Critical Realism and Actor-Network Theory/Deleuzian Thinking: A Critical Comparison in the Area of Information Systems, Technology and Organizational Studies

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Abstract: Much debate has encircled studies of information systems (IS), technology and organizations with regards to ideas of process, stability and change, performance and materiality. This encapsulates different ways of viewing dualities (e.g. subjective/objective, social/technical, local/global, macro/micro, structure/agency, reality/construction, being/becoming, etc.) as well as alternative ontological and epistemological commitments underlying particular approaches and research perspectives. This paper seeks to explore two specific approaches by focusing on a comparison of critical realism (CR) and actor-network theory (ANT)/Deleuze-inspired forms of inquiry. In particular, we focus on the notion of morphogenesis in order to explore in greater detail how this concept conjures up rather different images in relation to approaches centred around CR and ANT/Deleuze.

Keywords: information systems · technology · organizations · critical realism · actor-network theory · Deleuze · process · ontology.

1 Introduction

Realism, positivism and structuralism have dominated the areas of information systems (IS), technology studies and organizational research as well as other disciplines in the social sciences and humanities (e.g. sociology, linguistics, psychoanalysis, etc.). Although this has taken many forms, realism traditionally tends to assume a singular reality existing "out-there" independent of our actions and preceding any attempt to know it. Subjects, objects and causal relations are also deemed to exist in an independent form that can be clearly defined and represented [1]. In addition, a structuralist perspective focuses on how certain structural factors determine specific outcomes and patterns of behaviour with regards to individuals and groups within society [2].

While realism and structuralism remain as prevailing forces underlying many studies and texts within the fields of information systems, management and organization studies, a variety of approaches have emerged seeking to challenge this way of thinking. Albeit not an exhaustive list, this notably includes: social constructivism [3];

ethnomethodology [4]; critical realism [5, 6, 7, 8, 9, 10]; phenomenology [11, 12]; symbolic interactionalism [13]; structuration theory and sociomateriality [14, 15, 16]; actor-network theory [17, 18, 19] and Deleuzian thinking [20, 21]. In addition to sharing concerns with realist approaches to the study of information systems and organizations, they also seek to attend to the multiplicity, heterogeneity and complexity of meanings, interpretations and interactions associated with the highly contingent nature of informational and organizational worlds.

This paper seeks to contribute to the wealth of fascinating and insightful pieces on information systems, technology and organizations by examining in detail two contrasting lines of inquiry, namely critical realism (CR) and actor-network theory (ANT)/Deleuze-inspired approaches. More specifically, the paper seeks to examine how they differ in their understanding of ideas of process, performance, reality and construction and stability and change and how this impacts on their approach to issues of objects, ontology, action and agency in relation to certain dualist categories (structure/agency; macro/micro; being/becoming; social/technical). In doing so, we do not wish to reinforce strict divides between these two approaches or assume that they exist in some coherent form based on fixed categories (as clearly there is much diversity and difference within and between the approaches). In contrast, the aim of the paper is to explore how certain images and ideas overlap, where certain differences may transpire (in terms of assumptions and commitments) and how different commitments may impact on the study of process, performativity and everyday practice. More specifically, this paper examines how these two approaches attempt to deal with the problems of viewing "reality" as possessing a stable or definitive status (e.g. "out there" or "in here", whether that be in an essential, natural or socially constructed form[1]), while also wishing to avoid a situation of deconstructing everything until there is nothing left. This includes exploring how apparently opposing dualities, such as stability and change (or homogeneity and heterogeneity, difference and repetition, real and construction) are actually counterparts that require the accompaniment of their travel partners on each journey. Therefore, rather than placing these concepts in opposition, this paper seeks to question how we can find ways of becoming increasingly sensitive to the variety of information practices and organizational worlds in ways that allow the researcher to engage with the different assemblages, connections and associations that bring all of this to life through a study of morphogenesis.

To conclude, this paper seeks to explore how these two different perspectives approach the study of IS, technology and organizations with regards to ideas of stability and change, structure and agency, sameness and alterity, and process and performativity with particular attention to the concept of morphogenesis. This includes highlighting the importance of ideas and concepts that have emerged through the work related to critical realism, actor-network theory and Deleuze and how these have contributed to our knowledge and understanding of information, technology and organi-

[1] While a shift from epistemology to ontology may provide a way of keying into the process of construction which is less centred on human meanings and interpretation (e.g. social constructivists may reject the idea of a natural world existing out-there, however, this can be replaced by a socially constructed view of objects), the problem of identity still remains with a focus on existence and being.

zational studies. Additionally, in order to attend to the messy worlds of complexity and controversies that underlie our research settings, we wish to explore the different vocabularies, conceptual tools and methodological sensitivities attached to these approaches. The paper therefore seeks to provide a modest contribution to the development of concepts and methodologies that enable researchers to engage with and account for the multiplicity of everyday practices and the complexity of informational and organizational lives, by delving into the different ontological and epistemological commitments underlying these different approaches.

In order to explore these issues and questions further, we will first begin by providing a brief overview of the main ideas and specific commitments relating to the research underlying CR and ANT/Deleuze. We will then investigate these issues further by exploring how the different approaches direct our attention ontologically and epistemologically with regards to the study of information, technology and organizations.

