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### MECHANISMS WITHOUT CRITICAL REALISM

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# MECHANISMS WITHOUT CRITICAL REALISM

*Research paper*

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## Abstract

*Roy Bhaskar's Critical Realism (CR) is a popular philosophy in Information Systems (IS) research and is often linked to mechanism-based explanation (MBE) in IS. This association implies that (i) CR and MBE go hand in hand in the philosophy of science; or (ii) CR is the only available; or (iii) preferred philosophy for MBEs. However, the paper argues against the idea that CR is the only or preferred philosophy for MBEs. The role of CR in modern philosophy of MBE is marginal or even absent. CR carries extra baggage such as mystifying mechanisms as "unobservable." The proponents of CR in IS should explain how CR's mechanisms are distinct or preferred over MBEs in modern philosophy of science. Before this is shown, IS mechanism research and philosophy should reflect modern philosophy of science rather than CR.*

*Keywords: Mechanism-based Explanation, Philosophy of Science, New Mechanical Philosophy, Critical Realism*

## 1 Introduction

In the field of Information Systems (IS), the two major philosophical "isms" are positivism (Lee, 1991; Siponen and Tsohou, 2018) and interpretivism (Walsham, 1995). Critical Realism (CR), which was developed by Roy Bhaskar in the 1970s, was first mentioned in IS scholarship in the 1990s (Mingers, 1990; Orlikowski and Baroudi, 1991). Conceptual works on CR were published in the early 2000s (Carlsson, 2004; Dobson, 2001; Mingers, 2004), and since then, it has gained more support in IS (Bygstad, 2010; Cuellar, 2016; Tsang, 2014). In IS, CR is now a popular and seriously taken philosophical foundation, evidenced by a special issue on CR published by *MIS Quarterly* in 2013 (Mingers et al., 2013).

The CR discourse has promoted various theoretical and methodological ideas (Hartwig, 2007). Perhaps the most influential idea among CR advocates is mechanisms – sometimes referred to as “generative mechanisms,” “causal mechanisms,” or “social mechanisms.” For example, Smith (2018, p. 2) posits mechanisms as “the core idea of CR.” Furthermore, Smith identifies that “Bhaskar, the progenitor of critical realism himself, has called the generative mechanism the ‘lynchpin’ of critical realism.” (p. 2).

While some MBE papers not based on CR exist in IS (Avgerou, 2013; Hansen and Baroody, 2020), readers of many seminal IS articles could easily interpret that (i) CR and MBE go hand in hand in the philosophy of science; (ii) CR is the only available; or (iii) preferred philosophy for MBEs (e.g., Bygstad, 2010; Markus and Rowe, 2018; Mingers and Standing, 2017; Smith, 2006). A similar observation is made by Siponen et al. (2020, p. 5702): “Readers of the philosophy of mechanisms in IS ... may have inferred that various mechanistic accounts in the philosophy of science are explicitly or implicitly committed to CR.”

For example, Markus and Rowe (2018, p. 1261) claim in their *MIS Quarterly* article, citing Hedström and Ylikoski (2010), that the “causal mechanism concept evolved somewhat independently in two

intellectual communities, scientific realism and sociology, that appear to be converging under the banner of critical realism.” However, Hedström and Ylikoski (2010) actually criticize CR. Similarly, Volkoff and Strong (2013) used various sources to support a CR-based view of mechanisms, but their analysis included publications that do not endorse – and even oppose – CR, such as Hedström and Swedberg (1996) and Hedström and Ylikoski (2010). Also, seminal writings of MBE such as Mingers and Standing (2017) discuss different mechanism philosophers in their CR article. It is not mentioned by Mingers and Standing (2017) that all major mechanism philosopher they cite, are not committed to CR. We will elaborate on this in the next section.

In summary, and to reiterate, many seminal IS articles discussing mechanisms imply that (i) CR and MBE are closely linked in the philosophy of science; (ii) CR is the only available; or (iii) the preferred philosophy for MBEs. The primary aim of this paper is to challenge these views (i-iii). This has positive implications for the IS research community, as it seeks to emancipate IS mechanism philosophy from CR by highlighting the extensive non-CR related literature on MBEs in the philosophy of science. Secondly, we raise some concerns regarding CR as a foundation for mechanisms. This leads us to suggest that proponents of CR in IS should clarify how CR's approach to mechanisms is distinct from or preferable to MBEs in modern philosophy of science.

