CULTURAL ANTHROPOLOGY

TOKYO'S COMMUTER TRAIN SUICIDES AND THE SOCIETY OF EMERGENCE

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As the train slows to a halt between stations, commuters wait with dreaded anticipation for the familiar announcement: "Currently, due to the effects of a [human] body accident, this train has stopped. We apologize for any inconvenience and hope to resume service soon." Every commuter has learned to decode the otherwise indeterminate expression "[human] body accident" (*jinshin jiko*). Composed of the Chinese characters for "body" and "accident," the four-character term is a general classification for any incident involving human injury or death as a result of a mishap with a vehicle. Commuters know, however, that in the context of the commuter train network "[human] body accident" almost always means that someone has committed suicide by jumping in front of a train. They have learned as well that if the announcement does not mention a rescue under way, then train service will most likely resume within approximately 40 minutes. For the unlucky commuters trapped in rush-hour trains stopped between stations, which can be packed to over two hundred percent beyond capacity, 40 minutes is a very long time. The time is passed in a silence punctuated only by the odd status announcement from the conductor and the soft clicking of smartphone keys as commuters correspond with employees, employers, friends, and family, informing them that "yet again" they will be late because of a *jinshin jiko*.

For almost as long as there have been commuter trains in Japan, there have been commuter train suicides (Freedman 2011). With the onset of the postbubble recession in the early 1990s and the ensuing financial hardship, the number of

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commuter suicides in Japan in general and Tokyo in particular rose significantly. They have remained high since, bringing one or more commuter train lines in the greater Tokyo metropolitan area to a grinding halt almost daily.[1] As one contributor to an Internet news forum remarked with unveiled exasperation in 2007, "Not a day passes without a report appearing in the newspaper of delay on one train line or another as a result of 'bodily accident.'"[2] This is despite threats from train companies to hold surviving family members responsible for lost revenue and damage to infrastructure—compensation that would be far beyond the financial resources of a typical family.

Commuter train suicides are, of course, hardly unique to Tokyo or Japan. In Tokyo, as elsewhere, they disrupt the morning routine, invoking more exasperation than sympathy from commuters. Insofar as there is specificity to suicide in Tokyo's commuter train network, it derives from the extent and nature of the disorder effected by the event rather than from its causes. To live in Tokyo is to live on and by the commuter train network. Its web of interconnecting commuter and subway lines dominates the urban topography, providing the primary means of transportation for upward of 20 million commuters a day. Halting the traffic on a single line for an extended period of time, a commuter train suicide precipitates a disorder that quickly metastasizes throughout the network and city, disrupting the rhythm of urban life. This disorder of the network is known as "disorder of the [train traffic] diagram" (*daiya no midare*), and it is announced via station information boards, television, radio, and newspapers. The *daiya*, as I show below, is a dynamic schema of the discursive and nondiscursive forces that continuously make and unmake the lived experience of the urban. It is an articulation of the technological ensemble as a provisional ordering of heterogeneous realities—time, bodies, and machines—around a margin of indeterminacy constituting a second-nature techno-social environment that is experienced as the natural milieu. What makes the disorder of the diagram caused by the commuter train suicide distinct from other forms of *daiya no midare* (resulting, for example, from technological malfunction or unanticipated overcrowding) is not its gesture to a beleaguered soul and will to death—since no one seems to care about that—but that the disorder radiates outward from a body on the tracks.

My underlying concern in this article is how the commuter train network thinks *daiya no midare* (the disorder of the diagram) precipitated by the body on the tracks. The idea that the commuter train network thinks disorder draws on a philosophy that understands technology as part of the inherent infrastructure of thought. Technology, by this approach, constitutes a machine assemblage organizing

material and immaterial flows meshing with the structure of human thought and experience.[3] Or, as Thomas Lamarre succinctly suggests in a work that draws on a similar theoretical trajectory, this means treating the machine as a "heteropoietic [human and technological] process in which human thinking happens differently than it would otherwise, in another flow of material forms and immaterial fields" (2009:301). Applying this approach to the question of disorder and commuter train suicides involves considering how the specific sociotechnical environment and network topology of the commuter train network informs the manner in which the disorder of the commuter train suicide is thought. At the same time, it means calling attention to the way in which the body on the tracks figures as a certain limit to as well as a possibility for different ways of thinking human and technological relations.

In this context, I am especially concerned with the development in the 1990s of a new technology for managing the *daiya*, called the "Autonomous Decentralized Transport Operation Control System," or ATOS for short. Developed by the East Japan Railway Company (JR East), the largest commuter train operator in Tokyo, soon after the company was formed from the privatization of Japanese National Railroads (JNR), ATOS combines advanced information technology and communications with the conventional commuter train apparatus to transform the commuter train network into a type of "smart" infrastructure. "Smart" infrastructures like ATOS are at the forefront of projects throughout the world to build so-called intelligent cities, often just called "cyborg cities" (Mitchell 2003). Such projects envision the city as a form of an emergent, living organism, in which the symbiotic interaction among distributed systems enables the city to sense and respond as a global entity to changes in its internal milieu. Evoking early-postwar organicist urban imaginaries inspired by cybernetics such as Japan's Metabolist movement, the "smart" city constitutes something of a neo-organicist materialization of urban space. As such, it replaces a 19th-century organic, anatomical model that stressed urban organization around commodity exchange with a neurological model emphasizing density of connections and information flows (Gandy 2005). As Matthew Gandy points out in an astute analysis of this neo-organicist vision, the smart city can be a difficult phenomenon to critique. Fulfilling in many ways a kind of Deleuze and Guattari imaginary of social space as rhizomatic flows, it seems a highly progressive human–machine hybrid that encourages spontaneity over determination in an embrace of chaos as a protean force. Accordingly, "chaos," Gandy writes, "is no longer seen as an anomalous dimension to the urban experience to be problematized or excluded from analysis but a rich vein of social and spatial

interaction through which we may perceive signs of alternative or hitherto overlooked urban forms" (2005:31). While critiques of the neo-organicist city have focused mainly on the way in which the flow of information and access to resources around smart infrastructures is often limited by politically and socioeconomically structured inequalities (Graham and Marvin 2001), the question of how ATOS thinks disorder vis-à-vis the problem of commuter train suicides attends directly to the currency of chaos. What it reveals is that it is not chaos per se (nobody wants a city of chaos!) but rather emergence that is the valued condition for realizing the "rich vein of social and spatial interaction." By emergence, as I explain below, I am referring to a particular way of conceptualizing networks that draws from a theory of emergence with roots in postwar cybernetics and post-1970s complex systems theories developed in relation to research in artificial life. Emergence, I show, elevates the living organism to an exemplary paradigm of resilience based on its perceived distributed physiological topology and corollary capacity to treat irregularity as part of an unfolding regular order and environmental condition. While emergence makes the fabrication of distributed infrastructure an economic imperative, it also, I argue, rethinks the disorder of the commuter train suicide within a new economy of life as an irregularity that is part of the everyday precarious order rather than an expression of modern urban malaise. It does so by corporealizing the commuter train network in the effort to transform it into an emergent entity within a society of emergence.

