

15 Cellular Capitalism: Life and Labor at the End of the Digital Supply Chain

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On one end of the line, a consumer touches the smooth glass surface of their mobile phone. On the other, a new kind of logistical laborer enters the correspondingly smooth landscape this device claims to deliver. In the function of their phone, they find an interface of operation that partitions the world into nodes of logistical time and space—the segmented structure of the data center sutured to the mundane materiality of supply. As the lines of this new network spread from the streets of New York to Mumbai, London to Beijing, the movement of trucks, bikes, feet, and hands are abstracted onto objects, encoded into emerging algorithms of assembly. The workers captured alongside them become the vanguard of virtualization.

This chapter considers the place of the mobile phone in contemporary logistical networks, taking last-mile logistical service Amazon Flex as a case study for theorizing the phone as an interface to the ends of the global supply chain. As the world's largest digital retailer, Amazon has access to a phenomenal amount of aggregate data from user transactions and order fulfillment. As the corporation turns toward total integration of their supply chain, the Amazon Store—with its tailored product suggestions—finds a counterpart in the Taylorization of apps for their digital delivery, routing Fresh and Prime orders through algorithmic predictions of customer demand, traffic patterns, and stock availability. As the cloud's calculations average out any remaining human traces from the world below, it is not only global sites of assembly that become accessible as operationalized objects in the software systems of planetary production. The local sites of distribution—along with the lives and labor that remain there—necessarily do so as well. Here, all supply chains are digital supply chains.

The economic structures of the gig economy, I argue, have emerged in response to the integration of the interfaces common to the mobile phone. For consumers, a logistical service like Uber, Postmates, or Amazon Flex offers a convenience. But for delivery drivers (both of human and nonhuman cargo), the regimented control of the app, which integrates the networked requests of passengers with an awareness of the driver's

precise position, defines the totality of labor. The coordination of connectivity—of Internet access, image processing, and global positioning—within the confines of the cellular phone is what renders every part of the operation operationalizable, distributed into the smallest tasks requiring the least possible skill. Every pickup, every turn, is now governed by the app. This is also what allows these new labor platforms to present themselves to drivers as turnkey solutions for turning time into money. It is cell phone as assembly line.

Logistics is the management of flow, the elimination of friction in pursuit of a smooth and seamless world of efficient operation. Everywhere and always, companies like Amazon work to secure supply chains absent the rough edges that define contemporary commerce—to remove the tired drivers, porch pirates, and fraudulent orders that break the continuity of consumption. A digital supply chain, then, may seem to be a contradiction. This, after all, is the domain of the discrete. It is the logic of the network, of lines and nodes. But this abstraction is crucial to contemporary logistics: the operative appearance of a continuous process overlaying a materially discontinuous one. Or perhaps it is the other way around. In either case, this uncertain processual appearance is, I argue, what the cell phone has come to offer global capital.

To examine this offer, this chapter begins by introducing the idea of mobility—and, more significantly, cellularity—as cultural conceptions critical to the operational control afforded by the mobile phone. Situating this control in the functions of Amazon Flex, I explore how the mobile phone enables the ordered divisions necessary for Flex's gig economy work by allowing workers to operate in digital representations of physical space, from geolocated directions to the structured images of two-dimensional barcodes. I conclude with the suggestion that, in constructing an actor capable of acting digitally on the analog world, the mobile phone enables at a planetary scale a future where all work, inevitably, will become digital work.

Cordless Confines

There is a conventional understanding that the mobile phone was a modification of an already established technology. But this perception neglects the fundamental distinctions essential to its history. The telephone connected places, after all, not people. Installed in a subscriber's home or office, it tamed the vast geographies of the world with wire and cable, indexing distant sites into directories made answerable at the point of call. Loosened from the limitations set out by the landline telephone's fixed inhabitation in space and time, however, the mobile phone constituted a radical reconfiguration of the nature of telecommunication—one that media scholars still grapple

with (see Ito, Matsuda, and Okabe 2005; Katz 2008; Ling and Donner 2010). Misa Matsuda (2005, 20–21), for example, points out that in Japanese, the name for the mobile phone is the combination of *denwa* (telephone) and *keitai* (portable). But when *keitai*, rather than the conventional portmanteau of *kei-den*, became the standard term, it was as if the telephone was eliminated. All that remained was portability.

