



The Nature of Things: Dead Labor, Nonhuman Actors, and the Persistence of Marxism

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This article is about the question of social agency in the animation of *things*, and about how this problematic has been conceptualized in Marxist and Actor-Network Theory (ANT) approaches to human–nature–technology relations. Notwithstanding many obvious differences, we note that each tradition was founded on a radical shift to a relational ontology, a world of relations and processes and not things-in-themselves, and that each has developed, partly as a consequence of this move, analytically useful ways of investigating and talking about the work that things do, or appear to do, in the world. By relating the ANT category of non-human actors to the Marxist concept of dead labor, and by revisiting Marx’s own dialectics of technology as embodied in his figure of the “living machine” in *Capital*, we explore the different implications of these approaches for our understandings of the nature, materiality, and the efficacy of social agents. We argue that ANT’s reconfiguration of agency as a collective social and technical process—a process wherein the “nonhuman” can have very real social effects—can be deepened and given some political efficacy only if we take seriously the ontological problems of causality, accountability, and the directedness of social relations (and things) which ANT, and its wider, still evolving ethos among the social sciences and cultural studies, would have us forestall.

Why do the limits of power of the “nature of things” come to be restricted? Because, at bottom, if the subordinate was yesterday a thing, today he is no longer a thing but an historical person, a protagonist; if yesterday he was irresponsible because he was “resisting” an outside will, today he feels responsible because he is an agent and so necessarily active and enterprising. But even yesterday had he ever been mere “thing”, mere “irresponsibility”? Surely not. (Antonio Gramsci 1957:69–70)

It seems doubtful that when he wrote these lines, Gramsci had in mind the extension of agency and responsibility to “things” as such. The “nature of things” here suggests how what Gramsci saw as the persistence of fatalism in Marxism, replacing divine providence,

allowed its adherents to assure themselves that “I am defeated for the moment but the nature of things is on my side over a long period,’ etc” (1957:69). It is a source of strength for many, but as a coherent philosophy among intellectuals, he argues, it is impoverished, and a source of passivity that obscures more difficult questions about how political, economic, and social change comes to be realized *as* the nature of things, or how the nature of things might quickly turn.

It is, in some ways, a similar concern for questions of agency, durability, and change that has animated developments for two decades now in actor-network theory (ANT) among an expanding group of researchers. No longer limited to genealogies of scientific-technical knowledge and artifacts, the empirical studies around which ANT was developed, actor-network approaches have become prominent in areas beyond the initial disciplinary grouping of Science and Technology Studies (anthropology, history, philosophy, sociology), including cultural studies, human geography, and political ecology.¹ Actor-network approaches are not uniform, but can be broadly characterized by the rejection of a series of conceptually limiting (and putatively incapacitating) binary categories: macro/micro, subject/object, human/nonhuman, nature/society, local/global, theory/method, and structure/agency, to list perhaps the key discursive axes deconstructed in this work. In turn, the whole cloth of reality is revealed as constituted by infinite, heterogeneous, shorter or longer, more or less durable *collectives* or *networks* of human and “non-human actors”. The question of agency, as sociologist John Law puts it, then becomes “how actors and organizations mobilize, juxtapose and hold together the bits and pieces out of which they are composed” (1992:5). Similarly for Bruno Latour, the most widely influential spokesperson of actor-network concepts (at least in what we might call the dead labor of his texts), the main concern is both *relational* and *material*, not “with nature or knowledge, with things-in-themselves, but with the way all of these things are tied to our collectives and to subjects. We are talking not about instrumental thought but about the very substance of our societies” (1993:4).

Actor-network theorists have been remarkably successful at getting this perspective across and showing how the “nature of things” is a thoroughly relational and densely mediated achievement, its substance thickened by the inclusion of machines, texts, animals, microbes, and many other nonhuman actors. Their success hinges on a philosophically radical reconfiguration of social agency. The pragmatic claim is that, since productive and communicative social capacities—ie the generation of knowledge, objects, technologies, and the exchange of information—can only occur in the collective work of networks, then an actor is always *also* a network, an actor-network, or,

to add insult to injury to the humanists, an effect of authority produced in a network.² For Law, the proposition that “social agents are never located in bodies and bodies alone” is easily tested on himself and his profession:

People are who they are because they are a patterned network of heterogeneous materials. If you took away my computer, my colleagues, my office, my books, my desk, my telephone, I wouldn't be a sociologist writing papers, delivering lectures, and producing “knowledge”. I'd be something quite other—and the same is true for all of us.

So the analytical question is this: is an agent an agent primarily because he or she inhabits a body that carries knowledges, skills, values, and all the rest? Or is an agent an agent because he or she inhabits a set of elements (including, of course, a body) that stretches out into the network of materials, somatic and otherwise, that surrounds each body? (Law 1992:3)

The question is a compelling one, but it also points precisely to the analytical weaknesses of ANT. The first of these weaknesses it takes as its main strength: it has no way of distinguishing among “things”—things of different powers, and things of different ontological properties—save only as an *effect*. It asserts that there are no fundamentally irreducible, or ontological, differences between, for example, a “sociologist” and a “computer”. In the second place, and resulting partly from this indistinguishability of things (however willful), the question sets up its own, seemingly unbridgeable binary: either a person is an autonomous subject *or* a person is the “effect” of networks. As Gramsci's remarks with which we opened this paper make clear, this hardly exhausts the universe of possibilities. And indeed, more than a hundred and fifty years of materialist social theory has established fairly clearly that in fact any “subject” is dialectically *both* a subject and an object, at once able to “shape histories and geographies” and shaped by them. One of the foundational moves of Marxist theory, like that of ANT, was a radical shift to a relational ontology, a world of relations and processes and not things-in-themselves. Yet in some ways Marxist work asks different questions than does ANT about the relations between and among people and things. For the former, the question is not whether one is either a network or a thing, a cause or an effect, but one of how people forge their lives, and under what conditions. For as Gramsci (1957:76) was at pains to point out, “man is a process”, but he is “precisely the process of his actions”. The critical concerns then become, how do people forge the processes that are their lives? Who controls or establishes the conditions under which those processes operate? To what degree is that control total? How do people nonetheless resist that control? And why does it remain important to do so? Or to put the matter most starkly, it is