THE SOCIETY OF EMERGENCE

Organic paradigms and the subject of suicide recall, of course, the work of Émile Durkheim. It was Durkheim's (1966) seminal study that transformed suicide into a critical heuristic for society, and it was Durkheim (1984) who refined the biological analogies of the social that were popular in his time into the notion of an "organic solidarity," predicated on the idea of modern society born of a division of labor. According to Keith Sawyer, what is far less understood about Durkheim is how his work on suicide represents an "empirical demonstration" of emergence and can thus be read as an incipient move toward establishing a "sociology of emergence" (2005:104). Emergence, Sawyer argues, is a central theme throughout Durkheim's work and is expressed in the tension that underlies his notion of "sui generis": "Society is not just a sum of individuals, yet social facts arise out of the joint activity of individuals. Society emerges from individuals in interaction, yet social structure then becomes autonomous and external to individuals and exerts causal power over those individuals" (Sawyer 2005:105). Sawyer goes on to argue

that Durkheim's ensuing concern with the question of how the social order, once emerged, is maintained and reproduced, rather than how it is continuously subject to further transformation, is what obfuscated his importance as a foundational theoretician of social emergence.

The kind of emergence that Sawyer is ultimately interested in, however, is not that which is suggested by Durkheim's notion of "sui generis" but rather by theories of emergence stemming from research into complex systems in the 1990s. Such theories of emergence, as Sawyer explains, owe much to advances in computer technology at the time, which allowed for modeling multiagent, nonlinear, dynamical systems. They were also the product of a unique convergence in dialogue among biologists, economists, and artificial life (Alife) computer scientists in research hosted by the Santa Fe Institute, which is a historical moment that I return to later. As Sawyer notes, there is no unified theory of emergence. The concept encompasses, rather, a broad range of approaches with roots in mid-18th-century discussions of evolution and postwar cybernetics. Nevertheless, emergence can be understood generally as referring to the self-ordering protean creativity immanent to a decentralized network topology. The basic idea is that a complex global behavior or organizing pattern not implicit to an initial pattern of relations emerges from a simple network of distributed components. Accordingly, emergence is understood to be spontaneous as well as more prominent at the "edge of chaos" (Sawyer 2005:3).

Sawyer's use of Durkheim is ultimately a rhetorical tactic meant to establish a premise for incorporating contemporary theories of emergence into sociology as an explanatory model for complex social relations. Insofar as his argument provides a helpful summary of theories of emergence, his desire to exploit emergence is perhaps even more significant for the manner in which it demonstrates the rising appeal to the concept in recent decades as a governing trope, an experience, and an organizational imperative. Indeed, since the mid-1990s emergence has become a ubiquitous term. Predicating the decentralized network as an organizational imperative, a paradigm of emergence, and an inherent emergent paradigm, theories of emergence are behind discussions of emergent economies, emergent social media, and so on. In anthropology one could say that concern with emergent phenomena has displaced the discipline's preoccupation with vanishings; and, in the broader domain of social theory, emergence seems to have usurped the attention once devoted to questions of Hegelian dialectics.[4] While such dialectic denotes a kind of emergence, it is not the same as the emergence theorized in relation to complex systems. Whereas the former demands accountability in imaging confrontation

between two forces, the latter insists that the future is ultimately the outcome of forces too numerous to comprehend or control. Dialectics, moreover, premises a negative engine of operation that limits emergence to specific historical moments (Combes 2013:11). Put differently, dialectics invokes struggle under the premise of "organized domination" (Marcuse 1962), whereas emergence evokes the force of disorder in the "organization of uncertainty" (Power 2007).

Sawyer's appeal to emergence as an explanatory model conveys the sense that emergence is both intuitive and inevitable. We have always been a society of emergence, his argument suggests, but were simply unable to recognize this without the aid of advanced information technology. Rehearsing a kind of technological determinism, the argument obfuscates deeper historical conditions whereby emergence becomes thinkable as an ideal process in relation to certain socioeconomic restructurings and corollary concerns with resilience. The connection between theories of emergence and information technology goes beyond the logic of an auspicious technologically delivered epistemological alliance. Eran Fisher (2010), for example, draws attention to an alliance between neoliberal theory and computer sciences around the notion of emergence. Similarly, in an argument that I come back to at a later point, Melinda Cooper (2008) alludes to another historical alliance around emergence at work in the convergence of biotechnology, neoliberalism, and complex systems theory.

I want to suggest in the following that ATOS and the question of disorder posed by the commuter train suicide offers us another dimension of the relationship between emergence, technology, and political economic ideologies. What we find with ATOS is not a model of emergence but rather an attempt to instantiate emergence that begins with a shifting political economy and the problem of infrastructure resilience.

