

From Actor-Network Theory to Political Economy¹

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While originally deployed within the sociology of scientific knowledge, actor-network theory (ANT) has achieved some prominence across the social sciences and attracted a dedicated following.² Its breach with previous methodologies for social theory borders on the anarchic as the structural and systemic are rejected as legitimate objects of study. In their place, we are offered a middle-range theory in which the extremes of macro and micro have been ostensibly excised. The macro does not exist other than in the minds of deluded structuralists, yet the micro (actor in particular) must be located (in a network) and vice versa.

For a variety of reasons concerning the discipline's own history and objects of study, ANT has been well received within geography. Here, Castree goes so far as to argue, "One might say that ANT is today vying for paradigmatic status in the greening of Left geography... More than this, it has been advocated as an alternative approach in economic geography."³ As an indication of how ANT has won influence, Castree's own response is to reject the extreme postures attached to ANT while attempting to wed its more constructive insights to Marxist political economy.⁴

Such a response, however, contains two separate but closely related problems. First, there is the *analytic* problem that a weak version of ANT may depend on tearing ideas out of it without regard to their intended, totalizing, and evolving thrust. Indeed, it can even be argued that ANT is mutually self-incompatible, always challenging itself to further refinement or translation. The second problem with the integration of different methods is *strategic*. Accepting ANT is, to a large extent, incompatible with the promotion of putatively complementary analytics, however much qualified.

¹ This paper has a long history of amendment, updates and spin-offs, see B. Fine, "Callonistics: A Disentanglement," *Economy and Society*, 32, 3, 2003, pp. 478-84; B. Fine, "Political Economy and Nature," *Journal of Interdisciplinary Economics*, 14, 3, 2003, pp. 357-72; B. Fine, "Debating Production-Consumption Linkages in Food Studies," *Sociologia Ruralis*, 44, 3, 2004, pp. 332-42. Omitted here are discussions of ANT as "mimetics"—rendering the economy as science-like—and the significance of ANT for (the new) economic geography. For both see B. Fine, "What's Eating Actor-Network Theory?" mimeo, 2002. The current version has benefited considerably from the close attention of Alan Rudy.

² A. Saldhana, "Actor-Network Theory and Critical Sociology," *Critical Sociology*, 29, 3, 2003, pp. 419-32. Saldhana cites work across anthropology, economics, feminist technoscience studies, human geography, organizational sociology, social psychology, cultural studies, media studies, performance studies, political theory, sociology of globalization, sociology of tourism, and the philosophy of science. The range could easily be considerably extended. See also I. Roderick, "Bodies, Materials, Practice: Habiting Space and the Representational Limits of Latour's Semiotics of Assemblies," *Social Semiotics*, 11, 3, 2001, pp. 343-60.

³ N. Castree, "False Antitheses? Marxism, Nature and Actor-Networks," *Antipode*, 34, 1, 2002, p. 116.

⁴ For what might be termed an ANT-plus, approach in a variety of applications, see also J. Allen, "Redefining the Network," *Information Technology & People*, 17, 2, 2004, pp. 171-85; L. Knopp, "Ontologies of Place, Placelessness, and Movement," *Gender, Place and Culture*, 11, 1, 2004, pp. 121-34; C. McLean and J. Hassard, "Symmetrical Absences/Symmetrical Absurdity," *Journal of Management Studies*, 41, 3, 2004, pp. 493-519; A. Smith, "Power Relations, Industrial Clusters, and Regional Transformations," *Economic Geography*, 79, 1, 2003, pp. 17-40; A. Mutch, "Actors and Networks or Agents and Structures," *Organization*, 9, 3, 2002, pp. 477-496; T. Bennett, "Archaeological Autopsy: Objectifying Time and Cultural Governance," *Cultural Values*, 6, 1/2, 2002, pp. 29-47; P. Dicken, et al., "Chains and Networks, Territories and Scales," *Global Networks*, 1, 2, 2001, pp. 89-112; E. Whelan, "Politics by Other Means: Feminism and Mainstream Science Studies," *Canadian Journal of Sociology*, 26, 4, 2001, pp. 535-81. Essentially, this involves bringing back in what ANT specifically precludes.

In this light, this paper critiques ANT's economics both in terms of its intrinsic content and the wider intellectual context. Section 2 reviews ANT's general features and weaknesses with acknowledgement of its evolving character. Section 3 closely considers Callon's economic work, finding the deficiencies of ANT more sharply revealed, not least in the failure to understand the specific generalities of capitalism and the confused rediscovery of fragmented elements of mainstream economics. Callon's background in ANT serves as a barrier to his understanding of contemporary capitalism (a macro-structure if there ever was one). In conclusion, Section 4 offers more constructive alternatives to ANT in the debate over political economy and political ecology.

The Mighty ANT—From Modesty to Monster⁵

As a post-structural sociology of science, technology and knowledge, ANT has been concerned with how science is created, used, understood, transmitted and transformed. Its most striking point is to refuse a separation between nature and society. Under the label of symmetry, it adopts the provocative position that humans/society have no analytic or agential privilege relative to the nonhuman, the technical or nature. Opposed to both natural realism and social constructivism, ANT treats society and nature, humans and non-humans, scientists and machines, as of equal causal status.⁶ Here, emphasis is placed on the irreducible interaction of the natural and the social as a single world in which each acts upon the other. How they interact is highly diverse and unequal, giving rise to networks or associations of relations within and between human and nonhuman agencies, networks and associations, which are themselves subject to asymmetry and heterogeneity.

There is already a glaring contradiction in the approach, for the principle of symmetry has led to an asymmetry. Once we reject the idea of analysis as simply linear and unfolding from initial starting points, then there is no reason why the asymmetry and heterogeneity of networks should not reflect back upon nature and society and privilege the latter, especially in view of ANT's claims to be reflexive.⁷ As Latour, one of ANT's leading proponents, puts it, "there is a sense, nonetheless, in which the old dualism was right. We do indeed have to alternate between the state of social relations and the state of nonhuman relations."⁸ Otherwise, to treat human and nonhuman as symmetrical is to privilege the nonhuman despite the uniqueness of human sociality, consciousness, or intent.⁹ This is all to adopt a methodology that is profoundly ahistorical and asocial, positing

⁵ From a "modest" sociology, (see J. Law, *Organizing Modernity* (Oxford: Blackwell, 1994), p. 18), ANT has become, in Latour's apt metaphor, a Frankenstein-type monster. B. Latour, *Pandora's Hope* (Cambridge, MA: Harvard University Press, 1999).