not Law's question above that should set the agenda, but perhaps the last two words of the quotation from Gramsci: "Surely not". For in those words of refusal is built both a theory of alienation and an argument about its transcendence, a theory of the materiality of social relations, and the ongoing, even if always necessarily partial, attempts by people to create themselves as willful, autonomous, human *beings* rather than just the "effects" of some network or another.

This paper raises questions about the nature, materiality, and the efficacy of social agents by showing how ANT's reconfiguration of agency as a collective social and technical process—a process wherein the "non-human" can have very real social effects—can be deepened and given some political efficacy if it is read "back" through Marx's concept of dead labor. The questions that actor network (and "after network") theorists have articulated, in this sense, might find an explicitly social (and openly asymmetrical) basis that is predicated on what might be called structural questions of networked agency: how, in a world of ceaseless change, can we account for the durability and resilience of certain institutions, knowledge, and things? And conversely, in a world of powerful resiliencies, how can we best account for the production of newly "active and enterprising" agents?

Before ANT and Marxism are to be brought into conversation to inform such questions, however, certain qualifications must be made and ontological commitments clarified. In the next section, beginning with Castree's (2002) recent effort in this journal to articulate actor-network concepts with critical geography and then turning to two of the sharper critiques of ANT stemming from science studies (Fuller 2000; Haraway 1997), we call attention to some of the limits of ANT's ethnomethodological approach to human–nature–technology relations. Marx too was keenly interested in the relations between the human and the non-human, and especially in the relations of translation occurring between them in processes of production, so it is instructive to turn to his analysis of these relations precisely for the different sense of networked agency that it provides. In the following section, focusing chiefly on Marx's discussion of machinery in modern industry in *Capital*, we turn to the concept of dead labor, and to the dialectics of agency that Marx embodied in "living mechanisms", as a way of re-focusing and extending questions about the inter-workings of human and technical agencies. We conclude with some brief comments on the difference the persistence of Marxism makes not just to ANT, but also to critical social analysis.³

Some Actor-Networks are More Equal than Others

Instead of defining *a priori* the distance between the nucleus of scientific content and its context, an assumption that would render

incomprehensible the numerous short-circuits between ministers and neutrons, science studies follows leads, nodes, and pathways no matter how crooked and unpredictable they may look to traditional philosophers of science. (Latour 1999b:99)

Building from Latour's evocatively geographical description of capitalism as "a skein of somewhat longer networks that rather inadequately embrace the world on the basis of points that become centers of calculation", Noel Castree (2002) argues against a false-antithesis between Marxism and ANT suggested only by "strong versions" of each.⁴ Instead, he wants to accommodate a weaker version of ANT in Marxism, and at the same time to return critical Marxist sensibilities to what he calls the "green geographical left". There are both political and analytical advantages to be gained, for Marxist thought, in this move toward actor-network ontologies, Castree says, for "[o]nce power is seen as a relational achievement—not a monopolisable capacity radiating from a single center or social system—then it becomes possible to identify multiple points... at which network stability can be contested" (2002:122). Our own position is slightly different: while it is obvious that power is relational and may have numerous points of contact, application, or effect, it is also *therefore* "centered"—centered in institutions, in individuals, or in *structured* social relations. Actor-network theorists would not wish to deny that such is the case, which would be to deny, *inter alia*, the state, the school, the labor market, and, in sum, the (more or less) entrenched institutions of social reproduction and public life. In some ways, actor-network studies have indeed been quite effective at showing how such centering processes occur.⁵ And yet there are still substantial differences between ANT and historical materialism, especially in terms of the *directedness* of social relations, compelling Castree (2002:135) to enumerate a number of concessions required from ANT, among them the following:

- that many actor networks are driven by similar processes, notwithstanding their other differences;
- that these processes might be "global" and systematic even as they are composed of nothing more than the ties between different "localities";
- that these processes are social and natural but not in equal measure, since it is the "social" relations that are often disproportionately directive;
- that agents, while social, natural and relational, vary greatly in their powers to influence others;
- and that power, while dispersed, can be directed by some (namely, specific "social" actors) more than others.

These points all seem quite reasonable, and we shall hope that such prove to be acceptable in “weak” versions of ANT! But the need to assert them is interesting in itself, reflecting anxieties with ANT’s “absolute” claims to symmetry⁶ in the treatment of human and non-human actors (see also Laurier and Philo 1999; Sheppard 2002). For Castree, the marriage of Marxism to ANT thus produces a kind of Orwellian child as its corollary: if all actor networks are equal, then some are clearly more equal than others.

Our point is not simply that actor-network approaches do not account for difference, since the elucidation of heterogeneity among interrelated “actants”, and thus the elucidation of heterogeneity in “ourselves”, is one of the presumed benefits of efforts to collapse ontological distinctions between structure and agency in the form of networks. Nor is our concern that actor network studies simply ignore differences in power. As Sarah Whatmore argues, in developing the notion of *hybrid geographies* largely along Latourian lines, “... the property of collectivity does not preclude inequality (non-equivalence) amongst heterogeneous actants but rather insists that the distribution of power within a network can only be understood as a relational effect, conditioning performance of any particular actant (including humans)” (1999:29). Rather, our concern is with what the consequences might be of seeing the distribution of power as only a relational effect.

