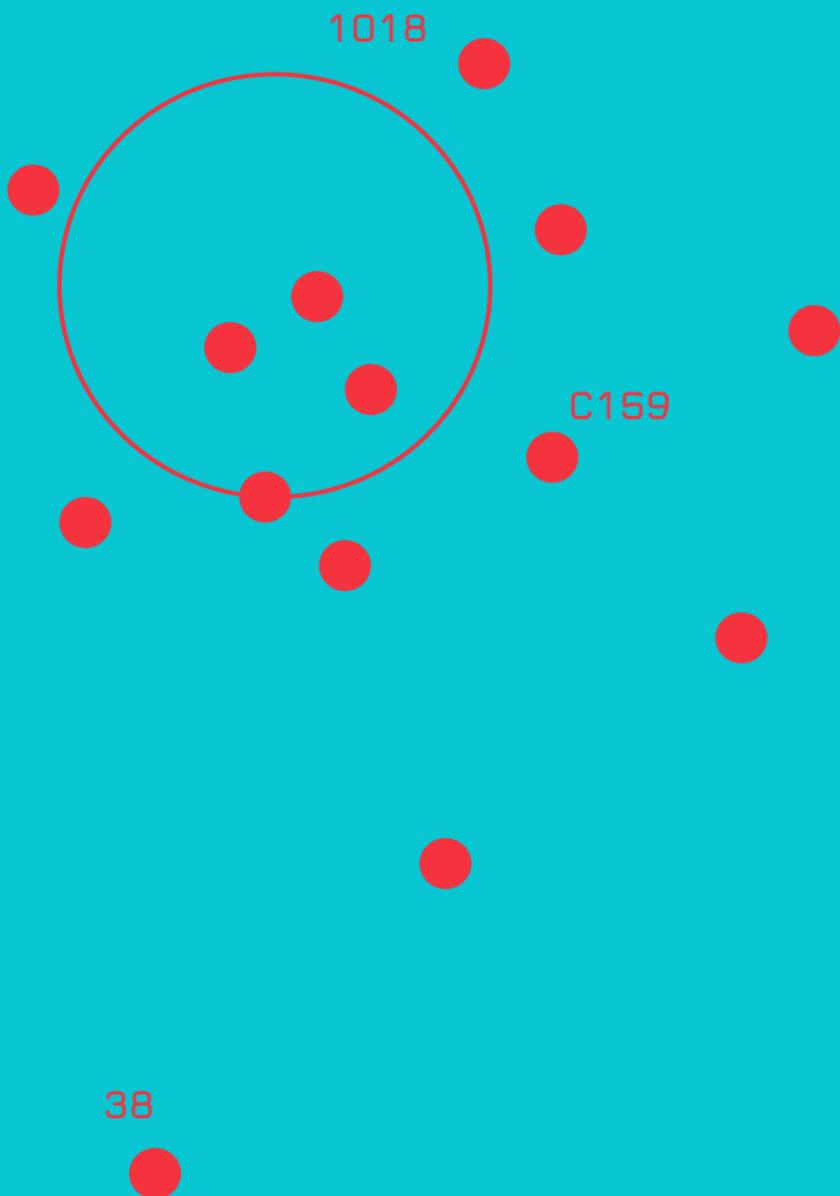


Logistical Worlds Infrastructure, Software, Labour



NO.3 VALPARAÍSO

**Logistical Worlds
Infrastructure, Software,
Labour**

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More from Less
Brett Neilson and
Ned Rossiter

MORE FROM LESS

Known in Chile as *los hombres verdes*, the green men of Ventanas are former copper smelter workers whose skin is scarred with green lesions produced by chemical reactions. Located some sixty kilometres north of the port of Valparaíso, Ventanas has been declared *una zona de sacrificio* due to pollution from heavy industry. The area's general toxicity mirrors the purity of its copper exports, which travel primarily to China. Copper is undoubtedly a form of elemental media, essential to today's digital capitalism and logistical technologies. Yet the reputed purity of the copper refined at Ventanas cannot fix the price of this commodity, which rather follows the fluctuations of trading on metal exchange markets. In the face of this financial uncertainty, data and logistics have emerged as the last hope to squeeze more from less in the Chilean copper industry, recasting the heroic role of the miner in a country 'married' to this metal. Wracked by strikes in the mining and the port sectors, Chile has become a laboratory for a new cycle of struggles, much as it was for twenty years a testbed of neoliberalism. Under these conditions, the Logistical Worlds research shifted to Latin America.

Our previous research in Greece and India focused on shipping ports and their hinterlands. Of particular interest was the role of infrastructure, software and labour as well as the connection of these facilities to China's international logistical expansion. The port of Piraeus, now majority owned by Chinese state-owned enterprise Cosco Shipping, is one of the world's fastest growing container facilities and renowned as the 'dragon's head' of China's Belt and Road Initiative (BRI). By contrast, the port of Kolkata is an unavoidable choke point in the establishment of logistical routes between India and China. Although it is one of the few locations on BRI maps where land and sea routes meet, the challenges in channelling logistical flows through this former outpost of British imperial power are multiple: geographical, geopolitical, financial and environmental. In the case of Valparaíso port, our initial point of interest in Chile, the situation regarding China is different. Despite China's prominence as the port's first export partner and the Chilean government's signing of a BRI cooperation agreement in 2018, plans for expansion at

Valparaíso port have stalled. This predicament led us to shift our attention to the copper supply line and the wider logistical systems that support it.

Follow the software has been a credo of the Logistical Worlds research. Rather than investigating the supply chain for the production, distribution and consumption of a particular commodity or following patterns of finance, we have preferred to track the role of software in controlling labour and the logistical movement of goods. A special interest has been the interoperability of software systems and especially situations where this breaks down. Our empirical research has sought to test the hypothesis that such situations correspond to instances of social struggle, cultural conflict, political unrest and technical inoperability. Our interest in Chilean copper production was not a departure from this approach. Rather than seeking to understand the addition of value at each step of the production chain, we focused on the role of data analytics and algorithmic governance in efforts to make extraction, refinement and transport processes more efficient. Apart from taking us to sites such as the Andina mine and the Ventanas smelter, both run by the Chilean state-owned company CODELCO, the research also involved meetings with data scientists, visits to ports and other logistical facilities, inspections of data centre and cable landing sites, and even investigations into concurrent lithium mining practices in the Atacama desert.

On the face of it, each of these sites and the facilities and infrastructures special to them are undoubtedly distinct. This goes all the way down to the bodies of labour and across to tools, systems and operations to say nothing of geographical features and social conditions. The quest for interoperability between these different kinds of elements and agents stretches back to the utopian 'cybernetic socialism' (Medina) trialled briefly during the Allende era and is more generally considered a core feature of global capitalism organized through the purview of logistics. That computational architectures designed for managing economy and society can calibrate to radically different political values and ideologies suggests their emergence and implementation do not join capital to state in straightforward ways. How is

it possible to reconcile methodologically and analytically systems and infrastructures whose logistical coordination seems at once unhitched from social contingencies and vital to the articulation of labour and life? This was among the guiding questions that motivated our research in Chile and the Logistical Worlds project more broadly.

Ports are connected to intermodal terminals by rail and road, copper is mined and trafficked to smelters for processing, and near real-time computational systems remotely measure mining operations deep underground. Yet the switch between extraction economies and optimization economies (Halpern) is highly variable and frequently inconsistent in terms of industry sectors, institutional settings and labour regimes. Indeed, optimization and efficiency gains through techniques such as computational modelling and simulation of work environments and data analytics enabled by smart devices seemed, to us at least, very much in a testing phase. The exertion of labour appears in no hurry to retire for productivity dreams attributed to machines.

Today, protestors and civilians maintain a popular revolt. They are impatient and fed up with a government divorced from ensuring a redistribution of wealth to address issues of social inequality and financial hardship. These disparities stem in part from years of a privatization agenda, which extended to water supply, for instance, although never fully to the copper mining sector, as CODELCO's continued presence attests. We look back to the time of our collective research in Chile and register this period around 2014–17 as one of transition. While evidence of urban gentrification was clearly apparent in parts of Santiago and the heritage section of Valparaíso on the hill above the old finance district and port area, these spaces were also scenes of social struggle and political protest. For instance, barricades blocked the entrance of various privatized universities. Occasionally we would run into confrontations between protestors and authorities, finding ourselves caught in clouds of teargas. Significantly, a logistical matter – the fair rise on the Santiago metro – sparked the popular insurgency of 2019/2020. Without claiming direct influence between the logistical focus of our research and the insurrection that was to follow, it is no secret that labour struggles in transport and mining,





which would join with student revolt and Indigenous protest, were crucial to the subsequent social explosion.

We might say that the drive to optimize and squeeze more from less stretched working and social lives to the breaking point. Incomplete and unevenly played out across economic sectors, the logistical imperative to optimize requires not only data but also a vast reservoir of social cooperation that at once generates data and becomes an object of governance based on analysis of such data. Whether in the introduction of *la nombrada electronica* in Valparaíso port, which has wrested a twentieth century system of labour provision away from trade union control, or efforts to streamline the copper supply chain in the face of shifting commodity prices and Chinese stockpiling practices, logistics continues to mess with labour processes and relations. Yet the understanding of logistics that animates the Logistical Worlds project extends beyond the business sector of logistics to encompass a mode of power that alters relations between economy and politics. In questioning the distinction between social institutions and material infrastructures, logistics changes and offsets the balance of state and capital. It enacts forms of capture as much as circulation and feeds off discrepancies and contingencies through constant feats of coordination.

Although it is too much to claim that Chile's testbed neoliberalism gave rise to this kind of logistical power, it is indisputable that the political and economic changes that swept the country from the 1970s derive from more than an application of doctrines belted out by Mount Pelerin ideologues or Chicago boys. For instance, the shift from a CEPAL-style import substitution economy to an export economy based on reprimarization did not rest only on neoliberal scripts trucked in from Europe and North America (where importantly they had not yet achieved policy runs). The selective intrusion of a neoliberal regime into Chile also required low labour costs, regional developmental strategies, state apparatuses prepared to carve out space for such extractive activities, and the implementation of logistical techniques and technologies favourable to economic restructuring that moved through transnational markets rather than national settlements.

Entangled with the dispossession of Indigenous and peasant populations, neocolonial debt relations and difficulties in reproducing labour power according to the norm of the 'free' wage, the extractive logic of these transformations presages many aspects of contemporary data economies, at least in relation to the dependence of capital on its multiple outsides and changing relations between profits and rents.

While the theorization of neoliberalism as a political project certainly applies, these circumstances stretch the capacity of the idioms of biopolitics and population management to explain the changes at hand. The emphasis on resource extraction requires not only the creation of environments or *milieux* that stretch capabilities of control and coordination beyond the realm of human vitality but also the testing of seemingly natural limits in the search for access to finite materials that is at once more calibrated and more sweeping. The application of logistical techniques of optimization to such extractive activities mobilizes computational routines that extend calculability beyond probability into patterns of correlation and prediction that respond to a desire for more environmentally pervasive practices of accumulation and valorization. Key here is the shift from environment as a natural resource ripe for plunder to environment as a frontier system of measure able to cut and dice speculation and contingency across a data enhanced spectrum of territory. Little wonder that the politics of resistance to *estratavismo* in Latin America has never stopped at the protection of human lives and livelihoods.

The imaginary of China as a new global hegemon is powerful, no less in Chile where a history of dependency on foreign investment has coupled with structural adjustment regimes that introduced neoliberal modes of economic governance and political dictatorship. However, as scholars such as Thomas Narins argue, the imaginary of Chinese foreign direct investment (FDI) in Chile and Latin America more broadly outstrips the actual increase in recent years. If FDI is one traditional measure by which economic historians and global development scholars ascertain the dynamic and extent of core-periphery relations on global scales, the role of transport and communication infrastructures coupled

with financial markets complicates the analysis insofar as extraction economies may be governed at a distance. Transmission and transport always assume a capacity to send signals of control and market power across space and time. Certainly, it is the case that contemporary Latin America is populated by a diversity of economic actors, unsettling the colonial era that saw European powers divide territory along country borders and follow principles of non-interference.

While Chinese state-owned enterprises such as China MinMetals purchase copper from Chile, their investments in this sector are comparatively smaller than those made by US or EU based firms. Nonetheless, it would be a mistake to underestimate the power of imaginaries to mobilize populations in political ways. The recognition of such power does not imply a direct connection between Chile's signing of the BRI cooperation agreement with China and the precipitation of social unrest, which seemed initially prompted by the government's increase in subway fares. A more powerful force, similar to what we see in Hong Kong, is the accumulation of years of struggle wrought by the commodification of daily life and exhaustion with neoliberal policies and their technologies of exclusion. To understand this dynamic as separate from the logistical commerce between Chile and China, however, is to overlook how instruments of financialization condition domestic consumption in China and manipulate trade patterns of commodities such as copper, hoarded in warehouses in Qingdao and tradeable on metal exchanges. In other words, the rise of popular politics and rejection of successive years of neoliberal policy programs in Chile cannot be fully divorced from the wider meshing of speculation and material exchange in which China is increasingly a central player. That Chile's governmental pursuit of a neoliberal agenda at all costs has met with popular revolt has not motivated our brief analysis here, no matter that our political sensibilities might align with such interventions. Rather, we simply note that techniques and apparatuses of managing social and economic life subsist in a paradigm of depletion that sees the extraction of more from less.

NO.3 VALPARAÍSO

The Ruin, the Jewel and the Chain
Alejandro Donaire Palma

THE RUIN, THE JEWEL AND THE CHAIN

Strangled by Ruins

When I was a boy in early 1990s, Valparaíso was a ruined landscape. The earthquake of 1985 damaged the city's infrastructure, including a significant part of the port terminals, whose operational rehabilitation took from 1990 to 1999. During those years cargo trucks were forced to cross the main urban routes due to the lack of direct access roads to the terminals, causing congestion and producing delays in freight shipment. It was repeatedly said that the port was 'strangled by the city'.

The earthquake was just the *coup of grace* in the decline of the old-good days when the port of Valparaíso was named the 'Jewel of the Pacific'. The city's late 19th century 'humble-Victorian' commercial splendor left as legacy a 'steampunk' socio-technical ecology of firms, knowledges and cracked infrastructures concentrated on a few streets between the hills and coastline. At the end of the 20th century, the territorial diagram of these port infrastructures – marked as topological points through space – was exceeded by cargo movement demand, responding neither to the urban configuration developed in the preceding decades nor the port management model promoted by 1980s neoliberal economic restructuring.

In 1981 the Pinochet dictatorship decreed two laws pointed to deregulate port capital-labour relations, giving more participation to private actors at the interior of the port; and putting an end to the system of licenses for stowage, which opened the activities to any worker according to the demand of the shipping companies. Despite this, the 1980s did not provide a context for the great jump of 'modernization' until catastrophe was imminent and the reconstruction of infrastructures made it necessary to rethink the port management model in its territorial dimension.

In this sense, two events delineate the early years of post-dictatorial transition in Valparaíso port. On the one hand, in 1990, during the last days of Pinochet's dictatorship, Law No. 18966 entered into force. This law ordered an operative separation between port infrastructure management – preserved under the control of the State Port Authority (EMPORCHI) – and port services such as stowage, transfer and

portage, which passed into private companies' hands under a multi-operator regime. On the other hand, in 1991, the initiation of the *Cabildo Abierto* opened a discussion on port modernization and its impact on the urban configuration, introducing a model of urban governance that emerged from trade resolutions and citizen organizations. This followed the logic of the stabilization and democratic legitimacy of the neoliberal governmental apparatus that reigned those years in Chile through the 'politics of consent'.

Both processes helped to redefine the composition of the port's socio-technical body, which passed from a hierarchical structure based on one great state-owned discourse of national development – inscribed in every worker's subjectivity as 'pride' – to a decentralized structure of decision based on heterogeneous interactions between agents operating in logistical chains that crossed the territory. A trans-metropolitan network of cities was emerging in last decade of the past century with the new scale of governmental management across the landscape of the global economy, and Valparaíso had the chance to link its port to the diagrammatic space of integrated world capitalism.