⁶ For a concise statement, see J. Law and K. Hetherington, "Materialities, Spatialities, Globalities," in J. Bryson, et al. (eds.), *Knowledge, Space, Economy* (London: Routledge, 2000). For alternative accounts, see Castree, 2002, *op. cit.*, and Jonathon Murdoch, "Actor-Networks and the Evolution of Economic Forms," *Environment and Planning A*, 27, 5, 1995, pp. 731-57; J. Murdoch, "Inhuman/Nonhuman/Human," *Environment and Planning D*, 15, 6, 1997, pp. 731-56; and J. Murdoch, "The Spaces of Actor-Network Theory," *Geoforum*, 29, 4, 1998, pp. 357-74. Note for McLean and Hassard, in explicit discussion of the criticism of ANT on privileging and symmetry, "proponents of ANT do not necessarily deny such differences and divisions. Rather they question their *a priori* status ... they are not given in the order of things ... Thus, in principle, everything is uncertain, although conversely the focus of many ANT studies is the way in which durability and stability is performed and achieved." McLean and Hassard, 2004, *op. cit.*, p. 507.

⁷ Law, 1994, *op. cit.*

⁸ B. Latour, "Pragmatogonies: A Mythical Account of How Humans and Nonhumans Swap Properties," *American Behavioral Scientist*, 37, 6, 1994, pp. 791-808.

⁹ As Murdoch observes: "ANT works, therefore, with a very simple definition of action ... In so doing, it questions whether humans are, in principle, very different to nonhumans: nonhumans can act; humans can function as simple intermediaries." Murdoch, 1998, *op. cit.*, p. 367. See also K. Bassett, "Is There Progress in

universal notions around actors and networks without regard to specificities that allow and justify the positing of *particular* forms of dualities. Furthermore, by criticizing others for sins that are inevitably reproduced, if concealed by abstruse terminology and a reflexive and evolving method, analytically ANT generates a distinct flavor of “having your cake and eating it.”

At this stage, it is easy to degenerate into parody, not least because of the anthropomorphism (an asymmetrical act in and of itself) often involved. Whatmore and Thorne draw on ANT when they suggest that we “believe that animals are best considered as strange persons.”¹⁰ Indeed, ANT’s conscious self-parody is never far away, as indicated by Latour’s reference to conversations between humans and ATMs and the voice of a never-built transport system.¹¹ Such insights are often buttressed by reference to the increasing integration of human and nonhuman worlds.¹² Indeed, “(i)n a world where pig livers are implanted in humans and plastic may soon grow on trees, ‘such hybrids are ubiquitous rather than rare—as (the) modern (worldview)... would have us believe.’”¹³

However, this is inappropriate in two senses. First, the ANT approach is general and does not depend upon the greater or lesser extent of integration of pig organ or other transplants, although there seems to be some ambiguity even over this. For, as Murdoch notes:

Latour believes the hybrids have proliferated to such an extent that it is no longer possible to retain nature-society distinctions: “it would appear that the scope of mobilization of collectives ha(s) ended up multiplying hybrids to such a (sic) extent that the constitutional framework which both denies and permits their existence can no longer keep them in place.”¹⁴

This seems to suggest that ANT derives its legitimacy from a qualitative shift in the emergence of hybrids in the modern world, despite the fact that the quote is drawn from a book with the provocative title, “*We Have Never Been Modern*.”¹⁵ Either Murdoch is wrong about Latour, which he

Human Geography?” *Progress in Human Geography*, 22, 1, 1999, pp. 27-48 and D. Conradson, “Doing Organizational Space,” *Environment and Planning A*, 35, 11, 2003, pp. 1975-92.

¹⁰ S. Whatmore and L. Thorne, “Wild(Er)Ness: Reconfiguring the Geographies of Wildlife,” *Transactions of the Institute of British Geographers*, 23, 4, 1998, p. 451.

¹¹ Bruno Latour, *Science in Action* (Cambridge MA: Harvard University Press, 1987); Bruno Latour, “On Actor-Network Theory: A Few Clarifications,” *Soziale Welt*, 47, 4, 1996, pp. 367, 369-381 (in part translated and posted to <http://www.keele.ac.uk/depts/stt/stt/ant/latour.htm>).

¹² For reference to surrogacy, see M. Strathern, “Cutting the Network,” *The Journal of the Royal Anthropological Institute*, 2, 3, 1996, pp. 517-35. For a discussion of BSE, a hybrid in the sense that it is a disease encouraged by human practices, see Sarah Whatmore and L. Thorne, “Nourishing Networks: Alternative Geographies of Food,” in D. Goodman and M. Watts (eds.), *Globalizing Food* (London: Routledge, 1997). Both deploy the ANT appeal to “hybrids”.

¹³ R. Roberts, “Taking Nature-Culture Hybrids Seriously in Agricultural Geography,” *Environment and Planning A*, 27, 5, 1995, p. 673, cited by Castree, 2002, *op. cit.*, p. 118.

¹⁴ Murdoch, 1997, *op. cit.*, p. 744, citing B. Latour, *We Have Never Been Modern* (Cambridge, MA: Harvard University Press, 1993), p. 49.

¹⁵ See Bruno Latour, “Why Has Critique Run out of Steam?” *Critical Inquiry - Rough Cut*, 2003, p. 38:

I have argued that “we have never been modern,” claiming that there never was a time when modernity’s interpretation of itself described its deeds adequately. I have even argued that this discrepancy between self-representation and practice was not due to the banal distance between words and things, theory and practice, consciousness and life, but that it was fully *functional*: it was *because* the moderns took themselves to be so thoroughly disentangled from the shackles of the past that they were so *efficient* at *entangling* themselves.

Whatever the validity of this view, it surely signifies both a historic difference between the putative modern period and the past (which should be subject to macro-analysis), and continuity of entanglement of the dualities listed.

isn't, or the central epistemological question of how quantitative and qualitative changes are to be differentiated remains unaddressed in ANT, which it does.

