Social Complexity, Actor Networks and the SPACE Framework

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SOCIAL COMPLEXITY, ACTOR NETWORKS AND THE SPACE FRAMEWORK

I take the word network not simply to designate things in the world that have the shape of a net, but mainly to designate a mode of inquiry that learns to list, at the occasion of a trial, the unexpected beings necessary for any entity to exist.

Bruno Latour

There are no simple stories to be told about organising as multiplicity. It is a painstaking empirical as well as analytical task to explore the complexities of ordering and short cuts are not possible.

John Law

This research paper is a sister document to the recently published *Extending Learning and Innovation: Communities of Practice & Actor Networks* (EL&I), which set out to explore two analytical methods for identifying and extending learning and innovation within organisational settings. In that paper, Actor-Network Theory (ANT) was positioned as an analytical tool that could provide a rich, socially analytic foundation from which to explore the symbiotic relationship between learning and innovation through the development of a radically different perspective on the notion of social context.

The objective of this paper is to explore the theoretical foundations of Actor-Network Theory in more detail, progressing through a review of the ontological commitments within its analytical framework and the central concepts it deploys in performing its empirical analyses. This process will be relatively technical, however, it will also serve as the basis for introducing our own analytical framework (SPACE), which shares some theoretical similarities and components with Actor-Network Theory.

Introduction

Actor-Network Theory is often perceived as an elusive theoretical method that is difficult to both define and explain. This perception has been manifested through the recognition that ANT's purpose is to take traditional concepts, histories and scientific accounts and interrogate their fundamental foundations. To paraphrase John Law (2008a), it is seen as a powerful toolkit for levelling the divisions that are usually taken to be foundational. So, before exploring ANT's analytical and conceptual apparatus, it is perhaps worth attempting to articulate a clear working definition of the method (theory) for the purpose of both guiding this review and supporting the introduction of a framework for analysing learning and knowledge forming practices.

Actor-Network Theory was developed in the early 1980s as a contribution to the sociology of knowledge. It initially emerged as a method for attempting to understand processes of innovation and knowledge creation within the domain of Science & Technology Studies (STS). During the 1990s, it developed into a broader analytical tool that was used in many diverse fields, including anthropology, geography, management and organisational studies and economics. However, this schematic account of its birth and subsequent development performs the well-trodden fallacy of treating ANT as an homogenous entity, a unified theoretical

form that followed a singular, linear line of development. With the benefit of hindsight this, as the notion of fallacy suggests, could not be further from the truth.

Unlike many historical accounts of the birth of a new theory, ANT did not emanate from the mind of a singular author, in the first instance, its 'parents' were multiple. The first writers to use the term 'Actor-Network Theory' were Michel Callon, Bruno Latour and John Law [1]. These writers used the term to describe their particular approaches to studies in scientific and technical innovation. However, retrospectively, each writer would provide a different account of what they believed ANT to be. Latour (1999) would assert its allegiances to ethnomethodology, whilst Law (1999) would argue that it belonged to the realm of material semiotics. To compound this confusion, during the early stages of its development, ANT appeared under numerous guises, including The Sociology of Translation (Callon, 1981), Co-Word Analysis (Callon, Law & Rip, 1986), and even Actant-Rhizome Ontology (Latour, 1999). All of which demonstrates, that far from being a unified theory developed with the momentum of linear progression, ANT emerged through a laboratory of 'open source' development with numerous competing descriptions, definitions and uses produced through a network of empirical activities and ethnographic case studies.

Achieving a working definition of a theory that has historically resisted forms of summary could, in this case, prove to be challenging. However, this problem provides ANT with one of its greatest strengths, and one which often remains significantly understated, that is, its ability to continually resist theoretical rigidity and dogma. Rather than being a fully unified theoretical model, ANT is a heterogeneous assemblage of bits and pieces 'masquerading' together under the general rubric of a method or theory. This suggests that the label of 'theory' may be overstated, and it would perhaps be better to conceive of ANT as an approach that acts, as John Law (2008b) has stated, 'as a methodological toolkit, a set of practices for inquiring, turning over interesting stones, tracing links, and most of all, of following unexpected leads and connections', that is, developing opportunities for creating learning and innovation.

> Actor-network theory is a disparate family of material-semiotic tools, sensibilities, and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located (Law, 2008a: 141).

