

ETHNOGRAPHY IN UBIQUITOUS COMPUTING

“I don't believe in teaching. One learns by looking. That's what you must do, look.”

Francis Bacon (1909-1992) a few weeks before he died.

Introduction

Those introduced to ethnography often struggle to understand what it is, what it has to offer and, most importantly, how to do it. Many find it hard to define in terms of the commonly used research nomenclature; is it a methodology, method, orientation, technique or something altogether different? How, they also ask, does it contribute to informing scientific investigation and what steps does an ethnographer follow to successfully do an ethnography?

Broadly, ethnography can be thought of as a sensibility or ‘way of seeing’ one adopts in collecting and interpreting field study materials [see Wolcott 1999]. This sensibility can be influenced by a wide range of ideas and theories. The methods and techniques used to collect data are also varied and can often be shaped by the settings an ethnographer finds him or herself in. So, to add to the newcomer’s confusion, ethnography is motivated by an assortment of intellectual traditions and is only loosely defined by its methods. At the same time, ethnography’s traditions—as well as its perspective on how empirical materials are gathered and interpreted—cast doubt on some of the common underpinnings of empirical, scientific research. For example, questions are implied if not explicitly raised about notions of validity and generalizability. All this is unlikely to be of much comfort to those embarking on ethnography. At this stage, however, it should be enough to recognize that it is not all that surprising that ethnography is the source of trouble for those fresh to it (as well as, it should be said, those who regularly ply its trade).

This chapter will initially provide some background to ethnography in the hope of unraveling at least some of this apparent confusion. Much has been written with similar motivations, especially in the social sciences and humanities, and those interested in pursuing ethnography are encouraged to review this work [e.g. Geertz 1973; Clifford and Marcus 1986; Bryman 2001, Wolcott 1999]. Here, though, the emphasis will be on how ethnography has made its presence felt in ubiquitous computing (ubicmp) and the associated areas of human-computer interaction (HCI) and computer-supported collaborative work (CSCW). It will be explained how ethnography is distinguished from the broader kinds of technology-oriented field studies reviewed in Chapter X [A.J.’s chapter]. Ethnography’s

contribution in the areas related to ubicomp will also be considered to better understand how it has been applied.

In the chapter's last two sections, closer attention will be paid to doing ethnography. Again, there have been efforts to produce how-to guides for ethnography in the social sciences [Hammersly & Atkinson 1983; O'Reilly 2005, Wolcott 1995]. Additionally, there are several notable commentaries of ethnography when applied to technology design [Anderson 1994, 1997; Button 1993; Button et al. 2009; Dourish 2006; Heath 2000; Randall et al. 2007]. Building on these past works, this chapter aims to focus on some particular issues raised by ethnography in ubicomp and the implications these issues have for real-world ethnographic practice. This will lead into a discussion of what such a practice is good for in ubicomp. Finally, thought will be given to how ethnography in ubicomp is beginning to transform so as to accommodate a number of distinctive aspects of design and technology.

Overall, the reader should be aware that this chapter is not a how-to or recipe list for undertaking an ethnography in ubicomp research. At a practical level, one would be hard pushed to produce anything useful of this kind that captures all the possible contingencies that can arise. More importantly, however, the ethnographic sensibility is not something that can be definitively expressed or prescriptively laid out. Rather, an ethnography is something that one must go out and do, and the ethnographic sensibility is something that only really comes about through experience in the field. The best preparation is to read past ethnographies, prodigiously, in the hope of learning how others have grappled with sensitizing themselves to the settings and peoples they are studying.

From Ethnography to Design

Ethnography

Although there are exceptions¹, ethnography is usually characterized by an ethnographer spending time in a place amongst a distinct group of people. So the ethnographer may spend time with a Somoan tribe [Mead 1928], Chicago's hobos [Anderson 1923], cigar smokers in Kentucky [DeSantis 2003] or Mobile phone users in Tokyo [Ito et al. 2006]; the kinds of people and places that might be studied using ethnography are endless. Common between all ethnographies, however, is the effort the ethnographer spends analyzing field materials and writing. Ethnography is a deeply literary practice that places great emphasis on the ethnographer crafting his or her evolving, descriptive analysis.

¹ One exception is virtual ethnography where the researcher participates in online or virtual communities (see [Hine 2000])

Indeed, the iterative composition of themes and arguments produced in writing is as much a part of ethnography as being in the field and collecting data.

To develop this point, this section will present some past work starting with a classic ethnography from social anthropology, and then moving to more recent examples of greater relevance to ubicomp. In both examples, the emphasis will be on helping the reader see how ethnographers start to piece together their field materials and apply certain sensibilities when interpreting them. Importantly, the reader should recognize that even with the older, seemingly less relevant work, there are salient themes that ubicomp research might draw on. The ethnographic sensibility is one that continually casts back to past ideas and theories to discover the world anew. Sometimes exception is taken to past work, but almost inevitably new arguments are threaded from old.

Nuer Time-Reckoning

Influenced by the early pioneers of ethnography in anthropology (e.g. Malinowski, Radcliffe-Brown and Seligman), Edward Evans-Pritchard played a key role in developing both anthropological theory and ethnographic practice [Beidelman 1974]. Particularly through his studies of the Nuer and Azande in the 1920s and 30s, he made significant contributions to what were then the burgeoning theories of *structuralism* and *functionalism* in anthropology. His time in the Southern Sudan and Ethiopia with the Nuer, for example, spanning 10 1/2 months, led to his classic monograph detailing how the Nuer's social structures were tightly coupled with their pastoral life [Evans-Pritchard 1940]. For example, Evans-Pritchard described how the personal names used by Nuer men, at least at the time, related to the coloring and form of their favorite oxen and, for the names of women, which cattle they milked. This demonstrated a curious tie between the Nuer and pastoral life. As Evans-Pritchard wrote:

“Sometimes the name of a man which is handed down to posterity is his ox-name and not his birth name. Hence a Nuer Genealogy may sound like an inventory of a kraal. The linguistic identification of a man and his favorite ox cannot fail to affect his attitude to the beast, and to Europeans the custom is the most striking evidence of the pastoral mentality of the Nuer.” [p. 18, 1940]

Similarly, Evans-Pritchard discovered Nuer time-reckoning to be guided by the activities associated with caring for and feeding cattle [Evans-Pritchard 1939]. The Nuer, for instance, have two main seasons, one *tot* associated with when they live in their villages and the other *mei* when they must setup and move from camp to camp to graze their cattle. These seasonal names are not just signifiers of the

time of year. They can also be used to refer to the activities they are associated with, so a Nuer might be said to be going to *mei* (camp) in such a place: “*ba wa mei*”. *Tot* and *mei* are thus not used as abstract points of reference in calendar time, but function more as practical terms loosely influencing social organization.

