

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2012 Proceedings

Proceedings

Sociomateriality as Radical Ontology: Insights for ICTs from the Phenomenology of Sport

Neil Ramiller

School of Business Administration, Portland State University, Portland, OR, United States., neilr@sba.pdx.edu

Follow this and additional works at: <http://aisel.aisnet.org/amcis2012>

Recommended Citation

Ramiller, Neil, "Sociomateriality as Radical Ontology: Insights for ICTs from the Phenomenology of Sport" (2012). *AMCIS 2012 Proceedings*. 8.

<http://aisel.aisnet.org/amcis2012/proceedings/PerspectivesIS/8>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2012 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Sociomateriality as Radical Ontology: Insights for ICTs from the Phenomenology of Sport

Neil C. Ramiller
School of Business Administration
Portland State University
neilr@sba.pdx.edu

ABSTRACT

The concept of “sociomateriality” challenges assumed distinctions between the human and social, on the one hand, and the material and technological, on the other. Arguments have been made for adopting a radical relational ontology that sees the social and material as dynamically emergent within the context of practice. However, it remains unclear what is truly superior about the sociomaterial approach, in contrast to rich analyses of complex interactions between human actors and artifacts, conventionally conceived. This essay suggests a modest step forward that brings cognition more clearly into the picture. Although those championing the sociomaterial position have good reason to tread carefully around cognition, a conceptualization that embraces the materiality of cognition, itself, can actually provide a more complete grounding for the desired ontological shift, and help point the way toward an improved understanding of such central concerns as competence and resistance.

Keywords

Sociomateriality, cognition, phenomenology, ontology.

INTRODUCTION

Galileo could not be a Galileo without a telescope.¹

The concept of “sociomateriality” is enjoying a great deal of currency in our scholarly community (Leonardi and Barley, 2008, 2010; Orlikowski, 2007, 2009; Orlikowski and Scott, 2008). The work in this area takes a stand for a more or less radical ontology that challenges the conventional distinction between the human and social, on the one hand, and the material and technological, on the other. The central question in the sociomateriality discourse is whether what we normally recognize to be the human and the technological are independent and predetermined, or emerge dynamically from practice. The sociomaterial position holds that (Orlikowski and Scott, 2008: 456):

... entities (whether humans or technologies) have no inherent properties, but acquire form, attributes, and capabilities through their interpenetration. This is a relational ontology that presumes the social and the material are inherently inseparable.

In short, we are not fully realized as humans without engagement with technology of some kind. This parallels how the linguists have long observed that our humanity depends for its full expression on the possession and use of language. Orlikowski and Scott comment on the ubiquity and pervasiveness of the human-technology bond in the following way (2008: 455):

As a thought experiment, consider doing anything in the world... that does not in some way or another entail material means (e.g., bodies, clothes, food, spectacles, buildings, classrooms, devices, water pipes, paper, telephones, email, etc.). Furthermore, these material means are not so much tools to be used to accomplish some tasks, but they are constitutive of both activities and identities.

Assertions along these lines seem valid on their face. On the other hand, stronger claims at the level of ontology suggesting that the social and material are *inseparable* can prompt reasonable skepticism. When it comes to explaining human, social, and organizational engagement with technology, what is the advantage in problematizing the familiar boundaries between the

¹ See Ihde, 2003: 134.

human and the technological, as opposed to creating accounts based on complex interactions between the two? Empirical illustrations of sociomaterial analysis have so far tended to disappoint, in two ways.

First, these treatments resort to a vocabulary that divides humans from the material, the social from the technological. These conventional terms of discussion are said to entail “analytical” distinctions only (Nyberg, 2009: 1181; Orlikowski & Scott, 2008: 456; Styhre, 2010: 65), but in practice reify the very Cartesian dualisms that sociomaterial thinking means to overcome. In short, the language in use continues to fall short of the radical conceptual promise, and so sociomaterial analyses tend to regress to an interactionist stance (Orlikowski and Scott, 2008: 468):

Part of the difficulty in discussing this perspective is that our language makes it difficult to express indissolubility. We are used to dividing, separating, and distinguishing. Thus, even terms such as ‘mutual constitution’, ‘entanglement’, ‘assemblage’, and ‘relationality’ allude to separateness, even as they try to move beyond it.

