Between Friction and Fulfillment

Jesse LeCavalier

One of the top-selling fidget spinner toy available on Amazon.com

"Fidget Spinners are Over," declares a June 2017 headline from the statistics website, fivethirtyeight.com.[1] A fidget spinner is a palm-sized novelty toy consisting of weighted lobes that spin freely around a central bearing. Contrary to fivethirtyeight's assessment, Amazon's best-seller charts suggest that the toy's popularity of is far from "over" as versions of the device occupied 18 of the top 20 spots on the company's "Hot New Releases" category for the same month.[2] The origins of the toy are contested – some versions credit a nervous tech industry worker looking to focus during long meetings while other accounts point to a chemical engineer who was disturbed by the sight of children throwing rocks at Israeli police and set out to design something "as a way of promoting peace … something that was very calming."[3] The toys are touted, dubiously, to have relaxing properties and to help relieve anxiety. Even though there is no substantial evidence yet to support such claims, products sold on Amazon still use them in their titles. For example, one product's official name is "UFO SPINNER Fidget Spinner Toy Ultra Durable Stainless Steel Bearing High Speed 3-5 Min Spins Precision Metal Hand spinner EDC ADHD Focus Anxiety Stress Relief Boredom Killing Time Toys."[4]

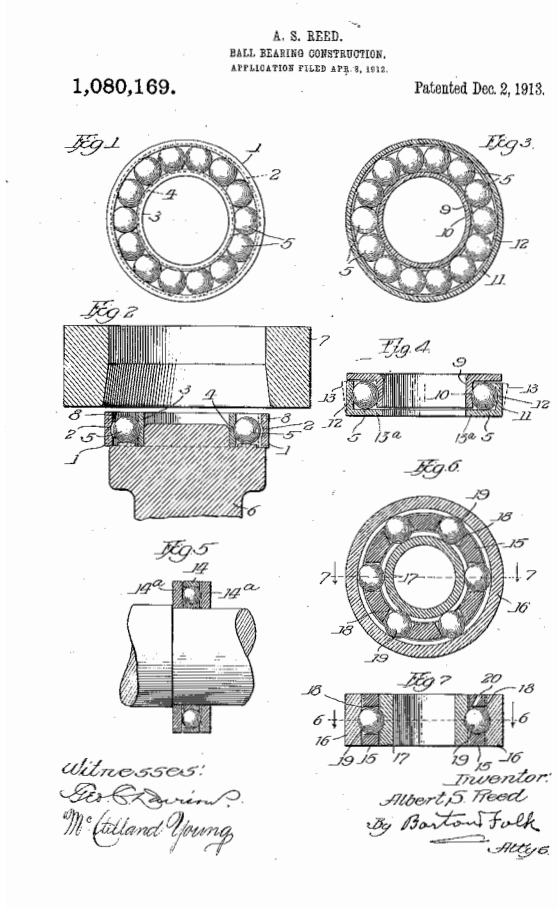
1. "Fidget Spinners Are Over," Walt Hickey, fivethirtyeight.com, June 16, 2017 (https://fivethirtyeight.com/features/fidget-spinners-are-over/).

2. "Amazon Hot New Releases," Amazon.com, accessed June 25, 2017 (https://www.amazon.com/gp/new-releases/toys-and-games/ref=zg_bs_tab_t_bsnr).

3. "Fidget Spinner Emerges As Must-Have Toy Of The Year," Kenny Malone, All Things Considered, npr.com, May 4, 2017 (http://www.npr.org/2017/05/04/526931943/fidget-spinner-emerges-as-must-have-toy-of-the-year). For more on the invention of the toy, see "Meet the Woman Who Invented Fidget Spinners, the Newest Toy Craze Sweeping America," Jennifer Calfas, time.com, May 03, 2017 (http://time.com/money/4762207/fidget-spinner-inventor-catherine-hettinger/) and "Millions sold: Was the original fidget spinner made in Suquamish?" Erik Lacitis, Seattletimes.com, May 17, 2017 (http://www.seattletimes.com/seattle-news/our-high-end-fidget-spinner-will-beat-the-competition-local-makers-say/).

4. "Do Fidget Spinners Really Help With ADHD? Nope, Experts Say," Jennifer Calfas, time.com, May 11, 2017 (http://time.com/money/4774133/fidget-spinners-adhd-anxiety-stress/).

