



## On the multiple frontiers of extraction: excavating contemporary capitalism

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### ABSTRACT

Understanding the intensification and expansion of extractive industries in contemporary capitalism requires an approach attentive not only to the literal forms of extraction prevalent in mining and agribusiness but also to new fronts of extraction emerging in activities such as data mining and biocapitalism. This article introduces the concept of operations of capital to trace connections between the expansive logic of extraction and capitalist activity in the domains of logistics and finance. Arguing that extractive operations are at large across these domains, we explore their relevance for capital's relation with its multiple outsides. The resulting analysis provides a basis for mapping struggles against the changing forms of dispossession and exploitation enabled by extraction.

**KEYWORDS** Extraction; logistics; finance; capitalism; neoliberalism; mining

### A dominant paradigm?

Is 'extractivism' becoming the dominant paradigm of contemporary capitalism and neoliberalism at large? Answering this question requires an investigation into the continuities and cleavages between the concept of extractivism and the literal meanings and materiality of the dirty business of extraction. The former provides a means of identifying the wider characteristics of economic, political, and social formations that are predicated upon an expansion and dominance of extractive activities. The latter describes historical and contemporary processes of forced removal of raw materials and life forms from the earth's surface, depths, and biosphere. Working through the links and gaps between these formations and processes is a task that can only be accomplished by forging a more precise conceptual definition of extraction. One of the problems we have with the notion of extractivism is that all too frequently it remains associated with a narrow and literal sense of extraction. While we definitely acknowledge the relevance of the expansion of the literal extractive frontier in contexts like mines and plantations for the

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workings of global capitalism, we are convinced that it is also possible to locate extractive dimensions in operations of capital that are seemingly remote from these domains. In this article, we propose to explore the contours and effects of extraction across both its literal and expanded senses. At stake in this exploration is an attempt to discern both the advances allowed by the notion of extractivism and the limits its utilization imposes for understanding the salient transitions and recurrent crises of contemporary capitalism.

It is no secret that debates on extractivism have been particularly intense amidst the turmoil and conflicts that have accompanied the crisis and contestation of neoliberalism in Latin America. The notion of 'neo-extractivism' has emerged in this context as a critical lens with which to view wider transformations of capitalism even under 'progressive' governments in the region. Debates on this topic have unfolded within the framework of what has been described as a transition from the 'Washington consensus' to the 'commodities consensus' (see for instance Massuh 2012, Svampa and Viale 2014, Svampa 2015). Speaking of 'neo-extractivism' implies a reference to the continuity of a long history of the region's insertion within the capitalist world system through violent forms of raw material extraction and associated processes of dispossession. What the prefix 'neo' signals is, on the one hand, a shift towards Asia as the main market for Latin American commodities and, on the other hand, the fact that the 're-primarization' of the economy is connected to the state's ability to use and direct a certain part of the extraordinary rent from natural resources to the financing of social policies. Critics of 'neo-extractivism' make strong arguments against the qualities of 'development' connected to this primacy of extractive rent, shedding light on environmental pillaging, land grabbing, and the disruption and dispossession of Indigenous and peasant economies.

All these processes have been highly contested in Latin America as well as elsewhere. The amazing archive of struggles and resistance along the literal extractive frontier is a crucial point of reference for any attempt to imagine alternative futures and more equitable and ecologically sustainable ways to inhabit the planet. This archive is extensive in both space and time. One remembers, for instance, the slave revolts of the sixteenth and seventeenth centuries in the mines of colonial Latin America, which supplied the precious metals upon which nascent capitalism was built. Even in the latest round of post-Occupy global struggles, it is easy to identify conflicts along the literal extractive frontier. These include the South African miners' strikes that followed the state-sanctioned massacre of 34 workers at Marikana in 2012 (Naidoo 2015), the struggles against road building in the TIPNIS Indigenous area and national park in Bolivia (McNeish 2013), and the transnational 'Idle No More' movement that began as a reaction to Canadian legislation that eroded First Nations' sovereignty and rolled back environmental protections in the rush to develop the Alberta tar sands oil (Gilio-Whitaker 2015). While

it is important to honour and remember these struggles, we are convinced that there is a need to explore the potentiality for them to connect with struggles addressed to other areas of capitalist activity if they are to mount into movements capable of contesting capital in the manifold and heterogeneous articulation of its current forms of domination and exploitation.