Even though this definition provides a reasonable account of what ANT is and does, it is worth reiterating that this is only one definition amongst many. But for the purpose of our task (to develop a socially orientated framework for analysing learning and knowledge forming processes), it is the one that is perhaps most suitable. In what follows, we shall outline the main ontological and analytical commitments of this 'flavour' of ANT (as an approach rather than a theory) whilst also introducing elements from other 'flavours' to demonstrate its range, flexibility and theoretical depth, before assembling these components into a new 'toolkit' for the purpose of developing our own analytical framework (SPACE).

Social Complexity

The social world is fundamentally messy, which is perhaps a simple way of saying that it is inherently complex. Reducing complexity through a single order of simplification has been a recurring trope that has manifested itself in many different ways and forms. However, understanding the social and all its complexity continues to be an extremely attractive undertaking within the field of social theory. But what is attractive about this undertaking? What are we trying to understand and how will it help us develop a framework for extending learning practices and developing innovation?

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[1] Michel Callon was the first writer to use the term in his pioneering study of the St Brieuc fisherman.

In many ways, social complexity has come to stand for the essentially unpredictable and fluid, yet, self organising nature of the social and material world. In the previous paper (EL&I), we stated that the symbiotic relationship between learning practices and the process of innovation remains largely hidden within this state of complexity. Innovations are made manifest through people and things, but people and things do not exist in a vacuum. The material and physical environments in which they exist, and the social and cultural practices they participate in, are all integral to understanding how innovations are given material form, as well as the opportunities to succeed. Developing innovation, in whatever field, is a complex process where the dynamic interaction of multiple social and material assemblages creates unforeseen insight and value. Having a broader understanding of how networks of actors, cultural practices and material environments forge these assemblages, in ever increasing complex ways, is a necessary requirement for uncovering those insights and developing that value.

As we have previously stated in EL&I, ANT offers a radical way to both understand the nature of the social, as well as how it is performed or enacted. It achieves this by proposing an anti-essentialist, open-ended, and resolutely relational way of understanding the social world. Its *modus operandi* is to conduct empirical analyses of the relations between 'actors' and the networks and practices that produce and carry them. However, ANT, as an analytical method, does not rely on traditional interpretations of the concepts of actor and network, as its purpose has always been to expand and radicalise these interpretations to achieve very different ends.

Actor Networks

The concepts of actor and network lie at the heart of ANT's analytical framework, although as we have suggested, both concepts appear to hold significantly broader meanings than perhaps we are accustomed to. Actors, within ANT, are simply 'entities that do things' (Latour, 1992), but how ANT radicalises this definition is by denying the ontological privilege that is traditionally afforded to the agency or actions of human actors. ANT's first, and perhaps most important principle, is that it is committed to the premise of 'symmetrical analysis' or 'generalised symmetry', a principle which holds that the material and non-human elements of any network should, in terms of analysis, be treated in the same way as the social and human elements. In other words, we should employ the same analytical and descriptive framework when faced with either subject or object.

> ...the actor-network approach thus describes the enactment of materially and discursively heterogeneous relations that produce and reshuffle all kinds of actors including objects, subjects, human beings, machines, animals, 'nature', ideas, organisations, inequalities, scales and sizes, and geographical arrangements (Law, 2008a: 141).

To achieve this state of ontological levelling, ANT mobilises the concept of 'actant' as opposed to 'actor', which allows it to extinguish the privilege typically assigned to human agency. It states that non-human elements (actants) also possess forms of agency which allows them to act upon things, thus becoming actors. This assertion, as described by Fox (2005), does not intend 'to ascribe freewill to objects, nor to anthropomorphise them, but to recognise that objects act upon other objects and upon humans.' Agency and action, are therefore, understood not just as purely human processes, but as processes facilitated or enabled by heterogeneous networks comprised of human and non-human elements (Fox, 2005).

Like the concept of actor, the concept of network, within ANT, also embodies a much broader definition. ANT uses the term network to define 'a group of unspecified relationships among entities of which the nature itself is undetermined' (Callon, 1993: 263). This definition is designed to differentiate itself from both conventional

sociological and technical definitions, as it is not restricted to actors in a kinship or social network or nodes and connections within a technical one. As Michel Callon describes, the concepts of actor and network constantly redefine each other,

> ...the actor network is reducible neither to an actor alone nor a network. Like a network it is composed of a series of heterogeneous elements, animate and inanimate, that have been linked to one another for a certain period of time...An actor-network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of (Callon, 1987: 93).

