



Essai

Sociomaterial Practices: Exploring Technology at Work

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Abstract

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In this essay, I begin with the premise that everyday organizing is inextricably bound up with materiality and contend that this relationship is inadequately reflected in organizational studies that tend to ignore it, take it for granted, or treat it as a special case. The result is an understanding of organizing and its conditions and consequences that is necessarily limited. I then argue for an alternative approach, one that posits the constitutive entanglement of the social and the material in everyday life. I draw on some empirical examples to help ground and illustrate this approach in practice and conclude by suggesting that a reconfiguration of our conventional assumptions and considerations of materiality will help us more effectively recognize and understand the multiple, emergent, and shifting sociomaterial assemblages entailed in contemporary organizing.

Keywords: materiality, organizational research, sociomateriality, technology

Over the years, the field of organization studies has generated important and valuable insights into the cultural, institutional, and situated aspects of organizing. However, I want to argue that these insights are limited in large part because the field has traditionally overlooked the ways in which organizing is bound up with the material forms and spaces through which humans act and interact. And to the extent that such neglect continues, our understanding of organizational life and its consequences will remain necessarily restricted.

My concern in this paper is two fold: first, to argue that our primary ways of dealing with materiality in organizational research are conceptually problematic; and second, to propose an alternative approach that posits materiality as constitutive of everyday life (Barad 2003; Latour 2005; Suchman 2007). In developing the outline and implications of this alternative approach, I will draw on a few empirical examples to ground and illustrate the ideas. Developing new ways of dealing with materiality in organizational research is critical if we are to understand contemporary forms of organizing that are increasingly constituted by multiple, emergent, shifting, and interdependent technologies.

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Existing Views of Materiality in Organization Research

Viewed broadly, two prominent ways of dealing with materiality are evident in the literature on organization research. The first way largely disregards, down-plays, or takes for granted the materiality of organizations. A quick perusal of much organization literature reveals the absence of any considered treatment or theorizing of the material artifacts, bodies, arrangements, and infrastructures through which practices are performed. Barad (2003: 801), describing this situation in the social sciences more generally, puts it very well:

‘Language matters. Discourse matters. Culture matters. But there is an important sense in which the only thing that does not seem to matter anymore is matter.’

Consider any organizational practice, and then consider what role, if any, materiality may play in it. It should be quickly evident that a considerable amount of materiality is entailed in every aspect of organizing, from the visible forms — such as bodies, clothes, rooms, desks, chairs, tables, buildings, vehicles, phones, computers, books, documents, pens, and utensils — to the less visible flows — such as data and voice networks, water and sewage infrastructures, electricity, and air systems. Despite such pervasive examples, materiality has been largely ignored by organizational theory, which appears to assume (often implicitly) that it does not matter or does not matter very much in everyday organizing.

The second way that the organizational literature has treated materiality is to study specific cases of technology adoption, diffusion, and use within and across organizations (e.g. Barley 1988; Blau et al. 1976; Braverman 1974; Ciborra 2000; Orlikowski 1992; Rogers 2003; Sproull and Kiesler 1991; Walshaw 1993; Zuboff 1988). This stream of work has provided numerous insights into the role and implications of technologies in organizational life but, in doing so, has also generated some conceptual difficulties for dealing more generally with materiality in organizational research.

One difficulty concerns the explicit focus on technology adoption, diffusion, and use as separate and distinct phenomena occurring within organizations. The implication of such a focus is that materiality is an issue to be considered occasionally, as specific technological events arise — for example, when an organization invests in or acquires new manufacturing technology or when a new communication medium emerges and is appropriated by members of various groups or communities. As such, technology is treated as a matter of interest only in certain particular organizational circumstances. Materiality, on this view, is a special case, and this is problematic because it loses sight of how *every* organizational practice is *always* bound with materiality. Materiality is not an incidental or intermittent aspect of organizational life; it is integral to it.

The other difficulty associated with organizational studies of technology adoption, diffusion, and use is their tendency to focus either on technology effects (a *techno-centric* perspective) or on interactions with technology (a *human-centered* perspective). Both perspectives are limited and limiting for a number of reasons. The *techno-centric* perspective is interested in understanding how technology leverages human action, taking a largely functional or

instrumental approach that tends to assume unproblematically that technology is largely exogenous, homogeneous, predictable, and stable, performing as intended and designed across time and place. Yet, as critics have pointed out, this perspective reifies technology, ignores how technology is bound up with historical and cultural influences, and thus produces technologically deterministic claims about the relationship of technology with organizations (Barley 1988; Kling 1991; Suchman 1994; Thomas 1994).

