Combining actor-network theory with interventionist research: Present state and future potential

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Combining actor-network theory with interventionist research: Present state and future potential

Abstract

Purpose: The purpose of this paper is to examine the philosophical and practical compatibility of actor-network theory (ANT) and interventionist research (IVR) and search for explanations for their scant combined use. The scope of investigation is limited to accounting, management and organization studies, but the findings are believed to be applicable in other social sciences as well.

Design/methodology/approach: An analysis is conducted of accounting, management and organization studies in addition to interviewing eight accounting scholars who have applied IVR and/or ANT in their research.

Findings: A comparison of the philosophical and other features of ANT and IVR suggests that they should be relatively easily combinable in studies. Based on interview material, three types of barriers to combining ANT and IVR are identified: perceived epistemological incompatibility; fear of going native or losing neutrality; and academic tribes. However, subsequent analysis indicates that none of these forms an insurmountable obstacle to the combination.

Research implications: The combined application of ANT and IVR could benefit both IVR and ANT researchers in management accounting as it would enable them to conduct theoretically grounded studies on dynamic processes, such as the emergence and implementation of accounting innovations, to pose original research questions and to find new perspectives to accounting phenomena.

Practical implications: Employing ANT and IVR in combination could increase organizational interest in management accounting research.

Originality/value: The paper contributes to the discussion on the compatibility of different research approaches and highlights ways in which researchers could benefit from combining ANT and IVR.

Keywords: actor-network theory; interventionist research; philosophy; methodology; research practice

1. Introduction

The following discussion took place after Author #2 had given a seminar presentation on the basic ideas of ANT and how they had been applied in management accounting research.

Author #1: Listen, I was intrigued by one of the points you raised back there, when you wondered why the authors of that interventionist ANT paper did not include themselves in the network of actors.

Author#2: Yeah, it seems funny that they first mentioned having done action research and then left themselves out of the description.

Author#1: Well, some people think IVR is just consulting in disguise, so downplaying the interventionist element could be part of these authors' publication strategy. But it's kind of a

pity because ANT and IVR appear to resemble each other quite a lot, both are interested in innovations, real-time change processes et cetera … You know, the more I think about it, the more they actually seem like a pretty well-matching couple.

Author #2: So do you know if there are any other papers in which they would appear together?

Author #1: I'm not sure … We'll just have to find out, won't we?

The implementation of innovations is a prolific topic in management accounting research, and various theoretical and methodological approaches have been employed to analyse the phenomenon. One stream of such research for instance has examined the processes of implementation through the theoretical lens offered by actor-network theory (e.g. Chua, 1995; Mouritsen, Larsen and Bukh, 2001; Qu and Cooper, 2011). Another example is the stream of innovation studies employing action research or other interventionist research approaches as their research methodology (e.g. Malmi et al., 2004; Wouters and Roijmans, 2011; Rowe et al., 2012). It is interesting to note that in addition to a fascination for innovations, actor-network theory (ANT) and the interventionist research approach (IVR) also share certain philosophical features, such as an interest in things in the making and the pragmatist notion of truth, both of which lead the researcher to explore the world closely with the actors who are operating there.

Despite the similarities outlined above, it seems however that ANT and IVR are rarely used in combination in management accounting research or, for that matter, in the broader field of management research. As a fundamental reason for this scarcity might be incommensurability of the two approaches, we formulate our first research question as follows: How compatible are ANT and IVR in a philosophical sense? If the philosophical features of the two exhibit similarity and compatibility, we could expect to find at least some studies in which they are mobilized together. This reasoning leads to our second research question: To what extent are ANT and IVR actually utilized together in studies? If an examination of extant literature confirms our intuitive notion of the scarcity of the combination that furthermore cannot be explained by incommensurability, the reason for the scarcity can be suspected to lie in scholars' perceptions of the compatibility of ANT and IVR. Hence, our third research question is: Which barriers and benefits are associated with the combined use of IVR and ANT?

In this paper we analyse the potential of combining IVR and ANT primarily in the field of (management) accounting and also examine, how much of that potential has become used. In doing so, we acknowledge that ANT is a philosophical, theoretical and methodological perspective, while IVR is a methodological approach. However, we do not perceive this as a hindrance to our analysis as our aim is only to examine the potential of applying them in combination. To obtain a broader impression of these issues, we also take a look at the closely related literature of management and organization studies (MOS). Our investigation of these issues may be characterized as abductive reasoning (Peirce, 1960; Dubois and Gadde, 2002) as it begins from the observation of a surprising phenomenon (the paucity of studies combining ANT and IVR) for which we then seek to find the most plausible explanation by going back and forth between extant literature and our empirical material (Ahrens and Chapman, 2006; Lukka and Modell, 2010). In this context it is appropriate to stress that we do not intend to promote or demote any research approach but rather to conduct a state-of-the-art analysis and reflect on its implications for research practice.

We conduct this research by combining theoretical analysis with an examination of accounting and MOS literatures and interviews with altogether eight accounting scholars who have applied IVR and/or ANT in their studies. We begin our literature analysis by investigating whether or not users of ANT have chosen interventionist research approaches as their methodology. In this respect we will pay particular attention to two aspects: the chronological aspect of the research process and the researcher's participation in the studied events. Timing-wise, the researcher may examine the events of interest either at the same time as they take place (real-time), after they have taken place (ex post facto) or as any combination of these. The degree of the researcher's empirical intervention varies from attempts to completely avoid intrusion to intentional and active participation in organizational problem-solving. We will then turn to IVR studies within the fields of management accounting and MOS in order to explore, in particular, which theoretical lenses, if any, are utilized in those studies. In the empirical part of the analysis, we investigate how accounting researchers who have experience from ANT or IVR or both perceive the compatibility of the two as well as the potential of their combined employment.

Our literature analysis indicates that in accounting - and also in MOS - there are only a few studies which apply an IVR approach together with ANT. Based on the interviews, we identified three barriers to the combined use. The first reason seems to be a certain epistemological dilemma, as perceived by some ANT scholars, according to which an ANT researcher should not have an agenda. This dilemma seems to be related to the ANT notion that researchers should not impose ready-made conceptual categories or frameworks upon the actors they are following since this constitutes a premature attempt to define the characteristics of a construction, is condescending towards the actors and also guides the research results too strongly. However, Latour's recent writings (e.g. 2004a,b; 2005) have assumed distinct political tones that seem tolerant of researchers with an agenda as long as they do not try make ontological decisions on others' behalf. Moreover, we suggest that the perceived dilemma might be based on a confusion related to the multiphase application history of ANT. Against this background, the idea of combining ANT and IVR does not seem inconceivable and might even be considered to hold untapped potential for management accounting research.

The second reason why ANT and IVR are rarely combined in accounting studies relates to ANT researchers' fears of becoming too emic or losing their neutrality, which are regular and valid concerns associated with the application of IVR. They are partially related to the third reason for the scarce combined use of ANT and IVR, academic tribes (cf. Lukka, 2010; Vaivio and Sirén, 2010), which concerns differences in researchers' educational and institutional background [1]. Presently the researchers employing ANT and IVR can be seen to constitute two separate schools of thought with largely different members, which may certainly be claimed to limit these academics' freedom to experiment with different approaches or employ them in combination.

We argue that the combined application of ANT and IVR could benefit both IVR and ANT researchers in management accounting as it would enable them to conduct theoretically grounded studies on dynamic processes, such as the emergence and implementation of accounting innovations. The combination would also help researchers pose new questions and find new perspectives to accounting phenomena. In terms of practical implications, employing ANT and IVR in combination could increase organizational interest in management accounting research. Despite the limitation in our scope to accounting and MOS, we believe these findings are applicable to other social sciences as well as there is no

particular reason why ANT or IVR research in accounting would differ markedly from that conducted within other social science domains.

The rest of the paper proceeds as follows. The second section describes the key features of IVR and ANT as well as explores their philosophical and practical compatibility. The third section presents the results of the literature and interview analyses regarding the realized combination of IVR and ANT. The fourth section discusses the findings, while the final section draws the conclusions of the study.

2. The potential for combining IVR and ANT

2.1 Key features of IVR

Interventionist research is a longitudinal case study approach (with variations), in which active participant observation is used deliberately as a research asset (Jönsson & Lukka, 2006). IVR is often problem-solving oriented as the researcher typically participates in an organisational change project by providing expert knowledge and enabling organizational learning (Jönsson, 2010; Sunding & Odenrick, 2010). In IVR, the researcher is an active participant in the real-time flow of life in the field, and therefore she has to adopt an insider's viewpoint (the emic perspective) to the issues at hand in order to produce a theory contribution (the etic perspective) (Jönsson & Lukka, 2006; Suomala & Lyly-Yrjänäinen 2012). IVR frequently relates to attempts to develop and implement innovations in practice, most explicitly when the constructive research approach – a variant of IVR – is applied (e.g. Kasanen et al., 1993). In addition to the constructive research approach, the umbrella notion of IVR comprises action research, action science, design science, and clinical research (Jönsson and Lukka, 2006). While some types of IVR, especially action research studies, have gained a relatively established standing in certain areas of social studies (e.g. Kuula, 1999), they are still rare in the field of accounting and most, if not all, of the accounting examples of IVR fall in the domain of management accounting (e.g. Wouters and Wilderom, 2008; Wouters and Roijmans, 2011; Suomala et al., 2010).

The process of conducting an IVR project can be depicted in various ways (Baard, 2010), one of which is presented in Figure 1 (cf. Jönsson and Lukka, 2006; Suomala et al., 2014). A prerequisite for IVR is naturally gaining access to an organization. This may take place either before or immediately after the formulation of theoretical research questions (although in some cases the intervention may precede the formulation of the research agenda). The next phase involves working in theoretical and practical modes simultaneously in order to, respectively; make sense of the original state of the target organization and to come up with accounts of views regarding how the organization or a sub-process could be like in the future. The latter point, which requires that the researcher and the organizational actors establish a common vision, guides the subsequent change process in which the researcher participates as a team member. The outcome of this phase is often a solution concept, which can be applied in the organization. Finally, the last phase of the interventionist research process depicted in Figure 1 involves the researcher applying so called reverse engineering to reflect on the findings of the research project in light of prior research and to formulate the theoretical contribution of the project to be disseminated through an appropriate publication forum.