## 2 CR plays a marginal role, if any, in the philosophy of MBE

As noted, mechanisms may be considered the central idea in CR (Smith 2018). However, this should not lead to the interpretation that CR is the leading or primary philosophy for MBEs. Unfortunately, IS readers might easily draw this conclusion from reading seminal articles on mechanisms (Markus and Rowe, 2018; Mingers and Standing, 2017). To elaborate, these articles discuss major mechanism-philosophers in the philosophy of science, such as by Salmon, Bechtel, Craver, Darden, Machamer (e.g., Bechtel and Abrahamsen, 2005; Machamer et al., 2000; Salmon, 1998). For their credit, Mingers and Standing (2017) do not claim that these philosophers are CR philosophers. However, it is not explicitly stated to IS readers that these philosophers (W. Salmon, Craver, Darden, Machamer) are not CR philosophers. Furthermore, it is not clarified that none of them endorse CR. W. Salmon called himself as *logical empiricist* (and not positivist), while Bechtel, Craver, Darden, Machamer call themselves as *naturalists* (Machamer et al. 2000). The outcome of this that IS readers who read seminal mechanism accounts in IS (e.g., Markus and Rowe, 2018; Mingers and Standing, 2017), but have not read Bechtel, Salmon, Craver, Darden, Machamer, cannot know that these philosophers' MBEs are different from CR's mechanisms. Contrarily, IS readers of mechanism accounts (Markus and Rowe, 2018; Mingers and Standing, 2017) may believe that (I) mechanism philosophers by and large in the philosophy of science are committed to CR; (II) or these philosophers' (e.g., Salmon, Bechtel, Craver, Darden, Machamer) mechanisms accounts align with CR. As previously stated, neither of these assumptions is accurate.

Furthermore, some IS sources justify the role of CR as major or leading view of mechanisms by referring to sources, which explicitly criticize CR. Consider, for example, the following *MIS Quarterly* article:

“The causal mechanism concept evolved somewhat independently in two intellectual communities, scientific realism and sociology, that appear to be converging under the banner of critical realism (Hedström and Ylikoski 2010)” -- Markus and Rowe (2018, p. 1261).

“proponents of social mechanisms appear to have embraced the philosophy of critical realism ... as a foundation for their theorizing (Hedström and Ylikoski 2010)” -- Rowe and Markus (2021, p. 84)

Here they cite Hedström and Ylikoski (2010). However, as noted by Siponen et al. (2020, p. 5702), this is contrary to the claims by Hedström and Ylikoski (2010). What Hedström and Ylikoski (2010, p. 57) wrote is that the “development of critical realism also seems to have stalled” and that CR carries “extra philosophical baggage that we may want to avoid.”

Thus far, we have argued that several seminar mechanism philosophers discussed in CR papers in IS are not critical realists, but *logical empirical* or *naturalists*. We furthermore noted that sometimes the sourced used to justify the role CR as leading mechanistic philosophy in IS are in fact saying the opposite. What is then the role of CR in the modern mechanism philosophy?

To start with, consulting various research handbooks and other mechanism literature do not support the claim, according to which, CR is a banner under which various strands of mechanism-based explaining (MBE) are converging. Bhaskar’s work has a peripheral place in *Social Mechanisms: An Analytical Approach to Social Theory* (Hedström and Swedberg, 1998). Likewise, in *The Routledge Handbook of Mechanisms and Mechanical Philosophy* (Glennan and Illari, 2018), Bhaskar’s work is mentioned in only two of its 34 chapters (Little, 2018; Ylikoski, 2018). And yet, CR is merely a minor acknowledgement for both Little and Ylikoski. Similarly, *The Oxford Handbook of Philosophy of Social Science* (Kincaid, 2012) contains eight chapters dedicated to “mechanisms, explanation, and causation.” However, only one chapter refers to Bhaskar (Byrne and Uprichard, 2012) and it is just a brief mention. Another contemporary textbook promoting MBE, *Process-Tracing Methods: Foundations and Guidelines* (Beach and Pedersen, 2019), makes only some passing mentions to Bhaskar’s work. Bhaskar is not once mentioned in Glennan’s (2017) book *The New Mechanical Philosophy*. The highly-cited mechanism paper by Gross (2009) in the *American Sociological Review* acknowledges critical realism as one (out of five) possible foundation(s) for MBE: a foundation he calls *mechanisms as triggerable causal powers*. Regardless, Gross identifies other equally valid foundations, and his key point is to consider mechanisms in the tradition of American pragmatism. In the *Research Handbook on Analytical Sociology* (Manzo, 2021), critical realism receives special attention in one chapter (Di Iorio and León-Medina, 2021). The chapter mostly focuses on identifying flaws in CR-based thinking. In the concluding chapter of that book, Hedström (2021) characterizes CR to contain “rather obscure ontological commitments” (p. 494) and proclaims that CR offers nothing useful: “the analytical sociology agenda in other respects is so far removed from [CR] that the prospect for a productive dialogue is minimal.” (p. 494)

All these examples underline the fact that critical realism is in no way “the foundation” of MBE. Furthermore, it is safe to say that mainstream philosophy of science on MBEs has never taken Bhaskar’s thinking seriously. To clear any doubts in this respect, let us look at the most respected journals in the philosophy of science. For example, *The British Journal for the Philosophy of Science*, founded in 1950, in its entire history, contains zero articles on MBE citing Bhaskar. Similarly, the journal *Philosophy of Science*, the flagship journal by the Philosophy of Science Association established in 1934, contains zero papers on MBEs citing Bhaskar. Other prominent CR scholars such as Margaret Archer, Andrew Sayer, Andrew Collier are equally absent in the MBE literature. We have summarized a selection of influential MBE literature in Table 1.

| Journal   | Paper                         | Citations in Google Scholar (25.4.2024) | References to CR literature |
|---|-------------------------------|---|-----------------------------|
| Erkenntnis  | Glennan (1996)                | 1134                                    | 0                           |
| Philosophy of Science                               | Machamer et al. (2000)        | 3729                                    | 0                           |
| Philosophy of Science                               | Glennan (2002)                | 1093                                    | 0                           |
| Studies in History and Philosophy of Science Part C | Bechtel and Abrahamsen (2005) | 1505                                    | 0                           |
| Synthese  | Craver (2006)                 | 635                                     | 0                           |
| European Journal for Philosophy of Science          | Illari and Williamson (2012)  | 533                                     | 0                           |

Table 1. A Selection of Influential MBE Papers in Philosophy of Science Journals.