Questions of translation and translatability figure prominently in debates and practices surrounding such potential connections between struggles, as we stressed in our book *Border as Method* (2013a, chapters 8 and 9). But it is also necessary to identify the ways in which the notion of extraction provides a means to map and join struggles that unfold in seemingly distant and unrelated landscapes. It is from this point of view that one of us has worked with Verónica Gago to intervene in Latin American debates about extraction by attempting to expand the notions of extraction and extractivism (Gago and Mezzadra 2015). Particularly relevant to this intervention with Verónica Gago is an effort to deploy these expanded notions to track and understand the penetration of financial capital within so-called popular economies in the huge peripheries of Argentinean and other Latin American metropolises (see Gago 2014, 2015). This work provides part of a growing body of critical thought that stresses the need to understand the current intensification and metamorphosis of neoliberalism across heterogeneous social landscapes and political formations.

The work with Verónica Gago provides a crucial analytical backdrop for the arguments we present in this piece. At the same time, the arguments we develop in this article are part of a wider project that approaches the topics of extraction and extractivism in relation to other domains and symptomatic developments in contemporary capitalism. Our work in recent years has been deeply engaged with the shifting geographies of capitalist development and crisis. This has involved analysis of the unfolding and crises of processes of financialization as well as critical probing of software and labour processes connected to the rise of logistics as a means of synchronizing and coordinating movements of goods and people (Mezzadra and Neilson 2013b). Central to this work is the elaboration of the concept of operations of capital, which not only describes specific and analytically isolable processes through which capital 'hits the ground' in diverse material contexts but also enables investigation of how such operations concatenate and spread within larger formations of capitalism (see Mezzadra and Neilson 2015). The concept of operations of capital allows us to pursue an analysis that underscores the crucial relevance of capitalist activities within specific economic 'sectors' without succumbing to arguments that position such sectoral activities as exclusive frames for the interpretation and contestation of contemporary capitalism and neoliberalism at large. The reference to extraction and extractivism thus occurs for us in relation to explorations of operations of capital also in the domains of finance and logistics. Far from presenting any one of these

'sectors' as the key for understanding the others, we treat them as relative frames or different points of entry for a more general conceptual as well as empirical investigation.

For this reason, we would hesitate to present extraction, as much as logistics or finance, as a dominant paradigm. Nevertheless when we are attentive to the continuities and ruptures that characterize the relations between literal extraction and extraction in the expanded sense, it becomes possible to attend to the prevalence and strategic role of extractive operations in contemporary capitalism. It is not only when the operations of capital plunder the materiality of the earth and biosphere, but also when they encounter and draw upon forms and practices of human cooperation and sociality that are external to them that we can say that extraction is at stake. It is easy to see that extraction, once it is understood in this expanded sense, highlights the relevance of capital's relation with its multiple outsides. This is a question that has been at stake in recent debates surrounding the topic of the continuity of what Marx analysed as so-called primitive accumulation (Mezzadra 2011) as well as in analyses that combine the reference to Marx with the reference to Karl Polanyi (see for instance Fraser 2014). In many instances of capitalist valorization and accumulation, profit takes more and more the shape of 'rent', precisely due to its reliance on resources that are not intrinsic to capital's turnover (Vercellone 2013). At the same time, we are convinced that there is a need to trace how this prominence of rent articulates with forms of profit that continue to have more traditional sources, for instance in the persistent industrial exploitation of living labour. Precisely because extractive operations permeate contemporary regimes of capitalist accumulation, the moment of dispossession that pertains to these operations intermingles with and can even seem indistinguishable from exploitation. The exploration of extraction and extractivism thus makes a new consideration of the surprisingly forgotten concept of exploitation an urgent task.

## Landscapes of extraction

At base extraction is a simple notion. As we have already explained, more often than not it refers to the forced removal of raw materials and life forms from the earth's surface, depths, and biosphere. Mining in particular dominates imaginaries and critical arguments surrounding extraction. From precious metals to fossil fuels, copper to uranium, tungsten to cobalt and the rare earth minerals essential to today's miniaturized electronics – the history of mining has always opened new frontiers and continues to find untapped substances to turn into commodities. The digging up of the earth's surface has both ancient mythological and contemporary resonances. There is a scrambling of time at stake in mineral extraction. Sedimented in the deep time of geological processes, extracted minerals are thrust into industrial

applications and have become essential elements in the devices and infrastructures that enable even the most recent developments in new media (Parikka 2015). As immaterial a metaphor as 'the cloud' may be to describe current technologies of data storage, processing, and transmission, its very existence is predicated upon an unprecedented intensification of extractive dynamics and related processes of dispossession (Mosco 2014). Fracking, in particular, presents a cutting edge of extraction, allowing it to continue beyond the point at which the gases it seeks to remove from the earth have been otherwise depleted. It asserts the demise of the carbon economy with all the promise of a new beginning. If it were the protagonist of a twentieth century novel, it would be Samuel Beckett's *Murphy*: 'I can't go on. I'll go on' (cited in Neilson 2012a, p. 87). Chasing down the chain of mineral extraction, whether it leads to coal, gas, or the 'grey gold' lithium that powers rechargeable batteries, is a means of discerning the shifting operations of capital as well as the multifarious forms of resistance that surround them.