INSERT FIGURE 1 ABOUT HERE

The emic viewpoint refers to studying human behaviour from inside the system, while the etic viewpoint means studying it from the outside, the latter being unavoidably the initial

approach for anyone examining an alien system (Pike, 1954). Inasmuch an IVR researcher manages to act in the emic position, the community in which she does the fieldwork accepts her as a competent and trustworthy member, an 'insider'. This is crucial not only in order to understand the meanings and actions of the actors in the field, but also because it also allows the researcher to communicate and act together with them (Jönsson and Lukka, 2006). In this context it is important to note that despite the monolithic term, IVR research can be implemented in a variety of ways. The degree of the researcher's involvement can vary from modest to weak intervention according to situation as well as the objectives of the research project (ibid.). The more prevalent of these two is modest intervention, in which the researcher(s) involved can, for instance, effect changes in an organization's contextual elements (e.g. software capacity) instead of tampering with actual systems or work processes. Strong interventions in contrast can involve, for instance, changes in the target organization's information system (e.g. designing a Balanced Scorecard) or redesigning work processes. In addition, the element of field experimentation, characteristic of much of IVR, can also assume a variety of forms (Kasanen et al., 1993; Labro and Tuomela, 2000).

While the adoption of the emic viewpoint is one of the key characteristics of IVR, it only makes up the first half of a research process; the second half consists of the researcher assuming the etic position, i.e., linking her findings to a theoretical frame in order to develop a theoretical contribution (Jönsson, 2010). The distinguishing character of IVR is the need for the researcher to cross the border between the outsider (etic) and the insider (emic) perspectives (Jönsson & Lukka, 2006). The shift between the differing logics applicable in the two domains provides opportunities for new insights regarding both of them. Being involved with on-going change processes in the emic mode as 'one of us' leads ideally to a situation where the researcher gets a set of research materials of highest quality for further analysis driven by the research question explored (Jönsson and Lukka, 2006; Suomala et al., 2010).

Being an insider does not by default imply that the researcher should turn a blind eye to issues of power or values. On the contrary, she can embrace them in order to produce a contribution that is significant also from the point of view of the surrounding society (cf. Flyvbjerg, 2001; Lukka and Suomala, 2014). For instance, an IVR researcher could end up in a situation where she has assisted in designing a costing system for public health services but feels the need to engage in scholarly discussion about the way in which that system is used to the detriment of societal wellbeing. This would represent an instance of an initially managerialist IVR project becoming reported in a critically oriented research article. In addition to such unintendedly critical pieces, IVR can also be harnessed in emancipatory studies where from the very beginning the researcher's aim is "active and subversive intervention into management discourses and practices" (Spicer, Alvesson and Kärreman, 2009, 538) that she considers harmful for society or the environment. Thus, the application of IVR is not restricted to any particular research paradigm, such as those exhibited for instance in Burrell and Morgan (1979).

However, there are also challenges in conducting IVR (cf. Jönsson, 1996; 2010; Jönsson and Lukka, 2006; Suomala & Lyly-Yrjänäinen, 2012; Suomala et al., 2014). First of all, an interventionist researcher needs to get an excellent access to the organisation(s) she wishes to examine (Dumay, 2010). IVR is also a relatively time consuming approach, which can be an issue for the researcher in many ways (Suomala & Lyly-Yrjänäinen, 2012). In addition to methodological and analytical capabilities, the emic mode necessary in IVR requires high people skills from both the researcher and the organizational participants (Dumay, 2010).

Swapping between the emic and etic modes can be a challenge, in particular regarding the risk of going so 'native' during the emic mode that a neutral attitude, necessary in the etic mode, is no more possible (Jönsson & Lukka, 2006). There may also be (at least felt) limits as to how critical the researcher can be in reflecting on her findings. In addition, she may also be at risk of causing damage to the host organization, so she has to be cautious of the potential 'elephant in the china store' effects (ibid.). As an issue of preserving business secrets may also emerge during the research process, she would be well advised to secure herself against these by clever contracting at the front end of the process. Finally, despite certain recent breakthroughs in publishing IVR, an IVR scholar may still face publication difficulties, due to yet enduring suspicions that IVR is nothing but consulting in disguise and its application yields only descriptive, a-theoretical studies (Baard, 2010; Lukka & Suomala, 2014).

Overall, as IVR is not yet a strongly established research approach in many disciplines (like accounting and MOS [2]), the case has to be particularly strong in order to get a report on an IVR study published (cf. Jönsson and Lukka, 2006). However, here it is apposite to note that descriptive as opposed to theoretical IVR papers result from the a-theoretical application of IVR by the scholars in question, not from an inherent defect of IVR itself.

2.2 Key features of ANT

Actor-network theory (ANT) has its origins in science and technology studies, where it has mainly been developed by Bruno Latour (e.g. Latour, 1987; 1988; 2005), Michel Callon (e.g. Callon, 1986; 1991; 1998) and John Law (e.g. Callon and Law, 1982; Law, 1992), and somewhat later also Annemarie Mol, especially in the "ANT and After" literature (e.g. Mol, 1999; 2002; Latour, 2004a, b; 2005; Law, 2004; 2008; Law and Hassard, 1999; Law and Singleton, 2005). However, as time has passed, the application area of ANT has expanded from science and technology studies to a wide variety of fields including geography (Murdoch, 2006), urban and environmental studies (Farias and Bender, 2012), information systems (Howcroft and Trauth, 2005), education (Fenwick and Edwards, 2010) as well as accounting and MOS.

In general terms, ANT can be characterized as a research approach that focuses on the relationships that are forged between human and non-human objects in material-semiotic networks (Harman, 2009). As befits an approach developed for the study of science and technology, ANT's first and most lasting preoccupation has been with the way in which scientific knowledge and innovations come into being. While traditional sociological studies of science put forth the claim that scientific facts are not so much discovered as they are constructed by a community of scholars, ANT's radical development of this idea is that such a construction process involves not only the scientists in question but also other actors, such as research equipment, objects of study, graphs and tables, and cleverly worded funding applications (Blok and Jensen, 2011). Moreover, ANT claims that the properties of a fact, innovation or other entity are not innate but gradually emerge during its construction, or translation, by a network of actors (Latour, 1987). More recently, ANT's interest in scientific knowledge has expanded into a consideration of democratic decision-making concerning the collective acceptability of phenomena resulting from the unfettered application of natural scientific knowledge, such as climate change or genetically modified organisms (Blok and Jensen, 2010). In contrast to the descriptive studies on innovations, the politically oriented ANT works often carry normative overtones in terms of promoting, for instance, the consultation of a variety of human and non-human groups in contested issues (Callon, Lascoumes and Barthe, 2009; Latour, 2004a, b) such as energy production. Below, we will

present the key concepts and philosophical foundations of both descriptive and normative ANT studies.

The key underpinnings of ANT can be elaborated with reference to four key concepts: actors, translation, alliances, and trials of strength. An actor is defined as any human or non-human thing which has an effect on another thing (Latour, 2005, p. 71). This definition implies that software, furniture, political ideologies, and numerical inscriptions are all designated equally concrete agency, and placed on an equal ontological footing with human beings (Harman, 2009). Awarding non-human objects with agency is a much contested issue, which Latour (2005) also sees as constituting a major misunderstanding. According to Latour (ibid., p. 76), ANT does not suggest that humans and non-humans should be taken as "symmetric" but only that an a priori analytical distinction should not be made between "intentional human action and a material world of causal relations".

Hence, ANT does not posit that non-human actors hold the power of determination, but rather that as long as an agency causes a change in the surrounding world, the form it assumes is irrelevant. By assuming such a position, ANT effectively overcomes the traditional distinction between nature and society, or conscious human subjects and mindless non-human objects (Latour, 1987). However, this view does not lead to the conclusion that the world according to ANT would be filled with simple causal relationships; on the contrary, various translations and trials of strength take place along the way as a truth, or a black box, is being constructed (Harman, 2009). An ANT researcher's quest in such a constantly changing world is to trace and illustrate the dynamics of these transformations (Latour, 2004a). The term translation itself eludes precise definition and differs to some extent by author. For instance, Callon (1986) describes translation as a stepwise process over which one group of actors, employing a variety of tactics, acquires the power to speak on behalf of others, while in his later work, Latour (2005, p. 8) suggests that translation occurs when a new, traceable association between human or non-human elements is produced. As a concrete analogy, Harman (2009) suggests that translation could be compared to the process of a bill passing through parliament; a number of actors modify it at each step to better suit their interests, and always with uncertainty on whether or not the bill will ultimately become a law.

ANT also highlights the importance of forming alliances. An actor with an agenda must succeed in enrolling allies if it wants a particular translation to succeed and a new black box to emerge (Callon and Law, 1982). The more connected an actor, the more powerful and real it is (Latour, 1988). The most successful innovations are those that manage to convince the greatest number of human and non-human allies of their viability (Law, 1992). Hence, the existence of social order, power, truth, or any other seemingly self-evident phenomenon should not be taken as a given but seen as the result of numerous trials of strength between actors (Latour, 1987). Such trials recurrently surface when actors resist others' attempts to define their interests and objectives, and refuse to enrol into a particular network. Thus, somewhat contrary to common conceptions, disorder is perceived as the norm, whereas the stability of a system is a fragile, laboriously achieved state that might crumble at any time (Callon, 1986). Unceasing maintenance is needed to keep a network of alliances from disintegrating and established truths from being questioned. The processes of fabrication, or construction, are considered to take place incessantly as each new element added to increase the strength of a construction might suddenly produce unexpected effects, sometimes resulting in attempts to regain stability by adding yet more elements (ibid.).