Bhaskar's and his CR disciples' impact on MBEs in the field of philosophy of science is, at best, highly marginal. Their influence on MBE thinking in the most prestigious outlets in the field of philosophy of science is non-existent.

### 3 Some problematic characteristics of CR

As Hedström and Ylikoski (2010) is sometimes referenced as the authority of CR's commonality and superiority in MBEs (Markus and Rowe, 2018, p. 1261; Rowe and Markus, 2021, p. 83), it may be worthwhile to look in more detail what they actually say CR in their mechanism article:

“The critical realism movement (...) has convinced many of the importance of mechanisms in social scientific explanations. (...) [Bhaskar's] critical realism is a tight philosophical package of ontological and epistemological views in which the idea of mechanism-based explanation is only a small—but the most intuitive—part. Many social scientists rightly have been attracted by his criticism of empiricist views of causation, but other parts of the package are problematic. For example, his transcendental argumentation, his layered account of reality, and his ideas about essences and internal relations have raised philosophical suspicions and doubts about their relevance for the social sciences. The development of critical realism also seems to have stalled: Although it is advocated in numerous books and articles, its supporters have largely tended to repeat or reformulate often quite cryptic original statements by Bhaskar instead of engaging with recent developments in the philosophy of science or using the ideas to explain important social facts.” (Hedström and Ylikoski, 2010, pp. 56-57)

This is also the case in IS. CR-scholars in IS do not engage with current philosophy of science, particularly the New Mechanistic Philosophy (Glennan, 2017; Glennan and Illari, 2018). Instead, they ground themselves in Bhaskar's often obscure and outdated texts from the 1970s. This aligns with observations made by Zhang (2023, p. 26), who criticized CR proponents for not “debating with more recent rivalling schools in philosophy of science, rather than positivism and other outdated philosophies of science that have long been discarded by serious philosophers.” Shortly put, (1) Bhaskarian commitments bring unnecessary baggage; and (2) modern MBE in the philosophy of science offers non-CR accounts of MBEs. CR writers in IS ignore this evidence; they compare CR with outdated philosophical positions instead of arguing how CR is preferred over other MBE accounts.

Within the page limits of this paper, it is not possible to go through all the problems of Bhaskarian CR for MBE. Here we focus on one major problem previously not discussed in IS. CR defines mechanisms as “unobservable.” This is an unnecessary and in many cases restrictive view on mechanisms in general and in IS. It also creates confusion, as even CR-oriented researchers differ in their opinions on the importance and persistence of unobservability in CR.

#### 3.1 CR mystifies mechanisms as “unobservable”

In this section we argue that CR subscribes to the problematic view of mechanisms as *unobservable* in a strong sense – not merely *unobserved*. CR takes the stance that the world can be *a priori* – i.e., before empirical investigation – divided into things that are observable and other things that are unobservable. Putnam (1966) refers to this as the observational-theoretical dichotomy and largely dismisses its usefulness. Burgos (2021) refers to this issue as the Observability-Unobservability Distinction (OUD). He argues that OUD is “a relic of logical positivism that has only caused confusion and unnecessary discord without improving our understanding of science.” (p. 700). Furthermore, he argues that the boundary between the observed and unobserved is undetermined and not stable:

“[A]ny entity deemed ‘unobservable’ today (whatever that means) could become ‘observable’ sometime in the future, which makes OUD heavily dependent on the current state of science. Since there is no way to predict how, when, or whether this will happen, OUD becomes too uncertain, temporary, and tentative.” (Burgos, 2021, p. 696)

We acknowledge that not all CR-oriented researchers accept this characterization for CR. For instance, Wynn and Williams (in press) state that the unobservability claim is “a gross misinterpretation of Bhaskar and of others.” They refer to their *MIS Quarterly* paper (Wynn and Williams, 2012, p. 794) where they have outlined how “unobservable mechanisms and structural entities may ultimately become observable by direct means as new instruments or measures are developed (...)”

Regardless, we make a two-part claim that 1) the unobservability claim is a central and persistent part of the CR discourse, and that 2) it is typical for CR discourse to switch positions when it is beneficial.

We now address the high prevalence of the unobservability claim. It should be contextualized that in the words of Roy Bhaskar, CR “is first and foremost a philosophy concerned with ontology”<sup>1</sup> CR places mechanisms on the deepest “real” level of its three-level stratified ontology. According to CR, the reality consists of an empirical, an actual, and a real level.<sup>2</sup> In Bhaskar’s parlance, the real level is *intransitive*, having a human-independent existence (Bhaskar, 1975, p. 21). Bhaskar (1975, p. 56) defined:

“My overall aim, it will be remembered, is to argue that the ultimate objects of scientific understanding are neither patterns of events nor models but the things that produce and the mechanisms that generate the flux of the phenomena of the world. (...) [W]hat is essential to the realism developed here is the idea that the things and mechanisms of nature, that constitute the intransitive objects of scientific theory, both exist and act independently of the conditions, normally produced by men, that allow men access to them.”

