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Actor-Network Theory

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Four Nails in the Coffin

In a lecture delivered in 1997 Bruno Latour identified the "things that do not work with actor-network theory." These were four: the word *actor*, the word *network*, the word *theory*, and, last but not least, the deceptively unobtrusive hyphen. These four inadequacies represented, Latour argued, "four nails in the coffin" of actor-network theory (ANT) and revealed the design flaws that had been built into this "careless experiment" in empirical metaphysics (Latour 1999).

Latour's diagnosis was perceptive, for those are, if not conceptual weak points, deliberately undertheorized concepts in ANT. Yet the corpse (if indeed there was a body in that box) has proved to be livelier than the image suggested. In the last two decades, ANT has traveled far and wide, insinuating itself into a variety of disciplines in the social sciences and beyond and becoming a powerful counterpoint to mainstream understandings of the nature and purposes of social theory.[1]

This is in fact what Latour hoped would happen. It was already too late, he suggested in 1997, to recall ANT and fix its obvious shortcomings. "The only solution," he argued, "is to do what Victor Frankenstein did *not* do, that is, not to abandon the creature to its fate but continue all the way in developing its strange potential" (Latour 1999, 24).

This strange potential has been developed to such an extent that today ANT no longer appears to us as a misshapen monster to be banned to the outer reaches of the sociological canon. Quite the contrary, ANT has begun to look like a companionable sort of fellow, a recognizable intellectual project sharing many of the features of conventional social theorizing. This is paradoxical, or at least ironic, because ANT started as an attempt to dissolve any received notion of "the social" as a distinct domain or dimension of human action. In its origins ANT embraced, admittedly tongue in cheek, the Thatcherite slogan, "Society does not exist." Over time, however,

it has drawn the positive implication of this negative statement: if society does not exist, then we need to equip ourselves with the means to bring it into being. Social theory is one of those means.

This chapter will trace the emergence of ANT as an increasingly explicit, if still resolutely unorthodox, social theory. One of the most remarkable aspects of this evolution is that ANT has not acquired the status and capacities of a social theory by means of increasing abstraction upon the particulars of a multitude of empirical case studies. Rather, ANT has found its way to social theory through a series of deep and transformative immersions into the peculiarities of different "regimes of truth" or "modes of existence"—beginning with its original journey into the nitty-gritty of scientific and technological innovation. In other words, the unfolding of ANT into a full-blown social theory has involved a multipronged effort to account for what is unique, specific, and empirically striking in different orders of action, without in the process conceiving of those orders as separate "domains" or "regions" of a broader, totalizing reality. Each of its empirical engagements has transformed ANT—or has afforded ANT an opportunity to mutate and reinvent itself, which is in keeping with a theory for which every act of translation, every displacement, involves change, distortion, and ultimately betrayal.

The chapter starts by discussing the origins of ANT in the field of the social studies of science (now most often known as science studies), its use of semiotics to dissolve preexistent actor categories, and its (in)famous take on the agency of nonhuman entities—the issue that came to differentiate ANT from the sociology of scientific knowledge. The chapter will then describe the forays of ANT into the realms of economics and law. This will help us understand how ANT departs from traditional forms of sociological inquiry into markets and legal institutions as separate "fields" or "domains" of social life. More importantly, it will offer us an opportunity to observe how ANT tackles two classic questions of social theory: the problem of calculation and the foundations of normativity.

I will then turn to the most deliberate formulation of ANT qua social theory, what Latour has described as a "sociology of associations" in radical antithesis to the conventional "sociology of the social." I will conclude by discussing the growing normative import of ANT and its progressive transformation into an explicit political theory. For ANT's success and expansion has thrown the theory into a position that

would have seem implausible when this monstrous creation took its first steps: that of making discriminating value judgments on the contours of the *good* society. How ANT addresses and elaborates its critical mission will determine the future evolution of this ongoing experiment.

Translations

Before it became ANT, the work of Michel Callon, Bruno Latour, John Law, and a handful of coreligionists belonged to a broad current of research that in the late 1970s began to transform the social study of science and technology. Reviewing the origins and sources of what is now known as science studies is beyond the scope of this chapter, but key to the emergence of this field was a thoroughly empirical, often ethnographic or microsociological approximation to the activities of scientists and engineers, particularly in situations of conflict or controversy. Bruno Latour and Steve Woolgar's *Laboratory Life* (1979), a close examination of the process of fact-making at the Salk Institute in La Jolla, California, was one of the seminal pieces of work in this tradition and showed that conventional categories of sociological explanation and contextualization did not live up to the richness, situatedness, and technical texture displayed by science in action. By all accounts, the close scrutiny of scientists at work—whether they were engaged in routine benchwork, writing and rewriting scientific papers, arguing about the meaning of experimental results, or fighting for their budgets—shook this cohort of social scientists out of received epistemological wisdoms and led them to a radical reconceptualization of the nature of scientific objectivity. ANT would emerge from this juncture as one of the most far-reaching and successful interpretations of the entanglement of technical practices and scientific knowledge-making—what Latour would characterize as the world of *technoscience* (Latour 1987).

Latour and Woolgar's *Laboratory Life* was originally subtitled "The Social Construction of Scientific Facts." In the second edition of the book (1986) the adjective "social" was dropped, an omission that marked a sharp turn away from the vocabulary and taken-for-granted categories of social science. "By demonstrating its pervasive applicability," Latour and Woolgar wrote in the revised version, "the social study of science has rendered 'social' devoid of any meaning" (Latour and Woolgar

1986: 281). The progressive rejection of the idiom of "social constructivism" was not exclusive to ANT, but a resolute move against social-scientific modes of explanation and a distinctive reinterpretation of the modifier "social" would become trademarks of actor-network approaches.[2]

The radicalness of this shift was best captured by Michel Callon in his famous article on the "Domestication of Scallops and the Fishermen of St. Brieuc Bay," the classic formulation of the ANT program of the 1980s (Callon 1986; although see Callon 1975, 1981, and Callon and Latour 1981 for precursors). In his account of how a handful of marine biologists were able to introduce scallop harvesting along the coast of Brittany, Callon introduced a lexicon that did away with any a priori distinction between social and natural entities. In Callon's retelling, the success of the researchers depended on their ability to forge an alliance with the scallops, which in turn required negotiations with a multitude of intervening and interposing entities—ocean currents, parasitic visitors, the behaviorally flexible scallop larvae, dissenting scientific colleagues, and so on. Through a series of processes of *interessement* and *enrollment*, the scientists eventually succeed in becoming the "spokespersons" for a range of other actors and interests—actors and interests that, along with the scientists themselves, were thoroughly reconfigured in the course of the controversy. The result is an account that displays "the simultaneous production of knowledge and construction of a network of relationships in which social and natural entities mutually control who they are and what they want" (Callon 1986, 59).

