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Combining qualitative methods to study collective cognition in organizations

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ABSTRACT

In this chapter, we argue that combining different qualitative research methods can facilitate the study of collective cognition in organizations, thus compensating the limitations of more traditional approaches. Using our own research experience in studying how designers develop new ideas, we explain how the combined use of ethnography, grounded theory and visual narrative analysis allowed us to gain a deep understanding of how material practices influence collective cognitive sensemaking in organizations. In particular, we show (1) how ethnography allowed us to map and unpack the material practices designers engage in when developing new ideas, (2) how interviews and grounded theory helped us articulate informants' interpretations of these practices and reveal the underlying cognitive processes, and, finally, (3) how visual narrative analysis was useful to systematically track changes in the evolving collective interpretations, and by doing so to link together practices and processes in a longitudinal fashion.

Introduction

The study of collective cognition in organizations can be traced back to the early 1980s, when strategic management scholars started being interested in the interpretive side of organizations (e.g., Daft and Weick, 1984; Kiesler and Sproull, 1982; Sims and Gioia, 1984; Weick, 1979). These studies mostly focused on the role of managerial cognition in influencing strategy formulation (e.g., Huff, 1982, Porac et al, 1989; Porac and Thomas, 1994) and strategic outcomes (e.g., Barr et al., 1992; Barr, 1998; Thomas et al., 1993). Ever since, a rise of interest towards cognitive processes in organizations has diffused throughout different areas of managerial scholarship drawing upon advances in cognitive and social psychology (see Kaplan 2011a for a more comprehensive review).

Early attempts to study cognition in organizations relied upon graphic representations, collectively referred to as casual maps (Huff et al., 1990) or cognitive maps (e.g., Barr et al., 1992; Bougon, 1992; Bougon et al., 1977; Fiol and Huff, 1992, Laukkanen, 1994), to visually capture the content and structure of managers' beliefs about key organizational phenomena and their links to decision-making.

Despite a call for further research using visual representations to collect and analyse data in organizations (see Meyer, 1991), cognitive mapping was gradually replaced by alternative approaches privileging verbal reporting to visual reporting. In particular, spurred by rising interest in how language constitutes ad constructs social reality (Alvesson and Kärreman, 2000), qualitative research on cognitive processes inside organizations turned to examine how conversation, narratives, and accounts shape the convergence around collective interpretations (e.g. Balogun and Johnson, 2004, 2005; Cornelissen, 2012; Donnellon, Gray and Bougon, 1986; Gioia, Thomas, and Clark, 1994; Kaplan, 2008; Maitlis, 2005; Maitlis and Lawrence, 2007; Quinn and Worline, 2008; Sonenshein, 2010).

In recent years, however, the visual dimension in the study of organizational processes has received renewed attention (Meyer et al., 2013). Inspired by a broader material turn in the social sciences (Hicks and Beaudry, 2010), more recent studies have started investigating how material practices and artifacts support collective cognition. This research shows how organizational members typically rely on various artifacts to develop collective interpretations as they formulate strategies (e.g., Buergi, Jacobs & Roos, 2004; Denis, Langley & Rouleau, 2006; Heracleous & Jacobs, 2008; Kaplan, 2011b), exchange knowledge across occupational communities (e.g., Bechky, 2003; Carlile, 2002), and develop and evaluate new ideas (e.g., Hargadon and Sutton, 1997; Sutton and Hargadon, 1996). However, while these studies provide robust evidence that material artifacts and practices may support the development of individual and collective interpretations, they told us less about *how* they do so.

In our study of how designers develop new ideas (Stigliani and Ravasi, 2012), we combined ethnographic observation, grounded theory and visual narrative analysis to unravel the transition from individual to collective level in prospective sensemaking. We argue that the combined use of these three methodologies allowed us to provide a deeper and more nuanced understanding of how material practices influence the development of collective interpretations. Ethnography helped us map and unpack the material practices designers engage in when developing new ideas. Interviews and grounded theory helped us articulate informants' interpretations of these practices, and capture the underlying cognitive processes. Finally, visual narrative analysis helped us systematically track changes in the evolving collective interpretations, and link together practices and processes in a longitudinal fashion.

By doing so, our study provides insights into innovative forms of data collection, analysis and interpretation, which, we argue, compensate the limitations of more traditional approaches to the study of collective cognition, i.e. experimental and natural. In the next

section we review these approaches by explicitly focusing on those studies investigating the links between material artifacts and cognition.