In this depth ontology of CR, the real level is regularly defined as unobservable. For instance, Mingers et al. (2013, p. 797) describes that in the CR worldview “successful occurrence of social activities warrants the existence of causally efficacious, although unobservable, social structures.” Likewise, Bygstad et al. (2016, p. 84) defines that “the mechanism itself is unobservable and non-deterministic, its effects are observed” (Bygstad et al., 2016, p. 84). In the same line of reasoning, Thapa and Omland (2018, p. 3) state that “we cannot directly identify the structure, conditions and mechanisms that are residing in real domain. However, the manifestations of these elements emerge through events in the actual and empirical layers.”

Furthermore, Rowe and Markus (2021, p. 84) conceptualize mechanisms – right after they refer to Salmon (1998) – as “(1) ontologically real, even if they are unobservable, (2) reasonably inferable as causal (through abduction), and (3) able to produce effects that would not happen otherwise.” We were not able to locate these discussions in Salmon’s book.<sup>3</sup>

Outside the IS, the unobservability claim is also repeated. Zhang (2023, p. 17) defines that the “intransitive dimension concerns the real, which includes structures and mechanisms that are unobservable” and that “the intransitive dimension is unchanging and does not depend on the transitive dimension for its being.” Reed (2009, p. 438) talks about CR’s “retroductive strategy” that help “uncover the real and unobservable mechanisms.” Likewise, Kaidesoja (2013, p. 85) specifies Bhaskar’s stance against Kant:

“(...) [T]he objects of scientific research are unobservable structures and mechanisms that generate events (or phenomena) which may become the objects of our experiences. In other words, according to his transcendental realism, scientific knowledge about unobservable structures, which lie behind the phenomenal world, is possible.”

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<sup>1</sup> YouTube: “Critical Realism – Roy Bhaskar” <https://www.youtube.com/watch?v=TO4FaaVy0Is>

<sup>2</sup> While the three-level stratified ontology is a core feature of CR, even devoted critical realists have started to question its purpose (Elder-Vass et al., 2023).

<sup>3</sup> Salmon (1998) does mention unobservability, but never in the sense of CR. He discusses how some entities such as water molecules and electromagnetic waves are “unobservable, at least for ordinary human capabilities of perception” (p. 116). Elsewhere, Salmon lists unobservable “micro-entities as bacteria and viruses, atoms and molecules, electrons and protons, and even quarks and neutrinos” (p. 77). Even though these entities are unobservable to human eye, they are *mediately* observable through specific instruments (viruses and bacteria through a microscope). Thus, these entities are not unobservable.

The dictionary meaning of the word “unobservable” is “incapable of being observed.”<sup>4</sup> The word “unobserved” means “not noticed or perceived.”<sup>5</sup> Why, then, does CR emphasize unobservability, and with such persistence, if it merely refers to the ‘unobserved’? The frequent mention of unobservability is a source of confusion.

Even visible CR scholars have raised concerns about the role of mechanisms in CR. Professor Ruth Groff, a major contributor to the CR discourse (Groff, 2000, 2004; Groff and Morgan, 2023), is one of the vocal critics. She has argued that “the vocabulary [of mechanisms in CR] is very muddled,” and that “clear thinking is just not helped by the vocabulary.” She goes on to claim:

“The term ‘causal mechanisms’ ... quickly falls back into regularity talk and makes it hard to keep track of which thing is doing what. ‘How it does it’ is a good question, but the real issue is that which things have real powers to do what. (...) I am very suspicious of the causal mechanisms talk. I think, sometimes it hides the fact that we are not quite sure.”<sup>6</sup>

Hedström and Ylikoski (2010, pp. 50-51) have emphasized that “there is nothing in the notion of a mechanism that would imply that it is by definition unobservable.” Therefore, we argue that even in CR-based IS studies, the identified mechanisms may contain observable elements, contrary to CR principles. For instance, Henfridsson and Bygstad (2013) presented an “adoption mechanism” (Figure 1) in their paper published in the *MIS Quarterly* CR special issue. This mechanism suggests that when digital infrastructure provides more services, more users will adopt these services, leading to more resources invested to the digital infrastructure. Recall the CR view of Bygstad et al. (2016): “the mechanism itself is unobservable and non-deterministic, its effects are observed” (Bygstad et al., 2016, p. 84). But how is this mechanism supposed to be unobservable, while its effects are not? The number of services is observable and measurable, as is the number of users, and the extent of invested resources. It seems there are no unobservable elements in this mechanism. Our argument applies to Henfridsson and Bygstad’s (2013) two other mechanisms as well.