The popularity of the device suggests that something is motivating its rapid spread, perhaps a reflection of an increase in collective anxiety as people desperately seek out sanctioned ways to relieve stress. The effortless action and comforting weight of the device has soothing properties, even if the scientific evidence is not conclusive. In fact, it is the humble ball bearing, the central assembly of rings and metallic spheres, that is the real hero of the fidget spinner's success and the element allows them to function as they do. The bearing has contributed significantly to processes of industrialization and has been a key point of military and geopolitical strategy exactly because of its ability to reduce friction so that motion may occur more smoothly, more quickly, and for greater duration.[5] As fidget spinners, and their central bearing, find their way to the hands of millions, it is possible to see this success as a small triumph for the ball bearing as millions of individuals perform infinite aspirational gestures of friction reduction in their own lives. And, if the origin stories of the device are true, voluntarily enrolling themselves in a behavior modification program in the process. The fidget spinner as friction reducer, as self-medicating stress reliever, and as device of control and discipline, would not be out place in the worlds of materials handling and logistics, concerned as they are will similar issues of behavioral regulation, control, and friction. But, as the fidget spinner suggests, the worlds of logistics are more ubiquitous than might be immediately evident and that we are more logistical than we might think.



Plan view of a patent drawing for a "Ball Bearing Construction" from A. S. Reed showing balls in place between grooved inner and outer rings. USPTO 1,080,169, December 02, 1913.

Friction Is The Enemy Of Fulfillment

The operations of the logistics industry, the area of work and body of knowledge concerned with moving things in time and space, do their best to overcome problems created by things like the shape of the planet, its gravity, and the friction that ensues. Too much and nothing can move, not enough and we lose control. In the quest

5. Peter Galison, "War against the Center," *Grey Room*, no. 4 (2001): 7-33.

to facilitate infinitely lubricated movement of things and people, logistics companies continually seek out ways to overcome friction and its effects. Through a diverse collection of technologies and instruments, enterprises concerned with the movement of objects through space aspire to greater levels of control and speed. Some of these technologies comprise vast and sophisticated networks of tightly calibrated command and communications systems that govern with exacting detail the location of an item in space and time. Other technologies are simpler in their mechanism. For example, a single ball transfer unit —effectively a lone ball bearing—is insufficient to offset the weight of an air cargo container. However, thousands of them assembled together lower the coefficient of friction sufficiently to allow a lone human to physically move something that would otherwise be impossible to handle. The bearing once again triumphs, this time by transforming the architecture itself. By transforming the floor of the fulfillment center into an effectively frictionless surface, logistics companies create a new kind of environment that hints an the transformations wrought by the industry, at the ways that human mobility is affected, and at an expanded set of design possibilities for creating program or atmosphere.

In the case of a distribution building, operated by Amazon or FedEx or UPS or Walmart for example, lubricating technologies like the ball transfer unit floor accelerate the work of routing merchandise along its trajectory. However, this process does not happen automatically and without such augmenting technologies, humans who find themselves inhabiting these environments, out of choice or necessity, can hardly function. Indeed, such technologies become a form of life support for an environment increasingly hostile to human life. In the automated warehouses of Amazon.com, the area of the fulfillment centers dedicated to moving and storing of inventory is described as the "Human Exclusion Zone."[6] Are there possibilities for discovery in these environments designed by us but hostile to us or must we adopt a more defensive posture as we brace for their imminent ubiquity?

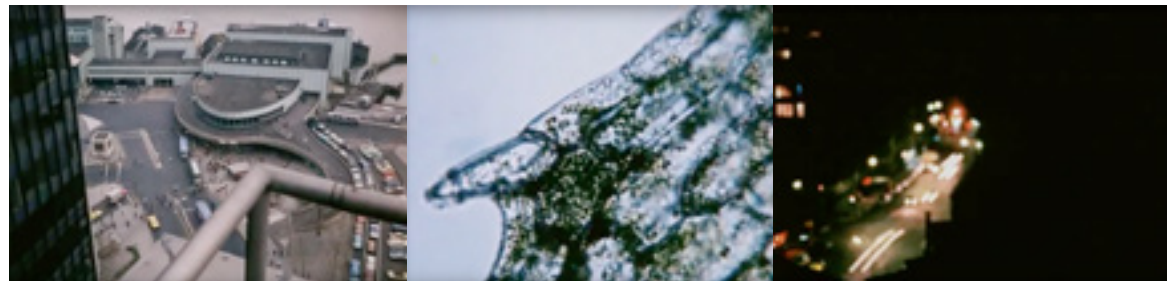
"Ballmat" roller platforms allow workers to glide air containers weighing several thousand pounds into and out of UPS aircraft

6. "The Window - High-Speed Robots Part 1: Meet BettyBot in "Human Exclusion Zone" Warehouses," amazon.com, accessed July 09, 2017 (https://www.amazon.com/Window-High-Speed-BettyBot-Exclusion-Warehouses/dp/B00UUK3IN6).

While the environments I am describing are generally contained within the warehouse landscape of light industrial ex-urban development, it requires little imagination to conjure a world where the logistical landscape spills out into everyday life. The emergence of Amazon Dash or Prime or Alexa are just a few examples that point to the increasing integration of fulfillment, both personal and logistical, into the built environment, not to mention the tiered systems of access that comes with them. The challenge of making sense of architectures of logistics, of fulfillment in other words, is an urgent one. It points to how we collectively imagine our social and political patterns, to how we might see each other as part of a collective or, instead, as a collective of consuming individuals. Some of that is influenced by the built environment and is supported or reinforced in overt and subtle ways.