Second, it remains unclear what is truly superior about a sociomaterial approach in contrast to analyses based on “mutually dependent ensembles” (Orlikowski and Scott, 2008) that deal in a rich way with the complex interactions between human actors and materials, artifacts, and spaces. Repeatedly intoning the argot of “entanglement,” “mangle,” “assemblage,” “imbrication,” “inextricability,” and so on, in juxtaposing the human and the material, does not by itself make the case. And so when Orlikowski and Scott conclude that predecessor research ontologies “entail accounts of impacts or interactions of the social and the technical. As a result, we lose the possibilities of seeing the technical and social as inextricably fused” (2008: 463), we are still left uncertain why adopting such a view is of any particular advantage. In fact, the statement appears to argue that this way of seeing is now itself the end goal, and not a means to other ends.

Is it possible to demonstrate more convincingly the scholarly advantages of sociomateriality’s radical ontology? In this essay, I will suggest a modest step forward, which brings cognition back into the picture. Although the sociomaterialists have good reason to tread carefully around cognition, I will argue that cognition, properly reconceptualized, can actually provide a more complete grounding for the sought-after ontological shift, and one that will help point the way toward an improved understanding of central phenomena of interest in our discipline, including competence and resistance.

PRACTICE AND KNOWLEDGE

Sociomateriality calls for replacing interaction with practice (Feldman and Orlikowski, 2001; Nyberg, 2009), and it also promotes a shift in focus from human knowledge to practice (Nicolini, 2010). It is within the context of real occasions of practice, then, that distinguishable actors take their form and can be said to “know” what they know.

If the way forward is through cognition, we must deal with the fact that accepting a *knowing subject* poses a problem. Will its resuscitation reinvigorate the subject/object distinction which sociomateriality is struggling to overcome? To the contrary, I will argue that *how people know* in practice, and even how they creatively imagine the possibilities for practice, are enframed by a grammar of materiality. Knowing is inherently material, a fact that calls on us to entertain a *psycho-materiality* of practice as a necessary complement to sociomateriality.

A PRACTICAL DIGRESSION

*We are the beings that we are through our entanglement with things –
we are thoroughly hybrid beings, cyborgs through and through.*²

It is a defining characteristic of humans that we have always lived, at least in part, in a world of our own making, which reciprocally shapes us. Certain ICT scholars interested in sociomateriality have acknowledged this broader reality. For example, Introna and Hayes draw on Latour in making the point (2011: 109):

For Latour... any talk of humans and non-humans in ways that would suggest that they are separately already what they are – as ‘social’ and ‘technical’ – and then we ‘add’ them together to ‘make’ a sociomaterial network is simply wrong. Latour ... suggests that both humans and non-humans share a common constitutive history... More than that, they do not merely share a common history; they are each other’s common history.

Some years earlier Ramiller commented at length on this broader relationality between humans and their technologies (Ramiller, 2001: 19):

² See Introna, 2009: 26.

Consider a very old technology – the stone hand-ax. Its contours reflect ancient observations and judgments and choices. The knowledge of how to make one and the knowledge of how to use one were captured in memory and reproduced both by practice and by communication. When taken in a sufficiently broad frame of reference, then, the stone ax was already a “complex” technology. Even while its design encoded the intelligence of its makers, the stone ax did not “know” enough, by itself, to accomplish meaningful work. It needed a person, informed by the appropriate culture, to complete it and give it purpose – to make it truly an ax, and not just an oddly shaped rock.

At the same time, the stone ax did not provide a mere technological amplification of its user’s existing, biologically-based capabilities. When this tool arrived on the scene and in our hands, it literally changed our minds. We became, in that very instance, “cyborgs.”