The first piece of legislation erected over the stones laid between 1981 and the early nineties was Law No. 19542 on the 'Modernization of the State Port Sector'. Approved in 1997, this law established the passage from a system based on centralized planning around EMPORCHI to a model based on Local Port Authorities. The following year the Valparaíso Port Authority (EPV) was created, introducing a logistical-port model based on the integration of public-private agents and the redefinition of port-city relations. Its first aim was to understand and manage the ruins.

Clustering the Fragments of the Jewel

EPV had to work across the remnants of the old-port until the early 2000s. In 1999, *El Puertazo* was probably the last social movement in Valparaíso that revolved around 'the docker' as a subject capable of articulating and mobilizing social demands in the city. One of its main triggers was

the high rate of unemployment in Valparaíso at the end of the nineties, the antecedents of which date to the transformation of the port labour regime begun in 1981. Moreover, with the completion of the restoration of Terminal One (T1) in 1999, the promise of 'port privatization' was accomplished when a concession to run this infrastructure for twenty years was awarded to a consortium formed by Ultramar Group and the German company HHLA – Port of Hamburg, which took over operations under the name of Terminal Pacífico Sur SA (TPS).

Despite the broad number of adherents, these developments weakened the symbolic repertoires linked to port-labour. Many issues related to port development became visible, understanding it as a complex logistical process that makes its way through the city, intervening in it and segmenting it, both materially and symbolically. This includes the changing role of 'the docker', who emerged not just as an agent involved in cargo movement but also as a '*porteño*', a citizen and consumer of the goods that circulate through the city.

Furthermore, 1999 also marked the beginning of the construction of the South Access route to the port, a 22-kilometer road known as the *Camino La Pólvora*, which encompasses three urban tunnels and three viaducts. This infrastructure was a result of the *Cabildo Abierto*, and its conception started in 1994–1995 with the purpose of improving cargo truck circuits and expanding the port's operational space through the construction of an inland terminal. When the South Access route finally opened in 2008, it helped to reorganize port-city borders and order freight flows, moving the port-terminal entrance from the congested Yolanda-Barón urban node to the Artillería Hill area. The road had two immediate impacts on city-planning debates. First, it allowed the planning of a passenger terminal (VTP) and the 'Puerto Barón' mall project in the Yolanda-Barón area. Second, the road made it possible to connect the Placilla-Curauma area – in the upper part of Valparaíso – to the coastline, accomplishing a new urban expansion.

The construction of the inland terminal or Logistical Support Extension Zone (ZEAL) began in October 2006. One purpose of this infrastructure was to relocate the cargo inspection processes conducted by

government agencies. This extra-port site, situated eleven kilometres from the maritime terminals, defines a point of communicational integration between the actors in logistics chain. If during the first decades of past century – when the port grew under the watchful eye of engineer Eduardo Budge – the aim was ‘to take metres from the sea to expand the port’, now the principal goal became ‘to extend the port through – and beyond – the city’.

The necessity to compose a common ground to integrate these different operative fragments (T1, the South Access route, ZEAL) opened public discussion about how to administer a port-logistical community in Valparaíso. ‘Cluster’ was the keyword promoted by the announcers of the coming new-good-days to the city. Michael Porter’s ideas permeated the strategic vision of these actors, both in the port sector and the emerging tourism industry, related to the ‘patrimonialization’ of cultural heritage carried out in parallel with port modernization. This point of view focused on ‘comparative advantages’ that define the position and relevance of Valparaíso’s port system in the global supply chain. The integration of the city as a node in the territorial planning established by IIRSA-COSIPLAN (Initiative for the Integration of the Regional Infrastructure of South America –The South American Infrastructure and Planning Council) set the horizon for the urban management tasks to come.

In Valparaíso, clusterization made possible a modular conception of territory as a diagrammatical ground of operation that emerged through interactions between agents that extract value from productive synergies and frictions. The social debate that followed the award of the Terminal 2 (T2) concession to the OHL group is an example of this, showing how a clash of positions around an infrastructure development can be managed as a positive input in socio-technical planning. When a group of artists, architects and tourist-real estate investors mobilized around the slogan ‘*Mar para Valparaíso*’ to highlight the social, cultural and economic impact of the terminal enlargement, they helped delimit a common framework for understanding port-city development. Their criticisms pointed neither to capital-labour relations nor –

on a larger scale – to processes of ecological devastation. Rather, the emphasis was on the necessity to find a sustainable way to extract and manage complementary ‘comparative advantages’ between port-logistical and cultural-touristic clusters. Socio-territorial struggles were reduced to technical problems.

Semiotic Chains

The entity responsible for promoting the common framework of evaluation and decision is the Port Logistics Forum (FOLOVAP). Since its creation in 2004, FOLOVAP has been structured as three committees: 1) Strategic, focused on defining the guidelines of the management model identifying trends and opportunities at a local and global scale, establishing priorities and objectives; 2) Tactical, as a collaborative work platform for the discussion, decision and diffusion of new initiatives for the optimization of the management model, solving the necessary technical and political processes to put them into practice in the territory; and 3) Operational, to coordinate the realization of tactical decisions.

These three committees act at different scales of socio-technical integration – from work niches to relations between public and private institutions – identifying the social codes involved in territorial representations and the communicational dynamics of agents in the chain. This makes FOLOVAP an institution that redistributes frictions by setting a common framework from which to face the different perspectives regarding the process, and by explaining how each agent positions itself and the others in the logistical flow. The objective is to generate discursive linkages that consolidate the idea of a Port Logistics Community, materializing the idea of a socio-technical system capable of modulating the territorial contexts in which it is deployed.

This platform operates complementarily to the Port Logistics System (SILOGPORT). This software has its background in the development of SI-ZEAL, created by the Spanish information technology company Indra for the control of operations within the port extension area. The success of this earlier application meant that Indra was tasked in 2013 with the creation of a Port Community

System (PCS), a larger scale tool for the management of the socio-technical system based in a customized model to meet the specific needs of Valparaíso. With the birth of SILOGPORT, it became possible to calculate and plan possible scenarios regarding the movement of transnational goods that cross through the city.

SILOGPORT is based on the systematization, exchange and dissemination of information along the logistics chain, positioning and mapping the physical and documentary flow of freight as well as identifying points of friction. The software integrates different operators in interdependent processes and pushes them to comply with standards of action and *best practice* in order to respond to the critical objective of the logistics industries: to put the right products and services in the right place at the right times in the process of circulation of goods. This operation of machinic servitude (Guattari) establishes a cooperative framework for the dynamic distribution of each agent in the territory based on a mutual control logic that seeks to ensure the continuity of flow. More than an imposition of action criteria, the software exposes the need for certain operations in order to optimize the movement over territory.

FOLOVAP and SILOGPORT are two integrated semiotic chains that maintain circulation and communicational flow in port-logistic socio-technical ecology. The political and discursive registers of FOLOVAP makes meaningful to different agents the terms of optimization and 'development of comparative advantages' established by the technical-operational coding carried out in SILOGPORT. This helps to consolidate the logistical model as part of a collective identity based on the growth of those who become part of the chain. SILOGPORT, by contrast, acts as a machinic register organized by a-signifying semiotic that allows identification of the optimal configuration of the logistics circuit from the actors involved, providing information to evaluate and define their position and participation within the system. The result is a common territorial diagram inscribed in the practices carried out by each actor in the chain to achieve more efficient performance, and in order to guide the common effort to improve the flow.

This double-semiotic inscribes the 'Jewel of the Pacific' in global supply chains. No longer as a bastard and poor fragment of a British colony lost in the 33rd parallel south, but as a convergence platform between the economies of Mercosur and Asia. The Jewel has been polished and linked following the impersonal path of *Le Tao du Prince*.



NO.3 VALPARAÍSO

The Port is a Debate
Jorge Budrovich-Sáez

THE PORT IS A DEBATE

Impressions of Valparaíso, Alimapu, El Puerto

In presenting an initial portrait of the port city of Valparaíso, of its contrasts and contradictions, I think it is relevant to recall the life and verses of Chilean poet Pablo Neruda who, like many others, inhabited this city with creative passion. A lover of travel, of the sea and of harbours, this is where he brought to life one of his peculiar houses, '*La Sebastiana*', from which he pondered and wrote about his experience of a city that rebelled against any attempt of urban and infrastructural domestication.

Neruda did not just live and experience the city of Valparaíso from his poetic lookout at '*La Sebastiana*'. Halfway through the century, at the beginning of the Cold War, he also inhabited its intricate neighbourhoods as a fugitive from a government that had determined to ban the communist party. Neruda condemned the government's excesses and publicly defended the miners' strike, becoming a fugitive and a symbol of the condemnation of the government's reactionary policies. As an outlaw and as a poet, he drew his encounters with the port city into exceptionally acute passages, among which we read:

El Puerto (The Port) is a debate between the evasive nature of the Andes and the sea. But mankind has been winning this battle, in a way, because the hills and the fullness of the sea shaped the city and made it uniform; not like a barracks, but with the disparity of Spring, with its contradiction of colours, with its sonorous energy.

As Neruda says, *El Puerto* – as it is called in other cities of Chile – is a debate, a dispute, a land of agony. Violent storms beat its coastline and challenge the continuity of port operations. Tremors and earthquakes periodically test the sturdiness of houses and buildings. Vicious fires enhance awareness of the risk of settling among hills and gullies – *alimapu*, as the ancient indigenous people used to call it. And the sum of all these natural phenomena demands that its inhabitants be ready and willing to rebuild, to re-establish, to restart projects in order to continue living.

The most devastating catastrophe that *El Puerto* has endured, however, was not caused by natural circumstances. That same Cold War backdrop, which turned Neruda into a fugitive, was the prelude to a political, economic and social upheaval that required yet more effort from Valparaíso residents to be able to live and dream once again: the military coup of 1973 and the subsequent neoliberalization of Chile. 'The debate' was silenced. The city became uniform like a barracks.

Waves of Modernization, Waves of Instability

According to stevedores retired from the port of Valparaíso, the arrival of containers, cranes and automation during the 1980s signalled a restructuring process linked to port modernization and increased competition in the international market. Clearly associated with the neoliberal onslaught which erupted following the military coup, it was also the end of a period of social and economic wellbeing, of important popular movements and empowered unions.

The traumatic uncertainty of the old stevedores is evident. As heirs of a strong union movement of Christian democrat tradition, tainted by the imperialist ideology of the Alliance for Progress and some discrepancies with the working conditions implemented during the Popular Unity (*Unidad Popular*) government, the memory of the immediate impact of the military coup on work at the docks triggers a certain distress. The devaluation of a work identity sustained by powerful unions, economic wellbeing and job security had to be rebuilt initially in the combativeness of resistance to Pinochet's dictatorship, and then in the revaluation of that work identity in a scenario that was profoundly changed by the expedited implementation of the dictatorship's neoliberal program.

Thus, the neoliberal reorientation of the Chilean economy dealt a heavy blow to the world of work on the docks in Chile. Almost 25 years later, as Law 19 542 comes into force towards the end of 1997 to 'modernize' the public ports sector, the new framework is completed with the creation of ten State-owned port companies (including the Valparaíso Port Company), which provide legal continuity to the Chile Port Company (EMPORCHI). A win

for decentralization, for the State's new powers and for competition among the different Chilean ports and, at the same time, the death blow to the old port-work identity.

It was not the first time that infrastructure modernization works had shaken the city–port relationship. The construction of the modern port at the beginning of the twentieth century was marked by tragic strikes demanding improvements to working conditions and protests by citizens who were horrified by the threat of destruction of the city–port relationship as they knew it. Discontent was reflected in paradigmatic headlines: 'The disappearing Valparaíso' (*Sucesos*, February 1920). The new port, with its 'modern and elegant installations', would eradicate businesses which made up local everyday life at the time, pushing the '*porteño* [port-dweller] identity' into oblivion. Fifty years later, at the height of the Popular Unity government, geographer Pedro Cunill's remarks (which, in a way, predicted Valparaíso port's logistic destiny) seem to insinuate the urgent need for greater efficiency and restructuring of the Chile Port Company (EMPORCHI): 'the administration of the nation's ports and maritime transport has been characterised, in general, by a lack of coordination and rationalisation, which has eroded port services and increased their cost' (1972).

From Port–City to Terminal–City / Logistics–City

No management model can fulfil the infinite possibilities of articulation between ports and cities. This is something that experts in the world of ports know only too well. The very idea of a port city is open to interpretation, entangled with territorial and historical variables, with social and economic forces, with political and technological decisions. Nevertheless, we can see a certain evolution between cities and ports, from the old days of the pre-industrial world, when they were narrowly articulated, to the times of industrial and post-industrial capitalist expansion. In just two centuries, the world-wide expansion of the market has changed the relationship between cities and ports almost to the point of absolute dissociation.

Since the 1980s, port cities ceased being the stage where trade between empires and nations are confused with cultural exchanges and political adventures. Ports

must take on the new role of key agents of the global goods supply chain, turning into logistics centres or 'third generation ports'. The port-city becomes the terminal-city / logistics-city. The territorial dimension of port activities is physically and conceptually reconfigured, and the very concept of port work and employment is separated from the old imaginaries of traffic and trade. The port spaces linked to the industrial economy must be abandoned to make room for logistics support areas and the waterfront of the post-industrial city.

The 'Valparaíso Port Development Plan' is the 'navigation chart' that the Valparaíso Port Company (EPV) has set out to advance towards the realm of logistical efficiency. The plan considers a range of projects which significantly transform the coastal edge of the city. New terminals and underground road access is designed to allow the uninterrupted circulation of trucks, the installation of huge gantry cranes and the building of tall walls of containers, all of which profile a future that to some is a dream of employment opportunities, while for others it is the nightmare of the end of tourism and heritage landscapes. The golden future of economic growth that these projects will bring to Valparaíso is advertised by simulations uploaded to YouTube, electronic signs on the main roads, articles in local papers and a television program called *Tu Puerto* (Your Port). However, if a passer-by with no links to port activities is asked what he or she knows about these projects and their impact, they would probably have only vague ideas.

Debate and Re-establishment

The Chilean Transport and Telecommunications Ministry is still suffering the consequences of pushing logistics to the background, a situation which was only reverted in 2010 with the creation of the Logistic Development Program. This contrasts with the interpretation of the 'EMPORCHI period', which has been described as a period during which 'port activity was a world of its own, with significant influence on the everyday life of port cities, not only with regard to the local economy, but also to customs and to their day-to-day evolution'. The repercussions of these

projects escape the parameters of the imaginary of native port dwellers who are firmly rooted in their parents' and grandparents' routines and customs.

But modernization of the port of Valparaíso is not only of interest to the Chilean State. The South American Council of Infrastructure and Planning (COSIPLAN) of the Union of South American Nations (UNASUR) has described it as a key project under the Initiative for the Integration of South American Regional Infrastructure (IIRSA). In this respect, the task to be performed by the Chilean State-owned port company, EPV, shines a light on the new dynamics that States must adopt in the neoliberal articulation of the global market. EPV and the powerful terminal operators (TPS and TCVAL) have carried out their expert work behind the backs of workers and citizens, leaving to the 'community' or 'population' a few social, cultural and sporting activities that appear to address the 'city-port tension' variable under the banner of 'sustainability'.

As stated previously, such terminal-city / logistics-city projects inspire both dreams and nightmares. And both possibilities have led to resentment and resistance from the new generations of citizens and workers, although with significantly different compositions. On the one hand, citizen organizations inspired by a renewed left-wing project seeking alternatives to the centre-left and centre-right coalitions which administer, without great differentiations, the implementation of the neoliberal and extractivist development program. On the other, port worker unions within which coexist a Christian democrat past with memories of resistance to the dictatorship and the thriving existence of initiatives with tendencies to re-establish an autonomous, popular and revolutionary leadership.

