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The Naturalistic Experiment: Video and Organizational Interaction

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Abstract

In this paper, we discuss ways in which quasi-naturalistic experiments can contribute to the analysis of social interaction in organizations and our understanding of practice, materiality, and technology. We focus on the contributions of two different types of naturalistic experiments that draw on audiovisual recordings. We discuss how these forms of experiment increasingly form part of a program of qualitative research and the ways in which they contribute both to organization analysis as well as more applied concerns such as the assessment of communicative practice and the design of advanced technologies.

Keywords

qualitative, experiment, video, social interaction

Introduction

It has long been recognized that the experiment, in its various forms, has underpinned some of the highly regarded contributions to management and organization science. Consider for example Landsberger's (1958) discovery of the Hawthorne effect, Lewin's research into leadership (Lewin, Lippit, & Whit,e 1939), or March and Simon's (1958) studies of bounded rationality and decision making. Indeed, it will also be recalled that Frank and Lilian Gilbreth's pioneering motion studies (Belliveau, 2010; Gilbreth, 1911; Gilbreth & Gilbreth, 1917), research that in some cases involved the use of film recordings, also included experiments and trials. While an experimental tradition continues in organization research, as Scandura and Williams (2000), Grant and Wall (2009), Highhouse (2009), and others suggest, only a small proportion of published studies includes either laboratory or field experiments (see Campbell & Stanley, 1966).

The relative absence of experimental research within organization studies derives in part from the wide-ranging critique of the method(s) and the challenges that arise in using experiments to produce generalizable findings. One important motivation for undertaking experimental research is to

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identify robust causal explanations for organizational behavior. Serious questions have been raised concerning the relationships between antecedents and their effect when these concern social action and whether, in many cases, alternative explanations account for any co-variation (see e.g., Aguinis & Bradley, 2014). It has been argued for example that notwithstanding the sophistication of the experiment and the internal validity of the findings, it can be difficult to generalize the findings to real-world organizations and their employees, that is, to achieve external validity. In the case of field experiments and related interventions, there are methodological challenges in sampling, exercising control over key variables, drawing causal explanations, generalizing findings, and even identifying an appropriate setting for the study. Despite the impressive defense of the contribution of various forms of experiment to understanding conduct and cognition (see e.g., Grant & Wall, 2009; Huxham & Vangen, 2003; King, Hebl, Morgan, & Ahmad, 2012; Mellor & Mark, 1998; Sekhon & Titiunik, 2012), these and a range of other concerns pervade the wide-ranging debate regarding experimental methods in organization research.

In this paper, we would like to discuss a distinctive form of experimental research that has become of increasing importance over the past couple of decades, experimental research that involves video-based field studies and is primarily concerned with the analysis of social interaction within work and organizations. This growing corpus of research has emerged in part within disciplines not commonly associated with management studies. For want of a better phrase, we will characterize these studies as *quasi-naturalistic*. This corpus of research includes both field- as well as laboratory- or office-based experiments. These studies involve a close, systematic relationship between field work, primarily video-based studies of work and interaction, add and experiment. In contrast to experimental research that is traditionally undertaken in management and organization studies, be it in the laboratory, office, or the field, they are not primarily concerned with the evaluation of theory or identification of causal explanation but rather with clarifying and discovering the knowledge, practice, and reasoning that inform the interactional production of everyday organizational activities. These quasi-naturalistic experiments are primarily *exploratory*. They form part of a broader program of research or case study in which they are used to expose phenomena and explore particular ideas and solutions.

In this paper, we discuss the methodological and analytic considerations that arise in undertaking quasi-naturalistic experiments and the ways in which they can contribute to video-based studies of work and collaboration. We sketch some of the principal elements and consideration that inform the different types of naturalistic experiments and then focus on two very different motivating examples. In the first, we discuss a program of office and laboratory experiments concerned with the ways in which participants use novel, prototype technologies to undertake a series of collaborative workplace activities. In the second, we discuss a field experiment in which key personnel were encouraged to deploy a set of practices to engender particular forms of co-participation. In both cases, these studies were qualitative, involved the interplay of conventional field studies and experiment, and primarily relied on the collection and analysis of video recordings of real-time organizational interaction. The experiments, like much quasi-naturalistic research, were driven in part by a concern to explore and assess the impact of a particular set of practices, techniques, or technologies but also to expose unanticipated phenomena and the contributions and limitations of analyses based solely on field studies. To begin, however, it is perhaps helpful to provide a little background to these methodological initiatives.

Background

In recent years, we have witnessed the emergence of a substantial corpus of video-based field studies that examine how tools and technologies, ranging from everyday documents to complex multimedia systems, feature in work and organization. This corpus has come to be known as “workplace studies”

and includes research into a broad range of organizational environments, including control rooms, operating theatres, architectural practices, offices, and call centers (see e.g., Engeström & Middleton, 1996; Heath & Luff, 2000; Llewellyn & Hindmarsh, 2010; Luff, Hindmarsh, & Heath, 2000; Streeck, Goodwin, & LaBaron, 2011; Suchman, 2007; Szymanski & Whalen, 2011; for a general discussion, see Barley & Kunda, 2001).

Drawing on analytic developments within sociology, namely, ethnomethodology and conversation analysis, these studies address the interactional foundations of organizational activity and the ways in which workplace activities are accomplished through talk, visible conduct, and the use of various tools and technologies. Video recording, augmented by field studies, has proved critical in this regard, providing the resources through which the routine accomplishment of work and collaboration can be subject to detailed scrutiny and analysis.

These naturalistic, video-based field studies of work and organization have been accompanied by a substantial corpus of quasi-experimental research in which particular practices, techniques, and technologies have been subject to detailed exploration and investigation. These experiments routinely form part of broader program of naturalistic research, video-based field studies of particular organizational activities and arrangements. They have made an important contribution to our understanding of workplace interaction and the resources and practices that inform the accomplishment of particular actions and activities. Perhaps the most familiar example of how these developments came together is Suchman's (2007) pioneering analysis of plans and situated action.

Suchman's study is a wide-ranging critique of the key assumptions that underpin artificial intelligence (AI) and cognate developments within human-computer interaction (HCI). Drawing on ethnomethodology and conversation analysis, the critique points to the limitations of plan-based, cognitive models of human conduct and draws attention to the "situated" character of practical action and the contingent reasoning that enables "users," in concert and collaboration with others, to deploy tools and technologies to perform particular tasks. Suchman's research was undertaken at Xerox and had a considerable impact on the design and development of advanced systems. Indeed, the findings revealed the shortcomings of the kinds of "intelligent" technology being developed by the corporation at the time (Brown, 1991). Perhaps more significantly, Suchman's research also informed the development of the emerging workplace studies: studies that were concerned with exploring the tacit knowledge and practice that enables personnel to accomplish complex tasks using tools and technologies. Suchman's (2007) original analysis served to expose the importance of the situated and the contingent, and yet it derived from her analysis of an experiment. The experiment consisted of pairs of participants using a prototype, "intelligent" photocopier to undertake a series of tasks; their interaction and attempts to use the system were video recorded and subject to analysis. Despite the seeming idiosyncrasy of the experiment, Suchman's (1987) analysis served to generate a number of highly influential and significant findings regarding the use of a new technology. More importantly, her analysis exposed the socially organized skills and competencies on which participants rely in attempting to use new technologies. Her insights concerning the "situated" character of human-computer interaction not only had an important impact on the emergence of workplace studies but also facilitated the use and development of experimental, qualitative approaches for studying and assessing the use of novel technologies (Lazar, Feng, & Hochheiser, 2010; Suchman & Trigg, 1991).