2 Critical Realism

Critical realism is often associated with the work of Roy Bhaskar [5] and in part emerged from his work in transcendental realism and critical naturalism. While the transcendental realist model of science is seen as equally applicable to the physical and human world, critical realism highlights the need to adapt this approach to suit the greater levels of change and alterity associated with the social world. While the problem of predictability in the social world is seen as a concern within CR, the fear of falling into the relativist trap of uncertainty brings CR back searching for certain links between effects, causal mechanisms and structures. For Bhaskar [22], there is a reality out there beyond our thoughts, beliefs and impressions that can be described in three levels: the empirical (experienced events); the actual; and finally the causal (the mechanisms which generate events). While the causal level may not be directly observable, for Bhaskar it is real and distinct from the domain of the empirical. If we take the example of magnetism and iron filings, the empirical may indicate that the filings follow a particular pattern. However, to explain why this occurs we must accept that there is some unseen causal mechanism operating (in this case, magnetism). From this perspective, the natural world is seen as comprising of heterogeneous systems with their own mechanisms, which when combined can produce less predictable effects.

Rather than presenting a hard determinist approach, mechanisms are seen as tendencies, and attention is directed to understanding and explaining these tendencies. For instance, while a traditional realist will use experiments to study how an infectious agent will cause and produce certain effects, the critical realist may describe how a subject may be infected, but remain healthy (e.g. because of their immunity to the infection or ameliorating effects of their own social conditions). Additionally, more than one mechanism can operate at one time and causal laws should be exam-

ined in relation to their tendencies.[2] Thus, tendencies can be possessed and unexercised, exercised and unrealized, realized and unperceived [22]. When applied to individuals, the critical realist therefore distinguishes between people's action as influenced by innate psychological mechanisms as well as wider social conditions. Society is thus seen to have more mechanisms at work than the natural world and the possibility of solid prediction is greatly reduced. The social scientist is therefore encouraged to focus on the identification, analysis and explanation of these different tendencies and mechanisms. Thus, while critical realists acknowledge the active role of individuals, they also highlight the role of structural factors in transforming and governing outcomes within their social world.

In order to identify the underlying generative mechanisms that produce manifest phenomena as observable, contingent tendencies or patterns, Bhaskar [22] seeks an essential unity of method between natural and social structures [23]. A categorical distinction is required between human action and social structure (as properties of the latter differ in the ways they pre-exist the former through which they are transformed or reproduced) and social structures are seen as existentially interdependent although essentially distinct to human action [5]. To link action to structure, the researcher is required to identify the slots in the social structure where active subjects must slip, in order to reproduce it. Rather than existing in some mechanical determinist form, social structures are viewed as multi-layered, stratified, relational and existing in pre-structured contexts.

Uncovering structural mechanisms and tendencies that are viewed as leading to instances of oppression and exclusion is also central to certain critical realist texts. This can include developing a hypothesis about the underlying mechanisms that generate specific oppressive patterns and examining these in more detail in order to assess the adequacy of the explanation (possibly deriving new hypotheses and testing them if required). This is seen to enable any identified oppressive mechanisms to be exposed and challenged. A comparison between the hypothetical-deductive method and CR highlights how the former focuses on the experimental level of observed phenomena, while CR describes the impact of unseen events and tendencies on outcomes and effects. (i.e. rather than simply A causing B, they introduce a C which can have profound effects on outcomes).

Various writers such as Archer have sought to translate, develop and further modify previous work in CR leading to alternative ways of engaging with ideas of stability and change. For instance, she explains how [6] (p. 376 in [8] p. 203) "action is a continuous, cyclical, flow over time: there are no empty spaces where nothing happens, and things do not just begin and end". This requires a greater engagement with how past actions influence how structures are enacted and performed[3] and the process of structural conditioning in terms of constraining or enabling social interaction that either transforms or reproduces structures and actions in the future [6]. The

[2] While the critical realist is aware of how access is mediated there is also a sense that it is possible to get closer to the true reality of things.

[3] Even though Archer and Latour have very different ontological commitments with regard to objects, structures and relations. It is interesting to see how both have an interest in how actions distributed elsewhere may assemble through particular mediations.

influence of Archer and more recent work in this area is particularly noticeable within the IS and organizational studies literature connected to CR [7], [24, 25, 26, 27, 28, 29]. This includes a special issue on CR and IS [10] and additional research that seeks to study the complex relationship between IS, technology and organization.

While it is interesting to consider the overlapping interests aligning CR and ANT/Deleuze-inspired approaches, it is also crucial to take account of the critical differences that set them apart. In order to explore these further, the next section provides a very brief overview of certain ideas and conceptual thinking relating to ANT and Deleuzian thinking.

3 Actor-Network Theory and Deleuzian Lines of Inquiry

ANT sets to examine how "actors and organizations mobilize, juxtapose, and hold together the bits and pieces out of which they are composed" [1] (p. 386). In other words, ANT seeks to explore how certain assemblages are created, maintained, fabricated, controlled and negotiated by the continuous performance of processes and practices [1], [30, 31]. This examination of reality, truth and fact-making practices relies on a focus on the processes of construction, translation and mediation through a commitment to avoid any reliance on certain *a priori* divides and principles [31]. This includes a focus on becoming in terms of mapping controversies, assemblages, heterogeneous engineering and distributed action. For ANT, the world is full of verbs and a continual process of morphogenesis in the sense of subjects and objects in the making (highlighting the need to attend to "things in the making" rather than things merely existing).