Extraction is not limited to mining and drilling for minerals, oil, and gas. Since the days of the so-called green revolution involving an intensification of technological and even industrial methods of farming, agriculture has taken a more extractive turn. This is the case for instance with the extensive soy cultivation in ever more marginal areas of the Latin American pampas (Cáceres 2015) or through deforestation in the Amazon (Petras 2013). These soy crops are destined not only for alimentary purposes but also for a variety of industrial applications, from the production of polyurethane foam to the making of cleaning supplies and adhesives. Soy cultivation has dramatically transformed rural landscapes in many parts of the world, with a disruptive impact on economies and populations. One has only to remember the role played by genetically modified seeds and the fertilizers and pesticides manufactured to work specifically with them to get an idea of the wider implications of the extractive turn in agricultural activities. The name of agribusiness giants like Monsanto, Dow, and DuPont are synonymous with the global expansion of such farming techniques, which are highly destructive of biodiversity and have spread particularly rapidly in post-conflict societies where the edge of primitive accumulation is focused on agriculture (see for instance Brown 2015, chapter 4). An extractive turn can also be witnessed on the new frontiers of aquaculture, for instance in shrimp farming in Southeast Asia (Horstmann 2007, pp. 150–151). Correspondingly, new logics of accumulation are evident in the oceans. The krill harvest in Antarctica, for instance, provides fish-meal for use in aquaculture as well as health products consumed by overfed human populations that suffer from high cholesterol levels (Ziegelmayr 2014). Life forms are more and more tested and put under pressure by the invasive action of extractive techniques, which do not stop at the border of the human body.

In all of the above examples, whether they involve minerals or life forms, extraction is understood in a literal sense. In an interesting discussion of the proceeds of such literal extraction, James Ferguson asks why they seem to be more susceptible to collective claims than those resulting from other economic activities. He hypothesizes that this is because 'the value' derived from literal extraction 'is so out of proportion to the effort; in some sense, we recognize that the value was "already there" – stumbled upon, not created ... from labor', but emerging 'fabulously, almost magically, as if from nowhere' (Ferguson 2015, p. 184). This simple understanding, which Ferguson uses to highlight popular attitudes, clearly derives from John Locke's famous discussion of labour and property. Ferguson uses this hypothesis to draw attention to the violence implied in extraction as well as its reliance upon contingencies that make it feasible as a revenue generating activity. In reality, as Ferguson himself is well aware, the situation is always more complex. Speaking of coal extraction, Tsing (2005, p. 51) outlines how the process involves not only the substance's coercion from the earth but also practices of transportation, storage, sorting, and grading. Only when these practices are operative can the raw material of coal be turned into a commodity. All of this is part of extraction too. Extractive activities always have their productive sides, which in some of the instances mentioned above involve the deployment of sophisticated technical and knowledge practices.

Nevertheless, it is important to stress the moments of appropriation and expropriation without which extraction cannot proceed. If we think of the extractive operations of capital, the point we made earlier regarding capital's relation with its multiple outsides takes on particularly salient forms. Capital is so dependent on its outsides that it is prepared to make considerable investments, for instance in prospecting and research, to ensure the constant reproduction of these outsides. Just think of the efforts trained on mineral discovery or the constant expansion of soy cultivation into ever more marginal areas. In both cases, there is a complex interplay between technological advances, knowledge production, and financial manipulation that allows capital to prepare the ground for further extraction. This does not mean that capital's operations are homogeneous along the extractive frontier. Capital's reliance upon heterogeneous conditions and materials that are not of its own making corresponds with a proliferation of different operations that impinge upon its multiple outsides. To be sure, the mobilization or application of these operations involves a kind of projective logic by which these outsides are already constructed as susceptible to appropriation by capital. The heterogeneity of operations that surround and prepare the ground for extraction concatenate in ways that are constitutive of a particular fraction of capital that we might call extractive capital. Equally, any one of these operations, let us take for example the financial dimension of mineral prospecting, can mesh into other concatenations that both support extractive activities and

are part of the formation of other fractions of capital. These concatenations and crossovers must be analysed in ways attentive to human inputs and property relations that sustain and perpetuate capital's drive for endless accumulation.