The *human-centered* perspective focuses on how humans make sense of and interact with technology in various circumstances. Here the technology is not black-boxed but understood to be different based on the different meanings assigned to it and the different ways in which people engage with it. Furthermore, such interpretations, interests, and interactions are seen to vary by time and place, entailing a more dynamic and situated view of the relationship of technology with organizations. While this grounds use of technology in particular socio-cultural and historical contexts, it tends to minimize the role of the technology itself. By focusing primarily on the human side of the relationship, the technology — as commentators such as Button (1993) and Berg (1997) have argued — vanishes from view in the preoccupation with the social.

Moving beyond these conceptual difficulties and conventional approaches requires a way of engaging with the everyday materiality of organizational life that does not ignore it, take it for granted, or treat it as a special case, and neither does it focus solely on technology effects or primarily on technology use. Such an alternative view asserts that materiality is integral to organizing, positioning that the social and the material are *constitutively entangled* in everyday life. A position of constitutive entanglement does not privilege either humans or technology (in one-way interactions), nor does it link them through a form of mutual reciprocation (in two-way interactions). Instead, the social and the material are considered to be inextricably related — there is no social that is not also material, and no material that is not also social.

Towards a View of Constitutive Entanglement

The challenge for organization scholars is to figure out how to take seriously the recursive intertwining of humans and technology in practice. A number of particularly interesting ideas for doing so have been emerging in sociology and science and technology studies over the past decade: for example, *actor-networks* (Callon 1986; Latour 1992, 2005), *sociotechnical ensemble* (Bijker 1995), *mangle of practice* (Pickering 1995), *object-centered sociality* (Knorr Cetina 1997), *relational materiality* (Law 2004), and *material sociology* (Beunza et al. 2006). These concepts challenge and transcend conventional distinctions between the social and the material. What is particularly valuable about such developments is their insistence on speaking of the social and the material in the same register, and of not reverting to a limiting dualism that treats them as separate (even if interacting) phenomena.¹

The development of these alternative conceptualizations can be broadly conceived as post-humanist, in the sense that they seek to decenter the human

subject — and more particularly, reconfigure notions of agency — in studies of everyday life. Latour (1987, 1992, 2005) has long argued that agency is not an essence that inheres in humans, but a capacity realized through the associations of actors (whether human or nonhuman), and thus relational, emergent, and shifting. As he observes (1994: 33): ‘The twin mistake of the materialists and the sociologists is to start with essences, those of subjects or those of objects.’ Suchman (2007: 261) similarly emphasizes the importance of reconceiving ‘capacities for action … on foundations quite different from those of a humanist preoccupation with the individual actor living in a world of separate things’. As Cooren et al. (2006: 11) write: ‘Agency is not a “capacity to act” to be defined *a priori*. On the contrary, it is “the capacity to act” that is discovered when studying how worlds become constructed in a certain way.’

Drawing on these influences, I want to suggest that we can gain considerable analytical insight if we give up on treating the social and the material as distinct and largely independent spheres of organizational life. In particular, this requires replacing the idea of materiality as ‘pre-formed substances’ with that of ‘performed relations’, in order to characterize the recursive intertwining of the social and material as these emerge in ongoing, situated practice (Pickering 1995; Latour 2005). As Pels et al. (2002: 2) observe: ‘it is not so much what materials … symbolize within social action that matters but their constitutive agentic effects within the entangled networks of sociality/materiality’.

The notion of constitutive entanglement departs from that of mutual or reciprocal interaction common in a number of dynamic social theories. Notions of mutuality or reciprocity presume the influence of distinct interacting entities on each other, but presuppose some *a priori* independence of these entities from each other. Thus, for example, we have tended to speak of humans and technology as mutually shaping each other, recognizing that each is changed by its interaction with the other, but maintaining, nevertheless, their ontological separation. In contrast, the notion of constitutive entanglement presumes that there are no independently existing entities with inherent characteristics (Barad 2003: 816). Humans are constituted through relations of materiality — bodies, clothes, food, devices, tools, which, in turn, are produced through human practices. The distinction of humans and artifacts, on this view, is analytical only; these entities relationally entail or enact each other in practice. As Law puts it (2004: 42; emphasis in original):

‘This is a thoroughgoing *relational materiality*. Materials – and so realities – are treated as relational products. They do not exist in and of themselves.’