While ANT attends deeply to the process of construction, this is very different from the typical understanding of constructed as aligned with "socially constructed", i.e. made of "social stuff" that is often human-centred [32]. Rather than viewing the social as something centred around human endeavours, Latour [32] argues that the social relates to the process of associating, as reality is considered as the outcome of these multiple processes of translation, mediation and complex associations. Furthermore, rather than relying on either human or non-human actors in command, this take on construction implies that agency is distributed among relational encounters over which there is no single control or mastery. Mediators and realities are therefore made of heterogeneous relations that have their own stories, different nests of associations and materiality that require constant repetition and a process that requires careful maintenance and repair [33]. To be constantly performed, deployed and redone involves a great deal of work and therefore studying how connections are established, associations done and undone, and how assemblages and facts emerge and are stabilized as outcomes during such a process, is a crucial aspect of the research process.

A diverse range of research has been conducted within the fields of IS, technology study and organizational studies relating to an actor-network style of approach [33, 34, 35, 36]. Although as in the case of the differences within CR, we can see how ANT authors may differ in their approach to the study of objects, stability and change. For instance, while Latour focuses on different regimes of truth making and modes of

existence, Law and Mol [37] have concentrated on the development of spatial metaphors and Bowker and Star [38] on standards and boundary objects.[4]

More generally, ANT has been criticized by writers from CR for failing to attend to the broader social structures that influence the local. For Reed [23] and Walsham [40], ANT does not provide appropriate ontological status to structure or agency, and one suggestion involved complementing ANT with the work of Giddens in order to capture the analytical standing of this separable, but interrelated aspect of social reality. While such suggestions provide interesting reflections on ANT, there are certain problems with combining ANT and structural elements in this way given that the structure/agency divide is something that ANT theorists strongly seek to avoid. This is not to say that ANT does not share a keen interest in issues of reality, construction and actions assembling through interactions "elsewhere", but that it provides a very different way of approaching such an idea of action and agency. This difference in relation to questions of structure and agency is exemplified in the ways in which both CR and ANT criticize sociomateriality (SM) with regards to how it portrays the relation between the social and material and bridges the dualist gap between structure and agency. Mutch [9] argues that the influence of Giddens on SM has resulted in the neglect of broader structural influences and the potential to conflate the flexibility of the technological artefact and the interpretive flexibility of agents. In particular, he argues that, "this leads to a downplaying of the material properties of different forms of technology and, in particular, to an underestimation of the degree to which aspects of structure are inscribed into such properties" [9] (p. 508). In contrast to this criticism emanating from CR, researchers from an ANT/Deleuze-inspired stance would present a different ontological view regarding the separation of structure and agency. While they may all agree with the importance of attending to the materiality underlying everyday practice, authors from an ANT perspective would argue that dualisms such as structure/agency, social/material, social/technical, nature/culture, should be viewed as outcomes in a constant process of becoming, rather than as starting points that need additional separation and clarification.

Furthermore, it is interesting how ANT is often positioned as failing to engage with the passions, desires and power relations that underlie the process of "network" building. For instance, Mutch [41] argues that ANT provides a "flat view of human agents, reducing them to effects and denying the embodied, emotional nature of human existence" [41] (p. 487). Although it may be the case that some who have sought to "apply" ANT may have not fully engaged with these aspects in their accounts, a study of different assemblages and encounters in the making should be rich with the different struggles, beliefs, passions and desires that emerge through such a process. Additionally, rather than viewing a human agent as a discrete entity or subject that simply possesses such passions or desires, these passions and desires are seen as emerging through relational encounters of becoming and assembling [41]. This also returns us to an important issue with regards to the shift from the social as something human

[4] Internal differences within ANT are apparent such as Mol's criticism of boundary objects for relying too heavily on a more epistemologically based approach and focusing of differing perspectives around the object, rather than multiple realities or ontologies [39].

centred, to the social as a process of associating and becoming and how this also relates to the work underlying Deleuzian thinking.

Many of the ideas discussed above in relation to ANT connect to the work of the French philosopher Gilles Deleuze. While there is still limited work based on the work of Deleuze within IS and organizational studies, certain authors have increasingly drawn from his work in order to find new ways of re-exploring certain long-standing questions [21], [42, 43]. This body of research has also highlighted the complexity underlying organizational processes and practices and the insights that can be gained through an engagement with Deleuze's work.[5] In this respect, Aroles and McLean [21] have drawn the links between ideas relating to ANT and Deleuzian thinking around the notions of difference and repetition. This includes exploring the difference and dynamism underlying the repetition of organizational practices and engaging with the intensive forces that coalesce through particular events, scripts and different forms of spacing, timing and acting [46, 47]. In particular, by directing our attention to specific matters of concern, truth-making activities, scripts and the intensive forces that underlie the process by which "entities" are repeated into action, it becomes possible to develop a greater sensitivity to both "thingness" and "subjectivity" [48].[6]

