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SPECIAL ISSUE OBSERVATION

Observing materiality in organizations

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Abstract

Research on materiality has grown rapidly over the past 10 years, highlighting the influence of physical artifacts and spaces in organizations, which had been overshadowed by discursive approaches. This body of research enriches our understanding of organizations in many areas including technology, decision-making, routines, learning, identity, culture, power, and institutions. However, researchers sometimes struggle to select methods suited to study materiality, as previous works have not been explicit in that respect. This article calls organizational researchers interested in physical environments – that is, artifacts and spaces – to integrate observation into their data collection. The first section presents a tripartite definition of the physical environment including activities, conceptions, and lived experiences. Ontological debates are introduced, and observation is proposed as a relevant method for studying materiality in organizational research. The second section presents observation techniques based on three approaches: *observing materiality in actions*, *observing beyond seeing*, and *making participants observe*. Each approach is mainly associated with one of the three components of materiality. The final section discusses the scope of observation techniques, suggests how to combine approaches, and flags difficulties associated with visual techniques.

Keywords: *Materiality; Artifact; Space; Observation; Visual techniques*

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This article focuses on how to observe materiality in organizational research. After the discursive turn at the beginning of the century, accompanied by associated methods (see e.g. Fairclough, 2003; Phillips & Hardy, 2002), organization scholars called for a 'material turn' aiming to reintroduce physical and spatial dimensions of organizations (e.g., Boxenbaum et al., 2018; Carlile et al., 2013; de Vaujany & Mitev, 2013; Pratt & Rafaeli, 2006; Taylor & Spicer, 2007). In this new material perspective, authors invite researchers to think of organizations as "conglomerates of physical artifacts" (Vilnai-Yavetz & Rafaeli, 2006, p. 10) or "as material and spatial sets, not just cognitive abstractions" (Kornberger & Clegg, 2004, p. 1095).

The material turn aims at "rematerializing the organizational world" (Yanow, 2012, p. 34), as the spatial and artifactual dimensions of organizations already appear in works that are now considered classics of organizational research. As Kornberger and Clegg (2004) note, space is part of Taylor's work on shop floor management. The same is true of artifacts that can be defined as man-made objects. In *Principles of Scientific Management,* Taylor (1914) explains, for example, the design and use of shovels of different sizes depending on the density of the materials in order to always lift an optimal load, and the use of colored cardboard to show illiterate miners their performance and promote learning.

The material turn emphasizes the socially constructed character of artifacts and spaces. It gives an important place to the social aspect in materiality which is now commonly accepted (de Vaujany & Mitev, 2013; Kornberger & Clegg, 2004; Taylor & Spicer, 2007), although the relationships between the material and the social have been conceptualized variously as intertwined (Pickering, 2001), imbricated (Leonardi, 2017), or co-constitutive (Orlikowski, 2007). Research related to materiality of or in organizations has grown quickly to contribute to our understanding of sensemaking (Garreau, Mouricou, & Grimand, 2015), identity (Cappetta & Gioia, 2006; Pratt & Rafaeli, 1997), routines (D'Adderio, 2008), power (Dale & Burrell, 2007), and institutions (Jones et al., 2012) – to name a few examples.

This body of research, however, rarely addresses the ways of studying materiality in organizational research. While a few authors have recommended methodological approaches (e.g., Bechky, 2008; Gagliardi, 1990; Leonardi, 2017; Yanow, 2006),

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articles mentioning available techniques are limited even though materiality presents particularities in terms of data collection (Reh & Temel, 2014). As de Vaujany and Vaast (2014) suggest in their article titled, *If these walls could talk,* spaces say something about organizations, but they cannot be interviewed. The influence of artifacts can pass through movements – which are easily visible; and also through other senses than sight – sometimes unconsciously (Gagliardi, 1990) – being more difficult for researchers to grasp. The Methods section in published articles gives more details about interviews and documents than it does about observations despite the particularities of materiality. For example, Bechky (2008) indicates that Elsbach (2003) did not mention in her published article that she used photography. Yet, Yanow (2012) considers ethnography, which is based on observation, to be particularly suited to taking materiality into account, because of the presence and experience of the researcher who is attentive to settings and objects in addition to being aware of acts and words.

The relevance of observation in studying the impact of materiality contrasts with the paucity of articles on the subject. The current article provides an overview of techniques for organizational researchers interested in physical artifacts and spaces. It proposes various ways of observing materiality in organizations through the examples of researchers who have detailed their research practices in organization studies or other disciplines. For this purpose, I have adopted a tripartite definition of materiality that includes activities, conceptions, and lived experiences.

In the first part, I define the materiality of physical environments and its properties, discuss ontological debates, and present the method of observation. In the second part, I describe and illustrate observation techniques grouped into three approaches: observing materiality in actions, observing beyond seeing, and making participants observe – each being a major means of studying one of the components of materiality. In the discussion, I present the scope of these techniques, suggest ways to combine the three approaches to study materiality in its entirety, and summarize some difficulties of working with visual data. The article's aim is to enrich our knowledge of techniques for observing materiality in organization research by associating one main approach and its techniques with one component of materiality (activities, conceptions, and lived experiences). It offers a guide in terms of approaches and techniques from which to choose, depending on how researchers wish to take materiality into account in their study.

Materiality and observation

The material world of organizations includes artifacts, spaces, and human bodies. Although the physical body has attracted increasing attention in research on strategy (e.g., Dameron, Lê, & LeBaron, 2015) and organization (e.g., Rahmouni Elidrissi & Courpasson, forthcoming; Schatzki, 2001a), I am limiting the scope of my investigation to the physical environment defined by Elsbach and Pratt (2007, p. 181) as including physical objects (artifacts) and their spatial arrangements. Artifacts and spaces are reciprocally linked in that physical artifacts are located in space (Gagliardi, 1990), and space "subsumes things produced, and encompasses their interrelationships in their coexistence and simultaneity" (Lefebvre, 1991, p. 73). Other authors (e.g., Reh & Temel, 2014) consider built spaces as a specific category of artifacts.

Materiality was first reintroduced into organization research with socio-technical systems (Carlile et al., 2013) to show the impact of technologies on the social world (e.g., Huber, 1990) or the mutual influences between the technological and the social (Barley, 1986; Leonard-Barton, 1988). The focus on technology has narrowed the scope of research on materiality in organization at that time. From the 2000s, the scope of research on materiality expanded to objects and spaces, recognizing that artifacts can facilitate collaboration (Kaplan, 2011), and contributed to sensemaking and sensegiving (Cappetta & Gioia, 2006; Garreau et al., 2015). The material and the social are mixed in practices (Schatzki, 2001b), each having a form of agency and thus, sometimes producing unexpected effects. For example, new phenomena can emerge from new material situations, as was the case with *panoramic seeing* born from the experience of a railway journey (Pickering, 2001). In addition, beyond providing a better understanding of organizational practices and dynamics, materiality can extend the approaches of organization studies by reintroducing neglected aspects. As Carlile (2015, p. S25) indicates, "materiality helps us to see durability and not just dynamics; accumulations and not just activities; outcomes and not just process, consequences and not just change; layers and not just context."

This broader view of materiality that is relevant to organizational research has led to a growing body of studies showing the impact of a wide variety of artifacts. This include maps (Garreau et al., 2015), PowerPoint presentations (Kaplan, 2011), garments (Pratt & Rafaeli, 1997), IT systems (D'Adderio, 2008), robots (Barrett et al., 2012), vehicles (Rafaeli & Vilnai-Yavetz, 2004), offices (Elsbach & Bechky, 2007), stores (Cappetta & Gioia, 2006), and buildings (de Vaujany & Vaast, 2014; Edinger, 2014; Jones et al., 2012). This variety first necessitates a definition of physical artifacts and spaces and their properties. Following such definition, I present associated ontological debates and their consequences on methodology. Finally, I introduce observation as a proper method for studying the effects of physical artifacts and spaces in organizations and organizing.

