Reading the Logistical Surface

JESSE LECAVALIER
New Jersey Institute of Technology

The logistical surface is nimble and adaptable but illegible to its authors. To better understand the implications of this condition, this article makes connections between human and machine systems by looking first to Norbert Wiener and then two related short stories: Rudyard Kipling's "With the Night Mail" and E.M. Forster's "The Machine Stops." The two texts establish political polarities that help to contextualize contemporary logistical worlds while also suggesting ways to discover alternative ones.

Imagine that the white noise of analog television static is actually an image of architecture. Instead of unpredictable records of communicative interference, imagine that the visual information is a controlled series of commands whose execution yields an image stubbornly illegible to its human authors. In one such example, from the world of logistics and fulfillment, the building hardly registers while its contents, in the form of mobile storage units, are continuously repositioned over a vast grid. As opposed to a field condition in which the part-to-part relationships create a dynamic whole, like a flock, global algorithms based on consumer demand govern the field I am describing. Its individual automated components seek out paths of least resistance in a constant process of reorganization that yields not an image of a changing whole but an image of noise. In 2012, Amazon.com spent $775 million on a company called Kiva Systems and transformed it into what they now call "Amazon Robotics." Kiva developed a series of patents for a system of small robotic drive units (RDUs) for use in e-commerce fulfillment centers. Rather than keeping merchandise in fixed locations (encumbering millions of square feet of warehouse space in the process), the RDUs are controlled by a series of floor markers in communication with governing algorithms as the robots seek out mobile storage racks stocked with inventory. The units slide under each shelf and a threaded cam lifts it off the ground slightly and brings it to awaiting human pickers who pull the requested items and add them to the orders they are building (Figure 01).

The process is constant as hundreds of such RDUs continuously reorganize the warehouse floor seemingly without conflict or friction. To the human eye, there is little order to these routines. The robots are directed to deposit their shelves based on likelihood of repeated consumer demand in such a way that shelves with popular items remain close to the picking stations, while less-frequently-ordered items are pushed to the edges. As a result, the plan of the fulfillment center floor is a constantly refreshing, if encrypted, portrait of customer desire.

The automated logistical environment of fulfillment has an order all its own that emphasizes nimble organization over legible form. One of the selling points of Kiva is that investors need not worry about the sunk costs of a warehouse building because their entire operation can be reconfigured or even completely relocated in a matter of days. Compared to the miles of conveyors, racks, and belts of other distribution centers, Kiva's version is nimble, adaptable, and while very large because of requisite economies of scale, has no fixed configuration. Instead, the megaform of a giant distribution center is supplanted by the megaformless. Likewise, at any given moment, the configuration of the racks, still contained by some kind of expedient envelope and organized by a floor, is always different but very likely to be generally the same, controlled as it is by the feedback loops of the RDUs competing with each other as they seek out their assigned shelf (Figure 02). The particles that constitute the interior are in constant motion but not at the expense of the entity as a whole. In this sense, the this automatic architecture is not so much a building but more like a cloud of particles: building as probability (Figure 03).

Figure 1: Interior view of one of Kiva's prototype warehouses. Kivasystems.com automatically redirects to Amazonrobotics.com.

Control, communication, and feedback are, of course, familiar terms and central to the science of Cybernetics developed by Norbert Wiener to account for a large field of investigation that includes, in his words, "the study of messages as a means of controlling machinery and society, the development of computing machines and other such automata, certain reflections upon psychology and the nervous system, and a tentative new theory of scientific method."[1] In *The Human Use of Human Beings: Cybernetics and Society*, Wiener writes that the results of the scientific revolutions of the 20th century meant physics now "no longer claims to deal with what will always happen, but rather with what will happen with an overwhelming probability."[2] While the Newtonian world was mechanical and stable, Wiener's contingent and probabilistic world, pointing to Willard Gibbs and others, is a constant struggle between order and chaos, organization and entropy, signal and noise. These conflicts and their tendencies to disorganization are central to Wiener's concerns and he points to feedback as the "control of a machine on the basis of its actual performance rather than its expected performance" in order to "produce a temporary and local reversal of the normal direction of entropy." He posits the central struggle in control and communication as a constant battle against "nature's tendency to degrade the organized and destroy the meaningful."[3] In the case of Kiva, the levels of command and control themselves have been automated and the result is a set of signals illegible to the authors of the systems that generated them. In other words, while humans wrote the algorithms to produce the dynamic environment of the Kiva Systems warehouse, the order that results is inaccessible without some kind of mediating or decrypting technology. The humans who work in these illegible environments are positioned at the picking stations and respond to input as it arrives, processing information and serving as switches in an item's journey to its next destination (Figure 01).