Americans, in contrast to most English-speaking callers, are more likely to reach for a *cellular* telephone than for a *mobile* one. At first this distinction seems meaningful only insofar as, while mobility is a cultural concept, a meaning attached to technology by its use and value in society, *cellular* is a technical description—both more specific and more recent—that references an underlying technological system and infrastructure. But *cellularity*, I argue, is a cultural concept, one that inspires allusions to Foucault's "cellular prison," its "regular chronologies, forced labor, and authorities of surveillance and registration" (1977, 227–228). This understanding is what is present when the phone is deployed as a tool for control rather than communication, when it enables not just a multiplicity of mobility but a multiplication of management. The mobile phone brings with it a promise of flexibility, of both geographic independence and economic opportunity. But in buying into the mobile phone, we get the cellular one as well.

The history of cellular networks is, after all, a logistical history. As the car became increasingly critical to the expanding suburban landscape in the United States, so did the idea of connecting the mobility afforded by the automobile with the more closely coupled communication of the telephone system. The challenge was in scaling this connection within the finite constraints of the radio spectrum. In 1947, Bell Labs engineers Douglas Ring and William Rae Young proposed a mechanism for frequency reuse that could efficiently employ the radio bands they had available. By dividing the coverage area into an (effectively) hexagonal grid, their approach allowed frequency repetition in nonadjacent cells so long as they were spaced sufficiently far apart (Ring 1947). While this system would not be implemented until decades later, the implication was that—unlike a traditional telephone, which had (at least at the local level) to provide a static point of contact tied to an individual subscriber—the "cellular network" need only provide a *space* for connection.

To speak of cells is to speak not only of wireless communication but also of prisons, monasteries, biology, and batteries. The Latin *cella* is also the root for the word *cellar*, and it was indeed used in the ancient world to mean a chamber or storeroom. In this etymology, we find structures like the *cella olearia* containing olive oil and the *cella vinaria*, which stored wine. But this type of storage was not limited to the organization of large numbers of objects; it could also serve to render "accessible to a multitude the

inspection of a small number” (Foucault 1977, 216). And so, in the temple’s cella, we find the image or figure representing the deity, a sacred sense of storage partly echoed by the chambers found in medieval monasteries centuries later. Over time, the divisions formed by these clustered rooms came to resemble nothing so much as “the cells of a honeycomb,” such that Virgil could describe the secretions of bees in the same language his contemporaries used for the dormitories of slaves, the sleeping quarters of the public house, and the workrooms of the brothel. All were *cellae* (Smith 1890, 391). Common to these confines was their lack of connection to an individual inhabitant. They were spaces in want of an occupant. And this, I will argue, is what connects them to the defining function of the mobile phone in the labor regime of contemporary capitalism. As a means for imposing cellularity, it constructs a simultaneously connected and disconnected space of operation—one filled by an actor who can be redistributed and reconfigured according to demand.

Flexible Labor

New media technologies have always brought with them the potential for new techniques of social and material organization. The productive power of the assembly line, for example, was possible only because the ruled “blanks” of paper forms had altered the organization of the shop to enable this demanding division (Yates 1993). The introduction of the telephone itself brought a new means of managerial access—one that precipitated many of the patterns of remote operation and outsourcing that now define the global economy (Hockenberry 2021). Indeed, the early history of the gig economy can be traced, in part, to the ways in which freelance websites like Elance (now Upwork) provided opportunities for outsourcing on the back of the global telecommunication network (Florzak 2002). But while its predecessor may have had some raw capability for disassembling tasks, it was the mobile phone—through start-ups like Uber—that demonstrated how this logic could be so effectively distributed.

Amazon Flex (see figure 15.1) is a digital platform for fulfilling Amazon’s on-demand delivery efforts. Launched in 2015 as a last-mile logistical program for paying gig economy workers to deliver certain kinds of Amazon orders, it is one of several options the company has developed for putting packages from the company’s Prime Now, Amazon Fresh, and Amazon Restaurants offerings into the hands of its increasingly insatiable consumers (though only Amazon Fresh remains active). Operating worldwide in countries like the United States, Germany, Australia, the UK, Spain, and India, Flex promises workers the opportunity to “be your own boss, set your own schedule, and have more time to pursue your goals and dreams.” All with “the power of Amazon” behind them (Amazon 2019b;