Contrary to all predictions based on the usual distribution of government between the two centrist coalitions, at the last municipal elections, it was the candidate for the citizen organizations that became mayor of Valparaíso. Tourism operators, architects, artists, university students and left-wing militants formed a citizens' pact which arose from the urgent need to organize in order to fight for a city that was languishing in unemployment, ruin and neglect. Convinced of the important heritage value of this old port city, they have

THE PORT IS A DEBATE

mobilized for a strong rejection of EPV's projects, delayed time and again by court actions on grounds of technical unviability and the environmental and heritage damage of these projects.

Valparaíso's port workers have learnt to manage the flexible working conditions imposed by Law 19 542 to their advantage. When they are not assigned a shift, some of them drive share taxis or work as brick layers. However, in spite of this flexibilization, which seems to undermine the strong working-class identity of previous struggles, the union still plays an active role with regard to relations between workers and the companies that operate the terminals. This is basically where the workers come in, appealing to the working benefits involved in the construction of the terminals. Such demands clash with the protests of the citizen groups, bringing to light another situation from which to approach the port modernization process which, as mentioned previously, already has cells that promote revolutionary tendencies.

Citizens and workers live and protest in a city where contradictions are unavoidable. As Neruda used to say, the Port is a debate where it is to be expected that, once again, mankind will win the fight.

**Somatheque of the Port of
Ventanas: Cartography, Maps
and Counter-Representations**
José Llano Loyola and
Paulina E. Varas



At first sight, the port of Ventanas, located 60 kilometres north of Valparaíso, and the surrounding town seem to be places affected by catastrophe. If this impression is indeed factually the case, it is important to understand the different levels of complexity of this devastating condition, considering that communication and information devices also operate at the core of human subjectivity, molding it for its exploitation and encountering, in this context, somatic rebellion movements.

Disciplines and wisdoms define the body differently. Many images appear in this process. The formation of extractive processes and the impact of logistics have bodily and subjective expressions. In the case of Ventanas, these include forms of pollution that remain in the organs and infect them to death, toxic clouds caused by the refinery that move through the air and get into children's lungs, and ships sailing from the port and crossing oceans to keep capital in movement. All of these expressions establish more than human connections.

The term *somatheque*, proposed by P. B. Preciado, approaches the body as a political and cultural record. Thus, the somatic apparatus is something broader than the body as an organic objectivity. A somatheque is not limited to the fleshy envelope of the body, but should rather be understood as a biological substrate that intertwines with the production and farming networks specific to technoscience. In our case, we use the notion of somatheque in order to reflect on counter-representations of processes involving complex variables – the economic development stimulated by the port sector, the copper refinery and its associated pollution, and the ways in which the community resists, since these practices are not consistent with the possible forms of life in the territory of Ventanas. Furthermore, bodies continue living interrelated to pollution, port logistics, the copper distribution process, lungs filled with arsenic and a sea without fish.

Today, in relation to planning, implementing and effectively controlling flows of material and immaterial goods, the concept of logistics presents us with a different way to understand the city, its information economy and ecosystems of labour mobility. It also offers another angle from which to understand the regulation of conflicts between the state, its public-private allies

and communities affected by pollution that embodies and invokes remnants of a model of extractivist development. The town of Ventanas evolved from housing a container terminal or shipping port into a hub interconnecting peripheries on a transnational scale. Thus, it involves not only processes of globalization but also the formation of a 'complex network of distribution systems', according to which the abstractions of the capitalist operations are perceived as fragments of a memory that has lost its place of origin. Furthermore, there is a duality in the town of Ventanas between the soil and the reallocation of a coastal edge of services. The way in which services are demanded through transnational configurations and agreements, which can be illustrated with contingency and supply chains, shows a new social-urban diagram of the relations of the displaced or those who absorb this material and immaterial elasticity in relation to space and livability.

Faced with pollution, the community establishes a founding solidarity within the culture of extractivist exploitation. This solidarity articulates a local kind of knowledge production and allegation, resulting in a horizontal pedagogy about singular and collective ways of doing which grow around the logistical processes maintained in the industrial area.

The aforementioned process has developed throughout time, involving different institutions. In 1965, the State of Chile established an Inter-Municipal Land-Use Plan for the region of Valparaíso (Plan Regulador Intercomunal), which created Industrial Suburbs (Zonas Satélites Industriales). These suburbs were potential locations for further copper foundries and refineries in the area of Quintero and Las Ventanas. A few years earlier, in 1960, the Foundry and Refinery Ventanas (Fundición y Refinería Ventanas, part of the National Miner Company, ENAMI) had been founded in an effort to develop a new State-owned factory capable of raising and accumulating more money for the new Chilean country project. Later on, between 1970 and 1980, a modification in the productivity and management process of ENAMI Ventanas began in terms of both human resources and technical staff. As a result, the company moved from a process of industrial production and exploitation, described as a boost in

performance and efficiency in the use of resources, to the acquisition of continuous improvement abilities and the enhancement of training and technical work, which would be later referred to as 'corporate monitoring'.

After 1990, management was optimized by privatizing the loading process, giving birth to the company Puerto Ventanas S.A. As of that date, the company has innovated its technology, reduced its costs, reframed the loading and unloading operations, eliminated the use of contracted services for maintenance, enhanced the physical quality of the refinery and modernized its electrical and control systems. Additionally, this modernization was reinforced through the use of notions developed by the corporate social responsibility approach. Thus, integral and environmental security started to re-signify workers' organization training so as to include them in the corporate governance process. Summing up, the arrangement of buildings and urban planning of the port of Ventanas' area has undergone a process that can be divided in three stages. The first one has to do with industrialization, with the State as guarantor and founder of its mission and vision. The second stage features materials production and exploitation, privatization of goods and the activation of trade and a production oriented towards the optimization of work time and distance monitoring. Finally, the third stage involves logistics and complex organization related to the technocratic and aesthetic systems designed as computerized patterns for flexible management of resources and commodities.

The different phases regarding resource management or industrial operations implemented since 1965 occurred within the Chilean sociopolitical context (dictatorship and democratic transition), which promoted privatization from 1980 to 1994. Therefore, the inclusion of material and technical-social resources, which proved that applying logistics within the company would lead to reducing costs and worries related to negative externalities, ultimately modified the internal and external language of private and State-owned companies. This was particularly true for the modes of operation: basic functions of the working relationship were reduced in terms of physical distribution (insourcing) and technical

specialties and customer service systems were included (outsourcing). The latter resulted in a reorganization of structures, suiting them for managing and controlling companies formed by shareholders, a board of directors and high management. These modifications were intended to develop structures and processes for guiding and controlling long term logistic-strategic decisions and large scale inversion decisions, as well as those regarding mergers and acquisitions.

Faced with this territory of conflicts and complexities, we developed a multi-cartography of contemporary eco-political practices where logistic technologies and the body unfold identity and the notion of nature. The map is not the territory, but the territory is rather a (im)material, mental and social construction in which subjects, agents, actants, institutions and communities coexist and discuss, act purposely and come into friction and conflict. While the traditional approach of urban-environmental history regards the normative body as peripheral identities, the idea of a somatheque of the port Ventanas intends to develop a record in use, which emerges from the knowledge practices and the logistic production of corporeality and includes institutional, dissenting and subaltern identities. Our approach addresses materials relating extractivism and financial capitalism in the port of Ventanas based on logistics, copper and pollution, as well as on the effects of the copper refinery procedures on the surrounding bodies and crops. Consequently, it is worth mentioning that the concept of 'extraction' will not be regarded only in relation to lifeless matter, but also in relation to workforce. It is in that variety of relations between the social, digital and financial where the situation of Las Ventanas could be appropriately analyzed, considering the antagonisms arising from these forms of extraction, which deeply connect the lives in suburban peripheries and the direct resistances to extractivist violence.

This research space was situated in the crossing between artistic practice, social-political action, cultural criticism and experimental methods, including field observation and testimonies from people involved in the resisting processes. Our objective was to elaborate

sensitive maps and diagrams of those other daily survival flows which offer resistance in the midst of extractivism and the industrialization process.

The drawings, diagrams and maps available at logisticalworlds.org were made with the collaboration of students of architecture and design of the Faculty of architecture, art, design and communications of the Universidad Andrés Bello, in Viña del Mar: Rocio Camacho, Fernando Laorga, Sebastian Villagrán Van Dorse, Sergio Fredes Ordenes, Eva Moreno, Felipe Miranda, Gabriel Jimenez, Francisco Díaz, Joaquin Veloso, Sofía Guzman, Marcos Oyarce.



La Nombrada:

**Union Power Structure and Labour
Regimes in the Port of Valparaíso**

**Hernán Cuevas Valenzuela,
Valentina Leal and
Lucas Cifuentes**

LA NOMBRADA

Fluctuations in ship movement and changing weather conditions produce variations in the landfall of ports and thus their labour needs. As a result, port activity has historically avoided establishing permanent salaried contract jobs because they would be inefficient or unsustainable for companies. Given the instability of the demand for dockworkers' labour power, union struggles have aimed to regulate port work and protect access to available jobs. In other words, labour unions have tried to control the labour offer and distribution of the limited number of shifts among unionized workers based on organization through closed or union shops. *La nombrada* – literally the naming or the call – is the name this appointment practice takes in Chilean ports.

La nombrada intervenes in the hiring of temporary workers by offering of lists of unionized workers to companies that need to engage labour. This creates a labour regime that is very characteristic of port work. The system centres on two principles: First, control (and in the extreme, monopolization) of the labour supply by the union through lists of registered members, which they use to limit the employer's hiring freedom, and second, solidarity among union affiliates in order to distribute the limited offer of job positions based on a fair division of shifts among workers.

Historically, this appointment system involved two phases: First, companies communicated their needs to the unions through hiring offices, specifying the number of workers and type of labour required per shift. In local slang, this was known as *la pedida* (the demand), which was the prerogative of port companies or ship owners and was carried out by a port official. The assignment of appointments occurred in union facilities under the jurisdiction of the maritime authority and during hours set for each union. Secondly, the unions, their leaders or a designated body responsible for the appointment system had a book with all of the names of affiliated workers and would call on – or name – the workers registered in the union lists who had permission to work. The appointments process followed a strict order and the union could not skip over a worker unless the maritime authority had suspended an employee.

This practice allowed the unions to: 1) influence the number of port enrolments used, 2) control the labour

supply in ports, 3) influence port tariffs and salaries, and 4) control ownership and distribution of labour.

Established through a nominative registry, enrolments took the physical form of a non-transferrable identification card with the holder's photograph and personal information. Workers thus became 'owners' of a position. Workers had to request an enrolment in the hiring office. In order to fill the number of vacancies, the hiring office had a 'preference list' that mainly consisted of relatives, close friends and substitute workers (the so-called *pincheros*). These barriers to entry of the labour market in the ports favoured higher salaries and generated a clique or 'closed' social world based on a dockworker culture of internal solidarity.

The unions used port enrolment along with the convening of the appointment system as a mechanism for controlling the labour offer. One interviewee reported that in this way, 'the workers were the owners of their labour'. This image underlines the importance of the figure of a worker who works for himself, as a free subject, and not as a salaried employee who works for the benefit of a company. This was an emancipatory imaginary common among dockworkers. It stressed autonomy and independent work but also petty bourgeois aesthetics that were consistent with stories describing dockworkers as a working class aristocracy.

The control of the labour supply gave the union enormous structural power – to influence and strengthen their demands with respect to threats in the labour market and to oversee the process of working in the port and in the economic system as a whole. One of our interviewees recalled that 'the port unions were very strong, very strong. They could make the entire country grind to a halt'.

Furthermore, the practice of *la nombrada* consolidated the union's power of association. As all appointments were union members, being a union member was attractive to workers. The arrangement made it possible for unions that monopolized the labour supply to capture a significant part of the high income generated by port activity. It also allowed distribution of financial resources beyond just the few assigned jobs, reaching the rest of the population in a type of trickle-down

effect associated with high incomes, levels and styles of consumption and the dynamics of family formation. This accumulation of power enabled unions to ensure high incomes for dockworkers. Several informants remembered with ambivalent nostalgia the period of bonanza during which some dockworkers even had the economic capacity to maintain more than one family and a bohemian lifestyle.

In addition to the primary salary benefits resulting from collective bargaining with the government and the Chamber of Shipping, unions granted health benefits, training and education, and educational scholarships for workers' children. They also promoted leisure activities and celebrations that promoted social solidarity and enhanced workers loyalty to the organization. *La nombrada* allowed unions to better deal with situations of eventual, contingent and temporary work, minimizing the impact of job and social precariousness usually associated with extreme labour flexibility. However, *pincheros* (temporary workers) remained in a situation of extreme vulnerability and precariousness.

The trade union structure we have described refers to the period prior to 25 September, 1981, when the Pinochet regime passed Law 18032, transforming the regulation of work in Chilean ports and liberalizing the labour market. This law modified, among other things, the union structure and the role that the unions had played up until then. It consolidated the disappearance of the indirect control exercised by the unions over enrolment, and the direct control over labour supply and the distribution of shifts through *la nombrada*. The immediate effect was a dramatic reduction of wages offered for each shift and the drop of direct employment in ports. However, *la nombrada* did not disappear altogether. How to explain its survival well beyond the legal modifications introduced in 1981 by the Pinochet dictatorship?

Certainly, one factor that explains the survival of *la nombrada* as an appointments system is union resistance. From the perspective of labour, the system has the effect of securing a minimum level of employment and salaries for union members. However, *la nombrada* is not only an appointment system but also a social practice that strengthens the associative, structural and institutional power of unions. It allows for the organization of a

dispersed workforce, bringing together the strength of many members to build trade union solidarity and obtain a better negotiating position that increases participation in terms of corporate income. This last aspect of *la nombrada* restricts the labour market and hence empowers the bargaining power of unionized workers. The structural power of dockworkers also rests on their collective capacity to produce logistical and economic disruptions. In Valparaíso, the effect of the mere threat of a stoppage during fruit export periods extends beyond the port area, affecting the entire logistical chain and production network of these perishable export products.

In the case of the Valparaíso, our evidence indicates that unions have lost power in terms of their associative strength, especially if we compare them with the unions of the 1970s. The loss of affiliates, the appearance of more unions, the reduction of their organizational capacity, the decline in the commitment and participation of members, the lower level of solidarity and internal cohesion, and the insufficient availability of material resources and access to expert knowledge are some of the factors that influence this loss of associative power. Although in all these factors the unions of Valparaíso have lost vitality, their continued existence seems largely to derive from the influence they still maintain on the placement of workers.

Today, many unions maintain control of the appointments system in ports across Chile. The situation of the largest union of temporary workers in the port of Valparaíso (*Sindicato n° 1 de Estibadores de Valparaíso*) is ambiguous in this respect. In Terminal 1, tendered by *Terminal Pacífico Sur* (TPS), the company allocates workers from lists of affiliates provided by the union. In this case, the union's strategy has been to accept the company's appointment system while maintaining close contact with management to favour the hiring of a majority of union members. In contrast, in Terminal 2, tendered and operated by TCVAl, the union controls staff appointments, which it coordinates with the company's human resources department. This form of operating has assured a number of stable work sources and shifts. The position of Valparaíso's main union, which involves

negotiating different mechanisms with different port companies, is representative of its leaders' pragmatism. This pragmatism is also visible in the way the leaders distance themselves from any class-based discourse. In an interview, the President of this union defined its objective as the maximization of its participation in both the product of port business and the total number of shifts. Hence, it is not surprising that during the dockworkers national strikes in 2013 and 2014, the dockworkers of Valparaíso continued to provide logistical services, even increasing their demand during the months of national stoppages.

Private companies operating ports have tolerated *la nombrada* because it favours a flexible hiring modality that is useful to meet changing labour requirements. Their business strategy is somewhat ambivalent. On the one hand, companies try to diminish the power of the unions, favouring their fragmentation. The Chilean labour legislation introduced during the military dictatorship served this purpose. On the other hand, companies 'need' unions to maintain and control an available, trained and flexible workforce. Furthermore, unions reduce the companies' transaction costs because the appointments system of *la nombrada* offers them the option of hiring of an ever-available workforce of numerous casual workers, who are flexible, organized, disciplined and experienced without the costs associated with a highly segmented labour market with information asymmetries.