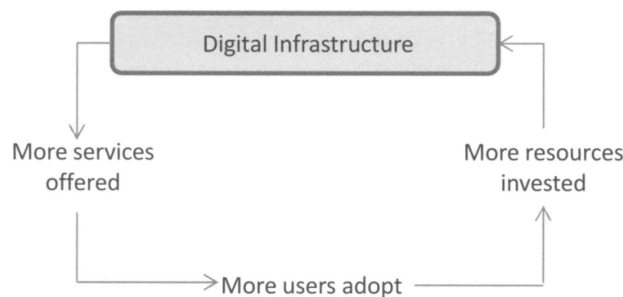


Figure 1. The adoption mechanism from Henfridsson and Bygstad (2013)

In addition to the issue of prevalent unobservability, we address another theme here: position switching. This offers a possible explanation for why unobservability is often claimed yet denied upon confrontation. Particularly in the context of CR ontology, position switching is typical (Cruickshank, 2004; Zhang, 2023). Employing a “third way” rhetoric (Lanamäki, in press), CR adopts different arguments when positioned against positivism and when opposed to interpretivism. This ontological position switching involves shifting between two views, depending on which strategy is most advantageous in each situation.

<sup>4</sup> <https://www.merriam-webster.com/dictionary/unobservable>

<sup>5</sup> <https://www.merriam-webster.com/dictionary/unobserved>

<sup>6</sup> Youtube: Critical Realism Network – A Philosophical Vocabulary for Critical Realism. – Professor Ruth Groff: <https://www.youtube.com/watch?v=HqZrQelafx>

Cruickshank (2004, p. 567) outlines these two ontologies: (I) “on the one hand, ontology pertains to what critical realists refer to as the ‘transitive domain’ of fallible, theoretical interpretations of reality”; (II) “on the other hand, ontology is taken to be a direct representation of the ‘intransitive domain’, meaning the reality beyond our knowledge.” Zhang (2023, p. 18) further explicates: “(I), ontology is derived from empirical knowledge and consequently transitive; according to interpretation (II), ontology directly mirrors the reality beyond our experience, so it is ‘categorically independent’ of empirical knowledge and intransitive.” The two ontologies are depicted in Figure 2.

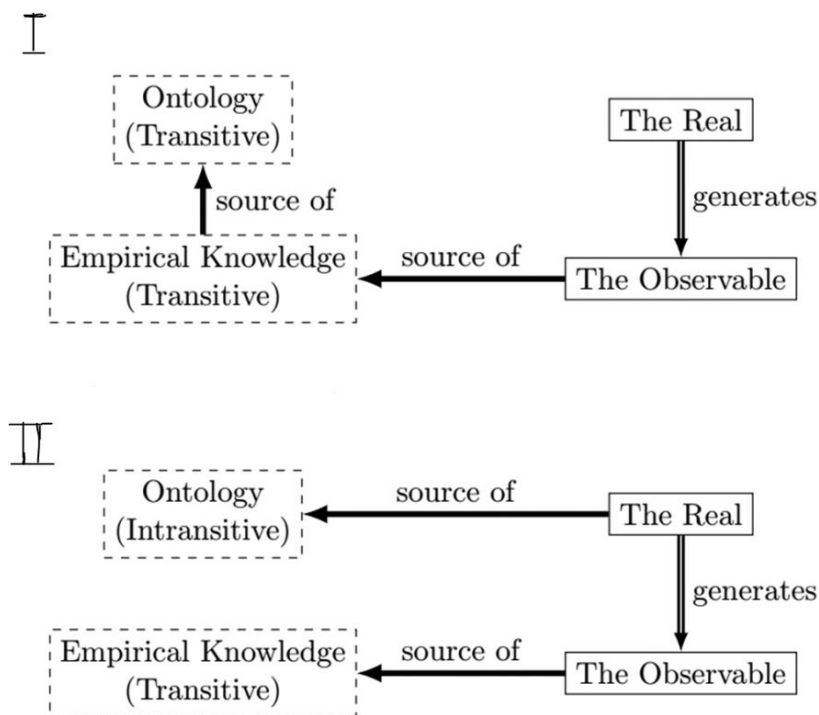


Figure 2. The two ontologies of CR, adopted from Zhang (2023)

In sum, we argue CR’s insistence on unobservability adds unnecessary restrictions. Yet, it may not help in understanding mechanistic models. For example, what the unobservability assumption of CR would add in the case of the adoption mechanism from Henfridsson and Bygstad (2013) – Figure 1? It seems to mainly confuse and mystify as readers wonder how these are “unobservable”. There is no reason to make the commitment that mechanisms cannot be observed. It can be also asked more generally whether there is any benefit in making philosophical ontological commitments before data collection. For instance, Czarniawska (2009, p. 134) warns that deciding “ontological status *a priori* once and for all – and worse still, distributing it according to a researcher’s preferences – terminates the research process even before it has begun.” Some parts of mechanisms may be observable, others not. Over time, some previously unobservable elements may become observable.

#### 4 Discussion: A way forward

In this paper we have built an argument that MBE in philosophy of science has little or nothing to do with CR. This is contrary to many IS claims on CR we have described in this paper. Furthermore, CR has various problems such as deeming mechanisms as unobservable. Now, advocates of CR can reply that let’s widen the scope of mechanisms as observable, and the problem is solved. But then it is not anymore CR as outlined by Bhaskar. Then one is developing a different version of “critical realism”, in



which case, it would be better to be called something else than CR, not to be confused with CR commonly associated with Bhaskar.