In fact, during his fieldwork Evans-Pritchard found the Nuer to have no abstract concept of time (as we do). They had no equivalent word for ‘time’, and did not talk of ‘time’ as something “which passes, can be wasted, can be saved, and so forth” [Evans-Pritchard 1939, p. 208]. On a daily basis, the passing of time was reckoned with respect to herding cattle to pasture, milking, churning, drying of dung fuel and so on. Moreover, the Nuer’s division of the day appeared greater during periods when the cattle-related activities were relatively more intensive. Likewise, longer periods between months or years were usually described using events as points of reference. Droughts, bouts of cattle disease, weddings, etc. might be used to make reference to the past. As Evans-Pritchard writes:

“Certainly they [the Nuer] never experience the same feeling of fighting against time, of having to co-ordinate activities with an abstract passage of time, since their points of reference are mainly activities themselves, which are generally of a leisurely and routine character. There are no autonomous points of reference to which activities have to conform with precision.” [Evans-Pritchard 1939, p. 208].

For the purposes of this chapter, Evans-Pritchard’s studies of the Nuer help to illustrate three general points concerning ethnography. First and foremost, they demonstrate how an ethnographer approaches studying a group of people *in situ* (see Chapter X). Over the course of the fieldwork, Evans-Pritchard observed, interviewed, took field notes and generally got to grips with the Nuer’s way of life. A central facet of this field research was to build, as far as possible, an intimate understanding of the Nuer and how they organized themselves socially. For this, Evans-Pritchard relied heavily on individual informants with whom he developed close relationships. His informants helped in practical matters like translation and detailing social practices. Interviews with others were also used, but the informants were usually the ones trusted and relied on. As well as this, Evans-Pritchard also purchased his own herd of cattle and tended to them as a Nuer might (or tried to). Collectively, these various strategies fall under ethnography’s broad and some would argue defining method for collecting fieldwork materials, **participant observation**. Notable, however, is that no one fieldwork strategy above is essential, nor must a critical balance be struck between interviews, observations and participation in some activity.

The approaches an ethnographer adopts tend to be driven by good (or bad) fortune and opportunism, of which more will be discussed later.

A second point to draw from Evans-Pritchard's work is the importance of interpretation in ethnography, specifically through textual description. In reading the many articles and monographs Evans-Pritchard produced from his studies of the Nuer and Azande, it becomes clear that his work has a distinctive discursive style. In his writings, he often begins by detailing a social practice. He then gradually builds up his descriptions, thickening them with various theoretical claims. In his article on the Nuer and their reckonings of time, for instance, he begins by describing the various systems the Nuer use to account for time. In the later stages of the article, these descriptions begin to interleave with an argument claiming that the Nuer's sense of time functions to coordinate and structure their social relations. More will be discussed of this claim below. At this stage, suffice to say that Evans-Pritchard provides us with an example of how the ethnographer makes choices to foreground certain aspects and themes in the ethnographic material. That is, there is a strong interpretive character to an ethnographer's written descriptions. In Evans-Pritchard's case he not only details the Nuer and their social practices. He instructs the reader to see as he does—to interpret the Nuer as he has.

The third and final point to be taken from this example is closely related to this idea of interpretation. As noted, Evans-Pritchard pursued much of his field research, particularly in his early years, with an inclination towards structuralism (or more particularly structural-functionalism). That is, he was concerned with how particular practices functioned to structure societies. For example, how the predominant activities of cattle rearing amongst the Nuer functioned to organize their patterns of movement, divisions of labor, notions of time, social relations and so on. Evans-Pritchard's writings were thus inclined towards a very particular analytical standpoint or orientation. Of course, Evans-Pritchard's depictions of the Nuer could well have been wrong (and indeed debates continue over the veracity of his work). What is important here, however, is that it demonstrates how ethnography is not merely description; it is not a litany of how many times x spoke to y, or a mapping of whom is related to whom—it is not the mere survey of a scene. The ethnographer draws on his or her own analytical traditions in the interpretative process to express something more of the setting studied, its peoples or possibly society *writ large*.

To summarize, Evans-Pritchard's studies of the Nuer offer a reminder of three important if not defining features of ethnography. For the purposes of clarity, these can be listed as follows:

Participant observation

Empirical materials are collected in the field using participant observation. Importantly, the interviews, observations and participation in everyday life that make up participant observation, do not adhere to a strict, formal method. Rather, they make up a loosely assembled collection of strategies used to investigate a setting and its peoples, *in situ*. Participant observation is thus driven by the motivation to gain a deep familiarity with a people and their practices and not by a strict idea of and adherence to method, *per se*.

Interpretation

In producing his or her texts, the ethnographer unavoidably interprets the people and setting under observation. Clifford Geertz, a central figure in anthropology who wrote cogently on this topic, famously sought to openly reveal this by referring to ethnography as *thick description*. “What we call our data”, he elucidates, “are really our constructions of other people’s constructions of what they and their compatriots are up to...” [Geertz, 1973, p. 9]. The processes of interpretation, then, the layering of construction upon construction, is something to be recognized and worked with in the ethnographic enterprise.

Analytical orientation

Whether it is made explicit or not, ethnographers invariably adopt one or sometimes several analytical orientations in their interpretive process. In the field, an orientation trains the eye, so to speak, providing the ethnographer with themes and topics to engage with. In writing, the analytical orientation is used to develop the empirical materials, teasing out specific arguments and sometimes contributing to broader theories of social practice and organization. In writing of the value of ethnography in systems design, Anderson [1997] captures the analytical mindset nicely:

“It is the patterns and patterning the ethnographer is looking for and not simply a realistic, behavioralized description or natural history. What an ethnographer is most interested in, and thus what makes an ethnography of particular interest, is not lots of everyday detail about some local scene. Neither is it some hitherto unsuspected, beneficial or deleterious aspects of an activity. Rather the ordinariness is somehow rendered extraordinary and yet, recognizable. The deeper patterns being played out, in and through the detail, come to the surface.” [p. 158]

Design-Oriented Ethnography

The *in situ* field studies undertaken in HCI, CSCW and ubiomp research have been somewhat removed from the kinds of ethnography found in anthropology. With their emphasis on informing design, the studies have tended to be far briefer and focused on the use of technologies and other material artifacts rather than the broader concerns of social life. Nevertheless, in keeping with the ethnographic tradition, there has remained research directed toward the detail of people's interactions with technology and "toward the production of a 'rich' and 'concrete' portrayal of the situation" (Hughes et al., 1997).

