Do Containers Dream of Electric People?
The Social Form of Just-in-Time Production

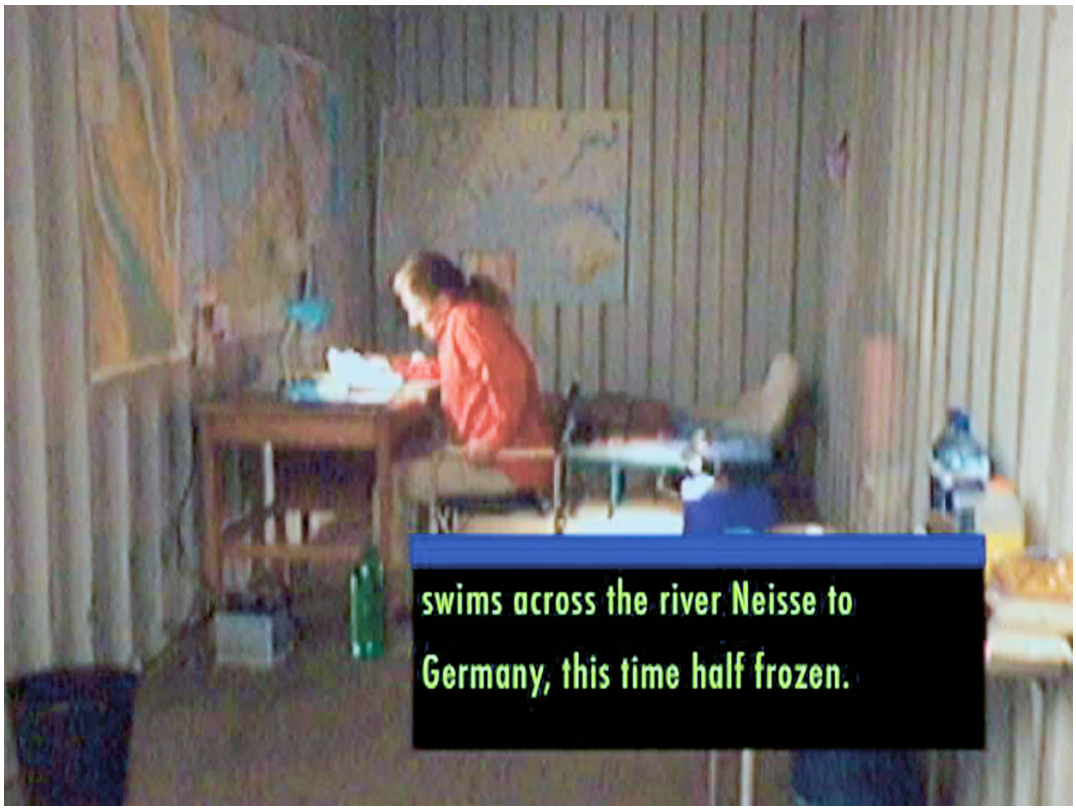
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Essay – May 9, 2011

Cultural critic Brian Holmes analyses the genesis of the distributional machinery of intermodal transport that circulates commodities through the global economy. What are the implications for our way of life, both for people tied to a particular area and for migrants? Is it possible to escape capitalism's laws of motion?



Stills from the video by Ursula Biemann, Contained Mobility, 2004.



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Once adopted into the production process of capital, the means of labour passes through different metamorphoses, whose culmination is the machine, or rather, an automatic system of machinery, set in motion by an automaton, a moving power that moves itself; this automaton consisting of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages. In the machine, and even more in machinery as an automatic system, the use value, i.e. the material quality of the means of labour, is transformed into an existence adequate to fixed capital and to capital as such; and the form in which it was adopted into the production process of capital, the direct means of labour, is superseded by a form posited by capital itself and corresponding to it.

*'In no way does the machine appear as the individual worker's means of labour. Its distinguishing characteristic is not in the least, as with the means of labour, to transmit the worker's activity to the object; this activity, rather, is posited in such a way that it merely transmits the machine's work, the machine's action, on to the raw material – supervises it and guards against interruptions. Not as with the instrument, which the worker animates and makes into his organ with his skill and strength, and whose handling therefore depends on his virtuosity. Rather, it is the machine which possesses skill and strength in place of the worker, is itself the virtuoso, with a soul of its own in the mechanical laws acting through it; and it consumes coal, oil etc. (*matières instrumentales*), just as the worker consumes food, to keep up its perpetual motion.*

Karl Marx, *Grundrisse der Kritik der politischen Ökonomie* (Outlines of the Critique of Political Economy), orig. 1858.