When contemplating the attributes of ANT as a theoretical lens, we can describe it as a very open research approach, which provides certain concepts as well as rules of method and principles (Latour, 1987) for researchers interested in studying processes of construction in a specific field. However, as an exception to the otherwise liberal attitude, ANT is critical of studies that try to explain processes and their outcomes by appealing to the presence of social forces or other pre-existing conceptualizations. Latour (2005, p. 147) presents the main tenet of ANT as being that "actors themselves make everything, including their own frames, their own theories, their own contexts, their own metaphysics, even their own ontologies". According to Latour (ibid.), the imposition of preconceived theoretical frameworks or conceptual categories on the research subjects is inappropriate as it constitutes a premature attempt to define an actor's characteristics, is condescending towards those studied, and also guides the results of the research too strongly: for instance critical theorists working from the assumption that capitalists will always try to exploit workers will not fail to find support for their assumption. Thus, in epistemological terms, ANT can be said to refute the possibility of employing knowledge gained through a priori theoretical reasoning, while subscribing to an extreme form of constructivism which considers all knowledge not as a cause but as a consequence of research activities (Latour, 1987).

However, according to our interpretation neither the rules of method (Latour, 1987, pp. 258-259) nor what could be called the checklist of ANT researchers' characteristics (Latour, 2005, pp. 10-11) can be claimed to contain explicit restrictions against IVR or otherwise conflict with it. In contrast, especially the politically oriented ANT works can be considered to acknowledge that regardless of the methodology employed, a researcher necessarily participates in the construction of reality as any social scientific study "is part and parcel of what makes the group exist, last, decay, or disappear" (Latour, 2005, 33).

In an explicitly political piece of work, Latour (2004a) even prescribes a practical role for social scientists hoping to conduct societally relevant research. By way of background, he argues that we are presently living in a Hobbesian world where heterogeneous groups are engaged in controversies over what constitutes reality; their interests and goals are dispersed and they do not perceive themselves as forming a collective. Latour's (ibid.) solution for overcoming such a state of affairs is a due process which involves an unbounded investigation of the multiplicity of human-nonhuman entities seeking entry into our shared reality and then a political decision over which of the entities are compatible with and accepted as part of the common world. This process of composing the collective takes place through painful experimentation, which requires among others that the collective-to-be is constantly provided with descriptions of how the experimentation is proceeding, what the collective looks like at the moment and what it might aspire to be in the future. Latour (ibid.) argues that social scientists could make themselves most useful by producing such accounts instead of trying to make ontological decisions on behalf of the actors. Social scientists' wish to make a difference in the world is legitimate; in fact, "the burning desire to have the new entities detected, welcomed, and given shelter is not only legitimate, it's probably the only scientific and political cause worth living for" (Latour, 2005, p. 259). However, in Latour's (2004a, 2005) view social scientists should abstain from trying to solve controversies about what constitutes reality as this is ultimately a political decision, and instead describe how new entities have been detected and accepted (or not) as part of the collective.

Within the field of management accounting, scholars have, rather unsurprisingly, applied mainly the early ANT works, focusing on the role of numbers and the translation of accounting innovations (Mouritsen and Justesen, 2011). The first applications of ANT among

the management accounting academia include the exploratory works of Miller (1991), Robson (1992), Preston et al. (1992) and Chua (1995). Since then, the usage of ANT as a theoretical lens in management accounting has mainly been based on the writings of Latour (1987, 2005), while somewhat fewer scholars have found Callon's ideas more inspiring (e.g. Christensen and Skaerbaek, 2007; Skaerbaek and Tryggestad, 2010). ANT has been especially credited for having rekindled researchers' interest in numbers and calculations, which are presently at the nexus of sociologically rooted investigations on accounting phenomena (Mouritsen and Justesen, 2011). Robson's (1992) ground-breaking study on the concepts of inscriptions and action at a distance has invoked numerous studies on how reports and tables containing accounting figures might be utilized by organizational centres to impose their will on those from which they are separated by a temporal or spatial distance, without resorting to direct intervention.

A second and perhaps more abundant stream of ANT inspired management accounting research has analysed processes associated with the fabrication or implementation of various innovations such as Activity Based Costing (e.g. Briers and Chua, 2001; Jones and Dugdale, 2002), the Balanced Scorecard (Qu and Cooper, 2011) or Enterprise Resource Planning systems (Quattrone and Hopper, 2005). These studies have underscored not only the prominent role of non-human actors in the dynamics of implementation but also the precarious and temporary nature of both success and failure of accounting constructions. Such empirical interest in innovations is something that ANT shares with IVR; whether or not they are compatible also in other respects will be discussed in the next subsection.

2.3 Compatibility of ANT and IVR

Examining the basic features of IVR and ANT, as described above, already indicates that they are compatible in several respects. First of all, both ANT and IVR are interested in innovations and recognize that innovations are transformed, or translated, to fit the local context in which they are implemented – unless they meet with such resistance that they become rejected. Second, both ANT and IVR recognize that a researcher necessarily affects the reality that she is investigating. In ANT, such effects are considered to stem already from the researcher's choice to focus on, say, a particular innovation instead of some other one, whereas in IVR a researcher's participation relates to the concrete actions taken by the researcher to actually implement the innovation, too. Third, the role prescribed to the researcher in IVR and the more recent, politically oriented ANT involves coming up with accounts of how things presently are in a given community and how they could be in the future. All these similarities give reason to anticipate that IVR and ANT also share more profound philosophical features, an issue that we consider next.

In philosophical terms, both IVR and ANT contain features of realism (and the closely associated correspondence theory of truth), of constructivism and relativism, and of the pragmatist notion of truth. Although it might seem like a contradiction in terms, realism and relativism in their moderate forms (see e.g. Lukka and Modell, 2010) can arguably hold simultaneously. Both critical realism and moderate social constructionism accept that the world is perpetually changing and fragile (constructionism), yet also stable to the extent that meaningful research is possible (realism). Indications of such simultaneity can be found for instance in Popper's (1978) model of three worlds as well as the works of Berger and Luckmann (1966) and Giddens (1990).

Correspondence theory has traditionally been linked with realism and it posits that a belief is true if it corresponds to reality, whereas constructivist notions are, at least partially, based on

idealism and thus consider truths to be, at least to some extent, created by individuals' minds. The pragmatist notion of truth again may be expressed as follows:

> *"[a]ny idea upon which we can ride …; any idea that will carry us prosperously from any one part of our experience to any other part, linking things satisfactorily, working securely, saving labor; is true for just so much, true in so far forth, true instrumentally."* (James, 1907/1981, p. 34)[3].

In other words, those beliefs are considered true on the basis of which people are ready to act and which they find useful, or to put it in the most straightforward form, that which 'works in the world' is true.

The pragmatist notion of truth plays an important role in the philosophy of IVR. This is since typically the main aim of the researchers' interventions is to produce solutions to organizational problems, and the success of an IVR project is notably determined on the basis of whether or not the solutions function in practice (Suomala & Lyly-Yrjänäinen, 2012). The correspondence notion of truth may also play a role simultaneously since the practical reasoning that actors apply in the world – and which IVR therefore is interested in – typically includes a mix of 'hard', at least inter-subjectively objectified, facts and actors' subjective meanings (cf. Kakkuri-Knuuttila et al., 2008; Lukka, 2014). In addition, as IVR focuses on exploring the world in the making, its natural world-view is also constructivist, acknowledging the role of social actors in creating reality.

Turning to ANT's philosophical features, to the extent that Latour may be viewed as a realist, it is also possible to talk about the concrete existence of actors. The number of actors may increase as new networks are formed or decrease when the networks holding them together disintegrate. Such relational existence suffices to support the claim that at each moment the correspondence theory of truth holds in relation to those actors which make up the world. To some extent we may, somewhat surprisingly, consider Latour even a naïve realist - and he openly admits to being one (Latour, 2005, p. 156), since in his view, at each moment there exist certain fully real objects of which the world is constructed (cf. Harman, 2009).

Some of the objects that ANT is interested in constitute actors, defined in ANT as any things that have an effect on other things (Latour, 2005). This dynamic definition reflects James' pragmatist notion of truth since it allows not only humans, animals and machines but also spiritual beings to be placed on an equal ontological footing as long as they affect the actions of some other thing. Such a definition, which gives primacy to process over beings, also resembles the "process philosophical" idea of truth emerging from change (see e.g. Rescher, 1996; Salmon, 1984; Seibt, 2003; Whitehead, 1978) and the "ontology of becoming" observed by Chia (1995) in postmodernist MOS studies. But the main linkage to the pragmatist notion of truth relates to the fact that ANT's major focus lies in exploring how certain constellations of things become so strong that they become 'facts' or 'black boxes'. The strength of such actors is viewed to correlate with their ability to have effects, that is, function in the world (Latour, 2005). ANT's constructivist aspects in turn are reflected in the idea that truths are produced through the process of translation, during which the interests of human and non-human actors become momentarily aligned. According to Harman (2009, p. 77), Latour's idea of translation represents "an industrial model of truth", emphasizing that producing stable facts requires considerable effort. This also relates to the pragmatist theory of truth in the sense that the facts produced through translations are fragile and exist only in

so far as their links to other actors are actively maintained and reproduced (Latour, 1988, pp. 185-186).

Thus, an important criterion for the continued existence of a truth in ANT is the size of the network holding it together: those facts which have the largest number of links to actors are more durable in practice than others (Latour, 1988); Giddens (1990) for instance refers to institutions as black boxes.

To summarize, a comparison of the philosophical and other features of ANT and IVR supports our anticipation of their strong compatibility and suggests that they should be, even relatively easily, combinable in studies (see Table 1). It is important to note that Table 1 presents currently established views of the basic characteristics of the two approaches, some of which will be challenged in the study at hand. More precisely, in section 4 we will suggest expanding the prevailing interpretation on how ANT views researcher influence on reality and the role ANT prescribes to the researcher. As mentioned above, their compatibility offers fruitful opportunities to examine innovations and other constructions "in the making" by gaining a deep understanding of the organization and access to high-quality material. However, there is one point of potential tension between them that derives from ANT's perceived epistemological antipathy towards theoretically informed ANT research. At least among the management accounting academia, IVR studies that do not contain a problematization based on domain theory (Lukka and Vinnari, 2014) are often derided as being a-theoretical; yet it is particularly such studies that adhere to ANT's principle of conducting "unframed" research and merely describing what takes place. Hence, IVR studies that management accounting scholars perceive as being properly theorized can be viewed to be at some odds with (at least a certain reading of) the basic principles of ANT. In other words, it seems that ANT as employed in its most profound and comprehensive Latourian sense (Latour, 1996; 2005) would only be compatible with an a-theoretical form of IVR, whereas theoretically informed IVR analyses could be conveniently combined with ANT when the latter is mainly applied as an ethnographic method only.