Seeing the distribution of power as only a relational effect seems to us a far too limited conception in two ways. First, and most obviously, it precludes in principle the search for *causes* of, and thus accountability for, the effects of power which it traces, especially those which might lie beyond the horizons of its individual human and non-human actors. Second, the insistence on seeing power as an effect tends to disregard power’s (also relational) *productive* dimensions, including its productive geographical dimensions. It is largely around the inter-relations of different productive and creative processes, however, that recent work combining Marxian and post-structural philosophies has had some of its greatest analytical purchase, as in Hardt and Negri’s (2000) notion of *biopolitical production* and Donna Haraway’s (1997:13) *apparatuses of production*. Haraway’s comparison of Latour with the feminist science critic Sandra Harding is particularly instructive in this regard. “Like Latour,” she writes, “Harding is committed to science-in-the-making. Unlike the Latour of *Science in Action*, she does not mistake the constituted and constitutive practices that generate and reproduce systems of stratified inequality—and that issue in the protean, historically specific marked bodies of race, sex, and class—for preformed, functionalist categories” (1997:36).

One of Haraway’s problems with ANT (at its most formulaic in *Science in Action*) is thus the rather tautological way that difference

is reconstructed in ANT's categories as a matter of *method* (ethnomethodology),⁷ a world (of network-building) that is revealed precisely by following the "leads, nodes, and pathways" of its protagonists (Latour 1999b). Indeed, Latour describes ANT's development this way:

It was never a theory of what the social is made of... For us, ANT was simply another way of being faithful to the insights of ethnomethodology: actors know what they do and we have to learn from them not only what they do, but how and why they do it. It is *us*, the social scientists, who lack knowledge of what they do, and not *they* who are missing the explanation of why they are unwittingly manipulated by forces exterior to themselves and known to the social scientist's powerful gaze and methods... Far from being a theory of the social or even worse an explanation of what makes society exert pressure on actors, it always was, and this from its very inception (Callon and Latour 1981), a very crude method to learn from the actors without imposing on them an *a priori* definition of their world-building capacities. The ridiculous poverty of the ANT vocabulary—association, translation, alliance, obligatory passage point, etc.—was a clear signal that none of these words could replace the rich vocabulary of the actor's practice, but was simply a way to systematically avoid replacing their sociology, their metaphysics and their ontology with those of the social scientists who were connecting them through some research protocol... (Latour 1999a:19–20)

Method, perhaps. Ontology certainly. The question of method that ANT poses—ie "how to follow scientists and engineers through society" (Latour 1987)—is quite obviously, and quite inventively, freighted with notions of "the real". The task of "designing a space for the actors to deploy their own categories" (Latour 1999b:99) depends, in this way, on the assertion of on an ontological "sameness" in historical subjects and objects that presumes to wipe the slate clean of social structures that might otherwise cloud the investigator's view of a particular network or set of networks (Fuller 2000; Laurier and Philo 1999; Winner 1993).

In itself, of course, this ontological leveling is not necessarily a bad thing: where would the laboratory sciences be had the experimentalists not deployed their spaces of laboratory instrumentation as a means of isolating certain aspects of nature, even *enhancing* the agency of others (Knorr Cetina 1992), by excluding additional processes that obscured the picture? Where would ecosystems ecology be without reductions of nature to biomass and energy transfers? Where would political economy be without isolating the circulation of value from all manner of other social processes? But, too

frequently, as Latour's comments above remind us, the problem is posed as yet another pithy but unbridgeable binary: *either* we can take seriously and learn from the knowledges and world-building capacities of actors, *or* we must blithely impose our own structures upon them (and this hardly ought to exhaust the universe of possibilities either).

Castree is right to warn of a false antithesis between Marxism and actor-network approaches, but it is also important then to raise questions about why ANT, on its own, is not very antithetical about *anything*. As Latour continues:

ANT does not tell anyone the shape that is to be drawn—circles or cubes or lines—but only how to go about systematically recording the world-building activities of the sites to be documented and registered. In that sense, the potentialities of ANT are still largely untapped, especially the political implications of a social theory that would not claim to explain the actors' behavior and reasons but only to find the procedures which render actors able to negotiate their ways through one another's world-building activity. (Latour 1999b:21)

The virtue of these "ontological politics", then, as Mol (1999:75; see also Braun and Disch 2002; Latour 1998) describes these political potentialities, is that, by following actor networks and the activities that hold them together, we gain a new sense of how "the shaping of the 'real' is both open and contested". But what kind of politics, ontological or otherwise, are *likely* to arise from a research program in which analysis, ideally at least, is to be reduced to a matter of observation? In view of the analytical accomplishments of the broader STS field (including actor-network studies) in elucidating the value-laden nature of the sciences in practice, we are left with an oddly "neutral"—and politically inert—sense of what a scientific or theoretical perspective provides.