How we approach ideas of process, thingness and performativity is therefore key when comparing these approaches to the study of information, technology and organizations. For example, CR seeks to attend to the process of construction through the study of generative mechanisms, tendencies and potentialities that are not yet realized (i.e. the agent and structures possessing certain tendencies are seen as waiting in potential and these tendencies are activated in the production of certain outcomes and effects [22]) and sociomateriality focuses on the sociomaterial dynamics connected to ostensive and performative relations. However, both approaches could be seen to rely to a certain extent on the idea that certain potentialities or tendencies exist in some discrete form with *something* waiting in *potentia* to be realized through further inter-

[5] Deleuze's work has had a resounding impact on many academic fields by offering new ways of revisiting long-standing questions and interests and challenging two influential "schools of thought" (or streams of thought), namely phenomenology and structuralism. In particular, Deleuzian philosophy is characterized by a systematic attempt to overcome dualistic reasoning and a reliance on *a priori* distinctions (nature/culture, object/subject) and this has involved shifting attention away from being and identity, as the founding blocks of knowledge and towards the concepts of becoming and difference [44, 45].

[6] While this approach attempts to avoid an excessive desire for coherence in which stability and multiplicity cannot easily co-exist or overlap, there are certain additional aspects that also need to be considered in terms of how we view objects in relation to space and time. For instance, the folding of time and space may produce effects of isochrony and isotropy interactions should not be viewed as isotropic or isochronic. Secondly, interactions are not syntopic as it is not possible to view everything from one place (i.e. there are no homogeneous interactions as actions are never carried out by the same material all along). Finally, participants may exert different kinds and quantities of pressures as interactions are not homogeneous or isobaric. This raises the question of how we may understand interactions and shifting agencies which are not always visible in the same time or place, do not exert pressure equally, and can lead to different outcomes in terms of stability and multiplicity [31].

actions and performances. In contrast, rather than viewing things as existing in moments in a progression towards some form of reality, Deleuze [49] argues for a focus on actualized virtualities, rather than realized potentialities. For Delanda, this requires a shift to a non-essential form of realism as true innovation would be impossible if the future is seen to be already given in a modality of time in which previously determined possibilities are realized:

> unlike social constructivism, which achieves openness by making the world depend on human interpretation, Deleuze achieves it by making the world into a creative, complexifying and problematizing cauldron of becoming. Because of their anthropocentrism, constructivist philosophies remain prisoners of what Foucault called "the episteme of man", while Deleuze plunges ahead into a post-humanist future, in which the world has been enriched by a multiplicity of non-human agencies. [50] (p. 41)

For Deleuze [51], both the intensive and extensive are real, in the same way that actors rely on networks and vice versa (through a process of localizing the global and redistributing the local). In this regard, the event of actualization therefore never "terminates its connection to the extended and indeterminate world of the undivided virtual Whole" [43] (p. 1493) as the extensive exists alongside the intensive. In other words, while certain forms of extensive outcomes may be experienced or actualized, these are not the product of tendencies awaiting realization depending on desire of social action, nor are they the outcome of a linear chain of construction from tendency to realization. In contrast, within the cauldron of becoming in which relational encounters emerge, a constant and dynamic set of forces rely on the complex folding of intensive and extensive relations that bring together many different spaces, times and actions through various encounters. These encounters can produce different openings and possibilities as they pop up through many different spaces and sets of relations. However, this does not mean that these events subsist in an abyss of chaos and indeterminacy as some foldings, engagement and relational encounters appear more likely, while other resist such assembling. Although we could refer to these processes of assembling in terms of actor-networks, relational encounters or virtual actualizations, what becomes really interesting is how such a focus on the different intensive forces underlying such a process of difference, repetition and morphogenesis can help in avoiding the research process becoming embroiled in a search for originating determinacy, identity, sameness and representation, or lost in a milieu of ambiguity and indeterminacy. We will explore these issues further below as we delve deeper into ideas of ontology and morphogenesis and how these can be seen to overlap and differ in relation to CR and ANT/Deleuzian thinking.

4 Reality, Construction and Morphogenesis

As discussed previously within this paper, both CR and ANT/Deleuze-inspired lines of inquiry seek to challenge approaches that neglect the materiality and embodiness of practices, or that maintain a heavy reliance on traditional realist or idealist approach to the study of IS, technology and organizations. For instance, in response to an increasing shift to a more idealist approach, Fleetwood [8] suggests that within accounts that subordinate entities and facts to merely language, a sense of being or meaning is often only achieved through language and discursive practices. This then relies on an "ontological claim that discourse, language or some other conceptual or cognitive activity, quite literally, constructs, creates, makes, produces, generates or constitutes entities" [8] (p. 206).[7] For Fleetwood [8], while the ontological turn, from a naive, unsophisticated, empirical and realist ontology to a social constructed one, has placed ontology on the "intellectual radar screen" he suggests that "many people, especially critical realists […] are concerned that current debate is mired in ontological ambiguity – i.e. lack of clarity, imprecision, conceptual slippage and confusion vis-à-vis matters ontological" [8] (p. 198). This also connects to a concern with those approaches that collapse everything into epistemology [53]. As stated by Linstead and Thanem [54] (p. 1483): "Despite the success of Burrell and Morgan's (1979) popularization of ontology and epistemology as core meta-theoretical concerns in organizational analysis, the field of organization theory more broadly has tended to favour the epistemological at the expense of the ontological".