EMBODYING DISORDER

The majority of commuter train suicides in the greater Tokyo metropolitan area occur on train lines operated by JR East (Sato 2011). Formed in 1987 as a result of the privatization and breakup of the once massive Japanese National Railways (JNR) into six JR passenger railroad companies, JR East is the largest commuter train operator in the Kanto region and the most financially lucrative organization within the JR Group. Privatization of JNR was a long drama ostensibly sparked by a failed campaign to rationalize railroad labor called the "Productivity Improvement Program" (*marusei undō*), initiated by the government in conjunction with JNR management in the late 1960s (Weathers 1994). But as with most

major changes with vast social and economic repercussions, there was no single, dominant cause or ideology behind the privatization of JNR. It began as an iconic battle in the struggle over Japan's transition from an industrial economy to a service and information economy in the 1970s. By the time that Japan's bubble economy collapsed in the early 1990s, however, the privatization came to exemplify the kind of radical social and economic reforms advocated under an embrace of neoliberal theory. This final reorientation is distilled in JR East's scrapping of JNR's guiding principle, "improve the welfare of the general public," in favor of the more economically oriented goal, "respond to market needs and establish effective management" (Ishikawa and Imashiro 1998:2). If the new motto imparts a neoliberal style shift from social to purely economic concerns, it also reflects a shift from thinking the commuter train network as an active or determinate apparatus to perceiving it as a responsive, interactive technology. Whereas in the former the commuter train network is thought to mediate a liberal ideal—improve the social sphere—in the latter it is perceived as mediated by economic activity and responding expeditiously. Importantly, JR East's strategy in dealing with commuter train suicides has conformed to this latter approach, with the company tending to adopt unofficial or inconspicuous measures to manage the problem. For example, sometime in the early 2000s, JR East installed mirrors at the front end of train platforms in a number of main stations in Tokyo and increased platform illumination. The mirrors, according to the JR East public relations official with whom I spoke in 2004, are intended to encourage potential jumpers to pause and "reflect" (*hansei suru*) on the ramifications of their actions, while the illumination is meant to chase away dark thoughts that might overcome commuters waiting for a train in the lonely hours of the evening.[5] In attending to the possible psychological repercussions of drivers and station personnel exposed to the traumatic event of someone jumping in front of the train, JR East management has encouraged an unofficial in-house practice whereby personnel involved in the incident are taken out drinking at the end of the day by their fellow workers. None of the above tactics has done much to reduce the number of commuter train suicides. However, somewhat paradoxically, as we will see, they appeal to the psyche of the commuter and train company personnel at a time when JR East has adopted other measures to manage commuter train suicides as physiological incidents.

A commuter train suicide brings a train line to an absolute and immediate halt, creating disorder of the *daiya* (*daiya no midare*). That such disorder is about far more than trains is intimated in the observation by Yuko Mito (2005), the author of a remarkable historical analysis of Japan's railroads, that the *daiya* is an implicit

index of the social order. On one hand, Mito's observation bespeaks the centrality of the *daiya* in everyday urban life. Although the *daiya* itself does not circulate among commuters, it commands their constant attention. Everyone knows of the commuter *daiya* and everyone remains perpetually aware of its condition via posters in trains that keep them informed of upcoming *daiya* revisions (*daiya kaisei*), and morning television and radio news provide regular *daiya* updates. On the other hand, Mito is drawing attention to the *daiya* as an expression of vast collaborative labor distributed across the city and nation. As Mito puts it, that labor embodies "the workers at power-generating facilities and the families of those workers who feed and support them . . . [the workers in] supermarkets and other infrastructures of circulation that support those families."[6] Disorder of the *daiya* unfolds as a massive disjuncture at the heart of the urban collective. To understand this, one needs to grasp the logic of the *daiya*.

Daiya is short for "traffic diagram," which is a universal technology for managing traffic flow within a transportation network that operates within stringent spatiotemporal parameters. Railroads and airports use traffic diagrams, whereas expressways and highways do not. In a railroad traffic diagram, the movement of trains is plotted on a horizontal axis of time and a vertical axis of stations (see Figure 1) (Tomii 2005). Each train line has its own *daiya*, and each line of the diagram represents a single train, with the angle of the line indicating the specified speed of the train on sections of track—the more vertical the line, the faster the speed; and the more horizontal the line, the slower the speed. In addition to providing a schematic of the actual track layout, environmental conditions (slope, curves), and signal locations, a train traffic diagram specifies the different types of service (local, express, semi-express), different train technologies, and allotted stopping times at stations. In sum, the *daiya* determines the spatiotemporal order of the commuter train network in addition to providing everything railroad operators need to know in order to operate the train.

Of course every train network uses a traffic diagram of some sort. What makes Tokyo's train *daiya* exceptional is the incredible attention that network operators devote to it as a means of transporting daily a number of commuters far beyond the infrastructural capacity.[7] In tangible terms, the latter condition means that a train car designed for a maximum capacity of 160 people will typically be crammed with between three and four hundred commuters. What is more, to accommodate the city's commuters, especially on main lines, train companies need to stream one train after another with an absolute minimal gap between them, sometimes as little as one minute and fifty-eight seconds between trains. A delay introduces a vicious

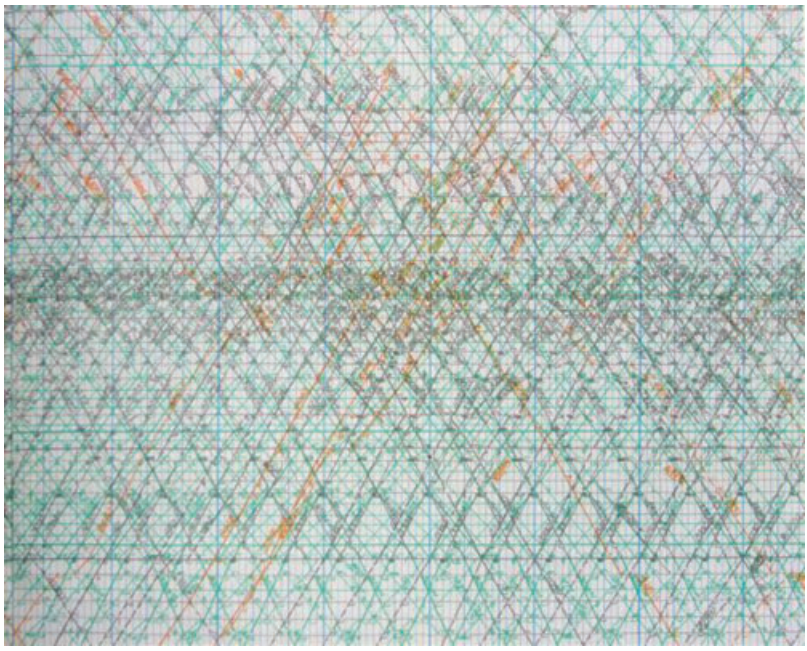

FIGURE 1. A section from a *daiya* representing two hours of train traffic on one train line (Tomii 2005).

cycle, leading to platform crowding and more delay, which naturally causes more platform crowding and so on. Tokyo's commuter train network is thus a system operating beyond capacity and on the verge of perpetual collapse. It is a system that should not work but does, only just barely by virtue of a delicate scripting of the techno-social relation in an immensely precise *daiya*.