It is useful at this point to turn to sociologist Steve Fuller's (2000) insider (but nonetheless sharp) critique of ANT and its influences across the wider field of science and technology studies, for Fuller reminds us that intellectual and political radicalism do not always go hand in hand. The pervasive effects of ANT on the wider STS field, Fuller insists, include "an aversion to normative judgments and even an open antagonism to the adoption of 'critical' perspectives" (2000:6). For the social epistemologist Fuller, this "normative confusion" is best understood in terms of the political and institutional contexts of ANT's inception. He thus situates the establishment of Latour and Callon's STS program at the prestigious *L'Ecole des Mines* in Paris in the early 1980s in its relation to a state-led strategic research initiative in STS for tracking the development, application

and reception of French scientific and technological innovations, a move that can be seen, long after its origins in Mitterand's Socialist government, to fit comfortably with trends toward client-driven research in partnership with government and industry. So, while the tendency for actor-network studies to stress the importance of mediators, whether human or nonhuman actors, may serve to contribute a more nuanced picture of how the science and engineering professions manage to succeed (or to fail) in their endeavors, Fuller worries that "the added complication diffuses responsibility for any of the actions taken in the name of science. On the one hand, this helps redistribute the credit for scientific work from the few 'geniuses' who normally receive all the glory; on the other hand, it makes it difficult to hold anyone accountable for anything" (2000:26). The effect, Fuller argues, is a dull critical edge to a field that envisions itself as quite progressive. Indeed, while Paris School⁸ scholars "often make much of the innovative political vision implied in the extension of agency from persons to things, some disturbingly obvious precedents for this practice seem to have been suppressed from STS's collective memory," writes Fuller, among them "... the metaphysics of *capitalism*, which, through the process of commodification, enables the exchange of human and machine labor on the basis of such systemic values as productivity and efficiency" (2000:20). ANT's ontological leveling effects, and in obvious ways, its networking "logic", often resemble capital's own.

Given these objections, and given the asymmetries of power (and hierarchies of scale) that Castree wants to maintain in his synthesis, the question arises as to whether a thoroughly relational sense of agency—one that takes seriously the materiality of things in lived social relations, and the stabilization of process in form—compels us to abandon the explanatory resources for understanding processes of differentiation that critical social theory has, at its roots, sought to develop. In what can be seen as an *increasingly* technological, mediated and, as many have argued, networked world, it is obvious that a reconfigured sense of agency, built through more nuanced concepts for understanding the relations among people, knowledge and things, is potentially of great value to any geographical social theory, whether it defines its objects as networks or other kinds of relations. What additional questions might ANT's reconfiguration of agency—which at its best offers a reconceptualization of how power and organization must be produced, stabilized, and made to cohere through relations among collectives of people and things—help to inform, even if we choose *not* to exclude the problems of human and social intentionality and causality as vital areas of inquiry?

Like Latour, Callon, and Law after him, Marx sought to illuminate the translation of properties between humans and non-humans, and

he also quite suggestively trod the boundaries between them: human and non-human, subject and object, living and dead. But while it was perfectly evident to Marx that humans and machines were *like* each other, or could be *made to be* like each other, in vital ways, for Marx this observation was not the answer. It was the problem to be explained.

Dead Labor/Living Machines

In Modern Industry man succeeded for the first time in making the product of his past labour work on a large scale gratuitously, like a force of nature. (Marx 1987:366)

Marx, of course, did not write in the language of networks. But he did write in the language of circuits, showing in great detail how capital—as value in motion—travels a set of circuits, from, for example, the hands of the capitalist, into the machines and buildings of the work place, and on into the produced commodity. He shows how capital, precisely *because* it is a relation, becomes “frozen” for greater or lesser duration as the means of production or the produced commodity, only to be returned to the capitalist when the commodity is exchanged on the market. Commodities “stabilize” social relations in technologies and “things as such”, and commodity circulation in this sense is a network.

Some of the capital that goes into the making of commodities ends up in the hands of the laborers in the form of wages, wages that are returned to the capitalists as the laborers purchase the commodities necessary for their own reproduction, for their own survival as “embodied labor power”, for their own ability to appear day in and day out as “living labor”. One of the main points of Marx’s analysis is to show that while the means of production may be a certain fraction of capital removed for a time from circulation, they are also more than that: they are “dead labor”, work ossified and made concrete in the shape and form of a machine, a building, a finished commodity, a technological artifact, a piece of property, or even nature itself.⁹ Even if, by the time of Marx, we had reached an era in which it was possible “to construct machines by machines” (Marx 1987:363), machines, even today, require more than the “dead” labor of machinists or software engineers (that is, other machines) to keep them working, and what is more, they may compel—as conditions and/or as effects—new hierarchies of work to articulate with them and develop around them: dead labor demands fresh living labor.

As divisions of labor deepen and become more technical, the “networks of association” that make a commodity or a machine or a building possible become longer, more complex, more variegated (Kirsch 1995). No longer, Marx writes (335),¹⁰ do laborers see the

end result of their own labor: “the detail labourer produces no commodities”. The final, ossified thing is a conglomeration, a stitching together of any number of discrete processes, often occurring over vast stretches of space and time. And as Lukács argues, the ability “to separate forcibly the production of use-values in time and space” allows for a greater rationalization of and control over the work process (1968:89). Such networks don’t just exist; they perform social functions. The rationalization process—the extension of networks that make complex divisions of labor possible—has profound consequences:

this fragmentation of the object of production necessarily entails the fragmentation of its subject. In consequence of the rationalisation of the work-process the human qualities and idiosyncrasies of the worker appear increasingly as mere sources of error... Neither objectively nor in his relation to his work does man appear as the authentic master of the process; on the contrary, he is a mechanical part incorporated into a mechanical system. (Lukács 1968:89; see also Marx 1987:306)

Given the unprecedented mechanization of manufacturing then underway (and given the already extensive divisions—and networks—of labor that were part of this mechanism), Marx was obviously quite interested in the “nature of things” in his own time. But in this he was concerned to draw ontological distinctions among many different *kinds* of industrial subjects and objects, such as between a tool and a machine or between a machine and a worker, even though each functioned in relation to and was thus also internal to other elements in the labor process. The automatic machine (or “automaton”), for example, is set apart from simple instruments of labor as something that, “after being set in motion, performs with *its* tools the same operations that were formerly done by the workman with similar tools” (353, emphasis added).¹¹ Machines both compete and co-operate with workers, de-skilling and cheapening much social labor but at the same time maximizing the efficacy of other forms of labor, especially technological or technoscientific work but also the capitalist’s own labor.