In this respect, the task of any ANT researcher is to 'follow the actors and actions' as networks are built up and broken down, but what ANT is interested in during this process, is the effects that are generated by the changing sets of multiple relations produced by a heterogeneous network of elements, as it views all of these relations as effects or results of that network. People, organisations, technologies, social orders are all effects or results of networks of human and non-human interactions or associations. For ANT, there is nothing else but associations. Associations are used to describe how networks come to be larger and more influential than others, how they come to be more durable through enrolling both social and material actors (Cressman, 2009). Its descriptions (ethnographies) tend to be *stories*, 'stories that have to do with the processes of ordering that generate effects...stories which erode the analytical status of the distinction between the macro and micro-social' (Law, 1994: 18). In short, the actor-network approach, with the support of ethnography, asks us to explore the strategic, relational, productive and associative character of particular heterogenous networks and their effects.

Black boxes and Punctualisation

The principle of generalised symmetry and the concepts of actor/actant and network are the most significant ontological commitments within ANT's analytical framework, as well as being the most consistent elements used by different types of ANT researchers and practitioners. However, there are a number of additional concepts that form an integral part of ANT's analytical portfolio.

As we have described above, the methodological cornerstone of the ANT approach is to 'follow the actors and their actions' to see how they build, develop and dismantle dynamic sets of relations in the form of actor-networks. ANT provides a range of tools to map sets of entities (actor networks) that influence, shape or determine an action. Although, each of these entities bears an integral association with other actor-networks. An actor can, at a certain scale, become a single integrated network 'which no longer needs to be considered...whose contents have become a matter of indifference (Callon & Latour, 1981: 285). Networks, in this instance, can become so large that they appear to be independent of actors. This appearance, within ANT, is considered to be false. These networks are often referred to as black boxes; entities that are taken for granted and require no explanation, a hermetically sealed network of people and things. The process by which these black boxes come into being is called 'punctualisation' (an abstraction effect). Punctualisation is the process by which complex actor-networks are black boxed and linked with other networks to create larger actor-networks. However, this process is not foolproof, as black boxes have a tendency to be 'leaky' (Callon & Latour, 1981), which means that opportunities for prising them open exist at almost every level.

> Punctualisation is always precarious, it faces resistance, and many degenerate into a failing network. On the other hand, punctualised resources offer a way of drawing quickly on the networks of the social without having to deal with endless complexity (Law, 1992: 385).

Translation Strategies

The concept of translation in ANT serves a significant methodological purpose. Its role is to provide ordering modes of action (translations) for identifying actors and forming new networks. Within ANT's theoretical toolkit, it is perhaps the most mechanical concept as it proposes a recipe of four well defined stages of action for enrolling actors and aligning interests (translating). It is also the concept that most clearly demonstrates how actor networks are mobilised, how they can potentially fail, and how that process can provide significant learning opportunities. In this sense, the concept shares obvious synergies with Community of Practice Theory, as outlined in EL&I. Michel Callon (1986) provides a methodological overview of the concept of translation in his seminal study of the St Brieuc fisherman (a study that also provides an exemplar account of generalised symmetry). The study outlines the four modes or stages of translation.

The first stage is *problematisation*, in which one set of actors defines a problem that is perceived to be shared and enacted by other actors. The first set of actors then institute a range of solutions to the problem, engendering the possibility of becoming an *obligatory point of passage*. This then leads to the second stage, *interessement*, in which the first set of actors define roles for the second set of actors and seek commitment to the proposed course of action. In the third stage, *enrolment*, the commitment to the course of action is then enforced through the necessary means, (inducement, persuasion, manipulation etc.), following which, the course of action is enacted. Which then leads to the final stage, *mobilisation*, where the second set of actors are mobilised to support the first set, transforming themselves into a obligatory point of passage. Thus, interests have been translated between the first and second set of actors in a temporary network in which all objectives have been aligned and the course of action followed through.

Translations of this type are often precarious, as the potential for stages to collapse can be made manifest within the process. However, this is of lesser interest to ANT, as its task is always to empirically observe 'how practitioners act as one piece with an assemblage of actants, non-human as well as human, to build networks and chains which achieve certain ends; while recognising that both human and non-human materials have resistive agency: the capacity to act back, granting or refusing translation' (Fox, 2000: 863). Through the process of translation networks can move in two different directions, divergence (spaces of negotiation) or convergence (spaces of prescription). Both of these of directions can be strategically relevant depending on the nature of the objective, however, the direction of movement also relies upon the types of intermediaries/mediators that are put into circulation within the network.