Logistics understands that every thing is always on the move and that human bodies are no different. For Wiener, "We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves."[4] These issues of information transmission raise questions that Wiener begins to answer by pointing to "a most remarkable" short science fiction story, "With the Night Mail," written by Rudyard Kipling in 1905. The story describes world of the year 2000 and follows the overnight journey of a transatlantic air ship on its way to deliver the mail from London to Nova Scotia. Through indirect exposition, it becomes clear that an organization called the Aerial Board of Control (ABC) is entirely responsible for the planet's governance. The ABC is a "semi-elected, semi-nominated body of a few score persons" whose motto, and indeed the planet's, is "Transportation is Civilization." The narrator of the story confides, "Theoretically, we do what we please so long as we do not interfere with the traffic and all that it implies. Practically, the ABC confirms or annuls all international arrangements and, to judge from its last report, finds our tolerant, humorous, lazy little planet only too ready to shift the whole burden of private administration on its shoulders."[5] There is an ominous utopian dimension to the story in that it suggests the ABC and its management of "the traffic" have largely solved the world's problems and people are free to go about their lives "as long as we do not interfere." Kipling's troubling suggestion that civil
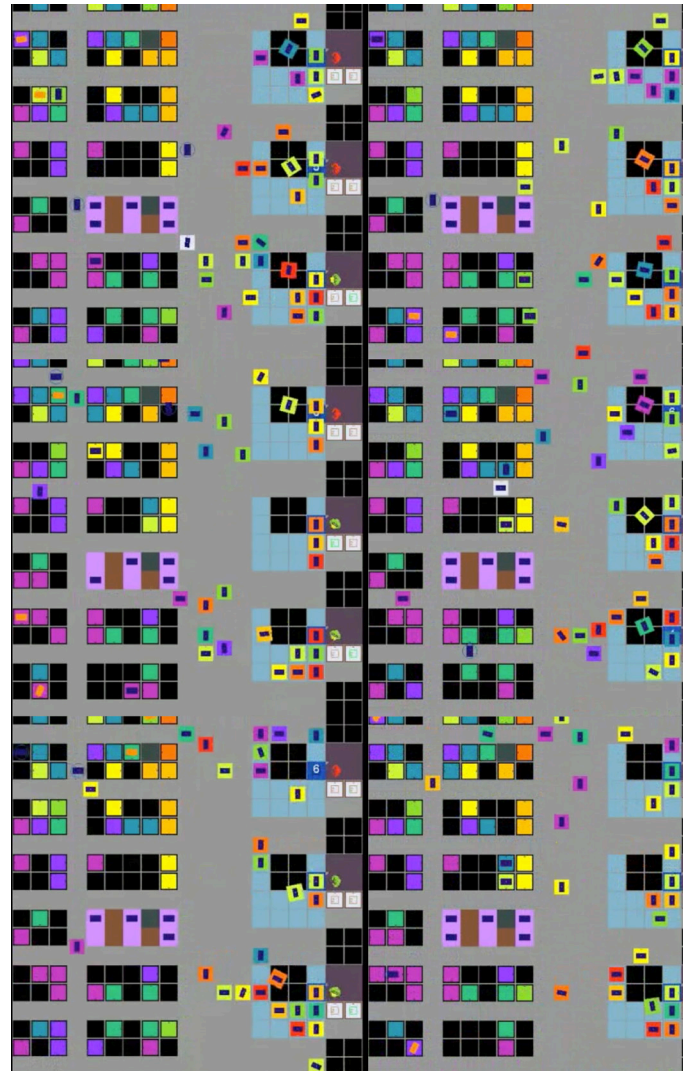

Figure 2: Simulation of Kiva's logistical floor (kivasystems.com).