In Valparaíso, unions have exploited a close relationship of dialogue with private concessionaires. It is difficult to determine the extent to which the transactions between unions and companies represent a clientele-type co-optation relationship and subordination of the union, or if in contrast, the union manages to negotiate at the same level as the company. As suggested above, the union does not work in terms of a class logic, but acts as a business participant providing the functional equivalent of a staff contracting company.

Throughout history, *la nombrada* has received criticisms related to the promotion of clientelist relationships between leaders and partners/workers; for being an inequitable, opaque and flawed distribution mechanism of shifts; and as a practice that has sown mistrust among unionized casual workers and their

leaders. Conservative newspapers and think tanks linked to the business sector have constructed *la nombrada* as a moral panic around perceived risks of ports being captured by dockworkers unions and their *mafiosi* leaders in detriment to the national interest. However, some of our interviewees criticize the staff placement undertaken by companies. They report irregularities of a 'black list' type to exclude workers. They also report abuses such as the non-payment of overtime hours outside of completed shifts, or the assignment of multitasking. In addition, we have collected accounts of preferential treatment obtained by some workers.

In recent years, an attempt has been made to formalize and regulate the appointments system to eliminate its shortfalls. In this way, the heterogeneous current scenario of forms of hiring and recruitment of casual workers in Chilean ports has begun to give way to a certain institutional convergence toward forms of appointment deemed more democratic and transparent. These changes involve limiting the direct participation of union leaders in appointments to avoid 'finger-pointing', producing guidelines to formalize the call process, the list of workers and its rotation (*la redondilla*), and enhancing the union assembly control of *la nombrada*. Along with these changes, there are other minor modifications between old and current appointments system practices. Instead of someone calling out names in a room full of people – the appointments room – digitized lists are circulated. The Internet is also used for dissemination, and workers are often contacted by telephone or even Whatsapp.

The continuity of the appointments system of *la nombrada* and the changes it has undergone derive from its functionality for both companies and workers. In other words, *la nombrada* has facilitated the coupling between business and union interests. Chilean port labour regimes result from a variety of contingent labour-capital arrangements, allowing for different accommodating solutions and appointment systems.

In the hands of unions, the appointments system is a social practice that functions as a mechanism of power. It allows union leaders to: (1) organize a dispersed workforce, (2) exercise leadership among their members,

(3) build union solidarity, cohesion among members and to accumulate the strength of many members and, potentially, (4) monopolize the labour supply.

At the same time, the appointments system provides benefits to companies by allowing them to reduce the high transaction costs that would result from the need to produce staff placement according to a logic of 'just-in-time' in a flexible and disarticulated labour market, such as that of the port sector in Valparaíso.

The appointments system may be more likely to remain if it manages to match the interests of workers to maintain jobs (or shifts) and levels of income, and the interests of companies to access a flexible workforce at low cost. Placing staff based on the daily labour requirements of port companies with a fundamental role played by the unions seems to lessen the negative impacts of labour precarization, making dockworkers' flexible work scheme less vulnerable to the vicissitudes of the port logistical sector, more predictable and safer.



**On the Modes of Existence of
Technical Extraction in Chile, or,
How We Extract
Jamie Allen**

HOW WE EXTRACT

Can anything be made without extraction? Are there modes of productivity that do not transport materials out of one place and into another, and in part just by doing so, create derivative value? Where does the impossibility of *ex nihilo* creation leave us, as empirically minded, self-supposedly *creative* humans who wish to add something of our own to a common world; who offer up perspectives and render contexts in ways that we hope will preserve and service the integrity of communities, materialities and justice? Are the patriarchal, colonial, racist and exploitative roots of modern capitalism and empirical research so intertwined as to render the motives of everything we see, and make from that seeing, complicit with these common d(en)ominators?

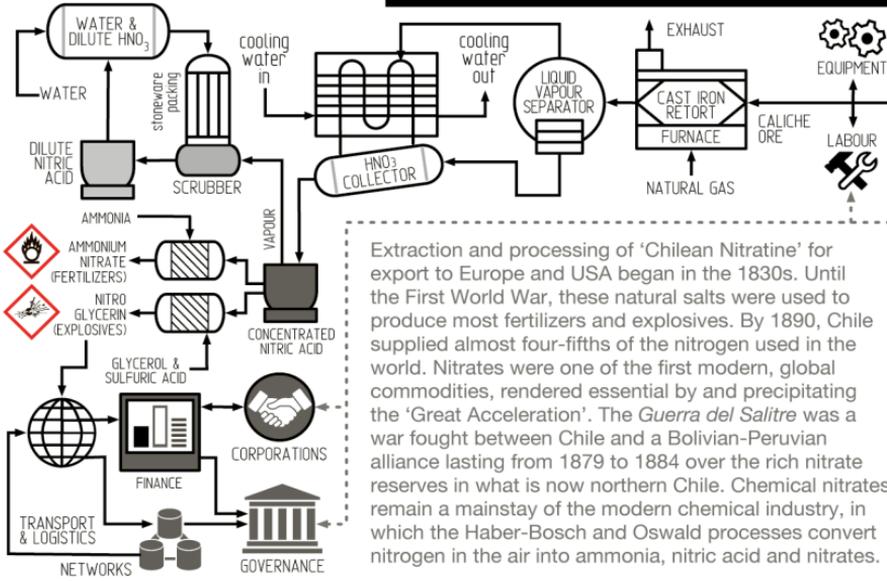
For more than a century, the South American nation of Chile has seen the materials and character of its territories rendered into commodities, largely servicing the interest of monetary profit both foreign and domestic. In this, Chile is rather like my own birthplace of Canada, a country that has quarried minerals, hewn wood and drawn water to sustain the wealth of that nation. Chile's shifting fortunes, however, have repeatedly intersected with discernable technical rearrangements, three great booms and busts of hype and actual productivity in agriculture, communications and energy. The Canadian Shield was allowed to become a more stabilized bedrock for the extractive industries of the North, which would not profit as quickly or inordinately from the agile synchronicity of globalized logistics of shipping, nor suffer as dearly from the fragility of global commodity markets that these economic cycles bring about.

The fortunes and failures of Chilean resource extractions are a subtext of the stories we now tell ourselves about the Anthropocene, of the 'Great Acceleration' and the elaborations of modern industry that such curves diagnose and extrapolate. The continual surge of hastened productivity, starting in the mid-20th century and continuing into our current moment, began as a continuation of a European addiction to (agricultural) productivity that was initially fuelled by injections of fertilizer provided by saltpeter extraction from Chile. This addiction became the backdrop of post-war synthetic chemistry innovations that could pull nitrogen from the

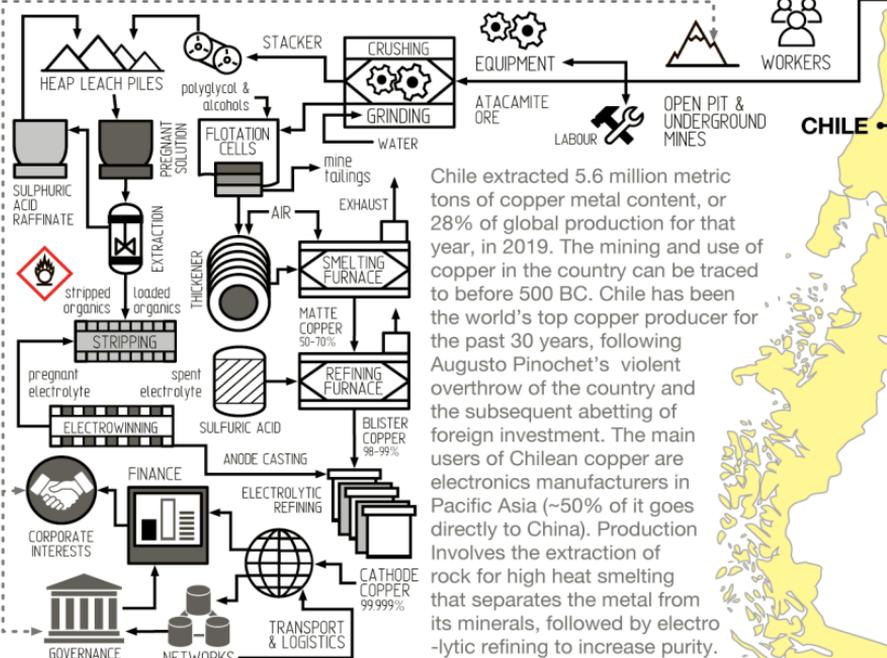
NITRATE *sal petrae* 'salt of rock'
 White crystalline salt used as fertilizer, explosives, and to preserve foods. AKA 'Chilean saltpeter', 'White Gold' 'Chinese snow'; potash, soda, potassium nitrates; *salitre*, *caliche*.

ON THE MODES OF EXISTENCE OF TECHNICAL EXTRACTION IN CHILE

...or, *How We Extract*. Comparative schematics of the ongoing colonial harvesting of the materials, territories, cultures, and stories of the mineral rich regions of South America between the Andes and the Pacific Ocean.



Extraction and processing of 'Chilean Nitratine' for export to Europe and USA began in the 1830s. Until the First World War, these natural salts were used to produce most fertilizers and explosives. By 1890, Chile supplied almost four-fifths of the nitrogen used in the world. Nitrates were one of the first modern, global commodities, rendered essential by and precipitating the 'Great Acceleration'. The *Guerra del Salitre* was a war fought between Chile and a Bolivian-Peruvian alliance lasting from 1879 to 1884 over the rich nitrate reserves in what is now northern Chile. Chemical nitrates remain a mainstay of the modern chemical industry, in which the Haber-Bosch and Oswald processes convert nitrogen in the air into ammonia, nitric acid and nitrates.

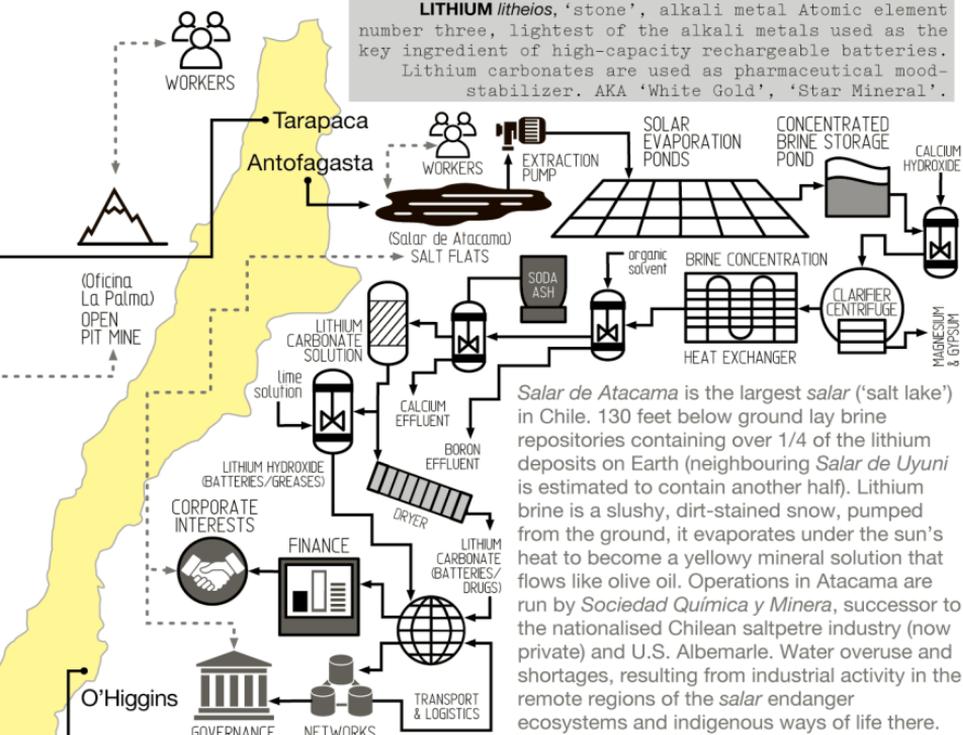


Chile extracted 5.6 million metric tons of copper metal content, or 28% of global production for that year, in 2019. The mining and use of copper in the country can be traced to before 500 BC. Chile has been the world's top copper producer for the past 30 years, following Augusto Pinochet's violent overthrow of the country and the subsequent abetting of foreign investment. The main users of Chilean copper are electronics manufacturers in Pacific Asia (~50% of it goes directly to China). Production involves the extraction of rock for high heat smelting that separates the metal from its minerals, followed by electro-lytic refining to increase purity. Copper mining emits massive quantities of trace elements, mine tailings and toxic SOx (sulphur oxide) gases. Mine tailings are often dumped directly into the sea, reshaping coastlines and endangering ecosystems.

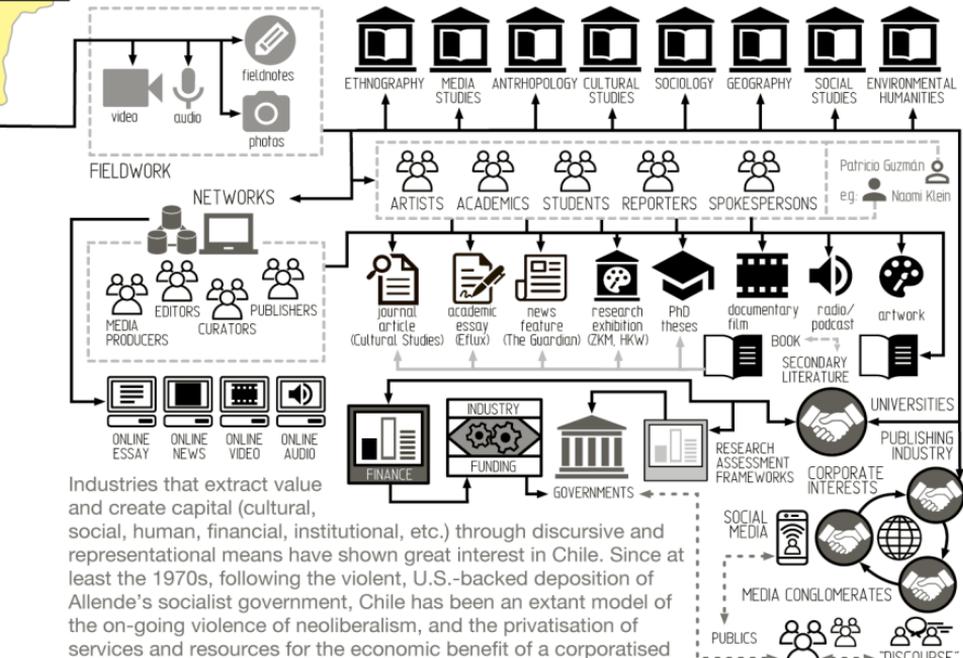
COPPER *cuprum, cyprium* 'cyprus metal'
 Red-brown soft metal with high ductility, electrical and thermal conductivity. Used in electrical wiring, roofing, plumbing, industry, brass and bronze alloys; metabolic mineral. AKA 'Azure', *cobre*.



LITHIUM *litheios*, 'stone', alkali metal Atomic element number three, lightest of the alkali metals used as the key ingredient of high-capacity rechargeable batteries. Lithium carbonates are used as pharmaceutical mood-stabilizer. AKA 'White Gold', 'Star Mineral'.



Salar de Atacama is the largest *salar* ('salt lake') in Chile. 130 feet below ground lay brine repositories containing over 1/4 of the lithium deposits on Earth (neighbouring *Salar de Uyuni* is estimated to contain another half). Lithium brine is a slushy, dirt-stained snow, pumped from the ground, it evaporates under the sun's heat to become a yellowy mineral solution that flows like olive oil. Operations in Atacama are run by *Sociedad Química y Minera*, successor to the nationalised Chilean saltpetre industry (now private) and U.S. *Albemarle*. Water overuse and shortages, resulting from industrial activity in the remote regions of the *salar* endanger ecosystems and indigenous ways of life there.