Callon describes the displacements that the different actors undergo in the course of the controversy as *translations*, a term he borrows from Michel Serres (1974). The term is meant to be as vague and generic as possible—somewhere else Callon (1981, 211) defines translation as the process of "creating convergences and homologies by relating things that were previously different." A translation, in other words, is an act of invention that operates by joining previously disparate elements. The inventive step implied by each and every act of connection is the fundamental unit of analysis for ANT, and it implies movement, distortion, and metamorphosis. Serres drew on information theory to characterize translation as an act of communication that both transmits and distorts a signal, a mediation that inevitably alters the message being communicated and thus creates a new, differential relation between sender and receiver (Serres 1980; see also Brown 2002). Callon reinterprets

the concept to describe the constant repositioning through which a certain entity emerges as a representative or spokesperson for others. "By translation," Latour and Callon write, "we understand all the negotiations, intrigues, calculations, acts of persuasion and violence, thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act on behalf of another act or force" (Latour and Callon 1981, 279).[3]

Negotiation, intrigue, calculation, persuasion, and so on—these modalities of action must be understood as devoid of any anthropocentric connotation. The value of a *sociology of translation*, the phrase use by Callon and Latour to describe this approach before the label ANT became available, lies in its ability to multiply the range of entities that can be shown to exert an active, mediating force in the transformation of a certain state of affairs. Agency, in this particular understanding, is a property of emerging associations—associations that bind human and nonhuman entities in hybrid collectives and that acquire, under certain conditions and for a specific duration, the property of actors (see also Law 1987).

To avoid the anthropocentric connotations of the term *actor*, Latour and Callon would often use the term *actant*, which they borrowed from A. J. Greimas's theory of semiotics (Greimas 1973). An *actant*, in the ANT interpretation, is "[w]hatever acts or shifts actions, action itself being defined by a list of performances through trials" (Akrich and Latour 1992, 259). An *actant*, thus, is not a type of agent or a category of being but the result of a process of acquisition and testing of competences, the gathering and concentration of capacities that results from assembling a multitude of entities and subjecting them to a test or trial of strength.

In the hands of ANT, Greimasian semiotics would become a powerful tool to dissolve the nature/society dichotomy, and indeed any a priori categorization of the actors involved in a controversy. All actors are automatically placed on the same plane of signification, and their identities can be characterized by tracing the establishment of semantic relations within a discursive or narrative context—what Greimas would define as a process of *interdefinition*.

The potential but also the limitations of this approach became evident in Latour's famous study of the rise of Pasteur's microbiology in nineteenth-century France. *The Pasteurization of France* (published in French in 1984 under the title *Les Microbes: Guerre et Paix*), takes as its empirical object a corpus of texts published in

three scientific journals over a period of fifty years (1870–1919). Latour then proceeds by registering the entities mentioned in these texts and tracing the connections posited between them. The analyst, Latour (1988a, 10) writes, "has only to begin at any point, by recording what each actor says of the others. He should not try to be reasonable and to impose some pre-determined sociology on the sometimes bizarre interdefinitions offered by the writers studied. The only task of the analyst is to follow the transformations that the actors convened in the stories are undergoing."

The result is an account that describes how Pasteur and his laboratory become central to an emerging alliance of microbes, farmers, hygienists, and politicians. This multitude of actors eventually coalesces around the central figure of "Pasteur"—not the brilliant mind canonized in hagiographic accounts of scientific discovery but a composite actor-network that interrelates and transforms the interests of an array of human and nonhuman actors.

Yet Latour's use of a semiotic analysis to redescribe a historical process gives rise to some equivocation. It is one thing to use semiotics to redescribe the interrelation of *actants* in a certain discursive field—the purpose for which Greimas deploys the method of *interdefinition*. It is a very different matter to deploy a semiotic analysis to provide an account of the rise and power of a particular historical actor—even if the account in question purports to simply emerge from a careful tracing of textual references. Latour (1988a, 12) disavows any claim to historiographical accuracy, emphasizing that "the presentation of the documentary materials does not follow the historical path but rather the network of associations that slowly make up the Pasteurian world." Yet by the end of the book, we are left with an account that both painstakingly records the materialization of "Pasteur" the semiotic actant *and* appears to provide a full description of the processes by which Pasteur, the historical actor, acquired his preeminent scientific and political position in nineteenth-century France (cf. Lynch 1997, 109–10).

This conflation of semiotic deconstruction and sociohistorical reconstruction would be at the root of some of the most perceptive criticisms of early ANT (Lee and Brown 1994; Pickering 1995; Schaffer 1991; Shapin 1988). What the semiotic approach allowed ANT to do, however, and this was its crucial advantage vis-à-vis accounts rooted in traditional sociological categorizations, was to multiply the range of entities that could be shown to act in a particular scientific controversy, to expand

the inventory of relevant characters in the unfolding and closure of technoscientific disputes. The hollowness of its key terms—what Latour (1999, 20) has often described as "the ridiculous poverty of the ANT vocabulary"—gave the theory the freedom to register a multitude of agencies and connections without the burden of fitting them into ready-made categories, and particularly without abiding by the dichotomies of the social-scientific canon: human versus nonhuman, natural versus social, intentional versus material, factual versus fictional, signifying versus nonsignifying. The result is an account that can, when successful, represent the stabilization of these opposites, and specifically the emergence of "nature" and "society" as the result of processes of purification that transmute entanglements of human and nonhuman entities into distinct and segregated domains.

Describing how "society" emerges as the result of controversies and as the effect of acts of purification requires, however, that the social realm be rendered "as uncertain and disputable" as the natural world (Callon 1986). This refusal to rest on the solid ground of "society" would quickly differentiate ANT not only from the sociological mainstream but also from the closely related sociology of scientific knowledge that had emerged alongside it in the 1980s.

Symmetry and Nonhuman Agency

For proponents of a sociological analysis of the production and stabilization of scientific knowledge, ANT's attribution of agency to "nonhuman" actors was a step back into naïve scientific realism or technical determinism. As Harry Collins and Steve Yearly argued in their critique of ANT, the problem with an account that grants "full agency" to the nonhumans involved in a controversy—the scallops in Callon's Breton fable or the microbes in Latour's reconstruction of the rise of "Pasteur"—is that "it must rest on routine methods of scientific research for that part of its evidence concerned with the nonhuman actants" (Collins and Yearley 1992, 317). In other words, the modalities of nonhuman agency that are revealed in ANT accounts are typically those identified and characterized by the scientists who have won the argument in question. The result, as Collins and Yearley (1992, 323) put it, is "a prosaic view of science and technology," one without the contextual richness uncovered by sociological studies of scientific practice.

The dispute between ANT and the sociology of scientific knowledge (SSK) boils down to different understandings of the principle of "symmetry." For SSK, symmetry expressed a commitment to subject the different claims and counterclaims of a controversy to the same sort of causal explanation. In David Bloor's (1973, 173) classic formulation, symmetry was "a refinement of the demand for impartiality" and required that the social scientist employ the same explanatory register to account for both sides of a dispute. "Not only must true and false beliefs be explained, but the same sort of causes must generate both classes of belief" (Bloor 1973, 173–74). In the hands of sociologists (and historians), this precept led to a "Strong Program" of social-scientific explanation, whereby the unfolding and particularly the closure of a scientific controversy were shown to be due to the operation of "shared understandings," "social mores," or "forms of life" (e.g., Collins 1985).