To help us begin to move towards a perspective of constitutive entanglement in organization studies, I want to propose a shift in our conventional framing of organizational practices as ‘social practices’. Such a labeling reinforces the idea that the material is not intrinsic to organizing. Instead, seeing organizational practices as ‘sociomaterial’ — to borrow a term given recent currency by scholars such as Mol (2002) and Suchman (2007) — allows us to explicitly signify, through our language, the constitutive entanglement of the social and the material in everyday organizational life.

Sociomaterial Practices: Empirical Examples

Some empirical examples may help to ground and illustrate how we may begin to examine the constitutive entanglement characterizing sociomaterial practices. The first example is taken from the activity of information search, while the second from that of mobile communication.

Information Search

Information search is a central practice of research work. Searching for something — a definition, citation, study, article, discussion, scholar, or review — is an activity most of us engage in at one time or another during the conduct of research. In the not-so-distant past, this activity of search — of identifying relevant scholars, locating articles, and finding reviews and discussions — involved among other things, visits to libraries, conversations with colleagues and students, perusing directories, indexes, journals, and conference proceedings, and photocopying bits and pieces of selected information. Today, many if not most of us will go straight to our computers to access the website hosting the Google search engine (or perhaps a specialized version of this, Google Scholar). Indeed, in common parlance, Google has practically become a verb. ‘I googled it’ has become a well-accepted and widely understood reference to the online activity of information searching on the web. And what most of us mean by this colloquialism is that we ‘used’ the Google search capabilities to obtain some information.

But this account, while simple and descriptive, is problematic. In the terms of the preceding discussion, it privileges the users, clearly putting the locus of control principally in the hands of the human researchers, and relegating the technology to a relatively passive, even domesticated role. But as I have intimated in the earlier discussion, this way of thinking about and understanding Google’s information search capability glosses over significant ways in which researchers’ work practices are constitutively entangled through their everyday engagement with the materiality of the Google search engine. Let us take a closer look.

Broadly speaking, the architecture of the Google search engine involves multiple servers, directories, databases, indexes, and algorithms, and reflects considerable choices made about its design, construction, and operation. One algorithm in particular sets Google apart from other search engines. This is the PageRank algorithm for which its creators — Lawrence Page and Sergey Brin — at the time, doctoral students in computer science at Stanford University, obtained a patent in 2001. As Google’s technology crawls the Internet, retrieving and indexing billions of web pages, its PageRank algorithm computes a ‘page rank’ for each page by examining its ‘backlinks’. That is, it examines all incoming links to the web page and, based on their number and kind, produces a score that ranks the page within Google’s indexes (this is akin to the weighted citation counts computed for published articles in academia). Thus a ‘page rank’ reflects the choices that people have made in deciding what other web pages they want to connect to from their own web pages. It also

reflects the relative social status of websites in that links from popular or official websites such as portals or institutional sites are weighted more heavily than links from other web pages. When displaying the results for a requested search, Google will order the results on the basis of each retrieved page's 'page rank' — the more highly ranked a web page is within Google's indexes, the higher up in the display order it will appear on the results screen.

Importantly, page ranks are not fixed or static, but dynamic and relative. As Google crawls and indexes the web constantly, the PageRank algorithm is continually updating its ranking of web pages because the underlying link structure of the web is changing all the time. Not only are web pages being added to and deleted from the web every day, but existing web pages are being modified, with links added and deleted. And these ongoing changes are reflected in the PageRank algorithm's ongoing updating of Google indexes. The performance of Google's search engine and its ranking of millions of web pages are thus dynamic, relational, and contingent. The results of Google-mediated search activities, to use Pickering's (1995) term, are 'temporally emergent'.

These temporally emergent results are not dependent on either materiality or sociality, nor on some interaction between them (to the extent that these are seen as distinct domains). Rather the performance and results of a Google-based search are sociomaterial. The Google search engine is computer code that was produced and is maintained by software engineers, that executes on computers (configured with particular hardware and software elements), and whose operation depends on the millions of people who create and update web pages everyday, and the millions of people who enter particular search terms into it. The result is a constitutive entanglement of the social and the material — 'a mangling of human and material agencies' (Pickering 1995) or what Suchman (2007) calls 'a creative sociomaterial assemblage'.

The same Google search issued by a researcher at different times will produce different results in terms of web pages displayed and their order. While this would also be the case if the researcher had conducted her search in libraries and colleagues' offices, the Google example manifests it more acutely and visibly. The information obtained with a Google search done today will shape research practices differently than had the Google search been done next week or last month. And in certain circumstances, such differences may be quite consequential. Indeed, as contemporary commentators writing about the web have noted, algorithms such as Google's PageRank don't so much 'search reality' as create it.