Visualizations Of Logistics Naturalize Its Operations

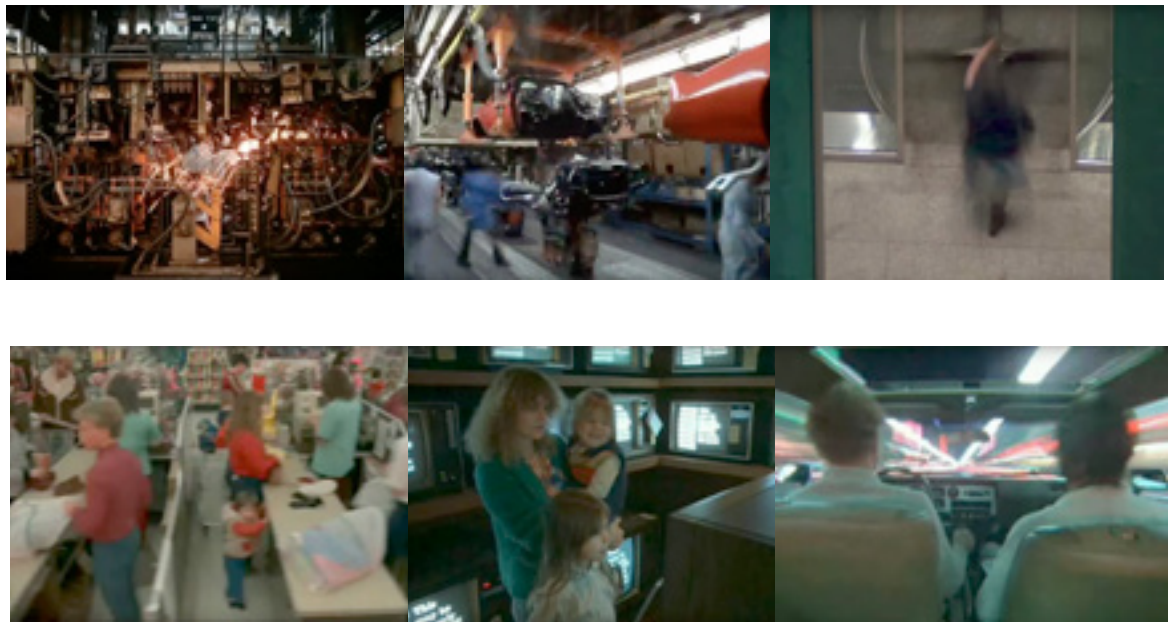
In the popular imagination of logistics, as evident in things like television commercials, the metaphor of "flow" emerges as a dominant trope. Scholarly approaches use similar language, influenced by Manuel Castells distinction between the space of places and the space of flows. By imagining that all the things swept up in global supply are somehow flowing suggests that they are moving of their own volition or are being propelled along by some distant force. By alluding to movement of liquids, the metaphor suggests a kind of physical inevitability and makes it easier to overlook the enormous effort it takes to move things (and people) through space. If everything in the supply chain flows, questions of access to mobility resources can be construed as the responsibility of the participants, suggesting that somehow all should be able to partake, even though this is a highly tiered system and access to mobility resources can contribute significantly to uneven development and increasing polarities and inequalities. When deployed in the context of global logistics, the metaphor of flow can work to naturalize the idea that commercial inventory, like rivers or waterfalls, must continue to be in motion and that these streams of goods move of their own accord. Indeed, if one beholds footage of fulfillment centers in action, the automated environments of materials handling can create such an impression. When these mechanical systems are accelerated, through the cinematic technique of the time lapse, for example, the images blur together into a single stream. Hilary Harris was an early pioneer of the technique and used his 1975 film, *Organism*, to make connections between the metabolism of the human body and that of the city. The film intersperses footage of microscopic physiological systems with accelerated images of New York City to establish links between the functions of an organism and that of a city. Through the blurred effects of time-lapse film, cars become pulsing streams of red and white, not unlike a circulating bloodstream.



Frames from the short film *Organism* (Hilary Harris, 1975).

The metaphor offers a model of urbanism underpinned by movement, circulation, and exchange but also as a self-regulating system that seeks equilibrium. In the 1983 film *Koyaanisqatsi*, director Godfrey Reggio also alludes to similar ideas, translating his title to "life out of balance." The film devotes much footage to processes of logistics and while the imagery creates similar effects, Reggio's outlook is less optimistic than Harris's.