It is an incidental and largely uninteresting point that the stone ax was in our hands and not physiologically embedded within our skin. The stone ax was inside us in a much more profound way: As it sat in our hands, so too it simultaneously occupied our minds. It changed how we think about our capabilities, about how we might make a living, how we might defend ourselves, how we might express ourselves. It changed our very concept of ourselves.

In short, to be human is to be technological, and technology is by its inherent nature human. A complete account of this mutuality must consider the materiality of knowledge. Doing so will carry us far beyond the simplistic conceptualization that has dominated inquiry in our field, to wit, that “people use tools to do things.”

Given these broad foundations, we can begin productively with how humans’ engagement with information technology is like our engagement in other material practices. Accordingly, in developing my argument about the psychomateriality of practice I will entertain examples from a domain rather far removed from organizational information systems, specifically the world of sports. The point in doing so is to put some distance between ourselves and our sticky ontological commitments as professional scholars in our own field, and to see matters of practice with fresh eyes.

“Entanglement” in the Practice of Sports

Contemporary discourse on the practice of sport yields two broadly opposing accounts of the relationship between the athlete and the materiality associated with practice. In both cases, the materiality most often of concern is the athlete’s own body. In one account, the athlete treats his/her body like an object, instrument, tool, or machine, and can sometimes suffer deep alienation and serious self-inflicted damage as a result (Messner, 1992; Stratton, 1999). In the other account, the athlete and the body assume a unity, dissolving the Cartesian mind/body divide and accomplishing higher levels of self-realization.

The concept of the body as a tool or machine has deep roots in Western civilization. Descartes first popularized the idea in the mid 17th century, and it became prevalent with the advent of the Industrial Revolution (Stratton, 1999: 158; Seltzer, 1992). The conceptual separation of “a mindful self independent of the body and nature at large... is essential to the ‘view from nowhere’ characteristic of a post-Enlightenment approach to knowledge” (Lock, 1993: 138). Moreover, the body came to be seen not only as a “machine of production” but also “a machinic product,” that is, something that could be produced itself through machine-like discipline and techniques (Stratton, 1999: 159; also see Seltzer, 1992: 12). Such a view was readily taken up in 20th Century sporting disciplines.

On the other hand, alternative accounts of sport depict participants becoming, through processes of intensive training, more fully infused and embedded in their own physicality. Moreover, it is said that the practice of sport can have positive effects beyond the competitive arena, transforming the athlete’s “kinaesthetic style, social interactions, and perceptions outside the game” (Downey, 2010: S23). The fusion of physical and mental self becomes in effect an *identity project* that goes beyond the production of bodily attributes (Downey, 2005: 202):

A crucial dimension of identity may be shaped by physical discipline, offering a path – hard and long, true, but reaching profound dimensions of daily life and experience – to change a person’s perceptions and sense of self.

The contrast in athletic practice between mind/body alienation and bodily engagement can help point the way to a deeper understanding of sociomateriality in a large range of practices beyond sports, especially when the engagement in question is extended to a consideration of the athlete’s relationship with his/her other tools (balls, boxing gloves, skateboards, soccer pitches, and so on). We will see that whether alienation or engagement prevails is a contingent matter, but one in which the actor’s own agency is central. This will suggest, in turn, that sociomaterial “entanglement,” while integral to human existence, is in any particular area of practice not ontologically given but a nascent possibility that must be realized in part as a cognitive accomplishment.

Wacquant, in his ethnographic study of a boxing gym in Chicago, documents entanglement, or the dissolution of the mind/body divide, as just such an accomplishment (Wacquant, 2004: 95-96; emphasis in original):

To learn how to box is to imperceptibly modify one's bodily schema, one's relation to one's body and to the uses one usually puts it to, so as to internalize a set of dispositions that are inseparably mental and physical and that, in the long run, turn the body into a virtual punching machine, but *an intelligent and creative machine capable of self-regulation* while innovating within a fixed and relatively restricted panoply of moves as an instantaneous function of the actions of the opponent in time. The mutual imbrications of corporeal dispositions and mental dispositions reaches such a degree that even willpower, morale, determination, concentration, and the control of one's emotions change into so many reflexes inscribed within the organism. In the accomplished boxer, the mental becomes part of the physical and vice versa; body and mind function in total symbiosis.