British sociologist John Urry has come up with an unusual idea: defining society by the ever-accelerating mobility of its members. To do this he proposes the concept of *mobility-systems*: 'Historically most societies have been characterized by one major mobility-system that is in an evolving and adaptive relationship with that society's economy, through the production and consumption of goods and services and the attraction and circulation of the labour force and consumers ... The richer the society, the greater the range of mobility-systems that will be present, and the more complex the intersections between such

systems.' [1] Urry devotes chapters of his book *Mobilities* to four infrastructural systems: pathways, trains, automobiles and airplanes. Interestingly, he suggests that these infrastructures are complemented by cultural systems serving to represent the movement of people and things, to communicate about it and to imagine its further possibilities. Yet strangely, in a book that gestures towards the concept of a technological unconscious, he says next to nothing about production and distribution. What's missing from his 'mobilities paradigm' is container shipping and intermodal transport, with their associated representational, communicational and imaginary techniques. What's missing is the social form of just-in-time production.

Like Margaret Thatcher, Urry believes that in the postnational era 'there is no such thing as society'. [2] He's against what has been called the 'container theory' of the social, which relies heavily on spatially bounded categories, reinforcing methodological nationalism.[3] In *Mobilities* he refers to Foucault's concept of governmentality, observing that 'state sovereignty is exercised on territories, populations and, we may add, the movements of populations around that territory'. In contrast he insists on the increasingly transnational movement of populations, and claims that 'such a "mobile population" is immensely hard to monitor and govern'. [4]

Urry is an innovative sociologist, seeking patterns of emergent order in the vertiginous circulations of neoliberal globalism. At its best, his work reads like a kaleidoscopic register of contemporary life. However, like other complexity theorists describing the dynamics of open systems, he fails to take into account the powerful drive towards closure that inhabits all large-scale system design. Thus he ignores the determinant social form of informational capitalism – as though, entranced by mobilities that exceed the capture of the nation-state, he had fallen into the very unconsciousness that contemporary technologies impose.

How to awaken from electric dreams? In this text I will describe both the technical and the cultural dimensions of what is arguably the major mobility-system of our time: the distributional machinery of intermodal transport that circulates commodities through the global economy. The vector I will use to approach this far-flung system is an imaginary one.

Contained Mobility

Picture a video projection on the walls of a global museum (but it could also be your laptop, or an iPhone in the city). The video opens with the sound of a female voice against the background of a swelling sea. It then resolves into two contrasting scenes. On the left, the computerized view of a container port, showing ships at berth or in motion through the channel. On the right, a surveillance camera *inside* a container, where a robust-looking man in an orange shirt moves between the spartan furnishings of an improvised room (bed, desk, table lamp, maps on the corrugated wall). The scenes shift back and forth from screen to screen; the graphics change in content, granularity and focus. The man gets up, sits down, strides about, meditates, sleeps. His name is Anatol Kuis Zimmermann.A scrolling text recounts his destiny: born in 1949 of a Belarussian mother and an ethnic German father who were deported to Siberia; childhood in Brest near the Polish border; university in Minsk; marriage, children, displacement of the family after Chernobyl; liberal, pro-European political activities and attempted migration to Germany. Thus begins an odyssey of deferral, transit and legal limbo, carrying this asylum seeker through nearly every country in Europe. Life as a geography of refusal. The container, we are given to understand, is now his only home. As the off-screen voice explained at the outset, Anatol Zimmermann has 'come ashore in an offshore place, in a container world that only tolerates the translocal state of not being of this place – not of any other really – but of existing in a condition of permanent non-belonging, of juridical non-existence'. He slips into his makeshift bed as a closing text appears on the left-hand screen: 'Everything new is born illegal.'

The video by Ursula Biemann is entitled *Contained Mobility* (2004). [5] It's an extradisciplinary investigation, by which I mean a work of art that seeks knowledge of the world through a confrontation with technical operations and discourses. A crucial part of this search is the interview leading to the reconstruction of Zimmermann's itinerary. But that's classic documentary, and as such, it's not even shown. Nor is the location of the container given. What makes the work so striking, and so useful for an examination of contemporary social relations, is the juxtaposition between the existential narrative of refusal and the abstracted imagery of global transport. One feels they are mirrors of each other. As Biemann notes, the visuality of the work is based in every respect on simulation: 'None of the images of *Contained Mobility* document reality. Every image is an artificial construct: a simulated seascape, a visual rendering of digital data, a webcam set up for a staged scene. The video is a conceptual statement about a particular state of being in this world.' [6]

The question that emerges from the conceptual image is double. First, what materially constitutes 'the translocal state of not being of this place'? And second, what is the relation between this displaced mode of existence and the representational techniques of computer simulation?

