

Affordances and Agency: A Clarification and Integration of Fractured Concepts¹

By: Paul Leonardi, Department of Technology Management, University of California, Santa Barbara, USA

As we stand at the dawn of the AI era, it is clear that scholars need to move quickly to understand how software that can generate new content based on its ability to learn from existing data and make decisions autonomously will affect how people work. Why do we need to move so quickly? Because the future is being written for us now by software engineers who are developing AI-powered applications and organizational leaders who are introducing them into their companies at a prodigious pace. We should take this statement seriously. As a student of technology and organizations, I am acutely aware that despite being social constructions (or perhaps because of it) early iterations of technologies and early organizational responses to them gain inertia fast. We settle into patterns that are reinforced by interpretations, norms, policies, contracts, and laws that lock us into certain trajectories that are difficult to change, even though they are of our own making. Unless scholars who study the role that technology plays in work and organizing can provide useful theories for how change is likely to unfold and with what consequences, they will not be able to shape decision-making and policy around AI development, implementation, and ongoing use.

When I was conducting the research that led to the paper, “When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies,” which was published in this journal in 2011, I did not feel much urgency. The simulation technologies being built and used by engineers at Autoworks were impressive, though not revolutionary. They were more powerful iterations of tools that had existed for many years. But they were becoming better at prediction and they were becoming more adaptable. I thought this was exciting. In my view, the engineers I studied could build better vehicles not only because their simulation tools allowed them to make better predictions faster, but also because they could often reconfigure those tools to do new things if they found themselves wanting to do so. After observing them work with their simulation tools, my goal was to build theory that would help explain why, in some instances, they sought changes to the technologies they used and why, in other instances, they reconfigured their work—sometimes formally and other times informally—around the technology. What seemed novel to me at the time was that there were many studies of microlevel adaptations of work around new technologies, as well as macrolevel studies of the coevolution of technologies and organizations over long time periods, but we did not seem to have theory that could account for contexts in which people could make changes to *either* their technologies *or* their work routines rapidly, fluidly, and organically.

To theorize these changes, I relied on two concepts familiar to the broader communities of information systems and organization studies but not central in either of them—*affordances* and *agency*—and one concept not popular in either area—*imbrication*. My innovation was to put these three concepts into conversation together (if you want to take a whistle-stop tour through that conversation, see Table 1). I wrote this grounded theoretical account patiently, hoping only that it would be a useful lens for understanding a process that had already unfolded at this one company, but which I imagined had likely unfolded similarly many times at many different companies. I was *backward-looking* because I did not have a feeling that the choices around how companies implemented simulation technologies or responses to them would have far-reaching impacts on the nature of work itself. Today, as we are beginning to see the widespread and (often) uncritical diffusion of AI across so many organizations, I have a very different feeling.

It is incumbent upon students of technology and organizing to be *forward-looking* and perhaps even prescriptive about the role that AI can and should play in our work lives. As I’ve had the opportunity to reflect, I’ve come to believe that the core concepts of affordances and agency developed in that paper are among the right concepts to help us theorize AI and the future of work. But to be useful for such a purpose, they will need to be clarified and better integrated.

¹ This Guest Editorial is invited as part of the terms of the 2022 *MISQ* Impact Award. The award honors the paper published a decade earlier (2011-2013) that the selection committee deems to have had: (1) the most significant and sustained scholarly impact, as shown by citations, by how it led to a change in thinking in the field, and by its prescience in identifying an important issue today; and (2) a real or potential impact beyond academia, especially through how it influences the way our field engages in an important real-world domain. As part of the award, the author is invited to write a reflective editorial on the topic.

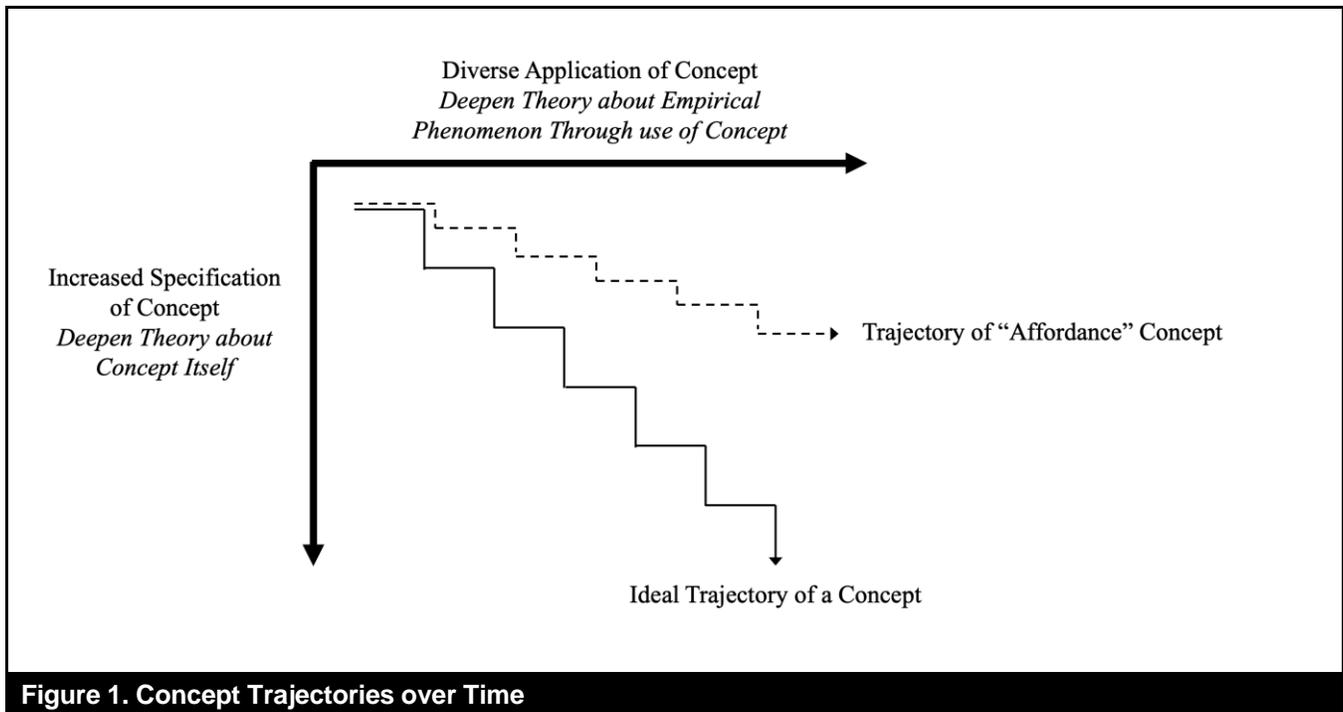
Table 1. Agency, Affordances, and Imbrication in Conversation (from Leonardi, 2011)