The productive consequences of the sociomaterial assemblages entailed in researchers' search practices are particularly evident when one considers the controversy surrounding Google's move into China (BBC News 2006). In January 2006, Google agreed to censor its search services in China in order to gain greater access to China's fast-growing market. This censored version — Google.cn — is strongly regulated by the Chinese authorities and restricts access to thousands of sensitive terms and websites. For example, the BBC news website is unavailable; so too are any websites related to the Taiwanese independence movement and the 1989 Tiananmen Square protests. A search for the banned Falun Gong spiritual movement produces only articles denouncing it

(e.g. articles such as 'Outlawing the Falun Gong Cult' and the 'Campaign against the Falun Gong'). And Chinese residents can't simply engage other Google websites (such as Google.com or Google.co.uk) to bypass these restrictions. The so-called 'Great FireWall of China' blocks access by Chinese residents to many sites on the web, including all alternative Google search engines.

As it turns out, similar albeit less visible restrictions are occurring elsewhere on the web. For example, as Zittrain and Edelman (2002) demonstrate, the French and German versions of Google simply omit search results deemed inappropriate or unlawful by the respective governments. Censorship, of course, is not new, but its inscription within search engines powerfully highlights how it can configure, in real-time, the performance of the emergent *sociomaterial assemblage*, and thus the everyday practices of researchers seeking information to do their work.

Mobile Communication

Let me turn now to another empirical example, that of mobile communication, and draw on a research study that my colleagues and I are conducting with a company we call Plymouth (Mazmanian et al. 2006). Plymouth is a small and prestigious private equity firm. Operating since the mid-1980s, the firm has raised over three billion dollars in private investment, and is currently managing its sixth investment fund of almost two billion dollars. At the time of our data collection in 2004, the firm employed 33 people, including 22 investment staff and 5 senior support staff. The firm prides itself on its respect for individuals and its commitment to work-family balance, and as part of helping its members manage their busy, mobile lives, the firm issued all investment and senior support staff (27 people) with BlackBerry wireless email devices in 2000 (four years before we began our study).

In the course of analyzing the communication practices of these information professionals, it became increasingly evident that attempting to understand their practices in conventional 'media use' terms neglects critical aspects of what they are experiencing. In particular, viewing the professionals as 'using' their BlackBerrys to communicate with each other significantly overlooks how their communication practices have been substantially reconfigured through their engagement with BlackBerrys. Let's consider some details.

The BlackBerry service, as implemented within Plymouth, is *sociomaterially* configured to continually 'push email' to the handheld devices, meaning that at any time of the day or night, members' BlackBerry devices receive email messages sent to them via wireless networks from the server where individuals' email accounts are registered. While the professionals can choose when to look at and respond to the email being delivered to their BlackBerry devices, most report scanning their BlackBerrys frequently. As a senior associate in the firm noted:

'There are not many people here who don't check their BlackBerry every seven or eight minutes There aren't many people you can email that you won't hear back from right away.'

Frequent checking of the handheld device typically led to the decision to respond to some (if not all) of the email messages received. A partner in the firm acknowledged,

‘Because it’s so easy to check, (a), you do it, and then (b), once you see it, “Oh, I’ve got to respond to that.”’

Members of Plymouth explain that they experience a strong obligation to check incoming messages, so as to ‘stay in touch’ or ‘keep in the loop’ with what is going on in the firm or their teams. All members report expecting that others will be available via their BlackBerrys, and most assume that these others expect the same of them. As one partner observed: ‘We all have BlackBerrys, so you know that everybody is seeing the traffic.’ When such expectations are enacted in practice, they are reinforced over time, becoming intrinsically bound up with the device, and shifting how people think and act with it. A senior associate noted:

‘In general … people’s expectation levels have gone up … People presume that it’s fairly easy to reach you 24/7. So I think you have a lesser degree of sensitivity just sending an email.’

One senior support member elaborated on her experiences with the increased expectations associated with BlackBerrys:

‘One of the things that I’ve noticed more and more is that people will BlackBerry me in the evening, you know, after 8:30 in the evening. I’m pretty much settled in and people know that it [BlackBerry] sits next to me, my cup of tea is there, my knitting is in my lap, something’s on television and I just take care of business. “Linda, do you think you can order this, this and this for me?” Fine. Sure.’