Second, though, hybrids are the product of previously separate and identifiable elements, whereas ANT is designed to deny any initial privileging. As recognized by Strathern, however:

The more hybrids are suppressed—the more categorical divisions are made—the more they secretly breed... the capacity of hybrids to proliferate is also contained within them. For the very concept of the hybrid lends itself to endless narratives of (about, containing) mixture.¹⁶

Thus, the hybrid metaphor is conducive to an expansionist analytical program both in object and subject, or object/subject. As Law pronounces, ANT is “diasporic” and “has spread.”¹⁷ This has been realized in a number of ways. The most important has been to launch a general critique of all dualisms.

With respect to economic geography, for example, most important is the critique of the micro/macro distinction. Latour argues that the micro depends upon the otherwise unexamined macro, and the macro is equally too distant from the complexity of the micro.¹⁸ Within ANT, the claim is that actors and their networks are simultaneously defined together, doing away with the macro/micro distinction. As Law puts it, in ANT “...essentialist divisions are thrown on the bonfire of dualisms,” while denying “that there *are* no divisions. It is rather that such divisions or distinctions are understood as *effects or outcomes*.”¹⁹ Indeed, there are no micro and no macro, only micro-macro, and no actors and no networks, only actor-networks. But the latter are “*intentionally oxymoronic*.”²⁰

Despite these developments, ANT is potentially subject to its own critique, given that research must decide between what it does and does not include/exclude (a dualism) within its scope—something Latour acknowledges, given that everything is not necessarily networked with everything else.²¹ As Lee and Brown have argued, the model underlying ANT is so potentially all-encompassing that it incorporates each and every human and nonhuman agency in principle.²² Surely, though, interconnections are so vast that the question of otherness cannot be sidestepped or

¹⁶ Strathern, 1996, *op. cit.*, p.522.

¹⁷ J. Law, “After ANT: Complexity, Naming and Topology,” in J. Law and J. Hassard (eds.), *Actor Network Theory and After* (Oxford: Blackwell, 1999), p. 10.

¹⁸ B. Latour, “On Recalling ANT,” in J. Law and J. Hassard (eds.), *ibid.*, pp. 15-25. As an author influenced by ANT, see also Nigel Thrift for the idea that the micro-macro “distinction is still remarkably common in the social sciences and humanities, even though it is neither empirically observable nor theoretically sensible.” Nigel Thrift, *Spatial Formations* (London: Sage, 1996).

¹⁹ Law, 1999, *op. cit.*, p. 3.

²⁰ *Ibid.*, p. 5. For recognition of this problem, see Latour, 2003, *op. cit.*, and McLean and Hassard, 2004, *op. cit.*, p. 500: “As an academic biographer cannot follow actors everywhere, he/she engages ultimately in a practice of ordering, sorting and selecting. Consequently, there are additional problems associated with providing rigid guidelines that specify which actors the research should follow, which he/she should exclude.”

²¹ Latour, 1994, *op. cit.*, p. 806. An early observation of this can be found in: S. L. Star, “Power, Technology and the Phenomenology of Conventions,” in J. Law (ed.), *A Sociology of Monsters* (London: Routledge, 1991), pp. 26-57, and also E. Laurier and C. Philo, “X-Morphising: Review Essay of Bruno Latour’s ‘Aramis, or the Love of Technology,’” *Environment and Planning A*, 31, 6, 1999, pp. 1047-71. For further discussion, see A. Lowe, “After ANT: An Illustrative Discussion of the Implications for Qualitative Accounting Case Research,” *Accounting, Auditing and Accountability Journal*, 14, 3, 2001, pp. 327-51; and K. Munir and M. Jones, “Discontinuity and After: The Social Dynamics of Technology Evolution and Dominance,” *Organization Studies*, 25, 4, 2004, pp. 561-81.

²² N. Lee and S. Brown, “Otherness and the Actor Network,” *American Behavioral Scientist*, 37, 6, 1994, pp. 772-90.

left to be contingent. Analytical choices must be made, and made transparent, some factors privileged (included), others not (excluded).

But which and why remains a mystery in the absence of theory. ANT is light on theory. For Latour, in fact, ANT is not a theory but “a very crude method to learn from the actors without imposing on them an *a priori* definition of their world-building capacities.”²³ As Laurier and Philo put it, Latour is only “telling stories and providing weak explanations.”²⁴ “While helpful in describing relations *within* networks, (ANT) tends to fluctuate between minute description of the particular and rather abstract generalizations about the characteristics of all networks.”²⁵ For ANT, this is a virtue and a necessity as a means to escape the confines of theoretical determinism.

The problem is, that description can be endless, or better, boundless. Castree cites Latour to the effect that, “explanation emerges once the description is saturated.”²⁶ True or not, when does the point of saturation emerge, and how might one know? The boundaries and inclusions/exclusions of ANT’s networks are “arbitrary in the sense of being subject to analytical choice, because they are unguided by socially and historically rooted theory, not least the nature of capital and capitalism for the contemporary world.”²⁷

Three further observations can be made. First, there is no symmetry in the rejection of the macro/micro distinction. For, while the macro is undoubtedly abolished, the micro is essentially retained, albeit under the name of micro/macro, and primarily as rich or thick description. ANT necessarily focuses on micro-processes, however widely cast, as recognized, for example, by Allen.²⁸

Second, the emphasis on (critique of) dualisms is misplaced, for it presumes that binary oppositions are involved in such methodological issues. This is, however, recognized but only in a way that highlights the universal (and hence ahistorical and asocial) character of ANT, which is done by using metaphors based on geometrical figures and motion, in general, and topology as a branch of mathematics, in particular.²⁹ As Knopp puts it in describing ANT’s topological rather than spatial imagination:

A topological imagination focuses on connections, flows, simultaneity, situatedness, contingency, “becoming” ... rather than on fixed spaces, surfaces or dimensions onto which grids and other forms of logical order are superimposed. It is less concerned, therefore, with order, finitude and certitude than on incompleteness, fragility, and tenuous, fluid relationships.³⁰

It is a perverse irony that ANT, in denying that we have ever been modern, should appeal to a modern perverse form of mathematics that is otherwise devoid of historical and social content to establish the point.