But absolute precision is not exactly how the system works. It works, rather, because it enfolds a margin of indeterminacy that allows it to be both precise and imprecise. In the words of an information scientist involved in developing technologies of the *daiya*, this is the "secret" of the *daiya* (Tomii 2005). While commuters in Tokyo tend to think of the *daiya* as a single, determined object not unlike a schedule, it is actually a dynamic schema composed of two components, a "principal" (*kihon*) *daiya* and an "operational" (*jisshi*) *daiya* (Tomii 2005). The former is an idealized configuration of traffic flow, and the latter, as the name suggests, is a general reflection of the overall fluctuating circumstances of actual train operation. Whereas the principal *daiya* references the temporality of clock time and delineates a schedule, the operational *daiya* reflects the tempo of the network. Neither the principal nor the operational *daiya*, then, is a precise representation of the actual

circulation of people and machines within the network. The activity of the network, rather, is everything that occurs in the interplay between the lines of these two diagrams. This dynamic property of the *daiya* is what leads *daiya* technicians and system operators to declare that "the *daiya* is a living thing" (*daiya wa ikimono de aru*) (Eguchi 2008:103).

Again, while this is not entirely different from the processes of other railroads in the world and in Japan. What lends the Tokyo commuter train network its specificity is its operation beyond capacity, whereby the entire focus of railroad operators is not on maintaining precision per se but rather on maintaining the precision of the margin of indeterminacy. The margin of indeterminacy is the space and time of the human and machine interface. Put differently, it is the dimension in which bodies and machines, with their incommensurable qualities (technicities), intersect with the time and space of institutionalized regularities to produce a metastable techno-social environment of everyday urban life. In other words, it is a dimension of perpetual precarity that is held together by collective investment in the security of repetition and routine. Disorder of the *daiya* threatens that configuration. Disorder, however, can be aligned with different determinations.

Around the same time that there was a significant increase in the number of commuter train suicides, there was also a noticeable change in the terminology deployed to announce the incidents. Throughout the postwar years and up until 1990, commuter train suicides were invariably reported in newspapers and station announcements as "suicide by jumping into [the path of the train]" (*tobikomi jisatsu*). In the early 1990s, however, the term "bodily accident" (*jinshin jiko*) appears and begins to displace, albeit never entirely, that idiom. The term is actually an abbreviation of *jinshin shōgai jiko,* which roughly means "an accident resulting in bodily injury." As part of new operational directives, it was officially introduced into railroad parlance for commuter suicides when JNR was privatized. Entitled "Regulations Regarding the Reporting of Railroad Accidents" (*tetsudō jiko nado hōkoku kisoku*), the directives specify four accident conditions: entering the track area (*tachiiri*), falling from the platform (*tenraku*), contact with a train entering the station (*sesshoku*), or committing suicide (*tobikomi jisatsu*) (Sato 2011:3). The first instance I find in Japanese newspapers of "bodily accident" (*jinshin jiko*) unequivocally associated with commuter suicide is in an article from *Asahi Shimbun* in May 1991 that reports on two incidents in the same day, one on the Tōkaidō Line and another on the Yokosuka Line.[8]

We can read this recourse to new terminology as an attempt to gloss over the difficult problem of commuter suicides. Alternatively, we can see it as announcing

a shift in emphasis from mind to body—or, more specifically, from psychology to physiology. Such a shift is articulated in the difference between newspaper accounts of *tobikomi jisatsu* and *jinshin jiko*. While it is not unusual to find details of the jumper's life and references to motives such as mental illness, employment, or relationship problems in reports of *tobikomi jisatsu*, such details and speculations disappear entirely in accounts of *jinshin jiko*. The latter focus instead on the bare symptomatic logistics of disruption. Insofar as numerous examples could be drawn from different newspapers, the following accounts from *Asahi Shimbun* in 1996 provide a concise comparison.

> Shin Keisei Dentetsu Misaki Station, Company Employee Jumps in Front of Train [*tobikomi jisatsu*], Chiba
>
> Just past noon on the 21st of the month at the Shin Keisei Dentetsu Misaki Station in Minami Misaki of Funabashi City, a company employee from the area jumped in front of a Tsudanuma-bound local train that departed from Matsudo. He died as a result of his body being struck by the train. According to the Funabashi Higashi police, the man was distressed about his work and the incident is being considered a suicide. As a result of the accident, three following trains were delayed from five to ten minutes. [April 22, 1996][9]
>
> JR Nambu Line Bodily Accident Kawasaki, Tama Ward/Kanagawa
>
> At around 8:45 a.m. on the sixth of the month a 61-year-old man from the Tama ward of Kawasaki City was struck and killed instantly by the Kawasaki-bound train from Tachikawa City on the JR Nambu Line. As a result of the accident, 14 trains were cancelled and there were delays of up to 45 minutes. According to the Tama police, the man was kneeling on the tracks. The area of the accident is 20 meters from a railroad crossing. [July 7, 1996][10]

The report of *tobikomi jisatsu* leaves no doubt that the cause of the death was suicide and refers to a possible work-related psychological cause. By contrast, the account of *jinshin jiko* mentions only the man's death as a result of being hit by a train, and the ensuing network disorder. There is only a vague allusion to the possibility that the event was suicide in the sentence "the man was kneeling on the tracks." The point is that *tobikomi jisatsu* and *jinshin jiko* invoke different relations of disorder that in the mid-1990s were overlapping and in tension with one another. In the former, disorder is particularized and individual. It is the manifestation of an individual's pathological mental condition and thus commensurable with the expression "disorder of the heart" (*kokoro no midare*), which refers to an

individual's psychological disquiet as a result of tumultuous, uncontainable emotions. The irrationality, not of the action of someone taking their own life, but of the circumstances whereby one person's emotional disorder can create chaos for so many others is the source of commuters' exasperation, which is exemplified in the frequent insistence in web-based discussions of commuter suicide that "if you want to kill yourself, do it in a way that is not troublesome to others!" (*shinitai nara hito ni meiwaku shinai yō ni shinde kure*). What makes the commuter population dispassionate in response to the train suicide is thus not just the frequency of such events but also the presumptuous, inconsiderate, and antisocial behavior of the commuter who involves a city of strangers in his or her personal disorder. By contrast, there is no individual, no pathological condition, and no tragic story in reports of *jinshin jiko.* There is only a body and an ensuing network disorder. The term *jinshin jiko* thus involves thinking of the commuter suicide entirely as a moment of infrastructural failure. In what follows, I look at the manner in which this thinking corresponds with the corporealization of the network through ATOS in order to deal with irregularity as a regular everyday occurrence in Japan's society of emergence.