If one is willing to revise CR to account on mechanisms, then why to start with outdated and many ways problematic account, namely Bhaskar's CR mainly developed in the 1970s. Why not to rely on the mechanistic developments in contemporary philosophy of science, which have been developed and revised constantly based on criticism during last 30 years. At the same time, according to Hedström and Ylikoski (2010), the "development of critical realism also seems to have stalled" as critical realists "have largely tended to repeat or reformulate often quite cryptic original statements by Bhaskar instead of engaging with recent developments in the philosophy of science" (p. 57). Would IS mechanism research be better off if it was aligned with the mechanistic developments in contemporary philosophy of science, not what Bhaskar wrote more than forty years ago.

To learn from the developments in the philosophy of science, there is a need to review the philosophy of mechanism in relation to IS. One practical foundation for mechanistic research in IS is the minimum definition by Illari and Williamson (2012, p. 123): "A mechanism for a phenomenon consists of entities and activities organized in such a way that they are responsible for the phenomenon." As such, mechanistic explanation is concerned with 1) description of the phenomenon, 2) description of how the mechanism is responsible for the phenomenon, 3) description of what are the necessary entities and activities constituting the mechanism, and 4) description of how the entities and activities are organized. Similarly, the six mechanistic theses outlined in Glennan et al. (2022) may inform MBE research in IS as well. Another practical help may be Nathan's (2021, Chap 7) "diet mechanistic philosophy" that productively reminds us that less philosophy may lead to better science. Likewise, Ioannidis and Psillos (2022) advocate a minimalist conception they have coined as Methodological Mechanism.

What these examples demonstrate is that the development of MBE is very lively in the philosophy of science. Various aspects of mechanisms that CR have taken as granted have been scrutinized by philosophers of science. For example, mechanist philosophers have discussed ontic vs. epistemic conceptions of mechanisms (Nathan, 2021; Salmon, 1984; Wright, 2015; Wright, 2012). This kind of constructive disagreement and reflection is much more beneficial to the progress of science than plain acceptance of Bhaskarian tenets from the 1970s.

In this paper we have identified misleading claims in IS papers about CR's influence on MBE scholarship. We have also identified problematic aspects of CR for MBE. Here we also wish to make the broader observation on how the IS-CR discourse has been mostly shaped by CR advocates. *Information and Organization's* 2004 CR special issue (Robey, 2004) is the sole anomaly providing counterpoints to CR-promoting claims, by Klein (2004) and Monod (2004) challenging Mingers' CR essay (2004). Apart from some exceptions, the discourse surrounding IS-CR has primarily been a history of CR advocacy, a continuous cycle of mutual praise. However, the IS-CR advocates have mostly neglected to engage with critiques provided in fields such as philosophy of science (Kaidesoja, 2006, 2013), in management and organization (Contu and Willmott, 2005; Willmott, 2005), in analytical sociology (Di Iorio and León-Medina, 2021), in Marxist social science (Magill, 1994), in international relations (Käpylä and Mikkola, 2011), in social epistemology (Zhang, 2023), and many other related areas. The MBEs – unrelated to CR – have been rapidly developed in the philosophy of science (see *Philosophy of Science* and the *British Journal for the Philosophy of Science*). CR mechanism advocates in IS should argue for how CR mechanisms beats these state-of-the-art views in the philosophy of science, instead of repeating Bhaskar's old criticism on two philosophical movements that existed decades ago. It is also possible that Bhaskar's CR, developed in 1970s, lacks resources to be a serious contender in the heavyweight division of MBEs.