The traditional story about these human inputs and property relations is well known. The extractive zeal of European imperialism emptied the world's pits and mountains and lined the mints and museums of the metropole with metals and artefacts that barely conceal the scars of slavery and indentured labour. As Achille Mbembe memorably argues, the connection between forced labour and extraction is so strong that it allows an understanding of the slave trade in extractive terms. Mbembe writes of a process by which 'African peoples are transformed into living minerals from which metal is extracted', giving rise to a transition from '*homme-minerai* to *homme-métal* and from *homme-métal* to *homme-monnaie*' (Mbembe 2013, pp. 67–68, our translation). A similar logic applies in other instances of forced labour that were central to the continuity of extractive activities throughout the long centuries of colonialism and imperialism. One thinks of the mines of Potosí in contemporary Bolivia where Indigenous people were compelled to work according to the *mita* system for the silver extraction that sustained the circulation of the first global currency (Mezzadra and Neilson 2013a, pp. 32–33). Taussig (1984) has eloquently traced the 'culture of terror' surrounding the labour regimes that enabled rubber extraction in the Putumayo territories of the Amazon. Resonances of this coercive and fear-generating culture can be found in other theatres and periods of colonialism where the extraction of this same precious 'milk' took place – from the Congo to Burma, Indonesia to Madagascar (Tully 2011). Throughout the globe, a complex composition of labour enabled extractive activities in heterogeneous colonial and other fringe landscapes. A global history of this labour force would include Welsh coal miners (Williams 1960), coolies who plied the rubber plantations of Malaya (Tully 2011, chapter 16), and the Quechua and Aymara who negotiated with the 'devil' in the tin mines around the city of Oruro, Bolivia (Taussig 1980, part III). Part of this history would also encompass the multifarious struggles and rebellions that made the miner an iconic figure for the labour movement in many parts of the world. The mutinous foment in the worlds of coolies and other forced labourers would supply another chapter in this global history.

Our interest here is not to write another volume in the immensely important archive of labour history. Rather we want to remember and question the justifying narratives and juridical regimes that sustained and enabled colonial extraction – narratives and regimes that have mutated but also maintain continuity in the present day. Ingrained in practices and techniques of extraction is a kind of colonial imprint that becomes particularly apparent when new fields and quarries are opened in the landscapes and spreadsheets of

contemporary capital. The violence of this opening often manifests in controversies surrounding property and land rights. To take just one example from the panoply of cases from around the world, the opening of the Porgera gold mine in Papua New Guinea exhibits multi-layered property relations that at once facilitate and impede the extractive process (Golub 2014). This multiplicity of layers is evident in the juridical regimes governing the relation between the land's surface and depths, the former of which belongs putatively to the Indigenous Ipili, themselves a kind of indistinct 'hinge' between two much larger Indigenous groups, and the latter belonging to the national government. In this instance, the government has power to issue a lease to outsiders 'if it decides that such a lease is in the best interest of its citizens – whether they consent or not' (p. 10). This arrangement then obliges a series of legal agreements, foremost among them a 'compensation agreement' by which the mine must 'pay for land and plants damaged by its activities' (p. 10). The agreement struck with the mine operator Porgera Joint Venture, primarily owned by Canadian transnational Placer Dome, has resulted in an uneven trickling of revenues to the Ipili, among whom the 'big men' of the group have been the primary beneficiaries. The upheaval resulting from the establishment of the mine has clearly led to a situation where 'the Ipili are the losers' (p. 213). Coumans (2011) details the environmental damage, shooting of trespassers, worsening subsistence crises, and social disorder. With due respect to Alex Golub's ambition to 'get beyond dualist stereotypes of ecologically noble savages fighting the good fight against global capital' (Golub 2014, p. 212), the case illustrates how property regimes are tested and manipulated in ways that allow the violence of extraction to proceed amidst contemporary cultural and economic sensitivities.

It would be easy to locate landscapes of extraction where this violence is much more pronounced and unmediated by compensation agreements and the like. Tales of dispossession and displacement are the flipside of the expansion of extractive activities. Indigenous groups are often the protagonists of these tales, sometimes negotiating benefits around the edges of extractive enterprises but always seemingly ending up on the vanquished side. While the groups that bear the brunt of drilling, mining, and agribusiness are multiple and scattered, the agents that pursue these activities display a surprising level of corporate concentration. In the mining sector, a limited number of companies control an increasing share of the industry globally (Ericsson 2012). Although massive players such as Vale, BHP Billiton, and Rio Tinto are being joined by companies based in countries such as Russia, South Africa, Mexico, and Chile, the industry is extremely polarized between major producers and small-scale exploration companies. Within this hierarchized scenario, states are not innocent actors. Whether engaged in juridical or territorial negotiations that allow the advance of extractive enterprises, as in the case of the Porgera mine discussed above, or directly involved in



partnerships or state-owned enterprises (as is the case increasingly in Russia, China, and India as well as many sub-Saharan African countries), the entanglement of states with extractive activities is an important aspect of their changing relations to capital. On the ground, this entanglement often involves multifarious and changing forms of patronage, from petty corruption through to political complicities with transnational actors and companies whose weight in national economies is rapidly increasing. Further complicating these scenarios are new trends in extraction such as mega-mining, fracking, green washing, oil sand processing, and the growing disputes surrounding conflict resources. These and other trends, not least among them the activation of discourses and practices of sustainability and corporate social responsibility (Welker 2014), ensure that the world's extractive activities continue along an open frontier.