Reggio's *Koyaanisqatsi* is a non-narrative film that takes viewers along a global itinerary using a variety of techniques, including aerial footage, time-lapse, and slow motion, all set to a score by Philip Glass. In a number of scenes, the position of the camera places the body in a range of mechanical mobility systems and conflates the eye of the lens with that of the viewer. By switching from an omniscient position to a "first person" view, the film produces different associations with the viewers. One particularly dense sequence, "The Grid," begins with workers leaving a Lockheed factory and then proceeds to describe a series of entanglements with mechanical control including a string of access points, from subway doors, to turnstiles, to revolving doors – each a moment of delay in pursuit of control and management. From these shots, the camera switches to a point of view from the front of a vehicle, allowing viewers to see what a car might "see" as it races at high speeds along the freeways of San Francisco and Los Angeles. The position changes again but this time the view is not from the front of a car but from inside a television in an assembly plant, looking out from the carapace that will eventually receive the tube assembly. As the conveyor moves the camera along, one can discern the various stages of process, including the housings and



Frames from *Koyaanisqatsi* (Godfrey Reggio, 1983).
These are from the section of the film, "The Grid."

monitors. Following the trajectory of a gravity fed conveyor, the camera shifts to a vertical tracking shot downward through crisscrossing mall elevators only to jump to a view from the conveyor of a snack cake production line and then the equally propulsive and jerkily disorienting path of a supermarket shopping cart. As the Glass score continues to build, Reggio presents a mother and two children indifferently watching one television amongst a bank of them, organic creatures embedded in and seduced by an environment of their own making. The film then turns to the object of their gaze and presents an escalating succession of rapid images from news, advertisement and entertainment. This instantaneous array of images is then punctuated with images of people walking in slow motion toward the camera, slowly acknowledging the presence of the camera with looks of self-satisfaction, curiosity or suspicion. The sequence concludes with a return to a view from a car – either from the back seat of a convertible or from a position in front of the hood – a view from the machine's perspective. As the camera speeds through Las Vegas, the city disappears into night as viewers seem to be propelled along tunnels of light made from the traces of the long and accelerated exposures.[7] Interrupted briefly by a view from inside what appears to be a religious procession, the camera continues to speed up such that the streams of lights consolidate around a single vanishing point before a cut to an aerial view downtown Los Angeles and the next movement. The moment of chaos within the procession is a counterpoint to the portraits of individuals walking toward the camera. The focus on individual specificity in a film about infrastructure and logistics prefigures the construction of the isolated consuming subject by companies like Amazon. In the crowd, individuals are difficult to discern, awash in a blur of adjacency and contact. In the context of logistics regimes in which friction is the enemy, the presence of humans becomes a special kind of irritant, as we grow increasingly incompatible with the systems and spaces we have designed for our fulfillment.

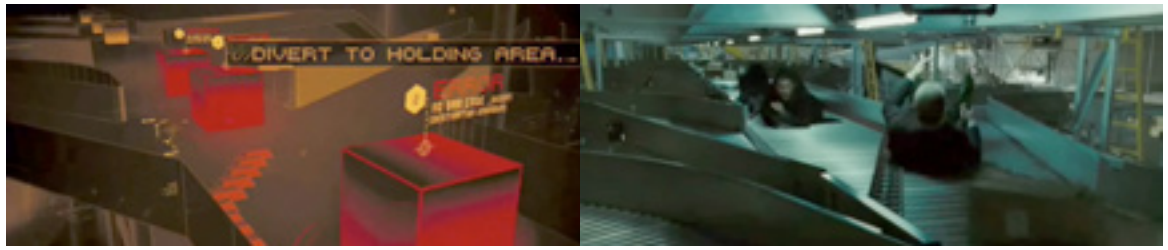
Humans Are Incompatible With The Operating Systems Of Logistics

Frames from *Eagle Eye* (D. J. Caruso, 2008) during a chase scene in an automated distribution center

7. Reggio explains his intentions with the film thusly, "What I did was try to eradicate all of the foreground of traditional film and take the background, or what's called 'second unit' and make *that* foreground, give *that* the principle focus. We were trying to look at buildings, masses of people, transportation, industrialization, as autonomous *entities* … in the synthetic world the presence of a different entity, a consuming and inhuman entity." Quoted in Scott MacDonald, Avant-Garde Film: Motion Studies, Cambridge: Cambridge University Press, 1993, 140.

In the 2008 film, *Eagle Eye*, a key chase scene takes place in a contemporary automated distribution hub at an airport.[8] In the space of the film, the two strangers are brought together to deliver a mysterious briefcase, guided by an equally mysterious computer system and on the run from the FBI. In the protagonists' attempt to escape, the computer system guides them into an automated distribution facility at an airport, effectively inviting them into the world of the machines. In exchange, the computer system reads them as inventory and thus as incompatible elements within the system. Indeed, one overhears a voice in the background exclaiming, "Hey! You're not allowed to be in here." As they tumble down a series of belts and rollers, the heroes' poor fit is initially an asset. In a bout of slapstick, a low beam clocks the pursuing FBI agent and sends him sprawling backward on the belt, enough time to gain some ground. However, it is the computer system that ultimately controls the outcome as it takes command of the sliding shoe sorters to divert the agent to another part of the warehouse.[9]

These elements are a common feature of an automated distribution system and allow packages to be diverted from the trunk line to various branching gravity-driven rollers. Telling in the films production design is the way in which the bodies are rendered in the computer's "vision" – not as bodies but as boxes with a pop-up annotation that reads "Error: No bar code, destination unknown." This suggests that all elements that pass through the computer's gaze are understood as inventory and that the task of the system it to sort and direct. While *Eagle Eye* is a product Hollywood, logistical vision shares the tendency to treat all material within the system as data points to be managed. The industry produces habits of mind that imagine material as data while nonetheless finding ways to physically manage it. By seeing the world thusly, such abstraction accelerates processes of externalization, as all decisions become problems of management and allocation. To an inventory control system, every *thing* and every *body* becomes both a parcel and a data point.