Additionally, Fleetwood [8] argues that rather than seeing entities as transformed from their pre-discursive moments (where they can exist independent of humans) into discursive forms, we need to envisage two states and a set of terms to discuss them (i.e. a reality out there and a constructed reality). However, this form of ontological multiplicity raises an additional problem by extending the issue of ontology in the search for even more beings. In addition to dealing with an essential form of reality, you then amplify this by incorporating a socially constructed one. It is easy to sympathize with Fleetwood's suggestion to reconsider the question of ontology in terms of what "matters". For example, while Chia [54] suggests that it has become commonplace to accept that reality, as we know it, is socially constructed, others may argue with the extent and basis of this claim, not least Fleetwood [8]. Furthermore, Gimenez [55], struggles with such a claim as it reflects the problem of separating the social and material and attempting to restore these links at a later point:

> Once the social has been divided from its material conditions of possibility, they cannot be put together again in thought or interpretation. Recourse to "background conditions" cannot restore the organic connections or internal relations between forms of consciousness, systems of thought (beliefs, interpretations, ideologies), social relations and their material base. This is why, in the end, it all dissolves into beliefs, inter-

[7] Edwards et al. [52] also support this view with regards to the privileging of language and meaning when exploring the problem of existence.

> pretations, and the like, thus resulting in a "suppose they gave a war and nobody came" view of social change. [55] (p. 23)

Rather than separating ontology into two realms or shifting between or along opposing poles (objective/subjective or structure/agency), can we find ways of rethinking ontology that avoid such a separation in this form?

4.1 Morphogenesis and Ontological Commitments

In an attempt to understand and explain organizational life in more detail, we can see how CR and the thinking around morphogenesis seek to delve deeper into our empirical studies by incorporating an appreciation of current and past actions and tendencies. For instance, Archer's concept of morphogenesis seeks to shift our thinking away from stasis and towards a relational process of change over time. In doing so, it aims to enable a focus on the material properties of technology, the mechanisms that bring humans into collision with structures that other humans have created and the ways in which technology and structures are located in the broader political economy [9]. For Mutch [9], this includes using a methodological strategy of analytical dualism to separate and hold apart structure and agency in order to explore their interplay over time. Structures are also viewed as virtual for Archer in the sense that they are dependent on human action in the past and present, and also with regards to how certain roles and institutions pre-exist those who come to hold them.

For those researching from an ANT/Deleuzian perspective, such a search for structural mechanisms which give rise to certain forms of potentiality could be viewed as ontologically problematic, as this relies on the coming together of pre-existing generative mechanisms and tendencies that are mediated in relation to human agency. This oscillation between the two (action as determined and action as determining) can also lead to difficult positions, as researchers find themselves constantly shifting between these two poles in the search of sources of action and agency at each level. While those working from an SM approach may attempt to reduce the level of oscillation between the two and bring them closer together, this is seen as a major problem from those working from a CR perspective who feel that the distinction is essentially not clear enough [41]. However, rather than getting into a debate concerning different degrees of structure and agency, perhaps another way to rethink morphogenesis is to focus on the process of becoming through an examination of relational encounters. In other words, by shifting our attention away from objective and subjective poles and a structure/agency dualism, we can focus on the performative and collective sense of action, in a distributed sense, rather than searching for an original source or pre-existing forms.

As within CR, an ANT/Deleuzian approach seeks to find alternative ways of thinking stability and change in terms of space, time and virtuality through the concept of morphogenesis. However, this is a very different view of the virtual and the process of morphogenesis especially given the desire within ANT/Deleuzian thinking [56] to avoid a reliance on generality, representation and identity. In this regard, Deleuzian

philosophy shares with Latour an interest in *becoming* as a way of capturing the complex and processual nature of events, actions and practices. Such a stance provides ways of engaging with the multifaceted forces, actions and potentialities that surround everyday practices without relying on pre-established frameworks, structures and/or entities, or on linear notions of causality [57]. In other words, contrary to essentialist approaches that focus on the surface level of extensive forms (i.e. entities), a Deleuzian study of morphogenesis aims to unravel the complexity, heterogeneity and multiplicity that underlie the process of difference and repetition. This involves finding ways of becoming sensitive to the assembling of different intensive forces that easily disappear or are hidden from view in the "actualization" of extensive forms and the intensive spaces of smoothing. Therefore, rather than a "repetition of the same", the focus is on the generative and performative notion of repetition through intensive difference that emerges in creative and novel forms (even if they appear extensively in the image of the same).