The potential symbiosis of mind and body lies in the basic "wiring" of human cognition. The philosopher Mark Johnson has pointed to the constructive dependence of human cognition on orientations provided by the physical structures of the human body. "Image schemata" are inherently framed with reference to our own bodies. This leads to the "fundamental moral: any adequate account of meaning and rationality must give a central place to embodied and imaginative structures of understanding by which we grasp our world" (Johnson, 1997: xiii). He concludes that we must recognize "how *the body is in the mind* – how it is possible, and necessary, after all, for abstract meanings, and for reason and imagination, to have a bodily basis" (Johnson, 1997: xvi; emphasis added.)

Intensive field investigations of sporting disciplines, such as Wacquant's (2004) study of boxing and Downey's (2005) study of the Brazilian martial art of capoeira, affirm the physical foundations of learning and knowledge (Downey, 2010: S35):

The study of sports, dance, musical apprenticeship, and similar physical practices makes clear that skill is not simply 'embodiment' of 'knowledge,' but rather physical, neurological, perceptual, and behavioural change of the individual subject so that he or she can accomplish tasks that, prior to enskilment, were impossible.

This more thorough-going grasp of embodiment "has as a principal characteristic the collapse of dualities between mind and body, subject and object" (Csordas, 1990: 7). It follows, then, echoing Johnson, that "... our bodies are not objects to us. Quite the contrary, they are an integral part of the perceiving subject" (Csordas, 1990: 326).

It is important to recognize that this collapse in dualities is not simply a matter of experiencing an insight but instead an accomplishment that arises in hard work and discipline. The dualities of mind and body, subject and object, in some sense constitute the starting point (Downey, 2005: 27):

... learning any skill often means treating one's own body as if it were an object to be manipulated. For instance, the leg that a moment ago carried a person effortlessly around the room suddenly must be positioned consciously: where the foot is placed, how deeply the knee is bent, whether the hip is twisting, all demand attention. Learning the skill means that this explicit awareness is gradually effaced, and the practitioner becomes *less* focused on the body.

However, such an "object-ive" perspective is not a fundamental way of seeing but simply a subordinate step in the development of skills that become elements in a repertoire to be deployed creatively, appropriately, and improvisationally. Downey, in describing his struggle to learn a capoeira handstand move, remarks (2005: 48):

When my instructor studied me, he recognized that I could not succeed until I changed my perception of the technique. His advice did not treat my body as an object. Instead, he tried to shift my corporeal understanding of my movements. He realized from watching me that I did not share his perceptions... good coaching is a form of applied poetic phenomenology: an analysis of how things are experienced that may facilitate a shift in an athlete's perceptions.

In the unity of mind and body that such disciplines promote, "What is 'learned by body' is not something that one has, like knowledge that can be brandished, but something that one is" (Bourdieu, 1990: 73; quoted in Downey, 2010: S26). Accordingly, "we are our bodies, and ... our lived experience of this body denies the detachment of subject from object, mind from body" (Reynolds, 2010). The engagement in training, then, "offers a path to explore other ways of being-in-the-world" (Downey, 2010: 205).

The Ontological Embrace of Tools and Spaces

*Man does not end with the limits of his body or the area comprising his immediate activity. Rather is the range of the person constituted by the sum of effects emanating from him temporally and spatially.*³

³ Georg Simmel, quoted in Borden (2005: 97).

Downey's reference to "being-in-the-world" hints that our inquiry into heightened engagement should not end with the dissolving of *body/mind*. Simply suspending the mind/body distinction still leaves conventional thinking to locate the individual fully within the space occupied by his/her body. On the other hand, is this understanding adequate from the perspective of the athlete's experience?

