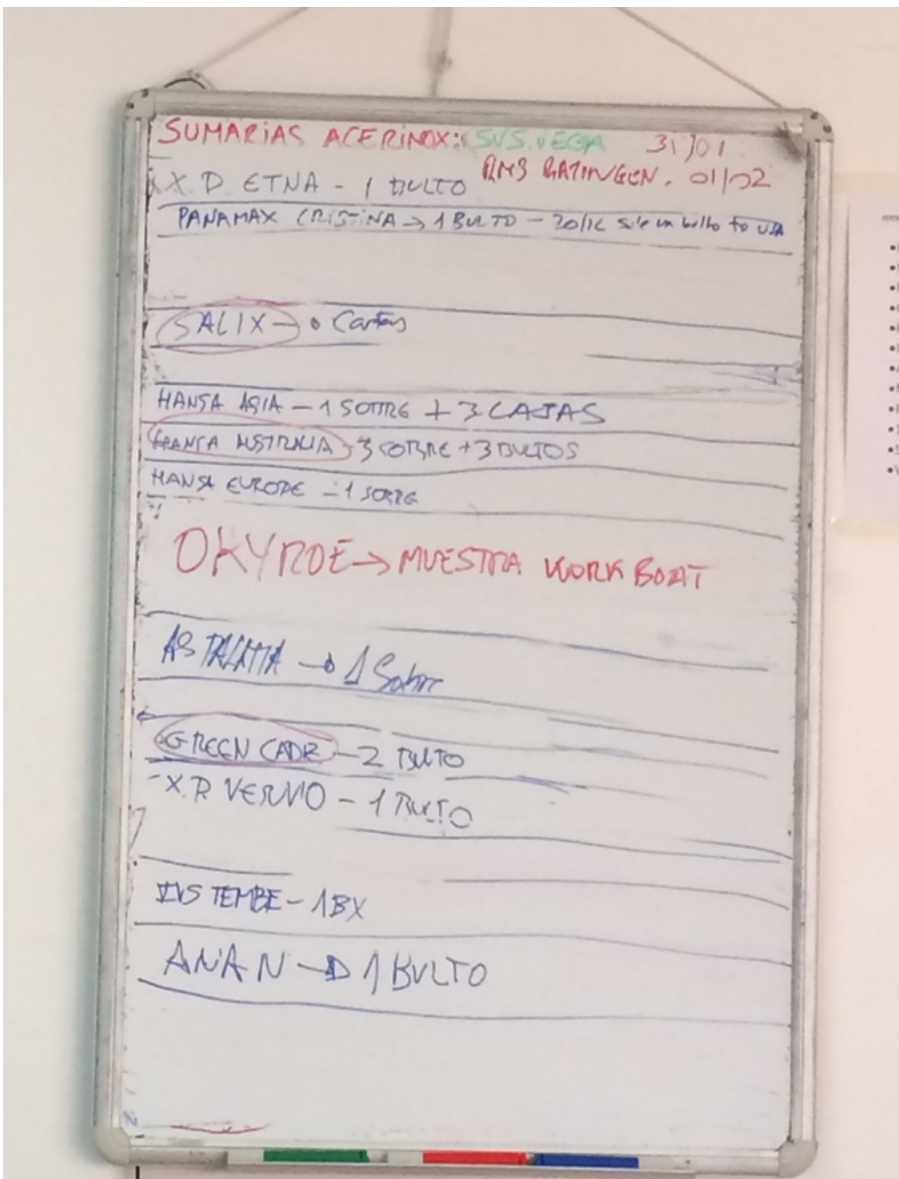
Ship logistics.
Photo: Hege Høyer
Leivestad. Algeciras, 2018.

filled with logistics documents that perform their roles as travelling objects of information. The piling up of tasks at the agency necessitates constant coordination between official actors and private companies. It also requires non-stop availability, or as Ignacio, a young agency worker, remarked one day after an intensive period of work and five hundred emails in thirty-six hours: "I don't think I will get to forty-five like this." Ignacio had not even reached his twenty-fifth birthday.

Victor, Ignacio and their colleagues are all used to mediating between the different temporal regimes that coexist in the Spanish port, where public offices do not always operate at all hours like the world of global trade.[1] When bad weather affects operations, ships lose their time-slots and bookings need to be postponed, sometimes for as much as twenty-four hours. In a state of constant readiness, and through intensive remedial work, employees at the shipping agency attempt to protect the chain and secure the flow of goods.

Mobile Documents

Victor and Ignacio's work reveals the port to be a constellation of different critical points of encounter where papers are taken, signed, stamped and returned to the office. The physical movement of papers through state port bureaucracy and private companies uncovers the multiple temporal schemes and rhythms of commerce that coexist in port infrastructures (Bear 2015: 133). While logistical operations are ultimately based on calculations for being "on time" (Anand 2017: 100), securing logistics time is an ongoing achievement (Carse 2014: 11).

The order of port logistics is reliant on myriad papers moving through nodes of company offices and port bureaucracy. Forms, cargo lists, clearances and invoices circulate in a hunt for human authorizations (Hull 2012: 17). Victor, for instance, regularly leaves the office with a backpack, eventually returning to the agency with papers signed by the ship's captain. Other operations are less straightforward. The lack of a signature or an official stamp can slow down a ship and its cargo, causing problems for crew changes and generating awful amounts of stress for agency employees. To facilitate the transit of ships involving a so-called third country – i.e. a country outside the European Union – Ignacio is constantly under time pressure to get the authorizing stamp from the Spanish Guardia Civil. Because the state office is open only on weekdays and only until 3pm, attaining official status through a physical stamp is often a race against the clock. In order for cargo to be temporarily stored in a warehouse, authorization must be granted by the public office where shipping agency employees claim to be ignored by lazy public officials when appearing with their documents: the customs (*la aduana*).

One of the key functions of the logistics document is confirmation of receipt of information. Such paper-based authorization and confirmation operates alongside the electronic forms and systems implemented by some public port entities. Young workers at the agency, like Ignacio, refer to the Port of Algeciras as "archaic" (*arcaico*), lagging behind other ports in what they see as an unavoidable digitalization process. Agency employees are, however, also witnesses to the multiplicity of different digital

systems controlling port logistics, many of which are not joined up and thus require a huge amount of desk work for intermediaries such as themselves.

Thrown into a material mediation between state bureaucracy and the demands of global shipping, logistics brokers often find themselves trapped among the port's coexisting and conflicting regimes. A given document is instantiated as a tool, revealing the central role of the state (Mathew 2016: 143) in making logistics happen through infrastructures of private–public constellations. Pieces of paper physically carried around not only document mundane movement, such as the changes of location of cargo and containers within the port; through circulation and acts of authorization and confirmation, these travelling documents also become materials of hierarchical
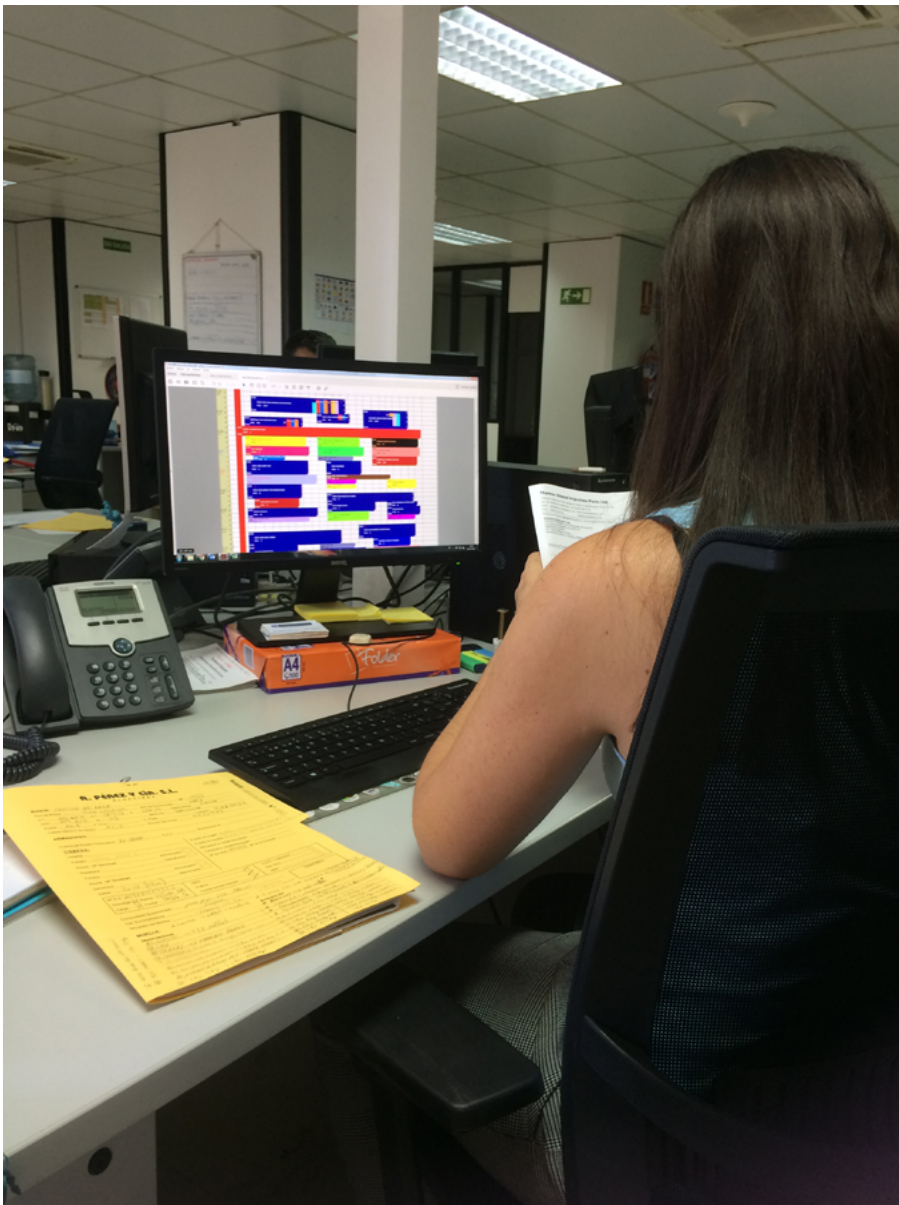
Logistics mediation.
Photo: Hege Høyer
Leivestad. Algeciras, 2019.