Physical artifacts and spaces: Definitions and properties

Because of the link between artifacts and physical spaces (Gagliardi, 1990; Lefebvre, 1991), I have chosen to analyze them together using a common definition. This article considers materiality as tripartite according to relationships between the material and the social. The three components consist of activities, conceptions, and lived experiences. This definition is mostly inspired by the triad conceptualized by Lefebvre (1991) for the production of social space, and by other authors interested in artifacts (e.g., Gagliardi, 1990) including invisible ones such as aromas (Warren & Riach, 2017). All these authors considered three aspects: contribution to actions, conceptions or intentions they convey, and feelings and meanings individuals give them.

Lefebvre (1991, p. 40) defines social space as "[t]he perceived-conceived-lived triad (in spatial terms, spatial practices, representations of space, representational spaces)." The practice of physical space, which includes production and use, constitutes the *perceived* because it "presupposes the use of the body: the use of the hands, members and sensory organs, and the gestures of work" (Lefebvre, 1991, p. 40). The *conceived* and the *lived* space are both representations, although of different natures. The conceived space is the one of planners, urbanists, engineers, etc. It is the locus of abstract social representations including knowledge and ideologies, and it has some consistency (Lefebvre, 1991). On the contrary, lived experiences are individual and derive from the experience of space, which is sensory, aesthetic, and cognitive. The experience can reach a great complexity according to Lefebvre, as it can include representations of the conceived space but also other individual knowledge, images, and affects. It does not require consistency and is fluid and dynamic. As individual experiences differ, a multiplicity of representations or lived spaces results (Lefebvre, 1991).

Lefebvre (1991) extends this definition to objects, which thus include conceptions from their creators. For example, in their article on desks as active objects in the workspace, Conrad and Richter (2013) indicate that tables materialize different conceptions. Based on their shape, round tables convey equality while rectangular tables differentiate according to the uneven distance between the people placed around them. Tables contribute – voluntarily or not – to social dynamics of meetings through the equality (or inequality) that they convey and the use people make of them. Thus, rectangular tables allow managers to show differences in status, for example, among boards of directors (Conrad & Richter, 2013). By placing themselves at one end, leaders signify their superior status. On the contrary, by sitting in the center, they maximize the integration of the members except those placed at the end, physically distant from exchanges. Each participant takes from the meeting their own representation, which includes meanings and feelings that together constitute the lived experience.

Gagliardi (1990) also considers three components of materiality, even though his perspective on culture differs from Lefebvre's (1991) Marxist-inspired perspective on the production of space. He defines the physical artifact as "a product of human action which exists independently of its creator," resulting from an intention that aims "at solving a problem or satisfying a need" that is "perceived by the senses, in that it is endowed with its own corporality or physicality" (p. 3). This definition includes a separation between the material and the social, which by contrast are linked in Lefebvre's definition. This separation makes it possible to consider the result of actions in addition to actions themselves.

Despite theses differences, Gagliardi considers artifacts like Lefebvre considers spaces, that is, resulting from production practices, including conceptions and perceived by the senses. Gagliardi motivates production by an intention to solve a problem or satisfy a need and specifies that artifacts constitute a translation of a broader cultural order that can be related with Lefebvre's conception. According to Gagliardi, each individual perceives artifacts and forms a representation that is both cognitive and sensory, called a *concrete image* similar to Lefebvre's lived experience. Warren and Riach (2017) also mobilize these three components of materiality in their work on aroma management. They indicate how culture (conception) influences the design and the management of aromas (activities). Subsequently, the impact of aromas on employees' performance at work would depend on lived experiences of individuals that result from their prior experiences and conceptual schema.

Our tripartite definition – which includes activities, conceptions, and lived experiences – frees itself from the theoretical perspectives of the authors from whom it drew inspiration, and which differ from one another. In particular, I have chosen the term *activities* to include, in addition to social practices, the activity of physical artifacts and spaces without simultaneous human interactions; for example, automated processes such as computer programs or deterioration over time. These activities of artifacts can have significant unintended consequences on organizations, such as the collapse of a building.

The relationships between the three components of materiality – activities, conceptions, and lived experiences – can be complex. Conceptions influence production activities. For example, according to Lefebvre (1991), the constructions of Frank Lloyd Wright and Le Corbusier include different conceptions of space (specifically a Protestant tradition and a scientific and intellectualized representation of space, respectively). However, conceptions do not systematically lead to implementations. Kornberger and Clegg (2004) note that many intentions are never realized. For example, most architectural projects get stuck in the design stage and are never

built. The low number of productions compared to designs leads Lefebvre (1991) to consider that artifacts reflect the conceptions of producers, who have the power to choose what they wish to achieve. Once produced, artifacts can convey conceptions in the social sphere (Carlile, 2002). However, individuals may use these physical artifacts and spaces differently (Gagliardi, 1990; Lefebvre, 1991), with consequences that are not necessarily expected (Kornberger & Clegg, 2004). People can also choose not to use them. For example, Pentland and Feldman (2008) observe that the creation of artifacts does not necessarily imply a change in the practices that they are supposed to modify. Royer and Daniel (2019) show that the same is true for legal artifacts, which constrain the formal aspect more than the actual content of a process. In addition, as individuals have different experiences because of their personal history, a multiplicity of lived experiences emerges (Lefebvre, 1991; Sergot & Saives, 2016; Warren & Riach, 2017) that can contribute to activities and be a source of new conceptions (Lefebvre, 1991).

Materiality, thus, plays a complex role in organizations due to the sometimes strong, sometimes weak coupling between activities, conceptions, and lived experiences. The three components are necessarily interconnected, which does not imply consistency (Lefebvre, 1991). This possible weak coupling between the three components, at the same time linked but retaining some kind of independence (Orton & Weick, 1990), has consequences on method. It implies first that one cannot necessarily access one component through another, and second that all three components are required for a global understanding. It makes systematic observation, ethnography, and case study more suitable research methods compared to surveys (Orton & Weick, 1990).

Besides components, physical artifacts and spaces have instrumental, aesthetic, and symbolic dimensions (Gagliardi, 1990; Lefebvre, 1991). According to Vilnai-Yavetz and Rafaeli (2006), the instrumental dimension refers to the way in which an artifact contributes to the performance of a task by an individual or an achievement by the organization. The aesthetic dimension concerns the sensory experience generated by an artifact, and the symbolic dimension refers to the meanings and associations that an artifact elicits. These three dimensions can be studied separately. However, Vilnai-Yavetz and Rafaeli (2006) recommend including all three, as did Elsbach and Bechky (2007) in their research on office design. Considering several dimensions makes it possible to highlight tensions between them, such as the aesthetic trumping the instrumental in fashion boutiques (Cappetta & Gioia, 2006), or the highly symbolic scrubs of nurses conflicting with some of their tasks (Pratt & Rafaeli, 1997). The three dimensions discussed can enrich analyses of physical artifacts and spaces by multiplying the possible points of attention for each of the components. Rafaeli and Vilnai-Yavetz (2004) used all three dimensions in their research on the green color of public transport buses in Israel to show how the emotions generated by the color are associated with the organization. They have studied the three dimensions as perceived by respondents, which is the lived experiences component. However, the three dimensions are also relevant for the two other components: activities and conceptions. For example, Lefebvre (1991) specifies that the symbolic dimension is part of the lived experience of individuals who associate images and symbols with artifacts and spaces, but also that individuals can make symbolic use of objects and that conceptions also include codes and symbols. The article on the management of aromas by Warren and Riach (2017) takes into account the aesthetic dimension in each of the components. The dimensions enrich the study of materiality but have limited consequences on research approaches.