Intermediaries and Mediators

The process of translation can only be performed through the intervention of intermediaries and mediators, which means that any translation is the effect of the active work of heterogeneous carriers. Within ANT, intermediaries play a fundamental role, as they can be anything that circulates between actors as well as what helps define the relations between them. The notion of an intermediary covers an inexhaustible range of heterogeneous materials (machines, technologies, texts, symbols, laws, inscriptions, maps, drawings, contracts, stories etc.)

> An intermediary, in my vocabulary, is what transports meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even if it is internally made of many parts (Latour, 2005: 39).

Mediators, on the other hand, perform a very different function and cannot be counted as a singular actor (black box). Their inputs are never a good predictor of their outputs; 'they transform, translate, distort and modify the meaning they are supposed to carry...no matter how apparently simple a mediator may look, it may become *complex*; it may lead in multiple directions which will modify all the contradictory accounts attributed to its role'(Latour, 2005: 39).

The criteria for identifying intermediaries and mediators is always relative to the local context in which they are circulated. They are not abstract entities, but entities that are formed through cultural and historical processes, that is, within a network. In terms of developing a socially orientated framework for analysing learning and knowledge forming processes, mediators are more significant than intermediaries. Intermediaries form faithful stable networks (black boxes), which is when a network enters a dominant phase and where its potential for extending learning and innovation is dramatically reduced. Mediators, on the other hand, are more intrusive, disruptive and creative, as Gilles Deleuze has stated, 'Mediators are fundamental. Creation is all about mediators. Without them nothing happens' (1995: 125). Like intermediaries, mediators can be formed from an inexhaustible list of heterogeneous materials. Within a network, mediators create the possibility of emergence, as they transform matter from one context to the next. They are inherently innovative. They can be identified in dominant and residual networks and reconnected to new assemblages for the purpose of exploring different objectives. In short, intermediaries support efficient networks, mediators have the greater potential to create innovative ones.

Having presented an outline the ANT's analytical framework and the central concepts it deploys in its empirical studies, we will now begin to introduce the our analytical framework (SPACE), through identifying the theoretical similarities and conceptual components that it shares with ANT.

Analysing Organisations and the SPACE Framework

As we identified earlier, ANT, as an analytical framework, is best described as a methodological toolkit, a set of practices for inquiring, turning over interesting stones, tracing links and following unexpected leads and connections, that is, developing opportunities for the creation of learning and innovation. SPACE, is an analytical framework that is designed to support these modes of analysis by providing a cartographic template of the ordering modes that operate within organisations and an interpretive schema for understanding the affects and effects that are produced by them.

Organisations are both social and historical entities, networks of people and things bounded together over a specific period of time. They are often perceived of as single actors, that is, as black boxes whose internal processes are taken for granted and thus do not require any form of scrutiny or explanation. It is only when a process of breaking down occurs (the organisation doesn't perform as intended) that this perception begins to dissolve and the intricate actor-networks that make up the organisation become visible.

From what we have outlined above it should be clear that ANT does not treat organisations as singular unified entities, but rather as multiplicities, a range of diverse entities (actor-networks) that interact to create ordering modes. ANT views organisations as ordering machines, intricate assemblages of heterogeneous components with complex social relations and effects. In analysing organisational forms, ANT looks for the topologies of networks, the ways in which *spaces* emerge as socio-material relations and how they become arranged in orders and hierarchies. As John Law has identified

> The different modes of ordering produce certain forms of organisation. They produce certain material arrangements. They produce certain subject-positions. And they produce certain forms of knowledge (Law, 2003: 2).

In this sense, organisations are multiplicities of effects, effects that emerge from the interactions between ordering entities (actor networks). SPACE, in the first instance, is a lens through which to view organisations in of all their heterogeneity, it is a map of these entities, a navigational guide that identifies and explores **Strategies, Practices, Actors, Cultures** and **Environments** and the interactions and relations that exist between them. To perform this task, SPACE develops both an ontological and epistemological approach. It simultaneously views organisations as singular (historically unique) and multiple (produced through the interaction of many parts and components). It works to understand the complexity of the social and to resist single orders of simplification (reductionist explanations), by analysing the multiplicity of ordering modes. **Strategies, Practices, Actors, Cultures** and **Environments** are all modes of ordering that produce affects and effects. It is the process of mapping and understanding the nature of these affects and effects that SPACE is primarily interested in.