There is a second element to the emergence of quasi-naturalistic experiments that in one sense is both more methodological and more theoretical but closely resonates with Suchman's (2007) analysis. Building on Schutz (1962), Garfinkel (1963, 1967) developed a highly distinctive approach to the analysis of social action, an approach that is articulated in part through a series of "breaching experiments." These breaching experiments included, for example, having subjects clarify the sense of commonplace remarks during conversations with acquaintances, having students return home and act as if they were lodgers, bargaining for fixed-priced merchandise, erasing the first move in the game of tic-tac-toe, and so forth. In various ways, the experiments served to expose the taken for

granted, the "background expectancies" that underpin and enable routine action. They also revealed the ways in which participants seek to normalize discrepancies, preserve a reciprocity of perspective, and reestablish trust (Garfinkel, 1967). Garfinkel suggests, coining Speigelberg's phrase, that breaching experiments are "aids to sluggish imagination"; they "produce reflections through which the strangeness of an obstinately familiar world can be detected" (Garfinkel, 1967, p. 52). As Crabtree (2004) notes, while breaching experiments may serve to engender "bewilderment, consternation, and confusion," they provide an important technique with which to examine how participants themselves respond to, manage, and repair infractions. In turn, they serve to expose and enlighten our understanding of the tacit resources, practices, and reasoning on which people rely in the routine accomplishment of everyday actions and activities.

In different ways, Garfinkel's initiatives coupled with Suchman's critique of goal-oriented, plan-, or rule-based models of human conduct have informed the emergence of a qualitative, quasi-experimental tradition within studies of work and organization. These include both office- or laboratory-based experiments as well as naturalistic interventions in everyday activities and encompass a broad range of small-scale "trials" in which particular practices, technologies, systems, ecological arrangements, task structures and the like, are subject to detailed exploration and in some cases assessment. These experiments include the assessment of specialized skills and communication practices in areas that include health care, education, and public speaking (see e.g., Antaki, 2011; Sarangi & Roberts, 1999). They also include a substantial corpus of research concerned with the analysis of how people respond to and use new technologies, both alone but more generally through interaction with others (Andre, Sellen, schraefel, & Wood, 2011; Hollan, Hutchins, & Kirsh, 2000; Hsieh, Wood, & Sellen, 2006). The aim of these experiments is not solely concerned with exploring the use of a specific set of practices, techniques, or technologies but rather with exposing the unknown or unexpected aspects of social organization that enables the concerted accomplishment of particular actions and activities. These experiments are routinely undertaken in the light of previous studies of particular activities and settings, a program of field research, and seek to explore specific aspects of these studies, expose the limitations and shortcomings of understanding, and reveal phenomena that might otherwise pass unnoticed (see e.g., Johnson, O'Hara, Sellen, Cousins, & Criminisi, 2011; O'Hara et al., 2014).

Both within workplace studies and associated experimental research, it is increasingly realized that audiovisual (video) recordings, augmented by field work, observation, and interviews, provide unprecedented resources with which to examine the fine details of organizational activities, embodied action and interaction. Unlike field observations, recordings provide access to the specifics of talk, visible and material conduct, and the ways in which participants use tools and technologies, objects and artifacts. They provide the resources with which to subject sequences of action and interaction to detailed analysis, repeated scrutiny of particular activities, using slow-motion facilities and the like. They enable researchers to build a substantial data corpus of naturally occurring organizational activities, a corpus that can be interrogated for various analytic interests and concerns. It also enables researchers to assemble collections, in some cases numerous instances of particular phenomena, actions, and activities, and compare and contrast practice and organization across different situations and circumstances involving a broad range of participants. Moreover, unlike other forms of qualitative data, video recordings provide the opportunity to present and discuss data, actual episodes of action and activity on which analysis is based, not only with fellow researchers but also with participants themselves to elicit their insights, observations, and comments, a resource that can prove invaluable when analyzing highly complex sequences of action found, for example, within control centers, operating theatres, or even the office environment. And audiovisual recordings, both of naturally occurring events as well laboratory experiments and real-world interventions, can prove invaluable in engaging practitioners, be they clinicians, engineers, or designers, enabling discussion and debate concerning data, findings, recommendations, and interventions (see Broth, Laurier, & Mondada, 2014; Heath et al., 2010; Streeck & Mehus, 2004).

Table 1. Examples of How Quasi-Naturalistic Experiments Can Vary.

Setting	Laboratory	Field
Experiment type	Trial	Intervention
Experimental period	Minutes/hours- Days	
Task definition	Set/specified	Open
Task duration	30 minutes Minutes/hours	
Participant recruitment	Invited	In setting
Number of participants per experiment	15-30	30 - hundreds
Recording requirements	Analyst focused	Setting dependent
Common relation to field work	Informed by and informs field studies	Informed by and informs field studies
Applications	Design of workplace technologies, assessment of constrained (e.g., one-to-one) communicative practices	Design of practices, techniques, and technologies and assessment of analysis and deployment

Like other forms of qualitative research (consider e.g., Silverman, 2016; Walsh et al., 2015) including those that utilize visual media—photographs, video, and the like—for the study of work and organization (Jewitt, 2014; Knoblauch, Schnettler, Raab, & Söffner, 2006; Ray & Smith, 2012), there is no formulaic approach to the design of these quasi-naturalistic experiments, and we find significant diversity in the ways in which they are organized and subject to analysis. This range is exemplified in Table 1.

There are no predefined requirements for particular forms of naturalistic experiment; however, there are features and considerations that are common to particular types. In general, laboratory experiments are frequently concerned with the exploration and in some cases the assessment or evaluation of a particular technique or technology. The term *laboratory* is used, but in practice, the experiments are more commonly conducted within an enclosed, circumscribed environment such as an office space configured to serve the particular experiment. Laboratory experiments are typically shorter, have a strict time scale and involve preselected participants that have certain characteristics, where they are required to undertake a clearly defined, pre-specific task or set of actions. In contrast, field experiments are undertaken in an everyday organizational setting or environment that is not subject to reconstruction or manipulation. The experiment is more flexible, undertaken over some hours and in some cases, days. Participants are not pre-selected and involve those who are ordinarily involved in the activities that arise within the particular setting or environment. In some cases, this may include the involvement of a substantial number of participants within a public or semi-public setting such as a museum. The tasks and activities that participants undertake are those common to the setting. In other words, while the experiment will involve the deployment of a particular set of practices, a technology, or an artifact, the integrity and characteristics of the setting and its routine activities are preserved as far as practically possible.

These two contrasting types of naturalistic experiment pose different constraints on and considerations for data collection. Laboratory- or office-based experiments provide the opportunity to configure the environment to maximize the quality of image and sound and access other forms of data from the use of computer-based systems and the like. It is not uncommon, for example, to use multiple cameras to enable participants and their activities to be recorded from different standpoints and to integrate real-time data, such as screen changes, into the corpus of recordings. For experiments that are concerned with exploring the use and impact of a complex technological system within the participants' interaction, this flexibility can prove invaluable. In contrast, field experiments can place severe constraints on data collection, in particular on video recording. With the

commitment to preserving the integrity of the setting and the routine activities in which people engage, it is necessary to position and orient cameras and microphones to avoid disruption and remain as unobtrusive as possible. It is not uncommon, for example, to use multiple cameras, but their field of view is often compromised and data collection can involve successive modification until it is possible to identify the most fruitful arrangement. In this regard, previous field work and recording in the setting(s), coupled with detailed analysis, proves invaluable in identifying the most suitable way of collecting data during the experiment.