Although the intensive domain encapsulates heterogeneous forces, desires and affects, the extensive refers to the homogenous, independent and grid-like forms of things themselves (e.g. metrics, measurements, goals, etc.). However, the work of intensive difference is often hidden by the extensive properties/qualities that they play a role in generating [58]. Key to the study of morphogenesis in terms of the extensive/intensive relationship is that both co-exist in a complex relational sense; objective and subjective positions are merely temporary moments that may "appear" as extensive outcomes within particular encounters; and while material forces and intensities may assemble from what might be considered the pure past and future expectations, "beings" do not exist "in the past" and in some *a priori* form that then acts on future events. Finally, although continuity may connect many different relational encounters, intensities and material forces behind the scenes, it is not possible to access this in some unmediated sense as different intensive forces may fold and appear through many different relational encounters and in many different spaces.

4.2 A Brief Example of Morphogenesis in Education Research

Within the sphere of primary and secondary education, we can see how a morphogenetic study of performance measurement and accountability based on an ANT/Deleuzian approach could be approached in a different way from a CR perspective. On the one hand, both may provide rich and fascinating accounts of morphogenesis presenting similarities such as: seeking to avoid a traditional realist account of information, knowledge and the practices of management; an engagement with the on-going process of construction that captures a sense of materiality; and methodological approaches that attempt to delve into the details of complex relations and outcomes (e.g. ethnography). However, these studies would not be approached on the same terms given the different conceptual and metaphysical commitments that underlie the alternative versions of morphogenesis. For instance, through a specific focus on becoming and by drawing from the conceptual imagery emanating from an ANT/Deleuzian perspective, an ethnographic study of performance measurement and

accountability would seek to explore the constant becoming of relations and assemblages through specific relational encounters and events.

From a CR perspective, a morphogenetic analysis may view certain performance measures (e.g. national standard assessment tests, five A*–C GCSE exam results) and alternative systems and standards (e.g. national curriculum and levels, examination systems, OFSTED, progress algorithms and data measurement, changing approaches to governance and the shift to academies) as structural tendencies and generative mechanisms that become realized in particular forms, within specific contexts. In contrast, from an ANT/Deleuzian approach, the focus would involve an examination of specific relational encounters and events in order to explore the ongoing relationship between intensive forces and extensive outcomes that emerge with regard to the tensions and assembling of various temporalities, spatialities and forms of engagement. This would involve delving into the minutiae of repetition as grounded on difference and the morphogenetic processes underlying the creation of extensive forms and the assemblage of different intensive forces in many different spaces. Thus, rather than assuming the existence of certain tendencies and generative mechanisms waiting in potential to be realized (or not), the focus is on the relationality of assembling in order to explore how certain facts, practices and outcomes may become stabilized and taken for granted, while other matters of concern and lines of flight emerge (e.g. schools not implementing the English Baccalaureate[8] (EBacc) curriculum when not considered in the best interests of many pupils within the school). For instance, while the attempt to overtly impose the EBacc curriculum onto all schools could be viewed as "resisted", the EBacc has become part of the national school performance measures. This move could be seen as placing a great pressure on schools to ensure their pupils study at least a minimum of five EBacc subjects assuming they wish to compare favourably with other schools in this measure. Furthermore, the grid-like form of goal-directed measures may be viewed as providing objective forms of measurement and a basis around the assessment of attainment and progress. However, rather than something that exists on some macro and structural scale and emerging from the past in some *a priori* sense, exploring various assemblages, tensions and forces enables a focus on how something such as the EBacc is performed through different spaces, times and actions. This requires an in-depth study of how such relational encounters play out through everyday practice and how they may connect many different spacings, timings and forms of actions, as well as different matters of fact and matters of concern [21].

5 Some Concluding Thoughts

There has been a diverse collection of work within the areas of CR and ANT/Deleuze-inspired ontologies that have pulled together a broad range of ideas and contributions and many of these have provided interesting avenues of thought in the study of IS, technology and organizations. In particular, this has included research

[8] The EBacc is a performance measure used in the UK to assess how many pupils in a school achieve a grade C or above in certain GCSE subjects (set by the DoE).

into construction and reality that seeks to explore a sense of permanence, stability and homogeneity alongside the alterity, mediations and multiplicity underlying such a process. Through a review of different aspects that align and divide CR and ANT/Deleuze-inspired forms of inquiry and a focus on the areas of IS, technology and organizations, this paper has highlighted the desire by both approaches to delve deeper into the complex relations and the multiplicity underlying this relationship. This includes some shared interests relating to ontological concerns (with a greater understanding of how we study objects, the process of becoming and ideas of materiality), epistemological concerns (avoiding a focus on representation in terms of a correspondence theory of truth) and ideas of space and time.

By attending to specific concepts (such as morphogenesis) in further detail, this paper has also sought to highlight important differences that divide these approaches. For instance, in contrast to the work of Archer, a study of morphogenesis from a Deleuzian perspective does not seek to sort out components into temporal cycles or structure and agency dualisms [6] that rely on an *a priori* existence of beings, things and tendencies waiting in potential to be realized. Differing ontologically in how ideas of process, being/becoming, stability/change and ideas of space, time and action are enacted produces different outcomes in terms of accounting for the complex relationships aligned to information systems, technology and organizations and how we view different matters of fact and matters of concern [31].