1. Organizations are made up of technology doing things (*material agency*) and people doing things (*human agency*). Technology does things (*material agency*), but what it does cannot be separated from who programmed it to do those things and who made decisions about how to deploy its capabilities in the practice of work (*human agency*).
2. Because organizations and technology are made from the same basic building blocks (human and material agency), ontologically they are the same. That is, if you looked at their DNA, organizations and technology would look identical. They are not even “constitutively entangled,” as the sociomaterialists would say; they are indistinguishable. You can’t have technology without organization and you can’t have organization without technology.
3. Be that as it may, the fact that we still call some things “technology” and other things “organization” is because of the way agencies are *imbricated*. Sometimes human and material agencies become imbricated into forms we recognize as technology and sometimes they become imbricated into forms we call organizations. Although we experience technology and organizations as distinct in practice based on our cultural conditioning, that does not undermine the idea that they are still identical ontologically.
4. All that conceptual work was the necessary scaffolding to answer the empirical question: *Why did engineers at Autoworks sometimes make changes to their technologies and other times to the organization of work around them?*
5. The answer was linked to their perceptions of *affordance* and its converse, *constraint*. The data showed that when they perceived that the technology afforded them the ability to work in new ways, they started working in new ways and, consequently, shifted the organization of work around them to better support their new capabilities. When they perceived that the technology constrained their ability to do something they wanted to, they figured out ways to get the technology changed so that they could use it as they desired. Their perception was not cognitive and did not occur absent interaction with the technology. Rather, perception was enacted in the practice of work.
6. In the end, these responses to affordances and constraints produced repetitive imbrications of human and material agencies. We can see the ongoing production and evolution of technology and organizing by examining this chain of agencies over time.

Ideally, any concept would follow the path of development illustrated in Figure 1. The *x*-axis depicts how the concept helps to explain empirical phenomena. If the concept is useful, it should allow us to explain many different empirical phenomena across different settings. Thus, the concept matures through diversification in its application. But concepts are not just things that explain. To be useful, concepts themselves must evolve. That is what is depicted on the *y*-axis. The concept must be deepened theoretically so it can continue to be useful and reveal new insights over time and in response to changing empirical contexts. Thus, the concept also matures through specification in its explanation. The ideal development of any concept, then, would follow the path indicated by the solid arrow: It develops both through empirical application and through theoretical specification. But the concept of affordance (and its interdependence with the concept of agency), I fear, has primarily taken the route of empirical application at the expense of theoretical specification. One need only look at the multitude of studies that show what affordances are enacted in one setting or another, or at the many studies that attempt to create typologies of affordances common when using a certain kind of technology or in a certain kind of activity, to see what I mean. The concept itself has not evolved much beyond the “relational” view that I sketched out in the 2011 paper, following Hutchby (2001), which finds a middle ground between the overly perceptual view offered by Gibson and the overtly materialist view advocated by Norman.

I think the reason we have seen more application of the affordance concept than the increased specification of the concept itself is twofold. First, the initial instinct for most researchers who encounter a new or newly revamped concept is to use it as a lens to “see what they can see.” Such an approach orients scholars to use the concept to deepen theory about an empirical phenomenon under study. Second, concept specification is hard. There are so many ways to think through a concept, so many ways of approaching it, and so many conflicting interpretations of it, that there is no easy path toward clarification, nay, coherence.

But to build theory that will shape how we think about AI’s role in work and organizing, we need to clarify the concept of affordance. As I will argue below, doing so also requires clarifying the concept of agency and integrating the concepts of affordance and agency together. In what follows, I will make some initial moves in this exercise of clarification and integration. Some of those moves will reinforce interpretations I made about those concepts when I wrote about them in the 2011 paper, and other moves will overturn some of my previous statements about them.



What Affordances Are Not

Most papers that draw on the concept of affordance present some intellectual history that begins with the work of James Gibson. Gibson's (1986) concern was to explain how and why animals make use of the environment in particular ways. He argued that all objects have physical properties that can afford certain uses. The operative word in that sentence is "can." For Gibson, a property of an object could provide an affordance, but only if the animal perceives it. In this view, perception is not purely cognitive but behavioral. Animals interact with the environment and, in so doing, discover characteristics of objects that are relative to their field of perception. In other words, if an animal is too small to reach the flat horizontal part of a rock, it will not perceive the rock as affording an opportunity to sit. Given such an observation, affordances cannot be the property of an artifact because they depend as much upon the user perceiving them as they do on the material characteristics of the object itself.

I am going to skip the usual genealogy of the concept that you find in most papers that would then move to Norman's (1990) "designed-in" view of affordances and, finally, to the "relational" view I advocated in the 2011 paper. Instead, I am going to take us to where we are today. Broadly, I see two primary ways in which affordances are typically conceptualized.

The first conceptualization is of affordances as a property of technology. Many papers (too many to cite here) use "affordance" as a stand-in for "feature" or "characteristic." In such a view, an affordance belongs to the hardware or software object under study. You can easily spot papers that adopt this *affordance as property* view because they offer a list of affordances that the technology provides. There are a great number of papers containing such lists. I suspect I am at least somewhat to blame for these lists. In 2012, I published a review paper with Jeff Treem in which we looked at the then-young literature on social media use in organizations. Inspired by the relational approach to affordances developed in the 2011 paper, we organized our review by asking ourselves two simple questions: (1) What affordances commonly emerge from social media use in organizations? (2) How do these social media affordances differ from those enabled by other forms of organizational CMC technologies? (Treem & Leonardi, 2012: 148). The goal of the review was to uncover what kinds of capabilities are documented in existing empirical studies about social media and what those capabilities afford. We found four common affordances: visibility, persistence, editability, and association. Our argument was that social media can afford many possibilities for action but, at that point in time, the affordances above were the four most commonly represented affordances in the published empirical studies.

It was in no way a comment on social media technology, only a review of the findings in studies about them. After that, many papers created scales to operationalize these four affordances to measure how frequently they are used (e.g., Fox & McEwan, 2017; Rice et al., 2017). Other papers offered expanded and more comprehensive lists of social media affordances (e.g., Majchrzak et al., 2013; Bucher & Helmond, 2018). Perhaps not surprisingly, studies of technologies other than social media, such as electronic medical records (Anderson & Robey, 2017; Califf, 2022), video conferencing tools (Geenen, 2017; Vidolov, 2022), and of course, AI (Jeon, 2021; Zhan et al., in press) just to name a few, began appearing with lists of affordances (for a detailed review of this “list mania,” see Evans et al., 2017).