To understand how, exactly, ethnography is both understood and used in ubiomp, some background to its uptake in systems design offers a useful starting point. The basis for what might be thought of as a *design-oriented ethnography* began, initially, in HCI and CSCW, and later fed into ubiomp research. In the late 1980s, Lucy Suchman's now much cited book *Plans and Situated Actions* [1987] was perhaps the most influential factor in introducing a sociological and loosely ethnographic sensibility to HCI. It also shaped what was then nascent research into *computer-supported collaborative work* (CSCW). In her book, Suchman presented a study of photocopy use she undertook with her organization at the time. Using her findings as a basis, she made a convincing argument proposing that people's interactions with technology could be seen to be influenced by the particular features of a setting. Specifically, she highlighted the ways in which people's human-computer interactions were situated in social practices and that this *situated action* could be made 'visible' through detailed *in situ* studies. Such insights, she revealed, could provide a significant contribution to the understanding of how people use technologies and thus how future technological solutions might be designed.

Suchman's work was, in part, a reaction to the predominant thinking in HCI at the time. It contrasted with efforts that aimed to model the task-based and cognitive aspects of human-computer interactions and, in doing so, abstract away from the particularities of the setting. Suchman alongside others [Anderson 1997, Button 1993, Harper, 2000, etc.], provided an impetus for a "turn to the social" in HCI and CSCW, where greater emphasis was placed on revealing those moment-by-moment actions particular to a setting and the often coordinated interactions between people.

An early example of applying this kind of perspective to informing design were the studies of air traffic control [Harper, Hughes & Shapiro, 1991; Hughes, Randall & Shapiro, 1992; Mackay 1999]. This ethnographic research drew attention to the collaborative work of air traffic controllers involved in organizing airplanes in airspace. Specific focus was given to flight strips—the paper strips containing

the details of planes in the air—and their role in the control room. The various publications produced from this work elaborated on how flight strips aided in planning, helping with the management of plane trajectories and the coordination between controllers [MacKay 1999]. For example—and to oversimplify the details—the orderly arrangement of the flight strips was found to operate as a proxy for the orderliness of the skies; glances from controllers to the strips arranged on racks provided lightweight means of assessing, reacting to and anticipating the moment-by-moment conditions of the skies. In one attempt to develop design proposals from these observations, an alternative to flight strips was put forward [Hughes, Randall & Shapiro, 1992]. Here, different visualizations were used to demonstrate how a computer system might support the display of volumes of air traffic and the potential for collisions, and to do so using the same at-a-glance qualities of the physically arranged flight strips. Further proposals were made for enabling controllers to ‘test out’ different flight path solutions in advance, augmenting their established methods for judging and anticipating the busyness of the skies.

This example provides a useful illustration of some of the differences and commonalities between ethnography as it originated in anthropology and how it first took shape in HCI and CSCW. In common between the two were the use of careful *in situ* investigations of a setting, the collection of copious field materials and interpretive analyses represented through thick textual descriptions. The studies of the workplace differed, however, in that they were less prolonged and focused on specific mediated interactions—for example the ways controllers interacted with and through things like flight strips. Moreover, they took on an analytical orientation rarely given much attention in anthropology or sociology known as *ethnomethodology* (the orientation Suchman had also used to inform her ideas of situated action). This use of the ethnomethodological orientation (or so it was argued by its proponents) allowed for far greater emphasis to be placed on the ways work was practically accomplished and specifically the commonsense methods (ethno-methods) people use to get on with the business at hand.²

In its initial uptake in HCI and CSCW, then, ethnography took on a distinctive character in four primary ways:

1. The research was undertaken under greater time constraints.

² Much has been written on ethnomethodology and its use in systems design. For an accessible introduction to ethnomethodology see Livingston [1997] and for its role in design see Button [2000] and Randall et al. [2007].

2. The interpretive character of the research fell largely under the analytical auspices of ethnomethodology (even if only loosely).
3. Attention was given to specific interactional features of a setting (rather than the orderings of a society or culture) and a fine-grained level of analyses was employed.
4. The general outcome was oriented towards how technology could be designed to support the kinds of social practices and accomplishments the field studies revealed.

Ubicomp

Since these beginnings design-oriented ethnography has come in some shape or form to have an established role in HCI and CSCW. As ubicomp gained momentum as an area of research in its own right, it too incorporated the practice. Broadly speaking, research in these areas came to use ethnography as a means of, one, studying new settings to inform design and, two, evaluating the use of newly designed systems in the ‘real world’. Ubicomp also played its part in broadening the kinds of places design-oriented ethnographies were brought into play. Looking at technologies that were intentionally designed to pervade everyday life, ethnographers found themselves studying not only the workplace, but also leisure and domestic environments [Brown et al. 2007; Crabtree et al. 2006;], and those ‘spaces’ in between [Brewer 2008].

With the diffusion of a design-oriented ethnography into different research programs and its application in different settings, it has also come to incorporate varying analytical orientations. When compared to other disciplines that use ethnography, ethnomethodology continues to have a disproportionate presence as an orientation, arguably because of the early and substantial impact of Suchman’s ideas on situated action. Yet there have been recent trends, especially in ubicomp, to adopt different frames of reference. A continued focus on materiality and the interactions people have in physical space has, for example, helped foster a now reasonably developed position that incorporates theories from phenomenology [Dourish 2001]. Moreover, a growing interest in mobility has led to investigations of space as a topic and the use of relevant theories originating in the social sciences [Harrison & Dourish 1996, Ito 2006]. Cultural practices, too, have begun to be addressed. Some in ubicomp have examined computing in very distinct cultural groupings ranging from those in African townships [Marsden 2008], to Filipino and Ghanaian transnationals [Williams et al 2008], to Orthodox Jewish households in North America [Woodruff 2007].

This increasing openness to theory and analytical perspectives has not gone without controversy, however. A general and reoccurring commentary has emerged around whether much of the field research presented as ‘ethnographic’ in HCI, CSCW and ubicomp deserves such a title [Anderson 1997, Button 2000, Harper et al. 2005]. The debates broadly center around three issues. The first concerns the amount of time spent in the field collecting data. The weeks or even days spent doing fieldwork with the users of a technology have been criticized for being far too brief. With respect to ethnography, it is argued that they do not allow sufficient time for a setting to be adequately studied. A second issue concerns the use of an analytical orientation. Here it is questioned whether a field study that simply reports the details of a scene can legitimately be called an ethnography. So-called ‘scenic fieldwork’ has been contrasted with ethnography, where an analytical sensibility or orientation is seen as a defining feature [Button 2000]. Third, a debated issue arises over the question of who can make claims to be an ethnographer and thus practice ethnography. As researchers and commercial practitioners in ubicomp, HCI and CSCW wander out into the field and take on the strategies of participant observation, questions are raised over how well qualified they are to do ethnographies. It is questioned whether anthropologists have an authoritative position from which to examine the *in situ* use of technology because of their training [Harper et al. 2005].

None of these issues can be easily addressed. In many respects the debates and the different ways they are resolved come to make up the substance of design-oriented ethnography as it practiced and as it evolves in areas like ubicomp. The remains of this chapter aims to offer a greater insight into ethnography as a practice and the various pitfalls one can come across. The origins of ethnography and the ensuing debates in ubicomp, HCI and CSCW should be kept in mind, however. Not only will they allow a critical engagement with the following materials, they will shape how one develops one’s own ethnographic sensibility.

