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Response to Levins: Complexity, Knowledge Politics and the Remaking of Class

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The ascendancy of sciences capable of grappling with complexity is undoubtedly to be welcomed, not least in this moment of profound and overlapping systemic problems. Yet the emergence of sciences with a more sophisticated epistemology alone offers no reassurance that such knowledge will then primarily, or better, serve emancipatory and/or critical purposes. Rather, such knowledge must be treated as neither good nor bad *per se*, but dangerous. From this perspective, the paper explores the knowledge politics of the present conjuncture, the context for this rise of the complexity sciences. It discerns a new politics of security and “preparedness” that could well serve to construct a new dominant paradigm of complexity sciences that, to the contrary, serves primarily to construct a new “scientific” legitimacy for the egregious inequalities of the age of neoliberalism-in-crisis.

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Introduction

There seems little need to argue that the present is a moment of global, systemic crises and wicked problems: environmental change, global economic malaise, public health and epidemics, a landscape of innovation and research that is paradoxically both stalled and runaway (e.g., Cowan 2011; cf. Brynjolfsson and McAfee 2011), agriculture and food security, as well as domestic and international political tensions that include an ongoing epochal geopolitical shift. Along side these seismic social transformations are issues of an emerging “Anthropocene” (Dalby 2007; Latour 2013), in which human impact on the planet and its ecologies has become so overwhelming as to eliminate any analytical advantages from keeping separate ontological categories of the “natural” vs. “social,” or the respective sciences that study them. Indeed, on some accounts, this is simply one manifestation of a broader deconstruction of the modernist “mind/body” or subject/object categorical dualism that has dominated in recent centuries.¹

With this conjuncture of profound systemic turbulence and ontological insecurity has arisen a widespread popular sense of fear and anxiety, which is in turn mutually constructed with the emergence of a new “security” politics (Lentzos and Rose 2009; Amoores 2006). Moreover, this “securitization” takes a new form, concerned to anticipate and manage not a fundamentally stable system but one that is (now viewed as) constitutively dynamic, volatile and marked by disequilibria and potentially catastrophic “black swan” events (Taleb 2007; Anderson 2010). We may see this trend clearly, for instance, regarding issues of national security and terrorism, extreme weather events (including the floods affecting much of south west England as I write, which have led to the leader of the Labour Party opposition calling climate change an issue of national security [*The Guardian* 2014]), financial flows, epidemics and popular unrest.

Concerned with how best to understand and respond to these new challenges, many have suggested the need for a new paradigm of understanding. As Levins (2014, p.[2]) puts it in

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¹For example, Levins (2014, p.[1]) himself notes the importance of moves beyond the dualism of thinking vs. feeling.

his article, “We need a more complex approach to cope with complex realities, [while] our science is beset by a growing sophistication in the small that obscures the irrationality of the whole enterprise.” Such a sentiment seems to me beyond argument—the starting point of any possible progressive response, including in the realm of thought. Yet Levins’s paper offers much more than this. Rather, built on his long and distinguished career as a politically engaged biologist, it provides a compelling argument for one particular avenue of development of scientific understanding that may be able to respond to these enormous challenges, namely, regarding the sciences of complexity and systems. Here, therefore, he: shows how such a perspective goes beyond the limitations of the dominant static and reductionistic paradigm with its abstract, formal logic; illustrates some of the multiple complications to which it in turn gives rise (e.g., regarding negative feedback loops eliciting positive or negative correlation depending on which variable is taken as the dependent or independent variable); and demonstrates how an epistemic turn towards this paradigm can serve multiple projects of critical social sciences (e.g., especially regarding public health, but also agriculture, etc.).

For Levins, a combination of dialectical thinking with “mathematics of non-linear dynamics and networks shows us the sources of counter-intuitive outcomes” (Levins 2014, p.[1]). This is then illustrated with an extraordinary variety of rigorously and unquestionably “scientific” examples. His paper thus furnishes a form of explanation that, backed by increasing scientific sophistication and empirical detail, goes beyond the *a priori* philosophical argument of an (albeit) insightful critical realist/scientific naturalist (e.g., Bhaskar 1998) perspective to a renewed “dialectical materialist” (Levins 2014, p.[4]) paradigm of science. Moreover, this argument is particularly timely, not just in terms of the urgent imperatives of the problems above but also, and not unrelatedly (as we shall see), because “we are on the brink of seriously coping with complexity” (Levins, 2014 p.[2]). Levins’s is thus an invitation for critical thought to engage with an epistemic transformation that is already well underway.

This is an invitation I am myself keen to accept, and thus I am also keen to echo Levins in advocating the importance of such a move for critical scholars. The similarities in our position, however, would make only for unenlightening repetition of his paper. Perforce, then, I focus on differences in this reply through two key arguments, though I want to stress my broad support for his project.