Logistical Living

Let's try to answer that first question. Intermodal transport, a.k.a. containerization, is based on three pillars: rigorous standardization of the box allowing for stackability in ships and transfer by specialized cranes to truck or rail; continuous traceability thanks to a machine-readable bill of lading; and finally, the ability to lock a shipment from initial departure to final destination. Locally standardized containers had been used for land and water transport since the late nineteenth century, but the onset of intermodalism dates to 26 April 1956, when Malcom McLean loaded 58 aluminium truck bodies onto a tanker named the *Ideal-X* for shipment from Newark to Houston. [7] The water-to-wheels concept offered increases in speed and security as well as big savings on labour, all of which was recognized by the us government and the military, spurring a national standardization process that was ratified by the International Standards Organization in 1970. Deregulation of the us transport industry began around the same time, as a crucial component of the emerging neoliberal order; it was completed in all branches by the early 1980s. The rationalization of the docks broke the power of the longshoremen's unions, historically the strongest and most internationalist sector of the labour movement. [8] These developments smoothed the way for an integrated intermodal system that spread rapidly across the world, slashing freight costs and making logistics the key operational discipline of a globalizing economy. Given the military origins of logistics, it's significant that the first big government contracts with McLean's Sea-Land corporation were for war materiel to Vietnam. And it's equally significant that Sea-Land's wartime business became immensely profitable when McLean realized that the returning containers could be filled with the rising tide of manufactured goods from Japan.

The late 1960s saw the take-off of the Japanese economy, first in light consumer goods and then, after the oil shock of 1973, in fuel-efficient automobiles. Already the Toyota Motor Corporation had developed its system of continuous information flow between manufacturer and supplier, allowing for the delivery of custom-built parts in exact proportion to current needs without costly warehousing. The advent of containerization meant that 'just-in-time' production could be extended to an entire East Asian maritime network including the 'Four Tigers' of Hong Kong, Singapore, Taiwan and South Korea – a network that would ultimately re-centre on coastal China. [9] In the wake of Toyota's success, just-in-time or 'lean' production imposed itself on global auto-makers. It received wider attention through a best-selling industry study entitled *The Machine that Changed the World* (where 'machine' refers not to a single device but to an integrated process). [10] JIT

is what made the world translocal. However, its adoption by Western corporations after 1989 turned it into something very different from the trust-based relations between manufacturer and supplier extolled by the venerable Mr Toyoda. What emerged from the open markets of neoliberalism was a vast *delivery system* commanded by retailers engaged in a vicious search for the best possible price. And that turned out to be the 'China price': the lowest number on the planet for any category of basic manufactured goods.

By 2005, Wal-Mart imported some 350,000 40-foot containers a year of manufactured goods. That's almost 30,000 tonnes *per day,* the majority from China. [11] The containers pass through the ports of Long Beach and Los Angeles before departing by rail to truck transhipment centres feeding warehouse-sized stores. Thus 'the box' spawned 'the big box' – and with it, a whole new science of supply chain management, whose effect has been to drive both prices and wages to rock-bottom levels. [12] Though big-box retailing is most common in the USA, a list of global firms operating on the Wal-Mart model now includes 'Carrefour, Aldi, Metro, Royal Ahold, Tesco, Ito-Yokado, Kingfisher, and IKEA, as well as Home Depot, Costco and Best Buy'. [13] What began as a formula for automobile production has led to a worldwide re-articulation of industry, merchandising and consumption.