Design-Oriented Ethnography in Practice

So far, this chapter has detailed something of the character of ethnography and how it has been taken up in design-related areas such as CSCW, HCI and ubicomp. The aim has been to express a feel for design-oriented ethnography—to capture something of its origins, how it has developed and the points of tension in this development. In the following, a few of the more pragmatic details of undertaking a design-oriented ethnography will be discussed. Earlier, it was explained how ethnography is not something to be easily proceduralized. In this vein, three general topics will be discussed: *planning fieldwork*, *being in the field* and *analysis*. The intention is to give the reader an idea of what to look out

for and what to keep in mind when doing ethnographic fieldwork to inform design. Many of the points will be of a practical nature, but a few should be seen as returning to some of the central themes that underlie the ethnographic enterprise.

Planning

One of the first things to do when embarking on an ethnography is to scope and plan for the field research. In design-oriented ethnography, the scope will often be dictated by the kinds of technology one is interested in. Is the project concerned with investigating sites where ubiquitous computing might be used such as the home or office, or when mobile? What kinds of people are envisaged to inhabit these settings? Knowledge workers, the young or aged, families, etc.? Alternatively, is the project centered on an evaluation of a technology? If this is the case, where will the technology be deployed and what kinds of people will have access to it? Moreover, how might the different kinds of interactions be recorded: through observation, interview, video or audio recording, etc.?

Much of the decision making associated with planning empirical research was covered in the earlier chapter on field studies (ref A.J.'s chapter). There are several issues to keep in mind that have immediate relevance for ethnography, however. Three are considered in some detail below: the role of hypotheses, sampling and generalization, and access to fieldwork sites.

Hypotheses

Critically, unlike many other forms of scientific research, ethnographies will not usually be designed around an initial hypothesis or hypotheses. An ethnography is employed when the aim is to openly investigate a topic. For example, if a project was to use an ethnography to study teenagers and their use of mobile cell phones, the research would be framed in an open way, possibly with a broad question such as: "What is the role of the cell phone in teenagers' everyday lives?"

This investigative nature of ethnographic fieldwork makes it particularly hard to apply any strict structure or schedule when planning an ethnography, especially one that lasts over several weeks or months. Often circumstances will change or various, sometimes unexpected, themes will emerge that will alter the focus and trajectory of the research. The study of teenagers and their cell phones might, for instance, evolve over time as the fieldwork reveals that a far more salient issue is how cell phones are used to maintain friendships or provoke rivalries. The critical point here is that an ethnography should not be seen so much as a means to find resolution (to prove or disprove hypotheses), but instead as an exercise in opening up new avenues or possibilities.

As it happens, there are several examples of ethnographies of teenage cell phone use that illustrate this. Weilenmann (2003), for instance, used a study of cell phone talk between teenagers to show how questions like “Where are you?” prompt responses associated with activity and availability, and not just location. So, an answer like “I’m in the fitting room” says a great deal about all three. In another example, Taylor (2005) considers the material properties of the phone and its role in teenagers’ conversations. He suggests that the taken for granted presence of the cell phone in conversations between teenagers provides them with a means of managing the topic of talk and, at times, subverting topical talk; the phone provides a legitimate reason to break-off from a conversation and talk about something else, or someone else. Stepping back from the details of talk, Ito (2005) examines how space is configured as teenagers coordinate their activities using their phones. She reflects on the role the phone plays in power relations in Japan, between the teenagers themselves and with the institutions of authority including that of the teenagers’ parents. In each of these examples, what is evident is that the ideas are developed in and through the textual analysis and worked up in a discursive fashion. None of the three studies are used to definitively answer some *a priori* hypothesis of phone use by teenagers. What they accomplish, though, is a starting point for thinking about how phones are used and opening up a set of design possibilities.

The explorative nature of ethnographic research does not, however, eliminate the need for scoping or planning fieldwork. The point here is that the planing and scoping should be done bearing in mind the openness discussed. Room must be left for new and unexpected empirical themes to arise, and for the results that pose questions (and not just answers) around design. A project, then, is best approached with a flexible plan that can adjust with the unfolding research. The project’s members should allow for a bit of opportunism in their work rather than sticking doggedly to a method or fixed sequence of stages. The scoping of the research is something that might benefit from more restraint at first. Too often, ethnographies take on topics that are far too broad and, for much of the research, effort is spent managing the quantity, detail and complexity of the field data. In a similar vein, effort is put into figuring out what to focus on, the scope of the research and how to justify attending to one thing over another. By limiting the scope from the outset, the research is given space to expand and follow different trajectories. In many ways, an ethnography should be treated as a continuous scoping exercise, where decisions on method, analysis and interpretation need to be made on an ongoing basis.

Sampling and generalization

The issues of choosing how many participants to study and how long to spend in the field are difficult (and perhaps contentious) ones in ethnographic research. Empirical research, whether done in the lab or *in situ*, tends to be concerned with collecting and analyzing data that can be generalized to a ‘population’. In, for example, studying teenagers and their uses of cell phones, a study would be designed so that claims could be made about cell phone use by teenagers in general and not just the participants in the study. Thus, the procedure is usually to find a representative sample of subjects or participants and to use the appropriate empirical methods to generate generalizable data.

With the small number of participants usually included in a field study and its less than structured empirical methods, ethnography has been thwarted by claims that it offers no means for generalization. For the most part, however, ethnographic research has come to operate outside of this empirical framework; the issue of generalization is not entirely resolved, but rather seen in quite a different light. As an early protagonist of ethnography in sociology, Howard Becker, put it: “If we haven’t settled [these epistemological issues] definitively in two thousand years, more or less, we probably aren’t ever going to settle them. These are simply the commonplaces, in the rhetorical sense, of scientific talk in the social sciences, the framework in which the debates go on” [Becker, 1993, p. 219].

In an ethnography, then, there is not an overriding concern for choosing a representative sample from a population. Far more important is how a study’s participants (or a setting) will make visible their own common sense reasonings or social patterns and rituals. The ethnographer is not trying to explain social behavior in terms of whether an entire population does or does not do something—of whether *all* teenagers use their cell phones to maintain friendships. Instead, he or she is interested in the *how*. How is it, for instance, that the cell phone is routinely used by young people to make plans and coordinate with one another? From this perspective the issue is not so much with the representativeness of the study’s participants, as it is with the ways the ethnographer might start to see the established patterns of phone use. The question the ethnographer must ask is who might they need to observe or ask to get to grips with teenagers’ phone use patterns and where might they look?