Asked to elaborate on the source of such expectations, she replied: ‘I think they’ve just gotten used to it.’ Similarly, another senior member feels he needs to be available to his team members because of expectations he helps to set:

‘The junior guys I was working with on the deal would email me and I think they probably would find it odd if I didn’t get back to them very quickly. So I think people do begin to build expectations … of what your response time is going to be.’

Within a relatively small community such as Plymouth, these expectations of availability and accountability become generalized over time. One partner, a self-described ‘chronic BlackBerry user’, describes what happens when he doesn’t respond to an email message right away:

‘Well, you don’t answer and you make them wonder why isn’t he answering? And so being predictable all the time isn’t good. But there’s a new element in all this that never would have existed before these things were invented, especially when your counter-party is somebody that knows that you’re looking at it a lot. The element is that there’s an expectation on the part of a sender that what he’s sending is being read immediately. Whereas in the old days before BlackBerrys, if you left a voicemail for somebody or if you sent some other message, a fax, you could never be sure that it got into the hands of the recipient, or when it got in. [Now] if you’ve sent a message to somebody who’s a chronic BlackBerry user, I think you’re pretty confident that person has seen what you said.’

Another partner echoed this:

‘Once the audience that you interface with all the time knows that you’re a [BlackBerry] junkie – they honestly do this – if I don’t respond to an email in an hour people start to wonder “What’s wrong with Gary?” I mean it’s that bad.’

While there is no explicit directive at Plymouth that members be available via email, and the work allows for a certain amount of autonomy on the part of the professionals, many nevertheless take for granted that others persistently monitor their BlackBerry communication. Such ongoing monitoring leads to the production of even more communication and even more messages to be checked and responded to. The inadvertent outcome of these collective sociomaterial enactments is almost continual electronic communication within the firm.

These collective enactments escalate members' commitment to engage in email communication through their BlackBerrys. Members report feeling the need to constantly check their devices for incoming emails. None were able to account for this apparent compulsion. Two members, a principal and a partner in the firm respectively, attempted to explain it this way:

'I don't know. I just do. You do. You wait. If you see an email bounce up, you have to check it. It's kind of sick.'

'But with the BlackBerry, it's just so easy. It's like this little piece of candy. You just take it out.'

Another partner reported that his spouse purposely plans vacations to locations where there is no BlackBerry coverage (e.g. on ocean cruises). As he commented:

'Yeah. And I actually don't mind that, because vacations should be a break. But if we go somewhere where there is coverage, I can't not look at it. It's just the reality. And my wife understands it just is.'

This sense of compulsion extends up and down the Plymouth hierarchy. One junior associate reports checking his BlackBerry late at night, even when he knows that this is unnecessary:

'On a more quiet period, like right now when I'm not really intensively working on a project, it's hard for me to believe I would have gotten an email from anybody here at 11:00 at night that would have really needed a response before I went to bed. That being the case, I would always still check it just to know. Partly out of curiosity and partly – I don't really know how to describe it – the idea of just seeing like the message flashing and not reading it, I just can't imagine why I would do that. I would always check it.'

Some members portray their experience of compulsion as an 'addiction', referring to their BlackBerrys as 'CrackBerrys', and while this characterization is often accompanied by laughter, the labeling reflects a growing awareness among members of the firm that there are some critical tensions entailed in their communication practices. As one principal reflected on his use:

'You're sort of constantly tied. Here's an example. I'll be working sometimes on a deal that we're in the throes of and working pretty hard. And ... I'll have my BlackBerry for some reason by my bed and my wife will wake up at three or four in the morning and I'll be checking my BlackBerry or sending [emails]. Yeah, it's that sort of addictive.'

As members' communication becomes increasingly entangled with their BlackBerrys, the line between work and non-work becomes blurred. Another principal asked:

'But at what point of your day does the workday end? This tool makes it difficult for that workday to end. I mean, there's no doubt that my day doesn't really come to an end until I go to bed.'

And a partner described the double bind that is now at work in Plymouth's communication practices: individual desires to disconnect are in conflict with the collective expectations of the sociomaterial network:

'I think the one negative piece to this is that when you do choose to get away ... how do you tell people who do need to contact you that you're not going to be online in an efficient sort of way? ... That's the worry part of it, that once you've created an expectation that you're always reachable, do you therefore then always have to be reachable?'