For ANT, "symmetry" describes a rather different methodological commitment, namely, a refusal to deploy any a priori distinction between human and nonhuman entities, or between elements pertaining to Society and those pertaining to Nature. Instead, "natures" and "societies" are understood as by-products of a more elemental form of activity: the building of networks, the circulation of quasiobjects, the execution of trials of strength. These are all deliberately generic categories of action, designed to prevent any predetermination of what sort of entity might acquire agency.

Thus in their response to the challenge posed by proponents of the Strong Program, Callon and Latour emphasized their refusal to resort to social factors to account for the resolution of technoscientific controversies. "We have never been interested in giving a social explanation of anything," they wrote, "but we want to explain society, of which the things, facts and artifacts, are major components" (Callon and Latour 1992, 348).

This repudiation of sociology's "politics of explanation" (Latour 1988b) has a complex set of sources. In spirit, the ANT position is perhaps closest to the ethnomethodological injunction not to contextualize action but to explore how action produces its own set of contexts. In the particular milieu of French sociology—and it is imperative to remember that ANT was nurtured in an engineering school that was geographically near but intellectually and institutionally outside the hallowed grounds of Parisian academic sociology—the refusal to revert to a metalanguage of social

causes carried a direct challenge to the then-dominant interpretive schemes and in particular to the critical sociology of Pierre Bourdieu.[4]

In practice, the ANT and the SSK versions of "symmetry" were incompatible, but it took some time for this incompatibility to fully manifest itself. As Collins and Yearley (1992, 311) argued in their critique of ANT, "[s]ymmetry of treatment between the true and the false requires a human-centered universe." Inversely, it is only by *not* treating different human camps in a controversy symmetrically that early ANT accounts could fully highlight the agency of nonhuman actors.

This is a point that Simon Schaffer made in his review of *The Pasteurization of France* ("The Eighteenth Brumaire of Bruno Latour"). Schaffer argued that Latour's hylozoism—the attribution of life and agency to every element of the universe—effectively transformed "Pasteur" (the semiotic actant) and by implication Pasteur (the historical actor), into a sort of supernatural virtuoso. "Even though Latour reckons he has pulled of the trick of decomposing 'Pasteur' into the constituents which made him possible (hygienists, farmers, army doctors, the Imperial regime, statisticians, and microbes), he has in fact restored the great microbiologist to the status of a miracle-worker" (Schaffer 1991, 182).

A key and telling element in this elevation of "Pasteur," in Schaffer's view, is Latour's systematic understatement of experimental work. In *The Pasteurization of France*, experiments are essentially trials of strength through which the scientist attempts to enroll nonhuman entities in his endeavors; the laboratory becomes an "Archimedean point" that allows Pasteur to shift scales and become the obligatory point of passage for a new constellation of actors and interests (see particularly Latour 1983a). There is in this and other classic ANT accounts little interest in the contingency and polysemic quality of experimental results—for instance, in the fundamental ambiguity of experimental replication identified by the sociology of scientific knowledge (Collins 1985). ANT underplayed these quandaries in order to bring the enabling, agency-generating power of experiments into sharper focus.

Part of the problem with this approach was the crudeness and anthropocentric connotation of the distinction between human and nonhuman, and the flattening implied by an all-encompassing notion of "agency" (Lee and Brown 1994). ANT managed to render visible a far greater variety of actors actively participating in the unfolding of technoscientific controversies, but it did so at the expense of revealing

all these actors "as being the same" (Hennion 2012, 592), that is, as displaying a rather generic, monotonous modality of agency (see Sayes [2014] for a recent taxonomy of nonhuman agencies in ANT).

Perhaps the most evident example of this reductionism was the treatment of nonhuman organismic and animal agencies caught up in scientific work. Remember that the title of Callon's classic 1986 article speaks of the "domestication" of scallops, and that Latour, when he describes the role of microbial life in Pasteur's ascendancy, often resorts to a language of mastery and domination. Over time, however, ANT would open itself to more nuanced interpretations of the capacities of living things.[5] This evolution demonstrated that there was room within the theory for more discriminating understandings of action. In fact, any minimally attentive empirical investigation will quickly show that the mode of operation of any *actant*—the kind of force or pressure exerted by any assemblage—is in effect sui generis, and a good ANT account should give this idiosyncratic quality enough room to manifest itself. This appreciation for the distinctiveness of specific modes of being and acting would emerge more forcefully once ANT traveled beyond its original focus on technoscience and began to explore other orders of action.[6]

Economics and Calculation

In the 1990s, studies that claimed an affiliation with ANT began to proliferate across the social sciences and beyond. This expansion of ANT was facilitated by the minimalism of its theoretical elaboration, but the ease of travel sometimes resulted in a straightforward application of its lexicon to different "domains," without in the process subjecting the mode of inquiry to any modification, qualification or enhancement. These were, in other words, displacements without friction, translations without betrayal, and as such they offered no opportunity to refine the apparatus that had proven so fruitful in the study of scientific and technical controversies. As Andrew Barry (2013, 418) has argued, ANT is best understood as "a range of pieces of theoretical equipment, which may need to be tried out, modified or abandoned, but never simply applied. Part of the difficulty of formulating actor-network theory as a set of principles or concepts is that it should be adjusted in response to the experience of empirical research" (on the lack of "applicability" of ANT, see also Latour 2005,

141–56).

Two such adjustments to the experience of empirical research stand out in the history of ANT and its evolution toward an increasingly explicit social theory: the study of markets and the engagement with law. Here, I will briefly survey some of the most significant work on markets and economics before discussing in the following section ANT's understandings of legal procedure and of the law's normative force.

Market economics presents an enticing challenge to ANT: it posits a form of agency—human, intentional, calculative, and embodying a peculiar sort of abstract rationality—that seems deeply at odds with the kinds of hybrid *actants* ANT highlights in the world of technoscience. "The market," Callon (1999, 182) notes, "is a considerable challenge for ANT because it introduces a strict separation between what circulates (goods which are inert, passive and classified as non-human) and human agents who are active and capable of making complicated decisions (producers, distributors and consumers). Moreover, on the market, whether we are referring to real markets or those of economic theory, the agents involved are characterized by very specific and highly demanding competencies: they are calculating, know and pursue their own interests, and take informed decisions."

What would a theory bent on dissolving the centrality of human agencies and the role of cognitive capacities have to say about *homo economicus*, the mythical beast that inhabits the confines of the market? In effect, ANT would try to chart a path that rejected the solutions provided by both mainstream economics *and* economic sociology. "Whereas economics maintains the idea of a reality of 'pure' calculation," Michel Callon and Fabian Muniesa (2005, 1230) write, "the other social sciences try, by contrast, to show that real practices are infinitely more complex and leave little room for calculative practices per se." In other words, the challenge for ANT was to tackle what economics take for granted and other social sciences reduce to the status of epiphenomenon of other orders of action: the specific sort of calculative competence that characterizes economic action in a market context. The task, as Callon and Muniesa (2005, 1229) put it, is "to address empirically the calculative character of markets without dissolving it."