One major problem with the *affordance as property* view is that it places too much emphasis on what a technology might enable and it makes an affordance a technological accomplishment rather than a relational one. It compels researchers to attempt to identify and catalogue all possible affordances for every technology. In short, it moves research along the *x*-axis in Figure 1 at the expense of movement along the *y*-axis. We may learn more about what activities different technologies can afford, but that would not help us develop a better understanding of how affordances operate.

Another major problem is what I call the *N+1* problem. If affordances are treated as properties of an artifact, then all artifacts have the potential to afford certain activities. And, in theory, there should be an empirical limit (*N*) to those affordances. Scholars who adopt this view of *affordance as property* often argue that all affordances of an object are ready for action at the moment an artifact is created or adopted. They distinguish between “potential affordances,” i.e., all affordances summing to *N*, and “actualized affordances,” (Anderson & Robey, 2017), i.e., the subset of *N* that a person or group actually takes advantage of. As Volkoff and Strong (2017, p. 239) describe:

When we are confronted with a new system on which we have not yet been trained, are there any affordances? One answer might be “no” because we may have insufficient knowledge to have any sense of potential actions we might take or of the likely outcomes of such actions. In our view the answer is “yes,” in large part because knowledge is not a binary characteristic, but rather an emerging and ever-changing one. An actor might actualize an affordance ineffectively to start with, but over time and with training their skill level will increase. In the same way that affordances exist whether or not an actor is aware of them, we contend that the affordance as a theoretical “potential for action” exists whether or not the knowledge for how to actualize it has been acquired yet, as long as the physical capacity is there.

The problem here, of course, is that we can never know what all the affordances of a technology will be because what becomes an affordance is as much dependent upon the changing social context of use as it is upon the material features of a technology, which, in today’s world, are also increasingly changing. And it is impossible to predict all social contexts and the way they will interact with all the material characteristics of a technology. Thus, the problem is that when we see an “actualized affordance,” how do we know if it was a “potential affordance” to begin with (part of the *N*) or an entirely new affordance that could have never been predicted (*N+1*) and, thus, was never a potential affordance because we wouldn’t have predicted it. If that logic seems complicated, then it serves the point: Trying to determine all possible affordances and distinguish between what affordances could have been and what affordances are is not likely to advance theory on affordance as a concept.

The second conceptualization is of affordances as cognition. Here, scholars use terms like “perceived affordance” (Fox & McEwan, 2017) or “imagined affordance” (Nagy & Neff, 2015) to indicate that the most important impetus for action may be not what the technology actually affords people the ability to do but what people think or perceive it will allow them to do. What people think shapes how they approach technology and therefore what affordances are possible, or so the logic goes. Nagy and Neff (2015) argue that because few people can see inside advanced algorithms and understand how they work and what capabilities they might offer, they must rely on their cognition to produce accounts of what the technology is likely capable of doing, and, in turn, what it might allow them to do when using it. As Scarlett and Zeilinger (2019, p. 24) observe, such an approach would

consider how users have imagined their social media news feeds as offering objective access to their friends’ posts (and vice versa), despite the fact that this information is algorithmically mediated and therefore structurally constrained. While the objective form of communication that social media platforms are imagined to afford indicates a false understanding of what is technically happening ... the affordances that are imagined lead to particular uses and actions regardless of whether or not they are, in fact, misunderstandings, misperceptions, and/or misinterpretations.

Whereas the *affordance as property* approach tries to tie affordances too closely to unchanging features of the material artifact, the *affordance as cognition* approach tilts too far in the other direction. When pushed to its extreme, this approach holds that the technology's actual capabilities take a backseat to people's perceptions of them—and that those perceptions can and are often formed outside of the practice of actually using the technology. The problem with this approach is that it all but overlooks the agentic characteristics of technology use. Many technologies do things—they act. And technologies powered by AI often act autonomously, making decisions about what data to process, how to classify it, how to present it, and sometimes what to do with it. Any view of affordances must take into account the actual arrangement of materiality or the activities that the technology actually undertakes—whether or not humans perceive these qualities and processes at all.

My own writing in the 2011 paper was, at best, equivocal on this point and, at worst, too supportive of the *affordance as cognition* approach. That is because I used the data about how engineers at Autoworks formed perceptions of affordances and constraints of the CrashLab simulation tool as a basis for their proposed changes to the technology or to their work routines. I fear that presenting the data in this way gave short shrift to the embodied nature of their perceptions. They labored with the technology day in and day out and built up their understandings of its “working,” in Pinch's (1996: 26) sense of the term, through their individual and collective experience contending with its features and its activities. I think I better captured this *in-situ* back-and-forth with the materiality of the tool in a paper I published in *MISQ* a few years later (Leonardi, 2013b), which I think is actually much better-executed, more interesting, and more practically useful than the paper that is the focus of this commentary. But what do I know?

In short, if we are to take affordances seriously, we need to know what they are not. Affordances are not properties of a technology that can be discerned *ex ante* and listed out as though enumerating a set of features. They are also not cognitions—something that exists in people's process of thinking and imagining what a technology does and why it does it so as to form their own perceptions of it. If we take these two things together, then it seems obvious that affordances are not “action possibilities,” as most contemporary work seems to define them. The idea of an action possibility suggests that affordances exist somewhere—either inside the technology or inside someone's head—waiting to be realized. Affordances are certainly not lying dormant, waiting to be activated. Rather, they are produced through the very action that most scholars presume they enable. *Affordances are not action possibilities; they are the ingredients of action.* To understand why this is the case, we need to turn to the concept of agency, which is often absent in the discussion of affordances, but cannot be if we aim for increased specification of the concept. And this was one of the things I actually think I got right in the 2011 paper, though only partially.

Agency: From Material Agency and Human Agency to “Materialization”

My treatment of agency in the 2011 paper is one of the topics for which I am most criticized by our IS colleagues. Just about the time that this paper was published, many scholars were taking a “sociomaterial turn” that built on the work of Karen Barad's (2003, 2007) notion of agential realism. There are many interpretations of this perspective, so rather than try to offer *the* account, let me offer *my* understanding of what agential realism says about agency. It's a complicated theory, so I hope I'll be excused for simplifying.