Since its origins in the early 1980s, supply chain management has become the obligatory model for globalizing businessmen, who adopt just-in-time principles as a logistical ethos for corporate existence. As a technical manual explains, 'the footprint of the firm's global facilities … for sourcing, research and development, production, distribution and retail sales, and the effective coordination and management of all flows between them (information, physical / product, and financial flows) become the major determinants of competitive success'. [14] Marc Levinson, author of *The Box*, describes the effects such practices had on an American consumer icon as early as the mid-1990s: 'Workers in China produced her statuesque figure, using molds from the United States and other machines from Japan and Europe. Her nylon hair was Japanese, the plastic in her body from Taiwan, the pigments American, the cotton clothing from China. Barbie, simple girl though she is, had developed her very own global supply chain.' [15]

Logistics assembles the raw material of our lives. It is in this sense that everyone – not just Anatol Zimmermann – lives in a 'container world'. But crucial questions emerge, when logistics is generalized into supply chain management. How are global flows coordinated with local markets to make a profit in real time? And what effect do the giant distribution machines have on the stationary people who ultimately receive and consume the mobile commodities?

Real-Time Unconscious

To answer those questions we must deal with the representation of mobility-systems. At stake are the abstract models that regulate the temporal and spatial functioning of large and complex production lines. Surprisingly, it turns out that by the late 1950s the major problem of the big-box retailers – coordinating the levels of accessible stocks with the rates of flow through stores – had already been solved, theoretically at least, by a pioneer of computer simulation.

Jay Wright Forrester was a servomechanisms engineer in the Second World War, then head of a programme to build the Whirlwind, a multipurpose digital computer that was initially to be used in a flight simulator. That project morphed into the basis of the SAGE radar-defence system (for 'semi-automatic ground environment'). [16] By 1956, after inventing magnetic core memory and overseeing the rise of IBM as the USA's mainframe supplier, Forrester decided that the excitement in the computer field was over, and switched to management studies. His breakthrough came two years later, when General Electric executives asked him to examine their appliance factories, which would oscillate

wildly from peak demand to near inactivity, irrespective of business cycles. He immediately recognized the classic 'hunting pattern' that occurs when a servomechanism receives undamped feedback from an initial action, then overcorrects, generating more distorting feedback.

Forrester was convinced that industrial managers were unable to grasp the multiple rhythms of giant plants hooked into even larger distribution systems, and were actually *worsening* their problems instead of curing them. He designed a non-linear computer modelling program to show how policy decisions affecting the rates of flow between five interconnected categories of stocks – materials, orders, money, capital equipment and personnel – could be represented graphically in their effects over time, so as to reveal the unforeseen consequences of single interventions. The policy decisions could then be corrected via a sixth category, coordinated feedback information. This analysis laid the basis of a new managerial logic, known as system dynamics.[17]