Finally, physical artifacts and spaces have the characteristic of being immediately perceptible (Gagliardi, 1990). The experience of the physical environment is not limited to sight. It is also olfactory and aural and can be tactile (Gagliardi, 1990) although sight tends to predominate over the other senses (Lefebvre, 1991). Consequently, the meaning of artifacts and spaces can be intuitive, without conscious interpretation (Gagliardi, 1990). Warren and Riach (2017) note that aromas are supposed to have the capacity to elicit emotional responses without going through the cognitive system. According to Gagliardi (1990), it is the *concrete image* that he defines as multisensory and not necessarily present in the mind that stimulates reactions. This peculiarity of the perception of artifacts implies that discourses can be insufficient to grasp the impact of physical environments.

Ontological debates

Beyond definitions, materiality is the subject of ontological debates that cannot be ignored. A first ontological debate concerns the agentic character of physical artifacts and spaces. The debate is not about the potential influence of artifacts, which is widely acknowledged, but about the nature of this influence. According to the classic perspective of the Actor Network Theory (ANT) by Latour (2005), there is no difference between humans and non-humans, including artifacts, which are all 'actants.' Other authors consider that physical objects must be considered differently from actors – notably because of the absence of intention (e.g., Leonardi, 2017; Nicolini, 2013). Following Gibson (1986), several authors (Faraj & Azad, 2012; Leonardi, 2012, 2017) use the concept of affordance, which confers on materiality an ability to facilitate or constrain depending on activities and capacities of agents (Costall & Richard, 2013).

Another debate concerns the relationship between the material and the social realms. It pits the co-constitutive approach (e.g., sociomateriality defended by Orlikowski, 2007) against

the opposite view that distinguishes the two despite recognizing strong relationships between them. Proponents of separation argue that it permits to better understand the relations that these two constituents of the world maintain over time (Gagliardi, 1990) and to better study the relationships described as 'imbricated' (Leonardi, 2017).

I argue that these ontological positions are linked to theoretical perspectives so as to ensure consistency. Thus, the focus on relationships of the ANT perspective is consistent with an ontology that considers the elements of the relationship in the same way, whether human or non-human. The practice perspective rooted in the humanist tradition, which emphasizes the integrity of individuals, does not recognize the same agency, intent, and knowledge in humans and artifacts (Schatzki, 2001b). The sociomateriality perspective, which includes some research on technology, defines the material and the social as co-constitutive, which is consistent with the involvement of both humans and tools to achieve goals. Finally, the concept of imbrication (Leonardi, 2017) is useful for the purpose of producing or transforming artifacts. I regard ontology as an integral part of the theoretical perspective it serves. It follows that ontology per se is less important compared to the coherence between ontology and theoretical perspective. In this respect, Clark (2020) points to a contradiction in the classic ANT proposition which, on the one hand, emphasizes the non-human by attributing human-like actions to it, but at the same time reduces it through co-constitution and a method that consists of following the actor and focusing on translation. Indeed, co-constitution reduces the capacity of the non-human by excluding the possibility of non-symmetrical relationships, such as a precondition for action. Thus, co-constitution tends to underestimate the power of the non-human, especially when remote (Clark, 2020).

Another debate apart from ontological also exists on what should guide empirical investigation, should researchers follow the actor (Latour, 2005) or should they follow the thing (Appadurai, 1988)? Following the actor permits to understand how artifacts influence practices. For example, the practice perspective encourages researchers to analyze how artifacts contribute to practice, how they are used, and how they contribute to give sense to the practice itself (Nicolini, 2013). The focus of the study is thus the influence of artifacts on an object of study chosen by the researcher. Appadurai (1988) shares the theoretical view that humans give meaning to artifacts, but also argues that from a methodological standpoint "it is the things-in-motion that illuminates their human and social context" (p. 5). Supporters of following the thing highlight the diversity of people, situations and uses encountered. In this perspective, the artifact presents an intrinsic interest, thus becoming the object of the research. For example, researchers can investigate the production and uses of such artifacts. Following this approach, Suchman (2005) shows how the 8,200 copier from Xerox, which was considered an everyday object, has been reconsidered as an object of research in the company thanks to multiple affiliations. This second posture seems less common than the first in literature on organization.

The purpose here is not to defend an ontological posture because most of them are justified by the theoretical perspectives that they serve. The same is true of the place given to the artifact to guide the investigation. From a practical point of view on data collection, it might be opportune to think of artifacts and spaces as acting, whatever one's ontological perspective, so as to pay more attention to them. In the same vein, separating the social from the material permits a more thorough exploration of the symmetrical links of imbrication between the social and the material (Leonardi, 2017). In addition, the separation makes it possible to enrich our research (Carlile, 2015) by considering the non-symmetrical influences of materiality (Clark, 2020), such as diachronic relationships (Gagliardi, 1990) beyond practices (Winthereik, 2020).

Observation as a method to study materiality

The observational method can be defined according to Weick (1968, p. 360) as "the selection, provocation, recording, and encoding of that set of behaviors and settings concerning organisms '*in situ*' which is consistent with empirical aims." As Journé (2005) reminds us, this definition includes both the naturalist approach and quasi-experimentation in a real or natural situation. Thus, the observational method extends to situations voluntarily created by the observer in order to test theory and differs from laboratory experiments where the environment is not familiar to participants. Data collection *in situ* has advantages and disadvantages compared to other methods, such as interviews and questionnaires. It permits the collection of a large amount of fine-grained data at the time of occurrence, allowing a global understanding (Arborio & Fournier, 2015; Weick, 1968). Because of its capacity for global apprehension, observation is an appropriate method for studying the influence of physical environments. Further, observation allows the collection of data on things of which individuals are unaware and avoids retrospective and defensive biases (Weick, 1968). As the influence of artifacts is not always conscious (Gagliardi, 1990), their effects are less likely to appear in discourse collected through interviews, making observation in such cases particularly useful.

Observation can be used as a primary method of data collection in different research strategies such as ethnography (Bechky, 2008; Ybema et al., 2009), ethnomethodology (Nicolini, 2013), or as a complement associated with interviews and documents in case studies (Eisenhardt, 1989; Van de Ven & Poole, 2002; Yin, 2013). As defined by Weick (1968), the observation method also allows the researcher to stimulate or amplify behaviors. Stimulation of behaviors can enrich data

collection and understanding of these behaviors, especially if they are infrequent or hidden. Stimulation can take various forms. One of them is one-group pretest-posttest quasi-experimental design (Shadish, Cook, & Campbell, 2002). Weick (1968) cites the example of Holmberg who introduced machetes to a population of South American Indians and studied consequences. More commonly, several confrontational techniques can be used to improve understanding. Observers can ask participants to fill out a questionnaire and then observe how they reach agreement on answers that differed among them (Weick, 1968). Cross-self-confrontation can be used to spark controversy. This technique consists of filming two individuals (A and B) doing a similar task and having each of them comment, first on their own action and then on the comments of the other (Lorino, Tricard, & Clot, 2011). In their research on the largest electricity supplier in France (EdF), Wieviorka and Trinh (1989) organized meetings to compare their results with supporting diagrams to test their theory in development, provoking tensions that shed light on the relevance of their reasoning. Stimulation thus opens up the possibility of creating, introducing, modifying, and moving artifacts in order to stimulate reactions aimed at improving understanding. Some research strategies such as intervention research (Moisdon, 2015) or participatory action research (Kemmis & McTaggart, 2005) aim at improving the situation that was the subject of research co-constructed with an organization. In such research strategies, artifacts can be created or introduced with a transformative purpose in addition to understanding.