Basically, the idea is that things happen in the universe. We have theories that explain those things and those theories are intertwined with machines that collect data about them—the machines are created based on the theories and the way the data that the machines produce are interpreted in-line with the theories. This theory-machine configuration is what we might call an “apparatus.” So far, this tracks with what Latour and Woolgar (1979) wrote many years earlier in their seminal contribution to science studies, *Laboratory Life*. The apparatuses we use to make sense of the “doing” of the world lead us to make “agential cuts.” An agential cut refers to the way we perceive and define things in the world. While we often think of objects or beings as distinct and separate entities that remain consistent over time and space, in reality, everything is interconnected with constant changes happening at the smallest levels. This dynamic flow is called agency. To make sense of the world, we use our apparatuses. Even concepts like “me” or “you” are apparatuses that we use to make agential cuts that determine what's included in that definition and what's left out, even if such distinctions are somewhat arbitrary. Can there really be a me without you? As Barad (2007, p. 348) writes: “What the agential cut does provide is a contingent resolution of the ontological inseparability within the phenomenon hence the conditions for ... description.”

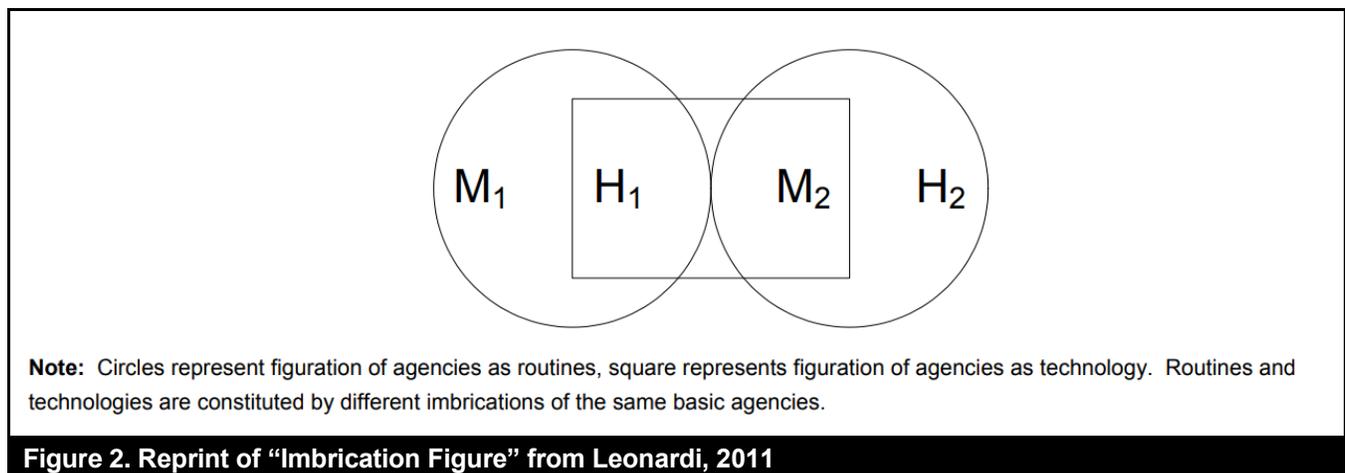
Thus, this orientation treats agency as a relationship, not as something that can be had. And to put this more squarely in the context of technology studies, calling something “material agency” or “human agency” is making an agential cut that, without further elaboration, denies the inherent relationality of the concept of agency. As Barad (2007, p. 33) says plainly: “It is important to note that the ‘distinct’ agencies are only distinct in a relational, not an absolute, sense, that is, agencies are only distinct in relation to their mutual entanglement; they don’t exist as individual elements.”

In the 2011 paper, I was certainly guilty—following the work of Pickering (1995, 2001), whose deep empirically-based argument I still find very convincing all these years later—of breaking the concept of agency into “material” and “human.” I suppose I was making an agential cut by advocating for such a distinction. However, if we read Barad more deeply, the quote above is one of many examples from her exposition of the agential realist approach that certainly admits the possibility that we can have “distinct agencies” so long as we recognize that they “are only distinct in a relational, not an absolute sense” and that “they don’t exist as individual elements.”

I thought that this was exactly what I was saying in the 2011 paper. In that paper, I presented a Figure (reprinted here as Figure 2) that attempted to illustrate distinct agencies that were in relation to each other. This is precisely why I employed the concept of imbrication. Referencing this figure, I wrote:

*Here one might consider that the tiler of a roof does not just imbricate a new imbrex with one existing tegula; she imbricates an imbrex with the entire history of imbrex–tegula relations that came before it, and that history influences, to an important degree, where and how she can place the newest tile. Thus although people can make choices about how they imbricate human and material agencies, the accumulation of choices that were made prior to their decision affect the types of imbrications they can make inasmuch as they shape their perceptions of affordances and constraints. When we look at an imbricated system of human and material agencies like the one idealized in Figure 1, we can begin to see how fundamentally related changes in routines are to changes in technologies because they contain the same building blocks, some of which are shared in common. Of course, where one begins reading the chain of imbrications (from a material or a human agency starting point) is somewhat arbitrary, and the chain of imbrications certainly stretches out in either direction. **In other words, it is arbitrary to look for beginning or end points in an imbricated system. Instead, the analyst should be more interested in explaining how imbrication occurs and the effects that prior sequences of imbrication have on future actions.** (Leonardi, 2011, p. 155)*

The emphasis here is new and not in the original article. I use it here to point out that I always thought what I was saying is that organizations and technologies are really just different manifestations of the same underlying phenomena. Where we, as researchers, as technology developers, and as people who work in organizations, decide to draw our squares or circles around the phenomena determine what we call a “technology” or an “organization.” And we don’t have complete autonomy to decide where we place those markings because of the history of prior divisions that have been made before us and for us. If I had used Barad’s words, I would have said that we make agential cuts to decide where a technology ends and an organization begins.