### **Beyond literal extraction**

As we argued earlier in this piece, capital's extractive operations cannot be restricted to literal extractive activities. A first way to move in the direction of an expanded concept of extraction is to map the marked dissemination of its terminologies and processes into other spheres of human and economic activity over recent years. Consider two quite different examples. In the case of cryptocurrencies like bitcoin, the image of mining applies to processes of encryption solving and transaction-verification that result in the issue of new bitcoins. The metaphor of mining has caught on in this instance because the creation of bitcoins is entangled in dense economic and technological dynamics that resonate with the workings of extraction. Bitcoin mining requires effort and resources and can only be conducted at a slow rate because the underlying technology known as the blockchain makes the currency available at a controlled pace that is reminiscent of the rate at which raw materials are extracted from the ground. At the same time, 'the "mining" metaphor is a deliberate nod to precious metal-based monetary systems' (Maurer *et al.* 2013, p. 268). The insertion of bitcoin into capitalist monetary circuits thus carries a reminder of the literal extraction that enabled the evolution of previous currency systems. Another significant reference to extraction at the cutting edge of digital capitalism can be found in the rapidly expanding area of games and gamification. In some regions of China, as well as in other parts of the world, thousands of young migrants are at work playing games. They spend hours upon hours in warehouse-workshops in front of computers and under the control of their bosses. These worker-players specialize in different games in order to extract points or in-game currency for sale to other players who are external to the rounds of play in which the points are generated. This activity is called 'Gold Farming', a term which again carries a reference to historical episodes of precious metal extraction. The worker-

players dedicate time to what are usually multi-player games, a time that players in other latitudes, especially in the United States, do not have, but for which they are willing to pay (Dyer-Witthoford and de Peuter 2009, pp. 142–151, Gago and Mezzadra 2015, p. 42).

In these instances, we can discern the workings of the expanded sense of extraction we discussed above. Understood in this expanded sense, extraction involves not only the appropriation and expropriation of natural resources but also, and in ever more pronounced ways, processes that cut through patterns of human cooperation and social activity. The prospecting logics that we fleshed out with regard to capital's relation with its outsides in the case of literal extraction take on peculiar characteristics here – since they refer precisely to forms of human cooperation and social activity. The expanding panoply of practices in data mining is an important register of the pervasive penetration of extraction into spheres of human activity that lie beyond the familiar domains of mining and agribusiness. From security to social media, purchasing patterns to financial practices, the collection, storage, and analysis of massive amounts of data enable correlations that at once are highly individualized and sort populations into a range of diverse categories: drivers, pedestrians, consumers of tuna fish, potential terrorists, mortgagees, viewers of Brazilian soap operas, and so on. This logic of profiling produces fungible schemes and relies on algorithmic operations that scan and aggregate data gathered through processes of what can be called digital excavation and extraction (Pasquinelli 2014, Rossiter 2016). There is no shortage of hyperbolic and even evangelical claims regarding the potentiality for data extraction and analysis to open up new continents for the operations of capital. Human activity inscribes multiple traces into digital environments, creating huge deposits of data that supply inert materials for new generations of prospectors that prepare the ground for properly extractive activities. These deposits of data are external to the operations of mining and analysis. Gathered into databases, their analysis generates correlations which, beyond the logics of causality and interpretation, bear the potentiality to anticipate behaviours, generate insights, and thus produce value. As Vincent Mosco writes, the data scientist is 'the new visionary ... who magically conjures truth from mountains of seemingly unrelated information' (Mosco 2014, p. 194).