A central feature of the method are observers themselves, who necessarily influence the course of action to varying extents (Weick, 1968). There are today three postures for observers depending on the degree of their participation: non-participant observation, participant observation, and observant participation (Soulé, 2007), which can be more or less covert (Roulet et al., 2017). According to Weick (1968), the presence of non-participating observers can lead to hostile behavior among actors. Non-participating observers can be asked for advice (Musca, 2006). They can also be asked to take sides in a conflict, so that non-participating observers are sometimes forced to intervene to maintain their relationship with their setting (Weick, 1968). Participant observation serves the main purpose of observing, with participation itself remaining a peripheral role. On the contrary, observant participation is primarily about participating, sometimes to the detriment of observation. Its main purpose is to produce data from one's own subjective experience as participant (Soulé, 2007). In the same vein, Wacquant (2015) calls for embodied approaches in which researchers, like the individuals they study, understand their object of study through their own body. For example, in his research on learning to box in a club in a Chicago ghetto, the researcher himself did the training at the rate of three sessions per week (Wacquant, 1989). Finally, the participant researcher can play a transformative role in action research strategy. As artifacts have their own physicality and are perceived by several senses (Gagliardi, 1990), the direct multisensory experience of the observer makes observation an interesting method for discovering and better understanding the physiological effects of artifacts.

Some advantages of observation as a method for studying materiality in organization research include: global apprehension, no need for actor awareness, potential for stimulating behaviors, and ability to experience the multi-sensory effects of artifacts oneself. However, how to observe artifacts and spaces is rarely addressed in the literature on observation. For example, Weick (1968), while detailing techniques to record facial or bodily expressions, did not specify how to observe physical environments. Nearly half a century later, books dedicated to observation still devote little attention to materiality (e.g., Arborio & Fournier, 2015). The following section presents several observation techniques to take physical environments into account in organization research.

How to observe materiality

The three components of materiality – activities, conceptions, and lived experiences – require different data collection techniques. As noted earlier, observation provides direct access to materiality that cannot be obtained through interviewing. However, observation methods do not provide direct access to each of the components of materiality and their effects. Indeed, lived experiences, being individual and including a cognitive part, require interviews to collect data on the feelings and interpretations of actors. I have grouped observation techniques into three approaches according to the role of sight in apprehending relationships between the material and the social. These are: *observing materiality in actions*, *observing beyond seeing*, and *making participants observe*. Each is a primary means of accessing one component of materiality, and each traditionally connects to different theoretical perspectives. The first approach – observing materiality in actions – is useful for studying the activities component, which refers to actions and interactions between humans and physical artifacts and spaces (particularly in production and use). It can be found, for example, in the socio-material perspective (Hindmarsh & Llewellyn, 2018), practice perspective (Nicolini, 2013), and ANT (Latour, 2005). The second approach – observing beyond seeing – brings together techniques that aim to apprehend feelings, conceptions, and absence. These techniques allow observers to grasp more thoroughly the effect of materiality when artifacts are static and sometimes highly distant from the social, but act through odors, sounds, and the meaning actors give to them. Some of the techniques are useful for studying the conception component. As physical artifacts and spaces mediate culture, order or institution,

observers can understand their instrumental and symbolic dimension and grasp their aesthetic dimension with all their senses, not only sight. For example, these techniques can be used in neo-institutional, post-modern, and cultural perspectives (e.g., Gagliardi, 1990; Kunter & Bell, 2006). Finally, making participants observe is the most indirect observation method as it delegates observation to participants themselves. This third approach is most relevant in studying the lived experiences component and can be used, for example, in the phenomenological perspective, identity research (Bechky, 2008; Davison & Warren, 2017) and critical perspectives.

Observing materiality in actions

Observing materiality in actions allows researchers to study activities, including the production and use of physical artifacts and spaces. As this activities component is close to social interactions between individuals, the techniques present no notable peculiarity aside from attention to materiality in actions (even in the absence of individuals). As observers – whether participant or not – researchers need to record various data including who is present, what each actor does with artifacts, how they do it in the physical space, and what they say about artifacts and spaces during the action. Hindmarsh and Llewellyn (2018) argue that observation must be limited to this and exclude any search for possible effects of artifacts that are not touched or invoked during the action because they are deemed irrelevant. This posture solves the intrinsic "problem of relevance" that arises from observing materiality. Materiality is omnipresent and, therefore, necessitates a focus on what is relevant to the research question (Hindmarsh & Llewellyn, 2018). However, such actor-focused perspective neglects distant effects of materiality that may not be verbalized such as light, odors, or feeling of a space. It also ignores productions by artifacts themselves, which can have delayed effects on the social realm: for example, an accumulation of products or waste that piles up in a production chain and can be discovered by actors later. Taking into account activities of the artifacts widens the points of attention of observers, but not the available techniques for observing them. These include video, photography, sketching, and note-taking.

Video is now the preferred method to record empirical details (for an introduction see LeBaron et al., 2018). It is an interesting technique because of its capacity to preserve both verbal exchanges and the richness of image, in addition to actions. The possibility of seeing and reviewing the film in slow motion allows a fine analysis of actions and behaviors, including facial expressions and tiny movements (Thierbach & Lorenz, 2014). It allows researchers who view the action to stop and zoom in on artifacts and spaces under study and examine how they are used.

A fixed video camera with continuous recording can be used to provide a sample of actions in the same place that can be easily compared. This fixed video camera technique is useful to study ordinary situations in ethno-methodological perspectives. For example, Hindmarsh and Llewellyn (2018) used it to study the end of consultations with patients as part of their research on dentists' learning. When action is not repeated in the same place, devices embedded in eyeglasses, for example, make video-making even less intrusive than mobile phones. However, the richness of video has some drawbacks. First, film analysis is highly time-consuming and can be tedious. Further, although video permits the collection of fine-grained data, it does not necessarily record all the data that researchers would like. This is particularly true when several people are busy around something or someone, masking part of the action, of people, and of artifacts. In these situations, it can be interesting to multiply the angles of view which can be done, for instance, by a team of multiple researchers. This division of data collection work can be performed according to the focal points (i.e., individuals and artifacts to be observed) or additional data collection techniques (i.e., photography and note-taking). Finally, video raises ethical and practical questions (Boxenbaum et al., 2018) that will be examined in the discussion section; notably, obtaining consent from actors.

Photography, because of its static nature, is not the richest way to capture action but it may be more easily accepted by participants. It allows researchers to record relationships to objects in the studied context, such as how people handle and view them. As part of a 6-year ethnographic research on culture change in a Coke plant, Down, Garrety, and Badham (2006) photographed employees at work (Figure 1). The photographs captured both the hostile environment and the masculine character of the work by teams of specialists who maintain and repair the doors and other aspects of the Coke oven battery.

When used systematically, photography can record an entire process. For example, Comi and Whyte (2018) did this during their ethnographic study of a project in an architectural firm to understand how visual artifacts participate in the transition from an imagined future to a realizable course of action. They took 600 photos of artifacts successively produced and used to arrive at the model of a real estate project, showing how these artifacts allowed imagining, testing, stabilizing, and reifying the project. Besides planned and systematic uses, other authors (e.g., Kunter & Bell, 2006) call for an emergent-spontaneous use of photography, which permits the collection of interesting data when something unexpected but revealing occurs. Photography can also be useful to show consequences of action. For example, Harper (2005) considers it particularly interesting for studying change: two photos of the same place, before and after, can provide rich details to examine and compare.

Figure 1. Specialists adjusting battery doors (Down et al., 2006, p. 102; reprinted with permission).

Drawing, which was part of the traditional ethnographer's tool kit, tended to disappear with photography. However, sketches remain important in representing spaces as well as the actions that can take place there. For example, Barrett et al. (2012) reported in their article the schematic view of a hospital pharmacy before and after the introduction of a dispensing robot. The reader can therefore easily perceive the transformation that has taken place, including the importance of the space occupied by the robot and the division of the space it created (Figure 2).