There is significant variability in the organization and characteristics of both laboratory and field naturalistic experiments. The principle that underpins almost all of these experiments is the commitment to the project or program of research of which the experiment forms a small part. That is, matters of design, structure, and even whether a laboratory or field experiment is undertaken are resolved with regard to the research and progressive development of the principal field studies. Rather than attempt to formalize how different types of quasi-naturalistic experiments are undertaken, in this paper, we will take very different examples, one laboratory and the other field, to illustrate some of the issues that arise in organizing and undertaking quasi-naturalistic experiments as part of a larger field or case study.

In the first instance, we focus on a series of laboratory experiments undertaken to explore the development of sophisticated, prototype technologies designed to support workplace collaboration between remote participants. In the second, we consider how quasi-naturalistic field experiments undertaken in everyday environments were designed to assess particular communication strategies and provoke new and distinctive forms of interaction and participation. In each of these cases, we discuss the challenges and considerations that arise at successive stages of undertaking these naturalistic experiments.

Enhancing Workplace Collaboration: Laboratory Experiments

There has been a long-standing interest in developing technologies to support real-time, synchronous collaboration among participants who are based in different physical locations. These developments resonate with the emergence of the new forms of organizational arrangement that began to emerge in the 1980s and with globalization and the growing emphasis on disaggregation, flexible specialization, and dynamic networks. Video telephony and video conferencing systems were the precursors to these developments, and more recently, publicly available solutions such as Skype and Google Hangouts are increasingly used to support remote collaboration. It is widely recognized that these systems place severe constraints on the type of work and task that can be undertaken by remote participants. For some years, substantial resources have been directed toward the development of technologies, so-called media spaces, that enable more sophisticated forms of remote collaboration across organizational environments (see e.g., Galegher, Kraut, & Egido, 1990; Harrison, 2009). The program of media space research in which we have been closely involved was initially undertaken with Xerox Research Laboratories and more recently has involved close collaboration with research teams in Japan, in particular with partners at NTT Communication Research Laboratories and the Universities of Tsukuba and Saitama (e.g., Luff et al., 2013; Luff, Heath, Kuzuoka, Yamazaki, & Yamashita, 2006). Quasi-naturalistic experiments coupled with studies of work have been critical to this program both in exposing aspects of interactional organization that would otherwise pass unnoticed, as well as informing the progressive design of systems to support remote collaboration. In this section, we would like to focus on one series of experiments, their design, analysis, and subsequent implications for studies of work and organization.

The Problem and its Questions

These experiments emerged in the light of two interconnected "problems," one concerned with the shortcomings of particular technological solutions and the other with our lack of understanding of certain aspects of organizational interaction. It is worthwhile briefly clarifying the character of these two problems.

Traditionally, media spaces consisted of audiovisual infrastructures designed to facilitate communication and collaboration among personnel located within different physical spaces within organizational environments—in some cases within the same building and in others in offices in different regions or countries (Gaver et al., 1992). Studies of how people used these systems identified a number of issues and problems. In part, these problems derived from the model of communication that informed their design and development. Not unlike more contemporary "solutions" such as Skype, media spaces were primarily concerned with supporting face-to-face interaction. They largely disregarded the material and digital resources on which people rely in working together in more conventional everyday organizational environments. And as contemporary organization research demonstrates, objects and artifacts and tools and technologies are essential features of the ways in which participants produce and coordinate their actions and activities within the workplace, be it in the office, an operating theatre, or a control center (see e.g., Barley & Kunda, 2001; Goodwin & Goodwin, 1996; Heath & Luff, 2000; Hindmarsh & Heath, 2000; Nevile, Haddington, Heinemann, & Rauniomaa, 2014).

It was necessary to address two interrelated issues: (a) to develop and assess prototype systems that enabled remote participants to work together drawing on a range of material and digital resources—as they would if they were co-present—and (b) create experimental situations in which it was necessary for participants to undertake collaborative tasks that relied on access to and the use of various material and digital resources. The system called Agora developed by a team of leading computer scientists and engineers at the Universities of Tsukuba and Saitama was designed to enable participants not just to talk and see each other but to have access to different views of each other and their environment. Rather than provide this access through multiple images, the engineers had developed ways of integrating these views through the use of polarized filters, video-mixing techniques, and methods of calibrating images from different cameras. The complexity of Agora undermined the possibility of deploying the system in a conventional working environment. An office-based or laboratory experiment provided the opportunity and the resources to explore the social and technical issues that arise in the use of the system. In the first place, we were keen to explore whether the system would enable remote participants to accomplish complex collaborative tasks dependent on the use of a range of material and digital resources. It was also critical to determine the limitations of the system and its ability to integrate and represent multiple real-time images of action and materials. The experiment therefore could satisfy two sets of requirements, one technical and the other interactional and organizational.

The Design of the Experiments: Identifying a Motivating Case

From the outset, we realized it was necessary to design the experiment on the basis of a *motivating case* that would provide specific requirements for the technology and the tasks undertaken by subjects or participants. Our studies of work and collaboration within a range of everyday organizational environments in areas that included health care, command and control, and the news media provided the resources with which to guide our selection of a motivating case and in particular a case in which participants relied on a broad range of material and digital resources when working together. We settled on design and architecture—a setting in which we had undertaken extensive field studies and had some familiarity and involved collaborative tasks that required access to both

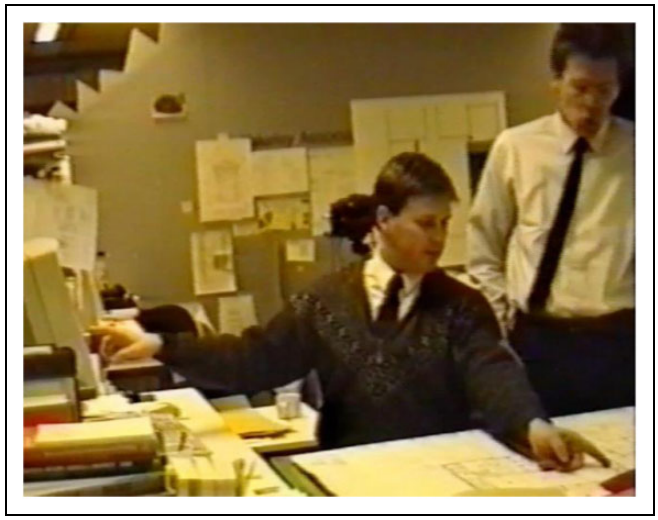

Figure 1. A frame from a video fragment that was used to inform the design of a quasi-naturalistic experiment. In this fragment, in a discussion with the architect on the right, the architect on the left juxtaposes a feature from study reported on the screen with one drawn on a paper plan. This form of collaboration where material and electronic documents are interleaved was the kind that the technology endeavored to support.

material and digital resources—sketches, plans, images, and the like (see Figure 1). It is also a working environment in which there is an increasing demand for systems to support remote collaboration—as projects become increasingly international and involve close cooperation between personnel drawn from a range of specialisms.

The Agora system was designed to enable remote participants to talk to and see each other. It provided visual access to the remote participant and their immediate environment, including access to their use of material artifacts such as paper documents as well as screen displays. The engineers had developed a technology that not only involved providing participants with multiple views of each other, their respective domains, their screens, and documents, but also, the system integrated images from cameras and projectors to present the remote participants' conduct in the local domain (see Figure 2). The complexity of the system would not allow it to be deployed in an existing, office environment, such as an architectural practice, and the experiment would have to be undertaken in a laboratory or laboratory-like setting.