The revolutionary productivity of the mechanized factory had captured the imaginaries of many before Marx, and it was partly his task to deconstruct the arguments of earlier commentators evidently in thrall to it, like the Scottish natural philosopher and champion of industry Andrew Ure. For Ure, Marx comments, the central machine of the factory from which motion is generated is described “not only as an automaton, but as an *autocrat*. ‘In these spacious halls [writes Ure] the benignant power of steam summons around him his myriads of willing menials’” (Ure 1835, cited in Marx 1987:396, emphasis added). Marx takes issue not with the anthropomorphism but with

Ure's double usage of it. Human–mechanical relations on the factory floor are depicted by Ure:

on the one hand as “Combined co-operation of many orders of workpeople, adult and young, in tending with assiduous skill, a system of productive machines, continuously impelled by a central power” (the prime mover); on the other hand, as a “vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinate to a self-regulated moving force.” These two descriptions are far from being identical. In one, the collective labourer, or social body of labour, appears as the dominant subject and the mechanical automaton as the object; in the other, the automaton itself is the subject, and the workmen are merely conscious organs, co-ordinate with the unconscious organs of the automaton, and together with them, subordinated to the central moving-power. The first description is applicable to every possible employment of machinery on a large scale, the second is characteristic of its use by capital, and therefore of the modern factory system. (Marx 1987:39b, citing Ure 1835)

If the automaton is a new historical subject, then, it remains also an object, something to be “set in motion”. It is the *dead* labor of earlier machinists, engineers and many others because “a machine which does not serve the purposes of labour is useless” (Marx 1987:178). Only living labor can bring the dead labor of the past—the network of associations that is the machine—to life. Compared with the mechanical metaphor of the network, Marx's dialectic of agency here is infused with a far more organic vocabulary: life itself, and the difference between living and dead labor, constitutes a crucial ontological divide. The factory is a “living mechanism”—more specifically, a “productive organism that is purely objective, in which the labourer becomes a mere appendage to an already existing material condition of production” (364)—but only *because* as a thing it is both relational and directed. For Marx, the otherwise “lifeless mechanism” of the factory is animated by living labor, and by a highly structured set of relations between people and things that is characteristic of the labor process: “While the labourer is at work, his labor constantly undergoes a transformation: from being motion, it becomes an object without motion; from being the labourer working, it becomes the thing produced” (184).

What Marx rejects outright, contra Ure and other celebrants of technology, was any notion that the machinery was *itself* generative of the value frozen in the objects produced; whatever the relative surplus value that could be squeezed out of labor with the help of technology, the machine adds “no interest” (368, fn 1), unless, that is, we are to fall into the trap of appearances that Marx warns against. Rather, the value contained in the machine—*itself* transformed from previous

intellectual, manual, and mechanical labors—is transferred, bit by bit, to the products and preserved in them for the market. Whereas a sewing machine degraded over perhaps 10 years, in Marx’s time, a computer, for those (like John Law and ourselves) working in elite Western academic institutions these days, lasts perhaps three or four years before it is replaced, usually under a university-wide corporate contract, during which time the value of the machine is presumably transferred into the products generated in and through it (in the form of journal articles written, analyzed data, printed lecture notes, internet clippings files, and so forth) even though the durability of any particular machine is not entirely predictable. But nor, for that matter, is the productivity of the worker who uses it entirely predictable, and here Marx’s comparison between machines and human beings is explicit:

The lifetime of an instrument of labor, therefore, is spent in the repetition of a greater or less number of similar operations. Its life may be compared with that of a human being. Every day brings a man 24 hours nearer to his grave: but how many days he has still to travel on that road, no man can tell accurately by merely looking at him. This difficulty, however, does not prevent life insurance offices from drawing, by means of the theory of averages, very accurate, and at the same time very profitable conclusions (197).

But while the “lifetimes” of human and machine labor can be compared, and indeed rendered the same in the leveled space of actuarial calculation, this does not make them the same everywhere (and in all ways).

Dead Labor, Non-human Actors, and Networks of Capitalism

Only dead theories and dead practices seek to reflect, in every detail, the practices that came before. (Law 1999:10)

There are several points to draw out of this way of understanding of the “nature of things”. First, the networks of association that turn the variegated relations of capital into ossified things—like a commodity, a worker’s body, or a research laboratory running tests on mice under contract with a “food products” conglomerate—are directed, if not entirely determined, in *this* world, by the logic and necessity of capital accumulation. There is ample scope for “agency” within this direction, since the logic and necessity of accumulation presents itself to workers, managers, and the overseers of investment as problems to be solved rather than as some sort of *deus ex machina*. And of course, it is the capitalist, Marx’s Mr Moneybags—plus, now, a “skein of somewhat longer networks” of shareholders, tax collectors, and financiers “that rather inadequately embrace the world”—who owns the end product. And it is Mr Moneybags (answering to his network of

shareholders who desire little more than what Marx called “past, materialized, and dead labor [transformed] into capital, into value big with value, a live monster that is fruitful and multiplies” (189)) who directs the fashioning of bodies as mere embodiments of labor power (Callard 1998; Harvey 1998; Henderson 1999). Or to put all this more simply and plainly, there is social intentionality in turning relationships into things; there are reasons for putting networks together, even if those reasons themselves are highly structured by and determined within the contested relationships that constitute capitalism as a social totality.¹² This is no less true of the sociological products of John Law’s brain, fingers, and computer (available to you at your library, which pays a suite of annual subscriptions so his product can be your use value), than it is of a more traditional product like 20 yards of yarn, a coat, a bible, or some brandy, even if the networks within which Law operates and the way value circulates through them may be more complex than Marx’s Moneybags. For Moneybags or for Law, “circulation sweats money from every pore” (114).