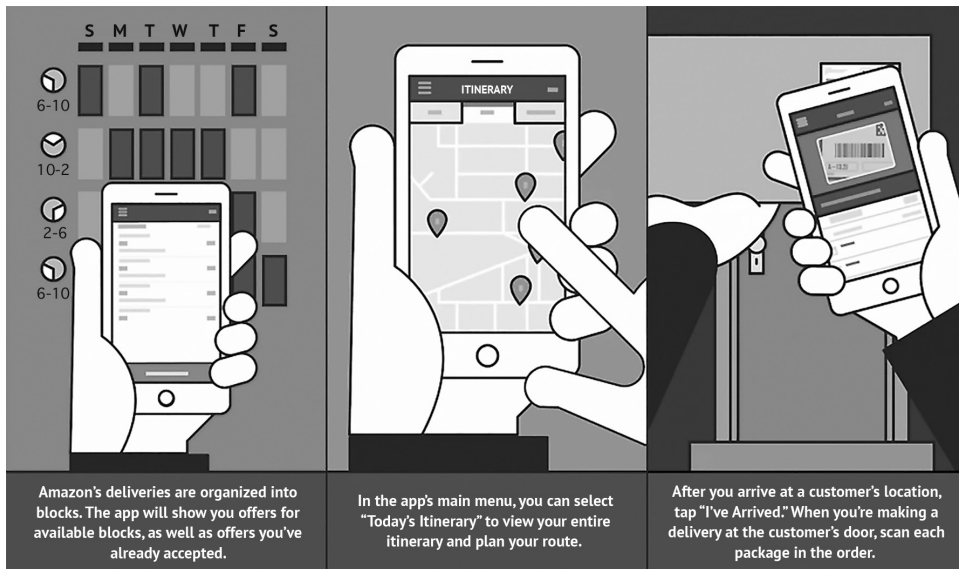


Figure 15.1

Screenshots from Amazon Flex (2018) training videos.

Yin 2019). But despite the otherwise unique invitation to “deliver smiles with Amazon” (Amazon 2019b), Flex is only one instance of an emerging platform economy (Kenney and Zysman 2016) specializing in last-mile logistics. Almost ubiquitously branded as “technology platforms,” rather than delivery companies, this constantly shifting landscape includes (at the time of this writing) firms such as: Postmates, Shipt (now owned by Target), Walmart’s Spark (powered by the cloud-based fulfillment service Bringg), Deliv (also acquired by Target), Senpex, Xpedigo, and Cargomatic in North America; CitySprint, Hermes, Stuart, and Yodel in Europe and the UK; Dunzo and Ekart in India; Rappi in Latin America; and Blu Couriers in Australia and New Zealand. Operating in a range of contexts, some of these firms are specifically oriented toward the delivery of food (Uber Eats, Seamless, Foodora, Deliveroo, DoorDash, Glovo, Ocado, Wolt, and Instacart, for example) while others are heavily tied to particular retailers (like Flex, Shipt, and Spark). And while Flex brings to bear only *some* of the labor patterns that can be distributed through the mobile phone, the fact that it was developed by a company like Amazon underlines the critical importance of the gig economy for increasing the density of contemporary logistical networks. Of course, given Amazon’s fraught labor history, it also represents a particularly problematic entry into an already precarious field (see Scholz 2016, 9; Hill 2020).

Like more publicly recognizable examples such as Uber, Seamless, and Postmates, Amazon *is* a delivery company. Indeed, over the past decade it has become one of the largest logistical operations in the world, not just a retailer, but a company managing inventory and point of sale for thousands of third-party vendors (and, in some markets, directly selling logistics the way it sells digital offerings like its Amazon Web Services). But while its customers may still largely prefer one-click delivery to one-click streaming, Amazon—unlike its gig economy competitors—has an advantage in marketing digital as well as physical goods. The edge Amazon finds in services like Kindle, Audible, and Prime Video is not just in the low cost to store and distribute these digital materials, but in the unprecedented control the firm exercises over this distribution process. The business model of the marketplace for “odd jobs” favors a distributed workforce largely removed from the social relations and economic attachments that had governed earlier forms of capitalistic exploitation. But while Uber remains dependent on allegedly independent contractors to drive cars, and Seamless requires restaurants willing to interface with its order system, Amazon’s digital offerings (and their corresponding labor platforms) are provided by the company’s own web services—often delivered to devices they have designed. This has not been the case for their more conventional commerce.

