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Mapping 'the ANT multiple': A comparative, critical and reflexive analysis

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Abstract

Despite decades of development, Actor-Network Theory (ANT) continues to be characterized by a good deal of ambiguities and internal tensions. This situation has led to a suggestion that instead of one ANT it may be meaningful to speak of ‘the ANT multiple’. Following this line of reasoning, this article aims to create a map of the variety of positions riding under the ANT banner. Based on an in-depth reading of ANT literature, seven different interpretations of ANT are identified and subjected to critical analysis while accommodating for the concerns of ANT proponents about the way ANT has been previously criticized. The results of the analysis serve to increase the reflexivity of both sides of the debate about their underlying assumptions, and provide suggestions how ANT could be employed, developed and criticized more productively in the future.

Keywords: Actor-Network Theory, comparative analysis, reflexive critique

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“ANT is the story of an experiment so carelessly started that it took a quarter of century to rectify it and catch up with what its exact meaning was” (Latour, 2005, p. 88).

In recent decades mainstream social theory has come under sustained criticism from two camps: relationalist and materialist. The proponents of the first (e.g. Emirbayer, 1997; Crossley, 2011; Donati, 2011; Powell & Dépelteau, 2013) claim that by privileging relations over substances many long-standing sociological dilemmas, such as the structure-agency problem, can be reformulated or sidestepped (Dépelteau, 2008). The proponents of the second (e.g. Rammert, 1997; Preda, 1999; Wajcman, 2002; Dant, 2006; Urry, 2007; Law, 2008) argue that even mundane sociological processes make little sense without reference to material and technological elements that have a crucial role in shaping human action. It is no wonder then that Actor-Network Theory (ANT), an approach based on relational materiality (Sismondo, 2010, p. 86), has recently experienced explosive growth in popularity: in recent years references to ANT have almost doubled.² Originating from the domain of Science and Technology Studies (Latour & Woolgar, 1979), ANT has increasingly come to be seen as a source of inspiration in fields as diverse as economic geography (Müller, 2015), tourism studies (van der Cuim et al., 2013), information systems analysis (Sarker et al., 2006), educational management (Mulcahy & Perillo, 2011), sociology of cosmopolitanism (Saito, 2011), or maritime archaeology (Dolwick, 2009). ANT’s frequently stated promises include a radical re-imagining of sociology on a basis of an ontology that treats humans and non-humans “symmetrically”, its problematization of many assumptions (e.g. micro-macro, society-nature) taken for granted by most existing approaches, and its minute attention to tracing how connections between social, material and discursive elements are actually weaved together into

coherent and mutually supporting networks of relations. As such, it is being hailed as “one of the most exciting attempts in recent years of renewing the sociological enterprise from scratch” (Krarup and Blok, 2011, p. 57). The question whether ANT really delivers on its promises thus warrants increasingly serious attention.

That is not to claim that prior criticism of ANT has been missing. On the contrary: as a highly provocative approach its virtues and vices have been hotly debated for decades (e.g. Russell & Williams, 1988; Amsterdamska, 1990; Bloor, 1999; Elder-Vass, 2008, 2015), resulting in an array of reformulations and refinements. However, critical engagement with ANT has often meant an attempt to ‘pick the winner’: sorting through various arguments, often in painstaking detail, making a selection from these claims and thereby imposing a preferred reading on the ANT text corpus. Having isolated a ‘true’ ANT alternative viewpoints, whether offered by critics of ANT or its various proponents, can now be dismissed as offhand claims, hyperbole, irony or misinterpretation; in any case, something not worth further consideration.

At the same time there seems to be a feeling among many that this strategy has not actually led to an increasingly convergent understanding of the approach but rather to a real cacophony of voices. It is for this reason that, after all these years, Müller still finds that “defining ANT is far from straightforward” (2015, p. 66), while Gad and Jensen go even further suggesting that “ANT cannot be defined as *one* singular entity but may be rather viewed as a multiplicity – the ANT multiple” (2010, pp. 75-76). This view then seems to support the image of ANT as a common denominator for a variety of viewpoints characterized by substantial differences. Every new attempt to isolate a ‘true’ ANT would only amount to yet another interpretive choice expressing the underlying preferences of the analyst. At worst the reduction of ANT to one clearly defined position would result in ignoring the diversity of the many fertile viewpoints riding under the ANT banner. To date the latter line of reasoning, although implicit in ANT literature, has not been pursued in detail. However, if this diagnosis of state-of-the-ANT is to be accepted it would quickly lead to a

number of difficult and important questions. How many ANTs are there? How do these ANTs differ? To what extent have the proponents and critics of ANT been talking past each other? What are the implications of adopting a particular interpretation of ANT? Are some ANTs better than others? If so, then on what grounds can one make the claim? All these questions are central, not only to those employing ANT but also to those wishing to expose and address its shortcomings. It is clear then that simply stating ‘the ANT multiple’ does not get us very far: the concept needs to be opened up for close scrutiny. This is what the following account sets out to do and this is what distinguishes it from other existing analyses.

The main argument advanced in this paper can be summarized as follows:

1. ‘Actor-Network Theory’ is an umbrella term for a variety of positions differing by their ontological and methodological assumptions as well as the role of ANT in the process of scientific enquiry;
2. At least seven different positions can be identified in the ANT text corpus. Each of these emphasizes specific aspects of ANT, yet none of them seem to capture the approach in its full diversity;
3. These interpretations have some overlapping aspects and they may occur together in specific accounts: however, at least to some extent, they are logically incompatible, which makes it meaningful to speak of them as distinct positions;
4. If taken at face value, each of these positions entails certain strengths and weaknesses. Some of these have been recognized in prior debates on ANT while some have not;
5. This situation is problematic because, to date, both the proponents and critics of ANT continue to operate on implicit but sometimes quite differing assumptions about the approach. The resulting confusion manifests itself in various ways, e.g. the presence of multiple positions within the bounds of one ANT account without any indication that the

author is actually aware of this tension, or a frequent claim that ANT has been misunderstood by its critics;

6. In addition to the claim of misunderstanding, ANT proponents have often mobilized two additional arguments to overturn the critique of ANT. All three reflect legitimate concerns about the way ANT has been treated by its critics, but can also be used as rhetoric devices for avoiding substantial engagement with critical arguments.
7. Therefore, the opening up of ‘the ANT multiple’ requires the analysis to be comparative, critical and reflexive. The following analysis satisfies all these criteria. It is comparative in seeking to identify, systematize and contrast various positions on ANT without prioritizing or excluding any interpretation from the outset. It is critical in seeking to uncover the strengths and weaknesses of each version, systematizing existing critique according to specific readings and constructing original arguments where necessary. It is reflexive in that, instead of simply imposing some implicit evaluative standards on ANT, the account also seeks to anticipate and accommodate the prior concerns of ANT proponents about the critique of ANT;
8. The resulting map of ‘the ANT multiple’ constitutes a distinctively novel contribution to existing literature, enabling the increase of the reflexivity of both ANT proponents and opponents about their underlying assumptions, and providing suggestions how the approach could be developed and criticized more productively in the future.

Some brief methodological notes: first, all the following interpretations have been developed inductively. In other words, there were no prior theory-led expectations guiding the search for different assumptions on which different ANT accounts are based but they emerged gradually through my in-depth reading of ANT literature. This is because of the implicit nature of various assumptions embedded in ANT accounts that often require considerable interpretive effort to be teased out. Second, for the sake of stylistic variety, this paper treats ‘interpretations’, ‘readings’,

‘positions’ and ‘versions’ of ANT as synonyms. Third, it must be stressed that the unit of analysis of this paper is an interpretation of ANT. In other words, if we have three texts, A, B, and C, then text A may have features of interpretations x and y, text B may include features of interpretations y and z, while text C may contain features of interpretations x and z. The aim of the current analysis is to abstract x, y and z from A, B and C, and to subject the former, not the latter, to a close analysis. I thus recognize my role as an analyst in selecting these positions, yet I also claim that in so doing I have identified real, significant and consequential features of ANT.³ All these interpretations can be seen as component parts of the overall ANT corpus yet – as the following article attempts to demonstrate – they do not add up to a coherent whole. (Moreover, as we will see below, some ANT proponents would argue that they might not have to.)

The core part of the paper is divided in seven sections. Each section contains a summary of the interpretation and a discussion of its strengths and weaknesses. The readings are illustrated by quotes from the literature as well as examples from empirical studies, purposefully chosen from different decades and disciplines to indicate that the particular reading is not an idiosyncratic remark but rather a durable feature of the ANT text corpus. Readings 1-3 focus on the differing roles of ANT as an ontological framework in the research process. Reading 4 discusses the controversies around ANT’s applicability, while Reading 5 treats ANT as a set of methodological guidelines. Reading 6 analyses ANT as a combination of ontological and methodological assumptions, while Reading 7 follows the implications of refraining from defining ANT in these terms altogether (see figure 1 for a visual summary of the readings). I will then turn to the discussion of the three ways in which ANT proponents have responded to the critique of ANT and to the rather surprising implication of combining these defences. The final section summarizes the findings and thereby provides a set of suggestions how the approach could be developed further.