But circulation doesn’t always sweat the same amount of money in the same way for all actors that throw it into circulation. So *one* set of social relations of the social totality (among many) centers on the constant need within contemporary capitalism to gain at least momentary advantage over competitors in the struggle to leverage relative surplus value. Innovation, new management practices, improvements in the means of production, attempts to garner greater efficiencies from workers (including knowledge workers, of course), all these, which are indisputably only possible through the building or transforming of networks, gain their shape and their substance for reasons structured beyond the mere will or desire of any individual capital (no matter how knowledgeable), but which capital nonetheless directs and gives form to. For with machinery, as Marx argues, “not only are the expenses of [the workers’] reproduction lessened, but at the same time [their] hapless dependence on the factory as a whole, and therefore upon the capitalist, is rendered complete” (398). Directive forces such as these can be uncovered, they can be contextualized, and the ways that power within them is *centered* can be explained. Despite ANT’s worries, this is not an impossible process. Historians, among others, have been doing it for a long time. Their explanations—and not just their descriptions—are often compelling.

Second, one of the peculiar features of contemporary capitalism itself is that “dead labor”—social relations ossified in commodities, means of production, institutions, etc—comes to dominate “living labor”—embodied labor power, that is people with wills and desires and needs. “Capital is dead labour,” Marx writes, “that, vampire-like, only lives by sucking living labour, and lives the more, the more labour it sucks” (224). All manner of “things as such”—like the

machines with which workers, including John Law, work—appear to direct and determine social labor, or perhaps seem like equal partners, making it seem that living people are mere extensions of those machines, and extensions of a network.¹³ Marx's point in calling ossified social relations vampire-like dead labor is that machines or other artifacts come to dominate the work process. To take an example close to our, and presumably John Law's, hearts, the computers on which we type, and the email that passes through them, in many ways now set the timing and rhythm of our academic work. The rhythms of our lives articulate with the demands of these machines and the modes of social interaction they make possible. But for those with less control over the work process than we might have, matters are far more stark. Consider the call-center operator, whose cold calls to dinner-eating consumers are placed by the machines at which they work, setting the pace and tempo of their labor, listening in on their voices and recording their keystrokes, determining the timing of their breaks (if any), and inducing not only medical problems associated with the stress induced by sped-up, invasive, badly paid work, but also the very nature of their repetitive motion injuries.

But this is a peculiar social relation because, in fact and at root, it is not machines and commodities and things that direct social labor and social relations, but just the opposite. It is not email that makes us work nights (and days), but the social relations of work. It is not the computers and dialing machines at the call center that determine how that cold caller works day-in and day-out, even as the life is sucked out of her, but rather the social relations of production and social reproduction that govern the workplace, together with the larger relations within which the firm for which she works is enmeshed.¹⁴ Or it would be just the opposite if, in fact, the "nature of things" was such that they were *only* networks of associations, and not real, material, ossified things with specific shapes, with pre-determined modes of operation, and specific biases of them. For example, to call an assembly line only a network of associations misses the fact that it is against the machinery itself that people are often reduced to struggling (cf Marx 1987:402–412), since, even though machines are themselves results of and inputs to networks of social relations, they still require specific modes of behavior, specific kinds of knowledge, specific modes of being.

Finally, none of the above should be interpreted as implying that the relations among humans, objects, nature, technologies, and knowledges are always fully within human control. Any product, all dead labor, can take on a "life" of its own, and may come to dominate the living labor that makes it (consider, eg, the emission of carbon dioxide). The "nature of things" is indeed to become non-human actors. Actor-network approaches have been successful in calling

attention to this process of becoming, and in providing an accessible grammar that has profoundly re-vitalized empirical studies of human–nature–technology relations. But if we are truly to avoid becoming mere “dead theories and dead practices” ourselves, then it remains important that we insistently raise the question that ANT wants so much to forestall: why are “things as such” produced in the ways that they are—and to whose potential benefit? How, to turn Gramsci’s point around, can people struggle to take control of those non-human actors, those things as such, and shape them so that the “nature of things” is really on their side?

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Endnotes

¹ The seminal texts include Bijker and Law (1992), Callon (1986), Callon and Latour (1981), Latour (1987; 1993; 1996), and Law (1987; 1992). More recent theoretical interventions include Law and Hassard (1999), Hetherington and Law (2000), and Strathern (1996). For varied examples of actor-network approaches in human geography, see Bingham (1996), Castree (2002), Hillis (1999), Hinchliffe (1996), Murdoch (1997; 1998), Swyngedouw (1999), Thrift (1995), and Whatmore (1999).

² The term “actor-network”, as Law recalls its development, was thus meant to be one “...which embodies a tension. It is *intentionally oxymoronic*, a tension which lies between the centred ‘actor’ on the one hand and the decentred ‘network’ on the other. In one sense the word is thus a way of performing both an elision and a difference between what Anglophones distinguish by calling ‘agency’ and ‘structure’” (1999:5, emphasis in original).

³ This paper is not intended as a review of actor-network approaches in human geography, but see Castree (2002), Duncan and Duncan (2004), Murdoch (1997), and Whatmore (1999), which point to a range of possible orientations for such geographies. Nor is its purpose to “convert”; as if ANT and Marxism existed in two separate universes of thought. Pluralism is the reality of contemporary geographical discourse (Barnes and Gregory 1997; Livingstone 1992), and this makes it especially important that we examine and reflect on the relations between different concepts. But while, for Whatmore, in a brief allusion to Marxist analysis of nature–society relations, “dialectics can be seen to raise its binary logic to the level of contradiction and engine of history” (1999:25), we attempt a more nuanced reading of Marxist theory, and of Marx’s own dialectics of technology in particular, which were, for Marx, an important means of understanding how nature (including human nature) was transformed through labor.