²³ Latour, 1999, *op. cit.*, p. 20. See also M. Callon, “Actor-Network Theory: The Market Test,” in J. Law and J. Hassard (eds.), 1999, *op. cit.*, pp. 181-95.

²⁴ Laurier and Philo, 1999, *op. cit.*, p. 1048.

²⁵ R. Hudson, *Producing Places: Perspectives on Economic Change* (New York: Guilford Press, 2001).

²⁶ Castree, 2002, *op. cit.*, p.119, citing Latour. B. Latour, “Technology Is Society Made Durable,” in J. Law (ed.), 1991, *op. cit.*, p. 129.

²⁷ Ben Fine, *The World of Consumption*, 2nd ed. (London: Routledge, 2002), p. 216.

²⁸ Allen, 2004, *op. cit.*

²⁹ See G. Ó Tuathail, “Postmodern Geopolitics?” in S. Dalby (ed.), *Rethinking Geopolitics* (New York: Routledge, 1998); and J. Law, “Objects and Space,” *Theory, Culture and Society*, 19, 5/6, 2002, pp. 91-105.

³⁰ Knopp, 2004, *op. cit.*, p. 126.

Third, ANT permits a form of intellectual policing in which any contribution is read for dualisms that are inevitably discovered. In the context of the nature/society dualism, which others might seek to explore through the historical specificity of capitalism, for example, Fine suggests:

ANT has been enabled to exercise its own version of what I term “-ismitis.” As it claims to have abolished (all) illegitimate dualisms, so it can read off all other contributions through the prism of having failed to do so. Anyone who explores the distinction between nature and society, even to discover how they are integrated, is liable to be found guilty of dualism. The parallel is with accusations of functionalism, structuralism, instrumentalism, economism, etc. against those who dare to suggest that function, structure, instrument, causation and economic factors prevail in society.³¹

It modestly suggests the incorporation of all (non-human) actors and networks. It monstrously torches and appropriates all (social) science by doing so. In short, whether modesty or monster, ANT is beset by conundrums of its own making. How does it fare with the economy?

Dismal Science

ANT and its adherents have been both weak on and dismissive of political economy and Marxism, in particular. It is not difficult to see why. Both mainstream economics and political economy deal in theory at high levels of abstraction, with considerable causal content, albeit in entirely different ways. Whatmore puts it neatly, recognizing for “realists” and “constructionists” alike that:

accounts that get lumped together into these categories are inevitably more diverse than their detractors acknowledge ... But for all their loudly declared hostility, these theoretical encampments are similarly premised on an *a priori* separation of nature and society.³²

Such is the ease with which hitherto economic analysis can be set aside. Yet, the world of markets raises problems that loom large for ANT, not least because capitalism represents the most powerful, extensive and overt form of homogenization of networked agents, with corresponding categories both in analysis and common usage—money, labor, wage, capital, profit, etc.

Where such terms have been explicitly addressed, as opposed to the more common avoidance, the results are limited. Consider, for example, the notion of capitalization, “an effect of heterogeneous materiality,” based on immutable mobiles, delegation, obligatory points of passage, scale effects and discretion, deployed by Law and Hetherington.³³ Such terminology aside, this is a theory of capitalization without a prior theory of capital! One suspects that some elementary understanding of financial capitalization (e.g., present value discounting) is being deployed as a metaphor for immutable mobiles and the like. Alternatively, at the other extreme, economics is presented as a minute description of firm practices as in Law’s provocatively entitled piece, “Economics as Interference.”³⁴ More recently, in an interview in a special issue of *Economy and*

³¹ Fine, 2002, *op. cit.*, p. 215.

³² S. Whatmore, *Hybrid Geographies* (London: Sage, 2002), p. 2.

³³ Law and Hetherington, 2002, *op. cit.*, pp. 47-48.

³⁴ J. Law, “Economics as Interference,” 2000, <http://comp.lancs.ac.uk/sociology/soc034jl.html>.

Society, Callon asserts that as a macro-structure, capitalism does not exist and is purely an illusory invention of its political economic critics.³⁵

Callon's older essays in *Laws of the Market* are more muted. But an immediate cause for concern is its heavy streak of idealism. Economics is perceived to make the economy rather than vice-versa. There he maintains "that economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions."³⁶ Further, the "economy is embedded not in society but in economics, provided one incorporates within economics all the knowledges and practices, so often denigrated, that make up, for example, accounting or marketing."³⁷ In short, he advises ridding ourselves of the cumbersome distinction between economics (as a discipline) and the economy and instead purports to show the role of the former in formatting markets.

These few snippets raise a host of questions. What motivates this approach to the relationship between economics and the economy? For Miller, Callon has fallen unwitting victim to "virtualism," believing the economy is the way that economists perceive it.³⁸ I suspect that this is unfair or even too kind to Callon. His is a theory—evident from the quotations above—that deliberately posits that economics *makes* the economy the way that it is, rather than being a discipline that simply studies, perceives and analyzes the economy and economic behavior.³⁹ Indeed, Callon proposes a mechanism through which this happens. It is the attachment of the market to "a peculiar anthropology," one constituting calculative agencies. Following Williamson and Bourdieu, calculation is perceived to be culturally grounded, both in scope and content, in the separation of cultures of affect and from those of calculation.⁴⁰

In short, for Callon, markets are historically variable according to the culture of calculation on which they depend, which is determined by economics.⁴¹ Callon thus argues that such market culture is always in a state of flux, a sort of social cost-benefit analysis of variable scope because of changes in that which markets treat as externalities. Externalities are "everything which the agents do not take into account and which enables them to conclude their calculations."⁴² Since everything is connected to everything else, any calculation and market must divide factors into those that are taken into account and those that are not in order for calculations to be made. Those factors that are excluded always offer the potential to be brought in for later, broader consideration.

³⁵ M. Callon, C. Meadel, and V. Rabeharisoa, "The Economy of Qualities," *Economy and Society*, 31, 2, 2002, pp. 194-217. More generally, "structures ... are only traces of the mind and have no existence whatsoever." O. Hanseth, et al., "Actor-Network Theory and Information Systems: What's So Special?" *Information Technology & People*, 17, 2, 2004, p. 117.