Traditional approaches to the study of materiality and cognition

Research across the social sciences is directing increasing attention to how materiality and visual engagement with reality influence cognitive work. In reviewing extant research on the topic, we identified different methodological approaches, which roughly fall into two main groups.

Experimental studies of materiality and cognition. Some cognitive psychologists argue that cognition is "distributed" in that it does not consist only of individuals' mental representations and operations, but also interacts with a material environment "rich in organizing resources" (Hutchins, 1995: 2). Central to this perspective is the notion of "cognitive artifacts" – such as calendars, to-do lists, computational artifacts, or simply a string tied around the finger – defined as "artificial devices that maintain, display, or operate upon information in order to serve a representational function and that affect human cognitive performance" (Norman, 1991: 17). These artifacts serve as "cognitive extensions" that facilitate various mental processes by extending the capacity of the brain to store and process information (Clark & Chalmers, 1998; Clark, 2008). Research in cognitive psychology also shows that individuals may acquire and process information verbally or visually, and that the strategies they employ have different effects on memory and judgment (Paivio, 1971; Kosslyn, 1976). Visual imagery is also believed to facilitate the comprehension and store of verbal information (Garnham, 1981; Wyer & Radvansky, 1999).

Research on creative cognition – an approach to the study of creativity based on the experimental methods of cognitive science – adds to this line of thinking, suggesting how the exposure to visual stimuli influences the activation of generative cognitive processes (e.g, retrieval, association, analogical transfer, etc.), the creation of pre-inventive structures (e.g.,

visual patterns, mental models, category exemplars, etc.), which are then modified through exploratory cognitive processes (e.g., attribute finding, conceptual interpretation, etc.) (Finke et al., 1992).

Collectively these studies look at artifacts as resources or stimuli to investigate the fundamental mental processes, such as attention, memory, problem solving and creativity, triggered by said artifacts. Although insightful in unpacking the main mechanisms underlying collective cognition, the results of laboratory experiments cannot be easily transferred and applied to organizational contexts, where complex patterns of interactions among people, and between people and artifacts unfold over time.

Natural studies of materiality and cognition. Research in the sociology of science has shown how scientists use a variety of tools, documents, and instruments to shape the collective production of new belief structures. Knorr-Cetina (1981), for instance, talked about the scientist as a practical reasoner, the scientific laboratory as "a local accumulation of materialisations from previous selections", and the scientist's work as an activity "consisting in realising selectivity within a space constituted by previous selections" (1981: 6). Later on, she developed the notion of "epistemic objects" (Knorr-Cetina, 1997) as objects of enquiry – such as a molecule, a production system, a disease or a social problem – argued that the "openness" of these "epistemic objects" facilitate scientific inquiry and the production of new knowledge (Rheinberger, 1997).

In organization studies, research on organizational artifacts has highlighted how physical objects are used to support cognition in situations characterized by a certain degree of ambiguity, and, in some cases, it has traced explicit connection with individual and group-level sensemaking (Bechky, 2008; Pratt & Rafaeli, 2001). The concept of organizational artifact was introduced by students of organizational culture to indicate visible and tangible expressions of a culture (Schein, 1985). Building on this notion, past research suggests how

organizational artifacts influence how individuals interpret organizations and organizational members. Organizational artifacts such as logos, buildings and products influence how stakeholders develop an understanding of an organization (Rafaeli & Vilnai-Yavetz, 2004). Other artifacts, such as office décor, uniforms, and other personal objects represent cues that, combined with pre-existing social categories (acting as frames), help members make (and give) sense of the relative position of other members within the social structure of the organization (Elsbach 2003, 2004; Pratt & Rafaeli, 1997).

Later studies have shown how artifacts affect the social processes through which interpretations are transformed and transferred across different groups and/or professional communities inside organizations (Bechky, 2003; Carlile, 2002, 2004; D'Adderio 2001, 2003; Henderson, 1991, 1998). Because of different background and experiences, different occupational communities tend to develop different understandings of organizational tasks, which in turn may hamper coordination and collaboration across community. Some artifacts, like drawings, machines, etc., that are shared by two or more communities can serve as "boundary objects" (Carlile, 2002, Bechky, 2003) facilitating the transfer and sharing of interpretations and knowledge across communities, and helping members to make sense of their respective contribution to a common task. Collectively, these studies look at artifacts as ways to store and transmit the social knowledge of a community, and to retrospectively reconstruct the meaning structures they embody (see Meyer et al., 2013).