First, Levins notes that “a common characteristic of the errors behind the epidemiological transition doctrine [and much other mainstream thinking besides] is narrowness—narrowness of time frame, geographic scope, species and discipline, and a static view of the world, what we characterize as undialectical thinking” (Levins 2014, p.[3]; brackets added). While accepting this point completely regarding the hugely significant epistemological failings thus identified, it does not follow that by adopting an opposite perspective, i.e., of complex systems, these epistemological errors are necessarily adequately dealt with. This then leads to the second point.

Levins (2014, p. [2]) argues that the “difficulty is that while the internal intellectual development of our various fields and the demands of applying our knowledge to real world problems of health, development, and environment, urge a more holistic, dynamic, contradictory view of the world, we are held back by the power of political economy, institutional inertia and 17th century reductionist/mechanistic philosophy.”

Conversely, the view that a fundamentally “progressive” epistemic shift is being suppressed or restrained by regressive political and scientific forces seems to me an unpromising way to think of complexity thinking and its prospects. Rather I want to explore how the forces mentioned here, not least “the power of political economy” and the “reductionistic/mechanistic philosophy” it puts to work, must be understood not just as

hurdles to development of complexity understanding, but may be—seem to be emerging as—its most significant drivers in the turbulent early 21st century. Key to this argument is attention to the irreducible politics of knowledge—as regards both the dependence of power on knowledge and reciprocally of knowledge on power—a theme that, for all their philosophical and scientific credibility and even critical political intent, scientific naturalist accounts tend systematically to overlook.

From this perspective we are forced to re-evaluate, or at least re-situate, Levins’s advocacy for complexity—(qualitative) “mathematics and dialectics” (Levins 2014, p.[1])—and its potential contribution to emancipatory knowledge (construction). In short, getting the “science right” is not enough, nor *per se* the road to a better future, nor even to a better—more engaged, useful, critical, productive, representationally faithful and sophisticated—science. As Philip Mirowski (2012) has put it, it is an error of the highest order to believe that “science” is necessarily on the side of the Left. For, from this power-attentive perspective, it is clear that it is equally, if not more, likely that the development of complexity scientific understanding could play a major role in construction of new and egregious inequalities and social injustices and their legitimation, not just promise a new and critically-engaged dialectical and holistic knowledge. And in this respect, without vigilance as to the knowledge politics dimensions, even insights and bodies of work such as Levins’s could unwittingly contribute more to projects that are more-or-less explicitly the very opposite politically in intent and outcome to that to which he has devoted his labours.

To paraphrase Foucault (1983), on whom we are drawing here, therefore, “complexity” sciences—like power *per se*—are not bad nor good but dangerous, and must be called upon with eyes open to their irreducible political and strategic dimensions. As such, this is also a call to look beyond *post hoc* explanation—and its three key questions (Levins 2014, p. [5])—as the philosophical acme of “scientific knowledge,” which appears from the Marxian philosophical realist perspective as epistemically prior and politically superior. Rather we must principally attend to what is in fact often the primary form of knowledge, conditioning forms of abstract explanation—and especially so in the present moment of profound systemic import and reshaping—namely practical and interventive knowledges of management.

Power/Knowledge and the “How” of Liberal Power Regimes

In making this argument we draw on Foucault, primarily his later work that has been only recently translated into English (e.g., Foucault 2004, 2009, 2010), regarding power/knowledge and the elaboration of these themes in work on biopolitics, governmentality and liberalism. This work deploys a productive conception of power as power relations that are both constitutive of and constituted by socio-discursive and techno-material practices, common senses, subjectivities and their “adequate” performance.

Once we conceive of power as productive, strategic, ambivalent, dispersed, relational and never total or simply “structural,” this affords the concrete and detailed empirical analysis of the “how” of power; how certain agents are *constructed as* more or less empowered. Moreover, a key “technology” of such power is forms of (what is thereby designated and constructed as) knowledge. Here, then, the construction of knowledges, especially scientific and technical-administrative knowledges of management and measurement (and to a lesser if still important extent, explanation), is understood as a crucial process for the parallel, irreducible process of specifically enabling and disabling certain social roles, identities, subjectivities, institutions, etc.

Hence tracing knowledge-power technologies in their heterogeneous assemblages becomes a crucial element in explanation of specific power systems while, conversely, the genealogies of the emergence and development of specific forms of knowledge (including, therefore, complexity sciences) must themselves never be understood in purely epistemic and

politically innocent terms. Thus while Marx (1845) insightfully notes that “the ideas of the ruling class are, in every age, the ruling ideas,” this perspective allows also the investigation of the reciprocal relation—of how the “ruling ideas” serve to support the empowerment of the ruling class and, moreover, *construct* it such that it *comes to be* the ruling class in an ongoing dynamic process of co-production.