Frames from *Eagle Eye* (D. J. Caruso, 2008).
Automatic sliding shoe sorters help the protagonists escape

8. For an in depth description of the interior of a UPS sortation centers, see John McPhee, "Out in the Sort," in *Uncommon Carriers* (New York: Farrar, Straus and Giroux, 2006), 176.

9. "Dematic FlexSort SL2," dematic.com (http://www.dematic.com/en-us/flexsort-sl2/).

As the technologies and practices of logistics, as well as the habits of mind that attend them, increasingly spill out of the enclosed worlds like those depicted in *Eagle Eye*, we humans will be challenged to make our way alongside such them and not always with the controlling system looking out for us.[10]

To overcome these escalating incompatibilities, we have developed augmenting technologies that help us to cope with the demands logistical environment. To meet order fulfillment quotas, warehouse employees rely on a host of mobility augmentations to increase both their speed and their range. So-called Automated Storage and Retrieval Systems (ASRS) create a human-machine assemblage in which the automated order fulfillment systems transport human "pickers" to the right location in space, at which point they select the appropriate items to be added to the order. The logistical environment is also an encrypted one and to navigate its illegible surfaces, technologies like wearable computer-scanners are requirements of the contemporary fulfillment center worker. Voice-directed picking systems subject pickers to the demands of software protocols as managers and company owners seek ways to increase output and profit. With these systems, language is no longer a barrier because the software can be programmed to communicate in the native tongue of the person whom it is directing, creating both an environment in which those humans in it can neither read, because of barcode-encrypted surfaces, nor communicate within. Kiva systems, now Amazon Robotics, creates a condition in which workers are stationary as small robotic drive units bring shelves to them for order assembly, effectively acting as organic valves mediating between the automated inventory floor and the awaiting delivery vehicles.[11] As the spaces of logistics continue to transform from mechanized to entirely automated, the ability to interact with these environments becomes increasingly dependent on mediating and decrypting technologies. Even if these environments are products of human ingenuity and even as their contents reflect some idea of fulfillment, access to them becomes more remote. If the habits of mind that form in the space of logistics are biased toward control and efficiency and as the industry spreads and serves as training ground for those seeking power or influence, similar thinking will likely try to assert its values on spaces not designed to be efficient or profitable.

The Freeze-Frame Turns Organisms To Machines, The Time-Lapse Turns Machines To Organisms

There is an absurdity to scene described above from *Eagle Eye* and though the humans moving through the automated system are not presented for humorous effect, it nonetheless conjures

10. Eagle Eye is based loosely on the Isaac Asimov story, "All the Troubles of the World" in which an omniscient computer regulates society and preemptively stops crimes through predictive modeling. Issac Asimov, "All the Troubles of the World," in Nin Tomorrows: Tales of the Near Future (New York: Fawcett World Library, 1959), 137-153.

11. For further discussion, see Jesse LeCavalier, "Bodies: Coping with Data Rich Environments," in *The Rule of Logistics: Walmart and the Architecture of Fulfillment* (Minneapolis: University of Minnesota Press, 2016), 151-178.

Frame from Modern Times (Charlie Chaplin, 1936) in which the Little Tramp is ingested by the machinery of a modern factory

canonical scenes of human and technological entanglement. A familiar example is Charlie Chaplin's maceration in *Modern Times* in which he is unwittingly pulled into the inner workings of the factory machinery. By compelling line workers to perform the same repetitive tasks, shop floor managers forced human workers into a machinic mode and as Chaplin is swallowed up and processed through the gears of the factory, that absorption is rendered literal and comic at the same time. Chaplin was also responding to the emerging field of Scientific Management and its attention to the minute human gesture. Scientific Management deployed disciplinary mechanisms to micro-manage human workers and offer constant feedback while also assessing their fitness in order to match them with the task deemed most suitable their abilities. With the emergence of mechanization, in which human workers labor alongside machines, efforts to monitor and improve efficiency remain but, in the case of manufacturing, more of the tasks are performed by machines with humans only performing crucial steps for which their affordable dexterity make them especially qualified.

THE MIDVALE STEEL CO.