To conclude, within this paper we have sought to review how CR and ANT/Deleuze-inspired lines of inquiry have approached certain metaphysical categories and concepts when examining the complex interrelationships and connections between information, technology and organizations. This has included examining the implications of different ontological and epistemological commitments and how they connect to alternative ideas of stability/change, structure/agency and being and becoming. Finally, this paper prompts our thinking around how we may experiment with more radical forms of empiricism that are more akin to the ideas of William James. For Whitehead [59], this would involve exploring the "becoming of continuity" rather than a convergence on the "continuity of becoming" [59] (pp. 68–69). In particular, this includes becoming attentive to how certain ideas and approaches may rely on a search for "being" and certain *a priori* notions, concepts and divides. This is in contrast to a focus on the process of becoming where our thinking and engagements shift to the complex relations between extensive and intensive forces and assemblages and enables a greater sensitivity to the different and constant process of becoming and repetitions within our organizational and informational worlds.

References

1. Law, J.: Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity. Systems Practice. 5(4), 379–393 (1992)
2. Runciman, W.G.: What Is Structuralism?. The British Journal of Sociology. 20(3), 253–265 (1969)

3. Berger, P.L., Luckmann, T.: The Social Construction of Reality: A Treatise in the Sociology of Knowledge. Penguin, Harmondsworth (1984)
4. Garfinkel, H.: Studies in Ethnomethodology. Prentice-Hall, Englewood Cliffs, NJ (1967)
5. Bhaskar, R.: The Possibility of Naturalism. Harvester Wheatsheaf, Hemel Hempstead (1979)
6. Archer, M.: Realism and Morphogenesis. In: Archer, M., Bhaskar, R., Collier, A., Lawson, T., Norrie, A. (eds) Critical Realism: Essential Readings, pp. 189–205 Routledge, London (1998)
7. Mingers, J.: Realizing Information Systems: Critical Realism as an Underpinning Philosophy for Information Systems. Information and Organization. 14(2), 87–103 (2004)
8. Fleetwood, S.: Ontology in Organization and Management Studies: A Critical Realist Perspective, Organization. 12(2), 197–222 (2005)
9. Mutch, A.: Technology, Organization, and Structure – A Morphogenetic Approach. Organization Science. 21(2), 507–520 (2010)
10. Mingers, J., Mutch, A., Willcocks, L.: Critical Realism in Information Systems Research. MIS Quarterly. 37(3), 795–802 (2013)
11. Sanders, P.: Phenomenology: A New Way of Viewing Organizational Research. Academy of Management Review. 7(3), 353–360 (1982)
12. Brigham, M., Introna, L.D.: Hospitality, Improvisation and Gestell: A Phenomenology of Mobile Information. Journal of Information Technology. 21(3), 140–153 (2006)
13. Goffman, E.: The Presentation of Self in Everyday Life. University of Edinburgh Social Sciences Research Centre (1959)
14. Giddens, A.: The Constitution of Society: Outline of the Theory of Structuration. University of California Press, Los Angeles, CA (1984)
15. Orlikowski, W.J.: Sociomaterial Practices: Exploring Technology at Work. Organization Studies. 28 (9), 1435–1448 (2007)
16. Orlikowski, W.J., Scott, S.V.: Sociomateriality: Challenging the Separation of Technology, Work and Organization. The Academy of Management Annals. 2(1), 433–474 (2008)
17. Callon, M.: Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. In: Law, J. (ed.) Power, Action and Belief: A New Sociology of Knowledge?, pp. 196–223. Routledge, London (1986)
18. Law, J.: On the Methods of Long-Distance Control: Vessels, Navigation and the Portuguese Route to India. In: Law, J. (ed.) Power, Action and Belief: A New Sociology of Knowledge?, pp. 234–263. Routledge, London (1986)
19. Latour, B.: The Pasteurization of France. Harvard University Press, Cambridge, MA (1988)
20. Sørensen, B.M.: Immaculate Defecation: Gilles Deleuze and Félix Guattari in Organization Theory. The Sociological Review. 53(1), 120–133 (2005)
21. Aroles, J., McLean, C.: Rethinking Stability and Change in the Study of Organizational Routines: Difference and Repetition in a Newspaper-Printing Factory. Organization Science. 27(3), 535–550 (2016)
22. Bhaskar, R.: The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences. Routledge, London (1989)
23. Reed, M.: The Limits of Discourse Analysis in Organizational Analysis. Organization. 7(3), 524–30 (2000)
24. Dobson, P.: The Philosophy of Critical Realism: An Opportunity for Information Systems Research. Information Systems Frontiers. 3(2), 199–210 (2001)
25. Smith, M.L.: Overcoming Theory-Practice Inconsistencies: Critical Realism and Information Systems Research. Information and Organization. 16(3), 191–211 (2006)