⁴ Latour (1993:121) cited in Castree (2002). For studies that, in different ways, bring elements of ANT into conversation with Marxist geographical theory, see Braun (2000), Kirsch (1995), Mitchell (1993; 1996: chapter 1), and Swyngedouw (1999). See also the work of philosopher Andrew Feenberg, who argues that actor-network approaches are especially useful for exploring some of the key questions raised by Marcuse, Adorno, Horkheimer, and other critical theorists concerning the survival of agency amidst technocracy (Feenberg 1999).

⁵ Thanks to an anonymous reviewer for this point.

⁶The early breakthroughs in the “symmetrical” analysis of science, associated with the Sociology of Scientific Knowledge (SSK) (or the “Edinburgh School”) were based on the principle that scientific truth and falsehoods must be explained in the same (predominantly social) terms, rather than, as with conventional and internalist histories of science, attributing truth and “good science” to nature itself, and assigning dis-proven facts and “bad science” to the domain of social influences and error. Actor-network theorists (or the “Paris School”) have taken “one more turn after the social turn” (Latour 1992) in their applications of the symmetry principle. As Fuller (2000: 7–8) describes it, “They believe that adhering to the original Edinburgh spirit requires breaking with its letter; hence, they call for a generalized application of SSK’s symmetry principle. The complexity of the techno-scientific networks revealed in their studies cannot be accounted for simply by invoking social factors, however ‘symmetrically’ they are applied to successful and failed courses of action. *Natural* factors need to be invoked as well—and just as symmetrically”. See the “Arguments” section in Pickering (1992); also Demeritt (1998) for a useful summary.

⁷It works, Haraway argues, as “relentless, recursive mimesis. The story told is told by the same story. The object studied and the method of study mime each other. The analyst and the analyzed all do the same thing, and the reader is sucked into the game. It is the only game imagined” (1997:34).

⁸See footnote 6 above.

⁹“Animals and plants, which we are accustomed to consider as products of Nature, are in their present form, not only products of, say last year’s labour, but the result of a gradual transformation continued through many generations, under man’s superintendence, and by means of his labour” (Marx 1987:177). Smith (1990) details this process and works out its political and philosophical implications. Twenty or more years into the genetic modification of food, and more than a generation after the passing of the Wilderness Act, it is hard not to take Marx’s point for granted.

¹⁰Page numbers here and below refer to Marx’s *Capital* (1987 ed) unless indicated otherwise.

¹¹The unresolved problem of agency in machines is still reflected today in the double meaning of *automaton*: either a robot or automatic machine, on one hand, or a person that acts mechanically, on the other.

¹²We mean “totality” in the sense developed by Thompson (1978) in his argument against Althusser. As Thompson (1978:154) remarked, the “capitalist mode of production is not *capitalism*”, and so when we say “directed, if not entirely determined”, we hope we call to mind the sense of social determination endemic to a capitalist mode of production, existing within a larger framework of the variegated and contested social relations of capitalism as a totality. This is the sense of “determination” developed by Raymond Williams (1977) (also against Althusser).

¹³Note what was missing in Law’s listing of what makes him a sociologist: *thought* and the other components of producing *original ideas*. So dominated is he by the dead labor that is the networks of which he is a part, he has forgotten that his *living brain* is also part of what makes him a sociologist (and a quite interesting one, too).

¹⁴Recent laws creating state and federal “do not call lists” in the US, while providing some relief to dinner-eating consumers, will also radically transform the social relations of production at call centers, likely inducing some combination of layoffs of low-wage workers and speed-ups for the rest, as telemarketing firms consolidate.

References

- Barnes T and Gregory D (1997) Reading human geography: The poetics and politics of inquiry. In T Barnes and D Gregory (eds) *Reading Human Geography: The Poetics and Politics of Inquiry* (pp 1–12). London: Edward Arnold