Similarly, the number of people participating in a study and the field study’s length is not driven by issues of generalizability. Again, it is the need to see how things are socially arranged and accomplished in routine ways that dictates the number of participants and the time spent in the field. Ethnographies in ubicomp often limit their participant numbers to roughly 5 to 15 and may have studies that run for weeks or, at most, a few months. It would be wrong, however, to assume exact numbers can be decided in advance. A common rule of thumb for both the number of participants and length of

time in the field is whether the ethnographer starts seeing the same patterns or themes reoccurring in his or her observations and interviews. Once this happens and the ethnographer feels he or she has a grasp of what is being observed, it may be time to either develop another line of investigation or put more time into analysis and writing.

A possibly obvious point to note is that ethnographic fieldwork does not necessarily have to include participants, in any formal sense. The work may involve, instead, the careful observation of a setting or the ethnographer taking on a role. For instance, Livingstone [1987] provides a compelling example of what can be learnt by both participating in and observing pedestrians crossing the road at a busy intersection. By being on the street and crossing the road oneself, at “eye level”, he demonstrates how road-crossing can be seen as something pedestrians accomplish through gaze direction and body orientation with respect to one another. This mutual coordination unfolds moment-by-moment so that the road is crossed successfully, as it were, through the continuous micro-coordination between fellow pedestrians.

Beyond observing a specific setting, an ethnographer may choose to apply an ethnographic sensibility to his or her own practices—undertaking what has come to be known as *auto-ethnography*. There are, for instance, examples of ethnomethodologists producing accounts of piano playing [Livingstone 1987] or playing with their pets [Goode 2006]. While these types of ethnography are rare in ubicomp research [for an exception see, e.g., Aoki 2007], the possibility should be seen as a serious option. This is especially the case as ubicomp continues to extend its interests to include, for example, urban computing, sports, health-monitoring, etc.

Access

A third more practical issue to consider with regards to planning an ethnography is gaining access to participants (if they are to be used at all). The time needed to plan and arrange access can be easily underestimated. Perhaps the hardest aspect is finding people who are willing to give up their time and, as they see it, to have their behaviors (and sometimes private lives) scrutinized. Generally speaking, it often works well to find two or three people willing to participate in a study and then ask whether they are able to make introductions to friends or colleagues. Having personal introductions seems to ease people’s discomfort. This, rather bizarrely, has been referred to as the *snow balling method*, as it involves accruing participants on a rolling basis. It is also helpful to explain the motivations and broad focus of the investigation to potential participants. The overall aim should be to help people feel at ease

with the research and emphasize it is the ethnographer who is the newcomer or novice to a situation or setting.

Something else to keep in mind is that participants do not have to be recruited and fully signed up to a study at its outset. Because the broad aim is to better understand the workings of a setting or particular activity, people can be sought out and invited to participate if and when it is felt they are needed.

To briefly review the points made above about planning an ethnography:

1. Plan for the research to be investigative and exploratory, not driven by hypotheses.
2. Be open to the study following new trajectories and evolving as new areas of interest and themes develop over the course of the research.
3. Scope the fieldwork tightly at first, giving room for the scope to alter, broaden and deepen.
4. Select the kind and number of participants with the aim of observing and detailing *how* social organization or order is accomplished, not with the aim of generalizing to large populations.
5. Consider alternatives to recruiting participants, such as simply observing a setting/activity or undertaking an auto-ethnography.
6. Leave plenty of time for getting access to an empirical site and recruiting participants as the effort involved in both can be easily underestimated.

In the Field

The prospect of going into the field to interview someone, observe a scene, participate in some activity, or take on some other data collection technique can be daunting. Unfortunately, things do not get any easier once in the field. One can feel awkward, clumsily getting in the way of the very thing being studied. The best that one can do to deal with the discomfort is to recognize that any awkwardness is an ordinary consequence of being somewhere new, with new people and taking on the role of observer. Indeed, a very real and practical aspect of doing fieldwork is learning to deal with the sense of unease. If one should be prepared for anything, it should be the possibility of asking stupid questions or doing something foolish. Thus, rather than trying to detach oneself from the setting and playing the proverbial fly on the wall, a much more realistic approach to starting off in the field is to simply start trying

different ways to engage with a setting. The concern should not be with getting it ‘right’ so much as getting one’s hands dirty, so to speak.

Another point worth remembering is that the collection of data and the analyses of collected field materials go hand in hand. The fieldwork may play a larger role at the beginning of a study and the analysis increase towards the end, but the two should interleave with one another in an iterative fashion. The fieldwork, of course, provides the raw materials. The analysis, though, helps the ethnographer discover a way of seeing and subsequently a perspective from which to revisit the field. Consequently, it is both one’s practical and sometimes clumsy efforts to collect data as well as the analytical perspective that guide the unfolding direction of the research. Indeed, the initial fieldwork may help shape the analytic sensibility and the subsequent use of empirical methods that define the ethnography.

Reflexivity and Indifference

The flexibility of ethnographic work may appear to confound the objectivity usually thought of as the basis for scientific research. How, one might ask, does an ethnographer remain objective if their methods and analytic orientations are able to change in response to the object of study? Does this really promote sound scientific investigation? There is, of course, a long and complicated response to these questions, a response that can quickly turn to questions regarding the nature of science and how ethnography corresponds to scientific principles. A catalogue of books has been written relating to these concerns [e.g., Clifford and Marcus 1986]. For the purposes of introducing ethnographic research and helping to convey its distinctive character, there are though two important concepts that should be considered. Both are complex, but deserve at least some explanation so they might be kept in mind when embarking on an ethnography.

One concept has its origins in anthropology and has to do with how a researcher reflects on his or her position in ethnographic research, specifically *vis-à-vis* the study of an established group of people—be it a community, workplace, family, etc. This *reflexivity* has come to be a fundamental feature of modern ethnography (and has also played a part in qualitative research more generally).³ The ethnographer, in a manner of speaking, builds a reflective stance into the ongoing fieldwork and analysis, recognizing the inevitable subjectivity of the accounts he or she produces. Reflexivity thus motivates the ethnographer to continually shape and reshape his or her fieldwork and analysis. Effort

³ See Macbeth 2001 for a thoughtful discussion of various perspectives on reflexivity and their contradictions.

might be made, for example, to collect and present multiple ‘voices’ from a setting or to adopt a textual style that juxtaposes conflicting perspectives. Whatever the specifics, the reflection and ongoing adjustments aim to acknowledge the perspectives and prejudices that come with being present in the field and taking up particular empirical methods. At best, a reflexivity is also something to be incorporated into the writing up and analyses of the field materials so that the analytic sensibilities take into account the processes of re-producing and representing a setting through the written word.