INSERT TABLE 1 ABOUT HERE

A pertinent example of combining theoretically tuned IVR with ANT as a methodological approach is Mouritsen, Larsen & Bukh, 2001), which is one of the very few management accounting studies mobilizing both ANT and IVR. We will shortly review the paper here as in our view it illustrates the general benefits that can be gained from the combination, although the authors do not explicitly discuss such issues. In their paper, Mouritsen, Larsen & Bukh (2001) examine how intellectual capital, an abstract concept par excellence, is translated into something that can be calculated and reported by organizations. The project serving as the basis of the paper was organized as a response to the Danish national policy which aimed to promote knowledge society, and it involved various actors, including the authors of the paper and 17 Danish companies that had agreed to develop and publish an intellectual capital statement. Based on interviews, surveys and participation in the firms' bi-monthly meetings, the researchers' role in the project is reported as being to provide the companies with feedback on how the development work in the firms was proceeding, "how it can be rationalised, where the differences between the firms are and how the 'next challenge' has been defined for various situations" (Mouritsen, Larsen & Bukh, 2001, p. 742). As we see it, the main benefit of the interventionist approach as employed in this research project was that by participating in the companies' development work, the authors were able to observe the construction of intellectual capital in the making and to see how, phase by phase, the

concept acquired different meanings in different organizations, confronted obstacles and resistance, established links within the organizations and finally emerged as an actor with certain properties and the capability to affect others. It can be asked whether such a nuanced and detailed understanding of a three-year process with17 firms could have been obtained without the researchers' emic involvement in it.

We will now turn to our empirical material in order to investigate the extent to which the combination of ANT and IVR has been employed in extant management accounting research.

3. Present state: realized combination of IVR and ANT in accounting research

3.1 Data and method of analysis

For the purpose of studying the extent to which ANT and IVR are combined in research, we analysed articles published in accounting in the time period 1991-2014 (full years). The journals were selected based on two criteria: first, that they are well-known in the field of accounting and second, that we considered them to be open to publishing studies which apply IVR and/or ANT. The following eight accounting journals (in alphabetical order) were included in the analysis: *Accounting, Auditing and Accountability Journal (AAAJ); Accounting, Organizations and Society (AOS); Contemporary Accounting Research (CAR); Critical Perspectives on Accounting (CPA); European Accounting Review (EAR); Journal of Management Accounting Research (JMAR); Management Accounting Research (MAR)* and *Qualitative Research in Accounting and Management (QRAM)*. For the purpose of our supplementary analysis, a corresponding set of MOS journals were selected: *Academy of Management Journal (AMJ); British Journal of Management (BJM); Human Relations (HR); Journal of Management Studies (JMS); Journal of Organizational Behavior (JOB); Organization (ORG); and Organization Studies (OST).*

The articles for the analysis were chosen based on three criteria: first, that they utilise ANT and/or IVR to a significant extent; second, that they belong to the field of management accounting (or MOS); and third, that they contain an empirical section. The articles were sought from scholarly databases utilizing search terms "Actor Network Theory", "ANT", "sociology of translation", "interventionist research", "constructive research", "action research", and "clinical research". Applying these criteria, 57 accounting articles and 85 MOS articles were found and subjected to analysis [4]. Henceforth we will employ the term "ANT articles" to refer to studies in which ANT was mobilized akin to a comprehensive conceptual framework and/or as a methodological approach. Our sample does not include studies that made relatively little use of ANT, such as those that incorporated only a few ANT concepts into another theoretical framework. Correspondingly, "IVR articles" comprise those studies in which some variant of IVR had been employed at least during some phases of the research process. The designation "ANT and IVR" refers to studies that fulfil both criteria.

The literature analysis consisted of two parts. The first part comprised reading each ANT article to identify when the research was conducted and how actively the researcher participated in the events. Regarding the chronological aspect, our aim was to identify all those studies that could have in principle been conducted in an IVR fashion, that is, those studies that contained a real-time element. An article was placed in the category "real-time" if it seemed that the empirical part of the research had been conducted during the same time as the events of significance to the analysis were taking place. A clear indication of such research was for instance that an article cited "participant observation" as a research method,

but the emergence of the notion "ethnography" was considered as a possible indication triggering further analysis. In cases where the time frame of the empirical research was not explicitly mentioned in the text, attempts were made to deduce it from more implicit notions, such as whether interview quotes referred to past or present events. As the analysis proceeded, however, it became apparent that some articles could not be categorised simply as "real-time" or "ex post facto" because the text did not provide enough information to establish the time frame conclusively. This realization prompted the establishment of a new category, "undecided". Regarding the degree of intervention, an ANT article was labelled "interventionist" if it was apparent that the researcher had actively participated in the events under study.

In the second part of the literature analysis, we approached our research task from the perspective of IVR studies to identify those IVR studies that could have in principle employed ANT as their theoretical lens. Towards this end, we read each IVR article and determined which theoretical lens, if any, had been utilized in the articles. By combining the results from the two parts of the literature analysis, we obtained two pools of potential ANT and IVR articles that we then compared to the actual number of papers mobilizing the combination. The results of the literature analysis are presented in section 3.2.

Informed by the literature analysis, we conducted interviews with altogether eight experienced accounting scholars who have applied ANT and/or IVR in their studies and whose studies were included in the literature analysis. Due to our focus on accounting and the scope of this journal, we did not interview any MOS scholars. The interviews, lasting between 40 minutes and 110 minutes, were conducted between June 2009 and May 2014 (see Appendix 1). Three of the interviewees had experience from applying only ANT, three had experience from only IVR, and two had experience from both ANT and IVR. Further individualizing information cannot be revealed as such an agreement was not made with the interviewees at the time.

The purpose of conducting the interviews was to gain answers to our third research question, that is, which barriers and benefits are associated with the combined use of IVR and ANT. We employed semi-structured interview guides (Appendices 2a and 2b) which, due to the exploratory nature of the research, were further modified as we discussed the contents of each interview after it had been conducted. The interviewees were asked both specific questions about their own published works and more general questions pertaining to ANT, IVR and their compatibility. The interviews were audio recorded and later transcribed. The interview data was then subjected to thematic analysis. Both authors first read the interview transcripts individually and then discussed their findings in order to arrive at a joint interpretation. When first analyzing the data, we sought to identify perceived barriers to combining ANT and IVR as well as the potential benefits that their combination was considered to offer. We found the barriers to be associated with philosophical principles, researcher bias as well as researchers' academic background and connections. As is characteristic of abductive reasoning, we then went back and forth between extant literature and our empirical data, noting that while reservations related to researcher bias could be expected based on prior research, the first and third barriers (epistemological dilemma and intra-paradigm tribes) constituted new findings. Similarly, while some of the benefits of combining ANT and IVR (gaining access to the emic level and high-quality material) could be expected based on prior research, being able to ask new kinds of questions and engaging practitioners emerged as new findings. The results of the interview analysis are presented in section 3.3, which is structured according to the themes that emerged from the analysis.

3.2 Literature analysis

As mentioned above, our search yielded a total of 57 accounting articles employing ANT, IVR or both (Table 2; for corresponding MOS table see Appendix 3).

INSERT TABLE 2 ABOUT HERE

 As can be seen from Table 2, we found 39 articles in which ANT was mobilized either by itself (35) or in combination with IVR (4). The distribution of these articles is presented in a summarized form in Table 3 below (for an expanded version see Appendix 4), which is structured according to the timing of the research (ex post facto vs. real-time) and researcher participation in organizational events (interventionist vs. non-interventionist).

INSERT TABLE 3 ABOUT HERE

Starting with the non-interventionist column in Table 3, eight articles could be identified as being completely ex post facto, whereas the majority of the articles (24) were non-interventionist and contained a real-time element. A prime example of such research is Briers and Chua's (2001) study of the construction of organizational knowledge, which according to the authors was conducted "(...) in situ and in real time" in their case organization (p. 58).

Moving on to the interventionist column, as was established earlier in the paper, ex post facto interventionist research is simply a contradiction in terms and thus there are no articles in this category. Four ANT-informed accounting articles could be identified as real-time and interventionist. These include studies on the role of accounting devices in strategy formulation (Skaerbaek and Tryggestad, 2010), financial management change in New Zealand (Lawrence et al., 1994), development of intellectual capital statements (Mouritsen, Larsen and Bukh, 2001), and the development of performance measurement in the university sector (Arnaboldi and Azzone, 2010). The final category of Table 3 contains three articles which could not be definitively identified as belonging to any of the other categories due to incompleteness of methodological information.

 The above findings indicate that the majority of published ANT-based management accounting research incorporates a real-time element; however most of the research has been conducted in the non-interventionist mode. Of the 28 real-time ANT articles in accounting, four were interventionist, and the rest were non-interventionist. A rather similar distribution was also observed in the case of MOS articles (see Appendix 5). Having said that, it needs to be acknowledged that there is great variation in the level of details provided by researchers regarding their empirical methods and their degree of involvement in the investigated organization. It is possible that a somewhat larger share of the analysed ANT research has entailed researchers' intervention but this aspect has been omitted from the articles because the researchers have considered it irrelevant or perhaps even an obstacle to publication. Furthermore, the role of the figures here is merely indicative.

Turning now to the total of 22 IVR articles, their distribution in terms of their employment of a theoretical lens is presented in Appendix 6 [5]. From Appendix 6 we can see that thirteen out of the 22 IVR articles employ a theoretical lens through which to study the phenomenon of interest, and in four instances that lens is ANT. The corresponding figures for MOS studies

are again very similar (see Appendix 7). Even though these results are only indicative, they provide an interesting contrast to the results presented earlier in terms of the prevalence of the combined usage of ANT and IVR. As presented above, the use of IVR in real-time ANT research seems a much rarer phenomenon than the mobilization of ANT in IVR studies with a theoretical lens. Such a difference might be taken to suggest that ANT scholars would hold slight reservations towards the combination of ANT and IVR, whereas IVR scholars would be more open to experimenting with such an approach. This very preliminary suggestion finds support in the next section, where we analyse our interview material in order to identify perceived barriers to the combined application of IVR and ANT as well as the potential benefits that the combination is considered to hold.