Industries that extract value and create capital (cultural, social, human, financial, institutional, etc.) through discursive and representational means have shown great interest in Chile. Since at least the 1970s, following the violent, U.S.-backed deposition of Allende's socialist government, Chile has been an extant model of the on-going violence of neoliberalism, and the privatisation of services and resources for the economic benefit of a corporatised state. Books like Naomi Klein's agenda-defining *The Shock Doctrine* (2007) precipitated a host of studies, artworks, fieldwork, film and other media making Chile into a case-study for late 20th century geopolitics.

CULTURE INDUSTRY writing, research, media, art as published and formatted cultural goods (writing, film, radio, exhibitions) and academic activities (talks, panels, conferences, writing) based on empirical knowledge practices (fieldwork, ethnographies, media capture). AKA 'political documentary', 'conscious media', 'artistic research', 'humanities'.

air, instead of from the Atacama desert. Solutions like the Haber-Bosch process would thereafter provide Germany and the world with their nitrate fix, driving Chile's saltpeter industry into the ground, almost overnight. Another Chilean commodity, copper, is a primary raw material for the electrical, electronic and information economies that flourished throughout the last century, re-invigorating Chilean extraction in the post-nitrate era (many of the conglomerates selling saltpeter would convert their operations to copper). And just as the cupric arc of technological lock-in plateaued, Chile's commodity futures would again prosper through the harvesting of lithium deposits within the country's borders. As high-capacity lithium batteries emerge as the means by which continuous flows of electricity will be provided from less-continuous sources of energy like wind and solar, Chile finds itself with yet another elemental resource curse, another portion of its landmass which global markets are driven to extract, another ambiguous burden of riches that must be negotiated against the sanctity and non-monetary needs of communities and environments.

'Research' is a word we use for work that prefigures or is juxtaposed with 'production'. For some, research is an activity that cross-cuts the cognitive labours of writing (in, say, the humanities), media making (of, say, documentary film) and other creative work (of, say, media making, art or design). Since the millennial turn, the disposition of research known as 'fieldwork' has become pronounced in the study and rendering of infrastructures, global politics and ecologies in peril. Numerous field trips, platforms and group expeditions have taken place that attempt to grasp the effects and planetary magnitude of global capitalism, as registered in particular instances and on particular sites, along the trajectory of a trans-Siberian train, in the case of the 2005 collective experiment, 'Capturing the Moving Mind: Management and Movement in the Age of Permanently Temporary War', or 'Mississippi: An Anthropocene River', also a collective research project and river journey on and along the Mississippi River in 2019. These empirical investigations in motion emerge when competing demands on time and a desire for interdisciplinary horizontality creates the need to conflate

research and production, organizing events and research opportunities that combine private method and public disclosure. In practice, they feel like a performance of both backstages and frontstages, a breakdown of the modernist scenography that separates 'research' from 'production', as well as being a transformative 'training' of multidisciplinary subjectivities that are sensitive and situated.

These experiences of terrains and with people can provide comparative insight and topological connections, in measure with the systemic violence and exhaustion under study. They are also problematic 'rites of passage', as Shannon Mattern puts it in her study of field guides, and effective means of pushing knowledge practices and institutions from the security of abstract hypotheses and conjectures. The research collective I was a part of that visited the Valparaíso port systems, copper mines and communities of Chile for the Logistical Worlds project in March 2017 was all of this: as a group of six or seven people, we visited a Codelco mining smelter; had lunch with local union reps at Port Valparaíso; conferred with foreign and domestic researchers, artists and activist; held discussions with astronomical data cleaners; ate, drank, joked and argued with new friends and fellow travellers, and variously collected notes and media that attempted to draw out how the long, narrow strip of land between the Andes and the Pacific Ocean that is Chile was continuing its long history of infrastructural-becoming. We were also given numerous powerpoint presentations, shown many systems schematics, process diagrams and illustrative operations plans, and plans for the future, most of which relied on or projected value created by extractive means.

Our varied group of researchers, activists, students, artists and media makers had individual and collective intentions and perspectives, sensitivities and emotional responses that also, of course, morphed during our time together. It is a time for which I am immensely grateful, as for the continued relations I maintain with the situations and people I connected with in Chile. And as I diagram these material and knowledge processes, I am compelled toward changing how I understand and engage with 'field' and 'work', as well as the ways I myself render, use, profit from and critically reappraise these

HOW WE EXTRACT

engagements. If the machinations of the mobile desire-machine of fieldwork can (as a mode of critical research on the environment, media and geopolitics) be brought to an abrupt if necessary halt by 2020's COVID-19 pandemic, this has also provided an opportunity to see this kind of work anew, for what it is, what it is not and what it could be.

NO.3 VALPARAÍSO

Copper Modernity

Ned Rossiter

COPPER MODERNITY

Copper conducts. Not just a metallic alloy with high thermal and electrical conductivity, copper also generates powerful political and social discourses of industrialization and economic nationalism. Copper orchestrates imaginaries of modernity, which emanate from its material presence in the social and economic lives of peoples, nations, empires and transcontinental circuits of trade. Indeed, in countries such as Chile where copper has been central to both economic prosperity and experiments in government from cybernetic socialism to brutal dictatorship, the spectral qualities of this lustrous metal condition an epoch of *copper modernity* fused with capital accumulation. The materiality of copper, in short, holds an intrusive force that shapes both political regimes and social conditions. To the extent that copper commands a response, whether as a commodity object or symbol of capitalist futurity, one can attribute to this metallic form an organizing capacity of mediation beyond media.

How to cast copper as a prism through which to analyse and conceive the organization of contemporary geopolitics is one of the chief methodological and theoretical curiosities motivating the inquiry of this essay. Of course copper does not have a determining or unilinear effect. Nonetheless, we can attribute to copper a catalysing potential in the organization of society, economy and environment according to the contexts and systems in which it is situated. As both imaginary and material object, copper precipitates a multiplicity of organizational endeavours supported by a range of technologies and techniques. From the extraction machines that mine the earth to blockchain technologies that guard against the 'trade financing' of metals using fake paper certificates, copper is a form of elemental media key to the organization of logistical worlds.

Chile is central to the global story of copper. In 1960 the country generated approximately 10 per cent of the world's supply of copper. Although substantially down from the 1960s, since the mid-1990s copper has comprised approximately 10 per cent of Chile's GDP and half of its exports. As a key source of employment, the copper mining sector bound Chilean politics and society to national imaginaries of economic development and industrial modernization. Within political discourses of Chilean

modernity, class and state formation held a dependency relation with copper as an exploitable resource and commodity to traffic in the capitalist world system. By 2001, after nearly a decade since the advent of the World Wide Web and expansion of the Internet coupled with continued growth in China's economy, Chile's share of copper on world markets had risen to 35 per cent. From 2011–15, however, the IMF reported that copper prices had decreased by 40 per cent with further pressures on prices expected as China enters a period of growth slowdown. Such a trend corresponds with what IMF economists term 'the end of the commodity supercycle'.

Prior to extraction as a copper sulphide, and before it finds its way into data storage devices and transmissions systems, copper exists as an elemental metal form. While China has adopted the strategy of extracting subproducts from sulphuric acid contaminants used in the smelting process and then hoarding copper in a concentrate form as a parameter in price setting in financial markets, Chile's mining sector has been forced to generate value beyond producing cathodes with high purity levels. The process of neoliberal organizational reform stretches back to the mid-1970s with the dictatorship years of the Pinochet regime, which set out to weaken union power in the sector through increased competitiveness achieved by downsizing the labour force and expanding the number of contract workers, outsourcing services in health and education, and further mechanization of production processes. The state-owned mining company, CODELCO, bore the brunt of these interventions. Additional pressures stemmed from government concessions opened to multinational corporations, which resulted in state and private companies often competing for the same lode in adjacent mining sites.

Chile's copper mines in the early twenty-first century function as a test bed of futurity, indexing a transition from a resource economy to data economies. In recent years China's lower production costs brought about by modern refineries and cheaper labour regimes have prompted Chile to offset declining revenue and its higher cost of labour by reducing production and obtaining efficiencies from supply chain management, ongoing

labour reform and increased automation within mining processes and logistical organization. An example of this can be seen in the partnership between CODELCO and the University of Chile's Centre for Mathematical Modelling in Santiago, who are developing 'smart mining' technologies using robotics, mathematical and computational modelling techniques, and machines equipped with sensor devices for real-time monitoring of production, labour, seismic activity, ambient temperatures inside the mines and air contamination levels. Despite these efforts to secure new lines of value from production processes, copper remains one of the most volatile metals in terms of its price on financial markets. Like any natural resource, the economic horizon of the copper mining industry is finite. Certainly the research focus of entities like the Centre for Mathematical Modelling has direct implications for prolonging the viability of the mining industry within an economy of depletion. However, such efforts are also indicative of a shift from Chilean modernity predicated on copper to a logistical futurity refined by technologies of precision.

Copper belongs to a raft of commodities in futures markets such as the London Metal Exchange (LME) and the Shanghai Futures Exchange. Founded in 1877 and acquired in 2012 by Hong Kong Exchanges and Clearing, the LME began trading with copper before expanding to include other industrial and precious metals such as zinc, aluminium, gold and silver. Copper ushered into the twenty-first century as a metal whose market value increased by 80 per cent, around three times the value it held in the final years of the preceding century. This escalation in price coincided with the commodities boom in the mid-2000s when oil prices surged and the housing bubble had collapsed. During this period domestic demand for copper rose fivefold in China for construction, electricity networks and infrastructure. The broader geopolitical context was marked by the onset of what many commentators refer to as 'the Chinese Century'. Copper has not been immune from China-led globalization and in recent years has attracted an artificially designed scarcity value in the form of hoarding. Stored as copper concentrate powder in state-owned bonded warehouses located in the port of





Qingdao, the technique of withholding product from trade resulted in surges in derivatives transactions on the world metals markets. Exemptions from customs duties and multiple sales of the same stock secured with the exchange of forged warehouse receipts are two key policy devices and commercial practices that instantiate a financialization of metal made abstract. Here, and similar to what we found in the ports of Piraeus and Haldia, the medium of paper governs transactions in futures markets, replacing the movement of metal and accumulation of actually existing inventory.

As an elemental metal, copper invites spectrum thinking: from the neuronal networks of the brain to the metabolic system of the body and its organs, from holes bored into the ground to stockpiling copper concentrate in China's warehouses, from cables of empire to electronic waste industries and the cultivation of soils with toxic contaminants. As an analytical device, copper has a multiplying capacity, bringing otherwise asynchronous conditions, practices and events into relation. In this regard, copper serves as an element within what Reinhold Martin calls 'a system of bridging', where not only physical or material connections are made, but also cognitive relations are conditioned as a complex of 'infrastructural mediation'. The ensemble of relations of metallic resource, machines, labour, state formation, global economies and finance capital, and prevailing ideologies and imaginaries all exist in a kind of recursive feedback loop, with each element playing back upon and constituting the symbolic and experiential lifeworlds, even the material and ontological conditions that comprise the limits of the system at any particular historical conjuncture.

The materiality that ties the imaginary of copper to the perceptual synapses of the brain is distinct from the physical properties of this metal and its alloys. As a trace element in tissues of the body, copper is required for neurological functions and the nervous system. The medical treatment of copper-induced neurological disorders strives to return the body to a system of equilibrium. Restoring copper balance in the body guards against disease and neurological degeneration. Excess copper in the brain, liver or intestinal organs can result

in copper toxicity, which is implicated in numerous neurodegenerative conditions and metabolism disorders such as Parkinson disease, Alzheimer disease and Wilson disease. A deficiency in copper absorption, by contrast, can result in coeliac disease, Menkes disease and dementia. These biochemical abnormalities are understood within the medical sciences as 'copper transport diseases' encoded into genetic mechanisms.

The metaphor of transportation overlaps here with earlier models of communication, which for centuries bound the transmission of symbols with technologies and infrastructure of movement. A decoupling of communication and transportation technologies occurred, as famously and somewhat controversially argued by James Carey, with the advent of the telegraph in the nineteenth century, which 'freed communication from the constraints of geography'. Time and space became reorganized and invested with new territories of power in the form of colonial empires. With the ongoing miniaturization of technology in recent decades, signal systems have again conjoined with transportation. Radio-frequency identification (RFID) chips with copper antenna are embedded in fashion garments and shipping containers, while digital wristbands track anxious bodies in motion and measure the productivity of workers in warehouses, factories and offices. Sensor devices are increasingly littered across urban settings. Movement is now calibrated according to key performance indicators (KPIs). Copper is both a signal and conduit of transmission, regardless of scale.

Such a condition or state of existence is vastly different from the role of copper in the organization of capital accumulation and technologies of mediation, where excess is optimized as either a standing reserve or amplification of signal. With a scalar switch from the molecular level of the body and brain to industrial techniques of extraction and economies of speculation, copper extends its propensity to effect the organization of systems and conditions in the world.

Across this sketch of developments and histories, copper per se is not a tool, but it is nonetheless an object shaped by organizational and technical processes that define social and economic imaginaries, transform

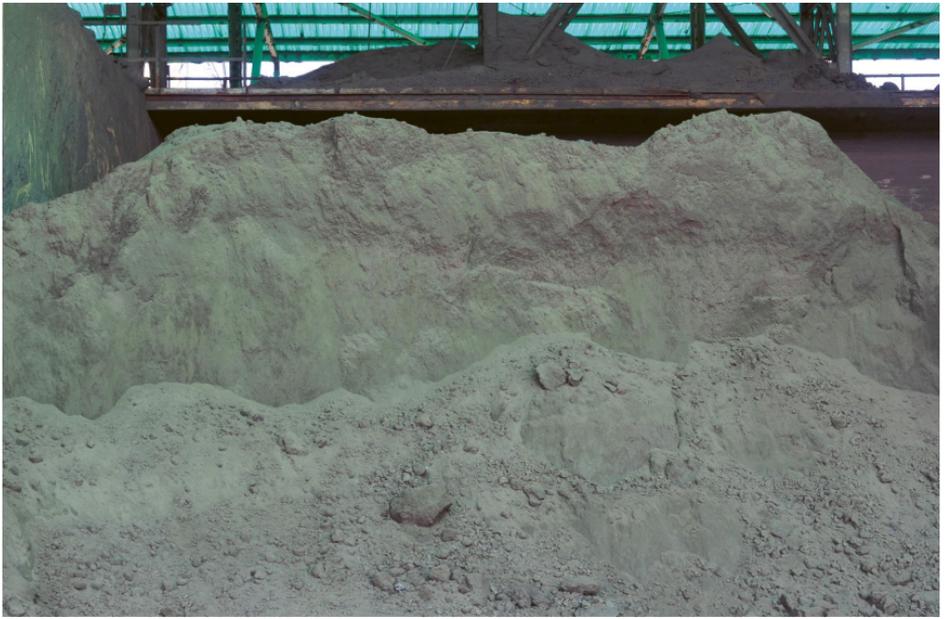
bodies and extend our sensory perception. In this regard copper can be understood as a technology. The many devices, objects and infrastructures of which copper is a component part hold their own mediating properties and capacities. Yet no matter how much we may wish otherwise, objects do not speak. Even if they possess forms of what Katherine Hayles terms 'nonconscious cognition', objects remain elusive. While materiality is often operationalized within our idioms of intelligibility – whether through classification, modification, abstraction and so forth – there nonetheless remains at a certain ontological level a stubborn refusal to inculcation.

How, then, to tune in to the silence of objects that is nonetheless underscored by the potential for force with transformative effects upon and within the world, on human subjectivity and ecological life? In recent years there has been a methodological predilection across the social sciences and humanities to 'follow the thing', as though revealing the movement and action of objects across networks lends an ontological substance brought about through the attribution of relations. There is undoubtedly some value in such a pursuit, but how to discern the hierarchy of relations – the politics – without succumbing to the depoliticized logic of 'flat ontologies' that prevails within the Latourian turn to assemblage theory? The history of copper modernity in Chile demonstrates that objects are never neutral. An elemental object as multivalent as copper traffics in confrontation.