relations through which different regimes of port work are evaluated and contested. As vehicles of information, logistics documents connect a wide range of actors, such as 'the public official', 'the logistics mediator' and 'the captain', through processes of receipt and confirmation. But mobile documents also distribute responsibility and take agency operatives out of the office, bringing them inside port facilities and thus instating them physically as indispensable workers for the port.

Materializing Logistics

Folders on the agency desk. Pieces of paper moving in and out of port offices in the hands of overworked intermediaries. Signatures and stamps. The movement of cargo depends on a parallel circulation of papers.

In a paperless era we have become accustomed to the hype around digital solutions for commodities on the move. In global supply chains new digital technological systems are regarded as being able to improve and optimize logistical operations, with the aim also of getting rid of human error and corruption in data management. But what about the material power of paperwork? In times of digital transition, paper documents continue to be central mediators between different and sometimes incompatible public and private regimes in the port. Paper's enduring importance might lie in the ways in which paperwork is not only a tool of bureaucratic control but also how it distributes authority and trust through its material circulation. What we see at Algeciras is the contours of a political economy of port paperwork.[2]

While logistics is shaped and made through the digital, cargo mobility is simultaneously anchored in the analogue.

This is the reality of backroom logistics.

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[1] But see Chu (2018: 205) on Chinese ports.

[2] See Hull 2012.

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Invisible Logistics:
Women Office Cleaners in Bhutan

Roderick Wijunamai

"My mop stick and bucket are like the land my parents own," Kinley explains,[1] as she narrates her working life as a cleaner. After all, the mop stick and bucket are the source of her livelihood, and the primary means by which to raise her child. What land is to her farming parents, brooms and mop sticks are to Kinley who, along with other such workers, clean Bhutanese office spaces to make a living.

The logistics of cleaning, that is, the organization, distribution and execution of cleaning, is largely disappearing from view across the world – in the sense that it is silent, behind the scenes and taken for granted. More than these acts of logistics, however, it is the human side – the human agency and labour involved (cf. Ehsani 2018) – that becomes even more side-lined, or unimagined, especially the work done by 'unskilled' staff. Saskia Sassen (1991) long ago pointed out that the high-rolling advanced sectors in our global cities depend on huge numbers of low-end service workers, from cleaners and janitors to stock clerks, without whom the world economy would come to a halt. It is these seemingly menial labourers that keep corporate offices functional. Yet, despite being the real powerhouse underlying everything else, the human side of the logistics of cleaning and care appears to warrant little attention.

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In fall 2021, I interviewed office cleaners in one of the biggest corporate offices in Thimphu, the capital city of Bhutan. This corporation employs at least fourteen people to clean the offices and client occupancies. All the cleaners are women and more than half among them are spouses of security guards who work for the same corporation. They related that they had taken up the role in consonance to their spouse's job. Kinley is one of the odd ones out in that regard.

Kinley grew up as a cowherd in Eastern Bhutan, and had come to Thimphu with her second husband some time in 2014 in pursuit of better opportunities. She explained that her husband then "ran away" (*jog yasi*[2]), however, and she was left by herself with her four children. With the help of her uncle, Kinley managed to secure the cleaning job she currently holds. Her responsibilities include cleaning the toilets, clearing the waste bins and sometimes cleaning the drain adjunct to the office compound road. In our conversation in October 2021, she categorized her work as *chabsa chami* ('toilet cleaner'), as opposed to *cham chami* ('sweeper'). Irrespective of the categorization, together these women call themselves – and are known by the organization as – *cham chami* (here indicating 'cleaner' in a general sense). There is no hierarchy among them, but most agree that 'wet cleaning' (*chabsa chani*) – referring to the kind of responsibilities Kinley has – is more arduous. They are obliged to stick to their specific line of work based on the remit for which they were recruited.

Upon recruitment, HR informs the supervisor who then passes the responsibility of teaching the trade on to the cleaners already employed there. The cleaners work in two teams, as *chabsa chami* and *as cham chami*. All of them live in the office compound, and they start their shift cleaning the main offices as early as 6:30 am. They then proceed to the client occupancies, at about the same time the clients leave for work, and remain busy there until early afternoon. All these schedules are arranged so as to keep them and their work invisible throughout. During their rather long lunch breaks, which span nearly three hours, they carry out their own household chores, cook and sometimes rest in their quarters. Following this, they are called to cleaning tasks that are not necessarily routine and are kept occupied thus until the early evening.

Each of the cleaners has a different story to tell, but they all share an insufficiency of income, for which they must make compromises. For Kinley, this means sending her three children away to the monastery and so foregoing the joy of raising them, as well as their companionship. For others, the decision to take up the job stems from the need to supplement their spouse's modest pay. None among them perceived their occupation as a viable sole source of earning. Kinley, for instance, like the other women cleaners, makes use of the corporation's unused land to grow vegetables, a surplus of which is sometimes sold to other staff of the organization to make a little extra money. Despite rural electricity subsidies which give each of them a hundred free units of power, all sweepers resort to collecting firewood from the nearby forest and refrain from using electric heaters. Again, this is to cut costs. With no partner and hence no complementary income, to make ends meet Kinley also has to work on the construction sites, fetching stones, during the office vacation.

Another thing that stands out starkly in all of the women cleaners' testimonies is what Hochschild and Machung (2003: 166) call the "the burden of the second shift" – and this is similar to the <u>stories related by Bhutanese women in other sectors</u> as well[3] – their struggle to juggle their job with managing a household. On the one hand, they are burdened with the logistics of household chores and various expected gendered responsibilities in their own families, and on the other they have the responsibility of cleaning and maintenance in the offices. They know that both these areas will not function without their labour. What is more, also noticeable are the embedded overlaps in gender, labour and logistics: certain sets of labour and logistics can only be afforded by a certain gender. This is because the recruitments, work patterns and schedules of these low-wage logistic services are structured in a way that conforms to societal gender norms and expectations. According to Yangchen, another of the cleaners, her husband's job has "no proper schedule" (*due tsey ten tey mey*) like hers, and this makes it all the more difficult to entrust him with household chores.

But why, despite the challenges of low earnings and the family–work balance, do these women prefer to work as office cleaners instead of going back to farming lives in their

villages? Many of them weigh the prospect of a more stable and regular income even on the bottom rung of these corporate offices, which farming does not offer. Unlike the drudgery of farm labour, Karma reasoned, she was "in a better place," as she did not have to "work under the sun … and sometimes in an extremely cold weather outside." Some of the identified push-factors responsible for <u>rural to urban migration in Bhutan</u>, and which some of these women also mentioned, include small land-holdings, difficult terrain, hard physical labour, unpredictable agricultural output and low market accessibility (Pelzom and Katel 2017). Most salient in their stories, however, is the imagined status of a city dweller. Migration from rural villages to urban areas, to work in these corporate settings, gives them a considerable sense of accomplishment and empowerment.

In most cases of rural to urban migration, these women testify, women and children tend to be left behind in the villages. Hence, their ability to come to the capital city, and earn what little they can, gives them a great sense of achievement. With such a perception, or what could be called mythmaking, of pegging their cleaning work against farm labour, the women tend to repress the unpleasant nature of their work, and the low wages they earn. As Yangchen admitted when asked to say one thing she did not like about her job, "I have to wake up early in the morning and reach the office at 6:30 am, before anyone else comes … I am now used to it, but it still is a little difficult in the winter as it gets very cold."

When comparing their work to farm labour, these women also emphasize the nature of the work in light of the different tools and equipment involved. They weigh up the conditions under which they must work on the village farm, but do not seem to mind having the most rudimentary of cleaning tools. The corporation where these women are employed boasts about having the most advanced IT facilities, and the latest amenities and infrastructure. And yet there is a stark contrast between the high-tech spectacle of front-end logistical efficiencies and the low-tech back end of manual labour and basic cleaning equipment.