By relying on ethnographic observations and interviews, these studies insightfully pointed out that material artifacts are deeply intertwined in the socio-cognitive dynamics unfolding in various organizational contexts. As mentioned earlier in this chapter, these scholars mainly used ethnographic data of how artifacts are used, exchanged and negotiated to infer the underlying cognitive processes. The limitation that we see in this approach resides in the ability to really understand cognitive processes by inferring them from the observation

of practices, rather than explicating these processes by fleshing out the links between cognition and material artifacts and practices.

In the next section, we describe how we approached the study of these links by combining different methods of data collection and analysis.

How we studied collective sensemaking in an organizational setting

In our study of how designers develop new ideas (see Stigliani and Ravasi, 2012), we were guided by the purpose to investigate how material artifacts – and the practices through which they are produced and attended to – facilitate cognitive work in collective sensemaking. We considered a design consulting firm as an appropriate setting to our research purpose, because designers often face ambiguity regarding both the solution to the problem they address and the context within which this solution will be implemented (Clark, 1985; Lawson, 2005), and use various types of artifacts, such as drawings, sketches, and models, to support their interpretive processes (Boland & Collopy, 2004; Sutton & Hargadon, 1996). Our findings show the interplay between material and conversational practices in the collective sensemaking process, and in particular show how material practices support the cognitive sub-processes involved in the gradual organization of individual interpretations, and the integration of ill-defined early ideas into more refined shared understandings.

In approaching this study we followed common recommendations for ethnographic work (e.g. Jorgensen, 1989; Spradley, 1980; Van Maanen, 1979), and we collected data by combining participant observation of three new product development projects, 56 formal semi-structured interviews and archival data, consisting in company- and project-related documents, as well as pictures and copies of the material artifacts created by designers during the projects. As explained more extensively in Stigliani and Ravasi (2012), we analyzed these data in three steps.

Step 1. Using participant observation to trace individual and group-level practices of sensemaking. Building on the idea that the conversational practices that underpin the production of new knowledge structures are "materially mediated" by textual and representational artifacts (Knorr-Cetina, 1999; Orlikowski, 2007), we began our investigation by carefully mapping the material artifacts that members produced and used in the course of the projects, and the practices that they engaged in as they did so. We did so through deep and prolonged ethnographic engagement with our research site, as the first author spent ten-month as a participant observer in three development projects.

Consistently with a practice-based approach to organizational analysis (Feldman and Orlikowski, 2011), we understood practices as recurring, routinized activities aimed at accomplishing a specific task and associated to specific artifacts (see Table 3 in the published article). Extracting practices from the general ongoing flow of activities performed by designers was based not only on our observations, but – consistently with the idea of practices as being meaningful to the practitioner – also on what informants consistently referred to and labeled as distinctive subsets of activities.

For example, across the three projects observed, we noticed that during team meetings, designers would engage in the tentative grouping and re-grouping of Post-its or cards representing preliminary ideas to trace connections across them and surface possible patters. For instance, during the initial phase of one project, members used cards including demographic information about the informants they had interviewed (age, number of kids, owned cars) and significant quotes from these interviews (see Figure 1). By grouping ad re-grouping these cards based on variables like daily schedules, lifestyles, aspirations, emotional needs, and purchasing behaviors, members eventually identified three main groups characterized by different needs and consumption patterns. Informants referred to this practice as "bucketing."

Figure 1. Bucketing at Continuum

Step 2. Using grounded-theory to articulate cognitive processes. In a second step of analysis, we used interview data to investigate the cognitive sub-processes that, according to informants, material practices and artifacts supported and enabled. In our interviews we asked informants to explain how and why they engaged in these practices, and how doing so helped them accomplish their tasks. Following recent research on sensemaking (e.g. Corley & Gioia, 2004; Maitlis 2005), we turned to common procedures for grounded-theory building (Gioia et al., 2012; Locke, 2001) to analyze our data. We used interview transcripts to capture informants' interpretations of the previously mapped material practices, and we used these interpretations to bring to the surface the cognitive processes underlying these practices.

When explaining how the production and use of material objects helped them produce ad refine new ideas, informants repeatedly used metaphorical expressions suggesting their material engagement with abstract cognitive structures, i.e., "organizing thoughts", "parking ideas", "connecting brains", etc. For instance, informants mentioned how the practice of "bucketing" described earlier helped them "sorting things out", an expression that suggested how being able to physically move cards and Post-its around helped group observations and

tentative ideas into broader categories, based on patterns of differences and similarities (see Stigliani & Ravasi, 2012).