Consider the material tools of practice – boxing gloves, balls, shoes, skateboards, and so on. Consider also the space that the sporting activity occupies and appropriates – the gym and boxing ring, the football pitch, the skateboarders' sidewalks, handrails, and curbs. Any given sport calls for an engagement with some particular materiality of the environment that is germane to that sport. There is, too, a particular "sociality" to the sport, in terms of how its structures define the meaningful interactions with other (human) actors. Does the practice of sport extend the self into this larger environment of engagement?

Johnson, in his argument for "the body in the mind," points in this direction. He writes (1987: xxxviii) "as minds we have bodies connected to the natural world, such that our consciousness and rationality are tied to our bodily orientations and interactions in and with our environment." Merleau-Ponty is more explicit on this point (1963: 168-169; emphases added):

For the player in action the football field is not an 'object'... The field itself is *not given to him*, but present as the immanent term of his practical intentions; the player *becomes one with it* and feels the direction of the 'goal,' for example, just as immediately as the vertical and the horizontal planes of his own body. It would not be sufficient to say that consciousness inhabits this milieu. At this moment *consciousness is nothing other than the dialectic of milieu and action*. Each maneuver undertaken by the player modifies the character of the field and establishes in it new lines of force in which the action in turn unfolds and is accomplished, again altering the phenomenal field.

This extensibility of the self was part and parcel of Merleau-Ponty's program to unwind the subject/object dualism of Western philosophical thought. For Merleau-Ponty, "... the constitution of the body as an 'object' is... a pivotal moment in the construction of the idea of an objective world which exists 'out there'... Once this concept of the body is problematized, so too, according to Merleau-Ponty, is the whole idea of an outside world that is entirely distinguishable from the thinking subject" (Reynolds, 2010). (See also Ihde on "extended embodiment" (2003: 135).)

Training in a sport creates a specific set of possibilities for the extension of the self through engagement with and, indeed, production of the environment (Downey, 2005: 32):

A person's possibilities for action help generate the primary qualities of things in the sensed world. ... The ways we can interact with the lived world color it even when we don't actually act. Tools offer possibilities to those who know how to use them, printed texts for those who can read them; even when we choose not to take advantage of these options, they define objects for us in an immediate sense.

In capoeira, for example, the instrumental music of the *roda* (the arena) creates an acoustic space for the extension of self into the *roda*: "... good players feel music in their bodies and incorporate it into their movements" (Downey, 2005: 87). In skateboarding we can see a similar example of this extensibility of self into the primary tool and beyond, to the architectural features of the occupied space (Borden, 2005: 100):

... the skateboard is less a piece of equipment and takes on more the character of a prosthetic device, an extension of the body as a kind of fifth limb, absorbed into and diffused inside the body-terrain encounter. [This entails] a projection of the self out into the board and space beyond it.

Accordingly, even "architecture ceases to be purely the Other, and is instead absorbed into the body-board-terrain relation. The spaces created are thus part of the skater as well as of the terrain" (Borden, 2005: 104; see also Thrift, 2004).

In conclusion, if we agree with Johnson that the body is in the mind, we can now say much more, and that is that the world, too, is in the mind. Each sport provides particular opportunities for the athlete to chart materials, space, and time, and make them his/her own.

TOWARD A PSYCHO-MATERIALITY OF TECHNOLOGICAL PRACTICES

Contemplating the achievement of what we ordinarily too glibly call "skill" in sports, we see that sociomaterial ontology should be viewed as an accomplishment of the subjects we study. Material "entanglement" may in general be integral to the human condition, but its realization in any particular setting is not a foregone conclusion. For example, as a unity of mind, body, technology, and space does not bless the practice of the novice in a sporting discipline, so too does the knowledge worker engaged with a new information technology not enjoy a seamless incorporation of that tool into the flow of action in the practices of work.

Reasoning in this way, we are moving in the opposite direction from that of such scholars as Nyberg (2009), Barad (2003), and Suchman (2007), who posit an undifferentiated mind/matter field from which the boundaries between human and technology are emergent through practice (Suchman, 2007: 283):

Beginning with the premise that discrete units of analysis are not given but made, we need to ask how any object of analysis – human or nonhuman or combination of the two – is called out as separate from the more extended networks of which it is a part.