Markets, in the formulation advanced by Callon and Muniesa (2005, 1229), are "collective organized devices that calculate compromises on the values of goods." Device (*dispositif*) is the operative term here and is to be understood, in the Deleuzian

sense, as a tangle or ensemble of heterogeneous elements that creates a particular sort of order (or sedimentation) while opening up trajectories of resistance and flight (or creativity) (Deleuze 1989). Callon (1998b) would reformulate these two dimensions as *framing* and *overflowing*, using the relationship between the two to recast the crucial notion of externality. A market, in this view, is an always ongoing effort to bracket or frame certain aspects of an object or a discrete set of dimensions of a relationship. This framing creates a space or zone of calculability by demarcating a narrow range of considerations relevant to a particular transaction. Calculation is never "pure" and is resolutely *not* the result of a process of "abstraction." It is rather an operation thoroughly mediated by devices, and which often includes a complex blend of qualitative judgment and quantitative computation.[7] Economic actors are best understood as *agencements*—another Deleuzian borrowing—that is, they express the agency that pertains to a particular arrangement of tools, equipment, humans, artifacts, algorithms, texts, and so on (Callon 2007a, 2016; see also Cochoy 2014).

The notion of "market device" has been used expansively by ANT scholars of economics. It refers to "the material and discursive assemblages that intervene in the construction of markets" (Muniesa, Millo, and Callon 2007, 2) and can encompass both the kinds of equipment we often associate with the term *technology*—machines, stock exchanges, telecommunication infrastructures—and an endless multitude of seemingly lesser entities—from routine accounting techniques to the disposition of desks in a trading room.[8] Muniesa's (2000, 2007) study of the production of prices at the Paris Bourse electronic stock exchange, for instance, focuses on an algorithm that produces a different aggregation of prices during the last minutes of trading. In Muniesa's (2007, 390) interpretation, prices are "material entities, always tied to concrete arrangements." Their signifying capacity (in the meaning of "sign" advanced by C. S. Peirce) depends on at least three interrelated aspects: "their material shape and display, the way in which they stand as a trace of something and, finally, their fit to a series of connections to other actions" (Muniesa 2007, 390).

In sum, ANT understands economic action as a material achievement—*homo economicus* is neither the fiction many social scientists assumed it to be (a diminished, apocryphal version of *homo sociologicus*), nor the disembodied expression of an innate capacity to behave in a utility-maximizing manner, as implied by neoclassic economics. *Homo economicus*—and by implication economic action—

is rather the contingent offshoot of a gathering of instrumental agencies. What emerges from these assemblies or *agencements* is not calculation as a human capacity but *calculativeness* as an emergent quality of technomaterial arrangements.[9]

Within the broad range of entities that can play a constitutive role in the creation of new market realities, ANT has paid particular attention to the tools devised by economists themselves. In this interpretation, economics (understood broadly to encompass marketing, accounting, and a range of other auxiliary disciplines) does not observe or analyze an external economic reality but contributes crucially to bringing a particular economy into being (Callon 2007a; Muniesa and Callon 2007). This point has crystallized in a series of arguments about the "performativity" of economics, particularly in relation to financial markets (see the contributions in MacKenzie, Muniesa, and Siu 2007). The models, theories and intricate mathematical formulae of contemporary finance operate as "an engine, not a camera," to use Donald MacKenzie's (2006) pithy phrase (see also MacKenzie and Millo 2003).

Even though ANT's approach to markets and the performative effects of economics has in principle a very broad empirical remit (see Çalışkan and Callon [2009, 2010] for a reconceptualization of economic sociology in terms of the study of processes of "economization"), a disproportionate amount of the scholarship produced over the last decade has focused on financial markets and financial technologies (Lépinay 2011; Preda 2009; Riles 2011). While this might reflect a certain path dependency of the field—much of the initial work took stock exchanges and financial trading platforms as its object of study—it raises an interesting question about the elective affinities between the theoretical apparatus developed by ANT for the study of economics and the specific features and capacities of financial markets. It is as if finance expressed in the purest or most easily observable form the sort of calculativeness that ANT places at the center of its understanding of economics. Or, perhaps, financial economics demonstrate most sharply the performative quality of economics because in the current politico-economic regime only finance seems to possess the power to create market realities de novo.

The arguments, counterarguments, clarifications, and qualifications that have accompanied the development of the performativity thesis have created a productive trading zone between ANT and mainstream economic sociology (see, for instance,

Fourcade 2011). Yet they have also served to delineate the main lines of opposition between ANT and its critics. In essence, those critics argue that ANT adopts uncritically the language and assumptions of economics—an argument not too dissimilar to the charge that sociologists of scientific knowledge leveled against early ANT accounts of technoscience. As Daniel Miller (2002, 219) argues, "the theory that Callon produces is in most major respects a defence of the economists' view of the world and a rejection of the evidence of how actual economies operate as available to anthropologists and sociologists." The discrepancy noted by Miller might be due to differences in the choice of empirical object—perhaps if anthropologists and sociologists had spent more time exploring the sort of financial and highly technologized markets ANT has opened up for scrutiny, they would have had to readjust their "social" explanations accordingly—but the broader point of the criticism stands. The performativity thesis has placed ANT on very treacherous terrain, forcing it to walk a very fine line between providing a thorough account of what Muniesa (2014) describes as "the efficacy of economics," and taking economic theories at their word and thus legitimize "the economists' view of the world." When that line is walked artfully, the result is an illuminating description of the manufactured quality of economic reality, with a degree of attention to the inner workings of markets and the role of economics in their construction that is unique in the social sciences. When the balancing act fails, however, the analysis can quickly degenerate into a convoluted acceptance of the claims of economists and economics, offering a redescription of reality that merely echoes the hubristic power of market-makers

Part of the problem here is ANT's choice of interlocutors within the discipline of economics. In addition to the attraction to financial markets discussed above, ANT has been drawn disproportionally to impeccably orthodox economic theories and theorists and it has generally neglected economists with a more expansive definition of economic rationality or a more embedded view of markets. For instance, Callon borrows his key notion of calculativeness from transaction cost economist and Nobel-laureate Oliver E. Williamson (1993), who identified it as the "general condition" of "the economic approach." There is little engagement with alternative schools of economic thought or with authors who locate the study of markets within a broader consideration of political economy or the public good. For some of the harshest critics

of ANT this amounts to a de facto intellectual alliance with neoclassical economics (see in particular Bryan et al. 2012; Mirowski and Nik-Khah 2007). For more sympathetic readers, the solution is to develop a more inclusive and less "economics-centric" version of ANT, whether by expanding the definition of performativity to encompass the operation of political actors (Blok 2011), or by incorporating the question of performativity within a larger examination of the creation, stabilization and transformation of markets (Pellandini-Simányi 2016).

In any case, these debates have pushed ANT to state more clearly its position vis-à-vis the *nomos* in the *oiko*nomos. The result is ambivalent. When Callon (2016, 17) argues, for instance, that "political and moral reflection is at the heart of markets and not pushed out to their fringes," he is allowing two parallel interpretations. On the one hand, he is claiming that the organization of markets is a thoroughly political and moral matter and that as such it requires mechanisms of public scrutiny and democratic governance. At the same time, he is also making political and moral reflection *internal* to the constitution of markets, one of the ingredients of their articulation, and by implication calling into question the very possibility of an *external* position from which the market itself—as a peculiar form of exchange and social organization—could be observed or challenged. Indeed, in much of the ANT work on economic action the extension of market logics is often treated as a *fait accompli*. Moreover, the market itself becomes the key engine for the production of new political realities. Markets, according to Callon (2007b, 158) "are a particularly effective apparatus for spurring the proliferation of new social identities and triggering the creation of unexpected groups that, once they exist, can demand to be heard, recognized and received in a recomposed collective."