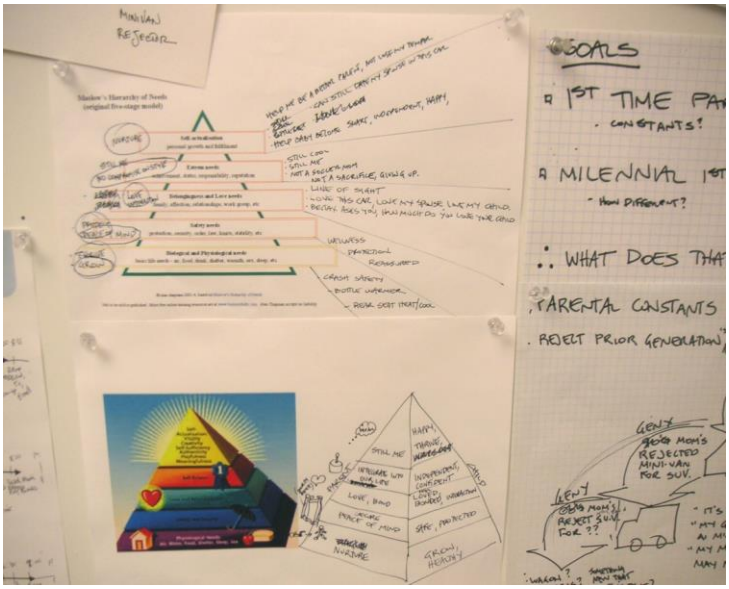
Past research on collective cognition has drawn attention to the importance of metaphors in the negotiation of a consensual understanding of social reality (e.g. Donnellon et al., 1986; Gioia et al., 1994). We used the metaphors that informants' spontaneously produced to account for their material practices (embodying their first-order interpretation of these practices) to infer and theorize the underlying cognitive processes (articulated as a second-order interpretation). Metaphors of physical engagement with cognitive structures, in this respect, helped us overcome the common difficulty to articulate one's cognitive processes and vividly label these processes for further analysis.

Step 3. Using visual narrative analysis to associate material practices to cognitive processes. Combining the map of practices resulting from ethnographic observations with informants' accounts of how these practices supported their cognitive work, we produced a multi-phase, multi-level grounded model of how material practices support collective sensemaking efforts. This phase largely relied on what we refer to as "visual narrative analysis" (not described in detail in article, for the sake of simplicity and space saving). We define visual narrative analysis as the investigation of a process through the systematic collection and analysis of the material artifacts produced and used during such process (for a similar method see Kaplan, 2011b) to document evolving mental structures (concepts, relationships, etc.) resulting from individual and collective cognitive work and embodied in the these artifacts.

Analyzing visual artifacts longitudinally in chronological order, helped us reconstruct how new understandings of users, needs, and relevant design attributes were tentatively explored, connected, refined, discarded, and eventually organized around a new "big idea". This analysis, for instance, showed how a pyramidal representation of Maslow's hierarchy of

needs inspired the evolving artifacts that eventually allowed designers to bring order in their exploration of consumers' needs by visually (and conceptually) arranging them in a hierarchy. When printed on paper, the idea of a hierarchy of needs lent itself to various visual manipulations as team members collectively attempted to merge ideas and link various insights from early stages (see, for instance, Figure 2), until the group converged on a visual representation of the "Vehicle hierarchy of needs" (undisclosed for confidentiality reasons). The new representation was used as a platform to produce further visual artifacts that gradually integrated emerging understandings of user needs, consumer categorization, and product features, to outline potential areas of innovation (undisclosed for confidentiality reasons).

Figure 2. Early visual manipulations of Maslow's Hierarchy of Needs.



The fundamental notions behind Maslow's model, then, triggered the initial idea of hierarchically arranging consumers' needs emerging from earlier field work in a pyramid. But it was the visual representation it inspired that offered an infrastructure to gradually organize insights emerging from the discussion (by providing an implicit relational structure to be filled with content), to keep track of evolving interpretations (as reflected in the numerous

tentative representations that the team produced), to facilitate the integration of different members' ideas (as two or more members physically added their ideas to the emerging framework by writing on a common board), and the establishment of visual linkages among different elements of the task (by using a mix of tables and color codes). In other words, it was the embodiment of Maslow's ideas into a more general visual representation that supported "organizing thoughts", "building on each other's ideas", "keeping the bread crumbs" and other cognitive processes that underpinned the collective sensemaking process.