³⁶ M. Callon, "Introduction: The Embeddedness of Economic Markets in Economics," in M. Callon (ed.), *The Laws of the Market* (Oxford: Blackwell, 1998a), p. 2.

³⁷ *Ibid.*, p. 30.

³⁸ D. Miller, "Turning Callon the Right Way Up," *Economy and Society*, 31, 1, 2002, pp. 218-33. See also J. Carrier and D. Miller, *Virtualism* (Oxford: Berg, 1998).

³⁹ Law, 2000, *op. cit.*

⁴⁰ Callon, 1998a, *op. cit.*, p.14.

⁴¹ This raises the issue of what came first, the economy or economics, an issue that is dogmatically settled by Williamson (see below) in asserting that the beginning of history is marked by markets. For a critique of Williamson on the issue of the origins of markets, see D. Ankarloo and G. Palermo, "Anti-Williamson: A Marxian Critique of New Institutional Economics," *Cambridge Journal of Economics*, 28, 3, 2004, pp. 413-29.

⁴² Callon, 1998a, *op. cit.*, p. 17.

Drawing upon Coase, Callon's notion is that the way to resolve externalities is to internalize them within decision-making units. Yet, he argues that the result is to create new externalities across the expanded set of internalized factors—what he calls an “overflowing,” which parallels with the profligate modern breeding of hybrids. In this way, ANT economics is almost a parody of the Coase theorem. Although the emphasis is upon pushing out the boundaries of economics (and markets) through internalizing externalities, this is not logically necessary, as is recognized by Callon in his discussion of (de/re)commodification. Indeed, for Callon: “The impossibility of eliminating all overflowing has, in reality, a profound reason... (c)omplete framing is a contradiction in terms, whereas complete externalization is possible ... in the case of pure gifts.”⁴³ Ironically, apart from the presumption of a pure gift (isolated from its dual impurities), there are a number of privileged dualisms here, not least those dovetailing between commodity/market/calculation and gift/non-market/non-calculation, each of which is open to question.⁴⁴

The discussion so far has drawn exclusively from Callon's opening essay in his collection. His closing essay is clearer and might be better read first. Here, he begins with the notion of externality as in economics and, then, following Goffman,⁴⁵ posits “framing” as setting the boundaries of significant mutual interaction, a process that is both costly and incomplete because of multifarious channels or “overflows.” For Callon, framing allows overflows to be measured.⁴⁶ Callon, drawing on Williamson, argues that:

(b)y focusing on the omnipresence of overflows, on their usefulness, but also on the cost of actions intended (partially) to contain them, constructivist sociology... encourages us to question the mechanisms used to create frames by suggesting ways in which the social sciences might help develop or confine such spaces of calculability.⁴⁷

In a footnote to the unpublished paper for the workshop from which the special issue of *Economy and Society* emerged, he clarifies his dictum:

that ‘economic activities are embedded in economics.’ This expression should not be misunderstood ... economics as a discipline is not alone in accomplishing this performing and framing. It is helped by other disciplines in the social sciences but also, and above all, by the actors themselves and especially by professionals of the market (marketing specialists, accountants, managers, etc.).

In this light, not only does economics make the market, but so does sociology and, potentially, the whole of social science. So it is hardly surprising that Callon has an extremely liberal definition of economics. At the simplest level, it seems to be little more than acknowledging that the market must have an accompanying discourse that is drawn from many sources. If, however, this is reduced to calculativeness so that economics is about framing quantification, then this would appear to be wrong. While the market always incorporates a quantitative element in view of the monetized exchanges that take place, it also embodies a set of qualitative relations—not least those between capital and labor and labor and nature—in a capitalist economy.

⁴³ *Ibid.*, p. 18.

⁴⁴ See B. Fine and C. Lapavistas, “Markets and Money in Social Theory,” *Economy and Society*, 29, 3, 2000, pp. 357-82.; Fine, 2002, *op. cit.*, Chapter 3; and C. Lapavistas, *Social Foundations of Markets, Money, and Credit* (London: Routledge, 2003).

⁴⁵ E. Goffman, *Frame Analysis* (New York: Harper & Row, 1974).

⁴⁶ M. Callon, “An Essay on Framing and Overflowing,” in M. Callon (ed.), *The Laws of the Markets* (Oxford: Blackwell, 1998b), pp. 244-69.

⁴⁷ Callon, 1998b, *op. cit.*, p. 256.

Calculation may be an important factor in markets, especially for those seeking to make a profit. But we all enter markets for the purchase of consumer goods—not to mention wage labor markets—with many other non-quantifiable motives attached. Further, if the impact of “economics” on the creation of markets is still being pushed, how does this work in practice, not least in view of the many different sources, economic or otherwise, that are now being advanced as influential? Surely don’t economics, law, accounting, marketing, anthropology, political science, sociology, etc., as disciplines or professions all work in the same way in forging markets? And, even if they do without regard to commodity, time, place, level of development, etc., no account is given of how the practices of markets themselves interact with, or even dominate, the calculative discourses to which they are attached.

One interpretation of Callon is that he is reminding us of the importance of the discourses attached to market practices, with a leaning towards making them determinant in some way. On an unkind reading, however, he lies somewhere between tautology (economies operate in a calculus of economics) and assertion (such calculation makes the economy what it is). This, though, is the least of the troubles with his economics. For Callon has the habit of taking a well-established concept within mainstream economics and both adopting and adapting it. Consider the externalities noted earlier. His use of them reflects a seeming obliviousness to the mountains of criticism that have been leveled against concepts like externalities from across the political economic spectrum.

What specifically is wrong with this approach? First, like mainstream economics, it is deeply rooted in methodological individualism (micro prevailing over macro in posturing as micro/macro).⁴⁸ It is impossible to define an externality without disaggregating and departing from the social, or separating the social (or natural) from the economic. This is possibly acceptable if the social (or natural) has already been defined, but this is not how Callon proceeds. He allows the market to be *redefined* on the basis of externalities without explaining from where the original market came or what it is. This is a result of ANT’s bonfire of dualisms, the burning of the micro/macro in particular.