The extension of data mining techniques across variegated economic activities corresponds with an entrenchment of extractive operations within contemporary regimes of capitalist valorization and accumulation. The resulting extractive imprint is apparent in the activities of enterprises such as Google as well as in practices such as high frequency trading, which mobilize data-driven commerce and arbitrage to accomplish openings that can be no less violent than those associated with literal extraction. Data mining reconfigures property relations, working the boundaries of 'privacy' while also testing and exploiting the differences, frictions, and connections between heterogeneous

jurisdictions. Over the past years, there has been a rapid development of a proper *lex digitalis* of the Internet (Fischer-Lescano and Teubner 2004, pp. 1010–1011), a kind of autonomous global order that mixes technical parameters with legal norms in ways that create variable geometries of relation with national and international legal orders. It is within this hybrid legal environment that data mining unfolds amidst multifarious disputes and technical acts of camouflage or encryption by which populations render themselves ‘anonymous’ or beyond the reach of digital extraction. Nevertheless, data mining continues to open up new frontiers for the expansion of the logics of property and to blur the borders between processes of governance and dynamics of capitalist valorization. Value extraction through data mining is predicated upon the direct exploitation of social cooperation as is particularly apparent in the well-known example of social media (see for instance Vecchi 2015). In this domain, users are required to accept ‘terms of use’ that are barely ever read yet contain permissive clauses that grant an extremely broad authorization for the mining and analysis of data generated by social interaction. While media activists may be aware of the implications of these legalities, the subjectivity of the user is one that is often indifferent to these protocols and structurally placed at the threshold between consent and coercion when it comes to negotiating issues of awareness and authorization. While this subjectivity increasingly intertwines with the figure and logics of citizenship, it is also shadowed by and invested with the pain and joy, the exhaustion and productivity, of another figure – the worker.

The productive front of data mining is particularly amplified in urban environments, which have been reshaped in many parts of the world by the stretching of work beyond traditional ‘points of production’. The urban landscape has become a site for new processes of data extraction that function through various ‘smart city’ and remote sensing technologies (McNeill 2015). Aimed at facilitating smooth forms of governance that make the city a privileged site of accumulation, these technologies have developed in ways that are increasingly intertwined with the booming world of logistics. The debates and practices that have sprung up around the taxi sharing application ‘Uber’ are a good example here. The rapid rollout and local infiltration of this app across many world cities has created an echelon of precarious workers who respond to the ‘click and ride’ demands of users while also displacing traditional forms of labour and organization in the taxi industry. Importantly, Uber drivers are not employees of the company that launched the app. Uber works as a kind of flexible and time-space sensitive device for the collection and mining of data that enable the extraction of skills and labour power from these drivers. In a wider perspective, Uber and other major ‘sharing economy’ players are laying the ground for new forms of data-driven urban governance that combine logics of privatization with service economy models of networked provision and decision-making

practices that widen participation along speculative fronts (Sadowski and Gregory 2015). They are, to quote from a recent text by Scholz (2016, p. 4), “digital bridge builders” who insert themselves between those who offer services and others who are looking for them, thereby embedding extractive processes into social interaction’.

These activities as well as the ‘extractive platform-based business models’ connected with them (Scholz 2016, p. 6) also extend and deepen the reach of a well-established form of property – real estate – that works as a properly extractive device in processes of urban gentrification. Although this is by now an old story (Smith 1996), the ‘new urban frontier’ is continually opening in diverse contexts (Bojadžijev 2015), prompted by the appropriation and expropriation of spaces, values, infrastructures, and forms of life that are submitted to capitalist valorization. The specific form of ‘extractive urbanism’ that rapidly develops around mining in many parts of the world, characterized by the proliferation and intertwining of enclaves and enclosures, can be taken as yet another form of urbanization where these processes take extreme although peculiar forms (see for instance Kirshner and Power 2015).

The role of data mining is also prominent in another important domain that deploys extractive logics to trespass upon the sinews of the human body. We have in mind what Rajan (2006) has called biocapital as well as the clinical labour (Cooper and Waldby 2014) necessary for its development. At stake here is not only the extraction of tissues and other biological substances from the human body but also the generation and patenting of knowledge derived from genomic manipulations that break down and recast genetic materials according to logics of risk and speculation. These operations require the input of bioinformatic data that is generated through the pains and tolerances of experimental subjects who are usually recruited according to specific parameters of gender, race, and class (Cooper and Waldby 2014). As Vora (2015) has recently shown, this opening of the human body as a site for annexation, harvest, and production has strong resonances and continuities with land plundering and natural resource dispossession under European territorial colonialism. The sophisticated techniques that link this generation and input of bioinformatic data to processes of genomic sequencing enable a continuous process of innovation that is also a continuous process of extraction. The most recent developments in biocapital are driven by improvements in the speed and functionality of data collection, storage, and analysis that have dramatically lowered the costs of and time required for the sequencing of genetic materials (Mosco 2014, p. 182). The resulting processes of innovation and extraction continually test the boundaries of property, generating once again disputes that require new juridical arrangements and a stretching of old ones.