liberties would be willingly sacrificed for greater convenience or for the ability to satisfy desire quickly resonates with contemporary inventions of privileged mobility like TSA Pre-check or the smart city. Similarly, the implication is that in order not to interfere with the global circulation of goods and information, one must participate in the regime. Thus, non-conforming bodies or populations become threats.[6] Weiner folds in this story because of its emphasis on the importance of traffic but extends it to include not just the movement of human bodies but the "transmission of human information."[7] In a contemporary context, it is exactly the trafficking of human information, including consumer desire and demand for efficiency, that governs the form of a system like Kiva's. It anticipates the processes that collect data and monetize attention in contemporary interfaces like Amazon, Google, and Facebook. This information, in turn, drives much of the logistical processes and, in the consumer realm, is linked to extraction, production, and distribution. In other words, the traffic and all that it implies. "With the Night Mail" is concerned with the details of trans-Atlantic mail transport but gives no suggestion of the implications of the rule of the Aerial Board of Control and only hints at a

world in which transmission of information and traffic flow have come to dominate other concerns.[8] This emphasis on a planet governed by logistics suggests another story written a few years later, also about a global system of control and communication: E.M. Forster's "The Machine Stops" from 1909.

"The Machine Stops" describes a world in which inhabitants occupy automated subterranean mega-cities and, freed from the demands of physical labor, devote their energy to the life of the mind. Residents share ideas through sophisticated interfaces and rarely leave their living chambers because, from their point of view, they have little need to do so. Early in the story, Vashti, a protagonist of the story and mother to the other central character, derisively acknowledges, "Of course she had studied the civilization that had immediately preceded her own – the civilization that had mistaken the function of the system, and had used it for bringing people to things, instead of for bringing things to people."[9] Indeed, the Machine is a kind of planetary Kiva System; a robotic building at the scale of the planet capable of delivering goods and services to its residents almost immediately. Inhabitants come to deify the Machine even as it breaks down and, while there is an alternative life on the surface of the planet, the Machine's residents are helpless to escape. Like Kipling, Forster anticipates a number of contemporary conditions around communication. While the surging and heaving crowds in Kipling are the symptoms of mob rule, the contact of flesh is redemptive and elusive for Forster. Indeed, the world of the Machine is one in which the human race is infantilized to such a degree that he even suggests imagining Vashti, as a "swaddled lump of flesh … without hair or teeth." By contrast, her son Kuno is bodily, vigorous, gets cut, hurt, bleeds. He is a thermodynamic swirl of pressures, indeed a "whirlpool." Kuno finds his way to the planet's surface, only to be caught by the "mending apparatus" and returned the Machine to be punished.

I include both of these stories in the context of a discussion about automated logistical environments because they not only share striking renditions of logistical futures but they also establish political polarities that help to contextualize Wiener's cybernetic speculations and to consider the role of the built environment within them.[10] In both cases, the systems that underpin each world are as ubiquitous as they are invisible. In "The Machine Stops," as with infrastructure more generally, only as elements begin to fail do its inhabitants become aware of them. In Kipling's case, mechanical malfunctions are few and part of the cost of ensuring the smooth "flow" of traffic. While both of these examples are works of fiction that describe worlds in which movement of information is central, they also point to the ways that "flow" is an operative fiction in contemporary life. That same productive fiction that obscures the effects of logistics just as it naturalizes its processes. Goods within a supply chain do not flow of their own accord but are carried along, actively and with great and unfairly demanded effort. With the implication of the gravitational force that directs flows, comes also an image of the globe, a planetary imagination in which goods, people, and capital flow freely. In the case of the floor of an Amazon Robotics warehouse, the localized response of each RDU takes the metaphor of flow away from us. Haltingly and in apparent disorder, the material being sorted offers a new image, one of entropy in reverse in which out of the clutter of the noise
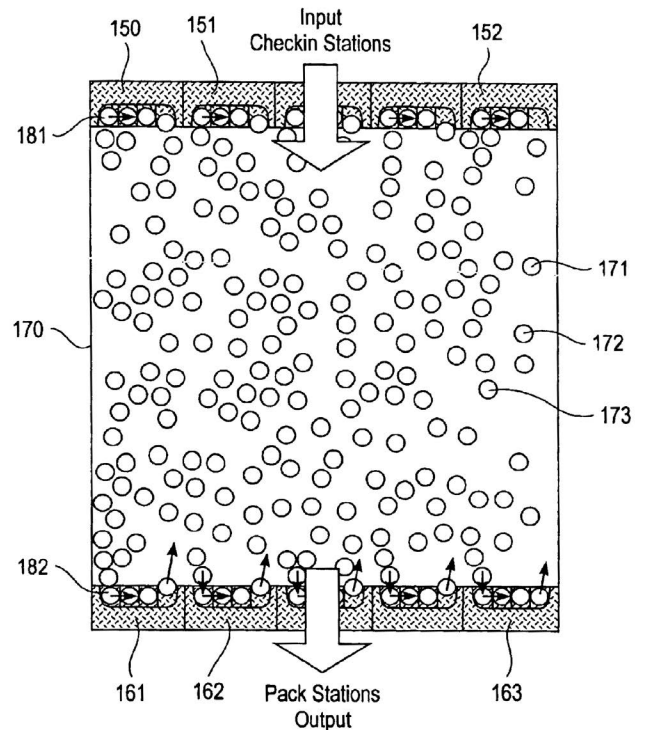