Callon, et al. earlier advised that we:

“Follow the actors”—this is the methodological cornerstone of the approach. A corollary of this method is that the distinction between macro- and micro-analysis disappears. In social science so-called large-scale issues are usually discussed with the help of notions such as structure and system, while the small scale is analyzed in terms of interactions or tasks ... Since size is nothing more than the end-product of processes of translation, the need for two analytical vocabularies is thus avoided.⁴⁹

There are two separate elements to this claim of resolving the micro/macro conundrum. One is what does it mean? The other is whether and in what sense is it valid? Given the paucity of discussion offered on both grounds, it is worth comparing with other relevant contributions. A

⁴⁸ As R. Walker suggests, in commenting on the application of ANT to agroecological controversies they “appear to have retreated from the well-tended garden of agrarian theory altogether into the bourgeois briar-patch of methodological individualism.” See R. Walker, “Commentary of Part IV: Fields of Dreams, or the Best Game in Town,” in D. Goodman and M. Watts (eds.), *Globalizing Food* (London: Routledge, 1997), p. 274.

⁴⁹ M. Callon, J. Law and A. Rip, “Putting Texts in Their Place,” in M. Callon, J. Law and A. Rip (eds.), *Mapping the Dynamics of Science and Technology* (London: MacMillan, 1986), p. 228.

comparison with the rational choice sociology is informative.⁵⁰ As Murdoch sympathetically summarizes the ANT approach:

Explanations of economic change, which depend on some conception of societal or structural shift, should be abandoned. Instead, we have seen the economy presented as a “grid” of interrelations between multitudes of units. These interrelations come in different shapes and sizes but can be understood as networks.⁵¹

This is indistinguishable from the ways rational choice theorists approach the collective. And there are other parallels in terms of reliance upon intermediate categories, for example, and thin claims dealing with power and conflict. As Hudson observes:

Actor-network analysts therefore may simply describe networks of inequality and gloss over the reasons for inequality. In capitalist societies, for instance, agents (human and nonhuman) possess differential capacities to shape relationships. Moreover this differential power is systemically linked to their capacity to accumulate money (capital) and then use this as a source of power to force others to act as subordinate intermediaries.⁵²

The significant issue here is not the inequality, for this is readily accommodated by asymmetry and heterogeneity within actor-networks. What is important is how these are tied to the *homogeneous* and homogenizing categories of money and capital. We all use money and relate to commodities across a huge range of activities and calculations so that the economic actor-network is macro, even in its starting point for incorporating externalities.

Thus, the second weakness in relying upon externalities is that Callon appears to conflate two different meanings of externality. One is the idea that everything potentially depends upon everything else, so there are multifarious knock-on effects. The other is the precise meaning of externality within mainstream economics. For conventional economics is happy to accept that everything depends upon everything else—such is the purpose of its general equilibrium theory in which all supplies and demands and prices are mutually determining. By appeal to externality, however, mainstream economics is concerned with those dependencies that take place outside the market mechanism. In other words, externalities can only be defined once the scope of the market is taken as given. As a result, externalities cannot be used to define markets, because markets must already exist in order to define externalities. Leff struggles to grasp the issue:

Capital externalities thus become new production costs ... [but] it is not enough to regard nature as a cost that is calculated in terms of natural capital. We need a political economy of the environment that is critical, in order to see poverty, unemployment, and the destruction of natural resources as effects of given relations of production.⁵³

We do need a notion of (capitalist) relations of production to reduce poverty, unemployment and the fate of natural resources to their simple effects.

⁵⁰ See B. Fine, *Social Capital Versus Social Theory* (London: Routledge, 2001). For affinities with Granovetter, see Callon, 1999, *op. cit.*, pp. 192-93; M. Granovetter “The Strength of Weak Ties,” *American Journal of Sociology*, 78, 1973, pp. 1360-80; M. Granovetter, “A Theoretical Agenda for Economic Sociology,” in M. Guillen, et al. (eds.), *The New Economic Sociology* (New York: Russell Sage, 2002); and M. Granovetter, “Economic Action and Social Structure,” *American Journal of Sociology*, 91, 1985, pp. 481-510.

⁵¹ Murdoch, 1995, *op. cit.*, p. 751.

⁵² Hudson, 2001, *op. cit.*, p.34.

⁵³ E. Leff, “Marxism and the Environmental Question,” in T. Benton (ed.) *The Greening of Marxism* (New York: Guilford Press, 1996), p. 146.

The third problem with Callon's "externalities" is that they are universal, ahistorical and asocial; they presume the presence of the (unexplained) market. One consequence is the absence in Callon's account of the traditional social scientific variables of class, structure and tendency, much less capital and capitalism (for which the market or markets are substituted). This is not an accidental oversight. The economists and economics Callon depends upon are profoundly orthodox—Coase, Williamson, North, David, Chamberlin—or offer heterodox twists to the model of perfect competition. A world of externalities is more marked by its lack of social and historical specificity than by its rupture with received economic wisdom. At most, ANT economics appears to re-invent and misrepresent a few established propositions from within the discipline of economics, displaying a commendable disrespect for the expert, if a not so laudable lack of expertise over the subject matter itself.

Conclusion

Given the shortcomings of ANT's economics, more useful analyses can be found within the current state and dynamic of the social sciences in general.⁵⁴ First, the current intellectual scene across the social sciences is characterized by a dual, diverse and uneven retreat from the excesses both of postmodernism and neoliberalism, as evidenced by the conceptual chaos, openness and diversity involved in the discourses on globalization and social capital. Significantly, these two broad notions have tended to be drawn to polar opposite extremes in stance. One pole addresses the systemic nature of contemporary capitalism and its implications for power, structures, conflict and tendencies. The other considers the social as complex aggregations of individual interactions with scope for positive sum outcomes on a piecemeal basis. Further, globalization has increasingly been won away from neoliberal understanding and prescription. At the same time, moving in the opposite direction, social capital (itself drawing heavily and selectively on network analysis) has been shifted from the radical sociology of Pierre Bourdieu to the apologetic prognostications of the World Bank and others.

Second, mainstream economics is an exception to the above, because it was untouched by postmodernism in the first place. Its retreat from neoliberalism is attached to an emphasis on the incidence of market imperfections, especially by way of novelty. Here, asymmetries in information are treated as a source of imperfect contracts. This has also given rise to a virulent strain of economics imperialism—the colonization of other social sciences by economics.