In summary, we see that the communication changes enacted at Plymouth emerge from the performativity of the BlackBerrys as engaged in members' everyday practices. It is not a matter of the material features of the BlackBerry technology having certain social impacts, or the new affordances of mobile email devices making communication more efficient or effective. The performativity of the BlackBerrys is sociomaterial, shaped by the particular contingent way in which the BlackBerry service is designed, configured, and engaged in practice. For example, the 'push email' capability inscribed into the software running on the servers has become entangled with people's choices and activities to keep devices turned on, to carry them at all times, to glance at them repeatedly, and to respond to email regularly. Such activities are only relevant in the circumstance of messages being continually pushed to handheld devices, and of shifting interpretations and interests that become bound up with the constantly available electronic messages. It is not a matter of the technology interacting with the social, but of constitutive entanglement.

As sociomaterial practices, mobile communication at Plymouth is significantly changing why, when, where, and how members interact. Norms of communication are reconfigured, altering expectations of availability and accountability, redefining the boundaries of the workday, and extending and intensifying interactions within the communication network. Plymouth members experience both increased flexibility (about where and when to work) and increased obligation to be continually responsive. The resulting blurring of employees' work and personal lives is beginning to undermine the espoused family-friendly values of the firm.

Conclusion

In this paper, I have argued that much of the organizational studies literature disregards or ignores the everyday materiality of organizing, and I have advocated a shift in our thinking about materiality in organizations. Specifically, I propose that we recognize that *all* practices are always and everywhere sociomaterial, and that this sociomateriality is constitutive, shaping the contours and possibilities of everyday organizing. The examples of Google and BlackBerry mediation are the (still-visible) manifestations of organizational practices become increasingly entangled with emerging sociomaterialities.

And as we saw, the resulting entailments are contingent, dynamic, multiple, and indeterminate. They are also deeply consequential for the kinds of organizational realities that are being produced.

Focusing on the sociomateriality of organizing practices sensitizes us to a different set of issues and influences than we have tended to focus on. For example, in the case of our information search scenario, we see how the researcher's Google search is constituted by the performativity of computers, networks, software, algorithms, directories, databases, and infrastructure, as these are enacted by the human agencies entailed in their design, construction, and operation. The resulting sociomaterial assemblage that delivers the search results to our researcher is both emergent and contingent. It temporarily binds together a heterogeneous assembly of distributed agencies, which for the duration of the particular search are provisionally stabilized. But this assemblage shifts over time as interests, computers, networks, choices, algorithms, websites, preferences, links, identities, and capabilities change. The performativity of the sociomaterial assemblage is thus fleeting, fragile, and fragmented, entailing uncertainty and risk, and producing intended and unintended outcomes. Focusing on these sociomaterial aspects of everyday practices will open up important avenues for examining and understanding the ongoing production of organizational life.

In a recent, provocative essay on social inquiry, Law and Urry (2004) argue that current modes of social research do not resonate well with important aspects of twenty-first century global realities. And they list a number of areas where this lack of resonance is particularly pronounced. For example, they argue that contemporary social science is ill-equipped to address issues of ephemerality, multiplicity, dispersion, and mobility. I believe some of these shortcomings arise from our conceptual difficulties in grappling with the inextricably material nature of our sociality.

Take for instance the issue of ephemerality, or as Law and Urry (2004: 403) put it: phenomena that are 'here today and gone tomorrow, only to reappear the day after tomorrow'. The search results returned from a Google request are examples of such fleeting phenomena. They cannot be easily understood if we ignore Google's emergent sociomaterial performativity or assume the search engine and its performance are given and stable. Multiplicity is similar: 'that which takes different shapes in different places' (Law and Urry 2004: 403). Google's temporally emergent performance and results are multiple, shifting by time, by location, and political and institutional conditions. Or consider dispersion and mobility: the distribution and movement of ideas across time and space may be manifest in many ways, including as we saw, through the sociomaterial entanglements of BlackBerry-mediated communication.

Addressing many of these issues of twenty-first-century organizational realities will require us to forgo perspectives that treat materiality as either invisible or inevitable, or that abstract, black-box, and separate technology from human affairs. Instead, we need perspectives that are grounded in ontological and epistemological sensibilities that take seriously the sociomateriality of organizing. I have suggested that recent developments in material sociology and science and technology studies offer useful vocabularies and

valuable guidelines for exploring the deep intermingling of materiality within practice. These can help us reconfigure our taken-for-granted notions, assumptions, and practices of organizational research, and allow us to recognize and investigate the multiple, emergent, and shifting sociomaterial assemblages that constitute organizations.

Notes

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1 See also the special issues on 'The Status of the Object' (Pels et al. 2002) and 'The Rise of Objects in the Study of Organizations' (Engeström and Blackler 2005).

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