3.3 Researchers' views on combining IVR and ANT

3.3.1 Perceived barriers
On the basis of the interviews, three types of barriers to combining IVR and ANT were identified: perceived epistemological incompatibility; fear of going native or losing neutrality; and academic tribes.

The issue of an epistemological dilemma was brought up by Interviewee 3, who considered ANT's predisposition towards the world to cause problems to a researcher with an agenda:

> *You have an epistemological dilemma because […] at the heart of ANT is the symmetry assumption, everything is good. So if everything is good, how can you be involved in action research, how can you enter in if everything is good? You just add one drop of something but it may not be relevant at all. (Interviewee 3, experience from ANT)*

This perception of an epistemological dilemma is likely based on ANT's idea that researchers should not take truths, facts or actors' properties as a starting point in their inquiry since these do not determine what takes place but only emerge at the end of a process of translations. In Interviewee 3's eyes, a researcher advocating for instance an accounting innovation would be trying to determine its success and other characteristics in advance, in a way short-circuiting the trials of strength that will arise during the implementation process and may sometimes lead to failure. The interviewee specified that as a reviewer he would not consider this dilemma to constitute grounds for rejecting a paper implementing ANT and IVR in combination; yet he would certainly ask the author(s) to explicate and justify such an approach.

Such a view of the epistemological compatibility of IVR and ANT was to some extent supported by Interviewee 4, who reminded us that in the world according to ANT, nothing is permanent:

> *[I]n some sense I agree with that point [epistemological dilemma]. I don't know if things are better [after the implementation of an innovation], it depends on how you define it. Better for whom? Better for what? […] It's that the entities are defined by their relationships, they don't exist in and of themselves, except in connection to a whole series of different roles and positions, and so I find it very hard to say things are better, full stop. (Interviewee 4, experience from ANT)*

This viewpoint highlights the uncertainty involved in forming alliances and the precarious nature of actors' existence. To take a concrete example, if a researcher would go into an organization with the purpose of developing and implementing a Balanced Scorecard, the

latter might become a successful decision-making aid if it was surrounded by allies such as compatible computer systems, enthusiastic managers and committed personnel. However, despite its initial success the innovation might later fall into oblivion if it was abandoned by its allies, for instance if it no longer was in line with strategy or if an enthusiastic CEO would be replaced by a new one who did not consider it a worthwhile tool. The researcher has no way of predicting how events will unfold after she has left the organization, and apparently because of such uncertainty Interviewee 4 would consider it problematic for herself to participate in the construction of the innovation in the first place.

Interviewee 1 referred to the same issue, although in a much milder tone, when talking about an interventionist research project in which he had mobilized ANT. In the project, he was expected to collaborate with a number of companies willing to develop a certain accounting innovation, and to produce a guideline that other interested firms could follow. The interviewee described his research team's position as follows:

> [W]e knew we were going to create a guideline, and a guideline has some idea of some things that you could do, or had to do, or it would be interesting to do, and therefore it says that some things are more important than other things. […] I don't think that we [researchers] were normative in the sense of saying that the [innovation] has to be good, or that it is good. I would rather say that "if you do this and this and want to have these purposes, then it could be an interesting option with these sorts of features".
> (Interviewee 1, experience from ANT and IVR)

The interviewee maintained that his team had managed to avoid commenting on the attributes of the innovation as such by focusing instead on offering various alternatives on how it could be developed, and by acting as facilitators rather than consultants. He considered such interventions on his research team's part to constitute "setting up the laboratory" in which the organizations then constructed the innovation, guided by the comments and options he presented. In other words, Interviewee 1 did not consider it impossible for a researcher to participate in the construction of an innovation as long as he refrained from explicitly claiming that an organization would be absolutely better off with it. Moreover, his team appears to have closely followed Latour's (2004a) normative advice to social scientists: to present the collective (here the firms) with a picture of how their experimentation (constructing the innovation) is proceeding and what it could look like in the future (which features the innovation could have). He thus in a way acknowledged the possibility of an ANT study ending up in an epistemological dilemma but seemed to have found a solution to it.

While interviewees acknowledged that qualitative research is always obtrusive to some degree, some of them considered IVR to constitute an extreme approach that could easily result in both types of researcher bias identified in prior literature, going native and losing neutrality (e.g. Miles and Huberman, 1994). Scholars who had conducted participant observation in the past recounted how they had grappled with the threat of becoming emotionally involved, and suspected that an IVR researcher would have an even harder time avoiding going native. Interviewee 2 explained this concern with reference to a project in which she had observed events in an organization undergoing accounting change:

> I've never done it [IVR] myself, I could just imagine it becomes very difficult, it's almost like a schizophrenic exercise if you say, in my case for example, if I had had to really

promote and believe in those [innovations]. […] I wouldn't say it's impossible, just that it's difficult to do. (Interviewee 2, experience from ANT)

Maintaining a critical distance was also something with which interviewee 4 had struggled in her research and which she had noted to be difficult to students conducting research in organizations:

"[S]ometimes it's very hard for the person to critically evaluate the site because they're so much, they see the world so much like the managers and I have to keep saying, 'But you're not one of them, you know, you have to kind of step out of it.'" (Interviewee 4, experience from ANT)

In other words, when a researcher begins to identify herself too much with organizational participants, she loses her ability to revert to the etic position and critically inspect the events she has witnessed from a theoretical perspective. This may result in a situation where she neglects to notice theoretically curious phenomena that surround her.

A related but opposite worry mentioned by one of the interviewees was the danger of an IVR researcher losing her neutrality in the eyes of organizational participants:

For example if you are the consultant who is engendering change, you might not get an idea of the resistance because it may happen behind your back. Because people will not see you as an ally […] They may be afraid that if they say something negative they may run into trouble because you may tell their superiors or whatever. (Interviewee 2, experience from ANT)

As noted above, these concerns related to researcher bias have been discussed more broadly in relation to qualitative studies employing interviews and participant observation as research methods. Therefore it seems that researchers who had experience from ANT only were not so much wary of the combination of ANT and IVR but of IVR in general. This observation takes us to the third obstacle that emerged from our interview material, namely researchers belonging to various academic tribes.

Prior studies (Lukka, 2010; Vaivio and Sirén, 2010; cf. Kuhn, 1996) suggest that researchers may be divided into paradigmatic tribes, for instance according to whether they utilize quantitative or qualitative research methods or depending on the ontological and epistemological assumptions on which their works are grounded. Based on our interviews, a similar division may also be noted *within* the qualitative accounting research paradigm. As this constitutes a narrower phenomenon than paradigmatic tribes, we have given them the label "academic tribes". One of our interviewees, an IVR researcher affiliated with a technical university, admitted that he and his colleagues had not previously given much thought to their works' theoretical contribution as their engineering training had emphasized the practical applicability of research results. Against this background, the employment of theoretical lenses such as ANT seemed like an excess burden:

Most of us have received a technical education and now we conduct accounting research. Of course we have developed that knowhow but it still means we work in two wide fields of knowledge. Then if we take yet another one, let's say a theoretical framework from psychology or sociology, that's quite a lot to master for an individual. (Interviewee 7, experience from IVR)

Similarly, among the researchers who had experience from ANT only, there was a person who had received part of her education in sociology and was strongly influenced by the traditions of that field:

> *[T]here's a strong training, particularly in [country name] where I did my sociology training, starting from going back to Weber where, first of all your research should be as value-free as possible […], and secondly that you need to be careful about your own involvement. That doesn't mean that I say all action research is impossible, not at all, it's just that I grew up in a tradition where this just wasn't done […] (Interviewee 2, experience from ANT)*

Interviewee 2 also recounted during the interview how she had conducted participant observation as an unpaid junior assistant in an organization. When asked about her personal involvement, she claimed to have remained "the stranger" (Simmel, 1971) throughout her stay, due to having a different background than the other organizational members. However, she also professed to have made friends among her co-workers and completed the tasks assigned to her so well that she had been asked to stay and work full-time in the organization. The question that inevitably comes to mind in this context is whether establishing such close personal relations and becoming immersed into organizational life in fact differ markedly from an interventionist researcher's involvement.

Overall, the existence of academic tribes was considered a rather problematic phenomenon by our interviewees:

> *[T]hat's the way it seems to be, that we can actually talk about 'ANT researchers' and 'IVR researchers' and other researchers, and such epithets are relatively valid on an individual level. That's probably the core of the problem in a broad sense, that as individuals we tend to become compartmentalized too much […]. We look at other approaches from the perspective of their weaknesses and threats and that's when a clique structure begins to emerge. (Interviewee 7, experience from IVR)*

A related concern expressed by some interviewees was associated with the question of how literally researchers should interpret ANT's advice to observe things in the making, that is, whether real-time research would be preferable to reconstructing events ex post facto:

> *ANT has sometimes become translated itself in a way that some [accounting researchers] seem to have adopted this slightly positivistic approach, you know, you just follow the actors and then you just report back from the field, you tell the story as you saw it, and I think that's wrong. You always have the author, there's always some sort of selection, some dramaturgy and how you present your story." (Interviewee 2, experience from ANT)*

This statement implies that even the small group of ANT-inspired accounting researchers would belong to different schools of thought based on what kind of methods or approaches they consider appropriate. Such diversity was also visible in our selection of interviewees: two of them preferred real-time research, two favoured documents and interviews, and the rest did not consider it fruitful to place research methods in a hierarchical order. Such views suggest that there is heterogeneity in management accounting research (Lukka and Mouritsen, 2002) within the interpretive paradigm and even within the ANT-inspired accounting research community. It is of course understandable that scholars pressurized by performance metrics often specialize in one theoretical lens or a particular research approach;

yet one should be cautious of such letting such practical complications translate into intolerance towards other theories, methodologies or approaches.

3.3.2 Perceived potential

When asked about the benefits of combining ANT and IVR, our interviewees acknowledged the already known aspect of gaining the emic perspective, but also proposed new ones, such as being able to ask new kinds of questions and engaging practitioners.