As such, from the corporations's perspective, so long as the cleaning logistics is fulfilled, it does not really matter how the cleaning is done or what is used in the process. In this, there seems to be a clear difference in logistical relations. On the one hand, the corporate office promotes efficiencies, and on the other inefficiencies are devalued and hidden, as well as feminized. This apathetic attitude towards the "support staff," as they are termed, is also seen in their exclusion from most social events the organization holds. Almost all the cleaners either never meet the managerial ranks or rarely get to encounter them. Their work world, and largely also their social world, is confined among themselves – or extends just to their immediate male supervisor, whom they perceive as "unnecessarily strict … never understand[ing] … and always suspicious" about them. "Even when we are sick, our supervisor is not willing to grant us leave. Instead, he scolds us and tells us that it is because of our recklessness," so Kinley narrated during our conversation in October 2021.

Amid these side-linings, and in the discharge of their duties, these women cleaners are aware of their essential service in maintaining the office spaces and keeping them functional. "We are usually not seen by anyone. But I can imagine how dirty the offices

would get without us showing up for even just one working day," Pema said. "In fact, some of us are called in during the lunch hour to clean the toilets and coffee stands, as it becomes very messy," she added. Such motivations, perceptions and the preference for a regular wage – despite it being insufficient – over unpredictable and difficult farm incomes, sustain the invisible logistics of cleaning in the urban spaces of Thimphu. These invisible cleaners overcome their job inequities through a debilitating myth, weighing it all up against the arduous farm life they would have if not for the cleaning.

Notes:

[1] All names used in this essay are pseudonyms.

[2] All the vernacular quotes reproduced in this essay are in colloquial Dzongka. I am grateful to my friend Tashi Choden for helping with the translations.

[3] See also Roder and Choden 2020.

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From Social Trust to Blockchain-Mediated Trust

Yuxing Zhang

Gourmets all over China wait all year for autumn, because that means the crab season is near. In the lower Changjiang (Yangtze) Delta region, the hairy crabs cultivated in Yangcheng Lake and nearby ponds (hereafter YL crabs) are a gastronomic delicacy, prized for their fragrant taste. YL crabs' status was raised in 2005, when they were declared China's first geographical indication (GI) product.[1] GI licensing is highly lucrative for crab farmers – only certified producers can use that appellation in their marketing. A problem for the eager public is the significant gap between the available supply of YL crabs and the nationwide demand: YL crabs account for only 0.4 percent of China's annual crab harvest.[2] This has given rise to the counterfeiting phenomenon known as 'crab bathing' (洗澡蟹).

In crab bathing, crabs cultivated elsewhere are placed in Yangcheng Lake, then labeled and marketed as locally harvested. Disguised as YL crabs, huge numbers are sold at unreasonable prices; unscrupulous merchants even inject some of these crabs with water to increase their weight (Xie 2021). Logistical chaos has ensued in the local crab market, which the local government has failed to regulate. This market comprises aggregators, buyers, regional wholesalers, shopkeepers, and finally, consumers. Step

by step, with coordination lacking between these multilayered distribution channels, the price inflates, and YL crabs become difficult to authenticate.

As early as 2006, anti-counterfeiting tags were distributed to farmers with GI certificates. Unfortunately, cheap, forged authentication devices soon flourished; they could even be bought online for 1 RMB each (Sun and Zou 2007). The distribution channels coordinating the movements of both authentic and counterfeit YL crabs are too readily interoperable, enabling the latter to exploit the value chains of the former, which has led to public distrust of the brand and even the market in general.

A crab-focused e-commerce store on JD.com, selling YL crabs with an anti-counterfeiting tag attached. The anti-counterfeiting tags, which change every year, are distributed by local bureaucratic agencies to certified farmers.
Photo: JD.com, Inc.: n.d.

Upgrading the Industry via Standardization

A series of logistical betrayals – weight discrepancies, inflated prices for gimcrack goods, the illicit flows of counterfeit crabs – were seen as resulting from the absence of well-

conceived, executable industrial standards (W. Zhang 2021). Responding to national techno-developmentalist agendas, the local government delegated some regulatory responsibilities to corporations. For instance, the Internet+ (互联网+) initiative strives to upgrade traditional industries using information technologies (State Council 2015). Likewise, the Thirteenth Five-Year Food Safety Plan (State Council 2017) mandates corporations' use of digital means such as food traceability systems to oversee issues like food security and false advertising. Although traditional market networks remain resilient, these policies demonstrate a governmental desire to 'upgrade' the food production market, by facilitating a shift from the hub-and-spoke network comprising multilayered, value-extracting middlemen, to a platform-oriented, business-to-consumer model wherein corporate and government agencies may easily intervene. In recent years, Chinese e-commerce platforms, including JD, Pinduoduo and Seeco, have begun to move crab sales online.

Driven by techno-developmentalist ideologies, local governments have now collaborated with corporations to trigger e-commerce penetration and a so-called 'industrial upgrade' (产业升级). On 13 September 2021, Pinduoduo (China's largest agriculture-focused e-commerce platform) and the Jiangsu Freshwater Fisheries Research Institute jointly consolidated a Changjiang Delta Crab Grading Standard. It formalized a series of industrial standards for crustaceans, including grading criteria, packing methods, storage and shipment procedures, solutions to weight discrepancy disputes, and more (W. Zhang 2021).[3] According to Pinduoduo's promotional material, the new standards would curb the spread of shoddy goods and false advertisement, both online and offline; and offer clear guidelines for quality assessment, encouraging consumers to choose other high-quality, non-YL crabs of the region (W. Zhang 2021). On the same day, Hancong Jiang, official representative of Huai'an Bureau of Commerce, joined Pinduoduo's crab sale broadcast to introduce the standards and recommend Hongze Lake crabs to the livestreaming event's 600,000 participants (X. Zhang 2021). These were advertised as being of the same quality as YL crabs.

The new standards were designed to formalize the distribution procedure and open the market for non-YL crabs from nearby lakes (especially to nonlocals), thereby triggering the development of new regional brands. Thus, Pinduoduo initiated the Changjiang Delta Cloud Crab Sale Festival to promote crab e-commerce (Zuo 2020). It also launched the Changjiang River Delta New Crab Farmer Program, offering farmers training in e-commerce, ranging from creating an online store to livestreamed sales strategies. This aimed to turn crab suppliers into tech-savvy entrepreneurs, cultivating one hundred leading brands among one thousand certified crab vendors over the next five years. Pinduoduo hoped to propel regional economic development by introducing new regional brands to nonlocal consumers, creating an online value-added market estimated to be worth twenty billion RMB (Xie 2021).

Technology-Mediated Trust

State policy and corporate promotional discourse have framed the transition to platformized transactions as an ideal solution to help farmers bypass value-extracting

middlemen, expand the market and ultimately upgrade the logistics of distribution via transcribing the flow of crabs onto platform data. In 2019, the Chinese State Council urged corporations to implement 'smart' Internet + Food (互联网+食品) supervision for agricultural products (State Council 2019). According to Linwei Fan, who oversees the quality control of crab products at JD, the platform has imposed the strictest standards to remedy misleading advertisement.[4] Specifically, JD requires merchants to submit six official certificates before they can launch online anything bearing geographic indications; AI programs are deployed to authenticate product descriptions. Furthermore, each crab sold on JD is accompanied by an exclusive, inalterable barcode that consumers can scan to track harvesting, packaging and delivery (Liu 2020). If the number of crabs listed by a supplier exceeds the productivity range estimated by JD's big data, the platform will stop assigning QR codes to this supplier (J. Chen 2020). Likewise, Pinduoduo has developed a database of agricultural brands to algorithmically predict harvest times and identify suspicious products appearing out of season (Pinduoduo Inc. 2021).

Although the market transition to platformized transactions is gradual and limited, it is eulogized in China's techno-developmentalist discourse as a technological fix that can provide a greater level of transparency for activities that were either partially or completely opaque in traditional market networks. To achieve this, blockchain – data-storage systems "using linked, sequential chunks of information" (Werbach 2018: 14) – is key (Tang 2018). Blockchain infrastructure allows participants to trust the data appearing on a distributed, synchronized ledger, since those recorded transactions are immutable (Satoshi 2008). To participate in this agricultural e-commerce market, crab farmers must subscribe to platform-based "trust-mediating services" (Bodó 2021: 2668), which register the distribution histories of crabs as measurable, time-stamped checkpoints for "protocological control" (Galloway and Thacker 2007: 31), a form of power and control that is operationalized via distributed networks and protocols.

Distributing crabs from the Changjiang Delta region to consumers nationwide relies on cold-chain delivery. After harvest, highly perishable crabs must be kept between 2 and 8 degrees Celsius and delivered within three days.[5] In cold-chain delivery, IoT-based thermal detectors harness and transmit real-time, location-tagged data inside refrigerated trucks and flights, enabling verification of the crabs' movement history and environmental condition.