While the boxes may have been branded with Amazon’s smile logo, their delivery had traditionally depended on logistical networks largely outside the company’s control. The trucks they were carried in belonged to companies like FedEx and DHL, or to local postal services. And the firm’s relationship with these entities has been fraught—both economically and logistically. The solution, Amazon has decided, is in a more complete control of distribution—one arguably analogous to a digitization of delivery. Indeed, while e-commerce may have begun as an uncertain proposition, with Amazon’s first store little more than a catalog for transactions completed by phone or fax, the supply chain leading to the firm’s fulfillment centers has now been almost entirely digitized. All that remained were those few miles between purchase and package. The company once claimed that “connecting your mouse to your front door was our moon landing,” but more regular trips have required the company to launch what has amounted to a sort of shadow postal network (Amazon 2012; Cheng 2019). And while successful, with many deliveries now completed by Amazon’s own delivery service partners, Flex has brought a more flexible—and more digital—response (see Amazon 2019a).

“The first step to delivering for Amazon Flex,” the company explains, is to “download the app” (Amazon 2019b). Indeed, the platform has only a few requirements for its newly minted logistical laborers—mainly that they can navigate through the unpredictable space of the material world and that they have a phone. After a worker has downloaded the app and consented to the requisite notifications, location tracking,

and camera access (the invasiveness of which previously required that they “sideload” the app onto their device outside the auspices of the official app stores), they provide a driver’s license and a bank account. They then undergo a background check and complete the mandatory training. This is not a driving test or an interview (after all, Amazon has confirmed that the worker is licensed to drive and eligible to be paid) but a program consisting entirely of viewing several three- to four-minute instructional videos. Alana Semuels (2018) describes watching 19 videos followed by quizzes, but when I completed my training, I watched only 8—with no quizzes (see also figure 15.1). Now armed with a not-at-all-comprehensive understanding of how they fit into Amazon’s logistical empire, the worker need only schedule their availability and wait for a final approval.

The freedom these videos promise a worker may suggest the kind of adaptability of life and labor to which we have long aspired. But though they may give the impression that Amazon is a benevolent employer, it is neither particularly benevolent nor are these workers really employees. Regardless of a worker’s preferred shift calendar, work—and, consequently, pay—is dependent on getting what Amazon refers to as “offers.” These offers represent a batch of customer deliveries, and accepting one commits the worker to a “block” of time—essentially a two- or three-hour shift during which a worker will be responsible for making all of the deliveries aggregated for that offer. There are a few different kinds of blocks. The regular sort appear on the system either the day of delivery or (at most) the day before, typically remaining visible for only a second or two before a worker commits to them. The company also provides “reserved blocks.” These are shifts set aside for a particular worker before they are opened up to others. These can be given out as often as once a week, but they usually appear with a less reliable frequency. Indeed, their availability, as well as their value, has been one of the most frequent topics of discussion in the many online forums—such as Amazon Flex Drivers (Reddit 2020) and a number of private Facebook groups—where workers congregate (and where Amazon, apparently, observes them; see Gurley 2020).

Questions abound about what reserved blocks are, why they are offered, or why they might have gone away. Details change constantly, with seemingly minute adjustments in the operational particulars of the Flex platform sometimes developing into long-term structural changes. What’s more, with several tiers of logistical labor at Amazon’s disposal, increased demand does not always translate to increased work. Even as the company has (at the time of this writing) introduced a “Flex Rewards” program with preferential scheduling to mitigate some of these concerns (with increased time to accept blocks and special “Rewards reserved offers”; see Amazon 2020), some workers have resorted to a black market in shift scraping scripts and autoswipe devices—complete with exorbitant prices and the risk of “cancellation” if they are detected

(Palmer 2020). Still, the primary position for the majority is to wait, swiping to refresh their phones in the hope that an offer will appear. Even when a reserved block is available, workers may have as little as 15 seconds to respond. Swipe to accept.