As we stated in EL&I, ANT makes use of numerous conceptual formulations to perform empirical investigations in local and situated environments. It performs these tasks through the mapping of relations (material and semiotic) to provide new insights into the nature and structure of those relations, their processes and their potential affects and effects. However, ANT cannot provide definitive accounts of all social and material phenomena, as its studies have to be considered as open ended accounts of particular instances at particular times. These studies can only be artificially closed and isolated from the broad openness of relationships. Through its ontology, SPACE offers a way to highlight specific (organisational) entities and networks within this broader range of relationships for the purpose performing certain tasks (identifying learning and knowledge forming processes). It is primarily designed to analyse forms of agency that operate within specific modes of ordering. Within these modes different types of agency are manifested through intricate historical and social networks of associations. It is these associations and the contingencies that exist between them, that SPACE is designed to uncover.

Within ANT, materiality, relationality and process become modes or techniques of mapping the real and enacting it (Law, 2007), SPACE is designed to apply the same modes and techniques. Through analysing the interactions that exist between **Strategies, Practices, Actors, Cultures** and **Environments**, SPACE creates a dynamic material view of the social context that emerges within and through organisational activity. However, SPACE is not a problem solving device, its role is primarily diagnostic. It is a framework for identifying discontinuities and problems, for searching out anomalies and contingencies. It looks for openings, differences and emerging spaces. It is not interested in solutions, only in problematisations. This is its epistemological premise, its role in tracing the creation, production and distribution of knowledge within organisations.

The similarities and components that SPACE shares with ANT will perhaps already be obvious, however before concluding, we would like to draw attention to three guiding principles that provide the framework with its structural 'backbone'. Firstly, the commitment to the notion of symmetry, that is, to a form of symmetrical analysis is integral. To insist on the principle of symmetry is to assert that everything deserves explanation and,

> more particularly, that everything that you seek to explain or describe should be approached in the same way. Why is this important? The answer is simple: it is that you don't want to start any investigation by

privileging anything or anyone. And, in particular, you don't want to start by assuming that there are certain classes of phenomena that don't need to be explained at all (Law, 1994: 10).

The second principle is closely related to the first, indeed the first principle would become contaminated if not supported by the second, which is a commitment to non-reductionism. Reductive forms of reasoning can, in some instances, be practical and effective. However, analyses conducted through SPACE, are by design, open-ended, they unfold and progress from the middle by considering multiple trajectories (networks) of causes and catalysts in the production of effects that are identified and traced. The desire to reduce complexity (social or otherwise) to a single order of simplification should not only be resisted, using this framework, but denied any place within the analytical process. As simplicity can often be a symptom of the desire for order and certainty, and one that has the potential to restrict emergent possibilities for extending learning and creating innovation.

The third principle, which is closely connected to the first and second, is a commitment to the practice of reflexivity with all of the connotations that that entails. If accounts are to be given and stories to be told, then the position of the storyteller should not evade scrutiny or be given undue privilege.

…reflexivity may be seen as an extension of the principle of symmetry: in effect it says, there is no reason to suppose that we are different from those who we study. We too are products. If we make pools of sense or order, then these too are local and recursive effects, and have nothing to do with immaculate conception, or any other form of privilege (Law, 1994: 16).

In this sense, the SPACE framework is designed to account for the subjective inference that the researcher provides during the process of conducting analyses. What this means in practice is that any pretension to objectivity should itself be problematised. The role of the researcher should not be positioned as an intermediary, but as a mediator, a translator of materials. The premise of the neutral observer or disembodied intellect should not only be avoided but exposed as a fiction, an unwelcome addition to the practice of performing ethnographic studies. The counter argument here is obviously well rehearsed. However, our position is not to fall within the realms of naivety but simply to acknowledge that SPACE is a tool (a piece of software) for amplifying relations and networks, for turning over interesting stones, tracing links and following unexpected leads and connections. The objectivity of the researcher, in this respect, provides limited value, value that has the potential to be exchanged for new learning opportunities, and therefore, new forms of knowledge.

This brief introduction to the SPACE framework outlines some of the similarities that it shares with an actor-network approach. The principles outlined above are what one might describe as 'directions for use', in terms of the approach required to apply SPACE within the context of organisational research. As stated earlier, the framework operates over two phases, a data collecting phase and an interpretive/diagnostic phase. Following the actor-network approach, the data collecting phase is supported by an ethnographic method that is compatible with the principles of symmetry, non-reductionism and reflexivity. However, the similarities with ANT, at this stage, should not be taken to be definitive, as each phase within SPACE incorporates components from a range theoretical resources including Symbolic Interactionism, Practice Theory and Assemblage Theory.

We will continue to outline these components in a series of publications that will be published over the coming months. In the meantime, if you would like any more information regarding the SPACE framework then please get in touch, we would be happy to discuss the possibility of any practical applications.

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