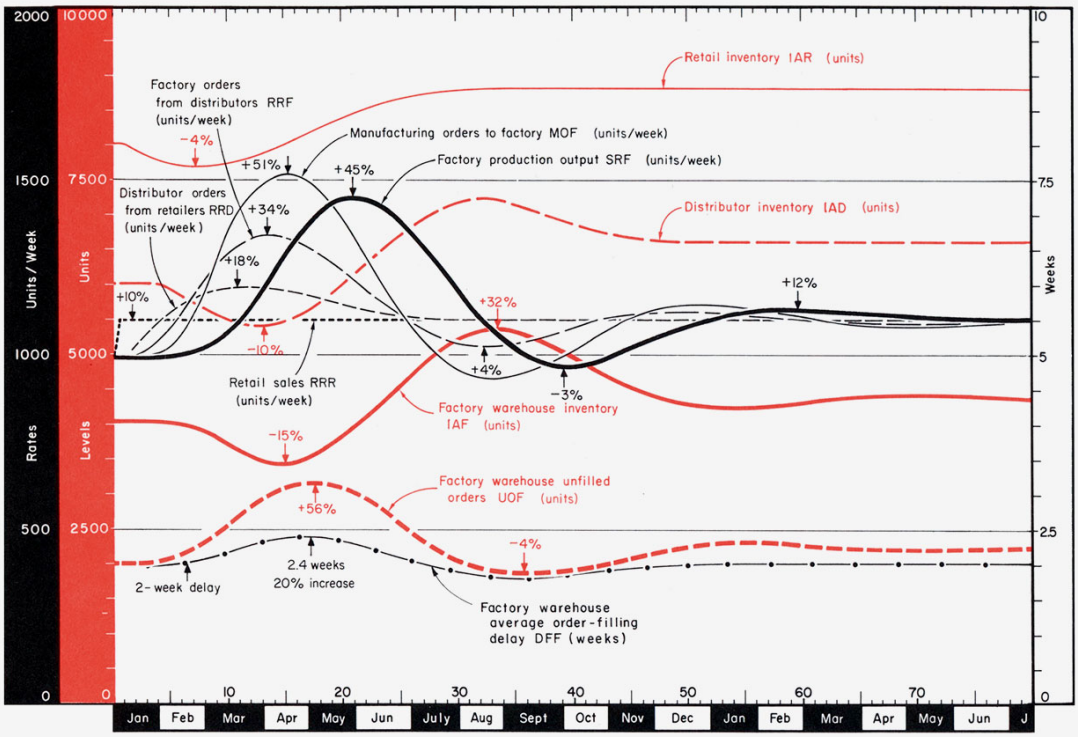


Figure 15-18 (Repeat of Figure 2-2) Response of production-distribution system to a sudden 10% increase in retail sales.

From Jay W. Forrester, Industrial Dynamics (Cambridge, MA: MIT Press, 1985 / 1st edition 1961), 174.

Most histories of cybernetics never mention engineers, focusing instead on scientists and the occasional philosopher.[18] Yet Forrester is undoubtedly the single most influential cybernetician, since his work has allowed the coordination of vast production, distribution and consumption processes taking place on opposite sides of the planet. It is fascinating to realize that his SAGE radar-defence program led very quickly to SABRE, or 'semi-automatic business-research environment', which is still the world's largest airline ticketing network. The ease with which we ignore the very existence of such crucial transport systems has everything to do with the technological unconscious, arising from the automation of large numbers of routine actions to which we no longer pay the slightest attention. Nigel Thrift explains this computerized repetition-compulsion: 'Through the application of a set of technologies and knowledges (the two being impossible to separate), a style of repetition has been produced which is more controlled and also more open-ended, a new kind of roving empiricism which continually ties up and undoes itself in a search for the most efficient ways to use the space and time of each moment.'[19] As the designer of semi-automatic environments including human beings in subordination to mechanical and

computational devices, Forrester was at the origin of this roving technological unconscious. Yet he found that his ideas could not be understood by the corporate class he was addressing. Only in the 1980s did they start making intuitive sense to managers.[20]

There was a technical reason. In the 1960s and 1970s, Forrester's simulations could not yet run with real-time information. Instead, approximate models were created and statistical forecasting techniques were employed. From the 1980s onward, quantum leaps in data-gathering and communications technology transformed all that. With the advent of electronic data interchange (edi), every aspect of production, transport, display and sales could be recorded, communicated, represented and analysed, so as to continuously map out the position and trajectory of each single object being handled by a world-spanning corporation. [21] The result is an 'executive information system' that gives managers centralized access to a continuously evolving set of logistical data, bringing dynamic simulation over the line into real-time representation. This provides the unprecedented ability to rationalize labour at every point along the chain, accelerating the pace and squeezing workers for higher levels of productivity. Still it's not enough for contemporary capitalism. As systems designer Paul Westerman explains, 'Aggressive retailers (like Wal-Mart) will not stop there; they will continue until all company data is available for analysis. They will build an enterprise data warehouse. They give all this information to their internal users (buyers) and external users (suppliers) to exploit and demand measurable improvement'. [22] Such is the formula of global supply chain management, in an information-age economy where the 'push' of Fordist industrial production and state planning has been replaced by the 'pull' of giant retail conglomerates.

With enterprise data warehousing, the just-in-time machine becomes both extensively and intensively pervasive. EDI is correlated with cash-flow, marketing and financing information. Point-of-sale data is associated with individual names on credit cards, then combined with cascades of other data gleaned from the Internet, generating behaviour profiles that can be used for the fine-tuning of display and advertising strategies. The models of optimal future performance built on the analysis of past actions are then relayed upstream to govern the behaviour of workers, middle managers and suppliers, and downstream to influence consumers, creating what Westerman calls a 'unified data system' (UDS) embracing every aspect of corporate planning. The big boxes of Wal-Mart now cast a 70-terabyte information shadow. To be sure, the possibilities of UDS have not yet been fully implemented. EDI is still rare among Chinese suppliers, while surveillance operators like Google and Facebook are only beginning to codify and sell our intimate data-bodies. There is no need to exaggerate the deployment of data integration. But even less can one ignore the tremendous advances in communication between manufacturers and distributors, the increasing granularity of representation that this communication makes possible, and last but not least, the accelerating absorption of consumer imaginaries into the managed flows of the pull economy.