26. Volkoff, O., Strong, D.M., Elmes, M.B.: Technological Embeddedness and Organizational Change. Organization Science. 18(5), 832–848 (2007)
27. Wynn, D., Williams, C.K.: Principles for Conducting Critical Realist Case Study Research in Information Systems. MIS Quarterly. 36(3): 787–810 (2012)
28. Dobson, P., Jackson, P., Gengartharen, D.: Explaining Broadband Adoption in Rural Australia: Modes of Reflexivity and the Morphogenetic Approach. MIS Quarterly. 37(3): 965–991 (2013)
29. Faulkner, P., Runde, J.: Technological Objects, Social Positions, and the Transformational Model of Social Activity. MIS Quarterly. 37(3), 803–818 (2013)
30. Callon, M., Law, J.: On Qualculation, Agency and Otherness. Society and Space. 23, 717–733 (2005)
31. Latour, B.: Reassembling the Social: An Introduction to Actor-Network-Theory. Oxford University Press, Oxford and New York (2005)
32. Latour, B.: The Promises of Constructivism. In: Ihde, D., Selinger, E. (eds) Chasing Technoscience: Matrix for Materiality, pp. 27–46. Indiana University Press, Bloomington and Indianapolis (2002)
33. Bloomfield, B.P., McLean, C.: Beyond the Walls of the Asylum: Information and Organization in the Provision of Community Mental Health Services. Information and Organization. 13(1), 53–84 (2003)
34. Bowker, G.C., Star, S.L.: Building Information Infrastructures for Social Worlds: The Role of Classifications and Standards. In Ishida, T. (ed.) Community Computing and Support Systems, Springer-Verlag, Berlin Heidelberg (1988)
35. Bowker, G.C., Star, S.L.: Invisible Mediators of Action: Classification and the Ubiquity of Standards. Mind, Culture and Activity. 7(1–2), 147–163 (2000)
36. Doolin, B., Lowe, A.: To Reveal Is to Critique: Actor-Network Theory and Critical Information Systems Research. Journal of Information Technology. 17(2), 69–78 (2002)
37. Law, J., Mol, A.: Regions, Networks and Fluids: Anaemia and Social Topology. Social Studies of Science. 24(4) (1994)
38. Bowker, G.C., Star, S.L.: Situations vs. Standards in Long-Term, Wide-Scale Decision-Making: The Case of International Classification of Diseases. Proceedings of the Twenty-Fourth Annual Hawaii International Conference on System Sciences, vol. 4, pp. 73–81 (1991)
39. Mol, A.M.: The Body Multiple: Ontology in Medical Practice. Duke University Press, Durham, NC (2002)
40. Walsham, G.: Actor-Network Theory and IS Research: Current Status and Future Prospects. In: Information Systems and Qualitative Research, pp. 466–480. Springer, New York (1997)
41. Mutch A.: Actors and Networks or Agents and Structures: Towards a Realist View of Information Systems. Organization. 9(3), 477–96 (2002)
42. Clegg, S.R., Kornberger, M., Rhodes, C.: Learning/becoming/organizing. Organisation. 12(2), 147–167 (2005)
43. Linstead, S., Thanem, T.: Multiplicity, Virtuality and Organization: The Contribution of Gilles Deleuze. Organisation Studies. 28(10), 1483–1501 (2007)
44. Colebrook, C.: Gilles Deleuze. Routledge, London and New York (2001)
45. Williams, J.: Gilles Deleuze's Difference and Repetition: A Critical Introduction and Guide. Edinburgh University Press, Edinburgh (2013)
46. Jones, G., McLean, C., Quattrone, P.: Spacing and Timing. Organisation. 11(6), 723–741 (2004)

47. McLean, C.: Potentialities and Possibilities: Objects, Memory and Crystal Images. In: Harvey, P., Casella, E., Evans, G., Knox, H., McLean, C., Silva, E., Thoburn, N., Woodward, K. (eds) Objects and Materials, pp. 359–370. Routledge, London (2014)
48. Latour, B.: Trains of Thought: Piaget, Formalism and the Fifth Dimension. Common Knowledge. 6(3), 170–191 (1997)
49. Deleuze, G.: Cinema 2: The Time Image. Bloomsbury/Continuum International Publishing Group, London (2005)
50. Delanda, M.: A Thousand Years of Nonlinear History. Zone Books, New York (1998)
51. Deleuze, G.: Difference and Repetition. Continuum International Publishing Group, London (2004)
52. Edwards, D., Ashmore, M., Potter, J.: Death and Furniture: The Rhetoric, Politics and Theology of Bottom Line Arguments Against Relativism. History of the Human Sciences. 8, 25–49 (1995)
53. Thrift, N.: Non-representational Theory: Space, Politics, Affect. Routledge, London (2007)
54. Chia, R.: Ontology: Organization as World Making. In: Westwood, R., Clegg, S. (eds) Debating Organizations: Point-Counterpoint in Organization Studies, pp. 156–181. Blackwell, Oxford (2003)
55. Gimenez, M.: For Structure: A Critique of Ontological Individualism. Alethia, Journal of Critical Realism. 2(2), 19–25 (1999)
56. Delanda, M.: Space: Extensive and intensive, Actual and Virtual. In: Buchanan I., Lambert, G. (eds) Deleuze and Space, pp. 80–88. Edinburgh University Press, Edinburgh (2005)
57. Aroles, J., McLean, C.: Deciphering Signs: An Empirical Apprenticeship. Ethnography. Forthcoming (2016)
58. Duff, C.: Assemblages of Health: Deleuze's Empiricism and the Ethology of Life. Springer, Dordrecht, Netherlands (2014)
59. Whitehead, A.N.: Process and Reality: An Essay in Cosmology. Free Press, New York (1978)