Third, the dual retreat from postmodernism and neoliberalism opens the prospect for a debate over the economics of contemporary capitalism across the social sciences, if not within economics itself. The outcome is currently extraordinarily open in view of a long list of contradictory features: the colonialist designs of economics imperialism, the alien methods of economics from the perspective of social theory other than the rational choice approach, the weakness of political economy across the social sciences in the wake of postmodernism, and the intolerance of mainstream economics.

⁵⁴ For fuller analysis, see B. Fine, "Examining the Idea of Globalization and Development Critically," *New Political Economy*, 9, 2, 2004, pp. 213-31.

In this light, what is required is a strengthened reliance upon a critical political economy of capital and capitalism. As has been admirably argued by Sayer,⁵⁵ commitment to political economy does not have to be at the expense of the cultural,⁵⁶ or the “non-economic” more generally; therefore, a renewal of classical political economy is essential. Attention is thereby drawn to general but historically delimited categories of analysis, not a method conducive to vague specifications of macro-micro relations. For this, appeal to universal categories, such as networks, however much contextualized, will not suffice.

As is implicit above, there is much in Callon’s ANT approach that conforms to economics imperialism, not least in the informal way in which concepts, such as externalities, are being picked up and used across a broad terrain. Here, Callon’s approach is, in fact, the obverse of the attempt at synthesis proposed by Castree at the start of this paper. Castree sought a ground where relational science and technology studies might engage relational political economy. Callon uncritically appropriates terms from economic “science” and imports them into a model drawn from relational science and technology studies.⁵⁷ Consequently, Callon’s contributions are confusing and disarming to those committed to combating economics imperialism. Yet the question remains: How are we to avoid falling foul of legitimate ANT charges of dualism, of confronting a given or acting economics with a given or reacting environment?

First, the ANT approach can be interpreted as emphasizing heterogeneity within and between actor-networks, unless these themselves establish the presence of some degree of homogeneity. Beyond such dull generalities, the capitalist economy does homogenize. As is recognized in the ANT literature and in Callon’s implicit medium of calculation across externalities, it is most transparent in the case of money. There is, then, a case for developing an abstract understanding of money in general prior to addressing how it adopts different forms, functions and meanings according to context and practice.⁵⁸

This too, however, does not go far enough, for much the same can be said of commodities around heterogeneity and homogeneity, as has been recognized in specifying the commodity as both use value (heterogeneous) and exchange value (homogeneous). Once again, the differences between commodities and their markets can best be examined by first distilling what they share in common. Yet, a third step also needs to be taken beyond accounting for money and commodities in general. While these pervasively inhabit our world, they derive from and are driven by capital that is itself differentiated by type, albeit uniformly geared towards appropriating profit on the basis of capitalist relations of production. Hinchcliffe is wrong when he says of the ANT approach:

One of the potentially insightful, enabling, and even frustrating aspects of the work ... is the refusal to stop analyses at catch-all terms such as “social,” “worldview,” “Western rationality,” and “capital.”⁵⁹

⁵⁵ A. Sayer, “For a Critical Cultural Political Economy,” *Antipode*, 33, 4, 2001, pp. 687-708.

⁵⁶ For my own efforts in the context of food and consumption more generally, see B. Fine, *The Political Economy of Diet, Health and Food Policy* (London: Routledge, 1998).

⁵⁷ For further resonance with the new phase of economics imperialism, see reference to perfect information for which, “the paradox is that the actors have no choice, since they are ‘acted’ by the network that holds them in place. Conversely, they are only in a position to act deliberately when there is imperfect and asymmetrical information.” M. Callon, “Techno-Economic Networks and Irreversibility,” in J. Law (ed.), 1991, *op. cit.*, p. 154.

⁵⁸ See Fine and Lapavistas, 2000, *op. cit.*, in debate with V. Zelizer “Fine-Tuning the Zelizer View,” *Economy and Society*, 29, 3, 2000, pp. 383-89.

⁵⁹ S. Hinchcliffe, “Technology, Power and Space,” *Environment and Planning D*, 14, 6, 1996, p. 662.

On the contrary, especially where capital is concerned, it does not so much stop as never get started!

Such a conclusion provides the second way in which to begin to broach the relationship between the economy and its non-economic dualisms, such as the environment. We all know that the environment is complex and heterogeneous. But environmental *relations* are both material *and* social in content. Those relations are heavily conditioned by, if not reducible to, the capitalist relations of production and their associated structures, tendencies and concrete historical outcomes. In short, an abstract analysis of capital(ism)—like the one that initiated this journal—is a precondition to accurately consider the contemporary environment and synthesize across the homogeneity/heterogeneity and nature/society dualisms.

At this stage, two closely related reservations are in order. First, ANT proponents and others will already be shrieking in horror at the prospect of a “closed,” sealed, or self-contained understanding of the economy, constructed as the dual counterpart to, or precondition for, nature. This is, indeed, a danger depending upon the methodology by which political economy is itself deployed, as is evidenced by much mainstream and other environmental economics. Second, as ANT would appear to suggest, are all abstractions from nature in the analysis of capital(ism) unacceptable? As Whatmore puts it:

Nor ... does recourse to variants of dialectical reasoning centered on the ways in which nature and society interact provide a radical enough basis for critical enquiry [see, for example, Harvey, 1996]. Far from challenging this *a priori* categorization of the things of the world, dialectics can be seen to raise its binary logic to the level of a contradiction and engine of history.⁶⁰

There are, though, both correct and incorrect elements in this cursory dismissal of Harvey's work. The dialectic between nature and society (or capitalism) is not immediate. One does not directly contradict the other in either a philosophical or causal sense. Rather, the dialectical understanding of capital must proceed only within the legitimate limits of unfolding its structures, processes, relations and tendencies. These cut across and construct relations with nature in complex and diverse ways; as Harvey's student, Neil Smith, argued 20 years ago, the emphasis was on the contradictory and indeterminate coincidence of the capitalist dialectic of natural and spatial homogenization and differentiation.⁶¹ Any single case study makes this obvious: the multitude of economic activities (not just capitalist production) that contribute to global warming; the tendency for accumulation of capital to displace living labor and expand use of raw materials and energy, as well as discouraging more efficient use of materials and energy themselves; the struggle to construct and utilize a notion of the environment in order to mobilize the state and other agencies for (in)action, and so on. Thus, it is conceivable that capitalism may bring global warming under “control” either as it relates to the material or, much more likely, the social consequences of climate change. But the complexity and diversity of environmental relations and outcomes would remain heavily dependent on, if not reducible to, the course of capital accumulation.⁶²

⁶⁰ S. Whatmore, “Hybrid Geographies,” in D. Massey, J. Allen and P. Sarre (eds.), *Human Geography Today* (Cambridge: Polity Press, 1999), p. 25.