[Insert figure 1 around here]

1st reading: ANT as a sensitizing framework

A first way to read ANT is to focus on the ‘theory’ part of the framework. Following Abend’s distinction between seven different meanings of ‘theory’, ANT can be considered “a *Weltanschauung*, that is, an overall perspective from which one sees and interprets the world” (2008, p. 179). This includes

“the nature of the location from which we look at the social world,⁴ the lexicon and syntax by means of which we talk about it, the nature of our conceptual scheme, the categories into which we group things, and the logical relations that there can be between concepts”

that, in turn, depend on implicit or explicit ontological and epistemological views of

“what can be known, what is worth knowing, what kind of questions can be asked, what counts as good evidence, whom are we talking to, what the social world is made of, what properties can these entities have, how they fit together, and so on” (ibid., pp. 179-180).

This definition fits well with the call from Callon and Latour for the creation of “a common vocabulary and a common ontology” (1992, p. 359), which would make it possible to observe the widest variety of human and non-human elements as well as associations between them without amounting to a set of propositions on the forms these associations can take (Latour, 1996, p. 10). In other words, according to this reading ANT is a non-explanatory framework providing a useful ontological language for speaking about the world instead of making empirically verifiable statements about it.⁵

In the most thorough analysis of ANT's philosophical underpinnings to date, Harman summarizes its basic assumptions as follows: 1) the world is made up of actants; 2) which are not "inherently reducible or irreducible to any other"; 3) linking to each other by translation, and; 4) gaining or losing strength not by their inherent essences but alliances to each other (2009, pp. 14-16).

Therefore, ANT invites us to cast the conventional distinctions (e.g. between natural and social, humans and non-humans, structure and agency) into the "bonfire of dualisms" (Law, 1999, p. 3), distinguishing it from a majority of philosophical and metatheoretical approaches that often treat these categories as a relatively unproblematic starting point of enquiry.

A recurrent critique of ANT (e.g. Amsterdamska, 1990; Bloor, 1999; Elder-Vass, 2008) accuses it of failing to make sufficiently rigorous and clear distinctions between certain categories. For example, it is argued that the treatment of human and non-human elements with the same vocabulary threatens to lead to ascribing anthropomorphic qualities to entities that lack them, or stripping these qualities from those that do actually possess them (e.g. scallops performing 'betrayal' as described in Callon's (1986) study) (Elder-Vass, 2008). However, according to this reading, such a critique is misplaced because ANT operates deliberately on a level of abstraction in which

"it is not possible to separate out (a) the making of particular realities, (b) the making of particular statements about those realities, and (c) the creation of instrumental, technical, and human configurations and practices, the inscription devices that produce these realities and statements. Instead, all are produced together" (Law, 2004, p. 31).

In other words, since ANT's level of generality is higher than that of any other ontological framework in existence, the differences singled out as crucial by the critics (e.g. those between nature and beliefs about nature, or humans and non-humans) do not even enter the picture. For example, the talk of 'translations between actants' includes all kinds of entities with all kinds of

properties entering all kinds of interactions and exhibiting all kinds of outcomes, whether these are the atoms of hydrogen and oxygen in a chemical reaction, a tooth fairy leaving money under the pillow, or a morbid Heidegger applying a hammer. Whether some entities have distinctive properties or whether some are capable of specific interactions is already a matter of empirical specification.

However, at this point it must be immediately noted that despite all the rhetorical claims to the contrary (e.g. Latour, 2005, p. 49), ultimately ANT's vocabulary does remain a metatheory of sorts, albeit a very minimal and abstract one. This brings us to the question whether the analytical move of raising the level abstraction to unprecedented heights has any practical value. Indeed it seems that in many cases the answer is affirmative. For example, Dolwick argues that ANT is more useful for maritime archaeology than other social theories because "within ANT, an actor (actant) may be anything: an insect, a boat, a person, a government, the unconscious, virus etc. ... It allows us to study just about anything – including ships and boats" (Dolwick, 2009, p. 45). Similarly, in information systems research Sarker et al. (2006) suggest that by avoiding *a priori* distinctions between humans and non-humans, micro and macro actors, stable and unstable situations, ANT vocabulary is better able to capture real-life complexity. Even those more critical about its tenets praise it as "theory as enlightenment" (Geels, 2007, p. 632) that enables one to deconstruct the basic assumptions of established disciplines and to offer fresh perspectives. For example, Elder-Vass has suggested that ANT directs attention to three aspects currently ignored or under-addressed by the proponents of critical realism: 1) raising awareness about the extent to which 'the *actualities* implicated in sciences' (e.g. genetically engineered life-forms) are subject to human construction; 2) turning attention to the need to make the mediation between large-scale social structures and local action explicit; 3) highlighting the role of non-human elements in shaping social events (2008, pp. 471-472). One would expect, then, that studies employing ANT as a sensitizing framework should

easily be able to illuminate the blind spots of existing philosophical and (meta)theoretical approaches and indicate how ANT can be used to transcend them.

However, the question remains what is to be done after ANT has performed the awareness-raising work? Could one not simply re-work the knowledge gained from temporarily adopting a more abstract perspective into frameworks capable of making more analytical distinctions than ANT itself? After all, Elder-Vass did not seek to replace critical realism with ANT but attempted to use the latter to see how the former might be improved so the modified critical realist philosophy, in turn, could be used for constructing a more nuanced sociological metatheory. Formulated in such a manner, almost any philosophical framework or sociological metatheory could be reframed as simply a special case of ANT. However, whether ANT positioned as such would have anything else to offer beyond a few sensitizing qualities remains problematic. For this reason it may be helpful for studies using only ANT itself to provide a transparent argument on why no attempts have been made to integrate ANT's sensitizing qualities into more nuanced frameworks.

Moreover, despite its apparent simplicity, ANT's basic ontology continues to be problematic for at least three reasons: 1) ambiguous positions on a number of issues, e.g. the extent to which non-humans have agency (Sayes, 2014) or the presence of contradictory ways to read the claim that the world exists only as assemblages (Elder-Vass, 2015); 2) logical problems stemming from the wholesale adoption of Latourian relationalism, e.g. its inability to explain change (Harman, 2009, pp. 122-134); 3) unsolved issues, e.g. how to avoid the lapse into an infinite regress of mediations when explaining how translation occurs (Harman, 2009, pp. 144-147). This is not the place to go into detail with each of these arguments – they simply serve as a reminder that many ontological aspects of ANT are still open for debate and cannot be infinitely postponed simply by switching to a higher level of abstraction or claiming not to 'do theory' at all.

In this section ANT has been treated as a non-explanatory ontological framework that, owing to its sensitizing qualities, provides a good starting point for conceptualizing the world. Its virtues of

abstractness enable the distancing of ANT from many traditional quarrels, thus possibly paving the way for new and interesting syntheses of various philosophical schools or sociological metatheories that could then feed back to each other – and to ANT itself. However, this view runs counter to ANT's repeated stress on closely following the empirical phenomena. After all, the amount of detail in ANT case studies is often overwhelming. Therefore, the following interpretation takes a more worldly view of ANT by committing its deployment to particular research outcomes: descriptions or middle-range theories.

2nd reading: ANT as a structuring tool for description/middle-range theory

A line of reasoning in ANT suggests that the framework can be used to improve descriptions of empirical phenomena. Thus Latour proposes:

“Every time we deal with a new topic, with a new field, with a new object, the explanation should be wholly different. Instead of explaining everything with the same cause and framework, and instead of abstaining from explanation in fear of breaking the reflexive game, we shall provide a one-off explanation, using a tailor-made cause. I am all for throw-away causes and for one-off explanations” (1988, p. 174).

The distinction between description and explanation is claimed to be a ‘false dichotomy’:

“Either the networks that make possible a state of affairs are fully deployed – and then adding an explanation will be superfluous – or we ‘add an explanation’ stating that some other actor or factor should be taken into account, so that it is the description that should be extended one step further. If a description remains in need of an explanation, it means that it is a bad description” (Latour, 2005, p. 137).

The end result of research is nothing more than a ‘thick description’ of the situation, ANT acting as an ontological mid-point for achieving it.

Characteristically to the overall debate, various commentators hold quite different views about this stance. For example, from a critical realist perspective ANT’s empiricism is seen to be too restrictive by missing out on unobserved mechanisms (Elder-Vass, 2008), whereas for others (Krarup and Blok, 2011) ANT has not been empiricist enough! However, leaving metatheoretical preferences aside, let us assess the merits of the argument in its own terms: if ANT is to be used as a structuring device for descriptions or middle-range theories then what would be the implications of this move?

At least three problems instantly emerge. The first is a well-known critique of inductivism: observation is always theory-laden and thus every act of description already involves interpretive choice. Krarup and Blok take an example of Callon and Latour writing about Renault’s involvement in developing an electric car. At one point the following claim is made without any justification: “Renault wants to remain autonomous and indivisible, itself deciding what will be the social and technical future of the industrial world” (1981, p. 290, quoted in Krarup & Blok, 2011, pp. 49-50). As Krarup and Blok argue, the problem with this description is that it implicitly ascribes Renault a common sense role of a corporation seeking to maximize its power whereas other potential, possibly complementary or even alternative explanations about its motives (e.g. environmental concerns) are being pushed aside. Therefore, ANT’s seeming flexibility may lead to an opposite result of what was initially intended: insufficient reflexivity on the analyst’s part and hence a largely unrecognized reliance on common sense explanations.