Studies of the workplace suggested that it was necessary to prioritize three principal issues in the design of the system for the experiment. First, it was important to enable participants to both see and hear each other, as in the conventional face-to-face view found in many telecommunication systems, but critically, to provide the participants with visual access to each other's digital and material resources, screens, paper documents, and the like. Second, it was necessary to enable participants to see each other in relation to these digital and materials resources, that is, to have the ability to see the other's activity in progress. Third, studies suggested that these viewpoints should be configured so that movements toward or away from an object should appear in a similar way in a remote domain. So, if a participant turned away from one object and toward another, their remote image would reflect that turn. This led to a configuration that in some way reflected work around a desk (see Figure 2) so that when, for example, one party turned toward a feature in their domain, the co-participant would see the shift in orientation of the co-participant as toward the feature as it appeared in their own environment. It was envisaged that these resources would be straightforward to use,

Figure 2. The configuration of the Agora system for the experiment. Details of objects can be referred to in different ways through the different spaces. The image on the left shows the different spaces of Agora. A large life-sized image provides access to the remote participant. A working area projects a general view of the remote desktop. Details can be discussed when documents are placed in a "document space." When a remote participant gestures over the document space of a shared screen, their conduct is projected over the "real" physical object in the local domain. On the right is detail showing how a remote participant's projected hand appears to the local participant.

requiring few changes in how participants might act if they were sharing the same environment. Hence, they would require little instruction in the use of the technology.

We developed a task that would place significant demands on the use of the system, to maximize the necessity to refer to, share, and co-produce digital and material documents such as drawings and plans. The task required subjects, or better, participants, to redesign a geographical area that they were familiar with in this case, a local region or a well-known district of Tokyo. They were asked to first identify problems with the area and then propose solutions and provide arguments for their proposal. They were given a set of documents including photographs, plans, and maps as well as paper on which to draw and write. The task was simple enough not to require lengthy instruction but relatively complex, requiring participants to refer to and discuss materials, such as maps, plans, and sketches, some of which might be located within their own domain and others, within the office of the co-participant. The task was designed to reflect the ways designers such as architects work with each other and enable the participants to identify problems and develop detailed solutions; activities that required sketching, annotating, and synthesizing documents.

The Operation of the Experiment

We designed the task so it could be undertaken within half an hour. We found that the system and the activity required no more than 5 or 10 minutes of introduction before participants were able to begin. Given that the task did require some familiarity with the region that would be redesigned, extensive discussion, and complex forms of reference, we chose participants and arranged pairs that had a high level of competence in the same language (i.e., natural language speakers).[1] Given our interests in the use of the system, reference practices, and collaboration, there was no need for strict selection criteria of types of participant, concerning age or gender, for example, or for pairing up participants in specific ways. We identified 26 pairs of participants: 16 Japanese and 10 English speaking. The participants ranged in age from 21 to 55, and there were roughly equal numbers of men and women. Following the sessions, we held a brief (15 minute) discussion with the participants that focused primarily on their thoughts and ideas concerning the system and whether they found any feature of the task particular challenging or remarkable.[2]

Unlike field studies where complex recording arrangements can prove obtrusive and in many cases impossible, laboratory- and office-based experiments provide the opportunity to record multiple views of particular activities and thereby gain access to certain aspects of action and interaction that might ordinarily be inaccessible. In the case at hand for example, we recorded data from the cameras used in the Agora system as well supplementing these views with wide-angle in situ recordings of the participants—in part so we could determine their actions more clearly with regard to their immediate environment. Together, six cameras collected recordings during each session, and the different views provided an unprecedented opportunity to examine in detail the participants' action and interaction within the production of reference to and annotation of documents, including such features as the design of particular gestures and use and manipulation of tools, pens, pencils, and the like. Wide-ranging access to the activities also provided an opportunity to examine the problems and issues that arose with the use of the system and in particular how the appearance of particular actions on certain displays could momentarily disrupt the activities of the participants. During the experiment, access to the data from cameras provided a way to monitor the activities of the participants in real time, suggesting initial phenomena and issues that may be worth subjecting to more systematic investigation and detailed review following the event.

Analysis of the Experimental Data

As with other forms of qualitative data, the analysis of audiovisual recordings of social interaction is iterative, progressively emerging through detailed inspection of the data and selective transcription of particular fragments. Candidate phenomena are identified, fragments are selected for more detailed analysis, and this analysis of transcribed fragments informs a development of the corpus of fragments to be considered (Heath et al., 2010). The preliminary review of video data, in particular for those with an interest in the social and interactional organization of workplace activities, poses significant challenges. The richness of the data, coupled with the slight and fleeting character of phenomena, many of which will be unknown in advance of data collection, can lead to a time-consuming review and cataloguing of materials, a process that frequently proves inadequate once analysis begins. Transcription is critical to analysis. It is through transcription that systematic observation and analytic insights are generated, and it is through transcription that it is possible to more rigorously identify patterns of action and sequence and progressively, the practices that inform their production. The transcription of talk and visible conduct, including participants' orientation to and use of digital and material resources, is highly demanding, and in consequence, it is neither practical nor worthwhile to transcribe the complete data corpus.

With quasi-experimental data, these difficulties are resolved, at least initially, by virtue of the aims of the experiment and principal phenomena it is designed to engender. In the case at hand, we initially reviewed a selection of recordings that included different participants undertaking the task at different stages of its development. From this review, we identified instances of particular actions and sequences of action where participants referred to features of their own and each other's documents, both material and digital; attempted to establish mutual alignment and a shared understanding; and co-produced drawings, plans, and the like. This collection included examples where the work with and through documents proved unproblematic and cases where misunderstandings and confusion arose and were resolved. We assembled substantial collections of different types of phenomena, action, and action sequence, collections that provided the opportunity to compare and contrast numerous instances of particular types of activity and difficulty across recordings that involved different participants at different stages of the task. In assembling these candidate collections of phenomena, we were able, where helpful, to integrate data from the different cameras, selecting as principal views those that, at least initially, appeared to provide clearest access to the actions in question. The preliminary review and analysis of cases was accompanied by a series of

data analysis workshops, which included specialists in both system design and organization studies. These workshops proved invaluable in developing observations and insights, clarifying ideas and arguments, and building evidence for particular findings. The preliminary review of the data corpus and the data analysis workshops in turn informed more systematic transcription and analysis of particular cases and collections.

Analysis of particular fragments begins with transcription, and transcription frequently begins with the transcription of talk. The orthography was developed by Jefferson (see e.g., Heath et al., 2010) and is widely used in research on social interaction, language use, and discourse. Consider the following fragment. It is drawn from our initial collection of sequences in which one participant refers to a feature of a document. The particular feature is the line of a proposed cycle path that one of the participants, namely Conor, has drawn on the map of the region that they are redesigning. The paper plan is positioned on Conor's desk, and his co-participant, namely, Lucy, points to the map as it appears on a display in her own office. Because of the novel design of Agora, Lucy's hand is projected into Conor's office, pointing at the appropriate place on the physical map. We join the action as Lucy checks whether the line does indeed represent the potential bicycle path.

One feature of this example of reference that drew our attention when transcribing the talk was the seeming uncertainty of Lucy with regard to features of the document. We were interested in whether there was an issue in identifying the object in question. It can be noted that there is a lengthy pause in Lucy's opening remark "So your (0.8) right here you have drawn this line right?" and an attempt to clarify the reference. The utterance is accompanied by a gesture in which Lucy repeatedly moves her index finger up and down the line of the bicycle path as it is displayed on the plan on the monitor in her office. To determine the characteristics of the participants' visible conduct, including their gestures, bodily comportment, and visual orientation and how these are coordinated with the talk, we take the transcript of the talk and progressively inscribe aspects of the participants' actions. This analysis and the related transcript focus on one "package" of activities surrounding two or three turns of talk (see Figure 3).