To make matters worse, the wonderful Dan Robey, who was then editor-in-chief of *Information & Organization*, asked me to respond to a paper written by Alistair Mutch (2013) that used critical realism to critique agential realism and its basis for the sociomaterial approach. He asked me because he had read the 2011 paper and thought that my approach made me a good candidate to appreciate both the critical realist and agential realist perspectives and to put them into productive conversation with each other. He asked Susan Scott and Wanda Orlikowski (2013) to write a response as well since they were some of the primary proponents of the agential realist approach in IS. I thought Mutch's ideas were interesting, though I didn't agree with many of them, and Dan encouraged me to be provocative and to play with them. So, I wrote a paper in which I attempted to compare agential realism to critical realism, and I made that comparison by primarily discussing the differences in their treatment of agency (Leonardi, 2013a). I never really thought of myself as a critical realist before that paper, nor do I now, but that paper was widely cited, and somehow the perspective that viewed organizations and technology as imbrications of human and material agencies became, in the minds of many people (as I intuited from their citation patterns and heard them say at conferences), anathema to agential realism. That image of imbrication vs. agential realism was only further enshrined in people's minds through the bad coincidence of a paper published that same year in the same journal by Kautz and Jensen (2013). In that paper, the authors playfully, but embarrassingly (and I would also say, unfoundedly), pitted the imbrication perspective I advanced in the 2011 paper against Orlikowski's (2007, 2010) use of agential realism in a strange "jester's monologue" for which I have received much ribbing at conferences by my peers over the years. But I digress. The point here is that I have always thought that the basic stances of the imbrication perspective and agential realism were aligned. But I realize that using the language, even though it was for analytic convenience only, of "material agency" and "human agency" made it seem as though the two approaches were saying different things.

If I were to rewrite the 2011 paper today, I would not go for analytic convenience. What I would say instead is that agency materializes. The materiality of our technology, the opportunities and structures provided by our institutions, the norms of our workgroups and occupations, and our own goals for work and self, combine in ways that make things happen. In other words, agency materializes at the human-machine-institution interface. Based on this view I might redraw the figure from the previous paper (Figure 2 here) more along the lines of what appears in Figure 3. This figure is, of course, imperfect, as was its predecessor. It attempts to signal that agency is materializing at the intersection of people, technologies, and institutions, all of which are themselves materializations of agency in a certain time, space, and container (hence the ghost-like figures behind them).

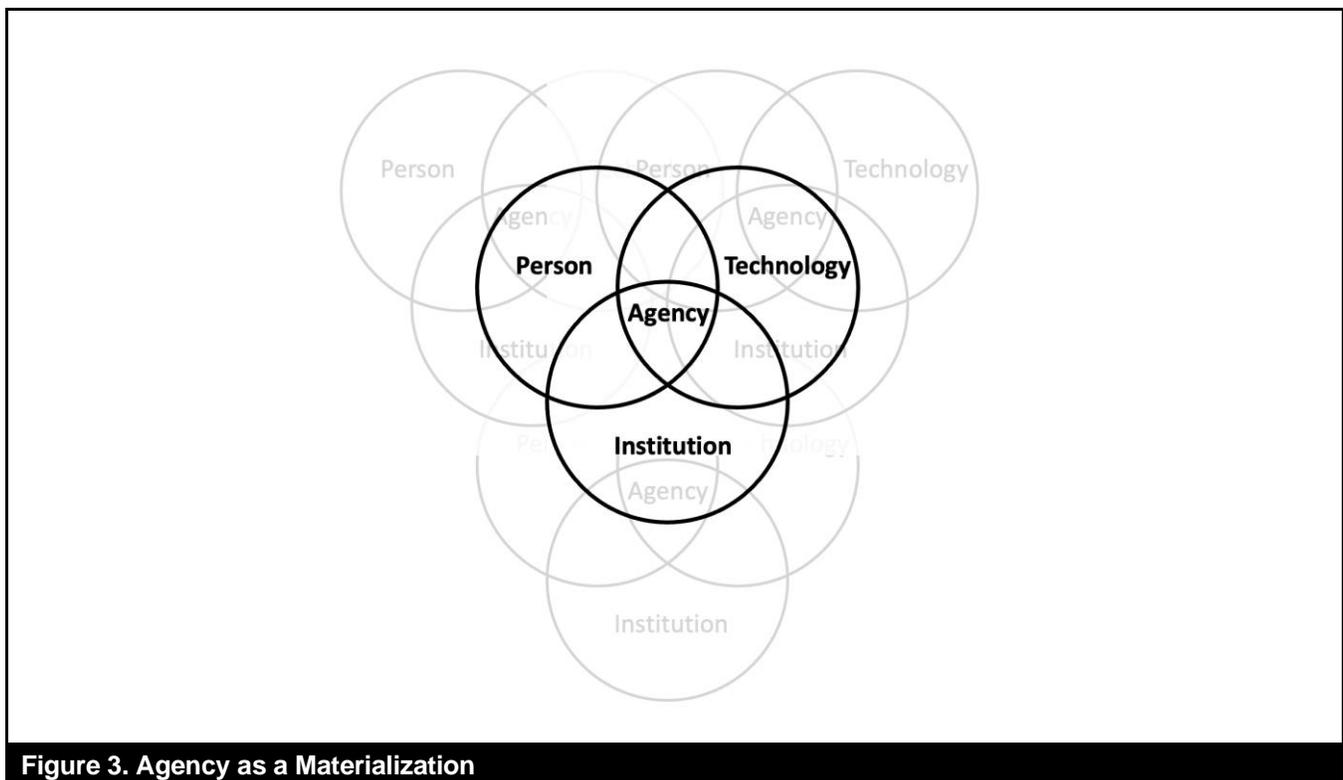


Figure 3. Agency as a Materialization

In this view, human and material agency are not distinct, not even in a relational sense. Agency knows no distinction. It is not the property of anything, nor does it belong to anyone. Agency materializes as a relation in its own right. From the standpoint of organizational studies of technology, agency materializes as people interact with technologies in the context of institutions. We might objectify and do some Cartesian splitting of people, technology, and institutions to background these forms in order to continue our focus on the here and now, but, really, people, technologies, and institutions are nothing more than agencies that have materialized in certain places and times and under certain circumstances. *Agency is not inherent in any person, place, or thing. Agency is materialized through relations.* Agency, which is variously defined as the “capability to influence one’s functioning and the course of events by one’s actions” (Bandura, 2006, p. 164), the “stream of actual or contemplated causal interventions of corporeal being on the ongoing process of events-in-the-world” (Giddens, 1976, p. 75), or the “temporally constructed engagement by actors of different structural environments” (Emirbaryer & Mische, 1998, p. 970), is thus better understood “not as an attribute whatsoever. Agency is ‘doing’ or ‘being’” (Barad, 2007, p. 178). As Latour (2005, p. 53) reminds us, “If you mention an agency you have to provide the account of its action, and to do so you need to make more or less explicit ... its observable traces. ... What is doing the acting is always provided in the account with some flesh and features that make them have some form or shape.”