The second problem concerns the distinction between description and explanation. Traditionally description is said to answer the ‘what’ question while explanation answers the question “why we observe what we observe” (Hedström & Bearman, 2009, p. 9). In ANT’s terms, however, this would

only mean that the existing description is insufficient and new factors should be added. The problem is that each ‘why’ adds new ‘whats’ requiring ever more ‘whys’. So unless we trace the actors back to the beginning of the universe and down to the elementary particles in principle, every description can be extended – making it a bad description by definition. Hence it becomes easy to understand why the question of when to ‘cut the network’ (McLean & Hassard, 2004) remains one of ANT’s most troublesome issues that cannot be simply swept aside – especially when it might be argued that ANT is biased towards the complexification of *every* phenomenon (see Reading 6).

Third, one may well wonder that if one is required to describe carefully and thoroughly then why should one adopt ANT for framing this task? Why not other frameworks? This is the thrust of Buchanan’s critique (1991) that advocates a critical narrative approach to the history of technology. Law’s response (1991) is correct to point out that such an approach depends on certain assumptions: however, the same also applies to ANT itself. One could claim that since ANT’s initial assumptions are more flexible than those of other approaches, ANT would allow the achievement of more thorough descriptions. However, this claim continues to be contested (see Kuukkanen, 2012). So as ANT has not become *the* framework for constructing ‘thick descriptions’ it leaves us with two possibilities: either other practitioners have yet to understand the true virtue of ANT or, alternatively, equally good means to achieve quality descriptions exist.

This interpretation also has a specific implication. Namely, there would be no reason to include ANT’s own vocabulary in the final description. This is because every time a description is framed in ANT’s terms – for example, calling an insect an actant (Dolwick, 2009) or referring to the visionaries in Electricité de France as ‘engineer-sociologists’ (Callon, 1987) – a move from a particular empirical situation towards a more general analytical concept is already being made. The particular is abstracted, some of its specificities removed: in other words, it has already been theorized (albeit in a very minimal sense). If, however, a thorough and attentive description really was the end goal of research, then re-insertion of ANT categories would serve no purpose

whatsoever. Therefore, the very fact that it continues to be done on a regular basis indicates that there is no unequivocal support for this reading in the ANT community.

Of course, not all researchers may feel comfortable with 'thick descriptions' as end products of their analyses. Instead many may seek to arrive at a set of explanatory propositions about a specific empirical domain involving a limited number of interrelated concepts, that is, at middle-range theory (Geels, 2007, p. 635). In terms of its level of abstraction, this type of theory would fill the gap between 'thick descriptions' and ANT's own extremely abstract analytical vocabulary. Here the use of ANT as a structuring ontological framework would enable researchers to create or refine theories strongly grounded in data while avoiding being constrained too early by oversimplified social theoretical concepts.

Indeed, this practice seems to have been (implicitly) followed in many studies. For example, in their analysis of business process change failure in an American telecommunications company, Sarker et al. (2006) highlight the blind spots of some management theories and offer nine theoretical statements using ANT's concepts. However, instead of stopping the analysis at that point, the statements are then used to improve specific aspects of existing management theories: for example, relating the changes in the direction and content of organizational communication to different phases of translation (*ibid.*, pp. 81-82). So in this case the rather general initial theorization of events in ANT's terms was used as a direct input for much more bounded theories about managing business process change.

As with description, the framework selection problem also remains relevant here: if ANT is to be used for constructing middle-range theories a reader would likely benefit from an explanation of why ANT should be preferred to alternative approaches, say critical realism, that could also be used for similar purposes. One would also like to find out how exactly ANT was used in the theorization process in order to move from ANT's own categories to middle-range concepts and propositions.

Increased clarity in these aspects would perhaps make it easier for the not-so-convinced reader to accept the added value of employing ANT as an ontological structuring device.

3rd reading: ANT as an end-point of analysis

Let me use Callon's seminal study (1986) to introduce the next interpretation. His account follows the attempts to save the population of scallops of St Brieuc bay from decline. In order to realize that goal, three marine biologists define the 'interests' of three communities – fishermen, scientists, scallops – through a proposed research programme. It is claimed that by finding out how the scallops anchor themselves to the collectors immersed in the sea, each community can benefit: the scallops survive, the long-term economic interests of the fishermen prevail and the scientific community gains new knowledge. By various techniques the associations between the elements are then forged, e.g. towline and collectors for scallop larvae or texts and documents aimed at the scientific community. Such a definition and coordination of roles demands active 'negotiations' between the elements. It turns out that a number of factors, such as currents and parasites, make it difficult for the larvae to anchor and survive. However, some that nevertheless seem to have anchored are treated as proof of success and hence become the 'representatives' of other scallops. The scientists and fishermen, in turn, are represented by their spokesmen. However, additional experiments on anchoring the scallops fail. Then some fishermen go out on the sea to catch some protected scallops. The alliance that seemed so strong is suddenly being 'betrayed' by its elements. It is interesting to observe here how Callon has divided the events of this narrative into 'four moments of translation': 1) problematization, consisting of interdefinition of actors and establishing obligatory passage points; 2) locking allies into their places by various devices of intersement; 3) enrolling the actors to ensure they keep performing the roles allocated to them; 4) mobilization of the allies and testing the representativity of their spokesmen. In this case a further event was added, for 5) dissidence and betrayal by allies also occurred meaning that the translation was not entirely

successful. He states that “translation is the mechanism by which the social and natural worlds progressively take form” (1986, p. 213). He also makes references to mechanisms specific to each phase: for example, enrolment is said to operate through physical violence, seduction, transaction or consent without discussion. It is therefore not a big stretch of the imagination to read Callon’s study as a (proto-)theory of translation: perhaps as a cycle of five phases explaining how the closure between the elements of the actor-network is achieved and how it might be reopened. What is truly notable here is that the description of empirical events in ANT’s terms remains an *end result* of the paper. A subtle shift from non-explanatory to explanatory theory is thus being made here: but with this the criteria of evaluating ANT studies change too. And this, in turn, raises the question about the types of research domains in which ANT as an end point of analysis might yield useful results. Let me use two recent studies to highlight the issues at stake. The first one comes from Storni (2012) who describes a process of designing a piece of jewellery. Drawing on ANT, he conceptualizes the emergence of a certain design trajectory as orderly practices coming to dominate over unexpected and surprising movements: phenomena he calls ‘objectifying’ and ‘thinging’ tendencies respectively. The trouble is that whereas Storni’s empirical case description is rather detailed the eventual generalization is not, for it is one thing to observe a shift from chaotic to orderly practices, but are there different patterns of how this might occur? Does the duration and intensity of these processes depend on what is designed? Or who does the designing? What other factors affect this process and in which direction? Considering the complexity of the account itself, one cannot escape the feeling that much more could have been teased out from the case. Carroll seeks to “rethink the ontology of the technoscientific state through the tools of actor-network theory” (2012, p. 489). His article uses ANT terminology to provide a detailed and nuanced description of the evolution of water management issues in California between 1850-1915. However, the concluding section argues that the state is a ‘complex assemblage of humans and non-humans’ and identifies a paradox: as the actual complexity of the state increases it becomes more

and more referred to as a ‘thing’, somehow separated from the people part of it (ibid., pp. 511-512). There are no serious attempts to solve this paradox or to offer more specific theoretical statements on the evolution of the technoscientific state. Conceptualization in ANT terms remains the end point of analysis, leaving an impression as if ANT was accepted as *the* theory of a technoscientific state. The conclusions of both studies immediately lead to a question about whether existing theories of design and state formation have so far really been completely blind to the observations uncovered by these ANT accounts? Indeed, if they had, were there other frameworks or theories besides ANT that could have been drawn on to formulate more accurate propositions? In fact, even a cursory look at the existing literature would suggest so. For example, evolutionary approaches have conceptualized innovation as a cycle of variation, selection and retention, and developed a number of hypotheses to describe and explain this process in detail (e.g. Tushman & Murmann, 2002; Schot & Geels, 2007). It would not be a big stretch of the imagination to assume that the design process would also involve selection from an increasingly narrowing set of alternatives. And regarding state-formation, the role of technological change in facilitating shifts to polities operating on increasingly larger scales has long been recognized in world-systems literature (Chase-Dunn & Hall, 1997; Chase-Dunn et al., 2010). Again, the virtues and vices of these particular theories are not important here for they serve to illustrate a more general point: as long as ANT remains the end point of analysis, as long as there remains a large gap of abstraction between ANT’s terms used to frame the events and the events themselves, comparison with existing middle-range theories is always warranted, and if this comparison seems to weigh against ANT its use would need a most careful justification indeed.