In this view, practice becomes the starting point for analysis (Nyberg, 2009: 1193):

There are not predetermined, unchanging agents that can cause something to happen: agencies are dependent on their mutual inextricability. The starting point for this type of investigation is thus not the actors that produce practices. On the contrary, it is the intra-actions within practices that produce actors and categories.

When people struggle with technology, for example, we witness the “assembly of actors... in a state beyond the human and non-human mode of ‘interaction’ ... cut into pieces” (Nyberg, 2009: 1193). Such “cuts” are emergent and situation-specific.

One effect of a practice-centered approach is a tendency to view social situations as prone to instability. Given the concern for dynamism and emergence, we hear that sociomaterial assemblages are “[f]leeting, fragile, and fragmented, entailing uncertainty and risk and producing intended and unintended outcomes” (Orlikowski, 2007: 1445). (See also Pickering (2003: 97), who calls the unity of assemblages “temporary, fragile.”)

Reflecting on the athletes we have considered here, the perspective I have just characterized would render puzzling the fact that “cuts” actually represent a starting point for novices. Also, the relative *stability* and reproducibility in masters’ performances would seem contrary to the fragility being attributed to practice. Finally, the creation of new practices would seem to depend on some *deus ex machina* for their realization.

I believe that it is possible for these two seemingly contrary perspectives to meet in the middle by bringing cognition back into the picture, but specifically the *materialized* view of cognition we have entertained here, shaped by extensions of the self into the body, others, tools and things, spaces, and time. New designs emerge and existing practices are reproduced with some reliability because *the ontological unity that is the core premise of sociomaterial thinking is in fact both a condition and an accomplishment of the human actors*. Knowing subjects do play essential, though not independent, roles in producing and reproducing patterns of order. However, grasping *how* they know can keep us from backsliding into a world of mind and matter, subject and object, in which our knowers enjoy the impossibly heroic and independent stature of Descartes.

Our human actor, whose boundaries in practice embrace the body and other tools of work, is not required to be “a rational, fully conscious and fully formed knowing ‘subject’” (Nicolini, 2010: 4). Nor is it necessary “to argue that knowledge, like a substance, is something that participants have, use, employ, or consume” (p. 9). We can readily agree that “the knower and what is known – the knowing subject and the knowing object – emerge together in practice” (p. 3) and that “knowing is a collective and heterogeneous endeavor” (p. 16). Nevertheless, we can also provide accounts of relative competence and even mastery, based on the unification of sportsman, craftsman, and knowledge worker with tools and materials. We can also differentiate the novice and, it should be added, the recalcitrant, the resister, and the rebel.⁴

By acknowledging psycho-materiality the scholar repopulates the post-humanist landscape of practice with human actors, where, faithful to the “rejection of dualisms” (Feldman and Orlikowski, 2011: 3), the humans in their own right are reconceptualized as heterogeneous. Thus, alongside Orlikowski’s core interest in “ontologies of technology” (2009: 127), we can undertake a reinvigorated ontology of humanity. So it must be, in fact, given the ambition of sociomateriality to dissolve the conventional boundary between the human and the material. In time we will perhaps see that the post-human excursion into a better understanding of technology is merely a way station on a route that leads back to a fuller appreciation of what it means to be, and become, human.

REFERENCES

1. 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.
2. Borden, Iain. (2005) *Skateboarding, Space and the City*, Berg Publishers, Oxford.

⁴ In psychomateriality there is, I suspect, an opportunity to recast our field’s long-running inquiry into the phenomenon of user resistance.