In his essay, 'Towards an Ontology of Media', Friedrich Kittler maintains that the Aristotelian attention to matter and form neglects the relation of things to time and space. Perhaps buried in this insight of mediation between things, and thus organization, are the components for a critique of power and the techniques by which it operates through technologies of empire. Integrated into computer hardware and cable infrastructure, copper is an elemental media that also signals a regressive turn in making the Internet accessible to the Western world. In places where copper as infrastructure is absent, the leap to wireless and fibre optics can be made more easily. Copper can take us back to the Greeks, and it can turn us into 'German media theorists'. But above all else copper is

elementary for colonialism. Copper is not an enabler, much in the same way that gold is not. Copper is a hoarder. It stores. And it switches and distributes.

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The Copper Line
Giorgio Grappi and
Brett Neilson

THE COPPER LINE

Extracted from hard rocks and mountains, copper is a tradable metal that occupies a place on the fourth row of the periodic table. Known for its capacity to conduct electricity, the element has become an indispensable component in the manufacture of computing hardware and other electronic equipment essential to logistical operations and today's capitalism. Our effort is to situate copper in its contemporary conduits of production and circulation, and, in particular within the patterns of mining, refinement, transportation and stockpiling that link its extraction in Chile – the world's primary copper producing country – to its storage and uses in China – the world's largest copper importing nation. We trace how the production and circulation of copper has mutated with shifting logistical arrangements that respond to the geopolitical position of China, the financialization of trade in base metals, the rise of business models based in data extraction and workers' struggles in times of labour precarization. On this basis, we ask what type of politics logistical practices related to the contemporary copper industry embody.

In investigating these political dimensions of logistics, our inquiry aims to be more than a work of commodity chain analysis. Our observations and theoretical speculations stem from limited empirical research conducted in the port of Valparaíso, the Andina mine run by Chile's state owned copper mining company CODELCO and the copper smelter run by the same company on the coast at Ventanas. While we share with commodity chain analysts a concern with the exercise of power in production processes, our interest is more specifically in the role of logistical operations in the coordination and execution of these processes. In particular, our concern is with the relevance of logistical operations in a situation where scenarios of financialization affect the industry's trajectories in ways that make transactions occurring at specific links along the chain no longer the primary determinants of the commodity's value. Futures trading and stockpiling have become no less important in setting the price of copper than value adding practices along different links of the commodity chain itself. To distinguish our analysis from the commodity chain approach, we thus use the term *line*

of copper. The word *line* is not meant to limit us to a two dimensional topology or to exclude the analysis of other topographical and spatial features associated with copper production, such as the use of zoning technologies. Indeed, the term carries the meaning of both a threshold and a connecting logic.

The history of copper mining in Chile places emphasis on the dynamics of extraction and their relation to class formation and state strategies of making capitalist modernity. Current Latin American debates concerning 'developmentalist neo-extractivism' extend these concerns. The discussion, however, has been surprisingly inattentive to the continuities and disruptions that link resource extraction to the data extraction that animates activities in the financial and logistical spheres. Reading the history of Chilean copper production through the lens of logistics brings into focus the relation between economic practices and political form, emphasizing the role of the state before, during and after the extraordinary experiment in neoliberalization conducted under the Pinochet regime. In particular, the Chilean case shows how the reading of neoliberalization as state withdrawal from the orchestration of society and markets does not apply as the nationalization of the copper industry (began by Allende and continued under Pinochet, who also opened concessions to multinational corporations) was coincident with its logistical organization. At the same time, logistical modes of coordination crept into state logics and actions, subjecting them to economic rationales and technocratic imperatives. Although these rationales and imperatives were in many ways depoliticizing, they also articulated strongly to a political program of development that abandoned strategies of import-substitution industrialization and looked for growth in export industries. Logistical practices of organization became central to the neoliberal project of securing political legitimacy through economic growth. This meant that state-sponsored extractivist projects became increasingly inseparable from market dynamics in which issues of finance, transportation, coordination across sites and the circulation of information were crucial to ensuring profitability.

Price fluctuation is a concern for the Chilean copper industry. In 1987, the formation of the Copper Compensation Funds, which was later incorporated into the Economic and Social Stabilization Fund, provided a governmental mechanism to smooth out periods of low copper price. Over time, the reasons for price fluctuation have altered. Although supply and demand and currency exchange fluctuations remain important considerations, the trading of copper futures is today an overriding factor. Such trading occurs on three global markets: the London Metal Exchange, the Shanghai Futures Exchange and the Chicago Mercantile Exchange. As in trading of other derivatives, speculative bets on copper prices serve to relocate risk without transaction of the underlying commodity. Dick Bryan and Mike Rafferty explain that in 'derivative markets prices do not in fact "derive" from the original asset' but 'usually run the other way, so that options and futures markets are the places where prices are first formed'. An additional complication involves stockpiling of the metal, both as collateral against futures trade and as 'dark inventory' stored, for instance, in bonded warehouses in China's free trade zones. These practices of speculation and storage have a significant effect on pricing and volatility, meaning that one of the only ways to make up for market uncertainties is to introduce logistical efficiencies on the supply side.

An opinion column published in the national newspaper *El Mercurio* in March 2017 urges that 'beyond the fluctuations of copper price, Chile must explore the future scenarios opened by technological transformation and grasp on time the new opportunities'. A sort of logistics revolution for copper presents itself as the only path for Chilean mining, where environmental sustainability, optimization and big data are keys to overcome the present orientation towards rentier extraction. This change requires a national agreement where digitalized governance and performance indicators substitute for the traditional pride of a country 'married to copper'. Research efforts into 'smart mining', seismic modeling and wearable technologies supplement attempts at software optimization of the copper line. Initiatives include the formation of data transmission hubs that transform machines and human bodies into mobile

infrastructure for operating an integrated network in the difficult environment of isolated Andean valleys. Left aside in this perspective is labour and, more precisely, the reaction of workers to this projected shift.

For both state and privately owned mines, the fall in copper prices since 2011 has led to rising pressure on companies to increase efficiency. This drive has given rise to an increase in labour disputes. Strikes along copper supply line, especially in mines and ports, have been a salient aspect of Chilean society over the past decade. More recently, mining strikes, particularly around the status of new workers and changes in shifts and benefits, have hurt business confidence in Chilean copper production. These strikes have also boosted investment in automation throughout the industry. With a new labour law adopted in 2017, more favorable to unions than the previous legal framework inherited from the Pinochet regime, companies are looking to logistics to find a way out from tense labour relations. In the meantime, the nature of copper mining has changed: no longer part of a national autonomy strategy, it has become fully enmeshed in global supply chains where extraction goes together with logistical governance and financial performances. Logistics becomes the connecting element between the restructuring of production and the long-lasting dream of Chile as the 'gateway state' for the Americas on the Pacific. Valparaíso port, one of the sites of our research, has a role to play in these dynamics and visions, even as its role in copper export is restricted to the shipping of refined product. Indeed, in tracing the line of copper from the Andina mine through to the point of export, we observed an increasingly automated process of valorization and refinement, which begins with the concentration process inside a mountain cavern on the mine site and ends with the production of cathodes in the smelter at Ventanas, some 40 kilometers to Valparaíso's north.

Part of our study involved research into the role of logistical software in shaping labour relations on Valparaíso's docks. On a visit to Terminal Cerros de Valparaíso (TCVAL) – a small terminal mostly dedicated to non-containerized cargo including copper ingots and cathodes – we noticed a computer-printed list of workers

on shift pasted near the entry gates. Our guides told us that the names corresponded to biometric data held by the company and that the workers had to scan on for each shift with their fingerprints. Research revealed this system to be the so-called *nombrada electrónica*, which had replaced the traditional labour provisioning system controlled by trade union officials who assigned shifts to workers in hiring halls. Historically, the system involved the possibility for a named worker to pass the right to work to another and to divide wages with them. Although the Pinochet regime eliminated this aspect of *la nombrada*, the system continued as it proved amenable to private port operators who valued flexibility in labour recruitment.

Until around 2011, *la nombrada* allowed recruitment of most of Chile's port labour on a day contract basis. But when grassroots union movements began to use the hiring halls to organize strikes, port operators turned against the system. The introduction of the *nombrada electrónica* in Valparaíso's shipping terminals offered a way of maintaining flexibility while wresting control away from unions. In this case, we observed how the introduction of a software system met labour insurgency among precarious workers and shifted the institutional form of labour recruitment. Yet the revitalization of Chile's labour movement has not been restricted to the port sector and extends to other industries, including copper mining. Beginning in 2007–2009, contract workers had also organized a series of successful strikes against CODELCO. Culminating in 2013 and combining with a resurgent student movement and ongoing Indigenous land rights struggles, the miners' rebellion resonated strongly with action on the docks, particularly given the central role played by precarious workers.

These affinities were prominent in our analysis the nexus between logistical activities on the docks and the role of software and data analytics in reorganizing the copper line. In these connected instances, the centrality of copper extraction to Chile's economy has ambivalent implications for the political positioning of labour. It can give workers the opportunity to disrupt a critical industry through strikes and other forms of labour disobedience while also providing a source to discipline workers' struggles and keep them within the boundaries

THE COPPER LINE

of an industrial dispute. At the same time, the economic centrality of copper production motivates introduction of logistical technologies that aim to smooth out labour relations by skirting around or minimizing the potential for such disruption.

The investigation of the copper line allows us to discern how extractive operations of logistics and finance generate regimes of labour precarity. More importantly, it points to the emergence of labour struggles that reach across sectors and hierarchies to confront a condition where capital is able to route around disruptions. In such circumstances, insurgency against any specific capitalist actor, if it is to be effective, needs to generate an encounter with the wider assemblages of capitalism that enmesh this actor, without forgetting the global dimension of logistical operations. Struggles in the Chilean mining and port sectors have been inventive in this regard, and importantly have entered into unstable alliance with environmental, student and Indigenous struggles. These patterns of alliance show how political practices forged in the grip of logistical command cross lines that current theory draws and reinforces between a politics of limits that emphasizes the excesses of the human and a politics of overcoming limits that finds possibility in labour or the human capacity to produce. This crossing of lines suggests that the by now widely recognized political dimension of logistics goes far beyond the realm of transport and circulation. Struggles conducted in the face of logistical power introduce new elements of politics with the potential to inspire organizational practices well beyond the limited sector of logistics as usually conceived.

NO.3 VALPARAÍSO

Logistical Natures in Andean Worlds
Katheryn M. Detwiler

LOGISTICAL NATURES

In 2003 a stone was placed on the *llano de Chajnantor*, a high-altitude plateau in the Chilean Andes. This stone designated *Chajnantor* as the site of one of the most ambitious astronomical projects on Earth: The Atacama Large Millimeter/Submillimeter Array (ALMA). Completed in 2013, ALMA is the \$1.4 billion dollar joint project of The European Southern Observatory (ESO), which comprises fifteen European member states, the US National Science Foundation and the National Institute of Natural Sciences of Japan.

Both ESO and the US have been dominant presences in the development of observatories in the Atacama Desert since the early 1960s, when mid-twentieth century European and US astronomy's southern hemisphere ambitions and shifting post-war geopolitics first took astronomers and site testers to the arid mountains of northern Chile. *Chajnantor* joins a patchwork of observatory sites in the Atacama operating since the 1960s as non-Chilean territories, with the rights and immunities of diplomatic embassies. From these sites data 'flow', as one observatory director put it to me, 'from photons to petabytes'.

At 16,500 feet above sea level on *Chajnantor*, ALMA is a telescope made up of sixty-six radio antennae synchronized to observe as one. From light collected at the boundary of the radio and infrared portions of the electromagnetic spectrum, ALMA generates massive amounts of astro-data. These data circulate from *Chajnantor* to an archive at ALMA's headquarters in Santiago, then on to a data centre at ESO's headquarters in Garching bei München, Germany. Finally, moving as the intellectual property of particular astronomers for a period of one year, these data are dispersed through access points at ALMA Regional Centers, or ARCs, in the US, Europe and East Asia.

From its high perch on *Chajnantor*, ALMA is proximate to and nearly equidistant from two other giant technoscientific installations: the Chilean state copper corporation, Codelco's, Chuquibambilla copper mine, one of the world's largest open-cast copper mines; and the Sociedad de Química y Minera (SQM or Soquimich) lithium mine, one of the largest producers of lithium in the world. Soquimich is one of two lithium mines operating





on the *Salar de Atacama*, the salt flat that is overlooked by the high peaks of the Andean *cordillera* in which both Chuquicamata and ALMA sit.

Chuquicamata, over a century old in its industrial incarnation, is in the midst of being converted from an open pit to an underground mine. The underground expansion will extend the life of the mine for thirty years, enabling Codelco to reach what remains of the ore body beneath the existing pit. The Soquimich lithium mine describes itself as a 'living mine', where solar irradiance is used to distill hyper-saline brines, pumped from subsurface aquifers, into a variety of industrial products. The last salt to be harvested in this process is lithium, a highly reactive alkaline metal, commodified as electro-mobility.

My fieldwork in the Chilean *altiplano* moved amongst this triangle of technoscientific installations. Each is a point of intensification of multiple temporal and material scales where energetic Earth forces are put to work as productive forces, evoking what architect Godofredo Pereira's describes as an 'axiomatic Earth' – every dimension a strategic domain. Transforming ore, brine and light into copper cathode, lithium carbonate and astronomical data, these installations are nodes in coordinated circuits of extraction, commodification and circulation so extensive that they render the Atacama Desert, as Martín Arboleda has described, as a 'planetary mine'.

Sublime in scale, these engineered worlds are planetary in their networked extents, organized around concerns with maximal production, efficiency and supply chain optimization as well as with those of ubiquitous computing, prediction, automation, simulation and continuous functioning. Even diurnal rhythm doesn't disturb ALMA's production of astro-data. Because the ALMA telescope operates in the sub-visible portion of the electromagnetic spectrum, it is not dependent on nocturnal dark to function. The aspiration toward continuous functioning is an aspect of what makes Soquimich a 'living mine'. Perpetual monitoring generates a continuous flow of data about the changing ionic specificity of the *salar* and of the brines being concentrated in evaporation pools. These data feed hydro-geological models that enable risk modeling and near

and long-term projections of brine compositions. ALMA employs atmospheric models, climate monitoring stations and radiometers to measure water vapour present in the line of vision of each antenna. These distorting atmospheric effects, along with those of temperature flux, wind speed and other variables, can later be corrected. Noise is 'cleaned' from datasets in increasingly automated ways. Chuquicamata's new underground mine aspires to be 'smart', as mine conditions and miners' activities will be monitored by ubiquitous underground and wearable sensors, the data from which can trigger automated decision making about mine safety and productive activity.

These are logistical worlds that, as Ned Rossiter has written, are typically 'distant from metropolitan imaginaries and suffer intrusions of materiality in ways that unsettle the abstraction of information'. Rossiter describes the 'smooth-world systems' to which logistical worlds aspire. Logistical 'nightmares', then, are contingencies that need to be controlled, doing 'whatever is required to get the machine up and running again'.

Automation and predictive modeling are deployed as partial solutions to these unpredictable disruptions. They are tools of what Benjamin Bratton has called the 'subtractive modernity' of counter-industrialization, variously called 'logistical' or 'surveillance' or 'supply-chain' capitalism. Refining older techniques for taming worker resistance and material recalcitrance, these techniques are marked above all by aspirations toward the capture of contingency, the containment of disruption, or what Bratton identifies as the 'automation of the exception'.

ALMA, Chuquicamata and Soquimich each take the non-finality of landscapes as a condition of possibility and a form of permeability that introduces the problem of contingency. As each giant of science or industry acts technically and infrastructurally, territorially and categorically, to operationalize Atacama substances and Earth forces – tectonic, hydraulic, atmospheric, meteorological and electromagnetic – the disruptions with which they contend are many.