The fundamental problem is that using ANT as an end result of analysis seems to have inherent limitations. Weick (1999) suggests that every theory makes a trade-off between three dimensions: 1) generality/scope; 2) simplicity/parsimony; 3) accuracy/specificity. Geels (2007) has applied these dimensions to ANT and concluded that it is “characterized by a gap between relatively simple,

sensitizing conceptual schemes and detailed, complex case descriptions with some empirical generalizations” (2007, p. 633). In other words, the very fact that ANT’s concepts are extremely abstract and its vocabulary relatively parsimonious makes it quite ill-equipped for middle-range theorizing.

Does that mean there is no point at all in using ANT as an end point of analysis? Again, the answer is not that straightforward for there are instances whereby such a strategy might prove quite fruitful. Take sociological grand theory for example. I am completely aware that for most in the ANT community this suggestion would amount to sacrilege, demonstrating a fundamental misunderstanding of what ANT is about. Then again, let us remember that – and I would be the first one to admit that it often seems otherwise – the sole aim of sociological grand theory has not been to produce more sociological grand theory, nor has it necessarily aspired to restrict itself to developing different meta-languages (although it definitely does that as well). Instead the endless wars between various conceptual frameworks have always reflected a common underlying concern about sensitizing values; this is because each meta-language enables us to capture some important slices of reality while neglecting some aspects deemed crucial by the competitors. Furthermore, when at their best, the likes of Marx, Luhmann or Giddens go far beyond scholastic debates to identify, describe and explain societal trends and phenomena, to discuss the contrasts between the past and the present, as well as the possible futures towards which we may be heading. In fact, grand theory has always sought for common denominators from the large web of complex interactions between various entities to reveal something novel, surprising and of long-lasting value about the way societies function – it is indeed vast in scope but not as disconnected from the real world as its opponents would have us believe.

Admittedly, this path has not been the one often taken by ANT proponents: partly because of the extraordinary combination of ambition, courage and capability required by the task, but more importantly, I think, because of the natural instinct of many ANT proponents to resist anything that

may be perceived as yet another ‘grand narrative’. Yet, if ANT’s claim about the supremacy of its symmetrical vocabulary is true, then by its very design it should have a head start in assembling such narratives! So where are the works changing our conceptualization and understanding of modernity, demonstrating the importance of non-humans in shaping and sustaining modernity and problematizing ‘society’ as a proper unit of analysis? Well, what about *We Have Never Been Modern, Politics of Nature* or *An Inquiry into Modes of Existence* (Latour, 1993, 2004, 2013)? I think all would qualify as grand theoretical works without being the ‘sociology of the social’ Latour himself (2005) has tirelessly mocked. But do these works still qualify as ANT? We will take up this question in Reading 6. For now we will turn to a reading that focuses on the question of ANT’s preferred domain of applicability instead.

4th reading: ANT as a framework for exploring ‘fluid’ situations

The fourth reading implies a certain division of labour between more traditional social theory and ANT. As Latour argues:

“It’s true that in most situations resorting to the sociology of the social is not only reasonable but also indispensable, since it offers convenient shorthand to designate all the ingredients already accepted in the collective realm. It would be silly as well as pedantic to abstain from using notions like ‘IBM’, ‘France’, ‘Maori culture’, ‘upward mobility’, ‘totalitarianism’, ‘socialization’, lower-middle class’, ‘political context’, ‘social capital’, ‘downsizing’, ‘social construction’, ‘individual agent’, ‘unconscious drives’, ‘peer pressure’, etc. But in situations where innovations proliferate, where group boundaries are uncertain, when the range of entities to be taken into account fluctuates, the sociology of the social is no longer able to trace actors’ new associations. At this point, the last thing to do would be to limit in advance the shape, size, heterogeneity, and combination of associations. To the convenient shorthand

of the social, one has to substitute the painful and costly longhand of its associations” (2005, p. 11).

In brief, “new topics, that’s what you need ANT for” (ibid., p. 142). Thus ANT as a ‘sociology of associations’ becomes limited to exploring the domain of the ‘fluid’ whereas conventional social theory retains its usefulness for stable situations.

The trouble is that this still leaves ANT’s role in the research process open: is it meant to be a structuring tool for better ‘thick descriptions’ of ‘fluid’ situations? Or for middle-range theories of the latter? Or does ANT as an end-point of analysis constitute *the* theory of the ‘fluid’ instead? Depending on the type of question asked and the type of research undertaken it can be any of those but in each case a reader of an ANT study would benefit from making this choice explicit. More importantly, however, each choice raises the need for further justifications. For if the last claim was true then one could ask why ANT as *the* theory of the ‘fluid’ should be preferred to other general approaches to complex situations, e.g. complexity theory (Byrne, 1998) (see Reading 1). On the other hand, the mere existence of various middle-range theories devoted to the study of complex situations demonstrates the possibility of finding a niche between very general conceptualizations and idiosyncratic story-telling, thereby posing problems for reading ANT as a stand-alone theory or a tool for ‘thick descriptions’ (See Reading 3). The second position, however, would bring us back to the need to demonstrate that ANT has indeed played a systematic and consistent role in shaping middle-range theorizations of ‘fluid’ situations. Alas, at best one can say that, although ANT has been occasionally deployed in such a manner, this use has not been a dominant one.

Geels’ multi-level theory of socio-technical transitions (2002, 2005) provides an instructive example of how ANT’s insights are commonly used instead. His theory conceptualizes shifts from one socio-technical system to another (e.g. from sailing ships to steamers) as an interplay between established ‘regimes’, emergent ‘niches’ and exogenous ‘landscape’ processes. The timing of

interactions between niches, regimes, and landscape results in different transition patterns (see Geels & Schot, 2007, for a full typology). Arguably the transition is a complex process involving uncertainty in a number of dimensions, e.g. the need for new regulations, change in user habits, choice between different technological niches, potential dominant designs, new supply chains, etc. – in other words, it can be well characterized as a ‘fluid’ situation.

It is notable how Geels handles ANT: on one hand he acknowledges ANT’s heuristic value for directing attention to the mutual interaction between human actors, socio-technical systems and rules/institutions. ANT’s sensitizing qualities are built into a metatheory framing the study of transitions (2004, pp. 902-904). On the other hand, he criticizes ANT’s vocabulary for being too simplistic for middle-range theorizing (2007, p. 633). Accordingly, no attempt is made to provide descriptions/explanations of transitions in ANT terms, either as a mid- or end-point of analysis. So while transitions theory offers a positive case of ANT influencing middle-range theorizing it can be seen at the same time that ANT’s role still remains limited to offering a few general observations. Moreover, there are some grave difficulties with maintaining the division-of-labour argument when one reads bold statements such as “society itself is to be rethought from top to bottom once we add to it the facts and the artifacts that make up large sections of our social ties” (Latour, 1992, p. 254). After all, the call to create a ‘common vocabulary and a common ontology’ would make little sense if the ambition was *not* to rewrite social theory in general. The impression that the latter has indeed been the goal is further consolidated when we recall that ANT has not limited itself to the domain of the ‘fluid’ but has sought to theorize socio-material stability on its own terms. For example, Callon (1991) has proposed the notion of ‘irreversibility’ to account for the durability of techno-economic networks. Arguments like these contradict reading ANT as a framework of/for the ‘fluid’ only.

5th reading: ANT as a set of methodological guidelines

All previous readings have assumed that, in one way or another, ANT is used as an ontological framework. This, however, has ignored explicit claims such as

“far from being a theory of the social or even worse an explanation of what makes society exert pressure on actors, it always was, and this from its very inception (Callon & Latour 1981), a very crude method to learn from the actors without imposing on them an *a priori* definition of their world-building capacities” (Latour, 1999, p. 20).

Indeed, elsewhere Latour has offered seven general principles to follow when constructing ANT accounts (1987, p. 258). According to this interpretation then, ANT is a set of methodological guidelines for conducting research, not an ontological starting, mid- or end-point of analysis. However, once accepted at face value this version too quickly runs into serious problems. The first, resulting from ANT’s suggestion to ‘follow the actors’ but lacking good criteria for ‘cutting the network’ (Bloomfield & Vurdubakis, 1999), has already been discussed (see Reading 2). The second is about the argument that by focusing on visible actants ANT might miss out silenced ones, ones with no voice, or ones whose structural location excluded them from participating in the network by the time the description of the analyst started (Russell, 1986; Klein & Kleinman, 2002). This, in turn, might simply lead to an incomplete analysis because some of the affected parties might go unnoticed. To remedy this situation Wyatt (1998) has proposed recourse to a higher-level principle where the accounts of actors and analysts would be treated symmetrically, allowing both types of accounts to simultaneously enter the research. Thus the research would be characterized by ongoing interaction between prior theoretical knowledge and actors’ own accounts. Alas, this move would contradict ANT’s frequent insistence on postponing the deployment of non-ANT theoretical categories as long as possible, or avoiding them altogether. Therefore, the decision to ‘follow the actors’ would require two additional clarifications: 1) why the privileging of actors’ own accounts

over the ones of the analyst would be justified in any particular case; 2) how the potential drawbacks of this move could be addressed and overcome.