The frustrating friction of securing an offer stands in stark contrast to the smooth structure in place to work the delivery once it is accepted. When a block actually begins, all a worker needs is a delivery vehicle and a phone (and insurance, though Amazon's commercial insurance usually covers workers during shifts). The app takes care of everything else. It tells the worker where to pick up packages, where to drop them off, and what route to take. For migrant workers, it can even speak another language. Bringing with it all of the inhuman sensibilities afforded by the mobile phone, it can determine location with incredible precision. It can see and scan packages with no opportunity for error. It remembers it all for you, storing records in a system designed for precise timing and technique. All it asks in exchange is a human body capable of the messy and mundane business of moving. The app cannot climb stairs (though it can tell if you have), nor can it navigate congested streets or decide when to double park. For this, it still requires a human host. But as every driver knows, the Faustian bargain will persist only so long as these technologies require human coordination (Scott 2019). For a workforce severed from the promises of Fordist security that once defined postwar capitalism, the cellular phone seems a valuable prosthesis, but it is only a temporary one.

The nature of this prosthesis, and the key to its cellular logic, is in the phone's capacity to provide logistical control, enabling ever-more-digital representations of physical space. Indeed, to call these devices mobile is not just to privilege a particular social and technical character, or even to enroll them within a particular class of media technology, but to signify their place as, first and foremost, a *logistical* media technology. "Harnessing and mobilizing, incarcerating and accelerating things and people," the cellularity of the phone is not Foucault's prison but—fitting for a form frequently coupled to the car—Paul Virilio's racetrack (Virilio 2006, 69–70). The purpose it serves for the digital systems of delivery is to translate "strategic space" into the "logistical time" required for routing the movement of workers into lanes of material flow. As "cities, partitions, trading circuits, satellites, and software" pull back to a crystalline landscape of competing forces of "surveillance, fortification, and movement," Benjamin Bratton argues, everything from architecture to computation has come to constitute successive iterations of the media necessary for capital's "mobilization and its administration" (2006, 7–9). The phone is only the most recent example.

Logistical mobility is not about speed in the raw sense. It is about the *control* of movement, who can produce it, when, and under what circumstances. "In every revolution," Virilio explains, there is always the "paradoxical presence of circulation," with

the revolutionary contingent attaining its ideal form “not in the place of production”—that is to say, the factory—but rather “in the street.” It is only here that the worker “stops being a cog in the technical machine” and, “becomes a motor.” This is where they can become a “producer of speed” (Virilio 2006, 29–30). But despite the promises of economic agency handed over to workers through these devices, they can only ever serve counter to those aims. Like other logistical techniques, cellularity brings both “integration and disintegration,” producing divisions it assembles under standards it defines (Bratton 2006, 8). Exemplary prompts for Flex drivers are: “Proceed to pick-up point” and “Wait for customer order to be completed.” With the same illusory smoothness of time as the Amazon Store itself, this leaves the app as the sole “motor,” the phone as the only regulator of movement. Coordinating communication from one newly divided cell to another, the prosthetic potential of the phone surrenders control to the abstract and structured space of the network (Cuppini et al. 2013). As it consolidates territory into logistical fields organized on the basis of “abstract calculation over omni-directional spaces,” we find here the sort of operation that Bratton argues now orders the vast reaches of the “open oceans” and the grids of “shared spreadsheets” alike (Bratton 2006, 8).

It is in this way that apps like Amazon Flex construct a digital interchange universalizing access to what critical logistics scholars such as Deborah Cowen have termed “logistical space.” But while earlier technologies like the cargo container may have replaced the inefficiencies of material exchange with inputs and outputs measured by the standard size of the 20-foot equivalent unit, platforms like Flex standardize the exchange of *services* (Cowen 2014, 40–44). Here, the “algorithmic management” of equivalent labor allows for the substitution of direct managerial control over workers (Altenried 2019, 124). As Alexander Klose explains, the container once suggested a “smooth, lossless,” “almost immaterial” image of transportation, so much so that it was easily forgotten that it was the result of tens of thousands of workers laboring amid a gigantic system “of steel and silicon” (Klose 2015, 26). So too is it easy to miss how structures like Flex’s blocks are not interface elements but a new order of logistical space-time (and perhaps *the annihilation of space by time*). They are literal building blocks for a representation of the material world built entirely for the cellular logic of the phone.