Figure 3: Coordinating software determines the paths for robotic drive units used in distribution centers; RDUs do not follow fixed paths. Source: Distrobot Systems, "Material handling system and method using mobile autonomous inventory trays and peer-to-peercommunications," U.S. Patent 6,950,722 B2, 2005, 8.

of the floor, order emerges in the form of the desired item. Amazon Robotics allows its RDUs to organize its warehouse flow but in keeping with patterns of logistics, these impulses tend to remain consistent at different scales suggesting a similar set of performance criteria also govern the structure of the built environment. In trying to understand and engage that environment, the search for an expanded repertoire of approaches becomes important. If we can no longer read what we write, even if indirectly, how then do we judge its content? While the implications of Kipling's story are menacing, he includes a puzzling additional layer to the work's publication that suggests a more chaotic and exuberant response to traffic and its implications.[11] The full title of the text is *With The Night Mail: A Story of 2000 AD (Together with extracts from the magazine in which it appeared)* and the publication includes almost as many pages dedicated to a range of supporting material, including letters to the editor, classified ads, and advertisements that suggest the story's world through the fragment. For example, under the heading, "Safety Wear for Aeronauts," advertisements for "High Level Flickers" (Figure 04) describe some kind of safety clothing but with the technical language of insider knowledge: "Our trebly resilient heavy kit is the ne plus ultra of comfort and safety. Gas-buoyed, waterproof, hail-proof, non-conducting Flickers with pipe and nozzle fitting all types of generator. Graduated tap on left hip." Such indirect signals, out-of-place objects, and mysterious fragments suggest larger wholes and offer a model for imagining future scenarios and counter scenarios.

ENDNOTES

1. Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Da Capo Press, 1954), 15.

2. Ibid., 10.

3. Ibid., 24-25.

4. Ibid., 95-96.

5. Rudyard Kipling, *With the Night Mail: A Story 0f 2000 A.D. (Together with extracts from the contemporary magazine in which it appeared)* (New York: Doubleday, Page & Company, 1900), 46–48.

6. For an in-depth analysis of the violence central to the industry of logistics, see Deborah Cowen, *The Deadly Life of Logistics* (Minneapolis: University of Minnesota Press, 2014). *In The Undercommons: Fugitive Planning and Black Study* (Brooklyn: Autonomedia, 2013), Stefano Harney and Fred Moten write, "Logistical populations will be created to do without thinking, to feel without emotion, to move without friction, to adapt without question, to translate without pause, to connect without interruption, or they will be dismantled and disabled as bodies in the same way they are assembled" (91).

7. Wiener, 104.

8. For that, see Kipling's 1912 story, "As Easy as A.B.C." This story is a sequel of sorts that concerns the suppression of unrest in the city of Chicago. In Kipling's renditions, crowds have formed ("for the first time in 19 years") to protest the activities of a group of advocates for democracy. After temporarily immobilizing the city's population in a terrifying show of force, the offending organizers are imprisoned by the ABC and sent to London to become part of a theater troupe. Kipling scholars point to this story as evidence of his authoritarian leanings but out of context it reads as dark satire of the dangers of libertarianism and of the banality of logistical evil.

9. E.M. Forster, "The Machine Stops," first published in the *Oxford Cambridge Review*, 1909. Available at http://archive.ncsa.illinois.edu/prajlich/forster.html (accessed May 25, 2015).

10. The connection between Kipling's and Forster's stories is indirect, though Forster would have been aware of the work as evident in his critical lecture on Kipling's poems from 1909. For a detailed analysis of the lecture, see Michael Lackey, "E.M. Forster's Lecture "Kipling's Poems": Negotiating the Modernist Shift from "the authoritarian stock-in-trade" to an Aristocratic Democracy," *Journal of Modern Literature*, Volume 30, Number 3, Spring 2007: 1-11.

11. Available at "Forgotten Futures" (http://www.forgottenfutures.com).

Figure 4: Fictional ad for logistical work clothes from *With the Night Mail*.