Third, Gad and Jensen note that the texts by ANT proponents do not actually offer much practical methodological advice on how to conduct such studies (2010, p. 73). This goes for both data collection and analysis. For example, case studies employing ANT – including the ones referenced here – scarcely, if at all, explain the research procedure or how the interpretive leaps from specific empirical instances to general categories (and vice versa) were made. This often leaves an impression that what happened between case description and eventual theoretical categories was scholarly magic rather than a process of disciplined interpretation.

In this regard, grounded theory provides an illustrative counter-example. In its latest formulations (e.g. Charmaz, 2006) this approach has jettisoned some of the assumptions of the orthodox version (Glaser & Strauss, 1967), such that prior theoretical literature is allowed to influence the problem formulation, the focus can be either descriptive or explanatory, one can adopt an ‘objectivist’ or ‘constructivist’ stance, etc. Nevertheless the whole research procedure is mapped out in detail and clear instructions provided for each step of the research. The existence of such tools thus provides another challenge for the researcher employing ANT as a methodology/method: the need to be more explicit about what exactly it is that makes ANT stand out from other inductive approaches, what are the things ANT enables us to do better than the alternatives, and how this advantage has been realized in the actual research procedure. The reason to take this aspect seriously is that often the methodological virtues of ANT taken for granted by its proponents – for example, its ability to “trace and reconstruct associations and connections” or to “mobilize controversies”⁶ – might not be readily apparent to the non-ANT audience. It is likely that at least partly the reason lies in the high level of abstraction on which these claims about methodological advances have often been formulated making it quite difficult to tease out the specific implications for middle-range practitioners. To take an example: for researchers working in the context of democratic peace theory

the value of using process-tracing techniques to detect a mechanism that would explain why democracies do not go to war against each other (Beach & Pedersen, 2013, pp. 38-40) is likely much more readily understood than ANT's value of "mobilizing controversies".

Previous sections have made it quite clear, of course, that the practice of ANT, as well as reflections on it, betray the 'pure' methodological interpretation. ANT keeps being used as an ontological framework for both non-explanatory and explanatory purposes. So why insist on treating ontological and methodological arguments separately? Would not a synthesis of these approaches remove the problems associated with both?

6th reading: ANT as a balanced combination of methodological and ontological assumptions

In brief: no, it would not. It would enable the bridging of the either-ontology-or-methodology divide characteristic to previous readings, but apart from that not much else, because it would still leave us with an array of unresolved issues:

- 1) Contrasting definitions: what to make of one-dimensional definitions of ANT or ones refusing to treat it in ontological or methodological terms altogether (see Reading 7)?
- 2) Multiplicity of choices: is ANT a starting, mid- or end-point of enquiry? Is it meant to structure descriptions or middle-range theories? Does it aspire to compete with high-level frameworks or with middle-range theories? Is it applicable to all or only 'fluid' situations?
- 3) Reading-specific problems: what should be done about ANT's ontological ambiguities, how to justify cutting the network, what are its advantages compared to other inductive methodological approaches, etc.?

The problem is that since the positions identified above can be combined in various ways, a number of hybrid usages of ANT become possible. Hopefully the foregoing analysis has already managed to demonstrate that the full implications of adopting certain positions on ANT are far from self-evident while no position is unproblematic. Hence the reader of studies using hybrid ANT might benefit

from a more reflexive account of which particular interpretation of ANT has been chosen, which combination of ontological and methodological assumptions is used, and why it has been deemed most suitable for the topic at hand.

Latour has explicitly objected to seeing ANT as an innocent object “because tools are never ‘mere’ tools ready to be applied: they always modify the goals you had in mind” (2005, p. 142). The remainder of this section will discuss two ways in which this can happen if ANT is being used throughout the whole research cycle, from start to finish. The basic argument is that 1) ANT’s methodological assumptions demand a focus on complexity and attune one to finding it; 2) leading one to observe a high degree of complexity in virtually every phenomenon; 3) but also raising the probability that the research setting will be highly localized; 4) the findings can now be taken as a justification that the initial methodological assumptions ‘worked’ while existing concepts of other frameworks were indeed too simplistic; 5) allowing us to start another round of research with similar assumptions. In effect, ANT becomes a self-reinforcing framework characterized by two biases: treating complexity as an inherent value and missing out on certain patterns.

At first glance ANT’s inclination towards complexity can be seen as a rather ingenious solution to the question about its scope of applicability (see Reading 4): since every situation can be rendered ‘fluid’ ANT can be applied anywhere! However, thereby it becomes far too easy to make a leap to treating increased complexity as a self-evident and inherently positive outcome that needs no additional justification. The problem is that often the practitioners of different fields of knowledge are already quite aware of the underlying complexity. For example, most doctors and caretakers probably do not think of alcoholic liver disease as a simple problem: likely this is also the case for people researching its management. However, one can ask what exactly is to be gained if this disease is reconceptualized as a ‘fire object’, defined by “patterns of discontinuity between absence and presence” (Law & Singleton, 2005, p. 331)? Or is ANT really required to demonstrate that a – note the term – technoscientific state (Carroll, 2012) includes both human and non-human

elements? If the described situation remains complex but now does so in ANT's terms, is it necessarily better? In what way does the reframing of events enable our understanding of the situation to increase? Opening up the complexity may not be a bad move – this depends on the circumstances – but just because one can use ANT to observe more complexity does not mean that this strategy would be automatically useful in every instance. Making explicit the added value of complexification would therefore enhance the reader's appreciation of the merits of the ANT study. A continuous stream of ANT critique (e.g. Russell & Williams, 1988; Mackay & Gillespie, 1992; Winner, 1993; Bruun & Hukkinen, 2003; Geels, 2007) has noted its propensity to highlighting the locality, contingency, complexity, fluidity and unpredictability of various processes, often focusing on a phase in which the networks are highly malleable (for example, the early stage of technological development). Recently Williams and Pollock (2012) have suggested that this problem may be a sign of a deeper methodological bias. They bring an example from their own work: an analysis of the implementation process of an Enterprise Resource Planning system in a university. The initial findings were rather familiar: although the implementation of the system was deemed to have been 'successful', administrators resisted change by inventing an elaborate set of workarounds that enabled old organizational routines to continue. However, when observing the same setting a few years later, it was found that almost all workarounds had disappeared while organizational practices had now become aligned to ERP's original templates.

Williams and Pollock suggest that the problem with such 'snapshot studies' may lie in the fact that the researchers leave the site of enquiry too soon. This, in turn, leads to exaggerating the short-term uncertainty while missing out on medium- and long-term consequences. Why this is so is easy to understand if we recall ANT's insistence on following the actors, undertaking a costly and slow registering of associations (Latour, 2005, p. 121), and paying close attention to every little unpredictability and controversy, no matter how small and insignificant they might appear – stated as a criterion of good ANT study (*ibid.*, p. 61). In order to cope with the enormity of the task, it

seems quite natural to narrow down the empirical scope, to focus on a single case, a relatively limited geographical location and/or a short period of time.

The argument is similar for ‘structure’ – here taken to mean “conditions of action” (Sibeon, 2004, p. 54). Because of ANT’s methodological demands the research is likely to be a single case study attuned to observing unexpected outcomes. As a result, seemingly countless instances of actants deviating from the supposedly monolithic ‘structure’ can be detected. It seems quite natural then to dispense with the concept altogether since it does not seem to offer any explanatory power. Here, however, structure as a constellation of various rules and resources simply refers to systematic biases in behaviour *on average* and *on an aggregate level*. In other words, structure as a ‘condition of action’ operates on the principle of probabilistic, not deterministic causation. It means that a single localized case study cannot dismiss the general trend simply on the grounds that it has observed some deviations from it because the latter may well turn out to be insignificant on an aggregate level. Therefore, if ANT is to be used throughout the research process, the problem of potentially missing out on long-term and aggregate outcomes needs to be addressed.

There are roughly three ways to deal with this problem. One option would be to accept Law’s claim that in STS (ANT included) “theory is done in the form of case studies” (2008, p. 630). However, this would effectively amount to a form of denial that Russell and Williams (1988) have poignantly described as ‘opening the black box and closing it behind you’: if ANT cannot be used to answer certain questions then there is no point in posing those questions in the first place! I am not sure whether ANT proponents in general would be happy to maintain such religious purity, that is, remaining faithful to the case-based approach for the price of leaving big questions and topics in the hands of other scholars and disciplines.

Another option would be to follow Latour’s path and to enter the game of tackling the big questions such as the nature of modernity (Latour, 1993). However, this shift has a particular implication, namely, that the highly valued goal of tracing each and every actant as closely as possible would

have to be given up because it would be simply impossible for vast topics. So for an ANT proponent there seems to be quite an unpleasant trade-off between two options: either expand the scope of research losing an essential part of ANT along the way, or keep squatting in the box while repeating to oneself that there is absolutely no reason to leave. In this light the main difference between Law and Latour seems to be that whereas the former treats ANT as a combination of ontological and methodological assumptions in which ‘following the actors’ remains an essential element, Latour is willing to relax the latter assumption in order to be able to say something about the topics that could not be addressed otherwise.