What’s the point of all this discussion about agency as a materialization? The reason we need the concept of affordance is to explain how exactly agency materializes. Explaining the various ways that agency materializes, as well as the forces that stop such materialization, should be a core focus of research for IS and organizational scholars. Once we recognize that agency is materialized and the way it is materialized has consequences, we must be prepared to explain how and why it materializes as it does, as well as what materialization looks like. This is an enormous program of research that has not really yet begun with any serious effort (for one exception, see the work of Cooren [2020] who uses a discursive perspective to address the materialization of agency).

What I meant when I said earlier that affordances are the ingredients of action should now be clearer. *The way that agency materializes in a given space at a particular moment is what will afford or constrain action.* By treating agencies as qualities that exist apart from and prior to action, my own thinking was limited in the 2011 paper to arguing that the construction of perceptions of affordances was the catalyst for new material agency → human agency imbrications and the construction of perceptions of constraint were the catalysts for new human agency → material agency imbrications. After thinking about that argument over the last 12 years, I don’t believe it is wrong, just limited. By considering agency as a materialization, we can take a more expanded view. If agency materializes in action, it does so in ways that afford and constrain the very actions that help to materialize it. Thus, when we are talking about affordances, we are always also talking about the materialization of agency. *Action knows no distinction among agencies because action is agency made manifest. Agency affords action and action creates agency.* That we have “forms or shapes,” to use Latour’s language, that we call technologies, other things we call institutions, and other things we call people, are historic ways of classifying and typifying agency-affordance relations. But there are signs that those typifications are weakening. When we implant chips into our brains to help with our cognitive processing or use nanobots to rejuvenate our cells, the typified distinctions between technology and people break down. There is only agency—relations affording action.

Conclusion

One consistent conclusion from the literature on technology use in organizations over the past 30 years is that people will use digital tools in ways managers and leaders cannot fully anticipate or control. Whether that delights or terrifies, the evidence suggests that the experimentation most workers do with their new technologies doesn’t last long. After about 12-16 weeks of testing their new capabilities, most employees in an organization will have settled into a routine with their new digital tools, and the ongoing effects of their use will be fairly predictable. The duration of that window of uncertainty (or opportunity) has been quite constant over the years, offering leaders and managers some amount of calm (Tyre & Orlikowski, 1994; Leonardi, 2013). During that window managers and other leaders can work to shape how people use the new technologies, they can take advantage of new user-led innovations, or they can simply ride it out and formalize changes to work once the window has closed.

The arrival of AI-based technologies in organizations, including those using large language models (LLM) and those with generative capabilities are quickly demonstrating that not only is the window failing to shut when it should, but maybe the glass has shattered because, distinct from most previous digital technologies used in organizations, AI-driven tools continuously evolve on their own. Every interaction or data input into an LLM, whether for text generation or code creation, refines its

learning and enhances its capabilities. Essentially, each engagement with the technology presents a slightly altered version of the last. The features available today might differ from what's accessible next week. Most of the digital technologies we're used to go through version change at set intervals. Those updates make certain features work better, and occasionally they provide new features. But even new features typically offer only slight evolutions over previous capabilities. Thanks to the autonomous learning that characterizes the most advanced AI-based tools, people who use them aren't learning to use a new technology once—they are learning to use a new technology nearly every time they engage with an LLM.

The current approaches to studying these tools and their profound implications for action boil down, at least in my reading, to two popular avenues. In the first avenue, scholars are adopting an “affordance” approach that moves us on the *x*-axis of Figure 1. They ask what we can learn about AI by looking at it through an affordance lens (Trocin et al., 2021; Gimpel, 2023; Liang et al., 2023). These studies fall victim to the problem I outlined above: Although they might tell us something new about AI, they don't really help us to move much down the *y*-axis to mature the concept of affordances through increased specification of it as a theoretical construct. So now we have a lot of studies showing what AI affords, just as we have had studies of what social media, blockchain, EMRs, ERPs, and many other technologies afford. More of the same in a new context is only of limited value. The second avenue is one in which scholars are really beginning to take seriously the notion of material agency (many of whom lean on the specification of it from the 2011 paper). These studies take the fact that AI can make decisions on its own as evidence of material agency and try to theorize how that material agency affects us, as humans, in the context of our work (Gibbs et al, 2021; Sundar, 2020; Murray et al., 2021; Raisch & Krakowski, 2021). This approach is interesting but it will be necessarily limited in its ability to provide novel insights because it does not tend to tie agency to affordances in useful ways and it seems, in my view, to ask the wrong question. Rather than trying to understand how AI is affecting work and the process of organizing through material agency (as a quality of technology), we might more fruitfully ask how agency materializes at the human-machine-institution interface in new ways when machines have an increased capacity to act, change, and create apart from user intervention.

The ways that work and organizing will change in the age of AI will have everything to do with how agency materializes in ways that afford and constrain action. In 2011, I traced the use of new technologies that users could make modifications to when they hit a roadblock. Today, those same technologies could probably just modify themselves without much, if any, help from humans. Agency is clearly materializing in new ways with new implications for who or what can act, and how. For students of technology and organizing, it's hard to imagine a more pressing or exciting topic to study. And certainly not one that seems more urgent.

Associate Editor Reflections—Mike Chiasson, University of British Columbia, Okanagan

It is with a mixture of emotions that I heard about Paul Leonardi's paper receiving the *MISQ* Impact Award. I am overjoyed to learn that such an important and ground-breaking paper has received this award. I'm also happy but cautious in thinking that its success was affected by any of my editorial work. In fact, I'm certain that several of my recommendations were usefully ignored in order to produce this award-winning paper. Reading Paul's note above, you can see why he is such a major contributor to the field, our theoretical ideas, and our motivations going forward. I can also say, with only some rough satisfaction, that Paul's note advances on a key point raised by the review team: that an expanded treatment of human and technical agency would make an even greater contribution to the field. It now is.

Senior Editor Reflections—Carol Saunders, University of Central Florida

It was a great pleasure for me to learn that Paul Leonardi is being honored with the 2022 *MISQ* Impact Award for his 2011 *MISQ* paper, “When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies.” It was also edifying to receive confirmation that the review process for this awarded paper was as good as I thought it had been.

The backstory is that the then EIC of *MISQ*, Detmar Straub, asked me in the spring or summer of 2008 to fast-track any papers that I thought would be good candidates for publication in *MISQ*. At the Academy of Management meetings in August 2008, I listened to one such paper presented by Paul Leonardi. He was presenting an empirical study from his dissertation that incorporated

an intriguing concept called “imbrication.” I invited him to submit his paper to *MISQ*, and he did so on September 17, 2008. I would like to share with you some details about the review process for that paper and reflect upon why it worked so well.