A further key insight, arising from Foucault’s later work, is the causal significance of security-freedom dynamics especially in liberal (capitalist) societies. Liberalism, as a power regime and not merely a political philosophy, is characterized by consumption of and dependence upon individual freedoms and circulation. Here the goal is thus one of managing or “conducting” such conduct not in terms of top-down total control according to pre-given normative demands (from the “centre” or sovereign power), but in terms of maximizing and optimizing such circulation vis-à-vis emergent or “natural” statistical norms or averages; norms and averages that must be measured and known by the relevant governmental authorities. Government in such liberal power regimes thus depends, both in practice and in its legitimation, upon a management of individual freedoms in accordance with a supposed “given” (or “natural”) reality, as discerned from various knowledgeable (hence power/knowledge) practices and technologies, including quintessentially “the market.” Yet in defining certain forms of emergent social systemic order precisely as “natural” and “real”—if only the state “gets out of the way”—there arises necessarily the presupposed flipside: that which must be thereby defined as the “unnatural” existential security threat to the system’s “natural” functioning, and so must be eliminated and may legitimately be subject to more authoritarian forms of (state) power.

Security and liberal individual negative freedom are thus mutually implicating and ontologically presupposing: e.g., how the freedom to drive one’s car dependably at 30 mph down a city street is dependent upon the clearing of that thoroughfare of the messy life, pedestrians, bicycles, livestock and their excrement, and traders that would likely previously have inhabited it but now come to be defined as “dangerous” (Norton 2008). Moreover, in terms of the subjectivities and connections of affect constructed by and in turn actively performing such regimes (Anderson and Adey 2011), the shadow of an omnipresent security threat—where “life is tensed on the verge of catastrophe that may emerge in unexpected and unanticipated ways” (Anderson 2010, 782)—and the anxiety and responsabilisation this conditions are mutually and complexly interwoven with the positive affect—the excitement, novelty, self-conscious enablement and individualized self-awareness—of the freedoms thereby constructed; at least for those who *are* thereby enabled *and so* “count,” in terms of both the discourses of legitimation of this power system and their effective comparative power enablement.

Liberalism, in other words, is constitutively “schizophrenic” (see also Losurdo 2010), constructing both the self-legitimizing materialized discourses of “rational” and “inevitable” progress *and* the shadow side that continually haunts this order with its existential collapse. Yet too often, critical scholars have interpreted this essential ontological tension as a fundamental weakness of liberal regimes, a “contradiction” presaging its inevitable or at least tendential self-destruction. As the present conjuncture of a global crisis of (neo)liberalism without any realistic prospect of the imminent overthrow of capitalism perhaps best exemplifies, however, to the contrary this tension is arguably a source of its tenacious flexibility and robustness. For, most importantly, it is precisely the capacity to harness both the productive power of (always prematurely universal) “positive” or “progressive” materialized discourses associated with the construction of new (individual, negative) freedoms *and inseparably* the *productive* power of “negative” materialized discourses regarding apparently “self-evident” systemic threats that underlies the productivity and resilience of liberal regimes, regardless of the opening this very mechanism provides to

critical social evaluation of such systems. As we shall see, this dynamic is also potentially of crucial significance for understanding the present—and, in particular, the emerging prospects for the complexity sciences.

Note immediately that this perspective is not proposing either that knowledge—scientific knowledge—is thus always to be distrusted as an agent of “power,” or—just as common a misapprehension—that it ontologizes and so blunts any possibility for critical analysis of specific configurations of knowledge-power. To the extent that some of Foucault’s more programmatic statements justify such a reading, it is certainly not validated by his wider and more detailed genealogical writings. And any further concerns regarding Foucault as a purveyor of relativism may be neutralized by incorporating these insights of his into a framework, such as the cultural political economy (CPE, see Jessop and Sum 2006) that informs this paper (see also Tyfield 2012a, 2012b), which retains a Marxian or Gramscian concern for critical analysis of real existing capitalism(s). Nor does the observation of the productivity of liberalism signal a positive normative evaluation of that power regime. Rather it raises the permanent *prima facie* objection to any given epistemic position or constellation—actual or merely advocated—that it comes at *some* cost in terms of a specific power configuration thereby enabled, and that this must be examined in its concrete particularity. What it does argue for therefore is the flipside of this position—namely, that the common scientific naturalist presumption that getting the knowledge “right” (as opposed to “adequate for given purposes”) is even a necessary, let alone sufficient, condition of a politically progressive or critical aspect to the knowledge must be foresworn.