Transcribing vocal and visible aspects of the participants' conduct provides resources with which to begin to examine the organization of action within the fragment and in particular, identify sequences of action that inform the activity's accomplishment. For instance, in this fragment, we find that Lucy's reference to and initial gesture at the line, "right here," is produced immediately following Conor turning toward the shared screen. Moreover, Conor's shift in orientation begins within the pause, in the turn following Lucy producing "so your" and raising her hand toward the monitor. Therefore, both the gist of the utterance and the accompanying gestures illustrating the line are produced with regard to securing the visual orientation of the recipient to the plan that in turn is established through the way in which Lucy begins the utterance. As she begins to continue "So we have to sa:: y like," Lucy pauses, the pause appears to be occasioned by Conor moving the paper map displayed on the monitor at which she is pointing. As the map comes to rest and Conor reorients to the map, Lucy continues readjusting the alignment of her gesture so it corresponds to the line on the plan. We find therefore an emerging negotiation concerning reference to a feature within the environment and how it is recognizably constituted between the participants themselves, a negotiation that evolves through successive sequences of actions. Referring to an object is not a circumscribed activity undertaken by just one participant but one that is accomplished in close coordination with another.

Analysis of the quasi-experimental data revealed a range of phenomena and issues, both interactional and technical, that required further investigation and informed subsequent research, including data collection, analysis, and system development. First and foremost, it demonstrated the limitations of our understanding of how participants establish and sustain mutual orientation to documents, both material and digital, and of the ways in which talk and interaction reflexively constitute the sense and significance of particular aspects of a drawing, plan, or even fragment of text. Second, the experiment highlighted the importance of peripheral awareness and engagement in

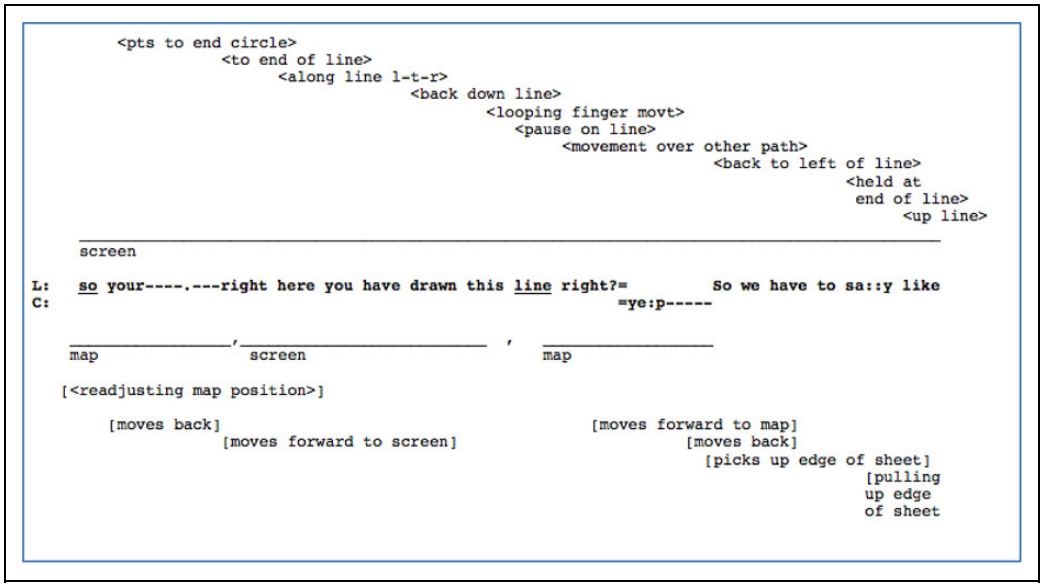

Figure 3. A visual transcript of the conduct of the participants used as a tool to support analyzing fragments of visual and vocal conduct. This has been developed from the format used by Goodwin (1981) and Heath (1986). Conduct is transcribed horizontally across the page, centering on the talk of the two participants: Lucy (L) and Conor (C). In lines just above and below the talk, the directions of gaze of the participants are transcribed. Above and below that, visible actions are transcribed. These include actions of the projected hands that are visible on the shared screen (<enclosed in angle brackets>) and bodily movements visible through the large screen ([in square brackets]). The positioning of the arrows indicates the onset of these actions and the completion.

the production of relatively focused tasks, in particular how the ability to remain sensitive to the actions of others, even though the focus of attention may be aligned toward other activities, is critical to the collaborative production of tasks. Third, the experiment provided the resources with which to examine activities that had remained relatively inaccessible in our naturalistic data, not least of which were the ways in which participants produce sketches and annotations—seemingly individual activities that emerge through interaction—activities that are co-produced and rely on contingent forms of co-participation.

These and a number of issues informed where we chose to undertake further research, how we collected data, and the initial analytic focus. In the first instance, we sought to identify a perspicuous setting (see e.g., Garfinkel, 1967; Sacks, 1992) in which to explore these concerns, a setting that would expose these issues as a practical matter for the participants themselves and a setting to which we could gain access for field work and recording. We identified a number of relevant settings, undertook a series of focused studies, and gathered various forms of recorded and field data from different perspectives and standpoints. These included video-based field studies of medical consultations, command and control, operating theatres, and museums and galleries. One of the most fruitful settings in this regard was a design practice in which participants produced ideas and plans for major developments in museums and galleries (see Figure 4). The setting not only enabled us to record using multiple cameras but also provided a substantial corpus of data in which the participants examined, reviewed, and co-produced complex forms of material and digital documentation both alone and in collaboration with others. Together with our related studies of settings such as control rooms and surgical operations, we gathered a substantial corpus of recorded field data for the

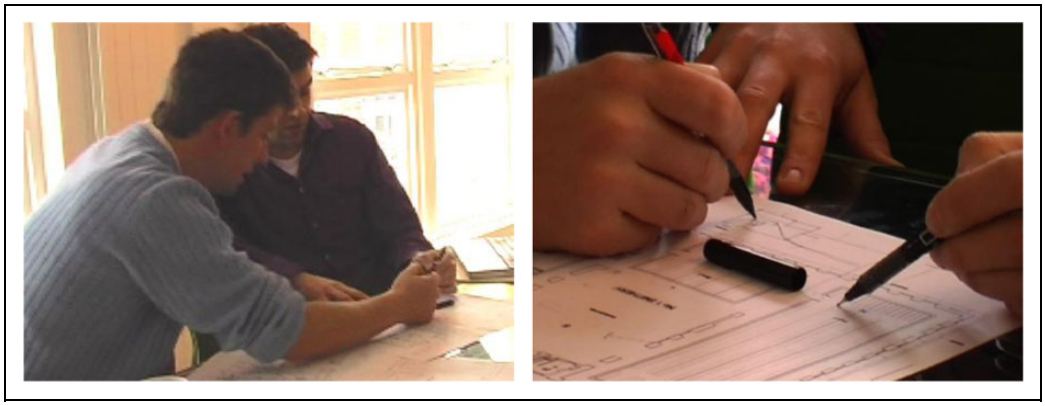

Figure 4. Details of a workplace study of designers informed by the quasi-naturalistic experiment performed using Agora. Here, multiple camera angles allowed us to focus on collaborative activities in more details, particularly on the analysis of how participants secured alignment to objects, even quite fine details of plans, in the local material environment (Luff, Heath, & Pitsch, 2009).

analysis of pointing, reference, and ecologically embedded action and interaction and formed the basis of analytic papers and publications (see e.g., Luff, Heath, & Sanchez Svensson, 2008; Luff, Heath, & Pitsch, 2009; Sanchez Svensson, Luff, & Heath, 2009). Our small-scale experiments thus provided the foundation and motivation for the development of a program of research.