Figure 2 illustrates how sketches can capture the spatial dimension; for example, the distance between shelves and the size of the robot – two aspects that may not be well captured by photography. Drawings and sketches can also represent an entire partitioned space, which cannot be done with photography either. Additionally, sketches can quickly represent flows by means of arrows to record movements by artifacts and people. As such, sketching may be more suitable for recording action data compared with photography.

Note-taking remains an important technique with many advantages. While it may not be well-suited for recording in settings with multiple or fast actions and people talking, it works best when action is slower, unexpected, and takes place over a longer period of time. There are many different ways of taking notes, from the traditional notebook to the computer, tablet, and mobile phone that can be used as a Dictaphone. Choosing between paper and digital media is essentially a matter of personal preference, as the two are substitutable in many contexts. Whatever the medium chosen, note-taking is a valuable technique in that it allows observers to record not only what they see and hear, but also what they feel, think, and do. This is particularly important for participant observation. Textbooks recommend splitting such notes into three sections. While the main part aims at describing action as precisely as possible in its context, the section on 'methodological notes' (Groleau, 2006) records interactions between observer and observed. These notes can later be used to analyze the impact of researchers' presence on the organization, and possible consequences of these interactions on collected data and analyses. Finally, the third part records ones impressions, intuitions, and elements of conceptualization. Because methodological notes and impressions relate to given descriptions, note-taking is often used to complement visual techniques. For example, researchers using video recording indicate that they regularly write down the exact time of their note-taking in order to precisely match notes with the action recorded in a video.

Sometimes the abundance of material to record can feel exhausting and overwhelming to researchers. Observation requires concentration, which decreases over time. In intensive collection contexts, a team approach is recommended. For example, in their research on spatial orientation, Thierbach and Lorenz (2014) took advantage of a 2-day event to collect data. As time was so limited, data collection was necessarily intensive. In order to collect a large amount of high-quality data, the authors decided that no researcher would observe for more than two hours without a break. In addition, each observer had to change location after one hour to avoid monotony, to multiply observation locations, and to get data from different observers at the same location. Such arrangements are possible when activities can be successfully anticipated. This is not the case in observation settings that are characterized by infrequent episodes involving multiple fast-paced actions interspersed with long, dull periods without action.

The different observation techniques – that is, video, photography, sketches, and note-taking – can be combined when observing materiality in actions. Sketches can be part of note-taking, and notes are useful complements to photography and video. In addition, photography can be combined with interviews, such as in the photo-interview technique (Harper, 2005). This consists of conducting individual or group interviews based on photographs, maybe taken earlier by the researcher. The photograph serves as a stimulus during the interview to better convey actions and reactions of participants. The image stimulates memory to a greater extent than an interview without visual imagery would (Harper, 2005).

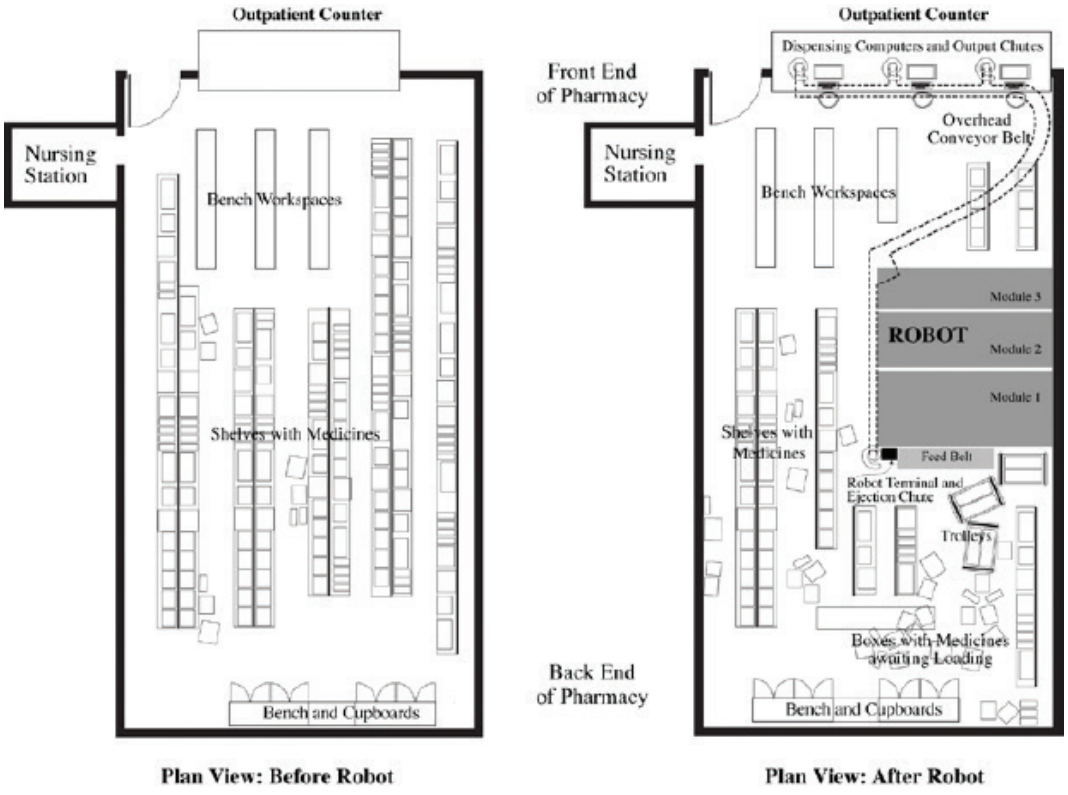

Figure 2. Layout of Duke Pharmacy before and after the installation of the dispensing robot (Barrett et al., 2012, p. 1453; reprinted with permission).

The same holds true for a video made by the observer. Portions of a video can be shown to actors who are asked to comment on what they did, as in the self-confrontation interview technique (Rix-Lièvre & Biache, 2004). Several authors (e.g., Bechky, 2008; Patton, 2002) indicate that photography can also be used as memory aid for observers. Photographs can remind observers of some activities that took place in the research setting but were not recorded in note-taking, perhaps because of time constraints. All the techniques that have been presented in this section to observe materiality in actions are mostly visual and may overshadow effects of materiality that are not detected as visible movement. Other techniques, or other ways of using the same techniques, can be used for this purpose.

Observing beyond seeing

One challenge of organizational ethnography is to make the familiar strange so as to infer what goes without saying (Ybema & Kamsteeg, 2009). To this end, chance is an ally of researchers. Unexpected incidents – particularly malfunctions such as a computer network shut down – make it possible to detect effects of artifacts that are no longer noticed. Among those overlooked artifacts are fixed artifacts of the environment, effects of which are not detected as visible movement, but can impact actors by their meaning or through senses such as hearing or smell. The techniques grouped in this section aim to record feelings and access to conceptions. The first technique is to experiment by oneself, the second is to examine artifacts and spaces, and the third provides ways of apprehending absence as defined by Lefebvre (1980) as part of a continuum with presence.

Experiencing materiality by oneself

Artifacts and organizational spaces integrate institutional arrangements and influence behavior, particularly by guiding and structuring the sensory space (Gagliardi, 1990). Both are perceived by the body (Lefebvre, 1991; Merleau-Ponty, 1945). Thus, observers – like anybody else – can personally experience the effect of artifacts with their five senses (Arborio & Fournier, 2015; Gagliardi, 1990) – notably their aesthetic and symbolic dimensions. This is particularly true for physical spaces whose apprehension first passes through the body (Lefebvre, 1991), which is capable of remembering it (Schatzki, 2001a). Observers can experience a space by walking through it, being

attentive to its design and the objects therein, and using some objects. They can take time to listen, to smell, and to touch. Observers can feel the comfort of a seat, the brightness of a place, the fatigue of walking through wide spaces, and the emotions this provokes. For example, in their research on the experience of a new place as an atmosphere (de Vaujany et al., 2019), researchers built upon their own experience of 110 tours of collaborative spaces that were empty most of the time to identify the emotional registers used by tour guides to produce a particular atmosphere.