What do we see, therefore, when we look at the contemporary emergence of the complexity sciences? An admittedly crude history can discern three rough periods of complexity science, at least in respect of the engagement of the social sciences, as it has become by turns both more sophisticated and, thereby, more amenable to application in understanding concrete (social-natural) problems. First, for much of the second half of the 20th century, complexity emerged as a largely epistemic or “blue skies” research project conducted at a high level of abstraction, particularly in American research institutions, where it was able to remain at that level precisely because it was funded by the military. Secondly, from the 1990s, there were growing attempts to claim its clear epistemological and ontological advantages *vis-à-vis* mainstream positivism—its attendance to relationality, emergence and (the reality of) systems—for projects of critical (social) understanding (e.g., Urry 2003, 2005). Levins’s contribution clearly speaks to this important perspective. Most recently, however, there has been a new lease of life to the complexity sciences, with the promise even of its generalized application and a broader embryonic Kuhnian “paradigm shift.”

Complexity, Neoliberalism, Security, Preparedness

Whence this newfound interest in complexity, then? Evidently it is inseparable from the “age of crisis” described above. Yet in order to understand this development more clearly, we must delve deeper, asking “whence these various crises?” and “in what socio-political context are the complexity sciences thus achieving maturity?”

The present as a moment of systemic crisis is in fact a moment of the “crisis of crisis management” (Jessop 2013, 12), and thus a crisis of *knowledge(s)*, specifically for the management of the spatio-temporal fixes that afford always temporary and inchoate “resolution” of the intrinsic and irresolvable contradictions of ever-expanding capital accumulation. Specifically, as Levins (2014, p.[3/4]) himself gestures, this is a moment of neoliberal knowledge politics and their crisis. Neoliberalism, in turn, is understood here as a knowledge/power regime characterised by a fundamentalist political epistemology of the market (Mirowski 2011). On this conception the market is primarily an epistemic and not just

an allocative mechanism. Indeed, it is the optimal decision-maker in any and every case, while thereby also maximizing individual negative freedom. It follows, however, that any and every reasoned objection to the market, both in general and in specific instances, is illegitimate, since it presumes that an individual (or collective, institutional—as in a “plan”) intelligence can attain or provide a more comprehensive understanding of the issue in question than does the market; and this is ruled out by definition.

The upshot of this market epistemology, then, is a commitment to various forms of limitlessness. There are no possible situations in which introducing the market would not result in the optimal outcome. Nor, therefore, against Polanyian objections for instance, are there pre-existing or intrinsic “natures” to specific phenomena (e.g., “society” or “nature” itself, in terms of ecological systems or forms of species-being) that would render the application of market mechanisms problematic, destructive or self-defeating. To the extent that arguments can be made that X would be thus destroyed, the rejoinder is always and in principle at hand: “this argument depends upon the limited knowledge of individuals or (scientific) institutions, whereas the market is a superior epistemic mechanism.” The very definition of what X *is*, therefore, may be called into play in this way, with the market again being called upon as necessarily the optimal means to answering *this* question too. As such, neoliberalism is committed to an ontological agnosticism that, *per se*, presumes a limitlessness (or at least a permanent veil of ignorance regarding) what phenomena are and can be, what they can and cannot endure and adapt to become.

Evidently this specific context of a dominant knowledge politics is constitutively inimical to the realist-critical epistemology of Levins, including in terms of the forms of epistemic authority it privileges (or even acknowledges) and the institutional preconditions of those forms of knowledge production; e.g., regarding its foundational opposition to state-public-expert knowledge and its distrust of and assault on the academy and its intellectuals, in terms of their commercialization and commodification in a “market place of ideas” (Tyfield 2012a; Mirowski 2011). Hence we are already forced to accept that the ground for the specific knowledge (political) project of Levins is unpromising.

Yet the intrinsic limitlessness of neoliberalism—which renders it a peculiar (in)version or radicalized mutation of classical liberalism—also has profound effects “in the world,” mediated by technoscientific power/knowledge technologies, namely, precisely the “age” of crisis. For the relentless expansion of the market necessarily without regard to the “real” constitution of phenomena does indeed, as Polanyi (1957) argued regarding fictitious commodities and the double movement, tend towards the destruction of the very preconditions of market economies, whether regarding the environment, ecologies of bacterial infection, money and debt or knowledge itself, to name just the most obvious of such contemporary concerns. Moreover, as an *epistemic* fundamentalism, neoliberalism tends precisely towards multiple overlapping crises of *crisis management* given the failings of the knowledge/power technologies at play regarding: (i) identification of the problem (vs. “no limits”); (ii) identification of the solution (vs. always “more market”); (iii) the knowledge production processes given epistemic authority in such analysis (vs. “marketplace of ideas”); and (iv) knowledge technologies to be put to work in managing and governing the “problem” (i.e., entrepreneurial pursuit of profit on the market or, as second best, commercialised science). In this way, therefore, neoliberalism *as* a power/knowledge regime is systemically able only to exacerbate and not address the multiple “crises” to which it in turn gives rise.