At this point one could be reminded that, in practice, no ANT account has included each and every actant and no account ever will – although, depending on the length and depth of study, the chains of actants can be traced to varying extents. This argument, of course, would shift the debate back to the question of ‘cutting the network’ – an interesting and important issue in its own right but not exactly the one at stake here (see Readings 2 and 5). However, in my opinion, this seeming dilemma can be addressed even better by taking Latour’s claim that ANT enables one “to trace more sturdy relations and discover more revealing patterns” (2005, p. 24) seriously. I think it opens up a genuinely exciting possibility: putting Latour’s claim to empirical test while remaining true to Law’s dictum.

Let us return to Callon’s study on scallops (1986) to elaborate on this point. It was argued above (see Reading 3) that his piece could be read as a crude theory of translation as a five-phase process. Based on this reasoning one could probe the extent to which the hypothesized general model of translation holds, map alternative pathways and failed translations, discover the reasons behind deviations from the basic sequence, map the sub-mechanisms specific to each phase of translation, attempt to find out whether there are recurrent sequences of forming associations between actants and, if so, whether these can be grouped into clusters of some kind... The possibilities are endless, limited only by one’s imagination. This, however, would require moving from single case study

design to cross-case comparative or meta-studies. Considering the amount of ANT accounts accumulated over the past 30 years, the pool of cases would be impressive indeed. In principle, it would be possible to include each and every ANT study that has used the concept of ‘translation’ to date. The compatibility of relational approaches with large-scale studies, use of quantitative methods and pattern-detection has been demonstrated (see Abbott, 2001; Dépelteau & Powell, 2013), and it seems that, recently, ANT proponents have indeed made first steps in this direction (see Latour et al., 2012; Venturini et al., 2015). Such a research would enable the discovery of whether there are indeed some durable, recurrent and non-trivial (that is, non-intuitive) patterns between widely differing domains that other approaches have so far missed. If descriptions in ANT vocabulary really amount to better explanations, this would be the best chance to find out.

7th reading: the ANT undefinable

According to the last and very pragmatic interpretation, ANT needs to be neither coherent nor transparent, only useful in some respect. Therefore doing ANT is primary whereas reflections on its potentially contradictory qualities are secondary. This view is best summarized by Neyland when he ends his paper with the following words:

“ ...if this article forms one entity in a heterogeneous flow of further ANT accounts, then this may form and perform the disputable content to which other ANT accounts can attach, dispute, and further propel. ... If the end point of this flow of ANT accounts remains ambiguous, and if it is further propelled by subsequent disputes of ANT, its content, membership, and direction, this may act as further evidence of the worthiness of ANT’s salvation” (2006, p. 46).

As ANT is continuously interpreted and reinterpreted by its original developers and later users, no one has the right to impose a preferred reading on it: as a result the framework continues to evolve in multiple directions turning ANT into a “relatively undefinable” entity (Gad & Jensen, 2010, p. 77). So whereas all the foregoing analysis was inclined to point out that increased clarity in certain aspects might be beneficial for the development of ANT, this reading then emphasizes a completely contrary view: ANT’s ambiguity is actually crucial for the approach to retain its experimental and inventive spirit!

The concerns of the holders of this view can be well understood in historical context, for no framework emerges overnight armed to the teeth, able to overcome all the limitations of existing approaches. After all, the provocative and counter-intuitive nature of ANT meant that it had to carve its niche for existence year by year, scholar by scholar, journal by journal. It is, therefore, easy to see why its proponents may have deemed it wise to avoid premature attempts to force the approach into an analytical straitjacket, and to abstain from long, scholastic, and probably futile debates on how ANT should be done instead of developing it by actually doing it.

However, there are limits to the usefulness of this emphasis as well. To begin with, we must distinguish between ‘contradiction’ and ‘under-specification’, equating ambiguity only with the latter. With this being the case, there would indeed be no reason to demand that novel experiments with ANT should be able to address each and every problem highlighted by existing critique.

However, if such an experimental trail is taken, surely a convincing meta-level argument can be provided: that is, specifying the grounds for the temporary bracketing of certain methodological and/or ontological issues.

Second, it must be remembered that over-reliance on ambiguity can easily lead to another extreme: that of total anarchy. It is logically impossible to make any affirmative claims without assuming anything. But deliberate employment of ambiguity makes the teasing out of these assumptions considerably more difficult, shifting the burden of interpretation squarely onto the shoulders of the

reader of the text. Insofar as the aim of ANT accounts is to ‘attach’, ‘dispute’ and ‘propel’ each other, this move can effectively delay the cumulation of the results of different studies – perhaps partly explaining why there continues to be much confusion about the maturity and identity of the framework to date.

The third issue concerns ANT’s notorious stylistic flair. At their best, ANT accounts indeed function like a sea breeze in the world of dry academic prose. For this reason it is hard not to agree with Latour when he writes that “the thick sauce of ‘objective style’ cannot hide for long the lack of meat. But if you have the meat, you may add an extra condiment or dispense with it” (2005, p. 127). Yet again there is a fine line between productive ambiguity and excessive rhetorical flourish for its own sake. Speaking from personal experience, when it comes to many ANT accounts, one often has to wade through heaps of condiment unsure about the amount of meat underneath in the first place. “In fact, it might not be entirely misplaced to suggest,” argues Sayes “that some of this confusion is willful, and that some of the most polemical claims are purposefully and provocatively radical” (2014, p. 143). Thus it sometimes seems as if ANT scholars were deliberately using the following strategy: 1) overload your ANT account with rhetorical devices, making the main message difficult to grasp while being provocative enough so the research would be noticed in the first place; 2) wait for the emergence of multiple attempts to make sense of your claims; 3) state that all criticisms have been misplaced, and; 4) write a ‘clarification’ using the same tactic as in point 1; 5) repeat and wait for career success! In this light, complaints that “my critics often don’t understand what I am doing” (Latour, quoted in Kochan, 2010, p. 580) seem somewhat disingenuous.⁷

Of course, as one can quickly notice, the attempts to refine and reflect on ANT have not disappeared anywhere. This is for a good reason: as the number of ANT studies has gone up so has the need for mapping, systematizing and making sense of the variety of ways it has been used (and claimed to have been used), for this kind of reflection just does not appear magically after a certain number of ANT studies has been conducted. So once again while this reading fails to do justice to

the ANT text corpus as a whole, at the same time it does help to understand why the ‘clarification of ANT’s meaning’ is far from being an unproblematic issue for many.

Defending ANT, or how to have the cake and eat it too

This work has been in development for some years now. And during various lectures, presentations, conversations and debates, I have repeatedly been struck by the ingenuity with which the proponents of ANT have problematized certain aspects of this analysis. Broadly speaking, three arguments have been commonly mobilized to defend ANT from criticism: 1) questioning the accuracy of criticism with the implication that if ANT is criticized for something it is actually not – e.g. criticizing it as an ontology whereas it is claimed to be a methodology instead – then all the problems singled out by the critic also become redundant; 2) questioning the legitimacy of the critic to make any evaluative claims of ANT. Implicit here is a belief that ANT has its own particular standards for judging the merit of each ANT account/critique of ANT, and if the text fails to match those it can be rejected outright; 3) questioning the value of clarity of ANT accounts by pointing out that under- or non-specification of certain aspects of ANT is actually the best way to retain its curious, innovative and experimental spirit. By implication, demands for increased clarity may hinder ANT’s development or even lead it to an intellectual dead-end.

Taken separately each argument has a rather straightforward answer. First, a critic may indeed be wrong about the underlying assumptions of a particular ANT account. At the same time, it is also true that no ANT account can avoid making any assumptions whatsoever. As soon as that is acknowledged one is led back to the question about whether the ANT account in focus has actually managed to address the potential problems accompanying its own assumptions, however the latter have been chosen. Second, reflections on ANT, studies employing ANT, and criticisms of ANT are all conducted, submitted and accepted (or rejected) with specific ideas of what constitutes a ‘good ANT’ in mind. If ‘the ANT multiple’ thesis is acknowledged as a realistic description about the

current situation, then there is hardly any consensus on who might have the legitimacy to criticize ANT or what the criteria of ‘good ANT’ might be. Third, one simply needs to take a cursory look at the burgeoning ANT literature to see that the need for systematizing, refining and sense-making is as present as ever. This would imply that not everyone is happy with ANT remaining in a constant state of vagueness.

No doubt these defences have been well-meaning (if also slightly mischievous), expressing worries about whether particular critics have actually wanted ANT to succeed or fail. However, what the supporters of these claims have probably not realized is what happens when these claims are combined to represent ANT as a whole and taken to a logical conclusion. This is because, in effect, this combination would amount to one of the following arguments: 1) any criticism of ANT is inaccurate by default because quotes proving that ANT is not something that the critic claims it to be can always be found in the literature; 2) even if the criticism is somehow not inaccurate, the critic has no right to impose their own evaluative standards on ANT although, for some inexplicable reason, the reverse can be done; 3) even if one nevertheless proceeds to do so, however, every ANT account is still exactly as it is meant to be because of productive ambiguity.