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## References

- Avgerou, C. (2013) "Social mechanisms for causal explanation in social theory based IS research." *Journal of the Association for Information Systems* 14 (8), 399–419.
- Beach, D. and R. B. Pedersen (2019) *Process-tracing methods: Foundations and guidelines*. University of Michigan Press.
- Bechtel, W. and A. Abrahamsen (2005) "Explanation: A mechanist alternative." *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 36 (2), 421–441.
- Bhaskar, R. (1975) *A Realist Theory of Science*, 1st edn. Leeds Books.
- Burgos, J.E. (2021) "The Real Problem with Hypothetical Constructs." *Perspectives on Behavior Science* 44 (4), 683–704.
- Bygstad, B. (2010) "Generative mechanisms for innovation in information infrastructures." *Information and Organization* 20 (3–4), 156–168.
- Bygstad, B., B. E. Munkvold and O. Volkoff (2016) "Identifying generative mechanisms through affordances: a framework for critical realist data analysis." *Journal of Information Technology* 31, 83–96.
- Byrne, D. and E. Uprichard, (2012) "Useful complex causality." In: H. Kincaid (ed.) *The Oxford handbook of philosophy of social science*, Vol. 109. Oxford University Press, pp. 109–129.
- Carlsson, S.A. (2004) "Using critical realism in IS research." In: M. E. Whitman and A. B. Wozcynski (eds.) *The Handbook of Information Systems Research*. IGI Global, pp. 323–338.
- Contu, A. and H. Willmott (2005) "You spin me round: The realist turn in organization and management studies." *Journal of Management Studies* 42 (8), 1645–1662.
- Craver, C. F. (2006) "When mechanistic models explain." *Synthese* 153 (3), 355–376.
- Cruikshank, J. (2004) "A tale of two ontologies: an immanent critique of critical realism", *The Sociological Review* 52 (4), 567–585.
- Cuellar, M. J. (2016) "Critical Realism as a Sociomaterial Stream of Research." *The Data Base for Advances in Information Systems* 47 (4), 60–66.
- Czarniawska, B. (2009) "Social constructionism and organization studies." In: Westwood, R. and Clegg, S. (eds.) *Debating organization: Point-counterpoint in organization studies*. Blackwell Publishing, pp. 128–139.
- Di Iorio, F. and F. J. León-Medina (2021) "Analytical sociology and critical realism", in Manzo, G. (ed.) *Research Handbook on Analytical Sociology*. Edward Elgar Publishing, pp. 135–154.
- Dobson, P. J. (2001) "The philosophy of critical realism—an opportunity for information systems research." *Information Systems Frontiers* 3 (2), 199–210.
- Elder-Vass, D., T. Fryer, R. P. Groff, C. Navarrete and T. Nellhaus (2023) "Does critical realism need the concept of three domains of reality? A roundtable." *Journal of Critical Realism* 22 (2), 222–239.
- Glennan, S. (2002). "Rethinking mechanistic explanation." *Philosophy of Science* 69 (S3), S342–S353.
- Glennan, S. (2017). *The New Mechanical Philosophy*. Oxford University Press.
- Glennan, S. and P. Illari (Eds.). (2018). *The Routledge Handbook of Mechanisms and Mechanical Philosophy*.
- Glennan, S., P. Illari, and E. Weber (2022). "Six Theses on Mechanisms and Mechanistic Science." *Journal for General Philosophy of Science* 53, 143–161.
- Glennan, S. (1996). "Mechanisms and the nature of causation." *Erkenntnis* 44 (1), 49–71.
- Groff, R. (2000). "The truth of the matter: Roy Bhaskar's critical realism and the concept of alethic truth." *Philosophy of the Social Sciences* 30 (3), 407–435.
- Groff, R. (2004). *Critical Realism, Post-positivism and the Possibility of Knowledge*. Routledge.
- Groff, R. P. and J. Morgan (2023). "Philosophy, metaphilosophy and ideology-critique: an interview with Ruth Porter Groff." *Journal of Critical Realism* 22 (2), 256–292.
- Gross, N. (2009). "A Pragmatist Theory of Social Mechanisms." *American Sociological Review* 74 (3), 358–379.
- Hansen, S. and A. J. Baroody (2020). "Electronic health records and the logics of care: complementarity and conflict in the US healthcare system." *Information Systems Research* 31 (1), 57–75.

- Hartwig, M. (2007). *Dictionary of Critical Realism*. Routledge.
- Hedström, P. (2021). "Coda—The past and future of analytical sociology." In G. Manzo (Ed.), *Research Handbook on Analytical Sociology* (pp. 490–505). Edward Elgar Publishing.
- Hedström, P. and R. Swedberg (1996). "Social mechanisms." *Acta Sociologica* 39 (3), 281–308.
- Hedström, P. and R. Swedberg (Eds.). (1998). *Social mechanisms: An analytical approach to social theory*. Cambridge University Press.
- Hedström, P. and P. Ylikoski (2010). "Causal Mechanisms in the Social Sciences." *Annual Review of Sociology* 36 (1), 49–67.
- Henfridsson, O. and B. Bygstad (2013). "The generative mechanisms of digital infrastructure evolution." *MIS Quarterly* 37 (3), 907–931.
- Illari, P. M. and J. Williamson (2012). "What is a mechanism? Thinking about mechanisms across the sciences." *European Journal for Philosophy of Science* 2 (1), 119–135.
- Ioannidis, S. and S. Psillos (2022). *Mechanisms in Science: Method or Metaphysics?* Cambridge University Press.
- Kaidesoja, T. (2006). "How Useful are Transcendental Arguments for Critical Realist Ontology?" *Journal of Critical Realism* 5 (2), 344–353.
- Kaidesoja, T. (2013). *Naturalizing critical realist social ontology*. Routledge.
- Kincaid, H. (Ed.). (2012). *The Oxford Handbook of Philosophy of Social Science*. Oxford University Press.
- Klein, H. K. (2004). "Seeking the new and the critical in critical realism: déjà vu?" *Information and Organization* 14 (2), 123–144.
- Käpylä, J. and H. Mikkola (2011). "Getting things right?": a reconsideration of critical realism as a metatheory for IR." *Journal of International Relations and Development* 14 (4), 401–439.
- Lanamäki, A. (in press). "Questioning the Third Way Rhetoric of Critical Realism." *The Data Base for Advances in Information Systems*.
- Lee, A. S. (1991). "Integrating Positivist and Interpretive Approaches to Organizational Research." *Organization Science* 2 (4), 342–365.
- Little, D. (2018). Disaggregating Historical Explanation: The move to social mechanisms. In S. Glennan and P. Illari (Eds.), *The Routledge Handbook of Mechanisms and Mechanical Philosophy* (pp. 413–422). Routledge.
- Machamer, P., L. Darden and C. F. Craver (2000). "Thinking about mechanisms." *Philosophy of Science* 67 (1), 1–25.
- Magill, K. (1994). "Against critical realism." *Capital & Class* 18 (3), 113–136.
- Manzo, G. (Ed.). (2021). *Research Handbook on Analytical Sociology*. Edward Elgar Publishing.
- Markus, M. L. and F. Rowe (2018). "Is IT Changing the World? Conceptions of Causality for Information Systems Theorizing." *MIS Quarterly* 42 (4), 1255–1280.
- Mingers, J. (1990). "The philosophical implications of Maturana's cognitive theories." *Systems Practice* 3 (6), 569–584.
- Mingers, J. (2004). "Real-izing information systems: critical realism as an underpinning philosophy for information systems." *Information and Organization* 14 (2), 87–103.
- Mingers, J., A. Mutch and L. Willcocks (2013). "Critical Realism in Information Systems Research." *MIS Quarterly* 37 (3), 795–802.
- Mingers, J. and C. Standing (2017). "Why things happen – Developing the critical realist view of causal mechanisms." *Information and Organization* 27 (3), 171–189.
- Monod, E. (2004). "Einstein, Heisenberg, Kant: methodological distinction and conditions of possibilities." *Information and Organization* 14 (2), 105–121.
- Nathan, M. J. (2021). *Black boxes: How science turns ignorance into knowledge*. Oxford University Press.
- Orlikowski, W. J. and J. J. Baroudi (1991). "Studying Information Technology in Organizations: Research Approaches and Assumptions." *Information Systems Research* 2 (1), 1–28.
- Putnam, H. (1966). "What theories are not." In *Studies in Logic and the Foundations of Mathematics* (Vol. 44, pp. 240–251). Elsevier.