Form D—136. Machine Shop, 18

ESTIMATES FOR WORK ON LATHES

OPERATIONS CONNECTED WITH PREPARING TO MACHINE WORK ON LATHES AND WITH REMOVING WORK TO FLOOR AFTER IT HAS BEEN MACHINED

OPERATIONS	TIME IN MINUTES
Putting chain on, Work on Floor	
Putting chain on, Work on Centers	
Taking off chain, Work on Floor	
Taking off chain, Work on Centers	
Putting on Carrier	
Taking off "	
Lifting Work to Shears	
Getting Work on Centers	
Lifting Work from Centers to Floor	
Turning Work, end for end	
Adjusting Slots Water	
Stamping	
Center-punching	
Trying Truenness with Chalk	
" with Calipers	
" with Gauge	
Putting in Mandrel	
Taking out "	
Putting in Plug Centers	
Taking out "	
Putting in False Centers	
Taking out "	
Putting on Spiders	
Taking off "	
Putting on Follow Rest	
Taking off "	
Putting on Face Plate	
Taking off "	
Putting on Chuck	
Taking off "	
Laying out	
Changing Tools	
Putting in Packing	
Cut to Cut	
Learning what is to be done	
Considering how to Clamp	
Oiling up	
Cleaning Machine	
Changing Time Notes	
Changing Tools at Tool Room	
Shifting Work	
Putting on Former	
Taking off "	
Adjusting Feed	
" Speed	
" Poppet Head	
" Screw-Cutting Gear	
REMARKS TOTAL	

NAME

Sketch ..... Number

Order ..... Weight

Metal ..... Heat No.

Tensile Strength ..... Chem. Comp.

Per cent. of Stretch .....

Hardness, Class

OPERATIONS CONNECTED WITH MACHINING WORK ON LATHES

OPERATIONS	Depth of Cut	Feed	Cut	Tool	Turns	Minutes
Turning Feed In						
" Hand Feed						
Boring Feed In						
" Hand Feed						
Starting Cut						
Finishing Cut						
Fillet						
"						
Collar						
"						
Facing						
"						
Sizing						
"						
Nicking						
"						
Centering						
"						
Filling						
"						
Using Emery Cloth						
" "						
TOTAL						

Machining—Two Heads Used

" —One Head Used

Hand Work

Additional Allowance

TOTAL TIME

HIGH RATE

LOW RATE

Remarks

Time actually taken

FIGURE 6.—INSTRUCTION CARD FOR LATHE WORK

Example of an instruction from F. W. Taylor, in this case a description of lathe work for the Midvale Steel Company with every step broken into its smallest component. From F. W. Taylor, *Shop Management* (New York: Harper & Brothers, 1912), 171

The industrialized factory housed workers who were subjected to motion studies that sought to root out inefficiencies. Such efforts persist in contemporary automated environments, including the space of fulfillment centers, but the corresponding analytical-visual mode is not the same. Scientific Management, as championed by figures like Ford and Taylor, found technologies for considering the micro-management of human movement in the development of photography and especially the high-speed photography of Eadweard Muybridge and Etienne-Jules Marey. These photographs effectively slow down time in order to understand aspects of motion inaccessible to regular vision. In these studies, the human body is captured and analyzed at the granular level; its motion slowed to understand aspects of motion not available to unaided observation. From the point of view of the managers charged with improving efficiency, these techniques allowed for the hyper-management of each gesture, subjected workers to increasing scrutiny and gave managers license to intervene at the bodily level in pursuit of greater efficiency (i.e. productivity). Subjected thusly, the human figure becomes an object of analysis and a site of engineering – a machine whose performance demands monitoring, maintenance, and improvement.[12]

If the freeze-frame was symptomatic of mechanization and scientific management, the time lapse might be better suited for the worlds

12. For more detailed discussions, see Hugo Kijne and J.-C. Spender, "Introduction," in *Scientific Management: Frederick Winslow Taylor's Gift to the World?,* ed. J.-C. Spender and Hugo Kijne (London: Kluwer Academic, 1996), James R. Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society* (Cambridge, Mass.: Harvard University Press, 1986), and Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992).