It should by now be obvious that ANT will always resist adopting an extraneous or "critical" position from which to adjudicate matters of concern. The question is whether it can develop a more explicit and forceful normative orientation on the basis of a thoroughly internalist (or internalized) account of action. ANT's engagements with law and legal institutions have brought this predicament into even sharper relief.

Law and Normativity

If ANT's approach to economics sought to preserve the specific quality of economic action—calculativeness—while revamping how we account for its emergence and distribution, ANT journeys into the world of law have attempted a similar feat: to produce an understanding of legality that is neither internalist—law as an autonomous "domain" or "system" ruled by legal reason or autopoietic logic—nor externalist—law as an effect or symptom of realities beyond the scope of its own form of discrimination. Law, as we will see, emerges from this interrogation as a peculiar "regime of enunciation," liberal in the range of agencies and actor-networks it deploys, yet capable of combining and refining them to produce an idiosyncratic mode of veridiction.

Looking back at the controversies that surrounded the emergence of ANT in the 1980s, this project would seem unlikely: actor-network accounts were often criticized for being deeply uninterested in value judgments and averse to any notion of *ethos* or normative orientation in science or elsewhere. Descriptions of science in action as an agonistic practice (see in particular Latour 1987) seemed to preclude any examination of transcendental orders of action (see Schmidgen (2013) for a more nuanced interpretation).

And yet, there were rumblings of a legal mode of thought in classic ANT. The emphasis on the role of inscriptions and the textual fabrication of truth in early ethnographic investigations of scientific practice (i.e., Latour and Woolgar 1979) would eventually offer an obvious point of comparison with the writing protocols and paper-pushing procedures of the law. Moreover, the key ANT notion of "translation" preserved in its French version (*traduire*) legal resonances that have been explored at length in the work of Michel Serres (see in particular Serres 1985). Finally, Latour has often put forward a *constitutionalist* understanding of modernity and its alternatives—the Modern Constitution is how Latour characterizes the schism of natural and social orders instituted by the Scientific Revolution and the Enlightenment, a settlement predicated on a clear "separation of powers" between science and politics (Latour 1993).

ANT's most sustained empirical engagement with law and legal practice is Latour's ethnographic study of the Litigation Section of France's Conseil d'État (published in French in 2002 under the title *La Fabrique du Droit*, and in English in 2010 as *The Making of Law*). The choice of the Conseil as an ethnographic object was

exceptional (few outsiders, if any, had ever been granted the degree of access to the institution that Latour enjoyed), and deeply consequential for how ANT would come to think about legal normativity. As McGee (2014, 126) has noted, the Conseil is probably the most "un-French" of French legal institutions, resembling in its peculiar proceduralism common-law traditions of argumentation by precedent and adversarial litigation.

In *The Making of Law*, Latour delves deeply into the everyday routines of the Conseil. Not only does he notice, in stereotypical actor-network fashion, how assemblages of nonhuman entities (from paper clips to the layout of the hearing chamber) shape law-in-the-making even in the most rarefied realm of administrative law. He also zeroes in on the striking fact that the ultimate unit of litigation, the file or *dossier*, is both physical artifact (the bundle of documents and statements that demarcate the facts under consideration) and legal category (the *case* or specific matter of concern over which the Conseil will adjudicate). "The judges," writes Latour (2010a, 192), "do not reason: they grapple with a file which acts upon them, which pushes and forces them, and which makes them do something."

Latour traces the meandering progression of the file through the chambers and antechambers of the Conseil. What he observes is a peculiar sort of movement: a winding, hesitant form of reason that advances bit by bit, methodically connecting textual documents with worldly facts until it reaches a final and definitive judgment. The "passage of law" (*le passage du droit*) is the phrase Latour (2010a, 119) uses to describe this trajectory of infinitesimal shifts and displacements—"this slow maceration which allows the connection of states of facts with the scattered pieces of text."

The discussion of the "passage of law" leads Latour to an elaboration of the question that so preoccupies the counselors and commissioners of the Conseil (and legal scholars at large): the emergence of law's normative force, or, in Latour's (2010a, 143) formulation, the relation "between the transfer of force and the peculiar movement of law." As one would expect, this question is addressed without resort to any external frame of reference—without resort, that is, either to the Nature that grounds natural law theories, or to the Social Conventions and Social Facts that provide a foundation for legal positivism. The question has to be answered in *legal* terms. For the Conseil may marshal in its operation a multitude of agencies, but it

gathers these forces through a form of association that is unique to the institution. In other words, the law is characterized by a mode of enunciation that is distinctively and irreducibly legal. This formulation does not imply a tautology; it simply describes a form of recursiveness. As Latour (2010a, 81) puts it, "There is no stronger metalanguage to explain law than the language of law itself. Or, more precisely, law is *itself its own metalanguage*."

The feature of the legal mode of veridiction that emerges most forcefully from *The Making of Law* is its *hesitant* nature. Law's normativity, in other words, is not grounded in the alleged solidity of its foundations but in the peculiar frailty and delicacy of the operations that achieve the formal resolution of a legal dispute. This hesitation is evident in every small shift of legal reasoning, and it produces a double effect. On the one hand, it increases the room for maneuver—it "produces freedom of judgment by unlinking things before they are linked up again" (Latour 2010a, 194–95). On the other hand, the continuous opening and reopening of the matter under consideration eventually grants the concluding decision a peculiar force. The slow maceration of the *dossier* results in a verdict that is surprisingly hardy and cohesive, a ruling that is able to exclude any further consideration or external factor and can stand on the force of its own halting and meticulous reasoning. "Those who enunciate the law," Latour (2010a, 193–94) writes, "seem almost to measure the realization of their performances by their capacity to have hesitated well, extensively, and sufficiently."[10]

Despite Latour's oft comparison of legal and scientific fact-making (the Conseil as a legal laboratory, etc.), it is clear that the examination of legal practice and legal procedure has inflected ANT with a new, or at least more explicit, concern for distinctions and differences, a preoccupation with what is peculiar to an institution that was not apparent in ANT's original examinations of technoscience. Some have seen in this concern with the identification of a legal "regime of enunciation" a blunting of ANT's critical edge. Alain Pottage (2012, 170) has criticized *The Making of Law* for being "too indulgent of the lawyer's sense of law," not least by prioritizing, to the exclusion of almost any other medium or register, *textual* processes of legal fabrication. Latour, Pottage (2012, 167) argues, "uncritically adopts the premise that there is an institution such as 'law' that has to be explained or materialized by social science, thereby diminishing the critical energy that the theory of actor-networks or of *dispositifs* might bring to the study of law."