At the interface between blockchain-based cold-chain transportation, software protocols and human labor, the platformization of crab distribution signals a gradual subscription to an extra-visible "informatized sovereignty" (Rossiter 2016: 40) wherein contingencies can be contained. Decisions mediated via data-crunching algorithms are seen to possess greater trustworthiness than human-mediated representations in fixing logistical chaos (Keymolen 2016; Botsman 2017). The threat of counterfeit crabs is used by the state and corporations to legitimize the platformization process and the corresponding shift from social trust to technology-mediated trust. Rather than eliminating the need for trust, blockchains afford trustiness without trusting (Werbach 2018). Platformized transactions are complemented by "smart contracts" (Szabo 1997) that supposedly empty the room of uncertainty, providing end-to-end observation and verification, whereas human-led proactive measures by their nature must fall short. Platformization has emerged out of local bureaucracies' incompetence in regulating

the value chains of GI brands in the traditional market networks. Without replacing state sovereignty in the market, informatized logistics complement state-mediated trust by reformulating the movements of crabs into integrative, blockchain-enabled platform data, in which institutional intervention can be undertaken more easily than in the traditional, multilayered market networks.[6]

Notes:

[1] GI indicates a product's place of origin when its reputation is primarily determined by the particular natural or cultural conditions of the region. See CNIPA 2021: 7–8. For GI descriptions of YL crabs, see W. Chen n.d.

[2] Xie 2021, citing statistics from the *Beijing News.*

[3] The standards classify crabs into four classes based on weight, completeness (i.e. no missing legs), color, aroma, etc.

[4] Cited in J. Chen 2020.

[5] Cold-chain infrastructure is only financially manageable for large-scale companies. Ninety-five percent of agricultural e-commerce platforms struggle to make a profit, because the cost of cold-chain hardware can constitute forty percent of the total expense (Yuanyuwuliu 2021).

[6] The transition to platformized transactions can lead to structural inequalities in terms of market share and rights over data access. Platforms can accumulate hyperscale data about individuals to shape the operativity of the agricultural market, and predict and modify users' behavior, wherein new varieties of monetization, subjugation and control can be produced. See Zuboff 2015.

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Buffering as Everyday Logistical Labour

Debbie Hopkins

Freight moves through water and air, by rail and road. Freight mobilities are central to global logistics. These mobilities are constitutive of the concept, ideology and practice of just-in-time logistics. Heralded for its efficiency and productivity, with everything arriving right when it is needed, thinking on just-in-time rarely engages with questions of labour – of the people who make just-in-time-ness possible through their everyday actions. One example is lorry drivers, workers at the forefront of everyday logistics. Lorries, drivers, fuels and its infrastructure, planners, roads and other forms of material infrastructure, business contracts and governmental regulations come together, in various configurations, to enable the mobilities of 'stuff', both 'freight' and 'waste'. These are moved from factories or ports to depots, warehouses or shops, and back again in dynamic circulations. Through their mobilities, lorry drivers (outside of the UK 'truck drivers' or 'truckers') negotiate time; they work to be (just) 'in time' and to not run 'out of time'.

Truck driving, then, offers an entry point to examine the il/logics of smooth and free-flowing logistics, and the effects and/or affects that these processes and logics have on workers' everyday lives (Chua et al. 2018). In this essay, I develop a conceptualization

of buffering as a logic, idea and material practice that seeks to actualize the bogus notion of just-in-time logistics. These are enacted by individual freight drivers through their everyday activities, and re-enforced through digital governance by way of digital tachographs and algorithmic routing.[1] Meanwhile, everyday conditions such as expectations or experiences of traffic congestion, and operational policies such as fines for missed delivery slots re-enforce them, too. I suggest that buffering offers a useful intervention in thinking about the logistical from the standpoint of labour.

Tacho(graphic) time. Digital tachographs are built into modern trucks, guiding drivers' paid and unpaid time, with financial penalties for infringements.
Photo: Jennie, March 2021.

Here I consider buffering as one way to interrogate the logistical everyday, attending to logistics-as-embodied. Logistical processes are made possible by the extra/ordinary practices of workers which are normalized, rationalized and invisibilized. By thinking through buffering in relation to logistical mobilities and logistical labour, this essay contributes to theories of logistics at the micro-scale, uncovering the hidden pragmatics of circulation. As a complicated and complicat*ing* labour of its own, buffering spotlights the spatial, material and affective realities of dominant logistical ideologies. I argue that the mythology of just-in-time logistical systems is contingent on buffering as performed by drivers, whereby they absorb the spatio-temporal burden to keep the system moving, and maintain the illusion of smooth logistical flows at local and global scales. In this way, drivers might be complicit with or coerced into traditional logistical frameworks.

The video below represents both the obvious and some of the less visible dimensions of logistical work. It shows where and how people see freight circulations. It also depicts the noises of radio, sounds of the road, vibrations and vantage points; it reveals the life of the road and life on the road (Merriman 2011). But the logistical also takes place beyond this, in laybys, in depots and in lorry drivers' homes – where waiting, resting, sleeping, eating, socializing all take place. Everyday stories are presented, illustrating what Maggie O'Neill (2000: 4), following Walter Benjamin, calls the "micrology" of people's lives. Photographs are used in conjunction with drivers' voices to uncover the times and/or spaces of buffering and how this process is both facilitated and hindered by technologies like the tachograph and its embedded socio-political and economic regimes.

Truckin' along. Recorded during a mobile ethnography from the passenger seat of a lorry. Video: Debbie Hopkins, June 2018.

Well, the office phones the customer up and says, "We've got a lorry coming down to you," say they're in Nottingham, and they say, "The driver will be there by 9am." You can probably get there by 9am but then the office gives you something else that has to go to Sheffield and that customer has given you a set time, 10am, but that's a bit too short. You carry on and try to get there on time… You miss your first appointment and then you go and do the second one but then you've got all the traffic and then you get behind on that one too.

– Jerry[2], March 2018

Some days it can be all right and other days if you get stuck in traffic if there has been an accident or roadworks or something and you're pushing on your time and you have the boss on the phone, you've got to be there by 4pm, mentally it can be quite daunting, especially if you're pushing to get somewhere and your time is running out and you're trying to think of somewhere to park up, somewhere to sleep.

– John, March 2018

*Morning queues. A queue
of lorries waiting to
enter a depot early in the
morning. Buffering offers
a new way of analysing
and interpreting the
spaces of logistics.*
Photo: Jennie, England,
March 2021.

Both Jerry and John reflect on the complex nature of navigating time. Freight driving is all about time: how it is organized, packaged and governed. This is coordinated by back-office routers or planners who increasingly, although not wholly, depend on algorithms to coordinate complex flows of who-goes-where and when. Jerry talks about getting behind schedule. Some depots and warehouses have delivery windows that the freight drivers must meet, sometimes being threatened with penalties – financial or operational – if they are missed. The driving task then becomes "daunting," John remarks, as they "push to get somewhere." John also notes the ticking clock of drivers' hours, the regulated patterns of rest that govern truck driving time. This sets the context for and of buffering, with additional labour taken on by workers – always planning, forecasting, imagining, enacting.

> *You get your four hours [of driving without a break] once a day, but if you do like a ten-hour day, you've got to have another 45 [minute break] before you go into your ten-hour drive by law. But then you've got your six-hour rule, so say if I start at 6am, by 2pm I've got to have at least half an hour [of rest] in that time. You can drive for three hours, then you've got a job for two hours, say, and that means you're going to be over your six hours, so you've got to get your six hours in before your half an hour because then you break the law... I'm driving, say, three-to-four hours, do the job, get out, do it, up the road and then you think, "hang on, what time did I start? Oh, I'm half an hour over."*

– Jerry, March 2018

Waiting while working. The mobile phone is an object of logistical buffering taking on meanings of work and leisure.
Photo: Debbie Hopkins, South-East England, May 2018.

Jerry's description of tacho(graphic) time above is confusing, but it is important. It weaves together various temporal rules of driving work, creating a complex mirage of different timeframes. Drivers must make sense of this and layer it onto the demands of management, routers and customers. To do so, they 'find' time and 'move' time, looking for ways to ensure they do not 'run out of time'. This time-play involves buffering – not formally built into the drivers' schedules, but designed and implemented by them: setting off early, finding quicker routes, 'knowing the roads', speaking with each other to share information about delays, developing networks and friendships with fellow drivers and depot workers. Drivers are constantly chasing time, in-time, out-of-time, playing with time. As the relationality between drivers' mobility and immobility, or activity and inactivity, becomes clear, the often-significant events-of-waiting (Bissell 2007) can be interpreted through buffering.

Forms of buffering are ongoing, layered into work/life. Work is allocated job-by-job, or daily. If it is daily, drivers will straight away start to think about where they might sleep if they 'tramp' (sleep in the cab of the truck), or what time they might leave home if they 'trunk' (do routes between depots on a regular route). I noticed this during my mobile ethnographies, when at 7pm in the final hour of a long day on the road the driver, Jo, kept looking across at his schedule for the next day, commenting "And I'll do it all again tomorrow." While his paid work might end at the depot, he was already planning for tomorrow. Buffering, then, is an embedded process that connects all forms of labour, that is labour.

Had a bit of a lay in this morning didn't start till 3-30 2 hour drive to my delivery. Now sitting in a layby waiting for moment before I drive the last few miles. Then we off to some nice tight lanes 😳

Early starts. A text which reflects the buffering spaces as well as the embodied conditions of buffering, including exhaustion and fatigue. Photo: Jess, February 2021.