What appears on the horizon is a self-shaping or 'autopoetic' modelling process that can integrate hundreds of millions of individuals and billions of discrete objects and desires into a single mobility-system, where every movement is coordinated with every other in real time. The integrative capacity of this kind of autopoetic system is what defines the boundary of each corporate entity, struggling against all others to increase the market-share that it controls. Under these conditions we live in an 'open' world of universal free trade across national borders, where giant organizations strive to impose closure on mobile populations. Their computerized map becomes our intimate territory. Such a dystopian state was once the exclusive province of science fiction: Philip K. Dick novels, where androids dreamed of electric sheep. But the container, having spawned the big box, now seems destined to bring a world-spanning containment strategy into being. The electronic dream is to maintain continuous contact between a global production system and you, the consumer, whose mobility need not signify uncertainty of behaviour. According to this dream, no desire should linger free without a sale. The representational techniques that

enable such a strategy have seen vast changes since the 1960s. Today they include multi-agent systems, where the decisions of autonomous actors are simulated on both the supply and the demand sides of the equation. [23] On the basis of such simulations, multiple autopoetic systems are orchestrated into smoothly functioning machines serving unified purposes. Yet behind such sophisticated devices one can still recognize the outlines of semi-automated environments, where the individual flow-chart of every object and actor is analysed into the coordinated curves of system dynamics. [24] Like an architectural plan for a global factory in motion, those intersecting curves define the social form of just-in-time production.

Escape

To tie up the threads of this argument, let's return to what started the whole thing rolling: John Urry's intriguing but radically undeveloped concept of mobility-systems. It's ironic to find Urry, in *Sociology Beyond Societies*, reflecting that his own discipline will not survive its transition to the global scale if it does not once again link its destinies to social movements. [25] Had he done exactly that with the social movement closest to his own concerns – namely, transnational migration – he might have seen how the spatially bounded 'containers' that formerly defined national societies are being replaced, not by the liberal ideology of 'open systems', but instead by postliberal constructs like the big-box retailers, whose JIT distribution machines are enabled both by advanced technology and by deterritorialized state-functions (monetary regimes, transport surveillance programs, selective border controls, 'foreign trade zones' inscribed in domestic territories, etc.). The exploitation and oppression that such hybrid constructs exert on cut-price migrant labour has been made explicit by recent struggles of workers in the intermodal transport industry. [26] And the society shaped by these 'postliberal aggregates' has been theorized by a group of sociologists who take their stand with the migrants.

In a book entitled *Escape Routes: Control and Subversion in the 21st Century*, these theorists find an example of social form in the automobile industry: the recently opened BMW plant in Leipzig, designed by the architect Zaha Hadid. As they explain, 'the building enables innovative working-time models and operating times of 60 to 140 hours per week, and because of this the plant can react quickly to specific changes in the market'. What the just-in-time factory reveals is the peculiar articulation of openness and closure that defines a contemporary mobility-system: 'The BMW plant is an interactive order, neither open nor closed, but open as soon as it incorporates the actors necessary for its functioning, and closed as soon as it can protect and sustain its functionality. The plant is not maintained by its exclusivity nor by an internally generated authenticity, but rather by a fluid belonging of different independent trajectories to an effective system of production. It is an aggressive structure, opposing everything that sets limits to its own internal interests or tries to infuse it with impurity. The BMW plant reacts aggressively to the fear of viruses, it is aseptic, clean, pragmatic: Western oblivion at the highest level.' [27]

Hadid's jaggedly flowing architecture enables the material process of inclusion / exclusion in today's society, while helping the public to forget its very existence. Here again, semi-automated flows create unconsciousness, erasing histories of emancipation. For the authors of *Escape Routes*, the coercive structures of postliberal globalization took form as 'the answer to the wild insurgency and escape that emerges after the Second World War'. This insurgency reached a peak in 1968, when the nation-state's promise of rights and representation ('the double-R axiom') was challenged by excluded minority subjects. Yet the opening of borders and the relaxation of social strictures soon gave way to the new state-corporate aggregates, operating in transnational zones of exception without any requirement of legitimacy. Under these conditions, demands for class, ethnic and gender equality lose their effectiveness. The paradoxical response is a 'politics of imperceptibility', whereby migrants in their fleeting singularity become invisible to postliberal power

formations. Recalling the liminal figure we encountered at the outset, the authors of *Escape Routes* might claim: 'We are all Anatol Zimmermann.'