The issues that were exposed by the experiment have also had an important impact on more applied research, in particular, the design and development of systems, including both media spaces and virtual environments, to support remote collaboration (Hindmarsh, Fraser, Heath, Benford, & Greenhalgh, 1998; Luff et al., 2003), as well as the growing interest in how people use widely available technologies to show and discuss visible aspects of each other's environment (e.g., Licoppe, 2015; Licoppe & Morel, 2013). They have also underpinned a program of further experimental work undertaken in close collaboration with industrial research laboratories and computer scientists and engineers at a number of universities. These projects, involving a range of different prototype systems, have also necessitated video-based quasi-naturalistic experiments (e.g., Luff et al., 2013; Norris, Schnadelbach, & Luff, 2013). It is important to note that they addressed the ways in which we can provide remote participants with the ability to share, manipulate, annotate, and discuss a range of objects, including material and digital documents; have access to the participants' respective environments; and in particular, refer to, examine, and analyze features of these objects, including moving images. They have also been concerned with exploring how we can provide participants with the ability to manipulate and move objects and reposition themselves while enabling others to determine their location and orientation with regard to features of the two distinct but interconnected environments (see e.g., Figure 5).

The design of these experiments reflects the structure and format used in the original study. They involve setting two, or some cases four, participants (two at each site) a particular task based on an analogous workplace activity and, following a briefing, requiring the task to be undertaken in 30 or in some cases 40 minutes with little or no intervention. The tasks are recorded using multiple cameras, and selective transcription of both talk and visible behavior was undertaken following the event. We also undertook discussions with participants immediately after the event to identify any overall reactions, problems, and the like with the systems. The focus of these tasks is not simply to require participants to undertake certain activities but to set tasks that encourage, if not demand, particular sequences or packages of collaborative action that necessitate certain forms of interaction. Some obvious examples are tasks that require participants to establish mutual reference not only to

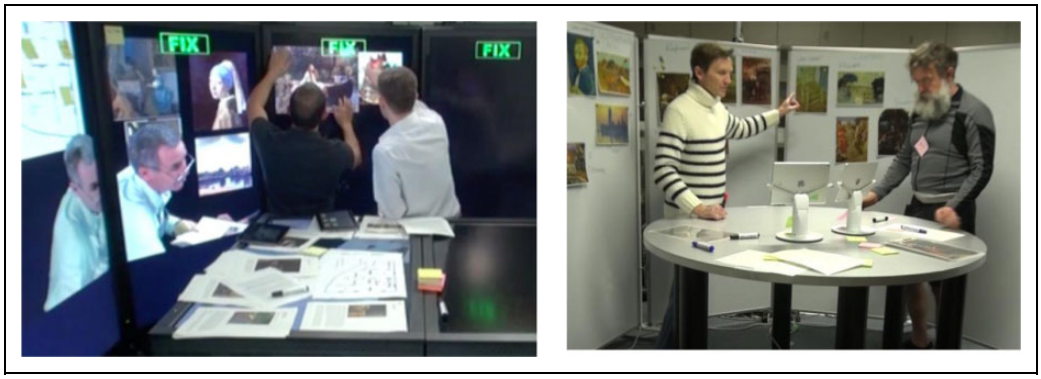

Figure 5. Two experiments with prototypes of technologies informed by the Agora studies and subsequent workplace studies. On the left is an experiment with tRoom, a high-fidelity, "blended environment" where participants can manipulate, discuss, and refer to objects on various surfaces, including documents on the desktop and moving images on the "walls" (Luff et al., 2013). On the right, a quasi-naturalistic experiment of video-mediated interaction through small robot proxies placed on a desk. The design of both these experiments drew from workplace studies of museum designers.

stable objects but to moving ones, tasks that require annotating or in other ways transforming materials such as architectural plans or that require the manipulation and rearrangement of objects, and interaction between participants within a particular local setting and with those at a remote site. The experiments therefore are primarily designed to explore how a particular technological environment provides the resources to undertake specific forms of interactional action and activity, action and activity that is found to arise within conventional organizational settings. In turn, the experiments expose phenomena, aspects of action and interactional organization that demand further investigation in everyday workplace environments.

Facilitating Competition: Field Experiments and Market Activities

Alongside the emergence of office- and laboratory-based naturalistic experiments, we have witnessed the emergence of qualitative field experiments in which a set of practices, techniques, or technologies are deployed in a naturally occurring environment. The interaction and activities that arise in the setting, in particular with regard to the practice, technique, or technology, is then subject to detailed investigation using video recordings augmented by field observation and in some cases interviews with participants. These practices, techniques, and technologies encompass a broad range of "interventions," including the deployment of communication strategies, interactive resources, works of art and craft, material artifacts, practices, and procedures. These experiments are not typically concerned with generating quantitative data, though we do find examples of statistical analysis used to augment aspects of qualitative analysis of the data. In contrast to more traditional approaches to quasi-experimentation that prioritize causal inference and attempt to manipulate independent variables to test hypotheses (see e.g., Grant & Wall, 2009), these small-scale field experiments derive from qualitative analysis of everyday organizational activities. In turn, they inform further investigation and analysis of particular issues and phenomena.

Consider for example the growing interest in using naturalistic studies of talk and interaction in organizational environments to enhance the communicative practices and skills of members of particular professional and vocational groups (see e.g., Antaki, 2011; Heritage & Maynard, 2006; Heritage & Robinson, 2011; Sarangi & Roberts, 1999). These initiatives rest on the detailed, systematic analysis of social interaction. They reveal that in particular settings in areas such as health, the news

media, and business, alternative ways of performing particular actions have an important impact on such matters as diagnosis, public opinion, and the sale of merchandise. Experiments can prove critical in this regard not only in clarifying how individuals may be taught to understand and use particular communicative practices, but to expose the limitations of an analysis and the understanding of a particular phenomenon, practice, and its organization. Consider the following case.

It has long been recognized that particular auctioneers can make a significant difference to the overall revenue generated by a particular auction. How particular auctioneers are able to generate "additional" value remains largely unknown. In a recent study of auctions of fine art and antiques (see Heath, 2013), we identified a set of practices used by particular auctioneers that appear to have a significant impact on the willingness of potential buyers to bid for particular lots and make further bids—even in cases where the potential buyer has withdrawn from the bidding. Very generally, these practices include: the specific ways in which auctioneers invite potential buyers to bid the next increment; the use of silence and various forms of bodily comportment to sustain the opportunity to bid; the use of the various phrases to encourage, even persuade, further contributions; and building successive opportunities for under-bidders to issue further contributions during the close of sale. To assess the robustness and limitations of our analysis and the issues raised in the deployment of these practices or techniques, we undertook an experiment with a leading auction house. We identified a middle-range sale of art and antiques, consisting of some 200 lots, and the auctioneers were instructed in the techniques. The auction was video recorded and the data subject to detailed transcription and analysis.