## Extraction, reloaded

The above discussion of extraction in both its literal and expanded senses supplies for us an excavation of contemporary capitalism. This is to say that the surveying and tracing of the history and present expansion of the extractive operations of capital offers a means of unearthing and exposing some of the most important tendencies shaping current processes of capitalist transition and upheaval. Prominent among these tendencies are the continuity of so-called primitive accumulation and dispossession in the present, and the emergence of new forms of exploitation that directly target social cooperation and force subjects to confront the risks and uncertainty of economic volatility. We have attempted to shed light on the extractive dimension of operations of capital, which always involves a relation of capital with its multiple outsides, also in these latter instances. This does not mean however that 'extractivism' or even 'neo-extractivism' can be the proper name of the dominant paradigm of capitalism today. This is because, as we contended at the beginning of this essay, extractivism is too strictly linked with activities that are extractive only in the literal sense. More generally, we are convinced that any definition of contemporary capitalism predicated on the primacy of a specific sector of economic activity can be misleading. Our notion of operations of capital points rather to the crucial relevance of the articulation of extractive operations with other operations of capital, which involve heterogeneous forms of labour and exploitation. This becomes particularly clear once logistics and finance are considered as part of an analysis that emphasizes the extractive dimension of the operations of capital also within these domains.

There is a need to stress that both logistics and finance are heavily involved in the expansion of literal extractive activities. In the case of logistics this is apparent in processes of transport and power supply as well as in new infrastructure developments and projects whose scale rivals that of mega-mining. Suffice it to mention the project of constructing the Nicaragua canal or the huge Chinese investments in railroads, ports, and digital infrastructures in Latin America, Africa, and other regions where the transportation of commodities and raw materials is crucial to the economy (see for instance Gransow 2015 and Brautigam 2015). More generally, logistics has been one of the key sites for innovations that extend well beyond activities of transport and communication to encompass supply chain management, organization of labour, and the refashioning of lifestyles. Building on these insights, critical thinkers (Neilson 2012b, Harney and Moten 2013, Cowen 2014) have developed the concept of logistics to analytically describe a mode of power specific to the practices of coordination and adaptation that have enabled such dramatic transformations.

For the analysis we are pursuing in this essay, it is important to highlight that logistical operations not only test and reshape the relations between production and distribution but also have a specifically extractive dimension. At stake here is the relation between the logistical coordination of supply chains and changing processes of production. Contrary to the situation pertaining in traditional industrial capitalism, we are confronted today with many instances that demonstrate a tendency towards a prevalence of logistical operations over specific processes of material production. Examining the operations of inventory giants such as Walmart and Amazon, Anna Tsing shows how they push costs back to producers, who are allowed to use 'any methods they want' to keep prices at a minimum. Although these methods often involve 'eliminating labor and environmental standards' (Tsing 2012, p. 521), what really matters for the practices of valorization pursued by companies like Walmart and Amazon is the 'logistical' capacity to synchronize diverse modes of production along the supply chain. That Tsing uses the term 'piracy' (p. 520) to describe the relation between supply chain operations and their surrounding economic and social environments shows just how close her analysis is to the semantic field of extraction. Supply chains striate the heterogeneous space and time of global capitalism, taking advantage of specific conditions of labour and social reproduction that are not necessarily of their own making. In this process, logistical operations display an explicitly extractive dimension, shaping and commanding from the 'outside' multiple and heterogeneous productive environments. But they also have to articulate with other operations of capital, whether in specific sites of production or in the coordination and organization of production along the supply chain.

Among these heterogeneous operations of capital, finance plays a ubiquitous role in organizing and shaping the working of supply chains as well as the global field of production. The same is true of literal extractive activities, which cannot proceed without the investments and speculation that sustain their expansion under conditions in which global financial markets play an increasingly important role in determining the prices of commodities. There is no shortage of critical thought surrounding the violence and pervasiveness of contemporary processes of financialization, which have been taken as the hallmark of a new form of capitalism (see for instance Martin 2002, Marazzi 2010, Grossberg *et al.* 2014). Among these processes are the development of new financial instruments, ranging from subprime mortgages to derivatives, and the emergence of techniques of high frequency trading enabled by specific forms of data mining and logistical arrangements. At the edge of these frontiers, finance has become more and more entrenched in daily life, deeply penetrating what used to be called the 'real economy' and disseminating its volatility far beyond the abstract movement of graphs and tickers. Goldstein (2014) argues that financialization and the subprime crisis extend

and reproduce the territorial seizures of settler colonialism while also 'fore-closing' the lineages of this historical injustice. Finance capital has become a site for the vast accumulation of unprecedented and unevenly distributed wealth, which is not necessarily visible and consistent in its manifestations. It has also fostered a spectacular accumulation of violence that can disrupt the life of entire populations and territories, as evident in structural adjustment programmes or bailout packages that compel extreme austerity, as in the recent case of Greece.