The trouble is that in these conditions the line between legitimate concerns about the validity of criticism and finding excuses for what one wanted to do anyway becomes erased. Every ANT account can be equally defended on the grounds of ‘useful flexibility’ whereas every criticism can be easily dodged. As a result there would be little motivation to address any criticisms because arguments for not doing so can always be found. Even worse, the eventual choice for or against ANT, or for or against different ANTs, would boil down to a matter of faith, not rational discussion about their varying efficiency in enabling people to uncover and make sense of empirical phenomena. In these conditions ANT would become effectively indistinguishable from a religious doctrine: this is probably not the corner in which many ANT proponents would like to find themselves.

However, as the above analysis has shown, every defence of ANT has been betrayed by its practice. As with positions on ANT, the defences of ANT then also seem to reflect the underlying multiplicity of the approach: each argument makes a good point about some aspect of ANT and its critique but these defences do not add up well. The important question is then whether this analysis has managed to engage with these defences constructively without relegating ANT to a gospel-like status. That is, how does one retain the ability to criticize ANT while still accommodating the concerns of ANT proponents? This is the subject matter of the final section.

Concluding remarks

This article started from a deceptively simple question: what are the implications of accepting the ANT multiple thesis? In order to answer this question I set out to map the possible varieties of ANT. Based on an in-depth reading of literature, I identified seven interpretations that were subjected to critical analysis. This systematization allowed to gain an overview of different actor-network theories, to highlighting the contrasting features of each interpretation and identifying their problematic aspects.

Table 1 summarizes the results of this analysis. The first two columns outline the defining characteristics of all seven readings whereas column three contains the critique. The last two columns transform the criticism into a number of questions one might pose when reading and evaluating a particular ANT account – some being reading-specific, some more general.

[Insert table 1 around here]

Where does this leave us in terms of reflexive engagement with defences of ANT? I would argue that this analysis has done so already – albeit with certain qualifications. This is because, as the previous section has already implied, I sometimes feel that for an approach that constantly urges the

other ones out of their comfort zone occasionally, ANT seems to reside too conveniently in its own. My overall position is that one can be wrong, unjust and lazy when criticizing an ANT account – but this is also true when countering the critique. Let me elaborate.

First, I wholeheartedly agree with ANT proponents that the critique of ANT has occasionally been inaccurate. Correspondingly, one of the aims of this analysis was to map the possible locations in which ANT proponents may be positioned in the first place. However, the analysis went further than that by showing that each particular location on the map is characterized by certain weaknesses that would eventually need to be addressed if one is to make substantive progress. So, a critic might be wrong indeed, but an ANT proponent might also be unduly evasive when the defence of misunderstanding is used superficially. For example, if ANT is being used as an end-point of analysis making the account resemblant to an explanatory device, then simply claiming that ANT is actually a method would not do.

Second, I have frequently experienced that the endless drive towards conceptual precision too easily tends to lead to endless debates about concepts instead of the uses to which these concepts could be put. Therefore, I readily acknowledge the potentially productive qualities of ambiguity. However, the above analysis showed that in many cases ambiguity in ANT accounts can be counter-productive. This implies the need for better recognition of the conditions in which ambiguity might be useful and in which it might not, otherwise it would become far too easy to justify *not* making *any* changes to *any* ANT account. So, a critic may be wrong in demanding pointless precision, but so can an ANT proponent by insisting that ambiguity is always useful.

Third, if all the talk about ‘justifications’ and what ANT ‘might benefit from’ doing sound suspiciously like legitimation criteria then again, I do agree. In fact, the fourth and fifth columns of the table can be considered a checklist of sorts for distinguishing between good and not-so-good ANT accounts. On the other hand, I anticipate that readers may deem (some of) these criteria as unjust, misplaced, incomplete or even completely ridiculous; furthermore, the same criterion may

be assessed quite differently by different readers. The list has at least partly succeeded, however, when one, upon reading it, finds oneself mumbling: “No real surprise there, good ANT accounts have always been about this”. By making these silently practised criteria visible, by bringing them together and systematizing them according to specific readings, this paper has contributed to facilitating the assessment of these criteria – including the abandonment of some that do not seem to be useful after all. However, I think it is necessary to resist the possible and possibly tempting implication that the definition of these legitimation criteria should be left only in the hands of the ANT community itself. Arguments of ‘not belonging’ or ‘not getting’ ANT should be taken for what they are – as a rhetoric for avoiding substantive engagement with the critique – because after all, it is the clarification of misunderstandings in a series of ongoing conversations that often leads to useful results. So, a criticism of ANT can be unfair, but so can its rejection.

This paper originated from my initially intuitive recognition that a lot of debate around ANT did not read like a dialogue but like a series of monologues with both the opponents and proponents of ANT relying on widely differing but not necessarily explicitly articulated understandings of what ANT is. Even more importantly, there was not one divide separating ANT proponents from their critics but many lines that seemed to run inside both camps. This implied a need to take a step back, not to succumb to a specific ANT version outright but to remain open to the possibility that there may indeed be many actor-network theories around. By identifying and mapping the varieties of ANT in such a manner I hoped to minimize the possibilities for future misunderstandings between both sides of the debate. However, it would be wrong to conclude that all the debate of the last decades has been a mere case of major scholarly miscommunication. On the contrary: as my analysis has hopefully managed to show, whatever one might assume ANT to be, whatever version of it one may eventually adopt, all of them currently suffer from actual, albeit somewhat differing shortcomings – substantial shortcomings that need to be addressed in future work and cannot be swept away by convenient rhetoric, as has too often been the case to date. The ultimate goal of this

paper has not been to pick the winner, a preferred version of ANT, but something else: to create a common ground for ANT proponents and its critics for an increasingly transparent, rigorous, informed, critical and inclusive debate on ANT's present and its future. Whether this analysis has managed to establish itself as an obligatory passage point for this discussion remains for the readers to decide.

Endnotes

1. This research was supported by the national scholarship program Kristjan Jaak, which is funded and managed by the Archimedes Foundation in collaboration with the Estonian Ministry of Education and Research. I thank Donald MacKenzie, Robin Williams, Stephen Kemp, Dave Elder-Vass, Endla Lõhkivi, Silver Rattasepp and anonymous reviewers for their valuable comments on the argument in its various phases of development.
2. In the Web of Science database "Actor-Network Theory" was a topic for 406 publications between 2006-2010 and 776 between 2011-2015; the same numbers for article search in Scopus were 418 and 828 respectively.
3. I thank Dave Elder-Vass for the precise formulation of this particular argument.
4. Although Abend speaks about the 'social world', the definition itself can be well extended to theories about 'socio-material', 'socio-technical' or 'socio-natural' worlds.
5. Some might read this as a description of ANT as a provider of 'methodological sensibilities', raising the question of why ANT is claimed to be an ontological framework instead. I do recognize, of course, that what one is able to perceive has an impact on data collection and analysis strategies. Likewise, no methodology, however general it may seem, can avoid making any ontological assumptions (see, for example, Abbott's (1988) insightful analysis of the underlying assumptions of linear models). However, I maintain that there is an analytical distinction between the two. In ANT's case this refers to a difference between

the call to develop ‘a common vocabulary and a common ontology’ and the call to ‘follow the actors’ (see Reading 5): a language for more inclusive observations vs. the actual strategies and techniques for observing. As we will see below, the emphasis put on either part differs from author to author and from topic to topic.

6. I thank one of the reviewers for articulating these advantages.
7. One of the reviewers sympathetic to ANT has pointed out that this passage is dubious for a number of reasons: that my own experience is anecdotal and does not contribute anything to the argument, that the argument is speculative and imputes a nefarious intentionality to the authors that can be neither justified nor substantiated, and that it has quoted Latour out of context. I fully agree with each and every one of these claims: dear reviewer, please accept my sincerest apologies! However, a deeper point was being made here: for one might well wonder why Latour’s writing about the “sociologists of the social” is considered “playful”, “ironic” and “provocative” when it is quite clear that his caricatures hardly exist in real life. Has ANT institutionalized making fun? Or might it really be that being provocative ceases to be fun as soon as one ends up at the wrong end of the stick? This raises a wider issue about a curious asymmetry between what ANT allows itself to do in relation to other approaches and what it rejects as invalid when it finds itself a target of similar strategies. I will return to the self-defeating implications of this stance in the next section.