The capacity to halt these smooth-world systems of non-stop production manifests in desert forces of earthquakes and weather events. Codelco's operations are

interrupted with some frequency by labour strikes and, not infrequently, by slope collapses that can become political flashpoints regarding the danger of the masculinized labour of mining – and that can devastate production. Strikes mounted by ALMA's Chilean workforce have twice halted the array, once including their occupation of the observatory itself. The observatory's science operations were halted during the massive social protests that engulfed Chile in October 2019, when outrage about the ongoing authority of Pinochet's constitution bloomed at a scale not seen since the formal end of Chile's dictatorship. In 2019, Soquimich's plan to expand production on the *sal/ar* was halted by a campaign of resistance mounted by Indigenous Likan Antai collectives, their legal complaint upheld by a Chilean environmental court. As I write, all ALMA operations have been stopped by the fearsomely disruptive effects of a pandemic virus.

So-called 'next-generation' observatories like ALMA strive toward remote-operation and the full automation of observation and data-analysis. Meanwhile, Chilean astro-data are *themselves* deployed in fostering an emergent 'subtractive modernity', in which unpredictable disturbances can be managed with ever-greater efficiency. Astronomy's complex datasets, which contain traces of highly contingent events like supernovae, provide proving grounds for the development of new algorithms for the automated prediction of, in one example, *slope collapse* – an algorithm developed on Chilean astro-data and put to work at Codelco's mines.

As of 2019, Amazon is partnering with the Chilean state to web-host Chilean astro-data, creating a data lake for a so-called Data Observatory that will 'consolidate, analyze in real-time and archive astronomy data streams from all wavelengths across all Chilean observatories in the Atacama Desert'. The transversality in which Chilean astro-data are instrumentalized to better mine the Atacama underground, along with the instrumentalization of astro-data as they are 'uploaded' to the cloud, represent ways in which, on the terrain of the Chilean sky, extractivism and governance are becoming 'smart'. As the Minister of the Chilean Economy put it, it is the 'volume, quality, speed and diversity' of astro-datasets – cosmic

complexity itself – that make them valuable for state, industrial and private enterprise.

As the installations at Chuquicamata, ALMA and Soquimich forge interactions among the underground, surface and sky, they also articulate with a parallel and enmeshed world – one not organized by the extractive view – that they must know and *manage* as a matter of logistical efficiency. *Chajnantor* is also *Thaknatur*, translated from the Kunza language of Likan Antai collectives as ‘the place of departure’ or ‘the place of flight’. *Thaknatur* is involved in an Andean ecology of practice defined, most prominently, by the ring of stratovolcanos that surrounds ALMA, Chuquicamata and Soquimich. This triangle of giants that, in their networked extents, exceed mere proximity is then *also* surrounded, ringed by agencies that exceed *them*.

This parallel world is organized through Likan Antai relations of *ayllu*, or collectives of human and non-human actors that include plants, animals, the elements, landscape features and people. Here, mountains are not only mountains but are agencies in in-*ayllu* kinship networks. In 2002, just one year before ALMA laid its ‘first stone’ on *Chajnantor*, in-*ayllu* representatives successfully sued Codelco for the removal of a radio antenna on the summit of the mountain (but not only a mountain) Kimal, which sits opposite *Chajnantor* across the *salar de Atacama*, and additionally secured reparations for ontological harm. These agencies, then, though ‘impossible as matters of political concern’, under what anthropologist Marisol de la Cadena describes as the ‘coloniality of modern politics’, in fact have a regional precedent of manifesting politically.

The dynamism of landscape and the disruptive potentials of Indigenous territorial claims that are rooted in dissent from the terms of sameness through which extractivism operates – everything an extractable resource – incite projects of institutional management that join the array of hydro-geological, atmospheric, environmental and mineralogical data and models employed at ALMA, Chuquicamata and Soquimich in order to manage risk.

Prior to coming into full operation, ALMA sponsored an extensive regional ethno-astronomy

project, used to substantiate the observatory's eventual claim that Likan Antai cosmology and radio astronomy are continuous with each other – fundamentally 'the same'. ALMA aligns its opening of the spectral window into the dark universe with the status of *Thaknatur* as 'the place of departure' in order to rationalize the observatory's emplacement. Ethno-astronomy is used to position Likan Antai ontologies in ALMA's account of its own inevitability. Anthropology, in Elizabeth Povinelli's terms, is used to make difference 'doable' and therefore *manageable* and thus makes anthropology an extension of a liberal logic.

In effect, once alterity is brought under the frame of sameness and once difference is flattened, Indigenous claims to in-*ayllu* hybrid kinship are undercut, making 'nature' separable and thus a commodity alienable from more-than-human ecologies. ALMA's arrangement of Indigenous 'Andean cosmovision' as continuous with radio astronomy is at once a way to accrue legitimacy through multicultural respect, while also a way of garnering innocence to its spectral and territorial occupation. Among other effects, this obscures astronomy's entanglements with multi-purpose projects of data-mining the Chilean sky, including the instrumentalization of astro-data to better mine the Atacama underground. In this sense, ALMA cloaks itself in the language of anthropology while inflecting the extractive logics of its mining neighbours.

The difference that inheres in Andean ontologies of place is a potential logistical nightmare for ALMA – should *Thaknatur* ever manifest politically. For anthropology, this difference is resolved as a potential dream, suggestive of possibilities beyond modernist homogeneity. But for ALMA, the political and ethical positions that dissent from sameness and register that which 'the state cannot recognize' are not taken as inherent threats to the Chilean state, capitalist modernity or scientific progress, or even added to the long lists of fears that torment modernist projects – of regression, feudalism, inefficiency, mess, contestation, savagery and refusal. What inheres in *Chajnantor's* status as *Thaknatur* is, for ALMA, a potential disturbance to be accounted

for and managed with institutional dispatch. Ontology isn't the same as contingency, but insofar as it poses a disruption to a smooth-world system of production, it is a contingency, a liability.



NO.3 VALPARAÍSO

Learning from the Atacama

Orit Halpern

LEARNING FROM THE ATACAMA

'Learning from landscapes is a way of being revolutionary for an architect'.

Robert Venturi, Dennis Brown and Scott Izenour, *Learning from Las Vegas*, 1972.

How should we rethink the ethical, political and social impacts of infrastructure? What might one 'learn' from landscapes? Taking my lead from the famous architectural and design treatise, *Learning from Las Vegas*, I want to begin studying these sites as landmarks in a landscape that very well may herald our future. This is a territory that bridges data and matter; both the producer of some of the largest non-proprietary data sets on earth and the provider of many of the very materials that create the information age. In this essay I will argue that these sites collectively form the landscape of a *planetary testbed*, a petri dish cultivating potential futures of life, politics and technology on both Earth and beyond.

Energy

'Chile is copper' is an often repeated mantra in this place I am told by Katie Detwiler, an anthropologist working on the Atacama and my guide to this place. And copper is in almost every machine, the conductor of all our electricity. The Atacama has some of the largest copper mines on Earth. Copper is industrial material, it also rests (although perhaps only for now) on an industrial economy. Copper markets are still relatively unleveraged, unlike some other energy, mineral and metal markets, there is little futures or derivative action. As a commodity it suffers from modern economic concepts of business cycles, and its political economy is seemingly still grounded in terms like GDP and GNP along with concepts stretching from Thomas Malthus and Adam Smith in the eighteenth century of resource limitation, scarcity, demand, price and above all population and nation. In Chile, copper is equated above all with nationalism. Under Pinochet these mines were actually unionized (contrary to what we might expect), and the state corporation CODELCO continues to smelt all the copper. This rather surprising history for a dictator whose

name is synonymous with the Chicago Boys emerged from an alignment with right wing nationalists, authoritarianism and neo-liberalism.

But a few miles from ALMA is another landscape of extraction, metal and energy. This one is linked to the stars and future(s). Space X, Tesla and the high-tech industries that in theory will eventually replace the vestiges of our old heavy industrial and carbon based economies all bank on the Atacama. For in this desert also lies the new gold, the future Saudi Arabia I am told by business journals and newspapers, the Salar de Atacama. These salt flats bear lithium. This is the lightest of metals, the future supposedly of both machines and energy. The medium that will replace the carbon futures that financial markets and nations have so heavily bought into and leveraged.

The beds are beautiful, they are created by brine, just brought to the surface. Lithium is never pure, it is mixed with other things, also all valuable – magnesium, potassium. As one looks over the fields, there is an array of colours going from yellow to the very bright blue. The first fields are still full of potassium that might serve as bedrocks for fertilizers, as the beds dry longer they turn bluer and then yellower, finally after almost a year they dry and lithium salt, LiCl, emerges. The salt is scraped from the bed, harvested, separated from trace boron and magnesium and affixed with Sodium Carbonate for sale. Alejandro Bucher, the technical manager of the installation, takes us on a tour. Sociedad Química y Minera (SQM), he tells us, is environmentally excellent, almost no chemicals are used in the process. The extraction of lithium is solar powered. The sun dehydrates the water and draws off the salts. A pure process. Except it drains water. He assures us, however, that the latest expansions and technical advances will 'optimize' this problem. Better water evaporation capture systems and planned desalinization plants will reduce the impact on this desert, which is the driest on earth, and on these brine waters that are also the springs for supporting fragile ecosystems of shrimps, bacteria and flamingos. Environmentalists, however, beg to differ; inquiries have gone into the environmental impact of the fields, and the general process of assessment has been criticized as opaque.

What Pinochet never did, privatize mining, is now fully private in the case of lithium. While SQM is Chilean, it is private. SQM has been attacked for anti-trade union practices, and unions are fighting to label lithium a matter of national security so the state can better regulate the material. This corporation also partakes in planetary games of logistics around belt roads and resources. In 2018, the Chinese corporation Tianqi acquired a 24 per cent share of SQM, essentially enabling them to dominate the corporation. While the government continues to monitor the situation and demand limits of Chinese participation on the board of the corporation, the situation continues to fluctuate. These games also demand even privatized water supplies. Water is a massive commodity. The largest desalinization plants on earth will soon be built here by the global syndicate Veolia to fuel the mining. This new infrastructure of corporate actors merges high-tech with salt and water in order to support our fantasies of eternal growth, so that we may drive clean cars and eventually arrive to the stars in order to extract ever more materials.

Optimization

The lithium mines more than anything suggest new attitudes or maybe practices of boundary making and market formation. They demonstrate a move away from the perfect stabilities of supply and demand curves to the plasticity of another order of algorithmic finance and logistical management. The relationship between these very different and radically shifting territories of mining, salt harvesting and astronomy can therefore only be realized in the turn to mathematics.

The incommensurabilities in scale and materials between the operations of mines and the seeming metaphysically interests of astronomical sciences is unified at the Centre for Mathematical Modeling in the University of Chile, located in Santiago some 1600 kilometres south. It is one of the world's premier mathematics research centres for applied mathematics in mining. In the lecture room where we were bought to hear the presentations, a number of researchers presented to us on themes of how machine learning, big data and complex modelling might transform mining. One of the lead scientists in

mathematical modelling at the centre, Alejandro Hofre, is trained in optimization and game theory. He explains that the centre's mission is to bring the best in mathematical modelling to bear on questions of mine optimization, discovery and supply chain management. Cheapening and improving exploration is critical, as it is the most expensive and difficult and expensive part of the extraction industry process, often bearing no return. This search for ways to do more with less is necessary as all the materials on earth, are, without question, running out. But this finitude in resources can be addressed through an infinity of data.

This new optimization economy is also aligned with rethinking mining unions and labour, as argued by Dr. Eduardo Vera, the executive manager of innovation and development at the CMM and member of the National Laboratory for High Performance Computing. The hierarchies of mines must go, to be instead managed by regular feedback loops derived from billions of sensors and automated systems that sense and decide the best actions; the best manner to ventilate, heat, cool, dig, chemically separate, mix, dispose and scavenge through material. The space of mining opened to the space of mathematics and abstraction; making terrain limits plastic, scavengable, optimizable and ultimately grounded in the math of physics and astronomy. These communication systems, complex geological models, fluid and energy dynamics, and communication systems might also find themselves at use in other places. Over lunch he tells me that entire computational infrastructures are being built for these purposes, and ultimately the maths being generated here may be used in asteroid and other mining. In Santiago, researchers speak of how astronomy's wealth of data and complicated analytics can be brought to bear on developing the complex mathematics for geological discovery and simulations of mine stability and resources.

The discussion also indicates a shift of economy, perhaps from extraction to optimization. Vast arrays of sensors, ever more refined chemistry, and reorganized labour and supply chains are developed whose main function is to produce big data for machine learning that will in theory rummage through the tailings, discarded

materials, supplementary and surplus substances of older extractive processes in order to reorganize the production, distribution and recycling of materials in the search for speculative (and financializable) uses for the detritus and excrement of mining. These computational-industrial assemblages create new economies of scavenging, such as the search for other metals in tailing ponds, or the reuse of these waste materials for construction or other purposes, currently in vogue globally. In this logic the seeming final limits of life and resources become instead an extendable threshold that can be infinitely stretched through the application of ever finer and more environmentally pervasive forms of calculation and computation that facilitate the optimization and ever finer salvage and extraction of finite materials. One might argue that this optimization is the perverse parallel of the event horizon. If one watches a clock fall into the event horizon, all one will see is time forever slowing down, the horizon will never be reached. History eternally deferred. In a grotesque mirror, futures are always deferred through big data, financial algorithms and machine learning practices. Except we are not travelling at the speed of light, and the Earth is not a black hole, rather these practices make crisis an impossibility, and blind us to the depletion of the ecosystem.

Technical Futures

The desert I visited therefore is both the site of new capacities to recognize new forms of life in astrobiology for example, or new maths for fluid and materials dynamics in the real-time monitoring and modelling of massive mines, or to produce new images of the universe. The Atacama maybe is always dying. Its flora and fauna vanishing, but as engineers at SQM tell me the new technologies will allow them to optimize water usage, to recycle and collect what evaporates and to make water in the desert. What was once a limited, finite resource in the desert – water – is now elastic, optimizable and the environment is fortified and made resilient. The new minerals and economies of space and lithium envisioned to replace the older metals and energies of industrialism will be run on algorithmic finance markets, hyper speculation and an

embrace of transformation and shock. Resource limitations and catastrophic environmental events are no longer understood as crisis necessitating a response through expertise and Milton Friedman fiscal policies, but rather as ongoing processes that can be incrementally experimented with and addressed through endless adjustments and manipulations in time and data collection.

But time and data can be manipulated in many ways. As recounted in *Waiting for the Light* (2010), a film by Patricio Guzman, in the immediate aftermath of the coup, on 11 September, 1973, there was subsequent torture and disappearance of thousands and the exile of nearly ten per cent of the population. Traveling in a Puma helicopter from detention site to detention site, the so-called 'Caravan of Death' carried out the executions of 26 people in Chile's south and seventy one in the desert in the north. Their bodies were buried in unmarked graves or thrown from the sky into the desert. The desert was militarized and turned into a weapon for the killing of dissidents and for the training of troops. Its resources supporting this state. Guzman parallels the search for bodies by mothers of dissidents killed by Pinochet with astronomers watching and recording the stars in the Atacama's high altitude observatories (the wave millimeter arrays had not yet been operational). Above all his theme is that the landscape is a recording machine for both human and inhuman memories, the trace of stars 50 million years away, and the search for loved ones within human lives. The implications of the film are that the desert itself provides some other intelligence or maybe memory not only for humans.

When I hear scientists speak of the possibility of real-time decision making in mining and the optimization of energy and materials through the perfection of sensing technology and big data in the mine, I hear a dual fantasy of stretching finite resources into infinite horizons through big data and artificial intelligence. I also hear a smaller more embodied parallel fantasy of a new form of experience and cognition no longer nested in single human bodies, whether those of labourers or those of expert economists, and rather bequeathed to large networks of human-machines. These dreams of AI and machine learning managed extraction might herald back to the history of machine learning.