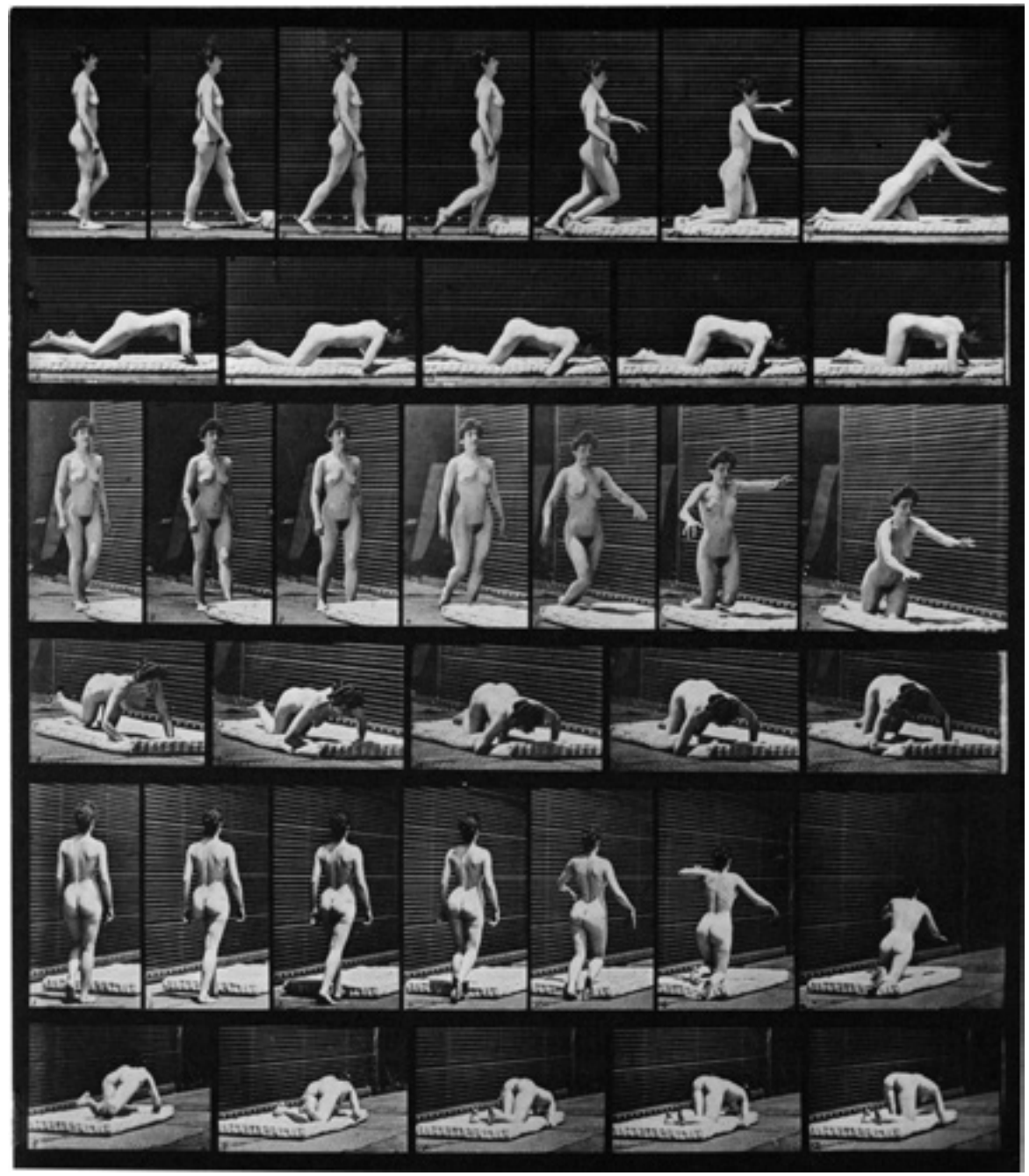
of automation and logistics. Indeed, in the long exposure, movement of humans tends to register only as blurs, effectively removing them from the frame, leaving only the machines. The same kind of thinking is used to consider the management of cities. However, the freeze-frame proves a difficult format for assessment. Instead, city managers must develop a more complete picture, which tends to produce a metabolic version of the city in which, like Harris's *Organism*, the city is imagined as a kind of body whose healthy equilibrium must be maintained. Cities in their modeling of mobility and movement (e.g. smart city monitoring) use both the physiological model of the time lapse, monitoring metabolism, input, output, monitoring "flow" e.g. of traffic, pedestrian movement, etc and the freeze-frame to micro-manage productivity.[13]

As the frozen frame of the high-speed photograph turns bodies to machines and time lapse turns machines to organisms, all become available for forms of management, leaving little space for the unexpected or the irrational. Which is why Plate 176 from Muybridge's *Animal Locomotion* series stands out. Muybridge's studies of human motion tend to focus on feats of athleticism, work, or everyday activities like walking, running, standing, sitting, throwing, etc. Even within the structured space of his photography studio, the models still appear to be performing their assigned motion with some degree of naturalness. However, Plate 176, described as "Woman Falling onto Mattress" creates a condition in which the model must act out an unnatural and irrational action, one that typically happens by accident not by purpose. The resulting images have an awkward humor to them, partly because they exist at odds with apparent purposes of the photographic enterprise. Not being a "productive" action, falling is not necessarily something that would be subject of an efficiency study, which makes is freeze-frame deconstruction all the more compelling. Frozen in a state of near collapse, and having just overcome the self-preservation impulse, the model's position is awkward and humorous because it defies expectations and allows a view of a body in a rare state and one impossible to maintain without the technology of the camera. Part of the absurdity of this image lies in the tension between the body in motion and the analytical grid in the background, designed to support an understanding of human movement as mechanical and capable of quantity based assessment and modification, as if seeking the most perfect way of falling to the ground. Such pursuit of an absurd efficiency suggests a productive realm of aesthetic exploration with the emerging dominance of logistical regimes of efficiency. As fulfillment becomes calculable and formulaic and predictive analytics can anticipate our next purchase before we know what it is that we desire, it seems useful to continue calling attention to these tendencies.