In ubicomp research, there is very little sign of reflexivity reported in the published literature. There is a small trend for ethnographers to situate themselves *vis-à-vis* their fieldwork, perhaps detailing their personal histories with respect to the studied setting [e.g., Wyche et al. 2006] or the analytical lens adopted [Swan et al. 2008]. There is, however, scant reflection on and critical engagement with the research presented in ethnographic works. The criticism of conventional scientific practice implied through such reflexivity is probably seen as beyond ubicomp’s scope. Nevertheless, whether reported or not, an ethnography of any kind should be seen as lacking without at least some reflection on the ethnographer’s part. Thought should be put into how the research is situated with respect to the fieldwork, the participants and the chosen analytical orientation. Such reflection can only help to understand what kinds of things are being gleaned from the research and what sorts of implications the results can have for design.

A second concept, the ethnomethodological *policy of indifference*, relates to this notion of reflexivity. In producing an ethnographic account—that is, going into the field, meeting with participants and applying some kind of theoretical orientation in producing the analysis—the field worker unavoidably takes on an authoritative or privileged status. The ethnographer is, after all, writing on behalf of one or more people. Even when incorporating a reflexive position, there is the implication that the ethnographer’s claims hold a certain importance over and above those he or she is studying; whatever the approach taken, choices are made over what to include and exclude. It is as if the ethnographer is peering into a world from the outside and explaining what he or she sees from that perspective.

It is this problem that the ethnomethodological *policy of indifference* aims to take on. It offers not a solution so much as an alternative perspective from which the ethnographer might approach their fieldwork. The *policy of indifference* is one that prioritizes a setting’s members’ ways of doing and seeing over and above the themes, theories and methods of social science. In adopting the policy, the objective is to reveal just how people, as a matter of course, achieve a recognizable order to their everyday doings. The emphasis is consequently on how members of a setting observably produce their

own order rather than how abstract theories might help to explain and represent social order. In the case of ethnography, the policy of indifference provides a way for a setting's members to be 'heard' over the authoritative voice of the ethnographer [Taylor, Swan and Randall, 2007].

An instructive example is found, again, in Livingstone's [1987] examination of pedestrian traffic flow. Livingstone contrasts two ways of getting to grips with pedestrian's crossing a busy intersection. On the one hand he recounts a sociologist's use of a film camera to record the intersection from above. On the other, he describes the experience of crossing a road, as a pedestrian. The camera's view, he suggests, lends itself to seeing who goes where and what the arrangements of people are. From a manufactured vantage point, as it were, the sociologist thus explains the pedestrian flows in terms of opposing "wedges" that move in "fronts" and are led by "point people". In contrast, the view from eye-level, as a pedestrian, gives access to how road-crossing is accomplished on the ground. As described earlier, from the eye-level perspective, one gleans the moment-by-moment glances and shifts in orientation performed to follow, shift, dodge and eventually get to the other side of the intersection.

What should be evident in this example is that the theory of crossings proposed by the sociologist is not available to the ordinary pedestrian. Pedestrians accomplish the business of road-crossing using just those methods they have to hand; they bring to bear their own 'lay' methods and theories for crossing roads. The policy of indifference, then, gives priority to the methods and theories of those people on the ground, so to speak. It claims an indifference to theories like the sociologist's because they do not reveal how, exactly, roads are crossed.

The legacy of ethnomethodology in ethnographies undertaken in HCI, CSCW and ubicomp has seen at least an implied recognition of the policy of indifference. Works from Tolmie et al. (2002) and Crabtree and Rodden (2004), both based on field studies of domestic life, examine how the orderliness of homes is unavoidably occasioned by the doing of domestic routines. That is, they detail the ways in which the social order of home life is locally accomplished in and through ordinary household routines. The policy of indifference is not, however, commonplace. Especially in ubicomp, a growing number of field studies have seen a closer alignment with the theorizing commonly associated with contemporary anthropology and the social sciences. Recently published work from Bell and Dourish [2007], offers an example. It frames the presence and use of garden sheds in terms of authority, power and gender. The shed, as the authors make clear, is used as a lens to detail how domestic boundaries are drawn between male and female, outside from in, and the migrations of technology between these categories. Thus, the attention is not directed at how the borders of home are routinely and unremarkably produced by its

members. Departing from indifference, the work instead aligns itself with contemporary social and cultural theorizing and situates the home/shed in such discourses.

The point here is not to set reflexivity up against the policy of indifference. What the reader should be aware of is that rather than objectivity, ethnographers use such concepts to grapple with producing written texts that resonate or ring true for their participants. They may not capture all that goes on in a setting and the perspectives of all participants, but at the very least the hope is that they reveal something of the peoples studied and of being in the places those peoples inhabit. Reflexivity and the policy of indifference are thus, in some respects, efforts to overcome the biases of the ethnographer. However, they are based on very different theoretical foundations and produce very different outcomes. Those new to ethnography should have these differences in mind when they review past examples of fieldwork and make choices in their own research.

Analysis

The classical image of ethnography in anthropology portrays the lone ethnographer writing up field notes in his or her tent after a day's observations and interviews with the 'natives'. The serious business of writing articles and monographs then happens once back at the office—the office probably located in some ivy-leafed bastion of academia. How often this happens today or, indeed, whether it happened all that often in the past is debatable.

Whatever the case, in applied areas like ubicomp, an ethnography is far more likely to be part of a larger project in which there are multiple team members, made up probably of social and computer scientists, designers and other interested parties. The collection of data in the field may well involve more than one team member and these members may not be limited to the social scientists. Similarly, the analysis, as already mentioned, is usually done in parallel with the fieldwork and will also often include researchers from a range of backgrounds. The implications of this multi-party analysis for ubicomp will be considered later. Here, the focus will be on two aspects of the analysis, one, data and its influence on analysis and, two, analytic sensibilities in ubicomp.

Data and its influence on analysis

For many, it is probably obvious that the type of fieldwork data collected has an impact on the kinds of analysis that can be conducted. Interview transcripts, for instance, are essentially the accounts participants produce of some past occurrence or possibly thoughts they are willing to express on a particular matter. The analysis of interviews can thus focus on the forms of talk used by the

interviewees or how, in a *post hoc* fashion, interviewees verbally account for themselves and their actions. Analysis that treats interviews as accurate descriptions of occurrences or what an interviewee actually thinks is common. However, this treatment will always be seen as more suspect and thus it is wise to be clear about the assumptions being made.

For reasonably comprehensive overviews of the different data collection methods used in ethnography and the bearing they have on analysis it is worth reviewing popular text books on ethnography such as Hammersly's *Ethnography, Principles in Practice* [1995] or Wolcott's *The Art of Fieldwork* [1995]. One data collection technique worthy of particular attention, here, however is the use of video cameras to record interviews or events in the field. The use of video has been common in ubicomp research as it offers a powerful means of capturing field materials. It allows recordings to be made from multiple perspectives and/or when the researcher is absent. When analyzing data, the recordings can also be watched repeatedly to observe, in detail, some aspect of talk or interaction. Another benefit is that the analysis can more easily involve others who may not have been in the field but who may, nevertheless, have insights to contribute. Indeed, 'data sessions' where video recordings from fieldwork is viewed by groups of researchers are becoming increasingly popular.