Reh and Temel (2014) propose a four-step observation process, implemented in their study of classroom atmosphere, to observe materiality with the five senses. In the first step, observers capture the action and the material context with "free floating attention" which covers people and physical environment. In the second step, observers focus on the physical environment. The authors state that they try "to trace how the surrounding materiality of space encounters [them] – to perceive and sense what [they] hear, smell, see and feel, to respond to the atmosphere of the space [they were] in, to the interaction between [their] body and its material surroundings" (Reh & Temel, 2014, p. 174). This global perception of the surroundings by the body requires observers to turn their attention away from actors so as to focus on their own sensations. In the third step, observers focus on individual things and details to improve their perceptions by activating all their senses. For this purpose, it is possible to dissociate the senses. For example, headphones can suppress sound while closing one's eyes removes sight in favor of the other senses. The fourth and last step involves reverting to the ordinary posture of observing activities while considering one's own lived experience. Relating one's personal experience with observation can lead one to identify relationships between the material and the social that had not been perceived before.

Gagliardi (1990) also suggests that action and communication tend to grab attention. Thus, capturing the language of artifacts is best done in isolation. To do so, he stays in the organization after all other people have left the place so that he can better grasp the language of artifacts. He also notes that the ability to capture specificities erodes with time spent in the setting. Consequently, the first visits are particularly interesting to apprehend the sensory singularities of an organization.

Examining physical artifacts and spaces

A detailed examination of artifacts and spaces is a means of identifying the conceptions that they materialize and convey. This examination can be done with the artifacts themselves or photographs of them. For example, researchers working on organizational identity can collect visual artifacts produced by the organization to analyze their symbolic dimension (Kunter & Bell, 2006). Gagliardi (1990) wonders whether the best way to study an artifact would be an archeological approach.

Researchers interested in technology can place the study of an artifact itself at the forefront. Leonardi (2017) recommends analyzing the artifact itself as the first step to study materiality. Such examination would include the artifact's component materials, how they are arranged into particular features, and what the artifact's features allow users to do, in order to identify use limitations. Leonardi argues that the study of materials is a prerequisite to understanding the use of technological artifacts and associated lived experience, because both depend on the physical properties of artifacts, which favor or constrain their use. Leonardi illustrates the importance of materials by recounting an experiment he runs in class. He indicates that, when volunteers are asked to stand on a chair, they remain on those made of steel but do not stay more than a few seconds on those made of soft plastic.

Photography can also be used when studying conceptions in research on organizational culture (Gagliardi, 1990), or identity (Bechky, 2008) for example. Lefebvre (1991) emphasizes that photography provides only a fragmented image favoring form over content. Taking the example of a house, he contrasts the immovable nature of a house easily rendered by photography with the flows of energies (water, electricity, etc.) consumed by its occupants and hard to capture by photography. Despite the limitation that reinforces illusions, Lefebvre (1991) does not deny the impact of the visible world in imposing standards. Photography is therefore suitable for studying conceptions that are social representations. As the materialization of producers' conceptions, artifacts not only guide behaviors but also generate meanings and emotions.

Despite its limitations, photography is an interesting technique because of its great efficiency. A few photographs are sufficient to record all visible artifacts in one place. Photography, thus, saves time compared to note-taking. In addition, it can provide data on things that researchers may not have noticed while on site and therefore could not record in their notes. Photography further permits the examination of images of artifacts and spaces, and facilitates comparison among them. It thus offers an opportunity to think more deeply about objects and their meaning (Bechky, 2008). When the meaning of a given space is not manifest, researchers can imagine removing one artifact it contains or replacing it with another, with opposite features, in order to better understand its influence. For example, in their study of an organization (assigned the pseudonym 'Angelic'), Kunter and Bell (2006) used photographs of spaces and artifacts produced by the organization. During an initial visit to the organization, Aylen Kunter took a

picture of the kitchen wall (see Figure 3), which was covered with portraits of Angelic's employees as babies. These portraits also appear on the organization's website. This photograph of artifacts staged in an organizational space is an interesting piece of data about organizational culture (in this case, a culture where employees are treated as children of the same family). Kunter and Bell note that this photograph highlights the visual nature of the organizational culture and facilitates convincing analysis compared to fieldnotes and interviews.

Finally, to enrich the analysis of conceptions of artifacts and spaces, deconstruction (Derrida, 1976) can be used. Deconstruction, originally, aims at generating new interpretations of a text through in-depth analysis of its construction, including recurrent exclusions (for applications in management, see e.g., Kilduff, 1993; Martin, 1990). Its use was then extended to pictorial, cinematographic, and architectural works and spaces (Brunette & Wills, 1994) and is part of visual research in management (Campbell, 2012; Maire & Liarte, 2018). Campbell illustrates the deconstruction of an image with the corrected map of the world by Mc Arthur. By reversing north and south and placing China at the center of the world map, Mc Arthur shows that maps do not reflect the world but are based on a convention that "centralises and often enlarges Europe" (Campbell, 2012, p. 110).

Accounting for absent artifacts

Literature on organization has focused on materiality of presence, but Giovannoni and Quattrone (2018) call for organizational research on "materiality of absence." Building on Lefebvre (1991), they argue that absence can also produce organizing effects. For example, in their study of the incomplete cathedral of Siena, Giovannoni and Quattrone (2018) show that the impossibility of the full representation of the cathedral provoked the maintenance of the organization throughout the entire period during which solutions were sought. In this case, absence did not influence the dynamics of the organization by the immanent presence of something existing (absent presence), but by the non-existence of something, which they describe as "present absence." In this case, they show that the incompleteness of the structure resulted from being unable to align civic, financial, architectural, and religious powers regarding the conception of the cathedral.

In their article on desks, Conrad and Richter (2013) included the absence of tables. They illustrated it with

Figure 3. Portraits on Angelic organization's kitchen wall (Kunter & Bell, 2006, p. 185, reprinted with permission).

photographs of meetings with absent or neglected tables at the RAND Corporation. According to them, absence of tables can be interpreted as a mark of unconventional attitudes favoring creativity, although other interpretations could be found as well. Identifying the relevance of absent materiality and its consequences on organizations through observation is difficult, yet possible. The relevance of something absent can be established in relation to normative expectations (Lynch, 2001): something should exist and yet is not there. For example, the observation of the unfinished facade of the cathedral of Siena immediately indicates an absence because what one sees is not congruent with the conception of cathedrals (see Figure 4).

The same is true of the absent tables in photographs of meetings at RAND Corporation, where people sit in a circle on the floor or on chairs. The consequences of absence can be actions – such as the search for solutions in the conception of the Siena cathedral – but also lack of actions. In this latter case, Lynch (2001) suggests systematically recording practices in order to show those that have not been carried out.

Techniques aiming at observing beyond seeing all rely on researchers as subjective individuals who experience materiality themselves and examine artifacts and spaces. They can complement data from techniques aimed at observing activities by adding physiological effects and conceptions carried out by physical artifacts and spaces. However, they do not give access to the lived experiences of actors (except those of participant observers).

Making participants observe

Lived experiences constitute the third component of the triad necessary for a comprehensive understanding of materiality. Although physical artifacts and spaces embody the conceptions of the individuals who produced them, the experiences of producers and users can differ depending on their prior knowledge and experience. For example, Rafaeli and Vilnay-Yavetz (2004) studied how stakeholders made sense of buses from a transport company in Israel. They showed that the dark green color generated unsolicited emotions toward both artifact and organization that could differ broadly among respondents. Some perceived the color as beautiful and others as ugly; some associated it with environment and nature and others with terrorism, war, or camouflage. The authors used traditional interviews as the primary method of data collection. Compared to this method, *making participants observe* consists in generating interviews from photographs, videos or drawings produced by participants themselves. As Davison and Warren (2017, p. 119) note, it is about "seeing the world through someone else's eyes." The various techniques available to researchers make different contributions that are presented below.