Absurd Efficiencies And The Possibilities Of Para-Logistics

If the effects of logistics tend to be naturalized and also expand to influence other forms of management, the drives to rational management and efficiency that characterize e-commerce fulfillment or retail logistics start to show up unexpectedly elsewhere. Speed and efficiency increasingly govern a range of interactions and exchanges and even the ways in which these processes are articulated and communicated suggest a degree of inevitability or "naturalness"

13. For an overview of literature on smart cities, see Robert Hollands, "Will the real smart city please stand up?" *City* 12, no. 3: 303 – 320. See also, Nerea Calvillo, Orit Halpern, Jesse LeCavalier, Wolfgang Pietsch, "Test-Bed as Urban Epistemology," in *Smart Urbanism*, eds. Simon Marvin and Andres Luque-Ayala, Routledge, 2016.



Eadweard Muybridge, "Woman Falling Onto Mattress" from Eadweard Muybridge, *The Human Figure in Motion* (New York: Dover, 1955, reprinted selection of plates from *Animal Locomotion*, 1887), plate 176

(e.g. flow). Cities become modeled on the machines they increasingly house. This is not an argument against efficiency but rather against the narrowing of criteria that admits efficiency as its sole metric, thus foreclosing on much of what is thought of as having cultural value. In Keller Easterling's study of Benton Mackaye and his ideas for rethinking terrestrial connectivity in the United States, she writes, "Whatever remains eccentric to a culture's boundaries and brackets is more likely to cross-reference its intelligence."[14] Such eccentricities might allow consideration beyond symmetrical modes of conflict. They also might offer ways to deal with the questions of scale and connectivity that are part of any consideration of networks of global mobility. As Bernes argues, modes of subjugation and alienation function differently in the global shipping instances he analyzes.[15] To "seize" the apparatus is simply to replace one form of power with another. From the perspective of the logistics revolution, the labor at the port facility is connected to a much larger, globally attenuated system of indenture.[16] Logistical technologies of circulation and management allow processes of extraction, production, and exploitation to be generally externalized from the majority of consumers, leading one to wonder to what degree logistics is something we can escape, and to what degree we might be able to think logistics *outside* capitalism. A counter-logistics might advocate for bringing production and circulation to a halt in order to restart them on different terms.[17] But what would a *para-logistics* look like? It could be something alongside the normal channels that would use the same tools and processes of logistics but direct them elsewhere. The prefix itself is hard to nail down. The Greek root *para-* means "alongside, beyond; altered; contrary; irregular, abnormal," while the Latin *parare* is "to be ready" and suggests "defense, protection against; that which protects from." In this sense, a para-logistics might be imagined as both an alternative space of logistics and a pre-emptive response to it. As one example, Cameron looks at instances that link the urban with its hinterland through community-supported agricultural initiatives to better understand how "community economies" take shape. Standing outside of normative systems but also poised to respond to them, para-logistical systems might contribute to a diversity of multiple ways forward. [18]

14. Keller Easterling, *Organization Space: Landscapes, Highways, and Houses in America* (Cambridge: MIT Press, 1999), 4.

15. Jasper Bernes (2013) "Logistics, Counterlogistics And The Communist Prospect," *Endnotes 3*, 2013.

16. W. Bruce Allen, "The Logistics Revolution and Transportation," *Annals of the American Academy of Political and Social Science* 553 (September 1997): 108.

17. Bernes, ibid.

18. J. Cameron, "Enterprise Innovation and Economic Diversity in Community Supported Agriculture: Sustaining the Agricultural Commons," in *Making Other Worlds Possible: Performing Diverse Economies*, eds. Gerda Roelvink, K St. Martin, and J.K. Gibson-Graham (Minneapolis: University of Minnesota Press, 2015) 53-71. See also Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015).

Friction Is A Necessity Of Fulfillment

Proximity and the contact that often follows create friction as surfaces encounter each other and irregularities produce drag, slowing or preventing unencumbered movement. Anna Lowenhaupt Tsing describes friction as "encounter across distance" and uses the concept to better understand both the sources and effects of different cultural movements within the regimes of global capital. As an example she uses shifts in the substance we call "coal" along its journey—a journey sometimes described as a supply chain or a commodity chain—from element of the ground to a part of an energy production mechanism. She describes how a lump of coal, "rubs up against other participants in the chain: unhappy villagers, conveyor belts, contracts. In its shape, its cost, and its composition, coal is made in the friction of the commodity chain."[19] In Tsing's reading, friction is a generator and a necessary action out of which new forms emerge. Let's continue to explore the productive dimensions of friction and the aesthetic possibilities of absurd efficiencies.

19. Anna Lowenhaupt Tsing, Friction: An Ethnography of Global Connection (Princeton: Princeton University Press, 2005), 51.