Even interviewees who were not personally disposed towards IVR, acknowledged the previously documented (e.g. Jönsson and Lukka, 2006) benefits of gaining a better access to an organization and obtaining a richer variety of materials than in the case of a more conventional research project. In this context the potential for theoretical contribution was highlighted over the practical implications, as expressed for instance by Interviewee 8: "It [IVR] is a means to another end". Another interviewee considered IVR to be especially useful for someone with an interest in ANT:

> *If you need to get a good understanding of a network, some kind of entity, about where the powerhouses are and what works, then what better way is there than to go into the network and do something? In this sense I think that for a person who wants to understand a network and its operations, an interventionist approach would, after all, be the best possible. (Interviewee 6, experience from IVR)*

Yet another benefit that is emphasised in the IVR literature is gaining access to the emic level (e.g. Jönsson and Lukka, 2006). In the emic position the researcher is accepted as an insider in the organization and she therefore obtains information about other organizational members' meaning structures, their values and interests [6]. However, this is where the interviewees were no longer unanimous. Most viewed the emic position as a clear upside:

> *I think it is worthwhile getting close and get the feeling on your own body, what are … I mean, first of all, how can you mobilize accounting logics, how can you analyse practices, with the help of the knowledge that we [researchers] have about accounting and management control, how can you utilize that and see what happens when we try to alter organizations with the help of those. (Interviewee 5, experience from ANT and IVR)*

However, Interviewee 1 did not consider the emic perspective to be of much importance. In his opinion, the implications of people's meaning structures are often unclear or contingent:

> *And I think at least ANT has the […] notion that part of objects and goals are endogenised, they come by fitting things into a situation, rather than exogenised. So we don't think about the meaning structure as something which permeates you beyond the interaction. […] [T]he meaning structure is not governing anything. […] And if it doesn't govern anything, why use it? It is not a cause, but an effect, why use it? (Interviewee 1, experience from ANT and IVR)*

Here the interviewee seems to refer to the ANT idea that actors do not possess an a priori essence but their identities, understood as their expectations, intentions and responsibilities, are defined by the network with which they are associated. Moreover, these identities are not fixed but may change over time as new elements enter or old ones exit the network and the framing of the interactions becomes altered (e.g. Callon, 1998). Hence, according to this anti-essentialist position, an actor's meaning structure is not considered a permanent feature that drives individual action but something which results from networked interactions. However,

in our view and consistent with the core ontology of ANT, even though meanings cannot be assumed stable forever, they can still be conceived of as actors as they certainly can (and often actually do) have an effect on another thing. Therefore it seems that while the emic position is awarded less significance in ANT than in the modern philosophy of causation in social sciences, which increasingly recognizes meaning structures as an integral part of explaining human action and certainly not only endogenous objects (e.g. Kakkuri-Knuuttila, 2006; Lukka, 2014), there could be unproblematic potential in developing ANT thought towards considering more profoundly the role of the emic domain.

The second benefit of combining ANT and IVR, which the interviewees viewed in more consensual terms, was that it would lead the researcher to explore completely new questions. Interviewee 5 recounted an example of a consulting project in which he and a colleague had been asked by an organization's CFO to conduct an examination of how the firm's management accounting function could be developed. The two researcher-consultants listed a number of omissions and development needs in a critical report, which was contested by top management who promptly ended the consulting project. Although this was disappointing to the researchers in their consultant role, it provided a starting point for a fruitful scholarly investigation, the results of which were reported as an ANT narrative:

> *But it [the intervention] was still important for raising all the important issues. Why was management accounting suddenly so unwished and why were they [top management] so angry about it? […] So it [the intervention] stimulated thinking about what was happening there and how we could understand what was going on. So I think in that sense interventionist research can trigger situations and perhaps stimulate new interesting cases. (Interviewee 5, experience from ANT and IVR)*

Similarly, Interviewee 2 pointed out that ANT researchers interested in analysing other issues than implementation processes could utilize IVR to generate new types of problematization:

> *If you engage in for instance the implementation of ABC or whatever, rather than just studying the change and how successful or unsuccessful it was, you may be able to see what was unsettled and what were taken for granted meanings before, so I think you could take it as an opportunity, some sort of intervention, that may help you gain access to certain things that otherwise would not have been problematized. (Interviewee 2, experience from ANT)*

An associated benefit that appeared in our interviews, albeit in a slightly more indirect fashion, was engaging practitioners. Practitioners could for instance benefit from understanding and applying ANT in their work:

> *I think that ANT is actually fabulous for managers, absolutely fabulous. […] Because you start to see the power of inscriptions and the beauty when your inscription holds. I mean that's why folks often criticize ANT for its instrumentality, yeah? Because you can actually flip it and it loses a lot of its critical intent. (Interviewee 4, experience from ANT)*

This quote suggests that the central ideas of ANT can be utilized by managers in their quest to gain other actors' support for their calculations, control systems, strategies or other constructions. However, practitioners rarely have the time to dive into the quirky vocabulary and complex argumentation style characteristic of much of ANT literature. Therefore a researcher applying IVR and ANT in combination could offer her theoretical understanding

of inherently uncertain change processes as an additional benefit to an organization in exchange for gaining access. IVR can be characterized as a two-way street, meaning that both parties to a project should gain something from it. Thus, if the innovation project involving the interventionist ANT researcher failed, at least the organization would gain a wider, ANT-based view into why the failure occurred. Or, in a less dramatic case, organizational participants would obtain an understanding of why a system that was expected to emerge from the development process with certain features ended up with some other, unexpected ones. By sharing her knowledge of the basic principles of ANT an interventionist researcher could also relieve certain organizational anxieties that are likely to emerge while an innovation is being constructed, for instance make managers less relentless in their efforts to find the "true cost" of something. As aptly expressed by Interviewee 4:

> *The reality is bullshit, there isn't such a thing as the true cost. An estimate is a goddamn estimate. What we have to do is to say, 'We've got enough confidence that we have worked our backsides off, we've got a process in place, and this is the best number we can get with all those relationships in place, so let's run with the damn thing.' (Interviewee 4, experience from ANT)*

Another way in which an ANT researcher applying IVR (or vice versa) could offer advice to the organization in which she is engendering change is by highlighting actors' diversity and unpredictability, thus increasing managerial acceptance of the fact that not all things can be controlled. In this context, Interviewee 5 referred to Latour's (1991) classic hotel key metaphor:

> *And then he [Latour] has this example of all the devices that we need to invest in to, let's say, optimistically have eighty per cent of the visitors actually leaving the key [at the reception] before they leave the hotel. But we never get to the perfection. […] I mean, people are difficult to … to manage, to control in a way. So people are strange and people are so multiply different, and that is the game that we are up against when we are trying to make our systems perfect. […] I'm not sure that practitioners have a sufficient understanding of this. (Interviewee 5, experience from ANT and IVR)*

Finally, with the help of ANT an IVR researcher may offer an alternative to ideas of innovations developing and diffusing in a linear and predetermined fashion, emphasizing instead how success often depends on minute things:

> *ANT is also good because it tells us a little bit about creating a market, which is good for business people when they want to be innovative and create businesses; what is the game. It is a game about understanding, it's a tiresome process to understand what works and what doesn't work on those stupid creatures called humans. (Interviewee 5, experience from ANT and IVR)*

4. Discussion

Based on the interviews, we identified three reasons for the scant combined use of IVR and ANT. The first reason seems to be a certain epistemological dilemma, as perceived by some ANT scholars, according to which an ANT researcher should not have an agenda since anything can take place at a given phase of, for instance, implementing an innovation. This view resonates with the ANT credo that the acceptance of a fact or the success of an innovation should not be explained ex post facto by appealing to some essential qualities since these are only determined during the translation – a process which may also fail.

Partially in relation to this principle Latour (2005) posits that researchers should not employ fixed theoretical concepts or frameworks when analysing their empirical material as these could pre-shadow the results. It would seem that some of our interviewees have interpreted this limitation in a wider sense, to imply that a researcher should not become personally involved in the reality that she is studying. However, as discussed in section 2.2, in his recent works Latour (2004a, b; 2005) explicates that conducting research is always a political act and professes that currently ANT researchers wish to be "much more engaged than what was possible with the scientist dream of a disinterested gaze" (Latour, 2005, 256). It has been argued that this political project, which is also shared by the broader 'ANT and After' community (see e.g. Dugdale, 1999), makes it possible for ANT researchers to help "to enact some realities rather than others in specific empirical settings" (Alcadipani and Hassard, 2010, p. 428).

When the above ideas are contemplated together with the principles of interventionist research, the two do not appear incompatible. If organizations are conceptualized as collectives and accounting innovations as new entities seeking entry into those collectives, it can be argued that an interventionist accounting researcher would have every right to wish that the innovation she is helping to implement would become part of organizational reality. The more important point from Latour's (2004a, 2005) perspective is that even though such a wish is legitimate, the researcher should not attempt to decide on the organizational members' behalf whether or not to accept the innovation; her own role should be limited to producing descriptions of how the implementation is proceeding in the organization and what options are available for the future. In our view this is already the case in most, if not all, interventionist studies as the researcher must leave the organization at some point and cannot control what happens with the innovation; neither can any singular actor, for that matter.

How, then, can we explain the perception of the epistemological dilemma? One answer to this question might be that there are multiple versions of ANT (Mol, 1999; Alcadipani and Hassard, 2010) and it could simply be the case that the version mobilized as a method theory (Lukka and Vinnari, 2014) in management accounting is less permissive of interventions than ANT as a sociological domain theory. Another potential explanation derives from the history of ANT and the way in which it has come to be applied in other fields, such as management accounting (Fig. 2). When ANT was only emerging, science and technology studies (STS) scholars such as Latour and Woolgar were concerned to examine how natural scientists construct facts about, for instance, the effects of microbes by making the microbes undergo certain trials in a laboratory. This classic ANT research setting is depicted on the right-hand side of Figure 2.

The natural scientists (in the middle of the figure's right-hand side) are undoubtedly conducting interventions in the microbes' lives through the experiments they have designed (Latour and Woolgar, 1979); they could thus be argued to apply IVR. It is also possible, although considerably less likely, that the natural scientists would report their results in the form of an ANT narrative. On the upper right-hand side of Figure 2, the STS scholar can, and often does, employ ANT when observing how scientific facts are made stronger by the scientists and how the microbes possibly resist the latter's attempts to define them.