The key point here, though, in responding to Levins’s account of complexity, is that it is this crisis that is eliciting a growing enforced acknowledgement (even from erstwhile cheerleaders and beneficiaries) of the bankruptcy of existing epistemic resources, in a desperate search for new forms of understanding. The primary reason for the contemporary emergence of this new “paradigm” thus is the self-reinforcing collapse of existing

materialized forms of understanding—as forms of social system-constitutive power/knowledge—which in turn has set in train, even (if not *especially*) amongst the currently most enabled agents and institutions of society, a desperate active and strategic search for *new* sources of technical and legitimatory knowledge upon which to base their continued system dominance. Moreover, as an inseparable element of this systemic transformation, in parallel the socio-material bases of a complexity science that would afford it widespread applicability and implementation are being introduced, particularly in terms of the massive popular roll-out of and voluntary connection to the new networks of technology-enabled social media and massive data production and circulation. And with this development, in seeming vindication of the still-prevailing neoliberal creed, “tech” start-ups are proliferating, with the promise (however illusory for most) of fortunes to be made, even in the absence of profits. Finally, this profound transformation in the dominant episteme must be set against the ongoing and, if anything, intensifying assault on the universities—an attack that these technologies are themselves involved in through “MOOCs” (i.e., massively-offered online courses) and new technologies of “measuring” research and teaching (Tyfield 2013)—which further weakens the hand of critical scholars, like both Levins and myself, who are calling for public and critical forms of knowledge.

Of greatest importance, however, is how this crisis of neoliberalism has elicited a new dynamic of security-freedom focused on a logic of anticipation or preparedness. Managing the future (using knowledge technologies) has, of course, always been a feature of forms of government, and of liberal government more generally (Anderson 2010). Yet diverse forms or logics by which “freedom” and “security” have been played off against and for each other may be identified. Three, in particular, stand out as important in recent decades (Anderson 2010; Oels 2013). First, there is a positivistic risk management, presuming reliable extrapolation, equilibria and system stability, that afford “societal” averages and management to optimize the “mean.” Secondly, a logic of “precaution” frames uncertain futures in terms of possible catastrophe that must be hedged against “at all costs.” Finally, and most recently, there is a logic of “preemption” (Anderson 2010; Lentzos and Rose 2009) or “risk management through contingency” (Oels 2013), which accepts the irreducible uncertainty and ignorance of the future but seeks to manage this through harnessing the opportunities for speculative and/or entrepreneurial exploitation of “events” as they emerge (Pellizzoni 2011).

Evidently, the last of these characterizes neoliberal governance most clearly. Consider, for instance, the fundamental ontological agnosticism and epistemic scepticism regarding “catastrophic” global climate change and the continuing fundamental trust in market mechanisms, via opportunities for personal profit, to construct the socially “optimal” mechanisms to manage climate risks that continue to dominate policy responses in that domain. More concretely, here we may point to any number of developments, especially in the opening years of this century, in terms of the attempts to “manage” climate change through the commodification of “carbon” or the weather. Conversely, the first of these logics, regarding conventional positivistic risk management, may be seen at work in the central role of the Intergovernmental Panel on Climate Change (IPCC), via The United Nations Framework Convention on Climate Change (UNFCCC), in the global talks on how to deal with climate change. Finally, precaution, while featuring in certain high-profile movements against novel (neoliberal) forms of techno-scientific risk (e.g., European movements against hormone-treated beef or GM crops), is clearly an oppositional logic at present, commanding little if any hearing in centres of state and corporate power (Oels 2013).

What is crucial, however, is that *all three* of these logics, i.e., *including* the dominant incumbent neoliberal logic of entrepreneurial opportunism, are manifestly inadequate in the face of the multiple crises (of crisis management) unleashed by (the crisis of) neoliberalism. And it is precisely for this reason that we may not only say that we are in an “age of crisis,”

but also that we are in an “age of (new) security politics,” since the failure of the former is precisely what presents or generates a renewed generalized popular sense of pervasive (systemic) ontological insecurity characterizing the latter.

It is thus, in these circumstances of security politics, that the complexity sciences are being turned to, though still under neoliberal-dominated conditions, i.e., as central elements in the construction of a new and newly politically and epistemically legitimate paradigm of “knowledge” that is being messily assembled in ways that seem to afford a requisite credibility to the claim that it can meet the demands emergent from this newly security threat-attendant zeitgeist. This means that, while grappling with irreducible uncertainty, systemic dynamism and openness, contingency and complexity, it can offer practicable advance guidance not just on management of stable averages but of extreme, freak or “black swan” events, according to a logic of preparedness, anticipation and systemic resilience (Lentzos and Rose 2009).