DISORDER AND EMERGENCE

ATOS replaces a Centralized Traffic Control (CTC) system that has been used in Japan since the late 1950s on the majority of train lines. Developed initially in the 1920s in the United States, the CTC remains the traffic control system used on most railways throughout the world (Isamu 2008). Its structure is straightforward: a human controller located in a Central Command Center (*shireishitsu*) monitors the progress of traffic on a large schematic of the system and issues orders to trains and stations. The controller's objective is to remain as faithful as possible to the principal *daiya*.

Although ATOS maintains a central control facility, the task of the technicians there is to supervise (*kanshi*) rather than manage (*kanri*), which does not leave them with much to do most of the time. In November 2005, I visited ATOS's so-called command center with a group of new JR East employees. Located on the third floor of an unassuming glass-and-steel building situated amid interweaving multilevel highways and train tracks, the ATOS *shireishitsu* is a large room in which information from each train line feeds into an array of computer consoles. In most cases only one technician was present at a console designed for three or four, looking over a printout of the operational *daiya* or clicking randomly through various monitor displays of the system status. At one set of terminals, a group of

young technicians had pushed their tall-back executive-style office chairs away from their stations into a circle, where they sat passing the time in relaxed conversation. Among them, two technicians competed to see who could sink a ball of crumpled paper into a wastebasket the most number of times.

It is important to emphasize that the shift from management to supervision articulated in the move from CTC to ATOS cannot be read simply as the story of a historical shift from a rigid centralized system to a flexible decentralized one. In reality, the complexity and density of traffic on main lines in Tokyo prevented train operators from implementing an absolute centralized control under the CTC, whereas ATOS, as we will see later on, allows for greater centralization of command than the centralized system ever did. In other words, the centralized system was in some ways very decentralized, while the decentralized system can be extremely centralized. The difference I want to stress, then, is the way in which the systems think the gap between the *daiya*. While maintaining a margin of indeterminacy is the crucial focus of both CTC and ATOS, how that margin is conceptualized is very different. Whereas the CTC thinks the gap between the *daiya* as an inevitable but containable force of entropy, ATOS thinks of the gap as a necessary condition of emergence. It does so by inverting the logic of centralized traffic control, shifting emphasis from controlling the principal *daiya* to managing the emergent order of the operational *daiya*.

What does the Autonomous Decentralized Transport Operation Control System look like? As one might imagine, it is complicated. But briefly, under ATOS, command and control follows a principle of "distributed autonomy" (*jiritsu bunsan*) whereby computers in each station manage the flow of traffic in their vicinity. Each station then produces its own operational *daiya* that it shares with surrounding stations (see Figure 2). This shared information constitutes the network's "data field," or operational environment. Whereas commuters were never part of the information loop between the CTC controller and train operators, ATOS enfolds commuters into its emergent order with updated arrival, departure, and delay information streamed in real time to station platform displays, web pages, or smartphone apps. What is more, when commuters waiting for a train hear the familiar refrain, "Momentarily, a Tokyo-bound rapid transit train will be entering the station. To avoid danger please stand back behind the yellow line," it is ATOS speaking to them, warning them yet again of the dangers of commuter life. At the same time, ATOS is listening, responding in real time to changes in the commuter flow in order to organize disorder into emergence. The question is how it is thinking the disorder of the commuter train suicides.

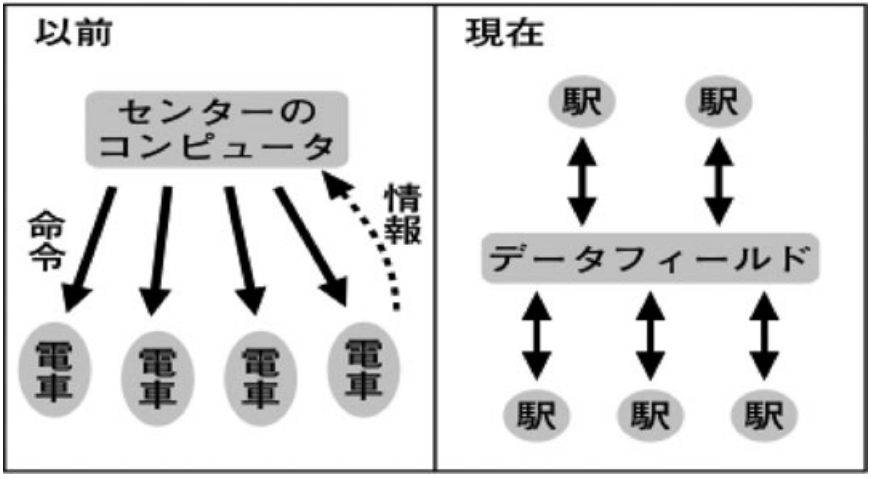

FIGURE 2. Diagram comparing the former centralized system (left) with the contemporary decentralized system (right). The diagram of the centralized system specifies commands flowing unidirectionally from a central computer with a dotted line and arrow indicating tentative information feedback. The diagram of the decentralized shows information flowing bidirectionally between stations mediated by the data field (Yamamoto 2003).

ATOS went online in December 1996 on Tokyo's most crowded and suicide-plagued commuter train line. By March 2005 it controlled JR East's entire Kanto network. Since its introduction, it has not prevented or reduced the number of suicides in the commuter train network. It was never meant to. Rather, ATOS is about managing the disruption of the body on the tracks. Somewhat ironically, if the body is the problem, it is also the solution, because ATOS draws its inspiration from the notion of the body as a decentralized system. As two researchers involved in the development of ATOS write:

> The autonomous decentralized systems are systems in which the functional order of the entire system is generated by the cooperative interactions among its subsystems, each of which has the autonomy to control a part of the system. It is well known that systems with such character are actually realized by biological organisms. The biological systems have the capability to self-organize various kinds of functional order due to autonomous coordination of many system elements. For example, animal movements are generated by the cooperation of many motor neurons which control muscular fibers, and various movements that are suitable for various purposes and environments are realized flexibly. The biological systems are also highly fault-tolerable systems in the sense that they keep functioning satisfactorily even if some

> of the neurons die. These striking characteristics of biological systems are attributable to the structure of organisms. (Ito and Hideo 1993:130)

Moving from the technological to the biological without recourse to analogy, the researchers suggest an isomorphic rather than an emulative or a comparative correspondence between technological systems and living organisms. In this context, the researchers emphasize the decentralized topology of living systems as means for achieving emergent self-organization with corollary resilience and fault tolerance, with resilience directed toward an external associated milieu and fault tolerance directed inward toward the system environment. Either vector predicates a similar logic—the capacity to enfold irregularity into an emergent pattern of operation. This capacity, then, becomes the critical corollary of self-organizing emergence and the index of "life" that translates across technological, economic, and organic systems. Nowhere is this clearer than in an exposition of ATOS offered by Kinji Mori, the information scientist and engineer responsible for developing "distributed autonomy" (*jiritsu bunsan*).