In such perspectives, it becomes possible to detect and assess the ways in which finance is currently characterized by the prevalence of what we call extractive operations. Finance itself can be rigorously defined, quoting from a recent book by Durand (2015, p. 187, our translation), as 'an accumulation of drawing rights (*droits de tirage*) on the wealth to be produced in future, through private and public indebtedness, stock exchange capitalization, and a wide panoply of financial products'. This is not an entirely new story. In his important discussion of finance capital in *Capital*, volume 3, Marx actually provides the basic terms of this definition, stressing the accumulation of 'claims or titles' to 'future production' as a distinctive feature of the specificity of the financial moment in the series of transformations effected by capital (Marx 1991, pp. 599, 641). There are at least two important points to be highlighted here: on the one hand, it emphasizes the extractive dimension of financial operations, connecting them with a command over the *future*; on the other hand, it points to the relevance of the wealth *to be produced*. This second aspect is particularly relevant for current debates on (private as well as public) debt. The emphasis on 'wealth to be produced in future' challenges any interpretation of finance as self-referential, of financial capital as merely 'fictitious' and opposed to 'productive' capital.

Taking these two points together, it becomes clear that the extractive operations of financial capital cannot be abstracted from the promise of future production, which also means from other operations of capital that shape and organize social cooperation according to heterogeneous logics. In this regard, the recent critical move to place debt at the centre of an analysis of the workings of capital (Graeber 2011, Lazzarato 2012) must be qualified by an emphasis on the compulsion to work that corresponds to the widening and further entrenchment of the logics of debt. An abstract figure of future cooperation traversed and constricted by this compulsion looms as the main 'source' of financial value, regardless of the forms and arrangements that this future cooperation may assume. Again, we can see here a kind of prospecting logic at work. The form of this future cooperation is anticipated by the operations of financial capital, which spreads the compulsion to work in its fabric. But it remains external to financial capital because differently from industrial capital it does not directly organize the materiality of productive cooperation. This is why processes of financialization are structurally

connected with processes of heterogenization, intensification, and diversification of labour, or with what we have termed the 'multiplication of labor' (Mezzadra and Neilson 2013a, chapter 3).

In this financial moment, as well as in the cases of data mining, urban extractivism, biocapital, and logistics we have singled out, the specifically extractive operations of capital provide a thread that guides our analysis. In each of these instances, the scope and directedness of extraction points towards an outside that sustains and enables these operations but also requires their entanglement and concatenation with operations of capital that work along different but not necessarily less violent lines. If finance supplies the abstract point of synchronization for these extractive operations and logistics provides their material nexus of coordination, it is important not to forget that literal extraction furnishes the energy, matter, and dynamism that fuel the whole machine. Rather than fretting over the question of whether extractivism has become the dominant paradigm of the current global conjuncture, we believe it is more important to come to grips theoretically and politically with the implications of the spread of what we have called extractive operations across different domains and fabrics of contemporary capitalism. The inexorable push of these extractive operations towards capital's multiple outsides draws our analysis to take distance from any understanding of capital as an accomplished totality. We certainly acknowledge that capital is characterized by totalizing tendencies, by a drive to reorganize the whole social fabric according to the logics and imperative of its valorization. At the same time, we insist on the way capital's constitutive relation with its outsides punctures and troubles this very process of totalization. An analysis attentive to the expansive frontiers of extraction cannot help but dwell on these punctures and troubles.

As the instances of extraction discussed in this piece show, the multiple outsides of capital cannot be reduced to spaces (which also means, forms of economic and social activity) or materials 'not yet' subdued to domination and appropriation by capital. Extractive operations relate to their outsides in very different ways in the cases of mining, soy cultivation, logistics, or finance. Attention to these differences requires an analysis that is aware of the heterogeneous ways in which these outsides are produced from within capital, through activities of prospecting, forms of organization, and speculative practices that always encounter and have to negotiate and overcome specific forms of resistance. The spread and increasing relevance of capital's extractive operations do not limit their effects to actual 'points of extraction', be they literal or otherwise. Extraction is certainly connected with processes of dispossession. But in its current forms, it alters and intensifies the social dimensions of exploitation, which is to say that it overlays and infiltrates the multiple ways in which living labour confronts and works through capital's drive to generate and appropriate surplus value. The conceptual expansion of extraction that



we have proposed has been made possible by the amazing continuity of struggles that have developed along the multiple frontiers of extraction. It is also part of the continuing search for forms of organization, institutional arrangements, and sources of sustenance and connection capable of confronting in an effective way the increasingly invasive and extractive dimensions of current forms of capitalist activity and valorization.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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