This line of criticism is right in identifying a point of transition in ANT's engagement with law, an alteration or redirection of its original critical impetus. Yet it is possible to turn the argument around, and read the evolution of ANT retrospectively from the vantage point afforded by its elaboration of the legal "regime of enunciation." Reading the theory backward (surely anathema to any ANT scholar worth her salt), one can discover, or at least intuit, a "normative pulse" in all the connections and associations that ANT has so lovingly traced since its origins as a sociology of translation (McGee 2014, xviii). In this reading, every link in a chain of translations, every bond in an actor-network, carries a normative force, a force that can be captured semiotically as the changing valence of a performance. As McGee (2014, 55) puts it, "alterations in the modality of doing correlate with modifications of value—for practical purposes, a change in modality of doing is indistinguishable from a change in value. This is a normative effect, then, but no normative criteria precede it: the valence of the effect is determined by the particular alteration at issue, not by any pre-given normative structure."

This normative valence was initially denied by critics and proponents of ANT alike. The former chided the theory for its perceived amoralism (the "power makes right" line of attack against the original ANT studies of science in action); the latter took great pride in not staking out any positive moral ground (viz the trademark military metaphors and Machiavellian aphorisms in Latour's work in the 1980s). Progressively, however, the ventriloquism implied in ANT's early claims to "speak the language of the actors themselves" has given way to more assertive value declarations. Perhaps it took the poisoned gift of comparison and a series of intense investigative journey through modes of existence beyond those of technoscience to introduce in ANT a greater willingness to make distinctions—including the distinction between right and wrong (or at least between better and worse). It is in the context that ANT has begun to formulate its own social theory, a peculiar metalanguage of the social.

The Sociology of Associations

Despite being known early on as a "sociology of translation," there was little in the initial ANT explorations of the world of technoscience that would have recommended

them to mainstream sociology. Contrary to what some sociologists thought it was (or wished it would become), ANT was most resolutely *not* an elaboration or application of sociological modes of explanation to the domains of science and technology. As Latour (2005, 94) puts it: "ANT is not the branch of social science that has succeeded in extending its methods to scientific activity and then to the rest of society, but the branch (or rather the twig) made of those who have been thoroughly shaken when trying to give a social explanation of the hard facts of science." It was in fact the fundamental inadequacy of social theory to account for anything that was specific, productive, and interesting in technoscience that prompted ANT to eschew "social" explanations in the study of scientific fact-making and search for a new, all-purpose theory of its town to replace the exhausted conceptualizations of the past. "[W]e have concluded that, overall and in the details, social theory has failed on science *so radically* that it's safe to postulate that it had *always failed* elsewhere as well" (Latour 2005, 95; emphases in original).

In the book *Reassembling the Social*, Latour presents his alternative to an always-failing social theory through the contrast between the traditional "sociology of the social" and ANT's own "sociology of associations." The contrast is admittedly schematic—Latour never spends much time parsing the classics of social theory, so his broad-stroke disqualification of sociological traditions need to be taken with a grain of salt—but it indicates the main thrust of the divergence. Briefly put, the sociology of the social is in the business of finding "social explanations" or "social causes" for existing phenomena or events. It understands the social as a fairly stable set of forces or agencies, a substance that supports and stands behind a world of concrete actions and interactions. The sociology of associations, in contrast, is preoccupied with tracing the translations and mediations that give rise to collectives. The social, in this interpretation, "is the name of a type of momentary association which is characterized by the way it gathers together into new shapes" (Latour 2005, 65). It is not a level of reality or a kind of stuff but "a fluid visible *only* when new associations are being made." As soon as a preexisting "society" or "social realm" is posited and deployed as an explanatory resource, this sort of association in the making becomes invisible; the purpose of the sociology of associations is to make those gatherings traceable again.[11]

To understand the challenge implicit in the call to a sociology of associations,

we need to revert to an old distinction introduced in early actor-network accounts, that between mediator and intermediary. A mediator is a connector that introduces a displacement in the position or valence of the newly related entities. Mediators "transform, translate, distort, and modify the meaning or the elements they are supposed to carry" (Latour 2005, 37). Intermediaries, in contrast, connect cause and effect seamlessly: they transport entities without distortion, exert a force without modifying its carrier or target. In the ANT imaginary, a network is always a concatenation of mediations—not, as the everyday understanding of the term often conveys, a smooth, frictionless plane on which entities are connected without undergoing change. Tracing a network thus involves describing a world in constant transformation, a sequence of connections "where each point can be said to fully act" (Latour 2005, 59).

The sociology of the social relies on intermediaries: "social" positions, groups, structures, or networks are the dei ex machina that explain what actually unfolds in the world. A sociology of associations, in contrast, increases the relative proportion of mediators to intermediaries, deliberately depriving itself of any already-existing social force or institution. It "has to pay the price, in small change, of what sociology seems to stock on its shelves in infinite supply" (Latour 2005, 35).

The sociology of associations must thus proceed slowly—Latour (2003, 143) calls it a "slowciology"—meticulously describing "the fragile and temporary construction of social aggregates." This is not to suggest that ANT concerns itself with "interaction" at the expense of "context" or that it emphasizes "agency" while understating the role of "structures." The constant back and forth between these poles is precisely what ANT hopes to avoid, replacing it with a different sort of activity: a scrupulous attention to the distortions and dislocations each translation, each mediator, introduces in the world. "Interaction" is in this sense as much an abstraction as "structure." Differences in scale—between, say, a "small" individual and the "larger" society—are the result of processes of association or group formation, not their precondition. As it did with technoscience, ANT introduces here a distinctively flat topography with the purpose of better registering connections and associations without the constraint of a ready-made dichotomy of the micro and the macro (see Callon and Latour [1981] for the original formulation of this program).

Social collectives might extend over time, but this does not imply that they

have a particular consistency due to their "social" nature. The durability of a social connection simply points to the tenacity and endurance of a certain effort to collect a collective. "An association is not a building needing maintenance and upkeep so much as a gesture needing continuation, the performance of a dance much more than a choreographic blueprint" (Latour 2005, 45; on gestures and ANT, see Hennion 2007).

It should by now be apparent that this sociology of associations displays, like the rest of ANT, a peculiar understanding of the relationship between description and explanation. The purpose of the social sciences is to produce accounts, and a good account is one that describes "a string of actions where each participant is treated as a full-blown mediator" (Latour 2005, 128). There can be no explanatory forces floating behind, below or above the network being traced. "If a description remains in need of an explanation, it means that it is a bad description" (Latour 2005, 137). It means, in other words, that certain critical mediators have not yet been incorporated into the account.

With *Reassembling the Social*, then, ANT puts forward an explicit social theory, even if, in characteristic fashion, it is a theory devoid of cause-effect relations, or even of a basic typology of relevant actors or actions. This is a weak and literally *insubstantial* social theory (Blok and Jensen 2011, 110). It is, crucially, a social theory that is not meant to make *theorizing* any easier.