The need to meet the times set by planners, routers or customers leads to inevitable early starts. Particularly noteworthy is a description of getting up at 3.30am as constituting a "lie-in." This is a pattern reflected across the 40-odd drivers I have worked with: setting off early to beat the traffic, getting to the first job, avoiding delays. This is not designed or enforced by employers or customers, but is rather a form of cognitive and embodied buffering work. Acts of buffering (for they are always multiple) implicate the spatio-temporalities of lorry driving work.

So, buffering is never a one-off event; it becomes imbued in the logistical everyday as a form of planning, of contingency and of agentic practice. Logistical mobilities depend upon these informal acts, rarely communicated or recognized, not officially

sanctioned, but reliant on the lives and bodies of those workers moving freight, doing the logistical labour on which capitalist systems are based. Thus, rather than being smooth-flowing, automatable systems, the functioning of logistics depends on workers' buffering as they absorb potential ripples. To understand logistics requires attention to the logistical everyday, to the informal practices that support the system and without which the myth of just-in-time would become even more evident.

Notes:

[1] A tachograph is a recording device installed in vehicles to monitor compliance with driving hour regulations.

[2] Pseudonyms are used for all participant names.

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How to Read Logistical Traces

Naomi Veenhoven

In this multimodal, annotated piece, I explore the ways delivery labels are read, deciphered and utilized in order to understand the experience of operational workers in the field of delivery. Delivery labels show multifarious traces of logistics labor: from the place within a sociotechnical assemblage, to the repetitive nature of the work itself, the segmentation of the logistical process, as well as workers' strategies for dealing with the time pressure inherent in time-sensitive logistics labor and circumvent work surveillance that are prevalent in this field. The following annotations are based on my ethnographic research into the experiences of workers in delivery logistics chains in the Netherlands, spanning September 2020 to early February 2021, for which I interviewed workers in various logistical processes, drove along and worked with first- and last-mile delivery drivers, observed in a sorting centre, and worked in a fulfilment centre.

Customer code (sender)

Order number

Depot code

Company carrying out the delivery

Code indicating the sender has paid for the transport

Date of order & shipment code

Name and address of sender

Instructions for the delivery driver
The driver needs to get a signature from the receiver as proof of delivery.

Confirmation of the general terms and conditions of carriage of goods

Name of receiver

Address of receiver

Number of packages

Notes by Pick-up point
Personell at pick-up points often add notes that help them identify the package correctly.

The 3S barcode
ID of parcel

43869667   0: 47479949

Coolblue B.V.
Postbus 1016
5004 BA Tilburg
Nederland

NOORD
PostNL

Franco

AVG

Naomi Veenhoven

Kuipersstraat 48-3
1074 EM Amsterdam

Handtekening voor ontvangst

1 collo

1

3SCBLU3869667

4

5

3

The number of the route assigned to a driver.
This number is also indicated on the roll containers with the packages for this route.

The Piece ID
This code corresponds with the barcode on the package.

PID: ...2901

Rit **17**

Parcel **56**

2

Datum: 04-10-2020

Date of delivery

The place in the route
This code indicates that this package is the 56th package the driver has to deliver.

* Some boxes do not have this additional sticker, instead the number is written on the box during the sorting process.

Veenhoven

1 *The labels and scribbles on packages are artifacts of the sociotechnical assemblage of delivery.*

They elucidate the presence of operational processes, computerized systems and various actors involved in the movement of a package from sender to receiver. In this assemblage, the social and technological are mutually constituted and reconfigured in a continuous process. Take the barcode: a collection of black lines of varying width

with white spaces in between accompanied by an alphanumeric code at the bottom. The barcode could be seen as the ID of the box: with this code, the box is "made legible to a computerized system" (Huggins 2020) used for planning and supervising logistical operations. But there is more. Allow me to share some observations:

- Without the software to give meaning and context to the barcode, the barcode means nothing.

- The barcode cannot be logged by this software without a scanning device used to read and log the code.

- If for any reason the barcode is illegible to the scanner, workers can help the computer system read the barcode by manually entering the alphanumeric code into the software.

- Most scanning devices, such as the mini-computers used by most delivery drivers and colloquially called "handheld," cannot operate on their own. As the name indicates: they are held by someone, operated by a worker with a certain amount of dexterity, such as the hand–eye coordination of bringing scanner to barcode.

- In turn, workers are often dependent on devices that are able to read barcodes so they can carry out their tasks. For example, when sorters scan a barcode they are provided with the location in the warehouse to where the package should be sorted.

This sociotechnical entanglement reveals the ongoing interdependence of human and machine reading in the logistical process of delivery.

2   *Illegible and invisible links in a chain.*

The label is one of the few direct links between the geographically and temporally separated links in logistical chain of delivery, and on it, one can observe the logistical traces of the whole operation. Operational workers, however, are only taught to read a selected part of the labels that their employers deem necessary for the workers to complete their task. This selective reading reflects how the workers understand (or better said, are denied access to the information necessary to understand) the logistical process of delivery in its totality. The following audio excerpts illustrate this:

The fragmented process of the logistics operation is supervised by managers that oversee everything through renderings of the data gathered by workers' devices. In contrast, workers concerned with the day-to-day operations of moving packages from one place to another are disconnected from the larger process of delivery. They do not see the full journey of a package from sender to receiver, and do not have access to the larger logic behind the tasks they must carry out. Much like the way they are taught to read the labels, they have to fully devote their attention to just a selected part of the operation.

3   ***The rhythm of a sorting centre.***

▶   Here you can hear the repetitive work of a sorter:

1.   Grabbing a parcel from the conveyor belt.

2.   Scanning the barcode.

3.   Checking the two numbers displayed on the handheld scanner.

4.   Writing the first number on the parcel with a marker.

5.   Placing the parcel on the assigned spot that is indicated by the second number.[1]

Like a carefully choreographed performance, these five steps are repeated continuously. The sound confirming that the scanner has successfully read the barcode forms a beat that workers use to keep up the required pace of sorting. As Kenzell Huggins (2020) argues: "[w]ithin warehouses, such [scanning] noises provide the rhythm of labor, providing the grooves that help workers recognize if they are setting a pace to hit target times."

4   ***Speculative reading to chase seconds.***

Delivery drivers are required to follow a tight schedule that often does not match with what happens in the world around them. Roadblocks, traffic jams and overly chatty customers are just a few examples of things that can disrupt this schedule. In order to deal with these various rhythms impinging on the schedule, drivers are forever chasing seconds – a temporal negotiation of constantly trying to make up for lost time or to save time that will inevitably be lost.

Efficiently reading labels and selecting and deciphering potentially useful information is such a practice of chasing seconds. For instance, as I drove along with Jade during her delivery rounds in the Dutch province of Zeeland in early October and late December, I noticed how she used the logistical traces on the labels to speculate about potentially time-consuming hurdles or moments in which time could be won. When encountering a

box with a brand label associated with elderly people, Jade expected that this delivery would take longer than the allotted sixty seconds for drop-off: "old people often want some small talk." She also shared that whenever she noticed a Chinese label, she anticipated a longer delivery time since often "the customers would have ordered it so long ago they probably forgot about it." The presence of a code that indicated 'track and tracing' services, however, was a relief for Jade: this service notifies customers about the expected time of delivery, so anticipating her arrival the customers would sometimes be ready and waiting, saving her the time it takes to ring the doorbell and wait for someone to open the door.

Yet the logistical traces proved to be poor predictors of the actual number of seconds Jade would spend or save on a given delivery – speculating about them did not actually help her save time. Rather, the speculative reading of logistical traces helped Jade cope with the extreme time pressure she was under: the mere idea of having some sort of control over these seemingly uncontrollable rhythms helped her to believe in the possibility of keeping up with the tight delivery schedule.

5   *Strategic invisibility: the disappearing act.*

At the beginning of our second shift together, Jade and I had to scan all the packages assigned to our route with a handheld – the mini-computer that runs the routing software – and stack them in the back of the van. When the roll containers assigned to our route were empty, Jade noticed there was one package in the schedule that we had not scanned yet. The software on the handheld only allows drivers to start their route once all packages have been scanned, so we had to find this missing package. But time was ticking as, simply put: starting with a delay results in not delivering packages within the scheduled timeslots, not delivering packages within the scheduled timeslots results in a low performance score, and ultimately, low performance scores can lead to being sacked. Hence, it was vitally important for Jade to find this package as soon as possible. After a couple of minutes of frantically searching the depot, Jade told a co-worker about the issue. This co-worker looked over his shoulder to check if the supervisors were out of hearing range and whispered: "just re-print the label." Visibly relieved but without uttering a word, Jade quickly walked to the sorting station, looked up her planned route, selected the code of the missing package and printed a label. As we left the depot, she broke her silence and explained the plan: the machine reads the presence of the barcode, not the box. So by scanning the label she had just printed Jade could finally begin the route and the supervisors would not find out that the package was actually missing.[2]

When workers acquire more knowledge about logistical processes, they also gain an understanding of what actions are registered and thus what is seen by their supervisors and what is not. By experimenting with the affordances of technological tools, such as the possibility to re-print a label, and by cleverly using the gaps in how labels are read – gaps between human perception, machine scanning and software logging – workers are able to dodge some of the surveillance of their work.