INSERT FIGURE 2 ABOUT HERE

The left-hand side of Figure 2 illustrates the application of ANT in the field of management accounting. On the middle level, we have a management accounting researcher who is interested in, for instance, the effects of performance management practices in organizations. By way of analogy, the management accounting researcher (compare natural scientist on the right) is allowed to intervene in the lives of organizational participants (compare microbes on the right) with the purpose of helping them construct a particular innovation by employing IVR. Naturally the management accounting researcher can also produce an ANT description about the organization she is studying. Regarding the upper level on the left-hand side, it is certainly possible that an STS scholar would employ ANT when following how the management accounting researcher constructs accounting knowledge in her organizational laboratory. It is noteworthy that nothing on either side of Figure 2 points to insuperable obstacles to applying ANT and IVR simultaneously.

The point we are trying to make with the help of Figure 2 is that as the very first ANT studies were empirically situated in a laboratory, this might have caused some confusion regarding the later research settings in which ANT is applied in non-scientific organizations (cf. Czarniawska, 2009). Thus, in terms of Figure 2, the management accounting researcher on the left-hand side might be mistaken for the STS scholar (who typically does not apply IVR) when in fact her counterpart on the right-hand side is the scientist (who constantly applies IVR). Such confusions related to the multiphase application history of ANT, combined with the perceived epistemological dilemma, might then have resulted in views that combining ANT and IVR is questionable. It is also possible that such views have emerged from the perception that ANT is not usually applied in natural scientific research, or from some other, as yet unidentified source [7].

The second reason to scarce combined use of ANT and IVR relates to ANT researchers' fears of becoming too emic or losing one's neutrality. It is true that IVR is somewhat problematic as concerns researcher neutrality. When conducting the intervention she cannot be completely neutral as she has to believe in her cause and be able to convince organizational management of its usefulness [8]. Although no facile solutions abound to tackling such issues, a good starting point is that the researcher profoundly acknowledges their existence and reflects upon them throughout the research process (Jönsson and Lukka, 2006). Due to various pressures exerted by other participants in the interventionist project, the researcher is often required to make a conscious effort to maintain her critical independence (McSweeney, 2004). Concrete steps taken to guarantee such independence include for instance the drafting of a formal agreement which outlines how the research and analysis are to be undertaken and what kind of role the researcher is expected, and willing, to assume. Such a document helps to counter pressures from other participants and also forces the researcher to give explicit consideration to the strength of her intervention.

During the actual research process, an interventionist researcher can try to avoid becoming too emic or going native by simultaneously interpreting practical events in theoretical terms (Miles and Huberman, 1994). In the etic phase, a competent IVR researcher can compensate for her possibly too deep immersion in the emic world by purposefully distancing herself from the organization and her own practical agendas, in order to be able to reflect upon her research results from a scholarly perspective (Jönsson and Lukka, 2006). A meticulously kept field diary can be of great assistance as it (ideally) contains records of the events as they unfolded and thus enables the researcher to retrace the process by which associations were formed among various actors to effect change (see also Latour, 2005). It may also help the researcher notice some taken-for-granted issues that she had not been able to see when

actually conducting the intervention. Finally, the most essential issue throughout an IVR project is that the researcher keeps in mind that she is first and foremost a scholar.

The third reason for the scarce combined use of ANT and IVR concerns academic tribes (cf. Lukka, 2010; Vaivio and Sirén, 2010). Presently the researchers employing ANT and IVR appear to constitute two separate schools of thought with largely different members, likely due to differences in their educational and institutional background. This phenomenon is similar to but much narrower than the Kuhnian idea of paradigms (Kuhn, 1970). In accounting, several paradigms exist simultaneously (see e.g. Wells, 1976; Chua, 1986; Cushing, 1989), subdivided into categories that can be labelled academic tribes. Thus, it is not a question of the oft-discussed paradigmatic competition between positivist and interpretive management accounting research but rather of the boundary and felt tension between two approaches within the interpretive/critical [9][10] paradigm. However, the "ANT tribe" and the "IVR tribe" seem to differ from each other in their disposition towards other tribes. The ANT school in management accounting appears as a group with relatively high internal cohesion with determined views about appropriate theories, methods and their combinations. Its counterpart in the academic world is constituted by non-ANT researchers, including also IVR researchers. The IVR scholars in turn come forth as a more open tribe, which is not opposed to non-IVR in general or ANT in particular.

The issue of tribesmanship is also associated with the first and second obstacles identified in our study. In the case of the second obstacle, certain tribes are inherently more wary than others of losing their neutrality and going native. As concerns the felt epistemological dilemma, belonging to a certain academic tribe can offer an epistemological shortcut as it reduces the need to consider the philosophical compatibility of unfamiliar research approaches with those considered acceptable by the tribe. Philosophical questions appear pivotal as regards scholars' adversity to combining ANT and IVR, although more pragmatic issues such as time considerations and publication pressures are also likely to play a role. Nevertheless, a division into "ANT scholars" and "IVR scholars" could be argued to constitute a less than desirable state of affairs as it might hamper the detection and theorizing of interesting management accounting phenomena and thereby the progress of the field (Lukka and Mouritsen, 2002). At the very least, the existence of academic tribes can limit academics' freedom to experiment with different approaches or employ these in combination even in instances of great epistemological compatibility and seeming fruitfulness. Perhaps one way of overcoming the barrier to combining ANT and IVR at the practical level would be for scholars from the two schools of thought to realize synergy potential through collaboration (Vaivio and Sirén, 2010).

As concerns the implications of combining ANT and IVR, there seems to be potential for IVR to contribute to ANT studies, and vice versa [11]. One instance of IVR contributing to ANT studies would of course be the active involvement of researchers in organizational processes, that is, conducting interventions. For ANT researchers interested in accounting innovations, IVR offers a suitable approach with which to implement the principles of following actors and observing things in the making. One of the key benefits of IVR is that it allows the researcher to observe organizational events from the emic position, as one of the involved practitioners. The emic position facilitates the researcher's communication with other organizational actors as well as enables her to gain a deep understanding of causal mechanisms and organizational processes. An interventionist ANT researcher would also be able to observe individual actors' meaning structures; however, not necessarily as fixed and

predetermined properties, but rather as fluid habits that vary during the translation process under observation.

ANT could in turn contribute to IVR studies by offering possibilities for researchers to generate entirely new and interesting research questions by problematizing taken for granted issues (Chua, 1986) and finding new perspectives to the implementation of innovations as well as other accounting phenomena. Naturally such benefits are not limited to ANT only; the application of other method theories (Lukka and Vinnari, 2014) could also convey similar benefits. While participating in organizational processes, interventionist researchers could, for instance, gain insights into the interplay of various institutional logics (Thornton et al., 2012) or examine the psychological effects of the innovations they are helping to implement. However, we argue that ANT could be of particular use to IVR researchers via its open ontology that enables the examination of the role played by nonhuman actors, such as accounting technologies or calculations, in various construction processes undertaken in organizations. Furthermore, ANT provides methodological principles with which to study the trials of strength undergone for instance by various accounting innovations as they are being translated (or not) into facts. By combining ANT and IVR, researchers can search answers to how-questions, (e.g. how innovations temporarily succeed or how power differentials come about), but of course they need to be conscious of the risk of losing their ability to observe taken for granted issues or to reflect on their findings in an unbiased scholarly manner.

Finally, through IVR contributing to ANT, the research field of management accounting could acquire more practical and policy relevance, which it has been accused of lacking. By combining their knowledge of ANT with participation in an organizational change project, accounting researchers could perhaps increase the benefits experienced by the organizations with which they cooperate. This applies also to politically-oriented social and environmental accounting researchers, who have begun to conduct action research as part of their engagement with firms in sustainability issues. In this context, ANT could provide increased understanding of the variety of human and nonhuman actors that influence the success or failure of projects aimed at increasing sustainability in the corporate sphere.

5. Conclusions

This paper was inspired by our ad hoc observations that although both ANT and IVR are employed in management accounting studies, for instance in those on innovation, they rarely appear in combination. The purpose of the paper was therefore to examine the philosophical and practical compatibility of ANT and IVR and search for explanations for their scant combined use. Towards this end, we conducted an analysis of accounting and MOS literature as well as interviewed eight accounting scholars who had applied IVR and/or ANT in their research. To reiterate our position, we have not tried to claim that interventionist ANT research would be somehow "better" than other approaches but to conduct a state-of-the-art analysis and reflect on its implications for research practice.

In line with our first research question, we probed the compatibility of ANT and IVR in a philosophical and practical sense. When analysing the philosophical and other features of IVR and ANT we found indications of strong compatibility, suggesting that it would be relatively unproblematic to combine the two in management accounting research. To respond to our second research question, we examined the extent to which ANT studies in accounting and MOS were conducted in real time as opposed to ex post facto, and whether or not those studies could be characterized as interventionist. We found that most of the accounting and MOS studies incorporated a real-time element but still only a few of them could be labelled

interventionist. In contrast, our analysis of the IVR articles indicated that in several of the IVR studies in accounting and MOS which employed a theoretical lens, that lens was ANT.

Our third research question concerned the barriers and benefits associated with the combined use of IVR and ANT. Based on our interview material, we identified three types of barriers to combining ANT and IVR: perceived epistemological incompatibility; fear of going native or losing neutrality; and academic tribes. The felt epistemological dilemma is apparently an expanded interpretation of the ANT principles according to which the properties of a construction are always uncertain and momentary, and therefore the results of a study should not be predetermined by employing fixed theoretical concepts and frameworks. However, according to our interpretation, Latour approves of researchers' agendas and engagement as long as they do not try to make decisions regarding the constitution of reality, or the acceptance of innovations, on behalf of others. Moreover, we consider it likely that the epistemological dilemma is at least partly due to the multiphase application history of ANT.

The second barrier to combining ANT and IVR, fear of going native or losing neutrality, is a valid concern related to IVR research, but should not lead to abandoning the combination. It could actually be viewed as a typical challenge in qualitative research conducted in the emic mode. Suggested solutions for overcoming this barrier include acknowledging the issue, making arrangements for retaining one's critical independence and consciously trying to distance oneself from the organization under study in the etic phase.