And yet, the sociology of associations does represent an important turning point in the evolution of ANT. As Gad and Jensen (2010, 63) have noted, it signifies "a more offensive stance regarding the capacities of ANT," and particularly a greater willingness to address the "social" as, if not a domain or region of reality, at least a particular kind of circulation. Remember that in 1986, Latour and Woolgar had dropped "social" from the subtitle of *Laboratory Life* with the argument that the adjective was now "devoid of any meaning." Twenty years later, Latour embarks on a project to reassemble this category of being, even if it is in the form of an eccentric and willfully unsystematic proposal.[12] While this brings ANT into closer alignment with other forms of social theory—to the extent that it introduces a degree of comparability with alternative sociologies—it also curbs the radical innovativeness of the original *sociology of translation*, the "free radical" quality of the actor-network. As López-Gómez and Tirado (2012, 5) argue, ANT has become a theory "capable of

providing interesting answers to ordinary questions."

ANT's sociology of associations is also a theory of and for a certain era—not because it is adapted to the proliferation of new communication media or to the supposed emergence of a "network society." As we have noted, the ANT understanding of "network" differs substantially from—indeed, it is the opposite of—what is usually understood by the term in the Internet era. Rather, the sociology of associations is a contemporary theory because it addresses itself to key empirical and political questions of our time. To begin with, it is a theory appropriate for a world thoroughly shaped by technoscience, where technical controversies and reflexive capacities proliferate seemingly without limit. The ability to create and trace associations is now so vastly enhanced and so widely distributed that any pretension social theory might have had to occupy a privileged or extrinsic position vis-à-vis the actors it studies has lost much of its legitimacy.

It is also a time when the question of "the social"—its nature, its quality, its very existence—reappears with a particular twist. An intensified awareness of connectivity coincides with a deep sense of ambiguity about the boundaries and consistency of our social aggregates. In what way are the constructs of electronic and digital proximity "social," and how do the patterns of circulation that create such gatherings relate to their political quality? ANT's flat topography resonates with a situation of "context collapse," as new media scholars would put it, when predigital notions of social distance and social scale seem increasingly incongruent with new collective lifeworlds.

In one of his commentaries on Gabriel Tarde's work, Latour suggested that his precursor's monadological sociology had arrived on the scene far too early. "It could be argued that a thinker of networks before their time could not transform his intuitions into data, because the material world he was interested in was not there yet to provide him with any empirical grasp" (Latour 2002, 118). The material world now provides ANT with plenty of empirical grasp to pursue a sociology of associations. The challenge is to make sure that this new sociology is not simply derivative of the processes that have created the conditions for its existence—that the theory can actually introduce a difference, *translate* the world in which it operates. That it can, in other words, become an actor in the contemporary world and perform the social in a particular way.[13] This implies a capacity to differentiate and discriminate among all

the possible kinds of social aggregates, and a willingness to advance a positive agenda about the sorts of collective worth gathering. Which leads us to our final question: under what conditions, and in which manner, is ANT becoming a distinctively *political* theory?

Normative Discriminations

In a discussion with John Tresch of his most recent project, *An Inquiry into Modes of Existence* (AIME), Latour states the need to move beyond the deconstructive impetus of classic ANT in order to establish a research program capable of identifying (and possibly strengthening) the values that animate the lives of the Moderns. ANT, Latour notes, "was very good at giving freedom of movement but very bad at defining differences" (Latour, in Tresch 2013, 304). It expanded the room for maneuver by ignoring the distinction between social and natural, human and nonhuman, knowledge and action. It is now time, according to Latour, to transform the liberating power of ANT into a constructive endeavor, to build on the foundations provided by ANT—on "the firm ground of relativism," as he puts it elsewhere (Latour 2005, 58)—and conduct a positive anthropology of the Moderns. The ultimate goal of this new intellectual project, Latour argues, is "to rebuild the institutions. To institute the values which we think it's important to have" (Latour, in Tresch 2013, 309).

The turn to "modes of existence" implies a redefinition of ANT's normative project—or at least a greater readiness to assert such a project (see Harman 2014). Latour has offered glimpses of this enterprise throughout his writings. "[T]he potentialities of ANT," he wrote in 1999, "are still largely untapped, especially the political implications of a social theory that would not claim to explain the actors' behaviour and reasons, but only to find the procedures which render actors able to negotiate their ways through one another's world-building activity" (Latour 1999, 21). In his 2003 article "What If We *Talked* Politics a Little?," Latour advanced a restricted, more discriminating notion of the political as a peculiar "enunciation regime," a fragile manner of speech driven by an internal criterion of truth: whether it manages to "trace a group into existence" (Latour 2003, 148), to define and materialize a collective that is always in the making, that must constantly start over.

AIME takes the form of a collective inquiry—the book published in French in

2012 and in English in 2013 is only the first "draft" of an ongoing project hosted at www.modesofexistence.org/—and it centers on the identification of a series of "modes of existence" characteristic of the Moderns. In Latour's formulation, a mode of existence is a particular form or genre of world-building that is guided by its own felicity and infelicity conditions and expresses an idiosyncratic discrimination of true and false. Scientific knowledge, now recast as "reference," would be just one such mode (driven by an *epistemological* differentiation of true and false), but so would "religion," "law," "network," "metamorphosis," or "double click," to name a handful of examples (AIME claims to have identified fifteen such modes so far). Each mode represents a specific itinerary of veridiction, oriented toward a particular, incommensurable definition of truth and thus *moral* in its own way (Latour 2013a, 452).[14]

Latour has conceded that this mapping exercise is resolutely parochial—at stake is a more rigorous reading of "the regional ontology of the Moderns," by which Latour seems to mean the Euro-American tradition, or, in other formulations, "the West." A significant part of this parochialism stems from AIME's references to Christianity and Christian values. The book opens with an epigram from the Gospel of John, *Si scires donum dei* (If you knew God's gift), and the religious undertones (and overtones) of the inquiry are unmistakable. Even if this is still "a religion without belief" (Golinski 2010), Latour has been increasingly explicit about the Catholic underpinnings of his intellectual endeavor, identifying a thread that runs back to his 1975 doctoral dissertation on Charles Péguy and the relationship between biblical exegesis and philosophical ontology (Latour 2013c; see also Bordeleau 2015; Smith 2016). The provincialism of this enterprise offers obvious and clear lines of attack (see, e.g., Fisher 2014; Viveiros de Castro 2016). Yet it is posited as a sort of clarification exercise, a form of self-recognition oriented towards a better diplomacy "both among the different regimes of truth in the West and between the West and other cultures" (Latour in Tresch 2013, 303).[16]

AIME's emphasis on the positive identification of values and the discriminating function of theory resonates with other recent strands of work within the ANT tradition. It is evident, for instance, in Annemarie Mol's (2013) elaboration of the concept of the "ontonorm" in her studies of diet and eating, or in John Law's and Marianne Lien's (2013) project to make room for a notion of ontological

multiplicity that would also encompass "not quite realised realities." As ANT abandons its original antinormative prejudice and acquires a more explicit political complexion, it increasingly places its research agenda in the context of pressing contemporary crises. Latour, for instance, has framed much of his most recent work around the challenges posed by the ecological crisis and the advent of the Anthropocene (Latour 2013b, 2014a). Callon and his colleagues have formulated a program for the "democratization of democracy" (Barthe, Callon, and Lascoumes 2001), and a strand of ANT work on economics has evolved into the study of "civilized" or "concerned" markets (Callon 2009, Geiger et al 2014). Significantly, the growing implication of ANT scholars in social movements, design work or artistic performance, part of broader orientation in science studies towards collaborative forms of practice, is pushing the theory in more experimental, less categorical directions (DiSalvo 2012; Marres 2012).