Notes:

[1] Credit: Soundscape produced by Naomi Veenhoven und Gianluca Koeswanto.

[2] Because Jade had scanned the barcode, she could provide proof of delivery by showing her scanning history. In the end, however, this was not needed: when we came back to the depot later for another load, we found the parcel after all and so were able to deliver it.

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Naomi Veenhoven is a Dutch ethnographer, designer and teacher. She recently graduated (*cum laude*) from the Research Masters in Social Sciences at the University of Amsterdam with an ethnographic study on the logistical processes of delivery in the Netherlands. She focuses on the anthropology of technologies and infrastructures, and has recently developed an interest in the experience of workers in partly automated labor. Naomi is fascinated by the things that appear mundane: she likes to uncover the hidden worlds behind the things we take for granted and show how sometimes the seemingly simple is captivatingly complex.

Spectacles of Supply:
Punjabi Trucking's Post-Eugenic Mass Media

Davindar Singh

Lately, scholarship has made a large deal of infrastructure's 'infra', excavating the 'hidden' regularities and contradictions that pervade sociotechnical systems. Much of the recent boom in logistics scholarship follows suit, whether examining logistics' occultation through "seamlessness" (Chu 2020), its defensive cloaking of its vulnerabilities (Orenstein 2019), its obscuration of the difficult lives of infrastructural laborers (Chua 2018), or its quotidian effects on patterns of calculation and other cultural logics (Hockenberry, Starosielski and Ziegler 2021). However, logistics has also served as gloriously mass-mediated spectacle. Its storage sites are picturesquely out-of-the-way backdrops for silver-screen and cartoon fantasies of vigilante justice, private locales in which vengeance is enacted for public good.[1] Supply chains underpin transnational montages of developmentalist propaganda, as in Chinese state-produced music videos celebrating Belt and Road's happy camels and gemstone shipments. Despite the importance of camouflage to logistical technics, logistics also makes for gripping consumer entertainment – sometimes with uncamouflaged political implications.

One such logistical spectacle is a recent Punjabi musical media craze for trucking. Though the Punjabi truck song has a storied history, in the last decade a wave of pop hits and

transnationally produced musical films have valorized male Punjabi truckers' North American emigration. These media bemoan long hours and celebrate male laboring perdurance, adorning shipping containers and new digital distribution formats with Bhangra dance. Here, I briefly trace continuities and changes in some popular logistical media – from 1960s Indian governmental eugenic propaganda films to contemporary Punjabi trucking music. From Malthusian past to labor-migrant present, these media reflect and contribute to regionalized political economies of supply, endeavoring to shape audiences' moral perspectives with respect to the exigencies of logistics.

Today, employment in North America's trucking industry is an aspiration for many Punjabi migrants, stemming from an admixture of causes beyond geographic wage differentials. These include limited education and English-language requirements, as well as comparatively easy entry due to worsening labor conditions behind the wheel. Such circumstances form part of concerted governmental and industry efforts to cheapen North American labor, thereby expanding logistical geographies of supply (Viscelli 2016; Chua 2019). These changing geographies are discussed in Punjabi musically mediatized (Agha 2011) and personal conversations about the financial and ethical merits of emigrant trucking life, including prior generations and future transnational relationships sustained through flows of remittances to South Asia.

Still from Ranjit Bawa's Truckanwale *2018, 1:59–2:14.*
Source: https://
www.youtube.com/
watch?v=XEhHKIvgYzY

One such mediatization, *Truckanwale*, tropes upon elements of previous decades of Punjabi trucker songs: couples' repartee about a morally insufficient husband/driver, driving's physical challenges and a romantic gaze at images of the driver's beloved, who is compared to a heroine of Punjabi eighteenth-century sung epics. However, verse-by-verse, *Truckanwale* plots the geography of the logistics revolution and its supply chain of cheap transportation labor to the Global North: from Punjab, via Dubai, to the United States and Canada, where it is filmed in the Punjabi enclave of Surrey, British Colombia. It also plots the social politics of transnational flows of remittance: "dust rises from the angry looks of those-with-dirhams-in-the-bank" (*Truckanwale* 2018, 1:58-2:03; translation by the author).
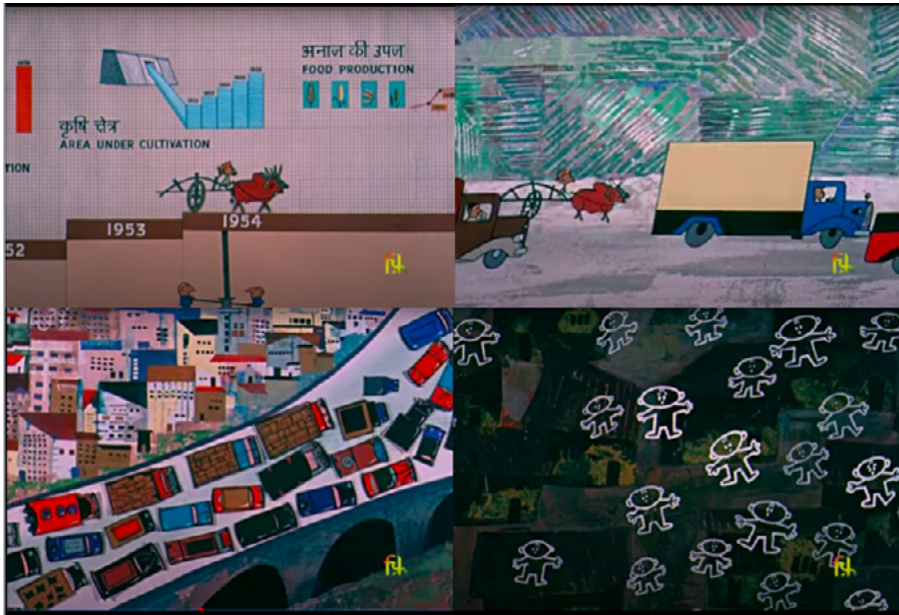
Truckanwale's rapid scene cuts and changing tempos are hallmarks of short films across the social media platforms advertised at the bottom of the video, but its slow-motion panning on romantic images has a longer filmic pedigree (though its predecessors were rarely shot atop tractor-trailers). Its wah-pedal guitar hits between choruses and keyboard minor-chord quarter notes are hallmarks of early Nineties LA hip-hop, a common touchstone for contemporary Punjabi pop. This is perhaps understandable given the large, often logistically laboring, west coast Punjabi population. Beneath their references to contemporary genres, media like *Truckanwale* and the emigrant logistical labor they extol emerge from a long logistical history on the Subcontinent. This history starts in colonial and postcolonial regionalized and racialized calculations of agricultural production, which administratively demarcated types of laboring persons across a landscape to be made agriculturally profitable through increased grain yields or decreased population (Bear 2007, 2015; Ali 2018; Bhattacharya 2019).

One media object that channels the state's Malthusian eugenic calculations (Khorakiwala 2017) is *Power for Progress*. Produced by the Films Division for broadcast over India's state broadcast network Doordarshan, over the course of one minute it flows from colonial-era domestic starvation, impotent rural labor and failed agricultural logistical transport to postcolonial supply chains, industrialized infrastructure and international trade imbalance. These speedy transitions' real-world histories haunt the present: the nationalist industrialization of agriculture, the Green Revolution, brought Monsanto pesticides into Punjab. It exacerbated economic inequality, engendering Punjabi militant separatism and, eventually, Prime Minister Indira Gandhi's assassination (Singh 1997). Fears of such tensions between center and hungry periphery made outreach, like this cartoon, essential for negotiating political crises in independent-yet-fractured India.

Stills from Madhav Kunte's **Power for Progress** *1969, 0:22–1:34.* Source: https://www.youtube.com/watch?v=l_bguc6Zjvo

Like *Power for Progress*, other governmental media linked paeans to production with laments about poor logistical circulation. In *Shadow and Substance*, produced for the Indian Films Division, the logistical progress of national development is diagrammed in higher agricultural yields and a "faster, faster" trucking industry, but stymied by a bumper crop of screaming "Babies! Babies! Babies!" The narrators – a bullock-cart driver and an alien speaking Russian-accented English – first bemoan India's lethargic modernization, then celebrate its future after resolving 'population issues'. They twice break the fourth wall to chide the audience for reproducing: fewer children mean more professionally developed children and more national resources, including logistical circulation. The on-screen scaling of production meets logistical bottlenecks, as

yesterday's bullock-cart is swarmed by today's gridlocked trucks and newly urban hordes. A montage of transport vehicles resolves these reproductive admonishments, starting with bullock-carts and ending with future spacecraft – futurity after Indians stop breeding excess hungry children.

Through public broadcast media like these, the developmental state put logistical calculations on full pedagogical display. Whether preindustrial, complicit in postcolonial transnational supply chains' extractions of capital (*Power for Progress*), or mired in excess population's choking of urban transport systems (*Shadow and Substance*), gridlock in the motion of supply entailed gridlock within calculable national development.

By using logistics to measure national development, these cartoons attempt to instill in the citizen-audience the state's calculations of supply, and of 'excess' population's untenable demands. Train the citizen-audience in logistical calculations of national demand and modernizing rhythms of industrial supply, and the citizen-viewer might personally aid production by reducing personal reproduction.