This is thus a logic of security-freedom that is specifically amenable to assistance from the knowledge/power technologies of the complexity sciences, in ways that the other three are not. Moreover, and again in supposed vindication of the liberalism of this development, this emerging complexity episteme and its practical capacity for management of security threats works through and depends upon a dispersed capacity (i.e., beyond a centralized authority) for contribution to the emergent “complex” knowledges of system management, in the form of the use of social media and the analysis of the “big data” thereby produced, as, for instance, in real-time epidemiological analysis of flu outbreaks through analysis of the frequency of Google search terms (that may only be statistically correlated, and have no clear meaningful connection to, issues of flu and its symptoms) (Mayer-Schönberger and Cukier 2013). Note therefore, that it is the practical political and strategic deployment of the complexity sciences, not their use in projects of critical *post hoc* explanation, that is setting the agenda for their current development, construction and emergence as a new “paradigm.”

Furthermore, where “successes” of such complex management contingently emerge, those agencies and institutions invested in these new processes become not only comparatively more enabled, but also able—and strategically interested—to emphasise the systemic threat to which they are responding; for now they have the means to manage it. Such successes thus simultaneously construct both the new freedoms upon which such complex management depends *and* the (materialized discourses of) security threats to which they are responding, generating a positive feedback loop and hence a powerful momentum to systemic disruption and emergence. In the same vein, neoliberal logics of future management can be ever-more compellingly presented as *themselves* a very source of security threat, as well as epistemically and politically backward and, crucially (politically, economically, technologically and scientifically) unnecessary.

To be sure, this new post-neoliberal power regime, which I have called “liberalism 2.0” (or “networked liberalism” or “complexity liberalism”) is still very much embryonic and its concrete and diverse manifestations in different places are no doubt far from settled. Yet wherever we look, across diverse domains of techno-scientific innovation and risk management—urban mobility, low-carbon energy, climate engineering, agriculture and food security, infectious and non-infectious or chronic disease and, of course, social media—the dynamic of new-freedoms-feeding-off-and-into-newly-acknowledged-security-threats-that-in-turn-construct-the-new-freedoms is distinctly discernible (Tyfield, forthcoming). And in all of these cases they are crucially mediated by the newly materialized discourses of complexity.

“Complexity Liberalism” and Reconstructing Class

But, as Foucault (2004, 2010) cautions us, such a power regime must necessarily define some

as “in” and some as “out,” and this is also clear in this case. First, let us attend to which groups are proving most influential in shaping the emerging complexity paradigm. Indeed, as Levins (2014, p.[15]) himself notes, Quinean issues of underdetermination certainly continue with complexity, so leaving plenty of room for agnotology and the development of complexity sciences that serve specific groups and political projects, i.e., those that can resource such knowledge and come in turn to be further enabled by it, as patrons and in-demand producers. Lest it need be said, it is also clear that the most powerful, best resourced and dynamic of the “power” projects behind the ongoing development and emergence of the complexity sciences are not those of critical social science. Rather they are those of corporate, state and “2.0” public networks seeking to exploit security-freedom dynamics in construction of preparedness power/knowledge technologies that further their strategic purposes.

But we may go further still in our analysis of the likely trajectory of the complexity sciences to explore the *kind of society* of which their growing deployment is actually conditioning the construction. For, more generally, as *constitutive* of social “common senses,” positions, institutions and subjectivities, the emerging complexity episteme provides an insightful window into the heterogeneous emergent system being actively and strategically cobbled together, via self-reinforcing dynamic feedback loops, in the process of developing and making use of the complexity power/knowledge technologies.

Deploying a Gramscian pessimism of the intellect, such an investigation yields a stark picture indeed. For complexity knowledges could play a crucial role in the construction of new class discourse and reality that not only *entrenches* and possibly *deepens* the yawning, obscene inequalities of the neoliberal era that have also been exacerbated by its crises (e.g., Stiglitz 2012; Piketty 2014), but also serves substantially to renaturalize and thereby legitimate them.

Here we draw upon the recent work of Curran (2013a, 2013b), who in turn uses Beck’s (2009) thesis of reflexive modernization and world risk society to illuminate a transformation and revitalization of the category of “class.” Following Beck (2013), one can see conceptions of class divided into a four-fold grid that emphasises the reproduction or transformation of society along one axis and a focus on the social distribution of “goods” only or *also* of risks and their associated “bads.” As examples of the resulting four-fold typology we may thus point to: Bourdieu (reproductive, goods); Therborn (transforming, goods); Mythen (reproductive, goods and bads); and Curran (transforming, goods and bads).