NETWORK LIFE: "IRREGULARITY IS REGULAR"

Mori has become something of a celebrity in the world of Japanese engineering, with the story of how he discovered distributed technology appearing in numerous interviews and articles in Japanese technology journals. Invariably, Mori is cast therein as a social visionary and maverick, eager to cast off conventional modes of thinking in pursuit of technological innovation (Takeuchi 2009; Yamamoto 2003). This image derives in part from the way that Mori advocates distributed autonomy not simply as a means for achieving more adaptable and efficient infrastructure but rather as a way of cultivating bottom-up organization and thinking in Japan. Distributed autonomy, for him, is thus a means of transforming Japan's managed society (*kanri shakai*) into a society of emergence. Recently retired from the Tokyo Institute of Technology, Mori is currently a professor emeritus at Waseda University's Green Computing Systems Research and Development Center on the Kikui-Cho Campus in Shinjuku, which is where I met him in the spring of 2012. He is a slender and energetic man, quick to smile, and eager to tell the story of how he discovered distributed autonomy, which he did for me, shifting comfortably back and forth between Japanese and English.

Much of what Mori related rehearsed a familiar trope of radical shifts (social, economic, technological, and cultural) circa 1970 around the emergence of an information society.[11] Thus, for example, he identified the rising necessity in Japan

for robust decentralized systems capable of infinite modification, 24/7 operation, and high levels of fault tolerance with the nation's transition beginning in the late 1960s from a mass-mediated industrial economy to a postindustrial information economy. Linking the evolution of the latter with advances in computer technology and emerging dense global connectivity, he argues that the predictable patterns of mass consumption and life that were part of Japan's postwar industrial society have given way to unprecedented consumer diversity within an increasingly complex and unpredictable emergent economic ecology.

What makes Mori's narrative and work remarkable is the historical and theoretical convergence it articulates with the legacy of artificial life (Alife) and theories of emergence. While Mori attributes the impulse to develop distributed autonomy to the New York blackout of 1977, which occurred while he was doing postdoctoral work at the University of California at Berkeley, he ascribes the inspiration for the idea to a number of thinkers behind an epistemological shift in biology in the 1970s that identified decentralized organization in living systems as fundamental to mechanisms of resilience and evolution. Specifically, he cites Richard Dawkins's thesis in *The Selfish Gene* (1976) on the body as a vehicle of genomic replication, Gustav Nossal's research in immunology, and Jakob Von Uexküll's notion of embodied perception (*merkwelt*). Importantly, this literature was also highly inspirational for Alife researchers in computer science and robotics. It is more than coincidence, then, that at the time Mori was working with JR East to develop ATOS, the MIT roboticist and Alife advocate Rodney Brooks published a seminal article detailing his creation of semiautonomous decentralized robots, which resemble ATOS in their architectural logic (Brooks 1991). While analogies between organic and technological systems are hardly new (think of all the railroad–body metaphors), Alife researchers claim they are not simply producing machines with functions analogous to living organisms but actually realizing life in machine form (Helmreich 2001; Johnston 2008). That is, their creations are not lifelike but embodiments of life itself. Central to this claim is the idea (extrapolated from biologists) that the essence of life is realized in an entity's capacity to handle irregularity within its internal system milieu and the external environment via self-organizing emergence. It is at this juncture that complex emergent systems theory becomes integral to Alife projects. In contrast to theories of natural evolution, in which the emergence of irregularity is also an engine of change but figures as an anomalous event within otherwise stable systems, Alife works from a counterintuitive premise that nature is characterized by a constant state of irregularity and instability that fuels an emerging self-organization and

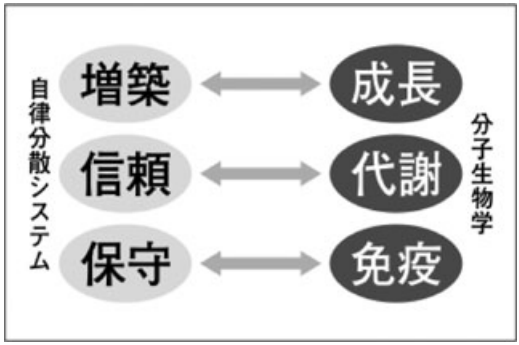

FIGURE 3. Diagram relating the distributed autonomy system with living organisms. From the bottom the terms on the left are expansion, reliability, and maintenance. On the right the terms are growth, metabolic renewal, and immune system (Yamamoto 2003).

complexity (Johnston 2008). Or, to borrow from Mori, this view turns on its head the understanding of nature as tending toward homeostasis, proposing instead the principle that "irregularity is regular" (*ijō ga seijō)*. Realizing the principle of irregularity as regular, Mori explained, provided him with the fundamental conceptual apparatus for distributed autonomy. It is what allowed him to translate processes of growth, metabolic renewal, and immunity within the living body into expansion, reliability, and maintenance within emergent technological systems (a correspondence that is diagramed in Figure 3).