Such calculations, like the industrialization they compelled in Punjabi agriculture, expanded Indian road transport and drove Punjabis into a postcolonial trucking boom. Though many scholars consider road transport a 'traditional' Punjabi occupation (Ghuman 2012), it became a dominant part of the Punjabi economy during the Green Revolution (ibid.; Bhalla et al. 1990). Under Cold War USAID and World Bank pressure, new agricultural technologies required larger fields and much capital investment (Patnaik 2007). Moving the resulting expanded yields to cities required high-volume road transport. Truck-borne, the Green Revolution's economic extraction entailed particularly regionalized center–periphery and scalar political tensions (Singh 2008; Kennedy 2013; Balakrishnan 2019). Concurrently – and not coincidentally – this regionalization became culturally audible through mass media. As documented in ethnomusicological classic *Cassette Culture* (Manuel 1993), regionalized musical styles gained circulability through
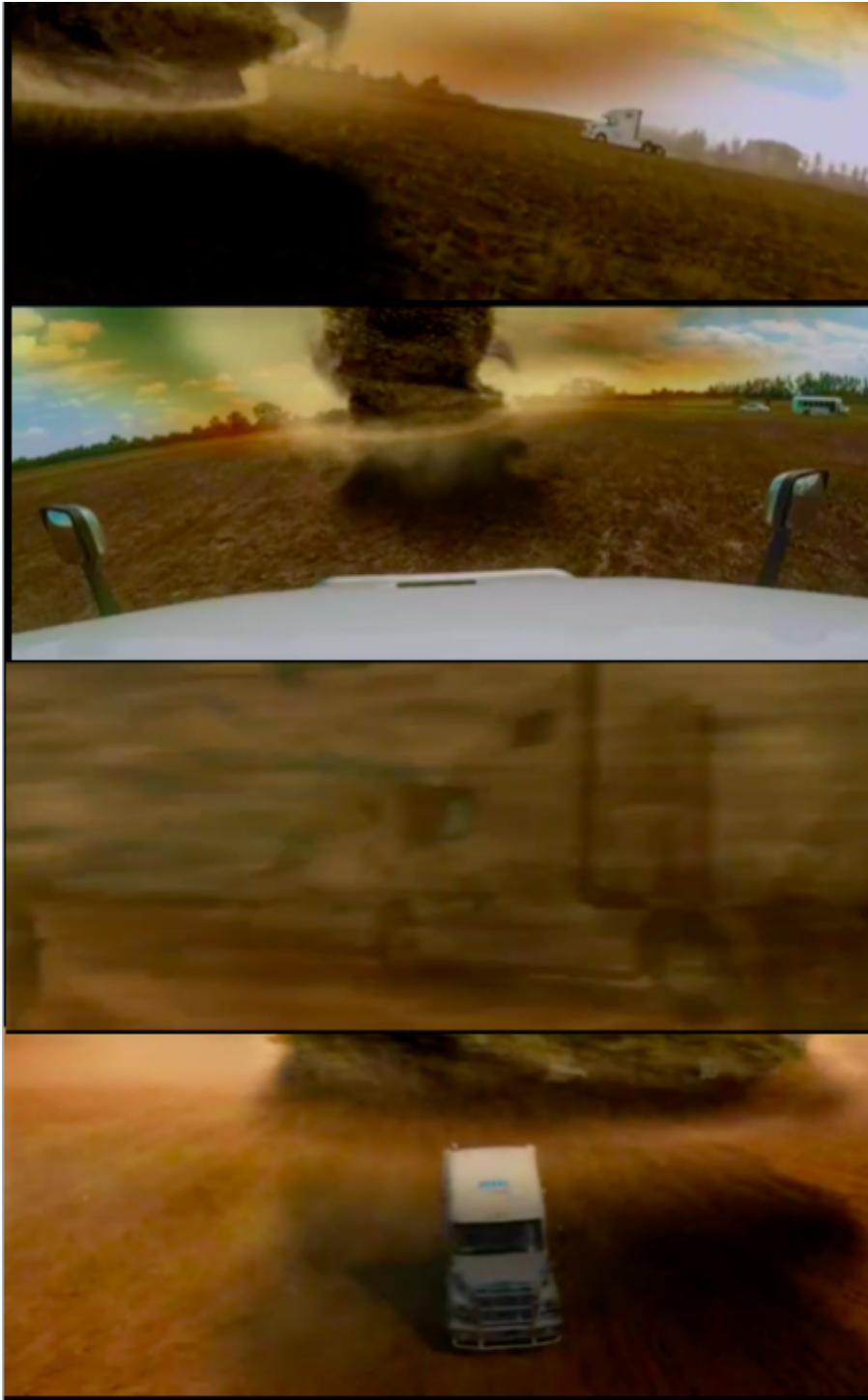
Stills from cross-generational trucking epic Banjara *2018, 4:42-6:40. Its star, Babbu Maan, is a much-loved Punjabi artist who has sung truck songs and whose family worked in transportation.*
Source: Pasha 2018.

imported consumer electronics (Sundaram 2009). This consumer-technology supply chain stemmed from India's logistical woes and developmental inability to wrangle a capital-intensive industrial technology sector (Chibber 2006; Neveling 2014).

Unlike the national development narrative guiding Films Division cartoons, interpersonal logistics in popular contemporary Punjabi trucking media follows routes orthogonal to developmental India's family planning austerities. Music videos valorize drivers' North American salaries, remitted funds to large subcontinental families and support of brides in lavish suburban homes. Feature films present heroic drivers braving tornados in fantasy truck races, mirroring these music videos' often no-less-fantastic narratives of migrant personal wealth. And unlike logistics in national development, these media focus on the interpersonal logistics of crossing chokepoints: focal points that constrain mobility, even as they route circulation for the extraction of value (Alimahomed Wilson 2018; Carse et al. 2020; Dua 2020). Such chokepoints may be spatial (like borders), interpersonal barriers to economic mobility, or both.

Many drivers in India's logistics industry express their frustrations about these chokepoints through recorded media. They self-release hundreds of <u>songs and poetic recitations</u> about contemporary trucking's difficulties, tying their struggles to those of farmers in India's protests against agricultural logistics bills. The perils of undocumented emigration are also recorded in mass spectacle, punctuated with bhangra <u>song-and-dance routines on flatbed trucks</u> in Canada, or <u>songs of death in Mexico's jungles</u> before reaching the US border. Some critical songs and poems about undocumented crossing depict the logistics industry as abattoir, its shipping containers quiet sites of migrant death (cf. Chu 2016).

> *In a locked truck's trailer, many emigrés died.*
> *When asked, fraudulent immigration fixers say: "They were dropped off in Germany."*
> *Don't swallow their lies, like me.*
> *Brothers of my colorful Punjab! Don't emigrate illicitly.*
> *– <u>Tuc Dauky na Laio</u> 2020, 4:03–4:40.*

Although today's mass-media logistical fantasy of fulfillment through transnational wealth speaks to unfulfilled fantasies of Indian national development, this is often not the same fantasy of seamlessly untroubled mobility and smoothly circulating value in the logistics industry's self-narratives (Chua et al. 2018). Rather, public discourse across a broad Punjabi media ecology indicates distinct and conflicting "political rationalities of flow" (Chua 2019) that hinge upon logistical exigencies. Such conflicting political rationalities emerge from historical geographic tensions within the distinctly biopolitical and eugenic political economy of developmental India, and today delineate spatially differentiated valuations of supply, whether of goods or of laboring persons. Rather than cloaking the rationalities of logistics, mass-mediatized objects performatively enact them in spectacle. As these highly visible and audible productions show, the spatialized logics of logistics, and the political tensions they engender, circulate widely in public cultural life.

Stills from Tuc Dauky
na Laio *2020, 4:03–4:40.*
Lyrics: Jassa Mattewalia,
singer: Jaswant Singh.
Source: https://
www.youtube.com/
watch?v=oHFrK8Iylh4

Notes:

[1] Orenstein 2019. See especially the luxurious pyrotechnics in the warehouses and docks of John Woo's *Hard Boiled.*

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Davindar Singh is a Presidential Scholar and PhD candidate in ethnomusicology with a secondary field in anthropology at Harvard University. His dissertation project, "Cultures of Cargo: Trucking, Musical Media, and the Logistics of Punjabi Mobility," traces how changes in Punjabi popular media, and parallel changes in South Asian logistics industries, emerge from a common history of transnational logistical extraction. This history looms large in contemporary political conflict in Punjab and is constituted, in part, through music, political oratory, masculine sports poetry, and everyday discourse about the spatialized motion of value in the making of post-Liberalization India's political economy. He is co-chair of the Society for Ethnomusicology's Sound Studies Section. He also used to be a saxophonist.

Logics of Metal Containment

Stefanie Graeter

What makes a metal? What does it contain? What contains it?

To mine metals in the Andes, mountains invert into craters, as bulldozers slowly harvest their earthly wares truckload by truckload. The elemental chaos of extracted slurry then passes through a complex maze of industrial alchemy – gigantic cauldrons, rotating molds, webs of piping, red-hot furnaces, cooling pools, ventilation ducts – intricately assembled to kinetically purify polymetallic mud into copper, lead, zinc, precious metals and rare earth minerals.