We reviewed the data corpus and found approximately 65 cases in which the auctioneer used one or more of the practices to encourage further contributions. We focused in particular on cases where bidders declined the opportunity to make a further contribution and were then encouraged by the auctioneer to issue a further bid. More than half of these succeeded, that is, the auctioneer elicited a further contribution from an under-bidder even though they had initially declined the opportunity to make a further bid. In almost all of the cases where the auctioneer secured a further bid, a competitor issued a further contribution. In other words, where a further contribution was issued by an under-bidder, despite having attempted to withdraw from the bidding, the price of the goods was raised by not one but two increments. And given the value of an increment may be hundreds, thousands, and in some cases, tens of thousands of pounds or dollars, then eliciting further bids makes a substantial contribution to the overall value achieved by an auction.

Despite the apparent success of the techniques, the experiment served to expose the limitations of our analysis of these practices and our understanding of the complexities of their deployment. First, it proved necessary in a number of cases for auctioneers to deploy not one but a series of different practices in the light of a potential buyer's resistance to issue a further contribution. How this combination was structured and the emergent interrelation of different techniques was underspecified in our original analysis. Second, the successful deployment of the practices, even a seemingly simple reinvitation to issue a contribution, is dependent on the auctioneer's contingent assessment of the potential "susceptibility" of an under-bidder to issue a further contribution. Even though we knew that ambivalent declinations to bid were evidenced by slight delays, the experiment pointed to other aspects of buyer behavior that also evidenced a potential willingness to continue. Third, we found that in some cases the auctioneer's pursuit of an under-bidder generated frustration and even complaint from others who were attending the sale—not least for the ways in which it appeared to delay the sale of particular lots and lengthen the auction. In consequence, the experiment provided a critical resource for developing the analysis and exposing issues and phenomena that might otherwise remained unexamined. These focused field experiments served not only to expose the rigor and limitations of the original analyses, but also revealed hitherto unnoticed phenomena and issues. In turn, they served to inform subsequent analysis that in some cases bore on the ways in which further video-based field studies were undertaken.

A focused, naturalistic experiment of this type poses a number of challenges. First and foremost, an exemplary event(s) has to be identified that enables the relevant deployment of the particular practice or technique while preserving the integrity of the particular activity. Second, it demands a detailed and systematic analysis of the technique or practice in question, an analysis that enables a specification that is precise enough to delineate the import of particular types of action and the sequential implications of alternative ways in which they can be produced. Third, in this case, the principal participant has to be instructed on how to deploy the techniques and provided with guidance on the contingencies that may bear on when and how the techniques should be used.

Field experiments also pose issues concerning data collection. For example, audiovisual recording has to be organized to enable access to, as far as practically possible, potentially relevant features of the participants' conduct that might bear on our understanding of the deployment and impact of the techniques within the interaction. This can prove more challenging than might be imagined given, for example, how a small variation in the production of a particular action can have significant consequences for the conduct of others. Moreover, to avoid any inadvertent or unanticipated disruption to the routine operation of the event, it is necessary to preserve the unobtrusiveness of cameras and recording.

More open and exploratory field experiments are being undertaken that are not primarily concerned with the analysis and assessment of specific forms of practice and technique but rather consider the forms of action and interaction that arise in the light of a significant change or disruption to an activity, setting, or environment. These interventions are more akin to Garfinkel's (1963, 1967) breaching experiments but not necessarily designed to engender "bewilderment, consternation and confusion" (cf. Crabtree, 2004). A substantial corpus of research that has used these more open-ended, exploratory naturalistic experiments is concerned with exploring how people, in concert and collaboration with others, respond to and manage the introduction of novel techniques and technologies designed to enable and encourage new forms of practice, participation, and engagement. In some cases, these more open-ended naturalistic experiments are undertaken within the workplace. However, given the tentative, experimental character of many prototypes and innovative systems, it has proved more suitable, at least in the first instance, to use domains where any problems and difficulties that arise do not lead to severe disruption or danger.

Museums and galleries have proven particularly important in this regard. They have provided rich and challenging domains in which all sorts of field experiments have been undertaken, many of which have been concerned with facilitating engagement and creating new forms participation within exhibitions (e.g., Galani & Chalmers, 2009; Meisner et al., 2007; Reeves, 2011; vom Lehn, Heath, & Hindmarsh, 2001; Yamazaki, Yamazaki, Burdelski, Kuno, & Fukushima, 2010). Experiments have included the deployment of new and sophisticated "interactive" exhibits, works of art and craft, interpretative resources, and the like. These experiments are commonly part of a program of naturalistic research concerned with the interactional organization of particular activities that are later used to inform the further development of innovative resources and installations. The design of this type of experiment differs from the more focused deployment and assessment of a particular technique or technology. First and foremost, while the technique, technology, or intervention may derive in part from some general findings concerning particular forms of action and interaction, the experiment is designed to engender and explore unanticipated activities and patterns of communication and participation. Second, participants are often given minimal introduction to the intervention; rather, the concern is to explore how people, through interaction with others, respond to and exploit the installation or resources in question—and how they serve to engender forms of participation and engagement.[3] Third, open-ended field experiments of this type can pose significant challenges for data collection since the forms of interaction and participation that arise can be relatively unpredictable. In consequence, the intervention is often deployed over a period of some days, sometimes weeks, and how data are collected evolves iteratively, in the light of successive

phases of analysis. Most critically, analysis is not primarily driven by some preestablished idea or issue but rather grounded in a review and transcription of the data and the discovery of particular phenomena and sequences of interaction; that is, analysis is more akin to more conventional case-by-case, qualitative field research. In consequence, these forms of quasi-naturalistic field experiment routinely expose aspects of practice and social organization that hitherto have passed unnoticed.

Discussion

In recent years, analytic developments within the social sciences coupled with the emergence of cheap and reliable audiovisual technologies have provided the resources with which to advance the use of both laboratory and field experiments in studies of work and organization. Freed from the ambitions of identifying causal explanations and exercising control over key variables, these quasi-naturalistic experiments are making an increasing contribution to our understanding of work, practice, and technology and in particular, social and interactional foundations of everyday organizational tasks and activities.

Whether laboratory or field based, the experiments emerge in the light of naturalistic studies of work and organization and in turn contribute to the further development of these naturalistic studies, not infrequently posing issues and phenomena that demand further investigation and analysis. Within the framework of a program of video-based field studies, these quasi-naturalistic experiments provide a number of important contributions. First and foremost, they offer the opportunity of assessing, even discovering, the limitations and shortcomings of an analysis or understanding of particular findings or ideas, findings and ideas that may be instantiated within particular practices, techniques, or technologies. They can subject findings and ideas to assessment and evaluation and provide resources with which to return to the "field" and develop and refine the analysis of naturalistic data. Second, these experiments serve to expose phenomena, actions, and organization that hitherto remained unnoticed. They are not simply "aids to a sluggish imagination" but a vehicle through which aspects and elements of action and interaction are revealed, not unlike, for example, the discovery of deviant cases in conversation analysis or incongruent practice in field studies (see e.g., Hughes, 1958; Maynard & Clayman, 1991). Third, quasi-naturalistic experiments can provide the resources with which to enhance the quality and characteristics of a data corpus and in particular the recordings of forms of action and interaction. Critically, these quasi-naturalistic experiments do not stand independently of a program of naturalistic video-based field studies. They are developed from the analysis of naturally occurring activities, and their contribution is subject to and developed in the light of further analysis of action and social interaction as it arises within everyday organizational environments. These different forms of naturalistic experiment are not designed to provide proof or evidence of particular aspects of social organization, practice, or even system use. They are through and through exploratory, designed to throw into relief particular phenomena and expose particular features of practice and organization.