In a pessimistically optimistic vein, however, might this also be the final possibility to undo the very fantasies of modern imperialism and anthropocentrism? There is hope in those infinitesimally specific signals found of a black hole from aeons ago, beyond human, even Terran time. The reminder that there are experiences that can only emerge through the global networks of sensory and measuring instrumentations; that there are radical possibilities in realizing that learning and experience might not be internal to subject but shared. Perhaps these are just realizations of what we have known all along. That our worlds are comprised of relationships to Others, but there is a possibility that never has this been more evident or been made more visible than through our new technologies, even our financial technologies and our artificial intelligence systems. As they automate and traumatize us, they also reveal perhaps what has always been there – the socio-technical networks that exist beyond and outside of us. Realities impossible to fully visualize.

The event horizon telescope presents us with the radical encounter with our inability to ever be fully objective and the possibility that there are things to learn and forms of experience that are beyond the demands of capital or economy in our present. My hope is that perhaps in encountering the impossibility of ever imaging the reality of the event horizon, we might finally be able to witness and engage the precarious reality of life on Earth.

Concepts, Conceptos
Translation: Silvia Martinez

INFRASTRUCTURE, INFRAESTRUCTURA

Infrastructure is matter that moves matter (Larkin). At once mundane and monumental, infrastructure enables capital's expansion. Infrastructure is more than groundwork. Infrastructure cuts across corridors, fibres and code with imperial force. Yet infrastructure is vulnerable. Striking against infrastructure requires not just sabotage but constitutive acts of organization. Infrastructure permeates technical and algorithmic divisions to become both concrete and soft. Infrastructure is not boring. Infrastructure aestheticizes rationality.

La infraestructura es la materia que mueve materia. Mundana y monumental a la vez, la infraestructura permite la expansión del capital. La infraestructura no es solo el trabajo de base. La infraestructura traspasa corredores, fibras y código con fuerza imperial. Sin embargo, la infraestructura es vulnerable. Para atacar a la infraestructura, no solo hace falta el sabotaje sino actos constitutivos de organización. La Infraestructura penetra las divisiones técnicas y algorítmicas para tornarse tanto concreta como intangible. La infraestructura no aburre. La infraestructura esteticiza a la racionalidad.

LABOUR, MANO DE OBRA

Labour is not simply work. Labour is the name of subjectivity under the domination of state and capital. Labour lives and is animated by energy, unrest and movement. Labour inheres in bodily and cognitive relations. Labour is subject to processes of abstraction that seek to reduce it to temporal measure. The tension between abstract and living labour is constitutive of political struggle. This tension crosses bodies and souls. It also shapes global space. Logistical labour emerges at the interface between infrastructure, software protocols and design. Labour time is real-time.

La mano de obra no es simplemente el trabajo. Mano de obra es el nombre de la subjetividad bajo el dominio del estado y del capital. La mano de obra vive y se anima por la energía, la agitación y el movimiento. La mano de obra inhiere en las relaciones corporales y cognitivas. La mano de obra queda sujeta a los procesos de abstracción que buscan reducirla a medida temporal. La tensión entre la mano de obra viva y la abstracta constituye la lucha política. La tensión traspasa a los cuerpos y a las almas. También da forma al espacio global. La mano de obra logística surge en la interfaz entre la infraestructura, los protocolos de software y el diseño. El tiempo de mano de obra es tiempo real.

LOGISTICS, LOGÍSTICA

Logistics is a programmer's game. Logistical methods of organization apply to production and patterns of mobility. The global logistics industries are key to understanding emerging configurations of the social as well as their implied technologies and labour regimes. The primary task of logistics is to manage the movement of people and things in the interests of communication, transport and economic efficiencies. Central to logistics is the question and scope of governance, both of labouring subjects and the treatment of objects or things. Logistics arranges objects in space and time according to the demands of capital. Logistics puts anything, anywhere at anytime. Logistics is magic (Lyster).

La logística es un juego de programadores. Los métodos logísticos de organización se aplican a la producción y a los patrones de movilidad. Las industrias de logística global son fundamentales para entender las configuraciones emergentes de lo social, además de las tecnologías y las normas laborales implícitas. La tarea principal de

la logística es gestionar el movimiento de gente y de objetos en aras de las eficiencias comunicativas, económicas y de transporte. Central al tema de la logística, se ubica la cuestión y el alcance de la gobernanza, tanto de los sujetos trabajadores como del tratamiento de los objetos o de las cosas. La logística dispone los objetos en el espacio y en el tiempo según las exigencias del capital. La logística ubica cualquier cosa, en cualquier momento, en cualquier lugar. La logística es magia (Lyster).

STANDARDS, NORMAS

Standards are everywhere. Standards assume politics. Standards assume decision. More precisely, standards assume a political economy through which power is asserted. Their capacity to interlock with one another and adapt to change over time and circumstance are key to their power as non-state agents of governance. Standards underpin capital accumulation and political hegemony from the micro level of algorithmic apparatuses to the macro level of global infrastructures. Standards are crucial to the interoperability of protocols across software platforms and infrastructural components. The labour of creating standards never ends. Standards conflict as much as they match. The best thing about standards is that there are so many to choose from (Tanenbaum).

Las normas están en todas partes. Las normas suponen política. Las normas suponen decisión. Más precisamente, las normas suponen que existe una economía política mediante la cual se reafirma el poder. La capacidad para entrelazarse entre sí y adaptarse al cambio a través del tiempo y de las circunstancias es parte fundamental de su poder de agentes no estatales de gobierno. Desde el nivel micro de aparatos algorítmicos hasta el nivel macro de las infraestructuras globales,

las normas respaldan la acumulación de capital y la hegemonía política. Las normas son imprescindibles para la interoperabilidad de protocolos a través de las plataformas de software y de componentes infraestructurales. El trabajo de crear normas nunca acaba. Las normas discrepan tanto como coinciden. Lo mejor de las normas es que hay tantas entre las que elegir (Tanenbaum).

PROTOCOLS, PROTOCOLOS

Protocols govern systems. Their technics and rules of organization shape the extraction and divorce of value from those engaged in logistical modes of production. The capacity for standards to hold traction depends on protocological control. But there are also standards for protocols. Protocols are the immaterial groundwork of material infrastructures. Protocols enable soft forms of power. Protocols are the invisible servants to logistical operations that mobilize people, finance and things. By reducing the world to rules, we ruin our imagination to overthrow regimes – technological, social, economic, political. Protocols demand conformity. Protocols give no truck to contingency.

Los protocolos gobiernan a los sistemas. Su técnica y reglas de organización dan forma a la extracción y al divorcio del valor de los que se dedican a los modos logísticos de producción. La capacidad de las normas para mantener su efecto depende del control protocológico. Pero también hay normas para los protocolos. Los protocolos son el trabajo de base intangible de las infraestructuras tangibles. Los protocolos habilitan modalidades suaves de poder. Los protocolos son los sirvientes invisibles de las operaciones logísticas que movilizan personas, finanzas y objetos. Al reducir el mundo a reglas, arruinamos la imaginación necesaria para derrocar los regímenes,

sean tecnológicos, sociales, económicos o políticos. Los protocolos exigen conformidad. Los protocolos no dan lugar a la contingencia.

PARAMETERS, PARÁMETROS

Parametric rules govern time, space and the mobility of people, finance and things. Parameters set limits that define and delimit ranges of activity and action. Logistics organizes labour as an abstraction within parameters governed by software. In computer science a parameter is a function, command or 'formal argument' that establishes the reference for an 'actual argument', which then executes the command of the parameter. A change in parameters alters the operation of a program, model or simulation. Logistical operations are specific to the values that define the functions of parameters. Yet such operations are accompanied and perhaps preconditioned by the possibility of breaking and remaking rules. Therein lies the politics of parameters.

Las reglas paramétricas gobiernan el tiempo, el espacio y la movilidad de las personas, de las finanzas y de los objetos. Los parámetros fijan los límites que definen y delimitan los alcances de actividad y de acción. La logística organiza la mano de obra como una abstracción dentro de los parámetros que fija el software. En la informática, un parámetro es una función, una orden o un "argumento formal" que establece la referencia para un "argumento real", que a su vez ejecuta la orden del parámetro. Un cambio en los parámetros altera el funcionamiento de un programa, de un modelo o de una simulación. Las operaciones logísticas son específicas con respecto a los valores que definen las funciones de los parámetros. Sin embargo, tales operaciones van acompañadas y quizás preconditionadas por la posibilidad de infringir y reformular las reglas. Ahí yace la política de los parámetros.

ALGORITHMS, ALGORITMOS

Algorithms arrange infrastructural power. Algorithms play a vital role in calculating the material properties and organizational capacities of infrastructure. Algorithms build computational systems of governance that hold a variable relation between the mathematical execution of code and external environments defined through arrangements of data. Algorithms instruct things to do things to things. Algorithms create patterns. Condensing code and sociality, algorithms generate movement through data processing, scraping and forecasting. Algorithms drive financial markets, operate transport and communications infrastructure, connect global supply chains and allocate resources. Algorithms evaluate labour productivity and capital gains in real-time. Algorithms displace experts and transform worlds.

Los algoritmos disponen el poder infraestructural. Los algoritmos juegan un papel crucial en el cálculo de las propiedades materiales y de las capacidades organizativas de la infraestructura. Los algoritmos construyen sistemas computacionales de gobierno que mantienen una relación variable entre la ejecución matemática del código y los entornos externos, que se define mediante la disposición de datos. Los algoritmos ordenan a las cosas a hacer cosas a las cosas. Los algoritmos crean patrones. Al condensar el código y la socialidad, los algoritmos generan movimiento a través del procesamiento, la extracción y la previsión de datos. Los algoritmos impulsan a los mercados financieros, manejan la infraestructura de transporte y de comunicación, conectan las cadenas globales de suministro y adjudican recursos. Los algoritmos evalúan la productividad de la mano de obra y la plusvalía en tiempo real. Los algoritmos desplazan a los expertos y transforman mundos.

CHAINS, CADENAS

Chains supply. Chains connect. Chains bind. Chains link multiple units into single linear systems. Chains produce value. Chains join enterprises through relations of subcontracting and outsourcing. Chains proliferate difference within structures of economic power. Chains balance robustness against agility. Chains stimulate standardization. Chains grow gaps between rich and poor. Chains generate varied forms of hierarchy and exclusion. Chains connect diverse firms and labour forces (Tsing). Chains mobilize the political fantasy of hitting at the weakest link. Workers of the world have nothing to lose but their chains.

Las cadenas suministran. Las cadenas conectan. Las cadenas atan. Las cadenas enlazan unidades múltiples en sistemas lineares unitarios. Las cadenas producen valor. Las cadenas unen a las empresas mediante relaciones de subcontratación y de externalización. Las cadenas promueven la proliferación de la diferencia dentro de las estructuras de poder económico. Las cadenas equilibran la robustez contra la agilidad. Las cadenas estimulan la normalización. Las cadenas cultivan las brechas entre ricos y pobres. Las cadenas generan formas variadas de jerarquía y de exclusión. Las cadenas conectan a diversas empresas y fuerzas laborales (Tsing). Las cadenas mobilizan la fantasía de golpear en el eslabón más débil. Nada tienen que perder los trabajadores del mundo salvo sus cadenas.

ZONES, ZONAS

Zones are territories for organizing logistical operations. With historical precedents in free ports, pirate enclaves and colonial concessions, zones have multiplied their presence in the contemporary global landscape. Zones are instruments of market rationality subject to irrational

proliferation. Zones generate undeclared forms of polity (Easterling). Authoritarian capitalism conjures zones as spaces where anything can happen, liberal democracy presents them as hideaways for its constitutive coercions. Neither sites of transition nor development, zones are spaces where dispossession meets exploitation. Zones are not fields for your ethnography. Keep out and don't ask questions!

Las zonas son territorios para organizar las operaciones logísticas. Con precedentes históricos en puertos francos, enclaves de piratas y concesiones coloniales, la presencia de las zonas en el paisaje mundial contemporáneo se ha multiplicado. Las zonas son instrumentos de la racionalidad del mercado sujetos a la proliferación irracional. Las zonas generan sistemas de gobierno no declarados (Easterling). El capitalismo autoritario convoca a las zonas como espacios donde puede ocurrir cualquier cosa. La democracia liberal las presenta como escondites para sus coacciones constitutivas. Sin ser sitios de transición ni de desarrollo, las zonas son espacios donde el desposeimiento se encuentra con la explotación. Las zonas no son campos para tu etnografía. ¡No entres y no hagas preguntas!

CORRIDORS, CORREDORES

Corridors connect zones. Corridors bundle infrastructure along axes to narrow space and accelerate time. Corridors establish channels or pipelines of movement that intensify logistical organization and its accompanying tensions and conflicts. Stable regulations, well-developed communications, efficient transport systems and uniform software implementations are the basic requirements for establishing corridors. Yet corridors cross borders and negotiate variegated conditions of capitalism. Corridors string governance across gaps of knowledge and topography. Power vacates the office. Decisions are made in the corridor.

Los corredores conectan a las zonas. Los corredores embalan a la infraestructura a lo largo de ejes a fin de estrechar el espacio y acelerar el tiempo. Los corredores establecen cauces o conductos de movimiento que intensifican la organización logística y las tensiones y conflictos que ella conlleva. Los requisitos básicos para establecer corredores son los reglamentos estables, las comunicaciones bien desarrolladas, los sistemas de transporte eficientes y la implementación uniforme de software. Sin embargo, los corredores atraviesan fronteras y sortean condiciones abigarradas del capitalismo. Los corredores tienden hilos de gobierno por las brechas del conocimiento y la topografía. El poder desaloja el despacho. Las decisiones se toman en el corredor.

OPTIMIZATION, OPTIMIZACIÓN

All optimization is partial. Optimization modifies design to improve efficiency and performance. Optimization is the art and science of the tweak. Optimization drives labour hard. Optimization is clean. Optimization marshals mathematics to the ends of capital. Optimization generates externalities of time and dirt (Douglas). Linear or quadratic, unconstrained or bound, optimization embraces variables but shuns deviation. Optimization transcends heuristics. Optimization divides the world into levels or orders, selecting or finding possibilities within hierarchies. Optimization is not utopian. Optimization settles for the sufficiently good.

Toda optimización es parcial. La optimización modifica al diseño para mejorar la eficiencia y el rendimiento. La optimización es el arte y la ciencia del ajuste. La optimización empuja a la mano de obra sin tregua. La optimización es limpia. La optimización conduce a las matemáticas a los extremos del capital.

La optimización genera externalidades de tiempo y de suciedad (Douglas). Bien sea lineal o cuadrática, ilimitada o restringida, la optimización acepta las variables pero rechaza la desviación. La optimización trasciende la heurística. La optimización divide al mundo en niveles o grados, seleccionando o hallando posibilidades dentro de las jerarquías. La optimización no es utópica. La optimización se conforma con la calidad suficiente.

CONTINGENCY, CONTINGENCIA

Contingency is the nightmare of logistics. Contingency is more than unpredictability or randomness. Contingency registers the force of material practices and events that disrupt logistical operations. Labour strikes, software glitches, inventory blowouts, traffic gridlocks – all interrupt the desire for a smooth world that animates logistical interventions and fantasies. Contingency produces variation and movement that prompt the invention of standards and protocols. Contingency demands ‘fault tolerance’ to make logistical worlds seamless. Once a normative state has been achieved, disruption and renewal can happen again. Contingency makes logistics.

La contingencia es la pesadilla de la logística. La contingencia es más que la imprevisibilidad o que la aleatoriedad. La contingencia detecta la fuerza de las prácticas y de los eventos materiales que provocan trastornos en las operaciones logísticas. Las huelgas, los errores informáticos, los excesos de inventario, los embotellamientos de tráfico – todos ellos interrumpen la búsqueda de un mundo tranquilo que anima a las intervenciones y fantasías logísticas. La contingencia produce la variación y el movimiento que promueven la invención de normas y protocolos. La contingencia exige la “tolerancia a fallos” para lograr que

los mundos logísticos funcionen a la perfección. Una vez alcanzado un estado normativo, los trastornos y la renovación pueden volver a ocurrir. La contingencia hace a la logística.

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