I asked Mike Chiasson to serve as AE on the paper, and it soon became clear that Mike was an excellent choice. Mike was more knowledgeable than I about some theories covered in the paper. We conferred and decided to send it back to Paul for some specific changes before selecting reviewers and sending it out for review. Paul submitted the revised paper on February 2, 2009, and it was under review for three months. The paper was well received by the reviewers in the first round; two recommended minor revisions and one (Reviewer 1) recommended major revisions, as did the AE. Reviewer 1 made very detailed, helpful suggestions. The suggestions of the other reviewers were helpful as well, but not as detailed. Reviewer 2 added an interesting comment unlike any that I have ever seen:

I am aware that recommendations to “accept with minor revision” run the risk of being discounted because they lack sufficient critical analysis. Editors may respond to more salient calls for major revisions or rejection based on exposure of significant or even fatal flaws. To counteract this risk, I offer specific reasons below why I think this manuscript should be published with only minor revision.

Reviewer 2 then devoted two single-spaced pages describing the contributions of Paul’s paper, including its general relevance, its deeply insightful explanation of how IT artifacts affect social systems, its account relating to material agency that was more plausible than that found in actor-network theory, and its theoretical advances to structuration theory and Orlikowski’s notion of sociomaterial practices. Reviewer 2 said, “I can imagine this paper becoming very influential in years to come because it offers a solution to an intellectual puzzle that for too long has resisted analysis.”

The second round was received in January 2010 and was under review for just under three months. Reviewer 1 voiced several concerns about theoretical inconsistencies and the second reviewer recommended acceptance. Mike then did a fantastic job bringing closure to the review process by mapping out a detailed strategy to meet Reviewer 1’s concerns. He even placed numerous comments in the text of the paper. Mike explained to Paul that the remaining issues needed to be addressed or “otherwise the paper will remain of limited value to a much broader audience. Luckily, I have a solution that if properly implemented in the paper, will address these concerns.”

Paul found Mike’s suggestions to be “very specific and, as such very helpful.” Paul submitted the revision 13 days later on April 22 and it was accepted on May 13, 2010. In the acceptance letter, I wrote that I thought it would be cited frequently. To date, it is Paul’s second most cited work with over 2,000 citations. Even better, it is now being recognized for its impact.

In this paper, Paul has clearly made theoretical contributions related to understanding several important phenomena, including attributions of agency and the construction of affordances. But his award-winning paper wasn’t written as a “pure theory” paper. In his interview in the *AIS Insider* about his reflections on this article (available at <https://misq.umn.edu/awards-paper-year>), Paul noted that it had been rejected as a conceptual paper after two or three rounds at *Organization Science*. This is, no doubt, why it took 19 pages to get to the case study in his first-round manuscript. He found that it really is difficult to write a good “pure theory” paper. When Bob Zmud was EIC of *MISQ*, he explained why this is so: “They stand solely on their authors’ understanding of a phenomenon, understanding of relevant theoretical perspective for embracing this phenomenon, and writing abilities; and there is no data or analysis on which to fall back!” (Zmud, 1998, pg. xxix). Paul seemed to concur in his interview that he liked using data to generate ideas.

So, what makes a good review process? It is grounded in the actions of the author(s) and the review team. In Paul’s case, the review team provided him with timely and insightful guidance. The editors and reviewers pointed out concepts and theoretical distinctions that were unclear, surfaced inconsistent conclusions, suggested relevant readings, and advised on how to structure the paper. Paul responded quickly, sincerely, and fully to the comments and suggestions of the review team. In the few cases where he disagreed with a point, he explained why, and his explanation was respected. Of course, not all good review processes end with a publication. In this case, Paul provided us with an insightful manuscript for the review team to help with.

There are skills that a senior editor can employ to make a review process successful in addition to those related to picking the review team and keeping the process running smoothly. One such skill is knowing when to halt the review process. I was surprised when I realized, while writing this editorial, how long the review time had been for this “fast-tracked” paper with a process that had moved along so smoothly—1 year and 8 months. Actually, it could have been accepted much earlier, but Mike, Reviewer 1,

and I thought it important to make this paper live up to what we perceived was its potential. Although speed is very important in the review process, quality trumps speed as an attribute of the review process. Of course, the challenge is to know when to halt the review process. For example, Reviewer 2 would have been content to stop after the second round. It would have been a good paper, but not as nuanced as the final version.

Another important skill in an editor's toolbox is the ability to help authors develop their theoretical contributions. Lynne Markus in her editorial commentary on last year's *MISQ* Impact Award article, a Theory and Review paper, said editing the article was hard work. What she didn't mention is that it also takes another skill that she aptly demonstrated: helping the authors develop their theoretical contributions in their own voice. It is my experience that reviewers either think there are too many constructs and relationships that are poorly defined or too few to make the theory compelling. Also, reviewers tend to apply their own peculiar voices/understandings, which are difficult for an author to grasp unless buffered by a knowledgeable SE. It takes some editorial skill to navigate such (often conflicting) reviewer perspectives/concerns and to help the author dig deeper to fully understand the nuances of theoretical assumptions and paradigms. Editorial skills of this nature are especially important in our discipline because we, unlike the management discipline, don't have a journal specifically devoted to theory. Further, only *MISQ*, the *Journal of Association for Information Systems*, and *European Journal of Information Systems* in the AIS Senior Scholar List have a department specifically designed to publish pure theory papers. It is worth noting that both last year's and this year's Impact Award winner have made strong *theoretical* contributions to our discipline and beyond. May this trend continue!