The incongruity of the asylum seeker, abandoned in his improvised dwelling amid technological desolation, could evoke this sense of newfound freedom. As Ursula Biemann claims: 'Everything new is born illegal.' On a more troubling note, however, Biemann recounts that at one point in her interviews with Zimmermann she felt compelled to drop her documentary neutrality, offering to buy him a counterfeit Polish passport that would eventually grant him entry to the European Union: 'Anatol declined. Salvation would have meant the death of his problem, which by now was obviously not only a burden but also the condition with which he has come to identify: to march in the cracks between nations as the post-migratory subject into which he has mutated.' [28] Are we to understand the migrant's fate as double, permanently excluded from a fully satisfying life, yet irremediably attached to the mirage of inclusion? Would this be the condition of life in a container world?

I'll close, not with an answer to those questions, but with a restatement of the enigma constituted by the social form of just-in-time production. As we've seen, global society is filled by a rising tide of inexpensive goods, managed by increasingly automated systems and destined for consumers whose very desires are modelled by the supply chains. This is the world of the commodity, whose concrete promise of use-value is constantly belied by its abstract form as exchange-value. The conditions of exchange are such that despite the productivity gains of technology, work is still devalued to a bare minimum: the working day as the 'socially necessary labour time' required for the purchase of a minimal basket of commodities. Today it is the price of an exploited Chinese working day that exerts downward pressure on wages everywhere, throwing other workers out of a job even as it floods our lives with cheapened goods that must be thrown away almost immediately. In this sense, society really *is* defined by the ever-accelerating mobility of its members: workers, managers, consumers, all differently caught within the same compulsion to step on the pedal. The Marxist philosopher Moishe Postone points out that this dynamics of commodity production amounts to a strange destiny of 'domination by time'. His abstract statement of the problem reads like a concrete description of existence in the capitalist mobility-system: 'As a result of the general social mediation, labour time expenditure is transformed into a temporal norm that not only is abstracted from, but also stands above and determines, individual action. Just as labour is transformed from an action of individuals to the alienated general principle of the totality under which the individuals are subsumed, time expenditure is transformed from a result *of* activity into a normative measure *for* activity … This process, whereby a concrete, dependent variable of human activity becomes an abstract, independent variable governing this activity, is real and not illusory. It is intrinsic to the process of alienated social constitution.' [29]

Cigar-smoking billionaires still exist, of course: I saw them last night in Oliver Stone's new film, *Money Never Sleeps*. But the enigma of our era is the depersonalized principle that governs the estranging machine. Capital itself, in all its abstraction, is the electric dream. For those who do not feel at home in its translocal container world, nor free in the 'wild anomaly' of imperceptible wanderings, awakening will have to come through an as-yet unimagined social subversion of capitalism's universally represented and constantly communicated laws of motion. It's a matter of somehow altering society's unconscious rhythms. A tiger's leap just out of time?

(Stills from the video by Ursula Biemann, Contained Mobility, 2004.

From Jay W. Forrester, Industrial Dynamics (Cambridge, MA: MIT Press, 1985 / 1st edition 1961), 174.

Allan Sekula Noël Burch The Forgotten Space Last year, the documentary The Forgotten Space by Allan Sekula and Noël Burch was presented during the film festival in Venice. Once begun as a SKOR-initiated art project on the Betuwe route, a cargo railway running from the port of Rotterdam to the German border, the documentary shows the relation between freight shipments by sea and the growing internationalization of a worldwide industrial economy. The film is set in four seaports: Bilbao, Rotterdam, Los Angeles and Hong Kong. It examines the sea as 'the forgotten space' of our modern age, where globalization – though hidden from view – becomes visible in a most pressing way. Below are a number of stills from The Forgotten Space, 2010.

Courtesy of: Doc Eye Film, WILDart Film, SKOR / Foundation for Art and the Public Domain, VPRO, CoBo, ORF, Eurimages, Media Programme.)

Brian Holmes is a cultural critic living in Paris and Chicago. He holds a doctorate in Romance Languages and Literatures from the University of California at Berkeley, was a member of the editorial collective of the French journal *Multitudes* from 2003 to 2008, and has published a collection of texts on art and social movements entitled *Unleashing the Collective Phantoms: Essays in Reverse Imagineering* (New York: Autonomedia, 2007). His book *Escape the Overcode: Activist Art in the Control Society* is available in full at brianholmes.wordpress.com. Holmes was awarded the Vilém Flusser Prize for Theory at Transmediale in Berlin in 2009.