Figure 1: Seven interpretations of Actor-Network Theory

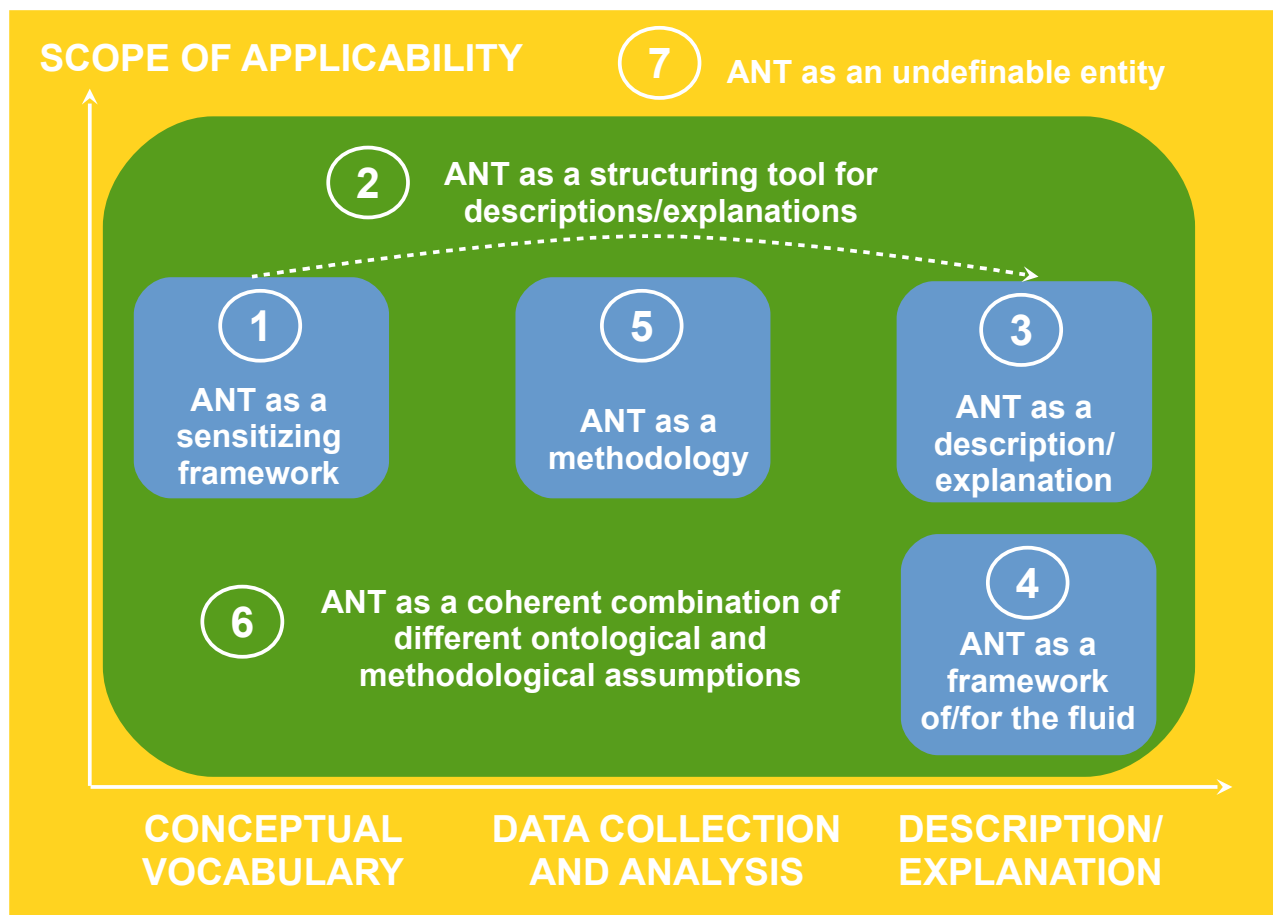


Table 1: Summary of ANT interpretations

Interpretation described	What is ANT?	Interpretation-specific problems	Questions about the way ANT has been employed	
			<i>Interpretation-specific</i>	<i>General</i>
1. ANT provides a very high level non-explanatory ontological framework transcending conventional analytical distinctions	Ontological framework, starting point of analysis	<ol style="list-style-type: none"> 1. ANT would have little to offer beyond some sensitizing qualities 2. Despite operating on a very high level of abstraction, ANT's ontology still contains ambiguities, logical problems and unresolved issues 	<ol style="list-style-type: none"> 1. What sensitizing qualities does ANT offer? What kind of philosophical/metatheoretical blind spots does it illuminate? 2. Is it possible to reintegrate its sensitizing qualities into more nuanced frameworks? Is it desirable? Why/why not? 3. Have the ontological problems of ANT been addressed? What solutions have been proposed? 	<ol style="list-style-type: none"> 1. What version of ANT has been employed? Have the ontological and/or methodological assumptions been specified? In particular, have the relations between ANT, other social theoretical and actors' own accounts been specified?
2. ANT provides an ontological framework for structuring 'thick descriptions' or middle-range theories	Ontological framework, mid-point of analysis	<ol style="list-style-type: none"> 1. Insufficient recognition that observation is always theory-laden may lead to non-reflexive and common sense explanations 2. The lack of good criteria for 'cutting the network' make it difficult to draw a non-arbitrary line from which to stop the description 3. The advantages of ANT for constructing 'thick descriptions' or middle-range theories may be difficult to demonstrate 	<ol style="list-style-type: none"> 1. What is the added value of using ANT to achieve better middle-range theories/'thick descriptions' compared to other possible approaches? <ol style="list-style-type: none"> 2.1 For descriptive purposes: have the possible issues of insufficient reflexivity and 'cutting the network' been addressed? What solutions have been proposed? 2.2. For middle-range theorization: has it been specified how the move from ANT's own categories to eventual middle-range concepts and propositions was made? 	<ol style="list-style-type: none"> 2. Why is this particular version of ANT deemed the most suitable for researching the particular empirical topic? Does the chosen version match the state of maturity of the field? What is the added value of ANT in enabling to answer the research questions?
3. ANT is an explanatory ontological framework applicable in a wide variety of situations	Ontological framework, end-point of analysis	<ol style="list-style-type: none"> 1. The simplicity and generality of ANT's vocabulary makes it ill-equipped for competing with middle-range theories that excel in the dimension of accuracy. This makes the value of ANT as an end-point of analysis questionable in many instances 2. At the same time the application of ANT to some topics (e.g. large-scale and long-term issues) is resisted by some ANT proponents 	<ol style="list-style-type: none"> 1. What is the added value of conceptualizing empirical events in ANT's categories as an end point of analysis compared to other frameworks or theories? 2. Is it useful to rely only on ANT's own categories or can it be usefully combined with other frameworks/theories? 	<ol style="list-style-type: none"> 2. Why is this particular version of ANT deemed the most suitable for researching the particular empirical topic? Does the chosen version match the state of maturity of the field? What is the added value of ANT in enabling to answer the research questions?
4. ANT is an ontological framework applicable in 'fluid' situations in which	Ontological framework, mid- or end-point of	<ol style="list-style-type: none"> 1. It remains unclear whether ANT aims to be a structuring tool or an explanatory device. Existing theories of complex situations pose problems for both interpretations 	<ol style="list-style-type: none"> 1. Has the role of ANT been specified? Does it aim to be a mid- or end-point of analysis for making sense of 'fluid' situations? 	<ol style="list-style-type: none"> 2. Why is this particular version of ANT deemed the most suitable for researching the particular empirical topic? Does the chosen version match the state of maturity of the field? What is the added value of ANT in enabling to answer the research questions?

conventional social theoretical vocabulary proves insufficient	analysis		1.1 If ANT is claimed to be a mid-point of analysis: see II 1.2 If ANT is claimed to be an end-point of analysis, see III	3. What are the strengths of the version of ANT adopted compared to other possible approaches?
5. ANT is a methodology/method for 'following the actors'	Set of methodological guidelines for data collection (and analysis)	1. The twin problem of systematic exclusion of certain factors or the need to include every actant needs to be addressed 2. Compared to other inductive approaches, ANT does not offer much practical methodological advice on how to assemble and analyse the data. Nor is it often clear exactly how ANT has been used in the research procedure	1. On what grounds has the research been delimited? 2. Have the possible issues resulting from privileging actors' accounts over the ones of the analyst been addressed? What solutions have been proposed? 3. Have the advantages of ANT over other inductive approaches been highlighted? 4. Has it been specified how the data were collected and analysed? Is it clear how the move from case description to ANT categories (or vice versa) was made?	4. What are the known weaknesses of the version of ANT adopted? Have these problems been addressed? Why/why not? If yes, then how?
6. ANT is a combination of ontological and methodological assumptions	Ontological framework + set of methodological guidelines for data collection (and analysis)	1. Contradictions between Readings 1-5 as well as the internal problems of each reading remain unresolved 2. ANT is biased towards missing out on long-term and aggregate outcomes, and treating complexity as a self-evident and inherently positive value 3. At the same time cross-case comparative or meta-studies of ANT are largely missing	1. What combination of ontological and methodological assumptions has been used? Why this particular combination? 2. Has the possible issue of ANT's methodology and ontology reinforcing each other been addressed? What solutions have been proposed? 3. Has the added value of complexification been made clear?	5. Has the particular interpretation of ANT been used consistently within the confines of the study in question? 6. Does the style of writing enable obtaining (relatively) clear answers to all these questions?
7. ANT is an undefinable entity: it needs to be useful, not coherent or transparent	?	1. The temporary bracketing of certain ontological and methodological issues would require justification in purposefully ambiguous studies 2. Ambiguity can delay the cumulation of studies 3. Not all ambiguity is necessarily productive for ANT's development	1. Has a convincing case been made for not addressing existing critique? Does the alleged value of experimentation outweigh the need for analytical clarity? 2. Do the rhetorical devices used in the account reveal or obscure the main message?	

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