If the principle of irregularity as regular provided Mori with the conceptual inspiration for distributed autonomy, it also energized something akin to a revolution in political economy to become the underlying modality of contemporary postindustrial capitalist society. The story of how this happened centers on a number of conferences held at the Santa Fe Institute in the late 1980s under the heading, "The Economy as a Complex Evolving System," which brought economists in search of an alternative to neoclassical economic models of centralized control and market equilibrium together with Alife researchers peddling theories of nonlinear complex emergence at "the edge of chaos" (Helmreich 2001; Mirowski 1996; Cooper 2008). The result was a newly energized conceptual rationale and technological apparatus (since the Alifers brought their complex-system algorithms) for a nonequilibrium theory of economic ecology in which perpetual precarity functions as the engine of socioeconomic growth. In a fascinating analysis of this historical convergence, Melinda Cooper situates the Santa Fe conferences not only within an emerging neoliberal political economy predicating social, economic, and environmental instability but also within a new "economy of life," engineered in correspondence with a nascent biotechnology industry (Cooper 2008). This new economy, she

argues, works to reorganize value creation, moving away from a classic Marxian understanding of value as derived from the surplus of laboring bodies to a notion of "life as surplus," in which value emerges within the metabolic processes of living organisms. For Cooper, "life as surplus" is exemplified in the biotech industry's commodification of new kinds of organisms, from oil-eating bacteria "to cell-based therapies, regenerative medicine, and stem cell science" (2008:11–12). In this sense it is also relevant to ATOS. After all, as mentioned earlier, ATOS enfolds commuter activity into its emergent pattern of operation, making it a kind of biotechnological entity par excellence. What is more, ATOS, as Mori suggests, premises a shift away from mass-mediated industrial society dominated by homogenous structures of consumer demand to an increasingly fluid global economy marked by complex and unpredictable economies. Such conditions, Mori argues, dictate a reorganization of labor and value whereby a commuter train company can no longer afford to think of itself merely as a transportation company but must instead become a "service creation company," creating value by "enriching our lives" (*ware ware no seikatsu wo yutaka ni suru*). Put differently, value is no longer a surplus produced in the conveyance of bodies to institutions of labor but rather a derivative of lifestyle patterns. Working from this formula, Mori has overseen the development of various ("symbiotic") distributed autonomy systems that operate in conjunction with ATOS's emergent data field in order to constantly cull data from commuters moving through the network. The aim, according to Mori, is to be able to anticipate the changing needs of each commuter–customer, which has translated into the renovation of stations throughout Tokyo in recent years and the transformation of the area between the ticket gates and tracks from a space designed for optimum flow in accordance with the principles of mass transportation into galleries packed with boutique shops and specialty food stores.

At the same time, the phrase "life as surplus" can be appropriated in ways counter to Cooper's theorization for a cynical reading of the treatment of commuter train suicides within the ATOS ecology. Put bluntly, economic restructuring in Japan under the principle of emergence via perpetual precarity has produced a literal surplus of laboring bodies. These "surplus bodies," often the product of Japan's postwar industrial machine, which valorized stable incomes and predictable life courses, are treated as nonperforming cells in the emerging techno-social body. Subsequently, they find themselves marked as redundant and expelled from the machinery of value creation. When Mori explained metabolic renewal to me, he described it as a natural miracle exemplary of "irregularity is regular," whereby a body functions always in a state of provisional stability, attending to the constant

death and malfunction of cells through the production of new cells. In realizing this process within the commuter train network, ATOS transforms the commuter train suicide into a metabolic event within the society of emergence. In this context, what the phrase *jinshin jiko* announces is thus not an incident involving a particular body but a regular irregularity within the emerging commuter train body. As such, it demands no compassion and asks for no individuated narrative of psychological stress, unemployment, or alienation. It demands, rather, only a process that gets repeated day after day in Tokyo, which compels one to wonder what kind of emergent force such repetition or irregularity actually carries.

In materializing the principle of irregularity as regular on a massive scale within Tokyo's commuter train network—not just within discrete machines situated in complex environments as in Alife—ATOS transforms the principle into a totalizing social logic. That is to say, since the commuter train network in Tokyo constitutes the urban environment, irregularity as regular becomes an internal force of system recursivity rather than an engine of dynamism in relation to an external complex environment. What we end up with, then, is a force of emergence that is containing and conservative. Such emergence, in other words, seems to have more in common with Durkheim's notion of "sui generis" than with the nonlinear dynamical emergence of complex systems theory. Normalizing irregularity as a condition of the milieu in a way that recalls Laurent Berlant's (2011) notion of "crisis ordinariness," such emergence mediates the commuter train suicide as a nonevent that Tokyo residents negotiate as part of the mundane and recurrent affective register of the techno-social body. To paraphrase the quote with which I began this discussion, if it seems that there is never a day without a commuter train suicide somewhere in Tokyo, then the processual structure of recursivity that manages these instances relegates the force of their disorder to background noise.

CONCLUSION

A loud buzzing alarm in the ATOS *shireishitsu* announces the presence of a body on the tracks. If "every network has its own exceptional topology," suggest Alexander Galloway and Eugene Thacker (2007:40), for the decentralized network that topology becomes manifest the moment that the network must confront a decision. Announcing that moment, the ATOS alarm brings *shireishitsu* technicians rushing back to their stations, transforming supervision back into command and control. Via telephones, two-way radio, fax, text messaging, and even cell phones, the technicians attempt to piece together the circumstances and grasp the extent of disorder: Where was the accident—in a station or at a crossing? Are there other

injuries? Are the stations and platforms crowded? Are they becoming crowded? Bit by bit, as the picture of the situation at the other end of the line emerges, the technicians weigh the gravity of the disorder and formulate a response. Twice during my tour of the *shireishitsu* the alarm sounded. Each instance however, proved to be a false alarm, and the disruption was minor.

A body on the tracks embodies a disorder that, while definitely not beyond the realm of anticipatable events, is still unthinkable for ATOS. Or, as Mori put it, "ATOS could manage the incident without much difficulty and resume operation in no time at all if it were not for the various authorities that get involved." What he meant were the police and firefighters, who arrive at the scene under a hail of sirens. The task of the former is to classify the event according to the "Regulations Regarding Railroad Accidents." Then the latter, assisted by station personnel, begin the unpleasant task of removing the body from the tracks. In the best of cases the body is still in one piece. More often, however, it is not. The result is an intensity born of the disparate orders of magnitude of human and machine that, although amenable to the organic logic of resilience, is ostensibly without value. As such it becomes part of a different ecology. Nothing illustrates this better than the description of the cleanup process from a former JR East railroad employee. He writes,

> All the pieces of flesh must be found. Then the blood gets washed away. What's on the tracks is taken care of by track maintenance workers but what's on the train is taken care of in the train garage. The smell brings the crows, and the crows clean whatever remains after the employees clean the train. [Mitsuru Sato, November 12, 2012][12]

Where Mori and the creators of ATOS draw inspiration from the body as a paradigm of decentralized processes and information, the author emphasizes the body resulting from a suicide as a material force rendered in flesh and blood that summons a series of physical actions: collecting, washing, and scrubbing. And it is the source of an intensity that, although unthought by commuters, is readily perceived by crows.