Age of the World, Pictured

Given this representational reconstruction, it is not surprising that images are fundamental to the Flex platform. After workers swipe “I’ve arrived” at the initial pickup station, the Flex app (and usually another human) will direct workers to the set of shelves containing the boxes and bags they will deliver. Deciding how to fit three hours’ worth

of deliveries (usually 30 to 50 packages—though sometimes more) into consumer cars is no easy task, and here drivers generally take some time to sort their items for delivery: determining what goes in the backseat or the trunk; making sure items to be delivered at the same stop are grouped together; and packing their initial deliveries to be more accessible than their later ones. But from Amazon's perspective, all that matters is that each item is recorded. In the platform's early days, the two-dimensional barcodes attached to each package would need to be scanned individually. Now it is more common for workers to receive a single code that aggregates all of the items associated with a block (though this varies by location; some workers will still scan individual packages at cart-scan sites to avoid the possibility they were missed; see Reddit 2020). Scanning the symbols on the barcode preloads a list of addresses—with a delivery radius that can average around 30 to 40 miles in less dense areas—all to be mapped out by the mobile phone app.

Despite Amazon's designs for automated operation, forums overflow with tips for getting blocks and strategies for delivering them (along with calls to unionize and complaints about Flex's increasingly onerous terms of service; see again Reddit 2020). Driving is a skill, of course, but so is knowing how to park, avoid tickets, and overcome the obstacles the system either fails to capture or does not care about. The workarounds Flex requires, and the folk knowledge it demands, speak to the difficulties that still remain in this last leg of logistical operation (see Soper 2020). While the app builds its own routes after a block's packages have been scanned, many workers suggest that it doesn't take traffic or related challenges into account—and they find they can often complete shifts faster through their own navigation. Individual judgment is likewise needed to determine how to access particular buildings, how to predict customer preferences, and how to decide when an item can be left and when it should be returned. "Undeliverables" occur when workers return packages for customers who are not home to receive them or when they are unable—or unwilling—to deliver them. But too many can produce negative weekly summaries. These can, in turn, result in canceled blocks, limited offers, or "deactivation"—an appropriately mechanical term for the sort of logistical cyborg imagined to be performing this labor. While Amazon acknowledges that deliveries sometimes go awry, and that accidents—vehicular or otherwise—happen, the company is vague about the exact consequences. The rating system for assessing a worker's standing is notoriously opaque, with a sluggish response to appeals. And given Flex's contingent nature, there is no guarantee of work and no protections (or overtime) when a delivery proves troublesome. When faced with an insecure delivery, then: "you gotta use your judgment, you gotta see who's around, who's looking, who's watching, you know [make sure] people don't steal that stuff and it's gonna cost you your job." As one worker concludes: "I'd rather be safe and bring it back to the warehouse" (Reality of Andy 2017; see also Flexing with Flex 2018).

When a driver indicates they have arrived at a destination, the app is supposed to provide all the protocols for delivery: Does the recipient need to be present, do they require an access code, and is there a preferred drop-off location? Workers verify they have delivered packages by recording an image to their phone. For customers, these porch pictures confirm that their items have been delivered. For Amazon, it ensures compliance from the driver. It may seem surprising that these are the only real images taken during the entire process. But the purpose of the other pictures is to scan two-dimensional barcodes, not to record the objects they are attached to. Flex’s operations are heavily mediated even at the moment of delivery. After all, completing an order is not about interacting with the customer. When, for example, a bike delivery driver arrives at their destination and puts down their (usually waterproof) duffel bag, they are directed only to look for the printed sticker containing the delivery’s optical machine code and its short (human-readable) four-character identifier (see figure 15.2). With Flex recalling for them how many items are to be delivered, it is just a matter of assembling and scanning the correct number of matching codes. As the system does not intend for the consumer to see the worker, the worker need not see the consumer. It is the camera—the system—that sees.



Figure 15.2
Barcode stickers from a Prime Now order delivered via Amazon Flex.