The third barrier, researchers belonging to distinct academic tribes, is related to the first and second ones in that it operates as an epistemological shortcut and may reinforce fears of going native. Belonging to an academic tribe effectively restricts individual researchers' freedom to experiment with different approaches and indicates that there is a need for more diversity and open-mindedness within the qualitative research paradigm.

As concerns the potential benefits of increased combined use of ANT and IVR, from the interviews we were able to conclude that there is potential for IVR to contribute to using ANT and vice versa. The first instance of IVR contributing to ANT studies is researchers' active participation in organizational events, thus gaining a deep understanding of organizational processes and the role of accounting therein. Second, ANT could contribute to IVR studies by offering possibilities to generate interesting research questions by problematizing taken for granted issues. Finally, through IVR contributing to ANT research, the perceived usefulness of management accounting research in the eyes of practitioners could also increase.

In this article we have examined the compatibility of ANT and IVR as well as indicated how their combined application could benefit our academic community. The scope of our investigation was limited to accounting, management and organization studies, but we believe our findings to be applicable also in other social sciences as there is no particular reason why ANT or IVR research in accounting would differ markedly from that conducted within other social science domains. Future research could investigate in more detail the process of combining ANT and IVR, for instance through a thorough examination of a case study, to see how the combination of the two becomes a strong construction in practice.

Notes

[1] We acknowledge that tribesmanship is a significant factor affecting the choice of research approaches and theories and it would certainly be interesting to study its determinants and effects more broadly. However, in

the present study our focus is on the compatibility of ANT and IVR with tribesmanship being identified as one of the barriers to their combination. Therefore a wider examination of tribesmanship remains outside the scope our analysis.

[2] This seems to be the general situation; however, there are individual MOS journals that appear to have a benevolent attitude towards IVR (e.g. Human Relations and British Journal of Management).

[3] The pragmatist movement is necessarily not completely consistent regarding realism. Already its main founders held somewhat differing ontological and epistemological views. Pierce's ideas bore close resemblance to scientific realism, while James was more interested in how individuals perceive the world as significant (although he did not reject the correspondence theory of truth), see e.g. Pihlström (1996).

[4] It is possible, perhaps even likely, that we have not found all IVR articles; scholars often tend to play down the interventionist aspects of their empirical work, probably due to relatively general institutionalized bias in the academe against obtrusive methods.

[5] It is worth noting that all articles in Appendix 6 include at least some real-time element, a characteristic feature of IVR.

[6] The emic domain can also be accessed by non-interventionist studies (cf. Lukka and Modell, 2010).

[7] We are grateful to the interviewees for raising the issue of epistemological dilemma as it instigated a profound thinking process that led us to develop Figure 2.

[8] This situation is again analogous to that of a natural scientist, who would hardly conduct laboratory interventions if she did not believe that they were useful or that they produced the hypothesized results. More generally, it is difficult to imagine a world where everyone did not have an agenda of some sort.

[9] Whether or not ANT can be mobilized in studies that are critical a priori is an ongoing debate (see e.g. Whittle and Spicer, 2008; Alcadipani and Hassard, 2010) and as such outside the scope of this paper.

[10] Such tensions between tribes may erupt as open conflicts, such as the one that took place within the critical paradigm in accounting research in the late 1990s (Miller and O'Leary, 1998; Froud and Williams, 1998).

[11] We obtained evidence of such synergy from two of the interviews, in particular, in which we discussed the interactive potential of the combined employment of ANT and IVR in the studies conducted by the interviewees. We cannot specify the precise source of this evidence here without violating the anonymity of the interviewees.

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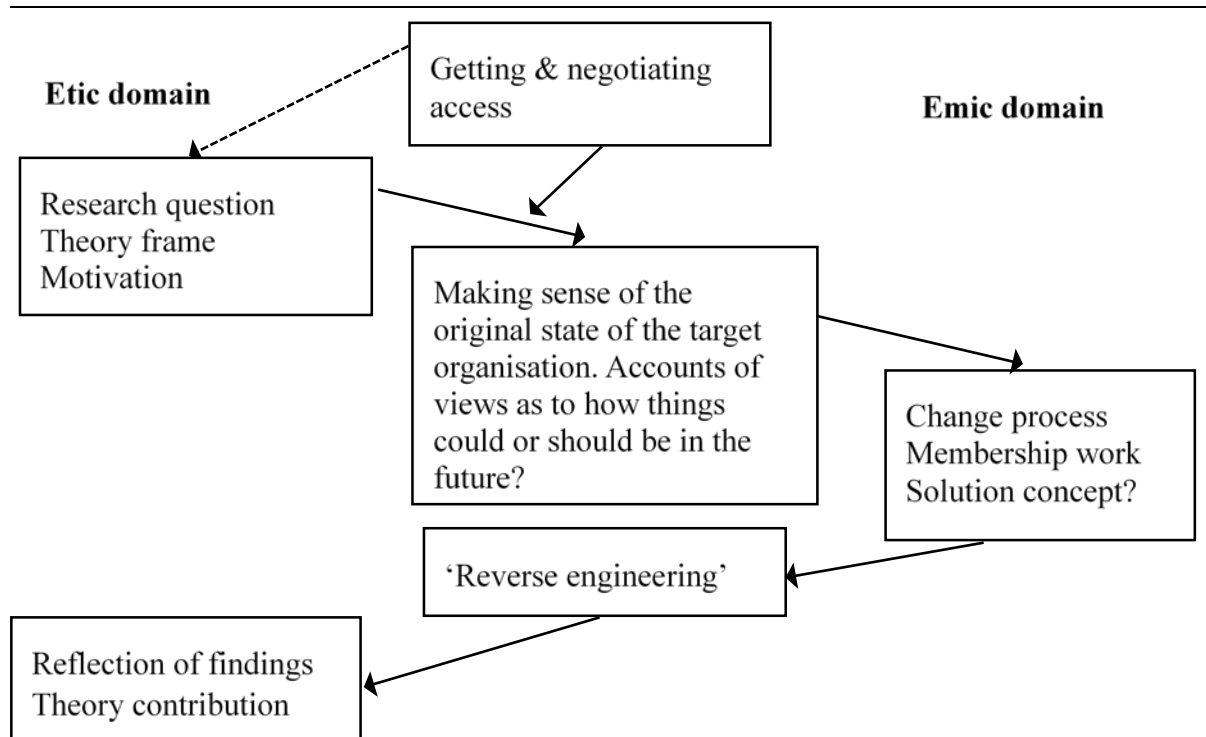
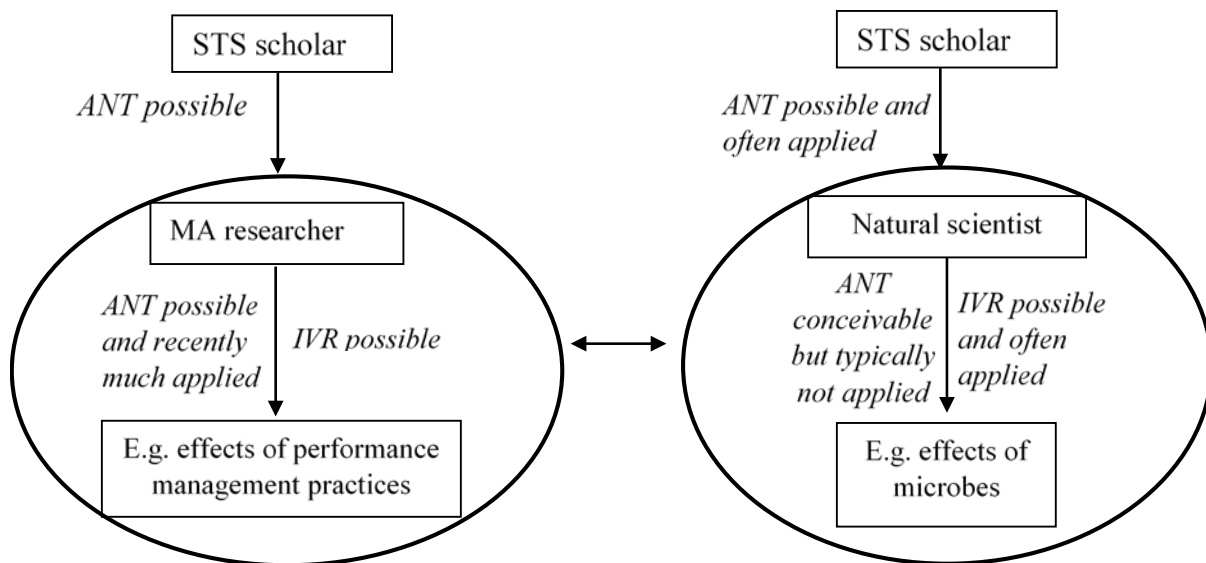Figure 1. An example of an interventionist research process.

Figure 2. Analogy between classic and applied use of ANT.

TABLES 1-3

Table 1. Established views of the basic characteristics of ANT and IVR

Characteristic	ANT	IVR
Ontological and epistemological position	Reality emerges in a relational and constructed fashion but all objects are fully real; knowledge is constructed by networks of humans and non-humans; prior theory has no role	Acknowledges both objectified facts and actors' subjective meanings; reality is constructed
Notion of truth	Correspondence theory; pragmatist notion	Correspondence theory; pragmatist notion
Empirical interest	Emergence of new things such as facts, innovations, ideas	Organizational change, e.g. implementation of innovations
View of researcher influence on reality	Affects studied reality through choice of research topic	Affects studied reality by actively participating in organizational events
Role prescribed to researcher	Writing an empirical account of the process studied	Assisting organizational actors in the project; writing a theoretically informed account of the process

Table 2. Distribution of ANT, IVR and ANT & IVR studies in accounting by journal

Journal	ANT only	IVR only	ANT & IVR	Total
AAAJ	3	4	1	8
AOS	16	2	2	20
CAR	1	1	0	2
CPA	5	3	1	9
EAR	1	1	0	2
JMAR	0	0	0	0
MAR	9	2	0	11
QRAM	0	5	0	5
Total	35	18	4	57

Table 3. Distribution of ANT articles according to timing and degree of intervention

Interventionist or not? Real-time or not?	Non-interventionist	Interventionist
Real-time	24	4
Ex post facto	8	n/a
Undecided	3	