I have attempted to engage this unthought intensity in this article through the question of how the commuter train network thinks the disorder of commuter suicides. In this context, I show how JR East's introduction of a decentralized traffic control technology reconceptualizes the indeterminacy of the *daiya* in order to process disorder as a regular irregularity. In so doing, it also works to corporealize the commuter train network in accordance with an understanding of the body as a

paradigm of decentralized complex emergence in which irregularity is regular. This concept, I show, has a genealogy that stems in part from the legacy of Alife research, where it was applied toward the fabrication of resilient and adaptive machinic life. At the same time, it has been embraced in recent political theory as a means of rationalizing precarious conditions in society, economy, and environment in the name of unlimited economic emergence and capital accumulation. Materialized in the commuter train network, it asks us to think the system as a kind of machinic life that, while accommodating commuter diversity as irregularity to instantiate postindustrial forms of value creation, also allows for treating the disorder of commuter suicides as a necessary process of metabolic renewal within an emerging techno-social body. As such, on one hand, it simply reinforces the experience of commuter suicides among Tokyo residents as routinized nonevents capable of generating only indifference. On the other hand, by making this experience inherent to the sedimented processes of the built urban environment, it remediates the commuter train suicide as part of a totalizing system logic. In other words, the commuter train suicide resonates merely as stabilizing system feedback. Can we then truly call such technologies like ATOS organic "smart" systems? If the idea of a smart system asks us to think about techno-social emergence, then the emergence it enables needs to be generative and inspiring, not containing. Such emergence would need to be able to think the body as the intensity of flesh and blood (not just data) alongside the metal of machines.

ABSTRACT

This article considers the treatment of commuter train suicides in Tokyo's commuter train network in an effort to think critically about the lived experience mediated by theories of emergence materialized through "smart" infrastructures. In so doing, it embarks from the question of how the commuter train network thinks the disorder of the commuter suicide in relation to how the network has been restructured in recent decades to handle irregularity as regular. This restructuring, I demonstrate, works to corporealize the network in accordance with an understanding of the body as a paradigm of decentralized complex emergence, which is a concept with roots in cybernetics and artificial life but which has also been adopted in recent political theory to rationalize social, economic, and environmental instability. Materialized in the commuter train network, this concept asks us to think the system as a kind of machinic life that, while generating the potential for new forms of value creation, potentially encourages the experience of commuter suicides as a necessary and recursive process of metabolic renewal within a totalizing system. [Japan, suicide, technology, trains, artificial life, cybernetics, emergence, biopolitics, chaos theory, infrastructure, smart systems]

NOTES

1. The increase in the number of commuter train suicides was part of an overall increase in the annual suicide rate in Japan beginning around 1990 with the onset of the recession. Since 1998 the annual suicide rate has stayed above 30,000 (see http://www.mhlw.go.jp/toukei/saikin/hw/jinkou/tokusyu/suicide04/2.html). Exactly how many of the train service disruptions between 1989 and 2000 were the result of commuter suicides is difficult to determine from annual statistics published by Japan's Ministry of Land, Infrastructure, and Transport, which does not provide region-specific data. An independent publication provides more detailed figures and precise classifications for the period of 2002–09, listing an increase from 85 to 169 suicides on train lines within the greater Tokyo metropolitan area (Sato 2011).
2. The original Japanese is as follows: 毎日のようにある 新聞の3面記事の隅の ほうにある人身事故で 毎日のようにある 新聞の3面記事の隅の ほうにある人身事故で 私も、通勤のとき に巻き込まれ出勤時刻 に遅れそうになったこともしばしば . . . (see http://news.goo.ne.jp/hatake/20071119/kiji228.html; accessed August 23, 2011).
3. One initial point of reference for this philosophy of thought is Wolfgang Schivelbusch's (1986) work on the history of the railroad. More importantly, much has been written about the relation between technology and thought that was developed in the postwar experiments around cybernetics. See, for example, Johnston 2008 and Pickering 2010.
4. In *Discourses of the Vanishing* (1995), Marilyn Ivy offers an implicit critique of the discipline's preoccupation with vanishing through her analysis of the suturing of nation and culture in Japan, effected via figurations of evanescence. By contrast, in the introduction to an issue of *American Anthropologist* devoted to the question of emergence, Bill Maurer (2005) provides a concise articulation of the contemporary trend toward emergent modes of ethnographic analysis in accordance with the discipline's rising interest in science, media, law, and environment. It is important to add that the authors in this issue, unlike Sawyer, do not take emergence for granted as an organic force but rather attempt to situate it within certain sociohistorical conditions.
5. Interview with Kazufumi Masuya from JR East Public Relations Press Group, January 18, 2004. Please note that when citing Japanese names in interviews and texts, I follow the convention of listing the last name first, unless a cited text bears the author's name otherwise.
6. Interview with Yuko Mito, July 7, 2005.
7. That attention to the *daiya* in Japan is exceptional is something I was able to confirm while participating in the Seventh World Conference on Railroad Research, held in Montreal, Canada, June 4–8, 2006. The event provided an opportunity to speak with railroad technology researchers from countries around the world, including China, Korea, Taiwan, and to compare the fundamental concerns behind research and development of rail technology in those regions.
8. *Aitsugi jisatsu, 18 hon ni eikyō Tōkaidō ● Yokosuka sen kanagawa, Asahi Shimbun,* May 28, 1991.
9. *Shin keisei dentetsu misaki eki kaishain ga tobikomi jistatsu chiba, Asahi Shimbun*, April 22, 1996.
10. *JR nambu sen de jinshin jiko kawasaki ● tama ku ● kanagawa, Asahi Shimbun*, July 7, 1996.
11. For an excellent summary of the dawn of the information society ideal in Japan, see Tessa Morris-Suzuki's *Beyond Computopia* (1988).
12. See http://railman.seesaa.net/category/748632–1.html (accessed November 12, 2012). I also met with the author, Mitsuru Sato, in Tokyo on September 23, 2012, to confirm this description.

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