In particular, Curran notes how proliferation of systemic risks leads to a new meaning and reality of class in which the primary criterion by which to distinguish different groups of society and the transforming and emerging stratification of their “life chances” is increasingly the level of exposure to such techno-scientific risks and/or the flipside of capacity to mitigate or avoid them. No longer, therefore, is the distribution of “goods” or diverse forms of “capital” sufficient to capture the reality and functioning of classed differentiation at work. Rather, what must be investigated is the diverse ways in which distribution of risks and “bads” serves to reproduce and transform the specific enablement of different groups in positive and negative feedback loops.

This conception of class already opens up a new analysis of the ongoing transformation of the class structures of 21st century globalizing, financialized capitalism, as, for instance, in the emergence of a new “precariat” (Standing 2011; cf. Breman 2013). It also does this by attending precisely to the issues that enervate the contemporary security politics, i.e., the pre-eminent transformations in political culture and power regimes currently in play. Moreover, and a distinct advantage of Curran’s analysis that has as yet to begin to be adequately explored, this connection of the reconstruction of “class” with “world risk society” opens up the possibility of exploring and incorporating as central the significance of the “rising” non-

Western “middle classes,” notably of China, India, Brazil, etc.² This is the case given the particularly intense significance of a “compressed” version of Beck’s reflexive modernity in these countries (Han and Shim 2010; Chang 2010), while opening up the possibility for critical scholarship of a social development of undoubted world historical significance that also thereby promises to take us beyond the panegyrics and wet-dreams on this subject from the business press that dominate current discussion.

It must also be noted that Curran’s analysis has clear resonance with Levins’s substantive conclusions (e.g., Levins, 2014 p.[8]). For instance, both highlight how increased environmental vulnerability (e.g., for those worst hit by extreme weather events) is disproportionately associated with those who are poorest, hence eliciting insightful critical scholarship of the multiple systemic challenges as a new social politics of self-reinforcing advantage and disadvantage.

But how does complexity come into this picture? Curran does not discuss power/knowledge directly, yet supplementing his analysis in these terms arguably offers important analytical gains regarding speculation about the future trajectories of this new class reality. For it is clear that differences in access to and influence upon the development of the complexity sciences compound the differential positions he highlights regarding distribution of “bads.”

In developing this argument, let us start by noting that class is a moral economy that serves to legitimate *unequal* shares as “fair” (and “natural”), quintessentially in capitalism via the law of value (Clarke 1982). It has been a common Marxian mistake, however, to believe that the concrete forms of class in 19th century industrial capitalism identified in Marx’s analysis were timeless and intrinsic—a matter of “political economic structure” vs. epiphenomenal cultural-discursive “superstructure”—leading in turn to class analysis that seeks only for how this structure is reproduced, as it must be then, by definition, in any capitalist society. Conversely, from a complex, qualitatively dynamic systems perspective that takes the concrete and changing mediation of semiosis seriously, such as CPE, we can see that the materialized discourse of “class” is a key element of liberal government that must be continually renewed, revised and performed in parallel with the broader structures of liberal capitalist life and the power/knowledge technologies that mediate it.

To recap then, today we are witnessing the emergence of a new liberal power regime characterised by the dominance of exposure to and/or capability to escape or even manage technoscientific and socio-natural risks (or rather security threats) as the key element of social stratification, a globalizing political economy dominated by intangible labour and value production, and a transforming constitution of state and civil society power mediated by new power/knowledge technologies of connection and data production and analysis. In these circumstances, and through associated dynamic positive feedback loops of new freedoms and security threats, legitimation of the resulting inequalities in all these spheres demands *and is in fact eliciting* the construction and emergence of a *new* discourse of “class”—a new sense of the very term, and the substantive hierarchy and stratification it connotes, in terms now of “global cosmopolitan elite,” “(rising) middle class” and “precariat.” This new “class” discourse must be able to legitimise the differential positions of individualized individuals in terms of their own “responsibility,” and especially in terms of their contribution to the “systemic” well-being of preparedness, resilience and flexibility on which such social legitimacy now comes to depend. In this light, though, it is clear that differential access to and proficiency with the complexity sciences becomes a self-reinforcing process, i.e., not just of increased personal facility but, just as importantly, of differential

² This is an issue I am currently researching, specifically regarding “low carbon” innovation in China and its class and power conditions and effects as part of the European Research Council (ERC) Project on “Methodological Cosmopolitanism: In the Laboratory of Climate Change” led by Professor Ulrich Beck.

social distinction and, for many, construction of a subjectivity marked by affective, experienced *self-legitimation* of this differential position vis-à-vis others.

For instance, whether securing access to the complexity sciences, their insights and advice, via personal effort and possibly sacrifice (intellectual and hence increasingly financial [viz. student debt burdens], temporal [the hours of slog for mastery], personal [the risk one exposes oneself to in the process of learning about it] . . .) or through sheer financial or political resources (e.g., as consultancy to the rich and/or powerful), in both cases this creates a differential enablement vis-à-vis the security threats thereby avoided while *also* counselling, and incentivizing and easing, the transformation of habitual practices that may become the marks of respectable, “responsible” society—“doing your bit” or “being a good (2.0) citizen” regarding climate change or pandemic risks The “winners” in this situation thus not only benefit more clearly from the complexity sciences—themselves primarily tailored to such producers, patrons and consumers—but also engage in (changes to their) practices that mark them out as “*deserving*” (not least in their own eyes and that of their acquaintances and social circle) of such differential enablement.