Having participants photograph physical artifacts and spaces that they have deliberately chosen gives researchers access to their representations and perceptions using the photo-elicitation technique. For example, in her research on organizational aesthetics, Warren (2002, p. 232) asked participants to photograph what "represents their work

Figure 4. Unfinished facade of the Siena Cathedral (© Tomáš Zrna, https://www.flickr.com/photos/gregor_samsa/29290454612, reprinted with permission).

environment to them." The associated interviews are essential for understanding the photographs, as images alone can be misinterpreted by researchers (Bolton, Pole, & Mizen, 2001). The images are used as stimuli for the interview. Researchers ask participants why they chose the object or space on their photograph and what are its features, in order to understand the meanings and perceptions arising from the participants' lived experience.

Images also often provide richness of details that can help researchers prompt participants during interviews. Davison and Warren (2017) indicate that Parker and Warren used this photo-elicitation technique in their research on the presentation of self and professional identity of accountants. Participants were asked to take photos of scenes, objects, people, and places that represented their identities as accountants. They were then asked to sort them according to whether or not photos expressed who they are before beginning the interview. Other uses of photographs are possible as well. As part of their research on part-time child workers in Great Britain, Bolton et al. (2001) had young people aged 11 to 16 take pictures that represent their working life.[1] Strikingly, these photographs almost always showed empty places and no action. The authors believe that photographs helped them discover the material conditions in which these children work – often behind-the-scenes cleaning work, unknown to customers and researchers – in addition to the way they perceived their role in the organization employing them. In their research on the institutionalization of suffering, Stowell and Warren (2018) used photo-elicitation in a particular way: Stowell, who took the photographs as part of her auto-ethnography, was asked by her coauthor to comment on them.

Participants can also record their own experience using body video cameras (Rix-Lièvre & Biache, 2004). Recorded data are very close to the lived experience. Researchers can see what the participant focused on in a context enriched by sound, including heartbeats, which can be useful for studying emotions. In the video elicitation interviews, researchers view portions of the film with participants, who explain their actions and sensations (Rix-Lièvre & Biache, 2004). Body video cameras, however, have limitations similar to those of photography. In their research on refereeing, Rix-Lièvre and Biache equipped referees with body video cameras. The resulting videos, although shaky, were easily understood by the referees who had recorded them, whereas other viewers could find them to be disturbing or destabilizing. This indicates a need for associated interviews with the participants who recorded the videos. Other techniques are available when research requires precise data on attention, provided context allows. For this, eye-tracking devices (glasses that participants wear for the experiment) provide precise identification of the eye's focus point. For example, in their research on orientation in space as a social process, Thierbach and Lorenz (2014) use this technique to capture the focus of gaze during the way-finding process, including use of maps.

Finally, observations made by participants can also be recorded in notes, drawings, and sketches. Drawings and sketches made by participants provide mental representations with their selections and omissions (Edinger, 2014). These selections, omissions, and possible additions provide an advantage over photography by better representing the necessarily subjective and partial perception of individuals. When produced outside the studied physical environment, drawings and sketches also give access to participants' memory. In her research on space perceptions of university library users, Edinger (2014) invited participants to visualize their library and draw their mental representation, called mental map. She asked them to draw from memory the map of the library, and in this map their favorite place with its features. Similar to photography or video recorded by participants, the drawn maps were accompanied by interviews focused on the subject's favorite place. They allowed identifying patterns of disorientation because of lack of knowledge and to architecture, as well as appropriation of space by students (Edinger, 2014).

Discussion

Following the material turn that calls for the reintegration of the material in the study of social phenomena, I have presented a panorama of observation techniques to study the influence of physical artifacts and spaces on organizations and organizing. I grouped them into three approaches, each being best suited for one of the three components of materiality (activities, conceptions, and lived experiences) (see Table 1). Together, these three approaches – observing materiality in actions, observing beyond seeing, and making participants observe – provide access to a comprehensive understanding of materiality.

Each approach has been associated with the component of materiality it suits best, and therefore should be selected to study this component. However, those approaches are not exclusive and can contribute to the study of other components. Observing materiality in actions is probably the richest in that, in addition to actions and interactions, it can be used to infer conceptions directly or through behavior. It also provides data on the lived experiences of individuals, especially the emotions legible on their face and the interpretations that participants verbalize during action. The techniques for observing beyond seeing, which stimulate bodily perceptions or attention to infer conceptions and meanings, also fuel the lived experience of the researcher. Finally, making participants observe can also be a means of studying the conceptions of artifacts and spaces as

[1] Working is authorized in Great Britain on a part-time basis up to 25 h per week starting at the age of 13, and full-time at the end of compulsory education at the age of 16.

Table 1. Observation approaches of materiality

Approaches	Main component of materiality	Goals	Techniques	Attitude of the researcher
Observing materiality in actions	Activities	Record actions and interactions between the material and the social in the production and use of artifacts and space.	Video (possibly with interview). Photography (possibly with interview). Sketch. Note-taking.	Active attitude on the alert to capture activities as they happen. It can include participation.
Observing beyond seeing	Conceptions	Infer conceptions embedded in physical artifacts and spaces.	Examination of artifacts and spaces or the photographs representing them.	Stand back from action: - to concentrate on inference of conceptions and meanings;
		Apprehend corporal and cognitive effects, including from static and distant artifacts.	Sensory experience of researcher.	- to focus on their own sensations.
		Account for absence of artifacts.	Grasp absence by comparison.	
Making participants observe	Lived experiences	Record interpretations and feelings of participants.	Elicitation interviews based on photographs, videos, drawings made by participants	Empathic listening

perceived by the participants, as well as a means of collecting some data on actions. Further, the overlap between approaches gives an opportunity to triangulate data.

Scope of use of techniques

Most of the observation techniques are valid across epistemological perspectives. Indeed, it is mainly the way a technique is used and to what end that inscribe it in an epistemological perspective (Ackroyd, 1996; Royer & Zarlowski, 2014). Many techniques can be used in research strategies as different as ethnography, action research, case studies and quasi-experimentation.

The techniques for observing materiality in actions – that is, video, photography, sketching, and note-taking – are free of epistemological imperatives. In particular, they can meet the criterion of researcher objectivity, which is necessary for validity in positivist research. These techniques are commonly used in ethnography, which as a research method is well-recognized in all positivist, interpretive, and constructivist perspectives (Reeves Sanday, 1983; Yanow, 2012). For example, ethnographic techniques have been used in Zuzul's (2019) research on boundary objects as generators of conflict in an objectified approach; in Stigliani and Ravasi's (2018) research on aesthetic knowledge using Gioia's interpretive framework (e.g., Gioia, Corley, & Hamilton, 2013), and in the posthumanist research by Hultin and Introna (2019) on the impact of work environment on identity work.

The techniques for making participants observe, such as photo-elicitation and self-confrontation, also have a wide spectrum of use including action research and critical perspectives. Indeed, explanations from participants requested by the researcher constitute a source of awareness useful for transformation in action research (Lorino et al., 2011) or emancipatory research. According to the perspective, participants will be considered differently as research objects, informants, research participants, research partners (Pole, Mizen, & Bolton, 1999), or co-inquirers in a co-construction (Lorino et al., 2011).

By contrast, the techniques for observing beyond seeing cannot be used in every epistemological perspective as they rely on the sensitivity and subjectivity of the researcher. For example, auto-ethnography cannot claim objectivity as a major interest of this approach lies precisely in the subjective experience of the researcher (e.g., fatigue or suffering) (Stowell & Warren, 2018). Regarding deconstruction, which aims at creating new hidden interpretations (Campbell, 2012; Maire & Liarte, 2018), it is associated with post-modern and critical perspectives.