Regardless of how one defines the civic mission of ANT—and whether one chooses to retain this moniker or replaces it with a new one (hopefully something more original than "post-ANT")—it is clear that such a definition will be key to the evolution of the theory going forward. If we are to lose the freedom of movement that the original ANT program created, it must be to gain an inspiring program of action. We can perhaps reconcile ourselves to seeing politics as just *one* mode of existence among many, capable of achieving at best a modest sort of "mini-transcendence" (Latour 2003), but this doesn't make political action any easier. Calls to participate in "the constitution of the collective" (Barthe et al. 2011) or to contribute to the "composition of a common world" (Latour 2014b) need to be accompanied by appealing formulations of the more-than-human *telos* of such an endeavor. Extracting the full potential of this reluctant social theory requires an ongoing effort to translate its idiosyncratic take on the world into compelling programs for change.

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1 An anecdotal marker of this expansion: the 1987 edition of *Social Theory Today* included one single reference to work in the actor-network tradition. A footnote in John Heritage's (1987, 265) chapter on ethnomethodology mentioned Latour and Woolgar's (1979) *Laboratory Life* as an example of a study that "converges in atmosphere, though not in specific orientation, with the [ethnomethodological] 'study of work' programme."

2 For a discussion of the multiple and sometimes mutually exclusive varieties of "social constructivism" that have proliferated in science studies, see Golinski (2008), Hacking (1999) and Sismondo (1993).

3 This definition brings to mind a passage in Barrington Moore's *Social Origins of Democracy and Dictatorship*: "To maintain and transmit a value system," Moore (1966, 468) writes, "human beings are punched, bullied, sent to jail, thrown into concentration camps, cajoled, bribed, made into heroes, encouraged to read newspapers, stood up against a wall and shot, and sometimes even taught sociology." ANT can be seen as an effort to address all those modes of action (including the teaching of sociology) through an apparatus that gives full representation to the many nonhuman mediators implicated in those operations.

4 ANT's epicenter in the 1980s and 1990s, the Centre de Sociologie de l'Innovation, is part of the École Nationale Supérieure des Mines de Paris, an elite engineering institution of higher education. Many of the leading proponents of ANT—Michel Callon, Madeleine Akrich, and Antoine Hennion in particular—were alumni of this Grande École and developed their distinctive approach in interaction with engineering students. As Fabian Muniesa notes, this inflected the peculiar kind of "constructivism" that characterized early ANT. "For ANT," he writes, "reality is constructed, but it is constructed in the engineer's sense (solid reality as the outcome of an organized, fragile, and laborious process of material articulation) rather than in the sense usually put forward in standard social sciences (social construction considered in terms of social conventions, belief systems, mental states or collective representations)" (Muniesa 2015, 62; see also Hennion 2016). In the meantime, and in contrast, the sociology of scientific knowledge that emerged in the United Kingdom in the late 1970s endeavored to assert itself as a full-blown sociology, on equal terms with other branches of the discipline and differentiated only by its object of study.

5 Latour's own collaboration with primatologist Shirley Strum marks a point of transition in this respect (Strum and Latour 1987). Even more significant is the influence of some of ANT's most important interlocutors, particularly Donna Haraway, Vinciane Despret, and Isabelle Stengers.

6 Antoine Hennion's work on music lovers and other forms of amateurism exemplified early on ANT's ability to provide a more nuanced and variegated account of agency (Hennion 2015; see also Gomart and Hennion 1999). Hennion's exploration of the sequencing of activity and passivity vis-à-vis technical objects echoes the idea of a 'dance of agency' developed by Andrew Pickering (1995) in his studies of scientific work in particle physics and mathematics. What brings Hennion

and Pickering together, despite their disparate empirical objects, is a shared attunement to the *temporal* dimension in the emergence of agency.

7 Frank Cochoy (2008) has introduced a range of terms—for example, qualculation, calqulation—to capture the "impure" forms of arithmetic that characterize market behavior.

8 For extended empirical elaborations of how a market emerges from the assembling of material mediations and technical capacities, see Coray Çalışkan's (2010) sociology of the international cotton market or Vincent Antonin Lépinay's (2011) study of equity derivatives.

9 There are resonances but also clear differences between the ANT notion of *agencement* and the sociological notion of *embeddedness*. Both characterize economic action as emerging out of complex patterns of relationality. Granovetter's understanding of "network," for instance, is not too dissimilar from ANT's: he sees networks as creating new economic realities through their shape or morphology, rather than as simply connecting preexistent actors and interests (Granovetter 1983, 1985). Yet the differences are perhaps more telling. In ANT, an economic agent is not (commonly) an individual, let alone a human one: it is typically a hybrid (or cyborg) combining a multitude of human and nonhuman elements. Furthermore, in Granovetter's work, and in economic sociology more generally, economic action tends to emerge and flourish through the multiplication of connections. ANT, in contrast, tends to dedicate greater attention to acts of disconnection and disentanglement, to how the form of calculativeness specific to a market economy emerges out of processes of severance or framing.

10 In Latour's later work, hesitation would become one of the hallmarks of the religious "regime of enunciation," or of religion as a "mode of existence" premised on dubitation and reprise. "The Scriptures," Latour (2013a, 310) writes, "are only an immense hesitation about how to comprehend a message whose distinctive feature is that it transports no information and requires that it always be given a new direction in order to correct its interpretation."

11 Latour has noted the influence of Gabriel Tarde's (1843–1904) monadological sociology on this conceptualization of a sociology of associations. The recuperation of Tarde's oeuvre has allowed Latour (2002) to present ANT as the alternative to a mainstream sociology founded on Émile Durkheim's injunction to consider "social facts" as *things*.

12 An important precursor within ANT of this program is John Law's (1994) book *Organising Modernity*. Based on an ethnography of a nuclear research center, the book addressed itself explicitly to social theory and defined the social as a materially heterogeneous ordering process. Law expands some of the methodological ramifications of this work in his book *After Method: Mess in Social Science Research* (Law 2004).

13 As Latour (2014a) argues elsewhere: "There is a huge difference between being "modern" and being "contemporary." Actually knowing how to become a contemporary, that is, of one's own time is the most difficult thing there is."

14 Latour's use of "modes of existence" in AIME resembles the category of the "metapragmatic register" in Luc Boltanski's (2011) reformulation of the critical mission of social theory. Both

authors are attempting to develop a critical apparatus that builds on the critical capacities of the actors they study but also possesses its own normative orientation, or pulse. For an analysis of the affinities between ANT and Boltanski's sociology of critical capacities see Guggenheim and Potthast (2012).

16 The self-avowed provincialism of AIME is best understood as analogous to the "provincialization of Europe" proposed by Dipesh Chakrabarty (2000), an author who shares with Latour a desire to resituate political and moral reflection in context of the Anthropocene (see Chakrabarty 2009).