By combining the results of this visual narrative analysis with the results of the grounded theory analysis, we managed to associate the different artifacts produced by designers at different steps of the projects to changes in the evolving collective interpretations, and by doing so to link together practices and processes in a longitudinal fashion and to produce a more general process model of how material practices support the transition from individual to group-level sensemaking (Stigliani and Ravasi, 2012).

The benefits of combining different qualitative methods

The combination of different qualitative methods allowed us to gain a deeper and more thorough understanding of the cognitive processes supported and facilitated by performing certain material practices. Had we used only one single method, we would have probably not captured the links between the different elements of our model. As mentioned earlier, participant observations of how designers work in group allowed us to identify the micro-practices designers engaged in (e.g. "browsing and collecting", "bucketing", etc.). Had we relied only upon the analysis of only this type of data, we would have probably missed the underpinning cognitive processes. As cognition mostly unfolds in people's minds, we needed to triangulate insights from observations (that in the first place hinted to the development of interpretations by designers) with interview and visual data.

Our interviews had an open format in order to elicit informants' cognitive interpretations of their material practices without "leading the witness". Initially, designers were not aware of the unfolding of their cognitive processes, and simply tended to consider the artifacts they created as simple "tools of the trade". As mentioned earlier, while invited to reflect on how these artifacts, and the associated practices, helped them accomplish their tasks, they often used metaphorical expressions. These metaphors proved very useful for us in order to flesh out the links between materiality and cognition and for informants in order to reach a higher awareness of how the engagement with materiality supports the development of their interpretations. In other words, these metaphors were useful to explain in an analogical way cognitive processes of which designers had only limited awareness, and that could not be illustrated in an analytical way. Our informants considered the increased awareness that they developed while the first author was in the field as important to explain their "technologies" when pitching their work to clients, and emphasize better the added value of their peculiar approach to problem-solving. In addition, the use of visual data (in the form of pictures, diagrams, frameworks, sketches) to complement verbal reporting (both as field notes and interview transcripts) helped us "reveal the data at several levels of analysis, and to induce the viewer to think about substance rather than about methodology (Meyer, 1991: 232)."

Given the benefits illustrated above, we argue that the combination of traditional qualitative methods, and the use of visual data as a complement to narrative data can prove useful in understanding organizational phenomena that involve multiple dimensions (in our case material, verbal and cognitive) and that happen at different levels of analysis (in our case individual, and group levels).

For instance, combining ethnographic fieldwork and accurate tracking of visual artifacts may illuminate our understanding of how "strategy tools" come to be and influence decision making in organizations (Spee and Jarzabkowski, 2009). Research on strategy-as-practice

(Vaara and Whittington, 2012) has draw attention to the vast array of artifacts – Porter's Five Forces, portfolio matrixes, scorecards, etc. – that strategists use to make, illustrate and justify decisions. Some of these artifacts are available as relatively standardized templates, popularized and supported by textbooks, articles and consulting practices; others are produced spontaneously by strategists as they address relatively unique ad context-specific problems (see for instance Gioia & Chittipeddi, 1991). Most of these tools combine concepts and metrics with visual representations of these concepts and the relationships among them. Visual narrative analysis of how these tools are implemented in the context of a specific decision making process may improve our understandings of how available tools are introduced ad adapted in organizations or crafted and developed in the course of strategic planning.

We see a second promising application of this method in the investigation of boundary objects. Past research has focused on the social interactions that unfold around these objects (e.g., Carlile, 2002; Bechky, 2003), but has not systematically examined whether and how visual and material properties of these objects affect the function they perform. In this respect, a comparative analysis of different objects used in similar settings, or a longitudinal analysis of changing properties of the same object may improve our understanding of how material artifacts enable interaction at the boundary between different groups and communities.

Finally, we believe that the application of our method to visual or material artifacts produced by informants as part of data collection may open up new and exciting opportunities for the use of artifacts in the investigation of organizational phenomena. Our study applied visual narrative analysis to naturally-occurring data – artifacts produced by informants as part of their daily work practices. Consulting practice have begun to explore opportunities to stimulate strategy making by encouraging team members to build complex

artifacts to articulate their understanding of the organizational identity and strategy (Jacobs and Heracleous, 2007, 2008). Future research may build on these experiences to develop visual methods of data collection that can be applied longitudinally and/or cross-sectionally to capture cognitive structures and processes that would otherwise be more difficult to access through traditional techniques based on the collection of textual data.

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