- Reed, M. I. (2009). "Critical realism: Philosophy, method, or philosophy in search of a method." In *The SAGE handbook of organizational research methods* (pp. 430–448). Sage.
- Robey, D. (2004). "Introduction to Critical Realism." *Information and Organization* 14 (2), 85–86.
- Rowe, F. and M. L. Markus (2021). "Theoretical Diversity in IS Research: A Causal Structure Framework." In N. R. Hassan and L. P. Willcocks (Eds.), *Advancing Information Systems Theories* (pp. 75–130). Palgrave MacMillan.
- Salmon, W. C. (1984). *Scientific Explanation and the Causal Structure of the World*. Princeton University Press.
- Salmon, W. C. (1998). *Causality and explanation*. Oxford University Press.
- Siponen, M., T. Klaavuniemi and M. Nathan (2020). "Mechanistic Explanations and Deliberate Misrepresentations." In: Proceedings of the Annual Hawaii International Conference on System Sciences (HICSS).
- Siponen, M. and A. Tsohou (2018). "Demystifying the Influential IS Legends of Positivism." *Journal of the Association for Information Systems* 19 (7), 600–617.
- Smith, M. L. (2006). "Overcoming theory-practice inconsistencies: Critical realism and information systems research." *Information and Organization* 16 (3), 191–211.
- Smith, M. L. (2018). "Putting critical realism to use in ICT4D research: Reflections on practice." *The Electronic Journal of Information Systems in Developing Countries* 84 (6), e12052.
- Thapa, D. and H. O. Omland (2018). "Four steps to identify mechanisms of ICT4D: A critical realism-based methodology." *The Electronic Journal of Information Systems in Developing Countries*, 84 (6), e12054.
- Tsang, E. W. K. (2014). "Case studies and generalization in information systems research: A critical realist perspective." *The Journal of Strategic Information Systems* 23 (2), 174–186.
- Volkoff, O. and D. M. Strong (2013). "Critical Realism and Affordances: Theorizing IT-Associated Organizational Change Processes." *MIS Quarterly* 37 (3), 819–834.
- Walsham, G. (1995). "The Emergence of Interpretivism in IS Research." *Information Systems Research* 6 (4), 376–394.
- Willmott, H. (2005). "Theorizing Contemporary Control: Some Post-structuralist Responses to Some Critical Realist Questions." *Organization* 12 (5), 747–780.
- Wright, C. (2015). "The ontic conception of scientific explanation." *Studies in History and Philosophy of Science Part A* 54, 20–30.
- Wright, C. D. (2012). "Mechanistic explanation without the ontic conception." *European Journal for Philosophy of Science* 2 (3), 375–394.
- Wynn, D. E. and C. K. Williams (2012). "Principles for Conducting Critical Realist Case Study Research in Information Systems." *MIS Quarterly* 36 (3), 787–810.
- Wynn, D. E. and C. K. Williams (in press). "A Rejoinder on Questioning the Third Way Rhetoric of Critical Realism." *The Data Base for Advances in Information Systems*.
- Ylikoski, P. (2018). "Social mechanisms." In S. Glennan and P. Illari (Eds.), *The Routledge Handbook of Mechanisms and Mechanical Philosophy* (pp. 401–412). Routledge.
- Zhang, T. (2023). "Critical Realism: A Critical Evaluation." *Social Epistemology* 37 (1), 15–29.