Conversely, unable to break into the professional/“civil society” networks of complex knowledge production and circulation or to afford consultancy services (that offer advice that is in any case not relevant to their lives or demanding of changes that entail unaffordable capital investments), the excluded not only thereby fail to benefit from such advice. They also find that many of their previously socially acceptable practices have come to be defined as “irresponsible” and worthy even of disciplinary sanction. This may well, in turn, further complicate their lives, making successful achievement of that which society now demands even harder. Yet, from the perspective of both the newly enabled (divorced from this experience and possibly simply relieved that it is not them that is facing the consequences of what are now accepted as irreducible systemic security threats) and possibly even the excluded themselves, that they are the losers of this new system is now, traceably and demonstrably, “their *own* fault” as manifest in the lack of systemic responsibility they display in their daily lives. Indeed, in this way they are even constructed *as the security threat*, the ubiquitous and ineradicable enemy within.

This is already the case regarding obesity and smoking, both of which are increasingly matters of public and media scandal, not least regarding the expense such feckless “lifestyle choices” impose on “overstretched” public purses. But one can readily imagine this logic extending far beyond the systemic “security threat” of (the multiple social costs of) chronic medical care and public health to, for example, infectious disease, resource security (energy, food, water), employment prospects and educational qualification, and “low-carbon” (e.g., heating, housing, mobility, food) living.

Such a process is, of course, precisely a *complex* one, seamlessly crossing “ontological” boundaries between the social and the natural, the local and the global, the corporeal and the ideational. As Curran (2013a, 48) notes, “that ‘reflexive modernization’ involves greater complexity and feedback effects between social action and natural outcomes is a plausible and important claim.” Indeed, alongside the redefinition of the “natural” in terms of complex, socio-natural emergence that this development itself sponsors—i.e., as “anything that may be exhaustively or comprehensively explained in complex systems terms as spontaneously emergent”—the existence *per se* of inequality may well become “explicable” in terms of the “natural”—and so presumptively unchangeable—costs of liberal resilient societies. And, conversely, specific instances may come to be equally explained (away) in terms of the newly “naturalized” complex explanations of the interweaving of socio-technical, socio-psychological, environmental and physiological-genomic factors that construct the “poor” as simply “naturally” predisposed to failure, irresponsible behaviour and recidivism; again deepening the self-confirming logic of irreducible, “natural” security threats that, without

fundamentalist moral blame or censure but simply as a matter of “complexity science,” are an irreducible and inescapable feature of social systems and thus legitimately demand policing.

Conclusion

The emergence of the complexity sciences is, undoubtedly, a moment of significant opportunity for political-epistemic projects of emancipatory explanation, critique and praxis.

Yet, I have argued that advocating this epistemic move without broader attention to issues of knowledge politics and power-knowledge presents a far too innocent and optimistic prospect. Rather, in the context of a new politics of systemic crises that in turn is dominated by a fundamentally liberal political response (and the basic absence and/or impotence of any vital movement of the Left), characterised by a dynamic of new freedoms and new(ly acknowledged) systemic security threats, the complexity sciences are emerging shaped predominantly by projects of corporate and state power and management for the continuation of the status quo despite the ill winds increasingly accepted as lying ahead. Indeed, more troubling still, the emergence of a complexity episteme may well exacerbate and naturalize the systemic violences and injustices of the neoliberal age, even as they move beyond that specific power regime.

Yet, the conditional (if tendential) modality of my argument here is crucial in that the specific and concrete manifestation of complexity knowledges and the power regimes with which they are co-produced is open and will assume diverse forms in different locations. As Amin (2013) has shown, for instance, even the Swedish model of social democratic universal public state provision may be rendered compatible with a turn to complex, systemic security politics. Hence the immanent development of neoliberalism described above, most evident in its crumbling core (the United States and the United Kingdom), is by no means the only, let alone the necessary, future (see also Lentzos and Rose 2009 for other “national” variations). The point I have sought to make here, rather, is the more modest and corrective one: that complexity sciences, even as we accept the utility (imperative, even) of embracing their development, are neither bad nor good, but, like all “technologies” precisely in their being useful, dangerous. Insofar as incorporating issues and perspectives of complexity promises to revitalize class analysis, and hence critical scholarship, there remains significant opportunity that this danger may be used against, and not just for, liberal capitalist political projects and new forms of inequality.

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