The era of the camera phone was remarkably brief, wedged in between the novel opening of the mobile phone and the attribution of the previously human quality of *smartness* to these freshly fitted attachments. But to neglect the importance of the camera in the history of these devices is to neglect the fact that the smartphone is smart only because of its confluence with other media technologies—*because* of the active accumulation of these rich and versatile sensory capabilities into a singular mobile prosthesis (for such an alternate genealogy, see Huhtamo 2011, 23–38). The smartphone’s geospatial awareness of position, sensitivity to radio waves, and perception of acceleration rivaling even the most well-tuned ear, not only suggest that this new-found intelligence is an entirely nonhuman one, it further distinguishes these devices from the lineage of electric speech that began with the telephone. In some sense, the history of all media is a history of mobility, of new mechanisms for the movement of thoughts, sounds, and images. But in substituting the sharing of “structured” images—either interfaces of operation or optical codes processed by machines—for auditory exchange, the mobile phone distributed the telephone’s network of signal processing out into the world, to segmented symbols providing a link not just between the physical and the digital but between the human and nonhuman (with the same sense of “structure” described in Heidegger 1977). Moving in the world, the mobile camera-phone constructed a world that could itself be made mobile.

Cellular Structures

While the camera on a driver’s phone is the one featured in Flex’s training videos, it is not the only camera on which the system depends. Less obvious are the orbiting imagers responsible for delivering satellite views routing drivers to their destinations. Like the structured images of the barcode, these are not pictures produced to join the world together. They serve only to take it apart. A view from everywhere and nowhere, these stitched tiles of pixels separate the planet into a grid that covers every hill, valley, ocean, and island. Brought into a singular frame, it is captured in the confines of an objectivity that demands a particular kind of object.

Logistics is a “matrix of rationality,” and the grid is one of its most fundamental structures (Cuppini 2018). Fred Moten and Stefano Harney trace this relationship to the carefully ordered architectures of the slave ship (Harney and Moten 2013; see also Cuppini and Frapporti 2018), while Bernhard Siegert (2015, 98) describes how Le Corbusier’s cellular architectures, hundreds of years later, proposed extending “forms of standardization” to the entirety of existence—reconfiguring the “dwelling, the office, the workshop, the factory” in the extruded shape of the skyscraper. The grid, Siegert

writes, is the “medium that operationalizes deixis,” linking “deictic procedures with chains of symbolic operations that have effects”—sometimes quite profound ones—“in the real” (2015, 98).

As a structure, the grid accomplishes two critical things. First, it normalizes—to various degrees—the geography over which it is laid. This is not to say that it makes the features of that geography identical, but rather that it *permits* difference by presupposing identity in their *function* in the cells. In describing the role of the Seven Ranges Survey in “designing” the western United States, Siegert (2015, 114–118) notes that the survey grid was based on repeatability. Its “projective nature” is what allowed territory to be divided up, sight unseen. As a “cultural technique aimed at dominating space,” the grid could be “cast across the land,” opening the West for operationalization by the East. Settlements were no longer “centers that may undergo centrifugal expansion,” but “cells in a homogeneous grid covering the entire territory.” As a result of this “Ptolemaic grid” of latitudes and longitudes, Siegert argues, the “transformation of America into one nationwide suburb was preprogrammed.”

The second function of the grid is to index and (as a consequence) to provide a function of location. Writing of the Bauhaus architect Ernst Neufert, Siegert (2015, 115–116) recalls that he “outlined a method for the complete standardization and totalization of the grid on all scales.” Anticipating “the linkup of matrix screen and global coordinate system,” Neufert’s grid enabled (on a planetary scale) the ability to index the exact location of individual buildings and (on a smaller one) the size and position of each object within them. With each index so defined, the objects that filled the space were standardized such that what constituted a building had *become* what would fit into the grid. As a result, it was axiomatic that “any new building would fit as seamlessly into any new settlement as any door into any door frame or any piano into any drawing room” (116). Once the grid has been laid, once its cells have been indexed, the expected value of their contents become defined—regardless of whether the space is yet occupied. The ordered structures that descend from these comparatively primitive forms cascade into an expanding polygonal fractal of possibilities for the range of their connective movement (see Krejewski 2011; Rossiter 2016). But while their cells approach perceptual smoothness, closer inspection shows only an asymptotic array of well-defined, standardized edges. They are revealed as just the latest iteration of the “totalizing, frequently fantasmatic standardization projects” that have sought to rationalize the twentieth century (Siegert 2015, 116).