Upon achieving elemental distinction, trucks and trains shuttle the mineral particulate along the path of gravity, down the steep, winding cordillera, and then pause, just short of the sea, at Peru's port of el Callao.

Here, weary metals are offered temporary respite. In the expansive storage yards of the port, they are sculpted back into minute mountains, where they wait, until a conveyor belt glides them to shipping containers, which towering cranes heave onto ships that will float them seaward toward futures of further commodification.

Metal purge.
Photos: Stefanie Graeter,
Cerro de Pasco, La Oroya,
El Callao, Peru, 2012.

Reversing Douglas's "matter out of place" (2002: 44), her definition of dirt as the symbolic disorder of material worlds, metallurgy overcomes the entropic vagaries of geologic time to precipitate order from molecular chaos; its product, metals in their place, purged, sorted and stored, are rendered ready for global commodity chains – for future pipes, cables, wires, beams, batteries, televisions, tablets, computers and phones.

While containment defines this logistical assemblage, the high energy demands of molecular sorting obliges a counter-energetic release of chaos: spills, seepage and absorption of metals are also constitutive of metal-making logistics. From extraction to shipment, rogue metal particles diffuse into environs, infiltrating eyes, skin, noses and mouths that cross their paths. Such unwitting metallic infusions turn bodies into heavy metal deposits, a long-term fleshy depository for particles otherwise logistically impractical to contain. This dispersion and corporal containment follow physical laws, but their materializations flow from social ones. Hermetic containment of metals, whether in smelters, trucks or storage yards, costs energy. And energy costs money. The logistics of storing and shipping metals is thus not only a techno-physical feat, but embedded with value calculations of spillage; how much metal is really worth containing, by what and by whom?

Among metallurgy's dispersants, lead is the most infamous. A structural analog to calcium, lead stealthily subs in for this vital mineral, leadening blood, brain and bones, while subjecting bodies to an array of injurious becomings – oncological, orthopedic, neurological, cardiological... The heavy metal's capacity to impair brain development, especially in the forming bodies of children, is the most studied by scientists and the most feared by their publics (Lanphear et al. 2005). Much has been done to contain lead better. Lead is now forbidden entry into many consumer products, but its material legacies, and ongoing uses in things like batteries, bullets, x-ray vests, weights, fine crystal and stained-glass, keep lead in material circulation, particularly at sites of extraction, shipment and storage.

The pervasive condition of lead toxicity along Peru's mineral corridor came to light during the rapid upscaling of metal extraction by way of neoliberal economic reforms. Studies by the World Bank and USAID (Gittelman et al. 1999; Espinoza et al. 2003), Catholic scientists (Universidad de San Luis 2005),[1] NGOs (Arriarán and Salazar 2015) and Peru's Ministry of Health (MINSA and DIGESA 1999) have repeatedly evidenced scandalously high blood lead levels. Unwittingly, the bodies of thousands of people serve as collateral infrastructure (Simone 2004) for metal commodity production: storage vessels for lead that no one bothered to contain.

Those who dwell amid the mineral scatter of extractive capitalism encounter lead as an ever-lurking, invisible potentiality – it may or may not be in each breath, bite or touch. Take the Port of El Callao, the terrestrial waiting room for metals about to cross the Pacific. Tens of thousands of people have built homes there, both before and after the mineral storage yards occupied adjacent plots of land. This is where scandalous lead levels in children were first discovered in 1999 due to decades of contamination.[2] Yet few in Peru consider the logistical centrality of the port, and the people who live there, to the neoliberal boom of transnational extractivism and the corresponding dis/ containment of its noxious matters.

My friend Camila, a local resident and community leader, has fought for years against the lead problem in El Callao. In 2012, she took me to an unmarked intersection of the wide thoroughfare Contralmirante Mora at the port, where we filmed trucks driving in and out of the mineral storage facility of Perubar for a film about the so-called lead zone. She pointed: "Look, right there are trucks exiting from Perubar that are sealed, but as they go, they lift up all of the minerals."

But as they go, they lift up all of the minerals.

Eating minerals.
Photos: Stefanie Graeter,
El Callao, Peru, 2012.

As if to demonstrate her words, this scene unfolded before us: Along the dusty road, an elderly man slowly pedals a bike, balancing a full plastic bag on the handlebars. He is dressed in jeans, flannel shirt, work boots and a baseball cap pulled low over his brow. Ahead of him, a large truck starts backing up, blocking his path and, as he nears, the reverse acceleration of the front wheels envelops his body in a cloud of dust. He has no choice but to stop. He breaks, throws his legs off the pedals, and his weight falls delicately to the right. He waits no more than three seconds, as the particulates settle upon him. Enough time passes to take a deep breath, but then he is quickly on his way. The dust scatters back down to earth, led this way and that.

"Look at the dust storm they make!" Camila called out. "That's dust with minerals! This is the route our children have to walk along every day!" As I set up for another shot, Camila chats up a young watchman, seated in a folding chair on the sidewalk. Camila calls to him playfully: "You're eating minerals for breakfast lunch and dinner! Your bones are just filled with them." The man just laughs, shaking his head.

This brief encounter – between man, bicycle, truck, friction and dust, laughing about eating minerals, kids walking home from school – exists within the making of metals. It is a logistical scene of metal dis- and re-containment: spill, spatter, subsume. It materializes logistical choices of metal containment, as well as their inverse: what the state and corporations deem unworthy of containing.

When lead was discovered at the port, the residents were angry. Their lives were hard enough: many lacked deeds to their homes, and were without access to sewage, water, electricity, or enough work and money to go around. In the social strata of human value, port residents occupy the racialized, classed, bottom rungs of *los pobres* (Spanish for 'the poor'). In the nation's imaginary they are among the most destitute and dangerous, the least deserving of prosperity and protection. Yet the magnitude of the lead levels found in their children's blood horrified the press, public and politicians more readily than their other troubles. Lead got them noticed, so residents organized around it. They held protests, got on TV and in the papers, blockaded roads, yelled at municipal meetings, got in the faces of corporate managers. The lead had to go, they proclaimed, but they also wanted indemnification for the harm already done.

Port containers.
Photos: Stefanie Graeter,
El Callao, Peru, 2012-13.

Their collective manifestations produced costly chokepoints in metal commodity flows and costly liabilities for corporate welfare (cf. Carse et al. 2018). Simply put, it would cost the companies too much money to prevent contamination altogether or to remediate its damage. As such, containing the political potential of their human infrastructure of lead storage became essential to the logistical (and therefore fiscal) viability of metal production. How was it contained then? Companies quelled flareups of social volatility on an ad hoc basis, distributing gifts and favors to keep lead silently contained in bodies. Choreographing distributions of indemnity, without admitting any liability, also made economic sense: such scarce flows of benefits created rivalries and encouraged beneficiaries to silence their competition. Accordingly, many did not earn a cent for their body's lead storage. Meanwhile, companies found technological fixes to better contain metals in their trucks and depositories because, to a certain

point, containing more metals means more money and less lead contamination. But not no lead.

The lead is still there. No one has cleaned the soil, and while improved, the trucks and yards can still leak. Sometimes, local kids hold up drivers leaving the depositories, and scrape out any of the remaining metals from the truckbed to sell on the black market. Lead spreads from house to house, from split sack to the ground, onto skin, up into the air and down again. The financial loss from lead theft is minimal, the management explains, and many residents suspect that the companies, drivers and police are all in on the matter. Logistically speaking, this type of spill is easier, and cheaper, left uncontained. These are the hidden logistics of metal production, the social and material arrangements of decisions not to contain.

Bodies at the port are still containers of lead. Unlike trucks, conveyor belts, cargo ships or depositories, their logistical function is not temporary storage to facilitate transport. Instead, they form a human infrastructure of socially condoned corporal damage, which results from a social logistics that makes harm inevitable and acceptable to reduce monetary costs. These are logistics to avoid further logistics. It is through this logistical choreography of invisible containment that metals get made.

Notes:

[1] To read about the scientific research of the Archbishopric of Huancayo, see Universidad de San Luis 2005 and Graeter 2017.

2 In the first USAID-funded lead exposure study conducted in El Callao in 1998–1999 (Espinoza et al. 2003), which was part of the World Bank's global campaign to remove lead from gasoline, researchers found blood lead levels in children of between 1 μg/dL and 64 μg/dL, with a mean value of 9.9 μg/dL. The Centers for Disease Control and Prevention's (CDC) current "reference value" for elevated lead levels in children is 3.5 μg/dL (CDC 2021).

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Stefanie Graeter is a cultural anthropologist interested in ethnographic questions of embodiment, materiality, knowledge and the political, with a geographic focus on Peru and the Americas. She is Assistant Professor of Latin American Studies and Anthropology at the University of Arizona. Her current book project, Mineral Incorporations, examines how lead toxicity is operationalized politically within social projects that resist – or support – Peru's extractive industries. Through an ethnographic examination of the social and material processes that bring bodies and minerals into relation, her work conceptualizes the politics of environmentalism, health and human rights within the noxious environs of racial capitalisms and post-Anthropocene worlds. In addition to ethnographic writing, she works with photography and film, including the short documentary, The Lead Zone.