Combining the three approaches

Using all three approaches is useful for a comprehensive understanding of materiality, for studying the relationships and dynamics among components of materiality (Lefebvre, 1991). However, I argue that the three approaches are difficult to implement simultaneously because of the different attitudes they require from observers. Several authors (e.g., Gagliardi, 1990; Reh & Temel, 2014) have warned researchers against allowing themselves to be dominated by action and to focus on sight to the detriment of other senses. Indeed, observing materiality in actions focuses on activities and social behaviors and requires observers to be on the alert to record what is happening and what is being said. On the contrary, observing beyond seeing requires taking a step back from action and focusing on oneself to reflect and sharpen senses other than sight. Finally, making participants observe requires an empathic attitude toward participants, as individuals, so that they can verbalize their lived experiences. The challenge of different

attitudes, focuses of attention, and paces supports alternating approaches over time or distributing them across a team of researchers.

Alternating among the three approaches leaves room for emergent findings from one approach that could motivate further investigation, implemented with another approach. For example, knowledge about conceptions resulting from observing beyond seeing can guide part of the observation in actions. Conceptions can also be used as a prompt during interviews with participants – for example, to check whether they have perceived them or not. The researcher's lived experience, including feelings, can encourage new points of attention for observing materiality in actions and stimulate conversations to gather the lived experience of participants. For example, in her participant research on the institutionalization of suffering (Stowell & Warren, 2018), Stowell's experience of suffering on-the-job physical injuries while recycling electronic equipment led her to ask her colleagues about job-related injuries, and discover that they, too, were hurt at work but considered it as part of their job. In return, observing materiality in actions help researchers to spot artifacts and spaces that are relevant to study in depth. Observers can then study their conceptions and how participants experience them.

Because of possible positive dynamics among approaches, Gagliardi (1990) suggests starting with the lived experience of the researcher when he or she first entered the setting. Novelty allows researchers to grasp particularities that they can photograph or record before they are accustomed to the environment and no longer perceive them. During observation in actions, researchers can take a step back mentally when situation permits (Reh & Temel, 2014), or physically after members of the organization have left the site (Gagliardi, 1990). A single researcher can alternate among approaches when the pace of action is slow or when staying over a long period of time in the setting. On the contrary, when access to the setting is time-constrained, such as a 2-day event (Thierbach & Lorenz, 2014), the concentration of data collection over a short period of time may require significant upstream preparation and a team among which to distribute data-collection techniques.

Difficulties of visual techniques

Visual techniques provide several benefits in observing materiality, but also pose ethical and pragmatic challenges (Boxenbaum et al., 2018). For instance, some activities, situations or organizations cannot be filmed or photographed because of their strategic or confidential nature. When visual techniques are not prohibited, participants can resent intrusiveness because the video camera is not as discreet as a notebook (Warren, 2002). Discretion has improved with modern equipment, such as cell phones. They are smaller than notebooks and people have grown accustomed to seeing such devices recording everywhere. However, feelings of intrusion can still be an issue. When participants are not accustomed to being filmed, Bottorff (1994) recommends making video familiar by filming regularly before the period of interest to the researcher and filming over periods longer than required for analysis during the period of investigation. The initial discomfort can disappear over time, even quickly if participants get involved in the action (Bottorff, 1994). Reluctance can stem from fears on the part of participants regarding their evaluation or diffusion of what has been filmed that could harm them. This reluctance can be removed by participants' trust in the researcher, which increases when they get to know each other during prior interactions. This trust requires the researcher's commitment to respect the right of participants to anonymity and confidentiality, by implementing all necessary procedures according to ethical principles of research. When participants change their mind, researchers must erase records related to them. Such loss can be necessary to pursue the ongoing research (Bottorff, 1994). The major difficulty of visual data is less in the possibility of capturing images to study and analyze than in their diffusion, including in academic publications. The use of people's visuals impedes confidentiality (Harper, 2005). The same is true of organizations that can be identified by their logo (Kunter & Bell, 2006), products, or headquarters. Blurring and cropping, while technically possible, can make visuals uninteresting. Therefore, the explicit consent to diffuse images by recognizable persons and organizations is paramount.

In addition, the ethics of visual techniques pose pragmatic challenges. Obtaining a signed form of consent from every person in a picture can be difficult when people are numerous. Boxenbaum et al. (2018) also note copyright issues that make the use of visuals difficult or expensive. As an academic author, my experience is heterogeneous. Obtaining copyright permission can be quick and easy when asking photographers, and certain academic publishers that have platforms from which one can obtain such permission for free with a few clicks. It can also be long, complicated, and costly with other publishers and organizations, to the point that one has to remove the visuals from one's manuscript. Boxenbaum et al. (2018) also mention the cost of printed publications on paper. Such cost might explain why there are few images in most printed publications despite the use of visual techniques by authors.

Conclusion

In response to the material turn in organization studies (Boxenbaum et al., 2018; Carlile et al., 2013), this article provides researchers with a panorama of techniques for observing materiality in and of organizations, grouped into three approaches. Specifically, these are: *observing materiality in actions*, *observing beyond seeing*, and *making participants observe*. The three approaches can be combined either alternately or

simultaneously for a comprehensive study of the three components of materiality (i.e., activities, conceptions, and lived experience). By linking observation techniques to components of materiality, this article complements previous methodological work on observation and study of materiality. Extant work has mostly addressed observation as a method in itself (e.g., Adler & Adler, 1994; Journé, 2008; Weick, 1968) or as part of what Denzin and Lincoln (2005) call a research strategy, such as ethnography and ethnomethodology. In any case, this was done without delving into the specificities of materiality. Those papers that have presented methods to study materiality have often done so in the context of a research area such as identity, status, and knowledge (Bechky, 2008); organizational culture (Gagliardi, 1990); or a focus on one type of artifact and space, such as technological artifacts (Leonardi, 2017). In contrast, I aim to bridge conceptual components of materiality with hands-on practicality in a way that cuts across research topics. In doing so, I followed a tradition perhaps best exemplified by Karl Weick's (1968) classic article on observation.

Associating three approaches with the three components of materiality has the advantage of being potentially relevant for a broad range of research involving materiality. Indeed, most of the techniques presented above can be used within various epistemologies, and together they cover a wide spectrum from positivist to postmodern and critical perspectives. Similarly, they are not specific to a theoretical perspective in organization studies, even if their use might suggest so.

Approaches and techniques being related to components of materiality that are common to both physical artifacts and spaces, the same techniques can be used to study both of them. The focus on commonalities does not negate differences between artifacts and spaces. Notably, whereas a physical artifact is inherently composed of materials, space is mostly characterized by an absence of materials. Further, physical artifacts exhibit great variety in terms of size, complexity, and spatial distribution. Callon and Law (2004) note that action can mobilize distant actants – phones for example – who are, therefore, both absent and present. Such spatial distribution has methodological consequences that have not been considered here. Future papers could differentiate observation approaches and techniques according to categories of artifacts. I also excluded the body as subject of research. I only considered how it is affected by the physical environment. Other work could address ways to study the physical body in organization studies.

Observation is a highly valuable method for studying physical artifacts and spaces. Like any method, it entails some difficulties, but it can provide a large quantity and variety of fine-grained data. It enables researchers to study aspects that are non-verbalized or even unconscious. This richness should not preclude using other methods as well; for example, in multimodal research (Boxenbaum et al., 2018). As understanding how materiality impacts organization and organizing becomes a more pressing question, I have argued that observation is well suited to collect rich data across a variety of research topics. The association between techniques and components of materiality should help interested researchers to decide which approach and methods are best suited to their research question and setting.

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