Video recordings are critical to these experiments and the ability to analyze the social and interactional organization of particular activities. The focus on social interaction also provides a resource, sometimes characterized as a "proof procedure" (see e.g., Heath et al., 2010; Heritage, 1984; Maynard & Clayman, 1991). It enables the detailed inspection and scrutiny of sequences of action to examine how participants themselves respond to the particular actions of others in the developing and contingent course of the interaction; that is, it enables the adoption of an analytic standpoint that prioritizes the endogenous, collaborative production of action and sequences of interaction. Interaction therefore is both a topic of inquiry and provides the analytic resources for exploring the organization of action. We have remarked on the ways in which video provides a unique opportunity to undertake repeated scrutiny of particular actions and activities and examine the ways in which they are accomplished in and through talk, visible conduct, and the use of various tools and technologies (Heath et al., 2010). In quasi-naturalistic experiments, particularly where

there is an opportunity to configure the setting, recordings can be of higher quality and make use of multiple cameras, providing access to the details of action and activity that may be inaccessible in materials gathered within everyday environments, environments that can pose severe constraints on data collection. Moreover, audiovisual recordings provide the academic community with the ability to inspect and assess the raw data and evidence on which analyses are based and judge for themselves the cogency, rigor, and reliability of insights, observations, and findings.

Video provides unique resources for applied research. It enables participants, practitioners, and others to examine and reflect on materials and observations and provide critical comment and insight to their own practice in the light of the circumstances in which activities are undertaken (see also Iedema, 2011; Iedema, Long, Forsyth, & Lee, 2006). They can also make an important contribution to what is sometimes characterized in computer science and engineering as *traceability*, the opportunity of returning to and if necessary, readdressing the materials in which some original observations, analytic insights, and even project decisions were based. Video recordings of quasi-naturalistic experiments can be a valuable resource for supporting the presentation of analysis, particularly to audiences who are not social scientists. For example, fragments of data from naturalistic experiments with prototype technologies can be critical to assist designers in assessing those technologies and also for comparing and contrasting proposals for future developments. Similarly, they can serve as resources for practitioners, like auctioneers, to reflect on their current practice.

Rather than consider the experiment as a vehicle for theory development and generating proof, we suggest an alternative approach, an approach that is becoming increasingly used within the social sciences and resonates with some earlier initiatives within sociology and anthropology, even within studies of work and organization (see i.e., Cefai, 2000; Gilbreth, 1911; Gilbreth & Gilbreth, 1917; Hviding & Berg, 2014). The various forms of naturalistic experiment that are emerging within studies of work provide the opportunity to expose and discover particular phenomena and provide observations and insights that can inform, even drive, analytic investigations of particular forms of action and activity that arise within everyday organizational environments. They are not substitutes for more conventional field studies. They do not seek to provide systematic evidence for or rigorous findings of social organization of particular actions and activities. They are fundamentally exploratory, exposing and evaluating phenomena and findings that demand more formal investigation within naturally occurring environments. They also provide the resources through which we can explore and engage more applied concerns, whether it is the design and impact of a new technology, investigating a communicative practice, or creating new forms of public engagement. The naturalistic experiment provides a unique opportunity to explore the consequences of particular ideas and developments, demonstrate their potential contribution, and discover the limitations of our analyses, observations, and findings. Video recordings coupled with relevant methodological commitments prove invaluable in this regard. They provide the resources through we can begin to explore and discover the social and interactional foundations of practice and organization within everyday working environments.

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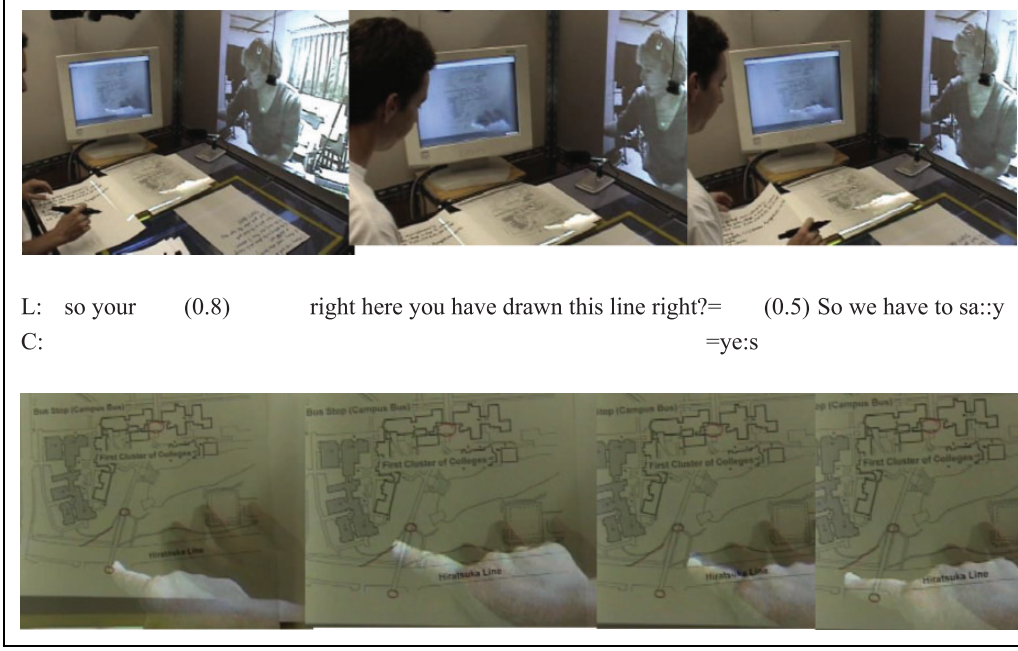
L: So your (0.8) right here you have drawn this line right?=
C: =ye:s
(0.5)
L: So we have to sa::y like
(1.5)
L: to build the: (1.3) the footpath or the:: bicycle pa ┌:th (or) whatever you want to
C: └(yep)
L: call it↑
(0.1)
C: do you think it should join up here though? (0.1) or::>because it is going to be pretty congested here perhaps↑ or should it join up somewhere else?
(3.3)
C: because if they all converge in the same spot↑ (0.2) ┌ (maybe)
L: └you know it should be before the hill goes up↑

Fragment 1 Transcript 1. Transcript of Talk.



Fragment 1 Transcript 2. Lucy gestures at the shared screen.

Notes

1. In laboratory- or office-based naturalistic experiments, it is often possible to draw participants from staff (or students), though not those associated with the particular research project or program in question. In this series of studies, it was more appropriate to recruit participants with some familiarity of office work and

even design; hence, we recruited participants through local organizations and societies. In later phases of the research program, it was necessary for participants to have experience of work tasks, and so a specialist recruitment company was used to approach potential participants.

2. Developing the preliminary instructions for participants requires much care and consideration. The instructions need to provide the necessary resources to enable the performance of the task and use of the technology while not undermining the broader motivations of the study. Therefore, it is typical for instructions to be as minimal as possible and more addressed to the task than either the technology or the wider aims of the study. Has how participants identify and manage problems during the experiment is a critical resource for subsequent analysis, interventions only take place in the experiment if participants have difficulties that prevent them making any progress. On conclusion of the experiment, it is useful to undertake a debriefing session using informal interviews with the participants individually and in pairs. In these, it is possible to gather opinions of the technologies and elicit whether the participants noticed anything unusual about how their own conduct or their colleagues appeared. It is preferable to undertake both preliminary guidance and debriefing sessions through the technology so that participants can use this to illustrate their reflections.
3. Unlike laboratory experiments, it is not necessary to engage in any explicit recruitment activity to secure participation in field experiments. Indeed, apart from being informed that recording is taking place, little information about the motivation for the experiment is given. Rather, most participants are members of the general public, customers, visitors, or staff who usually pass through the field setting in question.

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