⁶¹ N. Smith, *Uneven Development* (New York: Blackwell, 1984).

⁶² A. Vlachou, “Capitalism and Ecological Sustainability,” *Review of International Political Economy*, forthcoming, 2005; A. Vlachou, “Environmental Regulation: A Value-Theoretic and Class-Based Analysis,” *Cambridge Journal of Economics*, forthcoming, 2005.

This is not to say that Marxist or other political economy has readily provided the answer to environmental economics. It has too readily succumbed to the sorts of criticisms that ANT can legitimately make—that environmental outcomes can be read off from abstract political economy.⁶³ More sophisticated accounts, such as those of Benton and Harvey, tend to overgeneralize without descending to the level of detail that is necessary to integrate political economy with the environment.⁶⁴ For we can no more determine the nature of the environment from an abstract analysis of capitalism than we can posit concrete outcomes for culture or consumption.

But each would be weaker, if not fatally flawed, in the absence of an account of capitalist commodity production. The same applies to Marxist theory of the labor process that, significantly, has figured in debates over society and nature. Despite claims to the contrary, Marx's own analysis is heavily committed to material analysis in both the social and the physical senses.⁶⁵ Similar remarks hold for economics and the environment, although they are different and must be differently constructed in thought across their various and varying aspects, as is evident from Marx's theory of landed property and rent.⁶⁶ In each case, Marx offers an exemplary study of how society and nature are dialectically attached, if not dialectically antithetical, thereby justifying capital as a category that abstracts from nature in the first, but not anywhere near the last, instance. That this is a conscious choice on Marx's part and not an oversight is obvious from his own intellectual trajectory from considerations of alienation to the political economy of capitalism. More specifically, in the context of a stance of red *and* green as opposed to red *versus* green, both Burkett and Foster have painstakingly revealed Marx's "eco-credentials" against prejudiced and stylized criticisms.⁶⁷ Moreover, they have also demonstrated the validity, if not the necessity, of his dialectics (and its application to capitalism) for an understanding of nature and the environment.

The task is to build upon these starting points. Henderson⁶⁸ has brilliantly picked his way through these minefields, by addressing in concrete and complex terms the fictitious capital that attaches itself to nature. By doing so, he is able to avoid the heavy determinism and over-generalization associated with the two extremes of nature as obstacle, following Mann and Dickinson, and nature as resource or natural capital, as in mainstream economics.⁶⁹ Similarly, despite

⁶³ Much of the literature has fallen into this trap, especially the prominent works of E. Altwater, *The Future of the Market* (London: Verso, 1993) and J. O'Connor, *Natural Causes* (New York: Guilford Press, 1998). For critiques of these works along the lines suggested here, see N. Castree, "The Nature of Produced Nature," *Antipode*, 27, 1, 1995, pp. 12-48; M. Spence, "Capital against Nature," *Capital and Class*, 72, 2000, pp. 81-109; and especially P. Burkett, *Marx and Nature* (New York: St. Martin's Press, 1999) and J. B. Foster, *Marx's Ecology* (New York: Monthly Review Press, 2000).

⁶⁴ T. Benton, 1996, *op. cit.*; D. Harvey, *Justice, Nature, and the Geography of Difference* (Cambridge, MA: Blackwell, 1996). This is unfortunately so of many of the debates around ecology and Marxism that rarely move beyond the issues of methodology and value theory broadly interpreted. See, for example, the disputes in the journal *Historical Materialism* from 1998 to 2002 between P. Burkett, T. Benton, J.B. Foster and J. Hughes, and those between Burkett, Foster, A. Salleh and J. Clark in *Organization & Environment* between 2001 and 2004. Note, though, the extent to which these debates touch upon the issues raised by the ANT critique, especially those of intentionality, dualism and transhistorical categories.

⁶⁵ For critiques of Benton in this respect, see Hughes, 2001, *op. cit.* and, in the context of the laboring body, F. Callard, "The Body in Theory," *Environment and Planning D*, 16, 4, 1998, pp. 387-400.

⁶⁶ B. Fine and A. Saad-Filho, *Marx's Capital*, 4th ed. (London: Pluto Press, 2004).

⁶⁷ Burkett, 1999, *op. cit.*; Foster, 2000, *op. cit.*

⁶⁸ G. Henderson, "Nature and Fictitious Capital," *Antipode*, 30, 2, 1998, pp. 111-20; G. Henderson, *California & the Fictions of Capital* (New York: Oxford University Press, 1999); D. Mitchell, "Rural Realism: George Henderson's California and the Fictions of Capital," *Antipode*, 32, 1, 2000, pp. 90-98.

⁶⁹ S. Mann and J. Dickinson, "Obstacles to Development of a Capitalist Agriculture," *Journal of Peasant Studies*, 5, 4, 1978, pp. 466-81.

falling under the sway of ANT vernacular, Swyngedouw⁷⁰ offers exemplary studies of water by avoiding a dialectic of society and nature for one that “implies constructing multiple narratives that relate material, representational, and symbolic practices, each of which has a series of particular characteristics that internalizes the dialectical relations defined by the other domains, but none of which can be reduced to the other.”⁷¹ In short, rather than put political economy to the torch in deference to an ANT economics of dubious pedigree, it is essential both to develop an abstract understanding of capital(ism) in conjunction with its historically concrete and complex manifestations.

⁷⁰ Erik Swyngedouw, “Modernity and Hybridity,” *Annals of the Association of American Geographers*, 89, 3, 1999, pp. 443-65; Erik Swyngedouw, “Power, Nature, and the City,” *Environment and Planning A*, 29, 2, 1997, pp. 311-32.

⁷¹ Swyngedouw, 1999, *op. cit.*, p. 447.