There are some issues to keep in mind when using video, however. It should not be forgotten that video recordings provide a certain perspective on a setting. There is the obvious point on perspective to be made here that a video camera's framing of a setting draws attention to some features and misses others. The camera provides a constrained perspective on the world, so to speak. It is also important to remember though that the qualities of video are very likely to influence the analytical perspective in specific ways. For example, because video can be easily replayed and watched in slow motion, it lends itself to detailed analysis and repeated re-watching. So the emphasis is often placed on fine-grained analysis like studying patterns of speech, gestures, or nuanced interactions between people and with things. Moreover, because informants' conversations can be transcribed word for word and the video can be played back to an audience who were not present, video materials are often used to prove an empirical point. The visual and audio information captured and then replayed using video appears to be seen as constituting better or more valid evidence. These issues are not necessarily weaknesses or criticisms of video and its use in ethnographies. The point is that video encourages a particular way of seeing the world and making sense of it. It is not, then, be seen as the panacea for collecting data, but just one of the techniques ethnographers should be willing to use to investigate a setting.

Analytic sensibilities in ubicomp

A second aspect to analysis that deserves some consideration has to do with the analytic sensibility and how it is applied in design-oriented ethnographic field studies. If there is any kind of tradition in applying an analytical sensibility in design-oriented ethnographies it is to offer counter-theses to some of the established topics in ubicomp, topics like context, privacy, and location (aspects of which are discussed in chapters X, X and X). The trend is usually to use fieldwork materials to unpack topics and to illustrate how they cannot be easily abstracted from real-world situations.

Although predating ubicomp and targeted at expert systems design, Suchman's work [1987] is an early but again compelling illustration of this perspective. By investigating people's interactions with a photocopier that had been designed to guide users through copying tasks (using predictive models), Suchman was able to critically reflect on the notion of *plans* that was, at the time, fundamental to Artificial Intelligence (AI). Working within the analytical auspices of ethnomethodology, she revealed how people's interactions with the copier were shaped by the situation at hand. Any initial plans on a user's part could change on a moment-by-moment basis depending on what, exactly, was happening. In short, real-world planning was found to provide a loose structure to an activity, but not to operate in a step-by-step fashion. This contrasted with plans as they were thought of in expert system design and AI. Here, it was assumed human behavior could be broken down into discrete, sequential actions that could be defined *a priori*. This mismatch, Suchman suggested, was at the heart of many of the problems users had in operating the photocopiers. Seeming to establish a tradition, Suchman's empirical work was thus the impetus for a rethinking of a taken for granted aspect of AI, namely planning.

Figure 1. Whereabouts Clock.

A similar critical sensibility is evident in a more recent example of ubicomp research, one involving the deployment and evaluation of a location system called the *Whereabouts Clock* [Brown et al. 2007]. The Whereabouts Clock was designed for domestic use, providing those in a home with a lightweight means of seeing the location of other household members (Fig. 1). A key motivation in designing the Clock was to build on some of the features of a domestic appliance—the functionality was intentionally kept simple, it was physically constructed to be situated in one place in the home, and the display was designed so that it could be seen at a glance (like a clock). Crucially, the location of household members, tracked using their mobile cell phones, was displayed in a coarse-grained way. The display

showed householders at either work, home, or school, and had a region to represent when they were somewhere other than these three locations (Fig. 2).

Figure 2. Whereabouts Clock interface with three specified regions representing work, home and school and middle region for locations other than these.

There are many aspects of the use of the Whereabouts Clock that could be discussed including, for example, those related to appliance design, privacy, context, home life and so on. However, one aspect of its use in the field study raised some particularly relevant questions for ubicomp research. Specifically, the work provoked questions around conventional ideas of location and the way it is commonly thought of as something detected and represented using geographical coordinates. Brown and his colleagues were able to use the fieldwork materials they collected by deploying the Clock to demonstrate how location is reckoned in terms of what one imagines others to be doing in a place. In practice, location was treated more like *location-in-action* and not merely in terms of physical geography. The participants in their study described how places like work, home and school became meaningful in terms of their interactions, their accountabilities and their obligations in those places. When dealing with location, family members appear to construct a mental geography, as it were, that expresses a great deal more than just numerical coordinates.

Examples such as these hopefully demonstrate how ethnographers have sought to develop and think critically about some of the major themes in ubicomp. Overall, it should be apparent that through the application of certain analytic sensibilities, efforts have been made to detail, and in some cases defamiliarize, some of the ideas that underlie a good deal of technological development in the area. An important aspect to this, and one that should be considered in undertaking an ethnography, is the role the analytic sensibility plays. In both of the examples above, it is the sensibility that forms the basis for the critique and enables the research to be formulated as a coherent argument. The art of seeing action as situated, seeing it as bound up in the ordinary affairs of everyday life, informs the sensibility and offers a basis to rethink conventions in ubicomp. They hopefully demonstrate the value of drawing on and applying an analytic sensibility in ubicomp research.

What is it Good For?

So far, the presented materials have offered some background to ethnography and its uptake in design-related areas such as HCI, CSCW and ubicomp. A number of relevant aspects of ethnography as it is practiced in these areas have also been covered. There remain questions, however, about what ethnography is good for and when it should be used over and above the other methods used to inform design. This concluding section will aim to address some of these questions and also discuss how ubicomp research has begun to have its own influence on design-oriented field studies.

Design implications

Design-oriented ethnography provides the methods and techniques used to investigate people's real-world (inter-)actions with technology and also offers a theoretical basis from which to re-examine some of the commonly held assumptions in technical research. The methods and techniques used enable detailed studies of people's *in situ* activities and, as the examples above illustrate, the ethnographic sensibility lends weight to some of the more critical positions taken up and investigated in ubicomp. Are there, though, more immediate results that can be had from an ethnographic field study, offering, perhaps, more explicit implications for design?

This has been a long standing question for practitioners and researchers in HCI and, in recent years, of immediate relevance to those in ubicomp. Various attempts have been made to reconcile ethnography (in its various guises) with the processes and objectives of design. For example, during ethnography's initial uptake, attempts were made to integrate the results from ethnographic fieldwork with the then established (mostly cognitive-based) user modeling schemes (e.g. *Cognitive Work Analysis* [Vicente, 1999]). Efforts were also made to find common ground between the descriptive character of ethnography and the prescriptive aims of design (e.g. *Work-oriented Design* [Bloomberg 1995] and *Patterns of Cooperative Interaction* [Martin et al. 2001]) and, more ambitiously perhaps, alter the practice of systems design itself to be more amenable to the ethnographic enterprise (e.g. *Technomethodology* [Button & Dourish, 1996]). The use of more structured methods for assembling the results of field studies and configuring them to be applied to solving problems have also been proposed. These methods have usually entailed the use of diagrams and schematics of fieldwork materials to be used by teams of practitioners (e.g. *Contextual Design* [Beyer & Holtzblatt 1998]). All in all, the attempts have sought to experiment with the intersections between ethnography and design in order to provide some repeatable way of translating ethnographic results into useful design implications.