It is in this way that cellularity prefigures the digital. Indeed, Alexander Galloway (2014, 68–69) notes that while the analog is “the universe of proportion, of continuous variability,” the digital “is the universe of separation, alienation, distinction, division,

and making discrete.” In the “flat digitality” of grid screens like the “montage of closed-circuit security camera feeds,” “video compression codes,” or “computer desktop with its multiple parallel and overlapping windows” we find structures that are “no longer images.” They are merely “aggregations of cells that combine and coordinate to create some kind of whole.” Opposite this, he argues, stands the “deep digitality” formed by a “reduplicative multiplexing of the *subject*.” While in flat digitality the object is cellular, in deep digitality it is the subject who is cellular. Initiatives like Amazon’s Mechanical Turk attempted to distribute labor *out* onto cellular objects, objects that had been carved into “thousands of bits” for Turk’s “human intelligence tasks” (see Rossiter 2016, 130–131; Scholz 2016, 8). In producing a cellular *subject*, Flex operates in the reverse. It constructs an actor who is capable of acting digitally on what are otherwise analog objects—one who can indeed be redistributed or reconfigured on demand. It is indeed the case that the cellular prison “arranges things in such a way that the exercise of power is not added on from the outside, like a rigid, heavy constraint . . . but is so subtly present in them as to increase their efficiency by itself” (Foucault 1977, 206).

As far as Amazon is concerned, it is the production of this cellular subject that serves to “make digital” the material flows of an analog world. In the history of logistics, the “intermodalism” of the standard cargo container allowed distribution to be seen as an integrated system because the container was not just a vehicle for the efficient movement of materials but one that could itself be more efficiently moved (Cowen 2014, 40–44). Benjamin Bratton (2015) has argued that one of the critical characteristics of the accidental megastructure he calls “the stack” is the way in which it orders components for assembly into “higher order systems” (45, 81). Here, a device like the mobile phone is not only a vehicle for the movement of materials but one that can be upgraded. It provides mechanisms for standards-compliant interfacing to the various subsystems of the stack by (among other things) making labor more accessible to the Amazon Store’s software systems, with a cellular subject linked not just to radio waves but to an infrastructure designed to ensure compliance with neoliberal demands for a flexible, mobile, networked worker. The result is that for a company already efficient in digital design, there need be no difference between delivering bits for Prime Video and bins filled with Digital Video Discs. Amazon does not need to deal with the world, only with the “world in miniature.” Dematerialized and discontinuous, the “geography of the screen” replaces the analog landscape with a digital network that surfaces only those necessary points of contact (Dodge 1999, 7). Like links in a chain conditioned for contingency, this brings a kind of generalized departure that mirrors Virilio’s “generalized arrival” (1997, 16). The real is replaced by the virtual. Everything seems to have left without having to arrive. Logistics becomes just another software problem.

Conclusion: Cellular Futures

In the last decades of the twentieth century, management formalized a model through which global capital came to direct an unprecedented scale of productive assembly. The result was a singular and total unit of managerial analysis—the supply chain. While the elements that the supply chain operated on were not in themselves new, the changes brought by “supply chain capitalism” lay in the infrastructural and managerial requirements it set out. Contemporary production was no longer composed of siloed sites of assembly. It was a “networked enterprise,” tightly coupling suppliers and distributors to maximize the efficiency of every productive process. It defined an order of operation with associations formed by arrangements of subcontracting and outsourcing; a new mobility of labor; and an overriding logic of flexibility and interchange. As Anna Tsing (2009, 148–176) suggests, these sorts of changes have provided capital with “a model for thinking simultaneously about global integration, on the one hand, and the formation of diverse niches, on the other”—standardization and connection, and only at the cost of “growing gaps between rich and poor, across lines of color and culture, and between North and South.”

To speak of the cellular is to speak of cells, of divisions and isolation, the discrete and the digital. Cellular capitalism comes with the introduction of a device that renders supply as nodes in the network as easily as it does pixels on a screen. Replacing the messy materiality of the real with the controlled computation of the virtual, it is the outward manifestation of a structure with the inevitable aim of coordinating the worldwide activity of every single connection. The value digital work offers global capital is that it supposedly permits the extraction of value outside of the traditional confines of geography. Proximity, this volume argues, is no longer needed between workers and the objects and subjects of their work. But cellular capitalism extends this logic of efficient immateriality to work that could otherwise be nothing but local, nothing but material. In extending the planetary system of digital production and distribution to the closest connections of the supply chain, it is not just that which is far away that is rendered invisible, but that which has, until quite recently, remained very near.

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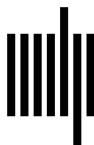
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