- Bijker W and Law J (eds) (1992) *Shaping Technology/Building Society*. Cambridge, MA: MIT Press
- Bingham N (1996) Object-ions: From technological determinism towards geographies of relations. *Environment and Planning D: Society and Space* 14:635–657
- Braun B (2000) Producing vertical territory: Geology and governmentality in late Victorian Canada. *Ecumene* 7(1):7–46
- Braun B and Disch L (2002) Radical democracy's "modern constitution". *Environment and Planning D: Society and Space* 20:505–511
- Callard F (1998) The body in theory. *Environment and Planning D: Society and Space* 16:387–400
- Callon M (1986) Some elements of a sociology of translation: Domestication of the scallops and the fishermen. In J Law (ed) *Power, Action, and Belief* (pp 196–229). London: Routledge
- Callon M and Latour B (1981) Unscrewing the big leviathan: How do actors macro-structure reality? In K Knorr and A Cicourel (eds) *Advances in Social Theory and Methodology* (pp 277–303). London: Routledge
- Castree N (2002) False antitheses? Marxism, nature and actor-networks. *Antipode* 34:111–146
- Demeritt D (1998) Science, social constructivism, and nature. In B Braun and N Castree (eds) *Remaking Reality: Nature at the Millennium* (pp 173–193). London: Routledge
- Duncan J and Duncan N (2004) Culture unbound. *Environment and Planning A* 36(3):391–405
- Feenberg A (1999) *Questioning Technology*. London: Routledge
- Fuller S (2000) Why science studies has never been critical of science: Some recent lessons on how to be a helpful nuisance and a harmless radical. *Philosophy of the Social Sciences* 30(1):5–32
- Gramsci A (1957) *The Modern Prince and Other Writings*. Translated by L Marks. New York: International Publishers
- Haraway D (1997) *Modest_Witness@Second_Millennium.FemaleMan©_Meets_OncoMouse™*. London: Routledge
- Hardt M and Negri A (2000) *Empire*. Cambridge, MA: Harvard University Press
- Harvey D (1998) The body as accumulation strategy. *Environment and Planning D: Society and Space* 16:401–421
- Henderson G (1999) *California and the Fictions of Capital*. Oxford: Oxford University Press
- Hetherington K and Law J (eds) (2000) After networks. Special issue of *Environment and Planning D: Society and Space* 18(2)
- Hillis K (1999) *Digital Sensations*. Minneapolis, MN: University of Minnesota Press
- Hinchliffe S (1996) Technology, power, and space—the means and ends of geographies of technology. *Environment and Planning D: Society and Space* 14:659–682
- Kirsch S (1995) The incredible shrinking world? Technology and the production of space. *Environment and Planning D: Society and Space* 13:529–555
- Knorr Cetina K (1992) The couch, the cathedral, and the laboratory: On the relationship between experiment and laboratory in science. In A Pickering (ed) *Science as Practice and Culture* (pp 113–138). Chicago, IL: University of Chicago Press
- Latour B (1987) *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press
- Latour B (1992) One more turn after the social turn... . In E McMullin (ed) *The Social Dimensions of Science* (pp 272–294). Indiana: University of Notre Dame Press
- Latour B (1993) *We Have Never Been Modern*. Translated by C Porter. Cambridge, MA: Harvard University Press

- Latour B (1996) *Aramis, or the Love of Technology*. Translated by C Porter. Cambridge, MA: Harvard University Press
- Latour B (1998) To modernize or ecologize? That is the question. Translated by C Cussins. In B Braun and N Castree (eds) *Remaking Reality: Nature at the Millennium* (pp 221–242). London: Routledge
- Latour B (1999a) On recalling ANT. In J Law and J Hassard (eds) *Actor Network Theory and After* (pp 15–25). Oxford: Blackwell
- Latour B (1999b) *Pandora's Hope*. Cambridge, MA: Harvard University Press
- Laurier E and Philo C (1999) X-morphising: Review essay of Bruno Latour's *Aramis, or the Love of Technology*. *Environment and Planning A* 31(6):1047–1071
- Law J (1987) Technology and heterogeneous engineering: The case of Portuguese expansion. In W Bijker, T Pinch and T Hughes (eds) *The Social Construction of Technological Systems* (pp 111–134). Cambridge, MA: MIT Press
- Law J (1992) Notes on the theory of the actor-network: Ordering, strategy and heterogeneity. *Systems Practice* 5:379–393. <http://tina.lancs.ac.uk/sociology/soc054jl.html> (last accessed 2001)
- Law J (1999) After ANT: Complexity, naming and topology. In J Law and J Hassard (eds) *Actor Network Theory and After* (pp 1–14). Oxford: Blackwell
- Law J and Hassard J (eds) (1999) *Actor Network Theory and After*. Oxford: Blackwell
- Livingstone D (1992) *The Geographical Tradition*. Oxford: Blackwell
- Lukács G (1968) Reification and the consciousness of the proletariat. In *History and Class Consciousness: Studies in Marxist Dialectics* (pp 83–222). Cambridge, MA: MIT Press
- Marx K (1987) *Capital*, vol 1. New York: International Publishers
- Mitchell D (1993) State intervention in landscape production: The Wheatland Riot and the California Commission of Immigration and Housing. *Antipode* 25:91–113
- Mitchell D (1996) *The Lie of the Land*. Minneapolis, MN: University of Minnesota Press
- Mol A (1999) Ontological politics: A word and some questions. In J Law and J Hassard (eds) *Actor Network Theory and After* (pp 1–14). Oxford: Blackwell
- Murdoch J (1997) Towards a geography of heterogeneous associations. *Progress in Human Geography* 21(3):321–337
- Murdoch J (1998) The spaces of actor-network theory. *Geoforum* 29:357–374
- Pickering A (ed) (1992) *Science as Practice and Culture*. Chicago, IL: University of Chicago Press
- Sheppard E (2002) The spaces and times of globalization: Place, scale, networks, and positionality. *Economic Geography* 78:307–330
- Smith N (1990) *Uneven Development: Nature, Capital and the Production of Space*. 2nd ed. Oxford: Blackwell
- Strathern M (1996) Cutting the network. *Journal of the Royal Anthropological Institute* (ns) 2:517–535
- Swyngedouw E (1999) Modernity and hybridity: Nature, regeneracionismo, and the production of the Spanish waterscape, 1890–1930. *Annals of the Association of American Geographers* 89:443–465
- Thompson E P (1978) The poverty of theory: An orrery of errors. In *The Poverty of Theory and Other Essays* (pp 1–210). New York: Monthly Review Press
- Thrift N (1995) A hyperactive world. In R J Johnston, P J Taylor and M J Watts (eds) *Geographies of Global Change* (pp 18–35). Oxford: Blackwell
- Whatmore S (1999) Hybrid geographies: Rethinking the “human” in human geography. In D Massey, J Allen and P Sarre (eds) *Human Geography Today* (pp 22–39). Oxford: Polity
- Williams R (1977) *Marxism and Literature*. Oxford: Oxford University Press
- Winner L (1993) Social constructivism: Opening the black box and finding it empty. *Science as Culture* 3:427–452