Footnotes

1. J. Urry, *Mobilities* (Cambridge: Polity, 2007), 51.
2. J. Urry, *Sociology Beyond Societies: Mobilities for the Twenty-First Century* (London: Routledge, 2000), 5.
3. U. Beck, *What Is Globalization?* (Cambridge: Polity, 2000 / German ed. 1997), 23-24; J. Law, J. Urry, 'Enacting the Social' (Department of Sociology / Centre for Science Studies, Lancaster University, 2003), at www.comp.lancs.ac.uk.
4. Urry, *Mobilities*, op. cit. (note 1), 49-50.
5. The video can be seen in two parts on YouTube, at tinyurl.com Also see geobodies.org.
6. J.-E. Lundstrom (ed.), *Ursula Biemann: Mission Reports* (Bristol: Arnolfini Gallery, 2008), 59. The same book includes my essay, 'Extradisciplinary Investigations', also at eipcp.net.
7. M. Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton University Press, 2006), 1 and *passim*.
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9. P.J. Katzenstein and T. Shiraishi, *Network Power: Japan and Asia* (Cornell UP, 1997); Ho-Fung Hung, 'America's Head Servant? The PRC 's Dilemma in the Global Crisis', *New Left Review* 60, November-December 2009.
10. J.P. Womack, D.T. Jones and D. Roos, *The Machine that Changed the World: The Story of Lean Production* (New York: Rawson Associates, 1990).
11. E. Bonacich and J.B. Wilson, *Getting the Goods: Ports, Labor and the Logistics Revolution* (Cornell University Press, 2008), 25.
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13. M. Petrovic and G.G. Hamilton, 'Making Global Markets: Wal-Mart and Its Suppliers', in N. Lichtenstein (ed.), *Wal-Mart: The Face of 21st Century Capitalism* (New York: New Press 2006), 108.
14. Kouvelis and Su, 'The Structure of Global Supply Chains', special issue, *Foundations and Trends in Technology, Information and Operations Management* 1 / 4, 2005, 1-2.
15. Levinson, *The Box,* op. cit. (note 7), 264.
16. For Forrester's involvement in sage, see P.N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996), chapters 2 and 3.
17. J.W. Forrester, *Industrial Dynamics* (Waltham, MA: Pegasus Communications, 1961); *Principles of Systems* (Cambridge, MA: Wright-Allen Press, 1968).
18. A notable exception is D.A. Mindell, *Between Human and Machine: Feedback, Control, and Computing before Cybernetics* (Baltimore: Johns Hopkins University Press, 2002).
19. N. Thrift, 'Remembering the Technological Unconscious', in *Knowing Capitalism* (London: Sage, 2005), 223.
20. See L. Fisher, 'The Prophet of Unintended Consequences', in *Strategy + Business* 40 (Fall 2005), 7.
21. For definitions of edi, see G. Boone and D. Kurtz, *Contemporary Business, 13th Edition* (Hoboken: Wiley, 2010), 219-20, as well as Bonacich and Wilson, *Getting the Goods*, op. cit. (note 11), esp. 5 and 35.
22. (San Diego: Academic Press, *Data Warehousing: Using the Wal-Mart Model* (San Diego: Academic Press, 2001), 26.
23. For a definition see any of the recent business manuals, such as B. Chaib-draa and J.P. Müller (eds.), *Multiagent based Supply Chain Management* (Springer, 2006).
24. This is the thesis of H. Akkermans and N. Dellaert (eds.), 'The Dynamics of Supply Chains and Networks', special issue, *System Dynamics Review* 21 / 3 (2005).
25. Urry, *Sociology Beyond Societies*, op. cit. (note 2), 18.
26. See the articles at www.warehouseworkersunited.org.
27. Dimitris Papadopoulos, Niamh Stephenson and Vassilis Tsianos, *Escape Routes: Control and Subversion in the 21st Century* (London:

Pluto, 2008), 26.
28. Lundstrom, *Ursula Biemann*, op. cit. (note 6), 59.
29. M. Postone, *Time, Labor and Social Domination: A Reinterpretation of Marx's Critical Theory* (New York: Cambridge UP, 1993), 214-215. Among many commentaries I recommend Howard Slater's text on counter-cultural artistic practice as a political cure for alienation: 'Toward Agonism – Moishe Postone's *Time, Labour & Social Domination*' (2006), available at www.metamute.org.

Tags

Capitalism, Control, Labour

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