3. Bourdieu, Pierre. (1990) *The Logic of Practice*, R. Nice (trans.), Stanford University Press, Stanford, CA.
4. Csordas, Thomas J. (1990) Embodiment as a paradigm for anthropology, *Ethos*, 18, 1, 5-47.
5. Downey, Greg. (2005) *Learning Capoeira: Lessons in Cunning from an Afro-Brazilian Art*, Oxford University Press, New York.
6. Downey, Greg. (2010) 'Practice without theory': A neuroanthropological perspective on embodied learning, *Journal of the Royal Anthropological Institute*, Supplement 1, Volume 16, S22-S40.
7. Feldman, M.S. and Orlikowski, W.J. (2011) Theorizing practice and practicing theory, *Organization Science*, Articles in Advance, 1-14.
8. Ihde, D. (2003) If phenomenology is an albatross, is post-phenomenology possible?, in *Chasing Technoscience: Matrix for Materiality*, D. Ihde and E. Selinger (eds.), Indiana University Press, Bloomington & Indianapolis, 131-144.
9. Introna, L.D. (2009) Ethics and the speaking of things, *Theory, Culture & Society*, 26, 4, 25-46.
10. Introna, L.D. and Hayes, N. (2011) On sociomaterial imbrications: What plagiarism detection systems reveal and why it matters, *Information and Organization*, 21, 107-122.
11. Johnson, Mark. (1987) *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*, University of Chicago Press, Chicago.
12. Leonardi, P.M. and Barley, S.R. (2008) Materiality and change: Challenges to building better theory about technology and organizing, *Information and Organization*, 18, 159-176.
13. Leonardi, P.M. and Barley, S.R. (2010) What's under construction here? Social action, materiality, and power in constructivist studies of technology and organizing, *Academy of Management Annals*, 4, 1, 1-51.
14. Lock, M. (1993) Anthropology and epistemologies of bodily practice and knowledge, *Annual Review of Anthropology*, 22, 133-155.
15. Merleau-Ponty, M. (1963 [1942]) *The Structure of Behavior*, A.L. Fisher (trans.), Beacon Press, Boston.
16. Messner, M. (1992) *Power at Play: Sports and the Problem of Masculinity*, Beacon, Boston.
17. Nicolini, D. (2010) Practice as the site of knowing: Insights from the field of telemedicine, *Organization Science*, Articles in Advance, 1-19.
18. Nyberg, D. (2009) Computers, customer service operatives and cyborgs: Intra-actions in call centres, *Organization Studies*, 30, 11, 1181-1199.
19. Orlikowski, W.J. (2007) Sociomaterial practices: Exploring technology at work, *Organization Studies*, 28, 9, 1435-1448.
20. Orlikowski, W.J. (2009) The sociomateriality of organisational life: considering technology in management research, *Cambridge Journal of Economics*, 34, 125-141.
21. Orlikowski, W.J. and Scott, S.V. (2008) Sociomateriality: Challenging the separation of technology, work and organization, *The Academy of Management Annals*, 2, 1, 433-474.
22. Pickering, A. (2003) On becoming: Imagination, metaphysics, and the mangle, in *Chasing Technoscience: Matrix for Materiality*, D. Ihde and E. Selinger (eds.), Indiana University Press, Bloomington & Indianapolis, 96-116.
23. Ramiller, N.C. (2001) Bedtime reading for technologists: Elaborations on a theme of Mitroff's, *Journal of Information Technology Theory & Applications*, 3, 3, 8-20.
24. Reynolds, J. (2010) "Maurice Merleau-Ponty (1908-1961)", *Internet Encyclopedia of Philosophy*, <http://www.iep.utm.edu>.
25. Seltzer, M. (1992) *Bodies and Machines*, Routledge, New York.
26. Stratton, J. (1999) Building a better body: Male bodybuilding, spectacle, and consumption, in *SportCult*, R. Martin and T. Miller (eds.), University of Minnesota Press, Minneapolis, 151-172.
27. Styhre, A. (2010) Organizing technologies of vision: Making the invisible visible in media-laden observations, *Information and Organization*, 20, 64-78.
28. Suchman, L. (2007) *Human-machine Reconfigurations: Plans and Situated Actions*, 2nd ed., Cambridge University Press, Cambridge.

29. Thrift, N. (2004) Remembering the technological unconscious by foregrounding knowledges of position, *Environment and Planning D: Society and Space*, 22, 175-190.
30. Wacquant, L. (2004) *Body and Soul: Notebooks of an Apprentice Boxer*, Oxford University Press, Oxford.