Despite these numerous attempts to find a systematic and concrete role for ethnography in systems design, no one proposal has been particularly successful or succeeded in sustaining any long-term interest. Certainly some have seen uptake in different quarters. For example, Beyer and Holtzblatt's *Contextual Inquiry* has found favor in commercial settings where value may be had in gaining a broad picture of organizational patterns rather than revealing detailed features of social interaction and informing system design. There appears, though, no tried and tested means of getting ethnographic materials to yield concrete design requirements. Indeed, it is a running joke in some circles that the design sections of design-oriented ethnographic publications tend to be notoriously weak, succeeding to do little more than suggesting the blindingly obvious when it comes to design.

Somewhat perversely, the practical value of ethnography in areas like ubicomp has been recognized through a growing number of exemplary, design-oriented ethnographic case studies rather than the proposal of any specific approach or method. The main lesson has been that an ethnography, at its best, succeeds in opening up a set of possibilities for design by providing a rich and detailed characterization of some setting and/or people. So rather than being seen as a means of narrowing in on a design, ethnography should be thought of as a way to discover the design spaces and how technological ideas might be subsequently investigated in more detail.

The routes of this idea were proposed early on in HCI by Anderson [1997], an ethnomethodologist who was keen to clarify the role ethnography should have in design. Emphasizing the analytic aspects of ethnographic inquiry, Anderson demonstrated how ethnography “opens up the play of possibilities for design” through its analytic strategies and literary modes of representation. Building on this early position, Dourish [2006] recently criticized how ethnographies have been judged in HCI. He points out that ethnographic studies are commonly measured by their ability to produce field work data as reliable ‘facts’, a criteria operating at the ‘empirical level’. He suggests this misses out on a key feature of ethnography: that much of the work in an ethnography operates at the ‘analytic level’ where the “data are theorized, understood, organized, juxtaposed, interpreted, and presented in order to make an argument that reveals something about the setting under investigation” [p. 548].

What these arguments from Anderson and Dourish illustrate, nicely, is how the analytic sensibility of ethnography has a sound role to play in design and specifically ubicomp. Bringing us back to the beginning of this chapter, both positions reveal that the analytic mindset applied in ethnographic inquiries is not a distraction from the aims of design, but something to be valued and fostered in the process of achieving some vision for design. The specific point worth noting here is that ethnography

should not be treated as one more tool for eliciting design requirements or indeed design implications. By understanding that its value is in opening up the possibilities, ethnography can retain its integrity as an analytic and interpretive enterprise but still have relevance to design.

Future directions

Something hopefully evident in this chapter has been the pliable nature of design-oriented ethnography. In many ways, it can be seen as something that has evolved as its related areas of study have matured. Tracing its trajectory, it contributed to design's turn towards the social and was applied first in the workplace but more recently in domestic and leisure settings, as well as to study those on the go. During these shifts, tensions have arisen over what constitutes ethnography and the kinds of analytical positions that can be incorporated. Ethnomethodology has remained a central influence as an analytical orientation, but a greater impact has been felt in recent years from the social sciences, especially anthropology.

This progress continues unabated. Interestingly, though, ethnography has not just played a contributing role in HCI, CSCW and ubicomp. It has also begun to feel the effects of some of the more progressive developments in these areas. For example, design-oriented ethnographies have begun to use probes to engage with their participants and provoke discussions specifically around issues relating to design [see Boehner et al 2007]. Postcards, diaries and cameras might be packaged (often creatively) to give to participants as probes, alongside conducting interviews and observations. Similarly, technologies might be deployed in the form of probes not to evaluate a design, but, instead, to learn more about the setting under study [e.g. Sellen et al 2006].

On the one hand, this seemingly inconsequential addition to ethnography in design could be seen as simply adding to the various methods ethnographers have to collect data. There are, though, more fundamental implications resulting from the inclusion of probes in an ethnographic study. Whether it is intentional or not, they immediately transform the role of participants. No longer are they the passive object of investigation. They take on the role of commentator or observer in their own practices; the probes become sources of disquiet, provoking one to question the commonsensical and routine in daily life. From the ethnographer's perspective, the probes and this change in role of the participants leads to a reframing of the empirical exercise. The probe takes on an active role, giving shape to if not completely rearranging the participant's practices. The use of probes thus necessitates a degree of reflexivity in the analytic perspective by introducing a new type of dynamism to the studied scene and shifting the authoritative voice of the ethnographer.

Another example of the influence developments in systems design have had on ethnography come from the idea of *critical technical practice*, first proposed in response to the introspective research programs within artificial intelligence [Agre 1997], and relatively recently introduced to HCI and ubicomp by various members of the Culturally Embedded Computing Group at Cornell University. Critical technical practice brings to systems design a recognition of the role technologies play in propounding a set of social values, of interjecting and enforcing particular cultural mores through the ways technologies are designed and used (and theorized). While these ideas have been long discussed in anthropology and sociology [e.g. MacKenzie Wajcman 1999], critical technical practice involves design in the interplay between the social and technical. It proposes a practice where technology designers reflect on their participation in society by propagating some values and counteracting others. This, consequently, attaches a moral dimension to design, forcing designers to be accountable for their choices and, hopefully, taking seriously their own practice.

Design-oriented ethnography has, in some respects, been forced to play catch up with this initiative (though not without controversy, see [Button et al. 2009]). Although, as noted, ethnography seeks a degree of reflexivity in its practice, there has been a lack of introspection around the role design-oriented ethnographies play in interjecting theory or values into design practice. The uptake of a so called 'critical practice' in ubicomp and other areas is encouraging ethnography to re-inspect its position in systems design and, in some cases, re-articulate the kinds of contributions it can offer design (e.g. [Bell et al. 2005; Dourish 2006]).

So ethnography, it seems, has an established place in ubicomp research. Its past and current practice has done much to help contribute to the design and evaluation of technological systems. Broadly, its successes have been in opening up the spaces for design and giving a language through which to imagine new possibilities. It has also played a large part in promoting a deeper engagement with the sites for technology and the impact technological innovations might have on such sites. In practical and theoretical terms, though, ethnography has come to be a practice growing alongside design. Its fluidity, in this sense, is at one and the same time something to be struggled with and celebrated. The ethnographer is continually reminded of the fragility of his or her place in the assemblies of people and things and how the ways of looking are never done, and always to be discovered anew.

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[FIGURE 1]