References

- Anderson, C., & Robey, D. (2017). Affordance potency: Explaining the actualization of technology affordances. *Information and Organization, 27*(2), 100-115.
- Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science, 1*(2), 164-180.
- Barad, K. (2003). Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society, 28*(3), 801-831.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Bucher, T., & Helmond, A. (2018). The affordances of social media platforms. *The SAGE Handbook of Social Media, 1*, 233-253.
- Califf, C. B. (2022). Stressing affordances: Towards an appraisal theory of technostress through a case study of hospital nurses' use of electronic medical record systems. *Information and Organization, 32*(4), Article 100431.
- Cooren, F. (2020). Beyond entanglement: (Socio-) materiality and organization studies. *Organization Theory, 1*(3), <https://doi.org/10.1177/2631787720954444>.
- Emirbayer, M., & Mische, A. (1998). What is agency? *American Journal of Sociology, 103*(4), 962-1023.
- Evans, S. K., Pearce, K. E., Vitak, J., & Treem, J. W. (2017). Explicating affordances: A conceptual framework for understanding affordances in communication research. *Journal of Computer-Mediated Communication, 22*(1), 35-52.
- Fox, J., & McEwan, B. (2017). Distinguishing technologies for social interaction: The perceived social affordances of communication channels scale. *Communication Monographs, 84*(3), 298-318.
- Geenen, J. (2017). Show and (sometimes) tell: Identity construction and the affordances of video-conferencing. *Multimodal Communication, 6*(1), 1-18.
- Gibbs, J. L., Kirkwood, G. L., Fang, C., & Wilkenfeld, J. N. (2021). Negotiating agency and control: Theorizing human-machine communication from a structural perspective. *Human-Machine Communication, 2*, 153-171.
- Gibson, J. J. (1986). *The ecological approach to visual perception*. Lawrence Erlbaum Associates.
- Giddens, A. (1976). *New rules of sociological method*. Hutchinson.
- Gimpel, H., Graf-Seyfried, V., Laubacher, R., & Meindl, O. (2023). Towards artificial intelligence augmenting facilitation: AI affordances in macro-task crowdsourcing. *Group Decision and Negotiation, 32*(1), 75-124.
- Hutchby, I. (2001). Technologies, texts and affordances. *Sociology, 35*(2), 441-456.
- Jeon, J. (2021). Exploring AI chatbot affordances in the EFL classroom: Young learners' experiences and perspectives. *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2021.2021241>.
- Kautz, K., & Jensen, T. B. (2013). Sociomateriality at the royal court of IS: A jester's monologue. *Information and Organization, 23*(1), 15-27.
- Latour, B. (2007). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.
- Latour, B., & Woolgar, S. (1979). *Laboratory life: The construction of scientific facts*. Princeton University Press.
- Leonardi, P. M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly, 35*(1), 147-167. <https://doi.org/10.2307/23043493>
- Leonardi, P. M. (2013a). Theoretical foundations for the study of sociomateriality. *Information and Organization, 23*(2), 59-76. <https://doi.org/10.1016/j.infoandorg.2013.02.002>

- Leonardi, P. M. (2013b). When does technology use enable network change in organizations? A comparative study of feature use and shared affordances. *MIS Quarterly*, 37(3), 749-775.
- Liang, S. Z., Chang, C. M., & Huang, C. H. (2023). Impact of AI affordance on AI adoption: The mediating role of self-monitoring and uniqueness. *International Journal of Human-Computer Interaction*, 1-12.
- Majchrzak, A., Faraj, S., Kane, G. C., & Azad, B. (2013). The contradictory influence of social media affordances on online communal knowledge sharing. *Journal of Computer-Mediated Communication*, 19(1), 38-55.
- Markus, M. L. (2022). Senior editor reflections (p. xxix). In H. Xu. & T. Dinev, Reflections on the 2021 Impact Award: Why privacy still matters. *MIS Quarterly*, 46(4), xx-xxxii.
- Murray, A., Rhymer, J. E. N., & Sirmon, D. G. (2021). Humans and technology: Forms of conjoined agency in organizations. *Academy of Management Review*, 46(3), 552-571.
- Norman, D. A. (1990). *The design of everyday things*. Doubleday.
- Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies*, 28(9), 1435-1448.
- Orlikowski, W. J. (2010). The sociomateriality of organisational life: considering technology in management research. *Cambridge Journal of Economics*, 34(1), 125-141.
- Pickering, A. (1995). *The mangle of practice: Time, agency, and science*. University of Chicago Press.
- Pickering, A. (2001). Practice and posthumanism: Social theory and a history of agency. In T. R. Schatzki, K. Knorr-Cetina & E. von Savigny and E. von Savigny (Eds.), *The Practice Turn in Social Theory* (pp. 163-174). Routledge.
- Raisch, S., & Krakowski, S. (2021). Artificial intelligence and management: The automation–augmentation paradox. *Academy of Management Review*, 46(1), 192-210.
- Rice, R. E., Evans, S. K., Pearce, K. E., Sivunen, A., Vitak, J., & Treem, J. W. (2017). Organizational media affordances: Operationalization and associations with media use. *Journal of Communication*, 67(1), 106-130.
- Scarlett, A., & Zeilinger, M. (2019). Rethinking affordance. *Media Theory*, 3(1), 1-48.
- Scott, S. V., & Orlikowski, W. J. (2013). Sociomateriality—Taking the wrong turning? A response to Mutch. *Information and Organization*, 23(2), 77-80.
- Smith, H.J., Dinev, T., Xu, H. (2011). Information privacy research: An interdisciplinary review. *MIS Quarterly* 35(4), 989-1015. <https://doi.org/10.2307/41409970>
- Sundar, S. S. (2020). Rise of machine agency: A framework for studying the psychology of human-AI interaction (HAI). *Journal of Computer-Mediated Communication*, 25(1), 74-88.
- Treem, J. W., & Leonardi, P. M. (2012). Social media use in organizations: Exploring the affordances of visibility, editability, persistence, and association. *Communication Yearbook*, 36, 143-189.
- Trocin, C., Hovland, I. V., Mikalef, P., & Dremel, C. (2021). How Artificial Intelligence affords digital innovation: A cross-case analysis of Scandinavian companies. *Technological Forecasting and Social Change*, 173, Article 121081.
- Tyre, M. J., & Orlikowski, W. J. (1994). Windows of opportunity: Temporal patterns of technological adaptation in organizations. *Organization Science*, 5(1), 98-118.
- Vidolov, S. (2022). Uncovering the affective affordances of videoconference technologies. *Information Technology & People*, 35(6), 1782-1803.
- Volkoff, O., & Strong, D. M. (2017). Affordance theory and how to use it in IS research. In R. Galliers & M.-K. Stein (Eds.), *The Routledge companion to management information systems* (pp. 232-245). Routledge
- Zhan, E. S., Molina, M. D., Rheu, M., & Peng, W. (in press). What is there to fear? Understanding multi-dimensional fear of AI from a technological affordance perspective. *International Journal of Human-Computer Interaction*. <https://doi.org/10.1080/10447318.2023.2261731>.²

² *Erratum*: This article has been corrected with minor changes to the title and headers/footers. These changes do not impact the academic content of the article. This error was corrected on December 1, 2023.